HEARING RESUMES ON WEDNESDAY 5 SEPTEMBER 2012 AT 9.31 AM

MR MILLS:

Now the Commissioners should have in front of them the witness list for today. I think it's just been placed up there, and that sets out both the parties who, I think, wish to be heard in person or, at least, through their counsel and also the order that's proposed.

JUSTICE COOPER:

Witness list's the wrong word I suppose.

MR MILLS:

I suppose it is actually just an automatic way, just one is accustomed to referring to it that way and it said that way yes but it it is the wrong way to refer to it, so the list of affected parties really.

JUSTICE COOPER:

There won't be any evidence from the bar.

MR MILLS:

No there certainly will not be from me. Shall I begin?

JUSTICE COOPER:

Yes certainly.

MR MILLS:

Now the Commissioners should have in front of them from counsel assisting the closing submissions. Before I turn to those specifically there are just some preliminary points I want to make. The first is that the submissions from counsel assisting are submissions from all three counsel assisting. They have been a collaborative exercise and I want to thank my colleagues for the work they've done on that. It follows from that that the views, the conclusions, the submissions really, the key submissions in here, are shared views that counsel assisting have come to. Mr Elliott will also, in his capacity as counsel

appointed to represent the interests of the families of the bereaved, will make a separate submission, as you know, at the end of this closing session. The next thing I just want to go to briefly, which is in the written submission, is at paragraph 34 – I don't think you really need to turn to it – but I just want to emphasise what the role of counsel assisting is here so that everyone's well aware of it and, as I've said in paragraph 34 of the written submission, so that there's no confusion over this at this stage of the enquiry, it needs to be emphasised that the submissions of counsel assisting are no more than that. They set out the views that counsel assisting have reached on the evidence, however, they play no greater role in the enquiry than this. It is entirely a matter for the Royal Commission itself as to whether the submissions that I'm about to deliver are accepted or rejected either in whole or in part. The final decisions are within the terms of reference, of course, solely within the province of the Royal Commission and the three Commissioners.

Now the other preliminary point I just want to touch on is that since preparing these submissions, of course, we have received in the last 36 hours or so submissions from other parties and there are a few points that I will want to deal with related to that. Some of them I'll pick up as I go through the written submissions or speak to them but some I will go through at the end with your leave just touching on points that I think need to be made. It is not extensive but there are some additional points that need to be made to save any need for a reply at the end of it.

Let me then just explain and outline the way in which I intend to deal with the written submissions. First of all, as the Commissioners will have seen if they've looked at this beforehand, there are extensive transcript references footnoted throughout the written submissions. In some cases sections from the transcript have actually been set out in the written submission but, generally, it's a statement of fact with a transcript reference connected to it. I don't intend to go to those. They are for reference. If at any point any of the Commissioners want to have those transcript references brought up that can be done.

Secondly, the structure of the written submissions, the first 23 paragraphs which I will largely read verbatim in a moment or two, largely summarise the key submissions, the key conclusions that will be developed through the body

of the closing. After dealing with that the structure of the closing submission is that it then turns to what is described as the design issues related to the CTV building and that section of the closing is intended to try to answer the three principle issues that the Royal Commission is required to address under it's terms of reference. The first one, of course, is why did the CTV building fail as severely as it did. The second one, and I'm paraphrasing the terms of reference, the second one is why it was that the CTV building collapsed so totally when no other building in Christchurch did. The third one is whether the CTV building met legal and best practice requirements when it was designed and built in 1986. In order to answer these questions, or at least to put forward counsel assisting's view on how they should be answered, that section on the design issues looks at the following points.

The first one is who made the decision that the CTV building would have its principle shear core located outside the main frame of the building and, of course, that's an issue that has attracted quite a lot of attention in various ways because of the effect that had on the performance of the building. So that's the first issue that gets looked at.

The second one is who made the decision that the building would be a shear core protected gravity load system, to use that term that has now obtained some currency.

The third point that gets considered under the design issues heading is whether David Harding was competent to be given and to assume responsibilities for the building design and there will be a careful examination of the errors Mr Harding made or at least the errors that I'll be submitting Mr Harding made in his structural design work. Now if David Harding or Mr Harding was not competent to undertake this work, and the submission that will be made is that he was not competent to undertake this work, then there's an issue about whether there was a connection between the areas where his incompetence carried through into design errors in that building. Was there a connection between any of those and the collapse of the building on 22 February? That gets considered.

Then there's the question of Dr Reay's involvement in all of this and the part of the submissions that I'll be turning to will ask how it was if Mr Harding was working beyond his level of competence, as I'll be submitting he was, how

was it that Dr Reay considered it to be appropriate to give him the responsibility for the structural design of the CTV building. So that's, in broad terms, the range of issues that I'll be dealing with under that topic of the design issues.

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Then, and this part got a little out of order in the final putting together of the closing submissions but I'll move it around as I go, the next part of my submissions will deal with the collapse series that have been put forward by Dr Reay and witnesses called on his behalf during the course of the hearing and as the Commissioners will probably recall Dr Reay himself proffered five collapse scenarios. Four more emerged during the course of the evidence and, again, I imagine the Commissioners will recall this. The first one was the, a claim that the building had been weakened by holes drilled in the concrete beams. The next was the issue about the internal staircase that was put in for CTV in 2000 and whether that had adversely affected the building's ability to transfer loads into the south coupled shear wall. The third one that I recall was the issue about whether the Council had properly exercised its change of use powers when Going Places went into occupancy in 2001 and then there was the issue over concrete strength and whether that was under-strength and whether that had played a role in the collapse of the building. So I'll deal relatively briefly with those, what I've described as collapse scenarios.

After the written submissions deal with that they then deal with the issue of the building permit in 1986 by the Christchurch City Council and whether that permit should have been issued, or whether the building was non-compliant and the permit should not have been issued and the submission I'll be making is that the building was not compliant with the relevant bylaw at the time that the building permit was issued, and the related but distinct question of whether areas of non-compliance ought to have been picked up by a reviewing engineer. The submission you'll hear from me on that is that at least two and possibly more of the non-compliant areas, at least what I'll be submitting were non-compliant areas, ought to have been identified by a reviewing Council engineer and one of them was. My submission will be, that Mr Tapper, as the reviewing engineer at the time, did pick up the issue with the diaphragm, floor diaphragm north shear core connection, whether he fully

appreciated the nature of the issues we don't know but, in my submission that I'll be making, Mr Tapper did in fact pick up in that letter of the 27th of August at issue about the diaphragm connection.

Now on this issue of whether the building was non-compliant with the applicable Christchurch bylaw at the time the permit was issued, as the Commissioners will be aware the extent of non-compliance does depend on the, how one interprets the provisions of the two relevant codes that applied at the time, 3101:1982 and 4203:1984 and how one interprets the bylaw and I'll be dealing with that but the, again as the Commissioners are aware, the big issue in that is whether the building was entitled to be designed as it was principally as a non-ductile building with the exception of the two shear cores, or the two shear walls, the shear core and the shear wall, or whether it could be designed. It had to be designed to comply with the ductility requirements of the code. That's really the issue that underpins at least some of the issues about was it compliant or was it not, and in relation to that the submission I'll be making to you is that ultimately that issue is to be determined by reference to bylaw 105 which gave legal effect in Christchurch to some aspects of the two relevant standards, 3101 and 4203, and not by reference to those two standards and if there is a conflict between any of the provisions in those standards and the bylaw, then because the bylaw has legal effect and the two standards do not in Christchurch, at least not at that time, then it is the bylaw that prevails and I will be taking the Commissioners through how I say the question of interpretation should be approached. I don't propose to deal in close detail with the very detailed provisions that are referred to in the submissions themselves. I will endeavour to navigate that in a way that enables the Commissioners to see how that argument has developed by counsel assisting and the fine detail I think is adequately set out and the Commissioners will be able to follow that but I will take you through it and explain the underpinning for the argument that it's bylaw number 105 and how the interpretation of these provisions should be approached in our view. Now I'm well aware that the Commissioners have heard some sharply divergent views on how to interpret the provisions in the two standards and also some views on the bylaw and ultimately of course that's a matter on which you will form your own view.

The final three sections of the submission deal first with the building assessments that were done both after the 4th of September and also after Boxing Day and then look at the construction issues, the work carried out by Williams Construction and subsequently by Union Construction. It does seem clear, and I'll develop this point, that there were construction defects and at least one of them has some real significance and that's the failure to roughen the connections between the in situ and precast concrete and that part of the submissions will look at the evidence that we've received that might explain why that happened and what the issues are that we need to be aware of that might lead to some wider implications.

Finally, the submissions deal with the question of the discovery in 1990 by Holmes Consulting Group of what at least in current terms would be described as a critical structural weakness. That of course, as the Commissioners know, was the dangerously inadequate connection between the north shear core and the floor diaphragms, an issue that was discovered entirely fortuitously because the Canterbury Regional Council asked for due diligence to be carried out on that building and in evidence both Dr Reay and Mr Banks accepted that this issue was probably the one that Mr Tapper had been referring to when he noted the diaphragm issue in his 27 August 1986 letter to Alan Reay's firm. Now the issues around that do raise in my submission some important questions about the effectiveness of the regulatory processes in place in Christchurch at that time and also the issues around the duty that a structural engineer who discovers a critical structural weakness has in relation to that knowledge and, at the present time, as we heard, to a large extent it seems to be governed, at least within the profession, by the IPENZ Ethical Rules and the issues around the 1990/1991 retrofit events do raise some serious issues, I think, about whether the current regime is adequate and I'll be dealing with that in further detail as I go through the submissions.

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Unless there's any questions about any of that I'm now going to go to the submissions themselves at the first paragraph. Now just bear with me while I read this initial part because I think it's the best way to deal with it.

In opening submissions delivered on 25 June 2012 the tragic consequences of the CTV Building collapse on 22 February 2011 were outlined and the

evidence the Royal Commission could expect to hear was foreshadowed. This included the evidence of survivors and eye witnesses to that collapse. In the course of this hearing the Royal Commission has heard and witnessed first hand the searing memories that are still carried by many people.

Evidence given by the occupants who survived was able to provide an account of damage observed after the September earthquake and the Boxing Day aftershock. This information has contributed to an understanding of the various collapse scenarios and to the post-earthquake assessments of the Building and I do just pause to say that it clearly took a toll on some of the people who came to give evidence on those issues and I'm sure we're all grateful.

One of the purposes of this hearing into the CTV Building collapse has been to enable the families and individuals directly affected by this tragic event to at least understand what led up to this collapse, as well as what happened on the day. Beyond this the principal purpose is to enable the Royal Commission to reach conclusions about the causes and make recommendations that will reduce the likelihood of such an event in the future.

Now, in my submission, what has become apparent in the course of this hearing is that much more is involved in the collapse of the CTV Building than the single event that occurred on 22 February 2011.

Paragraph 5 I then refer to the various questions really that I posed in opening the case for counsel assisting, that it was anticipated and, I suppose, hoped that in the course of the evidence the Royal Commission would hear, the evidence would enable a conclusion to be reached or an answer to be given in relation to each of these 21 questions that I've set out in paragraph 5. I just touch on them briefly.

The first one – what was the origin of the CTV Building design and, in particular, this issue about the location of the North Shear Core.

Secondly, how did the structural design work come into Dr Reay's firm and who had the principal design role within that firm?

Then over the page, if it was, as at that point seemed likely and as we now know is a fact, the principal structural designer was Mr David Harding, did he have the necessary experience and competence to carry out this work? If he did not, did that lack of competence contribute in any way to the collapse?

Next question that was posed was if Mr Harding didn't have the level of experience or the competence without supervision, was he given an appropriate level of supervision by Dr Reay's firm and, if he was not, did Dr Reay act responsibly in giving the principal design role to Mr Harding?

Next point that was posed was if, as at that time seemed likely, the design template that Mr Harding relied on in his design work for the CTV building was the Landsborough House calculations and the ETABS input/output data that Mr John Henry had done for Landsborough House, who made the decision that this was an appropriate template?

Next question that was posed was in using that data did Mr Harding fall into error, either through a lack of experience or competence, or both, in interpreting the material that he produced through the ETABS analysis and through his review of the calculations that Mr Henry had done for the Landsborough House and, in particular, as again seemed possible at that point, did he fail to accurately calculate the inter-storey drifts that could be expected from the CTV Building.

And, again, the question of if he did fail to adequately calculate those inter-storey drifts that the building might face in an earthquake did that have a causal connection to what happened on the 22nd of February.

Then there was the question about the issuing of the permit by the Christchurch City Council and whether it should have been issued.

Then the related issue of whether the non-compliance ought to have been picked up by the Council Reviewing Engineer.

And, related to that, an issue that I will be developing carefully in the course of these submissions, how it was that despite identifying issues in that letter of 27 August Mr Tapper ultimately signed off on the structural design for the building permit. What had happened there? Was it because Dr Reay had intervened in the process?

Then I had identified the issue, this is on page 3 of the written submissions, I then identified the question of construction defects, were there any? How did they come about?

And related to that was there a problem with the inspections that were carried out by the Council, by Mr Harding, as the Supervising Engineer, and also by the foreman on the site that might explain what had happened here.

Then the drag bar issue, that was identified as an issue that would have to be asked and answered.

Related to that we knew that a building permit had not been sought for the retrofit involved in installing the drag bars. The Council has said it should have been and I think it clearly should have been on my reading of the relevant by-law provisions.

And in the opening the question of why wasn't a building permit sought was asked and I think, in the course of the hearing, there's a related question that has emerged and that is what difference might it have made to the course of events if a building permit had been sought in relation to the drag bar retrofit and I'll make some comments on that as I go along.

Then there was the change of use issue.

The post earthquake assessments.

And the question of under-strength concrete.

Then over on page 44, finally, this question about the high vertical forces that the building was subjected to on 22 February and whether that really is the cause so that irrespective of any other issues that might have existed with the building that it would have come down no matter what.

Now I then say at paragraph 6 that in the course of the hearing a further and even more critical question has emerged, which I had not foreshadowed in the opening, and that is whether Mr Harding had the knowledge and skill required to detail the precast and in situ structural components so that the building as a whole was capable of transferring gravity loads and seismic forces into the foundations of the building. The Commissioners will be well aware, better aware of that than I am, of the fact that there is intended to be a pathway through structures which will ultimately transfer the seismic forces to which the building is being subjected down through that pathway in the building and out of the building into the foundations and, ultimately, back into the ground and I think an issue has arisen during the course of the evidence, as a result of questions that were asked and answered of various witnesses, or more specifically Mr Harding I think as to whether he adequately understood this need for a pathway of this kind and whether a failure to adequately understand and design for that might be the critical issue that led to the 22 February collapse. And I've referred in paragraph 6 to a section from the

transcript which I'll just read out because it relates directly to this, which was an answer given by Dr Reay in the course of his evidence, a question put to him in cross-examination about the deficiencies in the building and he said, *"The particular issues that I've mentioned, the first one is the potential issue of the connection of the floor diaphragm to the walls where there appears to have been an omission which was rectified in 1991.*

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This is simply not following through load paths which is a fundamental part of structural engineering." Now I'm not suggesting that this issue about load paths is limited to the specific question that he was asked and answered there about the diaphragm shear core connections but this point that he acknowledges about following through load paths being a fundamental part of structural engineering I think is a real issue that's emerged in the course of the hearing as to whether, in this case, Mr Harding adequately appreciated and designed for that.

I then touch on an issue, which I've already mentioned in the course of my preliminary comments so I won't repeat it, in paragraph 7 about this issue of code compliance and the over-arching issue of did the building have to be designed for ductility or could it be designed for the non-ductile requirements of the code and I'll deal with that later.

But what I do think is an issue, and I've mentioned this in paragraph 8, is that irrespective of what the view is that's ultimately formed about that issue of how the ductile and the non-ductile provisions of the codes work and the bylaw it is of itself in my submission a matter of serious concern that on such a significant issue there appeared to be a debate going on amongst highly qualified structural engineers that the Commission heard from, and it reflects, I think, the inadequacies, I don't think that's putting it too strongly, of some aspects of the drafting which enabled this debate to occur but then underpinning that, and I think the Commission heard this, for one, from Dr Murray Jacobs, it reflected a different view of the wider design philosophies that structural engineers ought to be bringing to their reading of the potentially black letter words of the codes and the issue of to what extent did one design to the edge, to what extent did one need to have and apply a deep understanding of the way in which structural designs need to be done

irrespective of how one might be able to find some wording in the code that would enable one view or another to be held. But the presence of that debate certainly to us as counsel was a matter of concern – that on what seemed to be such a fundamental issue we were hearing these divergences of view about what the code required.

Paragraph 9, just on this question of other suggested causes of the collapse, I just mention that Dr Reay and Professor Mander suggested a number of collapse possibilities and I've set those out just in summary form on page 5 of the written submission and again this will all be familiar territory but for the sake of others who may be listening to this here and overseas Dr Reay mentioned the issue or raised the issue of strain hardening, vertical acceleration, the lateral load resistance at the south wall and the building modification issues that I've touched on already, the drilling of holes, the memorable evidence of Mr Morris and the installation of the internal staircase, understrength concrete and the question of cumulative damage from the various aftershocks –

JUSTICE COOPER:

This reference to understrength concrete, Dr Reay wasn't saying it was understrength.

MR MILLS:

No he was, I'm sorry it's expressed in the wrong way, he was saying it was, it had been treated by DBH as understrength, at least that was his complaint as I understood it. They were saying it was –

JUSTICE COOPER:

Yes it's just that you're here addressing collapse possibilities said to have been raised by Dr Reay and –

MR MILLS:

Yes.

JUSTICE COOPER:

– Professor Mander so I wonder whether that –

MR MILLS:

I think it probably is rather poorly worded Your Honour.

JUSTICE COOPER:

Well it probably shouldn't be there should it.

MR MILLS:

Well the issue of concrete strength, is probably what it should say, was raised by Dr Reay as an issue in relation to collapse.

JUSTICE COOPER:

Well to reject.

MR MILLS:

Yes. Yes.

JUSTICE COOPER:

Right.

MR MILLS:

So it probably should just say as an issue, concrete strength, question mark, I suppose. Then Professor Mander he raised the issue of this Euler buckling as a potential collapse scenario which as I understand it was a theory that related to the overload effects arising from extremely high vertical ground motions which in Dr Mander's view may have promoted a deteriorated beam column joint. So all of those issues were raised.

Then as I've said in point (b) on page 5 there were further issues that emerged during the course of cross-examination by counsel for Dr Reay and for his firm and that suggested various other things that might have contributed, and there's three of them listed there.

The first one was essentially that the Council should have picked up any deficiencies in the building at the permitting stage and that the responsibility for ensuring compliance with bylaw 105 in the code lay with the Council, shouldn't have issued a building consent that didn't comply and related to that the contention that Dr Reay and his firm were entitled to assume that the building was code compliant because it had been consented.

I think it was also being suggested by counsel for Dr Reay and his firm that the Christchurch City Council also carried some responsibility for the collapse because it didn't exercise its change of use powers properly in relation to Going Places occupancy.

And then, finally, and this came up right at the end of the evidentiary stage of the hearing, the proposition that Holmes Consulting Group deflected Dr Reay's firm from carrying out a more rigorous structural analysis of the building because of the statement contained in the Holmes Consulting Group January 1990 report that referred, and I've set the passage out there, referred to the building generally complying with current design loading and materials codes. I imagine the Commissioners will recall that it's been suggested that that, I think it's fair to say, deflected a more rigorous enquiry after this fundamental problem was identified in the building.

Turning then to paragraph 10. In my submission at any rate at the end of this lengthy hearing process we've had, nearly eight weeks, approximately, well more than 80 witnesses that the Commission has heard from, in my submission the evidence is now there to enable a clear understanding of what went wrong here, if I can put it that way, through from the initial design to the collapse.

I think conclusions can be reached on the critical failings and the responsibility for those failings and I think the evidence also allows important conclusions to be reached about lessons for the future.

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Having said that there remains I think, inevitably, uncertainty about what it was that was the initial trigger for the collapse sequence, as the Commissioners know. The DBH report set out various possibilities for that but didn't reach a final view on which was the principal initiator, and the view at least that counsel assisting have taken, is that it's not necessary for the

Royal Commission to reach a final view on that. What is clear is that there are a number of possibilities. The most recent time history analysis, it was run at the direction of the Commission, showed potentially split second differences between this weakness in the building triggering the collapse, and this one triggering it, and so in my submission any rate, the exercise of trying to identify with certainty which one it was is unnecessary and not possible on the evidence that is available. And as the Commission will hear from counsel for Dr Reay and his firm, in their closing submission, yet another theory has been raised about what might have been the probable cause, and that will be dealt with in due course. But there are a number of candidates and I have not, counsel assisting have not, thought it necessary nor is it possible to say that's the one.

As I say at paragraph 11, in my submission what the evidence has revealed are failings and weaknesses at a number of levels. This includes the Christchurch City Council regulatory processes that were in place at the time and the inadequacies of the post earthquake assessment processes carried out by the Council. However, in my submission, the principal and critical failings occurred during the structural design work carried out by Dr Reay's firm. For this both Mr Harding and Dr Reay must carry the responsibility. The decisions that they made about the structural design of the building are, in my submission, the primary cause of the building's collapse. In critical respects the building they designed was not code compliant and was dangerously vulnerable to any earthquake that took the building any distance beyond its elastic response state and into the inelastic range. There was, in my submission, either no or an inadequate margin of safety provided for in the event that this occurred.

In the course of his evidence Dr Reay finally publically acknowledged that his firm was responsible for any failings in the work carried out by Mr Harding. You will hear when you hear closing from counsel for Dr Reay and his firm, there's a challenge to the way I put this but I'm perfectly content with the way it's put. I then go on to say that this is to acknowledge no more than the legal position, because of course an employer is responsible for the actions of its employee acting within the scope of employment. It is my submission and the submission of my other counsel assisting that the responsibility of Dr Reay is

more fundamental than this. It was his decision to give Mr David Harding virtually the sole responsibility for carrying out the structural design for the CTV Building, and in my submission that was done in circumstances where Mr Harding on any objective view was not competent to be given this level of sole responsibility. Dr Reay then made a deliberate decision not to provide no active supervision or mentoring for Mr Harding and in his own words in the course of evidence, to leave it to Mr Harding to tell him, to tell Dr Reay if he thought that he required some assistance. It's quite clear on the evidence and it's accepted. In the closing you'll hear, I think, from Dr Reay's counsel that that is the way it proceeded.

Now it is my submission that in doing that Mr Harding didn't comply with the IPENZ ethical requirement in that he did act outside his area of competence. One of the lessons that I think can be learned from what's occurred here is that both the IPENZ rule that applied in 1986, and the one that applies currently, which essentially leave it to the engineer involved to determine whether they are working outside their level of competence, is inadequate because for the obvious reason that one doesn't know what one doesn't know and as I think we saw when we saw Mr Harding give evidence, where one accepts the limits of one's competence are is very dependent upon the personality that is involved and an overly confident person about their competence is going to push that line out, potentially as I think happened here, beyond the point where it should've been. And of course this raises a wider issue that I know that the Commission is looking at about whether there ought to be some greater formality about the qualifications to design complex buildings.

As I say in paragraph 14, it is submitted that what has emerged from this hearing is that Mr Harding was not competent to take the principal responsibility for the CTV Building design and Dr Reay ought to have recognised that. There was then a serious failure by Dr Reay to provide the supervision that Mr Harding required.

Now I say at paragraph 15 that in my submission it has also emerged during the course of the hearing that Dr Reay himself, despite his obvious expertise in certain types of building work, had insufficient experience and competence himself in the design of complex multi-storey structures. And that leads me to

make the submission that after Mr John Henry left the firm, he being the one who had brought into the firm the expertise to design buildings, complex multi-level buildings, that the CTV brief ought to have been turned away. Dr Reay has said in his evidence that if Mr Harding had said he couldn't do it, that's what would have happened, but my submission in summary is that it was apparent, ought to have been apparent that the expertise did not any longer reside in the firm after Mr Henry left and that brief to do the CTV building should have been turned away.

On this question of Dr Reay's own levels of expertise to supervise and take some responsibility for this building, as I say at paragraph 16, he repeatedly made the claim that Mr Harding was better qualified to undertake the CTV design than he would have been because of his greater understanding of the Concrete Code and it was also the basis for a line of cross-examination of Dr O'Leary by my friend Mr Palmer, that Mr Harding was more experienced. It was also on display in Dr Reay's answer to Mr Elliott when Mr Elliott asked him to look at the drawings for the CTV building and identify the areas he thought were unsatisfactory. As the Commissioners may recall he identified only two – one was the connection to the north shear core but the other was the failure of the contractors to build the reinforcing spirals shown on the column drawings so that they went up through the beam-column joint.

Now in my submission Dr Reay was obviously right on the first point, although he was only referring to the drag bar issue and not the more fundamental design problems with the north shear core that have emerged in the course of the hearing. But the second issue, in my submission and there will be Commissioners who will better judge of this, that was only a minor issue and there were considerably more significant issues with that building that were not identified in response to that question from Mr Elliott.

So in conclusion really, at paragraph 18 I say that the result of all of this, and the decisions that were made about who would take responsibility and how that would be dealt with, how it would or would not be supervised, and essentially the latter, would not be supervised.

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The result was a building with numerous design defects that was not compliant with Bylaw 105, nor with the applicable Code provisions, and which

as a result it was extremely vulnerable when it was struck by the very strong earthquake forces on the 22nd of February. There is no question those forces were very strong but the building was also very vulnerable because of those designed defects.

And I really make the same point in paragraph 19, that while the forces to which the CTV building was subjected on that day were well above the design level earthquake, the vulnerabilities of the building that resulted from the structural design do not cease to be critical structural weaknesses simply because of the high vertical forces in particular but the high forces generally that occurred on that day. The CTV building is the only building in Christchurch, designed to the 1982 and 1984 codes, that suffered such a complete and catastrophic collapse and adopting the words that have been used by some of the engineers that have given evidence, earthquakes search out the weaknesses in structures and there were a number of critical structural weaknesses in this building which the earthquake found. And I then touch again on this question of the collapse sequence. I won't repeat that, but I just say at the end of paragraph 19, that a separation of the floor diaphragm from the north shear core continues to feature as a strong possibility and that most recent non-linear time history analysis that the Commission directed does give some support to that but it remains no more than one of several collapse candidates. Just on –

JUSTICE COOPER:

This is the initiating event issue again.

MR MILLS:

I mean the initiating event, yes. Now just on that question of the, could that have been the initiating event, Commissioners will recall that in the BDH consultant's report one of the factors that, I think particular, Dr Hyland relied on in resisting I think it is fair to say, that that could have been the initiating event was a photograph, a very graphic photograph which I am sure we all remember of the north core standing with the floor diaphragms angled against

it after the collapse had occurred and Dr Hyland's view as I recall it was that that photograph was really, made it unlikely that the collapse events were initiated by the detachment of the floors from that north core.

And I just mentioned in paragraph 21, evidence of Mr William Holmes, the Commissions' peer reviewer, expert peer reviewer, what he said on this because he had a view of that photograph that did accommodate the possibility that that was where the collapse events initiated and I have just set them out there in paragraph 21 A and B, I don't think I need to read them but he did put forward what seemed a credible alternative interpretation of those photographs which did certainly leave wide open the possibility that that is where it was initiated.

JUSTICE COOPER:

This issue of an initiating cause is one inquiry that I suppose could be made although I don't see it is requisite under the terms of reference as they are applied to the facts but is there any evidence from anyone which suggests that if one candidate initiating cause had not in fact been the initiating cause, the building would not have collapsed.

MR MILLS:

I am not aware of any evidence of that effect and indeed my reading of time history analysis evidence is that there were several events, any one of which would have triggered a chain reaction rather like setting off the first cracker in a line of connected crackers on Guy Fawkes Day which I still recall doing and one would very rapidly lead to another and if you lit it in the middle they would just go, it would connect up any rate.

JUSTICE COOPER:

So depending on one's view of the evidence, one could perhaps arrive at the point where there are a number of potential initiating causes?

MR MILLS:

Yes.

JUSTICE COOPER:

Or events, all of which in whatever sequence could have lead to the collapse of the building?

MR MILLS:

Yes.

JUSTICE COOPER:

And I suppose that is a criticism that might be made of the design, that there are various candidates which –

MR MILLS:

Yeah, well that is essentially where we've arrived at in our submissions that there were a number of serious structural weaknesses in the design of this building and effectively if it wasn't that one that led to the collapse it was this one, and we've heard as you are well aware, world leading figures in the structural engineering field who have disagreed with each other: Dr Priestley with his view that it would have been internal columns that would have been the initiating events on the lower floors; Dr Hyland and Mr Ashley Smith that it was the columns on line F that would have given way; Dr Priestley had good reasons really as to why he thought that wouldn't be the case, but so on it goes but what there was a lot of agreement on, including in the end from Professor Mander who was called to give evidence on behalf of Dr Reay and his firm. There were a significant number of problems with the design of this building and whether – in some cases a view wasn't expressed on whether those problems went as far as being non-compliant with code but there was a very large level of agreement as I read the evidence that this was a troubled building. One of those issues appears to have emerged from the construction, this issue about the smooth ends of the concrete and the lack of bonding that that would have created. Possibly also the issue I will come to about that photograph of the bent over connecting steel on that beam that went into the side of the north wall, the north shear core but fundamentally design issues that came from the work that Mr Harding did and came out of Dr Reay's office. So, of course it would be very satisfying to be able to say

unequivocally that is where the collapse initiated but in terms of answering the question that the Royal Commission has to answer under its terms of reference about why did the building collapse? That is not a question in my view that says tell us what was the single event that started the collapse. The answer to the why, is much more than that and it goes – which is why, both in the way that the hearing was structured and the way in which I am dealing with it now, it begins with the decisions that were made around the design and the responsibility that was allocated but it continues on. There are steps along the way all of which are playing a role in answering why. It includes the permit, it includes the decisions are the drag bar, it includes the decision not to apply for a permit for the drag bars. There are a lot of components to the answering of why.

JUSTICE COOPER:

Thank you.

MR MILLS:

Well that's the part I wanted to take the Commission through pretty much as it is written and I will now turn to some other issues. The next one in terms of the order of the written submissions and perhaps I should just touch on this very briefly, is this question of forensic preservation of the building debris which is in part caught up in the question that you were just asking Sir, and of course we heard from Professor Robin Shepherd who was called by Alan Reay's lawyers and I think the two things really is all I want to say about this.

1030

The first is that of course it would have been desirable to have had much more forensic control over the collapse debris than materialise but the reality is, as I have said in paragraph 24, and as Professor Shepherd accepted, that the police had to deal with the rescue and recovery process as a priority and there were consequences from that which were not compatible with the perfect forensic control of the site, so no particular criticism of that ordering of priority as it was made.

On the other hand – we have heard from Mr Frost and from Dr Heywood and I think there the work that they did, really the outstanding work that they did,

just volunteering their efforts while they were on site for other purposes shows that it would have been possible to have had better forensic control of that site than in fact occurred. And we were very lucky to have them do what they did because it has advanced an understanding of the issues. We didn't hear in person from Mr Trowsdale but I should include him in the list of people for whom we should be grateful that they put their shoulder to the wheel on this and went well beyond what they were required to do under what they were currently employed to do on that site.

Now the principle thing I think coming out of that brief reference which I touch on in paragraphs 29 and 30, is the evidence that Professor Shepherd gave about efforts in the USA to standardise best practice for structural failure investigations and he referred to guidelines that had been produced and I simply make the submission at paragraph 30, urge on the Royal Commission that there be a recommendation that such guidelines be developed in New Zealand. It should be investigated by the Ministry of Building Industry and Enterprise. I think we can do better than was done on the site and that included better control of debris that was dispersed and taken away. There was not the level of forensic control that could have occurred even with the priorities of rescue and recovery.

At paragraph 31 I have again set out the key terms of reference for the Commission. I am not going to go through them they were set out in the opening but I have set them out again of course because that is the jurisdiction of the Royal Commission and then I just want to pick up a couple of points about that at paragraphs 33 and 34.

At paragraph 33 I say this. It would not be surprising if some of the evidence that has emerged in the course of this hearing has triggered a strong reaction from some of the families of the bereaved. Much of the evidence must have been hard to bear. However, it is not within the jurisdiction of the Royal Commission to inquire into, determine or report on, any questions of liability. However, at least in my submission, this does not foreclose an inquiry into, or a determination of, errors or failings in design, inspection, permitting or construction that might have contributed to or cause the collapse of the CTV building and the consequent deaths and injuries. And that is certainly the

submission you will hear from me, it will address these issues and urge on the Royal Commission the conclusions that counsel assisting should be drawn.

JUSTICE COOPER:

Now that list of errors or failings in design inspection, permitting and construction, you would say – or is it your submission that must also include the reasons for those things?

MR MILLS:

Yes it absolutely must include the reasons because unless we know the reasons there can't be intelligent decisions made about how to avoid this in the future. The other thing I do say is that the question of liability. Liability is a legal term of art, it means legal liability. It is not foreclosing an inquiry as Your Honour just said into what happened, why did it happen, where were the failings that led to this because it is only by looking at those issues that one can draw sensible conclusions which is what the terms of reference ultimately require from the Commission.

I turn then to the design issues and I'll sort of henpeck my way through this I suppose to save time.

First of all the issue of the design layout. So we are going to just deal now with the origins of the basic layout of the building and I think it is now pretty clear and indeed I think it is entirely clear as to what happened here. We know it was a design-build project and Mr Brooks described it as a standard kind of speculative deal and I mention that because I think it is relevant to put this building into the context of what was the property boom in New Zealand in the 1980s. A shift from major buildings being built mainly by institutional owners, long-term holders to an era where buildings were being put up by – on a speculative basis and by developers who did not intend to be long-term holders and I think this is the context in which this emerges and I think it is relevant in some aspects of what has occurred here. The evidence was that the origins of this building came from a proposal that Mr Brooks had presented to Mr Neal Blair of Prime West, Mr Brooks said that he knew Mr Blair, he saw there was an empty site there. He came up with this idea and he took it to Mr Blair. The proposal that Mr Brooks put to Mr Blair was

accepted and Mr Brooks told us that from the outset it included a floor plate very similar to the final design and Mr Brooks was the one who had sketched that floorplan out with the north shear wall sitting outside the main frame of the building and he said in evidence the purpose of that was to give more rentable space.

As far as Prime West was concerned Mr Brooks said that the building was to cost as little as possible, subject to its achieving the intended function and having a reasonable appearance.

I turn then to paragraph 37 and the question of the engagement of Mr Wilkie as the architect for the project. And it appears that Mr Wilkie was the first of the, thinking of a generic term here, was the first of the consultants engaged for this work. He was engaged before Dr Reay's firm was brought in on it. I think that is clear and not disputed on the evidence. Mr Scott who gave most of the evidence on this aspect of it, said that he ran some numbers on the basic floor plate which Mr Brooks had sketched out and then he went to Mr Wilkie and asked him to draw off some preliminary architectural plans and I have said at paragraph 38 that his evidence was essentially consistent with Mr Brooks, that the shape of the building had been really decided before Mr Wilkie was asked to get involved and Mr Scott said that his recollection was that after their – Mr Wilkie had been engaged, there was a meeting which involved Neal Blair, Alan Wilkie, Michael Brooks and Mr Scott and he also said that the practice of Williams Construction was generally to first engage the architect and he said that the shape of that building was essentially locked in or confirmed I think was his terminology at that initial meeting. This is all before Dr Reay and his firm become involved.

1040

Now, both Mr Scott and Mr Wilkie referred to those initial architectural plans as being at least A2. The only reason I mention that is that the scale of the plans does have relevance in my submission to what Dr Reay was likely to have seen at the initial meeting that he had with Michael Brooks and Tony Scott. At least that's what appears to have been the membership at that meeting, and that meeting seems likely to be in February 1986. Now I've looked at the closing submissions from my friend for Dr Reay and his firm and while initially there was uncertainly around Dr Reay's involvement at this point

I think you will hear that it's not disputed now that there was an initial meeting and Dr Reay was at it.

It's also I think not disputed that the, some of the features, some of the design features of the building came from the Contours building which had also been designed by Mr Wilkie and in particular the relatively small, round columns that have attracted a lot of attention from the structural evidence in this hearing, that came from the Contours building. Mr Scott said that he thought Mr Blair wanted that, he liked that aspect of the Contours building and so it was done here.

Now in paragraph 41 I deal with an issue that, just briefly, that did attract some dispute in the evidence but I don't think it's there anymore and that is what decisions had been made about elements of the building before Mr Harding became involved and who made those decisions and I think Mr Harding, I think I probably touch on this later on, but I think Mr Harding was saying, well Dr Reay had made these decisions, and this is things like the use of the Hibond, the shape of the columns and things of that kind. I think it's clear that those decisions were not made by Dr Reay. They were made by Williams Construction and by Mr Wilkie and to some extent possibly by Mr Blair before this design was brought in to Dr Reay's firm. And I mention the Hibond particularly at paragraph 41. Mr Wilkie is saying that he thought that would have been a costing decision that would have been made by the contractor or the engineer.

I turn next to the engagement of Dr Reay's firm and I'm at paragraph 42 of the written submission. So after Alun Wilkie gets involved and has done these initial sketches then Dr Reay, or Alan Reay, apparently is approached by Williams Construction and asked to do the structural design work and I think the evidence was that there was an existing connection between Williams Construction and Dr Reay because they'd both been involved in the Aged Persons' Welfare building.

As I say at paragraph 44, I think this is now essentially undisputed, there may be some disagreement around the fine detail, but the initial contact with Dr Reay involved a meeting between Dr Reay and Mr Scott, probably Mr Brooks there as well and the meeting was probably at Dr Reay's offices. I've referenced the transcript on all of this. Mr Scott said he thought he was

introduced to David Harding at that meeting and that Mr Harding was asked to produce preliminary structural drawings from those A2 architectural sketches, certainly indicating as far as Mr Scott was concerned, and as seems highly likely, that those architectural sketches were taken to that meeting. Because of the nature of the discussion, they would have been directly relevant to it. Now as I say in paragraph 44 and as the Commissioners will be aware the timesheets that were put into evidence showed the first time recorded for Mr Harding was in March and you'll recall that the first time shown for Dr Reay was February which showed two hours and that seems likely to have been, at least in part, the meeting that's been referred to here. But I don't, in my submission at any rate the fact that Mr Harding's first time is recorded in March doesn't foreclose the evidence from Mr Scott that he thought Mr Harding was at that first meeting and they met him there and he was asked to do these structural sketches because it may very well be at an introductory meeting of that kind Mr Harding wouldn't have recorded time and that's what I've said here in that paragraph. I think the likelihood that Mr Harding was at that meeting is also supported by Mr Scott's evidence that after that initial meeting he said he dealt only with Mr Harding.

At paragraph 45 I've dealt with some of that already so, and I think this issue about Dr Reay saying he didn't have any memory but when he looked at what Mr Scott had said it would be correct. I think that issue has now not been disputed having seen the closing submissions from my friends, I think we can just take it that it's accepted that there was at least a meeting around this period at which Dr Reay was present.

Turning then to the issue of Mr Harding's appointment, at paragraph 46 of the written submission. Now, again, Mr Scott was the one who gave the clearest evidence on this and he said that he thought there had been a fairly comprehensive discussion at that initial meeting with Dr Reay about the type of construction techniques that were to be used, and you may recall that he referred to three options being proposed from that, and the third option was the one that was chosen and that involved the use of Hibond flooring and, again, this is slightly repetitive but as I say at paragraph 47 he also thought that it was at that meeting that Mr Harding was assigned by Dr Reay to take charge of the project. And we also got evidence from Mr Wilkie that he doesn't

have any recollection of a meeting with Dr Reay or Mr Scott for that matter. He dealt only with Mr Harding. So whatever happened here from a very early stage, and in my submission the likelihood is from that initial meeting Mr Harding was the contact point on this as the structural designer.

And I've expanded on that in paragraph 48 but there's no need for me to read that out.

Now in paragraph 49 I refer to Dr Reay's acknowledgement that at this early stage of the project he was involved in checking the quality of the client, ensuring that Williams Construction had the knowledge and experience to undertake the proposed work and then verifying that David Harding considered himself capable and prepared to commit the CTV job. Now I'll just pause to underscore the way that's expressed. It is from the transcript, because it captures I think very accurately what has now been said over and over again and acknowledged about this decision to put Mr Harding in on this role. It was very largely driven by the fact that Mr Harding considered himself to be capable and he wanted the opportunity.

Now at paragraph 50 I refer to this slightly vexed question on the evidence of the structural draftsman who was involved in this. You may recall that Dr Reay said that he thought, and it was put in that way, he thought he would have ensured that an appropriate structural draftsman would have been made available to assist David Harding. Now on the evidence the only structural draftsman in Dr Reay's firm at that time who really had experience with multi-level buildings was Terry Horn and as the Commissioners will recall he was enticed across from Holmes Consulting Group by Mr Henry who had worked with him at Holmes and when Mr Henry came across to Dr Reay's firm he persuaded Mr Horn to come with him effectively, or follow him, to assist him in the multi-level work that he, John Henry, was doing. So he's really the only one there who would meet this, and it's not a memory of fact from Dr Reay, it's just that he thought he would have done that, he would have put an appropriate structural draftsman in. That had to mean, I think, Mr Horn and of course as the Commissioners know there is, there is I think some unresolved factual evidence around this.

JUSTICE COOPER:

I seem to recall Dr Reay saying that he ensured that there was a good draftsman involved in the job when he first gave evidence on the matter.

1050

MR MILLS:

Well I put it as he thought he would have ensured, and yes that's right but he had no memory that I recall him recounting that it was Mr Horn. It was rather "Well I would have ensured" so that leads to Mr Horn and, of course, the timesheets give some support for that, although, of course, you'll vividly recall, no doubt, Mr Horn just repeatedly rejecting that he was involved in anything more than the foundation work and the detailed explanation he gave as to why that would be so.

JUSTICE COOPER:

Well it was quite detailed wasn't it?

MR MILLS:

Yes it was.

JUSTICE COOPER:

I mean that's one of the problems we have here the evidence from all these draughtsmen is very difficult to reconcile.

MR MILLS:

Yes it is, I accept that.

JUSTICE COOPER:

Because Mr Horn's evidence was analogous to somebody recognising their own handwriting wasn't it.

MR MILLS:

Yes and this is details, this is how I style.

JUSTICE COOPER:

This is my style of doing it. This is not me. This bit is and that isn't.

MR MILLS:

I think a suggestion will be made that, I think it may have come originally from Mr Fairmaid that in the course of transferring the drawings, I imagine the structural engineers sitting on the Commission will understand how this happens but I think the suggestion is that there's a transfer process that goes from what the draughtsmen would have done initially over to the next stage in which the individualised insignia, as it were, of that draughtsman may disappear and that that might be an explanation for why Mr Horn was able to be adamant that that wasn't his insignia but nonetheless it might have been at the stage before that.

JUSTICE COOPER:

There was also evidence wasn't there that in that process, which I think we called tracing, the role of the tracer is precisely that.

MR MILLS:

Yes, yes. Well ….

JUSTICE COOPER:

It's quite, that, in the end I suppose we have to come back to the timesheets unless you are n a position to submit, and I don't think you do do you, that the time, we can't accept the records, the time records.

MR MILLS:

Well I do say that the time records are not original records. They have been transposed from somewhere else.

JUSTICE COOPER:

Do we know who did that?

MR MILLS:

No we don't.

JUSTICE COOPER:

There's been no evidence on that issue has there?

MR MILLS:

No we endeavoured to find out but we didn't find out. No evidence has been given on that but they're not strictly speaking originals and so it's a transposing process so I don't, it can't –

JUSTICE COOPER:

And when was it done? Was it done for the purposes of this enquiry?

MR MILLS:

Well there was no suggestion of that although I don't recall the question being put directly. I had rather assumed that somehow within the office there would have been a transposing of individual records into the sheets that we saw but it's been done by hand. It's not a computerised transfer, so in my submission it can't be taken as absolutely an assurance of accuracy and, indeed, it became clear in the course of questioning that Dr Reay's time, for example, he didn't record all his time, which was not surprising given he was the principal of the firm and some subjective judgements were being made about what was put down as administration time and so on. So my own submission on this is that Mr Horn was very credible and the other factor. This is way out of order but let me deal with it now, the other factor that in my submission tells against it being Mr Horn is that he was very experienced in multi-level buildings. He had worked at Holmes. We saw how careful and how skilled, I think, Mr Henry was in this area. Mr Horn had worked with him so closely that he came across with him, worked for the year or so that Mr Henry was at Holmes. There was an issue with this building about the connection details between the floor diaphragms and the north core which, when people looked at it who had any experience of this sort of thing just picked it up and that, to

me, is another indicia on the evidence that says Mr Horn is right when he says that his work was with the foundations. It wasn't with the building as a whole because he had the skills to identify that problem and certainly, when we heard from him, he would have done that, in my submission. So I am going to say to the Commission that in my submission Mr Horn was credible and, of course, you know, the issue about the reliability of the timesheets is compounded by the fact that we have Mr Strachan and Mr Fairmaid who also appear on the timesheets and also say in varying degrees it's not right. But there are your candidates, Mr Horn, Mr Strachan, Mr Fairmaid. Mr Strachan and Mr Fairmaid had no experience, on the evidence at any rate, of multi-level buildings. So my submission certainly is that it was not Mr Horn that it was, other than the foundation work, and that the timesheets are not to be treated as a totally reliable contemporaneous record and that the, whatever involvement Mr Fairmaid and Mr Strachan had, they were involved in the levels above the foundation work and Mr Horn was not.

I can skip over 51, it's dropped away as an issue, and also 52 because I've already touched on that although I should just touch on an aspect of 52 because I think it does have a bearing on the reliability of Mr Harding's evidence. This related to the issue about the Hi-Bond and you may recall that, and I put it in my own way, but when Mr Harding gave evidence he assumed initially that these decisions had been made with input from Dr Reay – these decisions that had been made before he came in on it and, as I put it there, he warmed to this theme in relation to the use of the Fletcher Brownbuilt Hi-Bond and you'll see it in the transcript. He first described in detail how and why Dr Reay had made this decision but then subsequently he acknowledged he was not privy to how that decision came about. So there was a little bit of magic thinking going on initially and then under further questioning he acknowledged well actually he wasn't privy to it at all but there's fairly firm and enthusiastic evidence given initially. Oh yes this had all been Dr Reay's decision in relation to the Fletcher Hi-Bond so I just mention that because we are looking here and various places at the credibility of different witnesses.

As I say at paragraph 53 in cross-examination Dr Reay denied he'd made the decision and said and the materials decisions Mr Harding attributed to him

and I think that's right. I think in light of the evidence from Michael Brooks and Tony Scott, Dr Reay is right on that that he didn't make those decisions about round columns and Hi-Bond and the use of precast beams and so on and you may recall that Mr Wilkie said that the issue of precast concrete, for example, had an architectural element to it and he may well have been involved in that, the smooth more polished finish to it.

I turn then next to Dr Reay's knowledge of the building design.

Paragraph 54. Now Dr Reay said, initially at least, that he had not been aware of the basic layout of the floor plan, including the fact that the north shear core wall was located outside the floor plan of the building. He said the first drawing he'd ever seen was an architectural drawing and this led to a discussion in which he'd asked David Harding about the shear wall layout and you'll recall that from both Mr Harding and Dr Reay and I'll come back to that specific issue later on in the submissions but that was his initial evidence that he'd not seen it before that.

I say at 55 it's not entirely clear, at least not to me, whether Dr Reay claims to have been unaware that the structural design of the building was to be a shear wall protected gravity load structure.

1100

In my submission if that is what he's saying then it's contradicted by other evidence.

I say at paragraph 56 that if it is being claimed that he was unaware of the basic layout of the floor plan prior to the discussion he says he had with Mr Harding, again in my submission that's not credible. That initial meeting that I've already referred to with Mr Scott, and possibly Mr Brooks as well back in February of 2006, in my submission the credible inference to be drawn is that those A2 architectural sketches were at that meeting, the meeting was to discuss among other things the question of whether Dr Reay's firm would do some initial work on a no job no fee basis. Those issues of what the building involved would all have been directly relevant in my submission to making those kind of decisions and my submission is it's just not credible that the very first time, if this is what's being said and the evidence is a little unclear, but the very first time he became aware of the structural design was when he, and the layout was when he had that discussion with Mr Harding about the south wall.

JUSTICE COOPER:

Mr Wilkie was quite strong on the need for the degree although at the preliminary stage you had to be reasonably clear about some matters otherwise the pricing exercise would miscarry.

MR MILLS:

Yes and the basic layout, we've got the architectural drawings, the basic layout of that building, the floor plan does not change other than the presence of the south coupled shear wall that went in subsequently. We heard from Mr Wilkie and I think it's shown on the drawings that there was a fire wall on that south wall. So these issues about what did the floor plate look like? Where was the principal lateral reinforcing element in that building, being the north shear core? They were there on those architectural sketches, and if they were taken to that meeting, and in my submission it's highly likely that they were, and put the other way round extremely unlikely that they were not. Dr Reay is at that meeting, then they would certainly have been seen and they would have been relevant to the discussion that it's accepted was taking place at that meeting.

I have expanded on that in paragraph 57 with reference to the no job no fee discussion and just the reality was, and we all saw this and it's not surprising and it's no criticism, but with the passage of 26 years, there were a lot of things that Dr Reay said he couldn't recall and you will recall the questions I asked Dr Reay about the way memory operates and he said he remembered things best when he'd been on the job site or words to that effect. So this was not a building, on the evidence, that he was closely engaged in and so the contextual evidence in my submission is more compelling about what took place in that early meeting and when Dr Reay would first have seen this basic layout than memory 26 years later. And my submission which is at the end of paragraph 57 is that from the time of that initial meeting, Dr Reay was aware of the positioning of the north shear core and that the CTV building was to be a shear wall supported gravity load system.

And I say in paragraph 58, with reference to the evidence, that the closest Dr Reay came to acknowledging that he did know that the building had a north shear core from a fairly early stage in the design process was in response to a question in cross examination which asked him whether a different structural design might have resulted if he had been more closely involved in what David Harding was doing. His answer was no, because he knew there was both a northern shear core and a southern shear wall and so that would not have changed. No doubt the chronology into which that answer is to be placed may be open to some question. That is the answer that was given.

Now the other fact that I rely on in making the submission about this chronology and when knowledge was accrued I've set down in paragraph 59, and this is, as I say, further confirmation of Dr Reay's understanding of the basic nature of this building comes from the fact that he eventually acknowledged that he had directed Mr Harding to the Landsborough House file. Now the reason for doing that was because of its similarities to the CTV building. He wouldn't have directed him to a one level warehouse and said that'll help you with CTV. He was directed to this because of the similarities and that was a shear wall protected gravity load system. That's why it was relevant and Dr Reay had to know these things about CTV to direct Mr Harding to this.

The other fact I point to, bearing on Dr Reay's early knowledge of these matters I've set out at paragraph 60. He said that during the design process he had asked David Harding about the layout of the shear wall. Why? Because he was particularly interested in it he said. Now to be interested in it and to ask about it you have to know something about the building to know that that would be something that would be there that you'd want to see how it was being done. Dr Reay went on to say that this was the only issue with the structural design that concerned him. He said that at that stage he was looking at architectural drawings, not structural drawings, and asserted that the shear wall layout was all he would have been interested in and all he would have looked at. This is despite saying that the reason he could remember the discussion with Mr Harding about this issue was because the shear wall layout was an important issue to him and he wanted to satisfy himself that Mr Harding was not about to progress with something that was

going to be a problem. All of that, in my submission supports the actual scenario that I've been describing, but I also say that it's inconceivable, in my submission, that in asking about the south wall and looking at the A2 architectural drawings, he would not have noticed the positioning of the north shear wall outside the main frame of the building. It sticks out like a thumb.

Now when questioned by Your Honour, this is paragraph 61, Dr Reay said the reason for his concern, which led to this questioning of Mr Harding, was that the CTV building had a bigger floor plate than Landsborough House and as he had thought that Landsborough House was getting near the limits for having a shear core without a wall on the opposite side of the building, he wanted to assure himself that Mr Harding did have a wall on the opposite side. So it follows from that that he knew there was a shear wall on the north side. Dr Reay's concern about Landsborough House being near to its limits is likely to have been because of concerns Mr Henry had expressed to him during the design of that building, and the Commissioners will recall what Mr Henry said around that issue and his discussion with Dr Reay over it.

Now that leads me, I suppose, to a series of submission on the facts which I've set out at paragraph 62 and I say it is submitted that these various points lead to the conclusion that from the date of the first meeting with the Williams Construction personnel Dr Reay was aware of the basic layout of the building, including the fact that initially the contractor and the architect wanted the services located outside the floor plate of the building. He knew it would be designed as a shear wall protected gravity load structure. Whether Dr Reay's recollection, or Mr Harding's recollection is correct on the precise circumstances in which Dr Reay came to ask about the south wall layout is probably not a matter that needs to be resolved, although I will touch on it again a little later. It is submitted that Dr Reay wanted to see the shear wall layout because he was aware of the floor plan that was originally proposed, knew enough about what was going on to have at least a residual concern about what Mr Harding was doing with this.

I turn then to what I've described as David Harding's assumption of responsibility. I'm at paragraph 63. Now again this will all be pretty familiar territory I think, but so I'll touch on it at least.

1110

The evidence that Mr Harding gave I think in his brief of evidence was that prior to joining Dr Reay's firm in late 1985 he had no multi-level building experience which required the use of ETABS. That's the way it was put initially. But in the course of oral evidence he agreed that he had had no multi-level experience at all and he said that when Dr Reay approach him Dr Reay understood that.

Now it is correct that immediately prior to joining Dr Reay's firm in what essentially was a kind of a moonlighting exercise he had done the four-storey hospital residential building, and I've referred to that at paragraph 64, but as I say there, "Whether or not this building qualifies as a multi-level experience similar to what was involved in the CTV building, and in my submission it did not, it didn't involve any use of ETABS."

Now it was clear I think on the evidence from Mr Harding that what he was being offered by Dr Reay was a role principally in designing multi-level buildings including those that would involve the use of ETABS. And as we now know that was because Mr Henry had left the firm and he'd been filling that role himself so, essentially, it was looking for a replacement for Mr Henry in doing multi-level work. And as I say at paragraph 65, Mr Harding's evidence was that when he was approached by Dr Reay, Dr Reay specifically held this out to him. This was a way to get multi-level experience. And, of course, also the prospect of becoming an associate.

Now the other side of that which I've dealt with at paragraph 66 was it was clear from Mr Harding that he was unhappy with his then role at the Waimairi District Council and he wanted out because he didn't like the direction his career was going there which was in broad terms an administrative future rather than a structural designing future. So he said, and I refer to this at the end of paragraph 66, that when he was approached by Dr Reay he welcomed this as a way out and referred to getting back into consulting engineering work after "…not doing structural design for a long time".

He made it clear under cross-examination that he wouldn't have been interested in coming back to Dr Reay's firm, and of course this was coming back, he'd been there before, had it not been for that opportunity to get multi-level experience and I've referred to the evidence that he gave at paragraph 67. He said even if it had involved cutting-edge, tilt-slab work he'd have had

no interest. It was his aspiration to get experience in multi-level work that was the real attraction of going back to the firm.

Now over the top of the next page you may recall I put it to Mr Harding that the associate position was a lure and that from his previous experience working for Dr Reay's firm he knew the culture of the place, knew that he'd have to perform and so on but he resisted, at least the way I was putting to him, that issue but he did acknowledge, and I say this at paragraph 69, that it may not have been that the associate position in and of itself was what was pulling him back but he acknowledged that becoming an associate was a way of avoiding what he had previously experienced which he described as being a backroom number muncher and that's what he didn't want to go back to and the associateship was a, something that he took as an assurance that if he could become an associate then that wouldn't be the role he'd be put back into. So to that extent the associate issue was important to him, and I've said that at paragraph 70.

And so I think the conclusion certainly that I would draw from that is that what is important here is that for Mr Harding to have achieved the ambitions he had it was necessary for him to prove that he was capable of doing multi-level work. Now the Commissioners may recall that Dr Reay rejected that and said whether Mr Harding was able to do this work or not made absolutely no difference to his advancement to an associate position. In my submission that's simply not credible. He was brought into do this work and he had to show that he could do it. That's part of the mix I think here that's played out in this fairly tragic way.

Now I say at paragraph 71 that of course you've observed Mr Harding. He's given evidence several times, my submission is that despite his claims that he would not have felt able to do the structural design work had he not been confident that Dr Reay was reviewing his work that what we actually saw was something different. His demeanour was very confident and the evidence doesn't support that claim by him either in my submission and I think it's very telling that when Dr Reay brought that job to his desk Mr Harding described it, and I've got the transcript quote there, as, "Giving me the opportunity to do one." This is what he came for. This is what he was being asked to do. This is what he both needed to do to fill the role he'd been brought in for and he

wanted to do it because he was eager to get experience in multi-level works. "This gave me the opportunity to do one".

Now you will recall that in the course of cross-examination Mr Harding referred to needing to know there was a review process in place because when you're designing something for the first time you don't know what you don't know, all very, all very true, but in my submission there is little or no evidence that supports Mr Harding's claim that he had any doubts about his ability to do this work and that I think was also what we saw when he gave evidence, just in terms of his general demeanour.

I've set out at paragraph 73 a series of questions my friend Mr Rennie put to him and the one that I note, in fairness to Mr Harding, is the final answer he gave, which is on the next page, "I was competent to do it provided there was someone reviewing it."

But then as I say at paragraph 74, in my submission the evidence that we heard from him provided no basis for any reasonable belief on his part that he was being reviewed by Dr Reay and he referred only to that single occasion involving the south wall where he had said that he had discussed any issue with Dr Reay. Now of course he says he was running into problems with his ETABS analysis in getting the deflections right with only a north core and so he said, "We've got to have a balancing structural wall on the other side and I took it to Dr Reay because Dr Reay was the one who would need to talk to the architect or the owner or whoever about this and I didn't have the connections in effect." Dr Reay of course says, "I asked about it". But for the present purposes it doesn't matter which one of those is right. There is only one occasion on which they both agree that there was an enquiry made by Mr Harding of Dr Reay for anything about the structural design.

I thought it was also interesting, and I've referred to this in paragraph 74, that in the course of questioning Mr Harding then began to move away from the supervision being by Dr Reay to include supervision by the structural draftsmen. He said they were people in the firm from whom he might obtain guidance and he agreed that the oversight he thought he was getting was principally by Dr Reay checking the work of the structural draughtsmen so make of that what you will.

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He also said he was not calling out for supervision or review which I think was perfectly obvious from all of the evidence.

And, in my submission, which is at paragraph 75, he was working beyond his level of competence and he ultimately accepted that but the evidence is that he was confident he could do the work, in part encouraged by his confidence that he could follow the work that Mr Henry had done on Landsborough House and I've set out a section from the transcript on that. I don't think I need to read it through, but following that line of questioning, which he said well it wasn't easy to follow but it was clear to follow, referring to what Mr Henry had done, saying he was giving it a go and so on, not quite following the dots but he could see the method and he was following it.

Then when Commissioner Fenwick asked him some questions, and I've referred to this at paragraph 76, he said it was just a case of following the dots with the ETABS programme. So I think the evidence on this is that he was, he felt very comfortable with what he'd received from Landsborough House and felt that armed with that plus the confidence that he already seemed to have that he didn't need much hand holding on this. He was off and running.

And I've said at 77, I've referred to another passage in the transcript which I thought was quite telling where he was asked "So you see the CTV building as, in effect, a watershed building where you learned the skills that you needed to do other buildings" and his answer was "Very much so. I think it was really self-taught by going through John Henry's calculations for the previous job".

Now the other factor I think that's in there is that he did know about the culture of the firm from his previous experience there and the transcript reference that I've attached the next statement to will support this that he knew that if he was going to progress he needed to prove he could do the work.

As I say in paragraph 79 he referred to the culture as one that required high levels of performance and which did not offer you a lot of hand holding. This was a culture he acknowledged he knew from his previous period with the firm which he knew he was coming back to and which he said he was comfortable with.

Now it was very much on display and perhaps rather surprising, as I say in paragraph 80, that even when he was confronted in cross-examination with

the serious design deficiencies that had been identified by a number of expert witnesses, including the one that Holmes had identified, he was never really prepared to admit any problem with what he had done and I think I put to him the long list of criticisms from Professor Priestley which I've referred to there. Professor Priestley said he'd failed to meet best practice and so on and Mr Harding rejected every one of those criticisms. Now this was a confident, a display, dangerously confident in my submission.

He was also asked to comment on a number of opinions Professor Mander had expressed, if you recall that he, Professor Mander, I think it was he in questioning I put to him about best practice and in response to that he did then acknowledge the four points that I've listed on page 22 that they weren't, he agreed that they weren't best practice. It was the seating on the west wall, that it was a building with a significant number of problems, the responsibility lay with the design and not the Council and whatever the vertical acceleration forces were on the building they were likely to have exacerbated existing structural weaknesses, yes, yes, yes, but once again he refused to accept that any of these problems had any role in the building's collapse. He always came back to the same thing – it's the high vertical accelerations, that's what brought it down, not these problems.

Now again we no doubt all recall this pretty vividly, and I'm at paragraph 83, Commissioner Fenwick then asked him a series of questions about the way he'd gone about his design for the CTV building and as I put it there if it wasn't clear before that line of questioning I think it was patently clear to everyone observing that exchange that by the time that was finished it was evident that Mr Harding was seriously out of his depth in the work he had done on the CTV building and in some critical areas he was completely unaware of calculations that he should have made and Code provisions he needed to take into account.

I just turn next then, I think I've just time for this before the adjournment, to this issue, disputed issue, around the exchange between Mr Harding and Dr Reay over the south wall and, as I've said before, I don't think ultimately you will need to reach a fixed view on this but depending on which way you come on this it may have some significance.

So, as you're aware, different views were given on that by the two witnesses and, as I say at paragraph 86, in my submission at any rate, no matter which view one takes of this testimony both agree that Dr Reay looked at this issue and he approved it in circumstances where, in my submission, that review was superficial and inadequate. And I say that because if it had been careful and adequate then it would have triggered some of the wider issues that have now emerged about the performance of the building and its portionality and so on. If, as he says he did, he only ever looked at the architectural drawings then, in my submission, he could be criticised for that. It seems astonishing that having expressed concern about the location of the shear walls that he, on his own account, went no further than looking at architectural drawings and being satisfied. On the face of it, on his evidence, never asked to see the structural drawings to see how this issue that he agreed was important to him, how it was actually being executed in the detail. As we've all learned in this hearing it's the detail that matters.

Now, if on the other hand, it was brought to his attention by Mr Harding after Mr Harding had concluded that a south wall was needed then I think what follows from that is that Dr Reay would then have had to have been more closely involved in and better informed on what was being done here because, as you recall, Mr Harding's account was he passed it onto Dr Reay who then was to go off and clear the provision of a shear wall on the south side and he came back, according to Mr Harding, and said yes it's fine but it has to be smaller, basically kept within the frame of the external stairway. So that, I think, is the principal issue on which this conflict of testimony does have some relevance because, if Mr Harding is right, then Dr Reay's involvement was, I think, greater and at a more, had to be at a more informed level I think.

Now I do say at paragraph 87, and no doubt views will differ on this, but Mr Harding's recollection of events, as is so often the case with ancient memory, leveraged off something else and here it leveraged off his view or his statement that only Dr Reay could discuss this as it needed to be discussed with the owner or architect. He said this was not something he was in the position to do. Now I don't think that stands up well against the evidence from the Williams Construction people that they dealt only with him from that first meeting and, in my submission, on a design/build project of this kind the

logical first stopping point for any discussion about things that would change the look of the building or the spaces or windows in the building would have been Williams Construction and he did have, I think quite clearly on the evidence, he had those connections.

So, to that extent, I think that his evidence on this needs to be open to some doubt and I've set out at paragraph 88 this issue about what he says he discussed with Dr Reay and I've already touched on that so I won't deal with that further.

And you'll see, I've said this at paragraph 89, that Mr Harding said that if he'd been left to himself he would have had a wall the same length as the north shear core on the south side but he says he made that point to Dr Reay. There's a conflict of testimony on that and I don't think that it can be resolved. But on the core issue I don't think it matters.

I've set out then the contrasting evidence from Dr Reay at paragraph 90 and I've touched on that. I don't think I need to go into that in any greater detail other than just to note Dr Reay's response that he says he had when he looked at these architectural drawings that when he looked at the architectural drawings he considered that the building was more stable than Landsborough House because there was a south wall there and really that satisfied him.

Now, as I've said before, in my submission it cannot be correct when Dr Reay claims that this was the first drawing he had seen and before that he had not been aware it originally had a single shear core. I invite the Commission to conclude that that is not credible for the reasons I have just given you.

HEARING ADJOURNS: 11.31 AM

HEARING RESUMES: 11.47 AM

MR MILLS:

Thank you Sir. I'm at paragraph 91 on page 24 of the submissions and I'm going to deal now with the decision made by Dr Reay to give Mr Harding the lead designer role. Now I'm just going to go straight into the reference from the transcript, I don't need the preamble because I think this is quite a revealing section of transcript. It's Dr Reay giving this evidence. He said, *"He,"* referring to Mr Harding*, "was the one who said that he wanted to do the job and believed he could accomplish it. I had confidence in his ability. If he couldn't I expected him to come to me and tell me he couldn't. He would have found out fairly quickly if he thought he, if he found he had difficulty doing it I believe."*

Now I just pause at that point and make a comment on that. It seems to me that it's implicit in that statement that he would have found out fairly quickly if he thought he couldn't, if he had difficulty. Dr Reay at least contemplated the possibility that he might have difficulty but expected Mr Harding to be the one who would tell him if he had difficulty. Then he goes on to say, again reading from the transcript,

"I would've gained some confidence from reviewing the Westpark Building in terms of Mr Harding which may have influenced me in relation to the CTV Building.

He handled [Westpark]," and I've interpolated that*, "satisfactorily in my view and from there he undertook, he wanted to undertake the design of the next building and he was confident that he could do it, and I accepted that".*

And, again, it's the same dynamic. Mr Harding wanted to do it. He was confident he could do it. I expected him to tell me if he couldn't do it and I accepted all of that.

As I say in paragraph 92, and it's essentially the point that's coming out of the transcript, what stands out from these passages, and from Mr Harding's own evidence, is the extent to which Dr Reay judged whether it was appropriate to give Mr Harding the responsibility for this building by relying on the fact that Mr Harding wanted to do it and believed he was capable of doing it. In other

words, Mr Harding's self assessment largely governed the decision to repose this responsibility in him.

Now my submission on this which is set out at paragraph 93 is that despite the evidence that we've heard from Dr Reay on this that viewed objectively there was no defensible basis on which Dr Reay could have considered that Mr Harding was appropriately qualified to be given the sole responsibility for the structural design of the CTV building. In the first place Mr Harding was being brought in to do work that had previously been done by Mr John Henry. Dr Reay was well aware of the high level of expertise and skill that Mr Henry had in this type of work. In fact during the course of his, the various times he gave evidence, the transcript shows that Dr Reay increasingly was praising of Mr Henry's skills and qualities. In my submission it's impossible to rationally conclude that Mr Harding could take over the level of work that Mr Henry had previously been doing unless there was appropriate supervision and mentoring by someone else within the firm who also had the requisite levels of skill and experience. This is just not a matter of whether Dr Reay was more involved. There's then the question of whether he was in a position to offer adequate mentoring and experience but essentially none was given and it was left for the inexperienced Mr Harding to decide when he needed help.

Now the further submission I make which is at paragraph 94 is that by the end of the hearing, by the end of the evidentiary stage of the hearing it was apparent that Dr Reay did not have the required levels of skill and experience to provide appropriate supervision and mentoring even if he'd been willing to do so.

I think it's also clear from the evidence that Dr Reay did not bother to conduct anything approaching a careful interview with Mr Harding before offering him a position that was to fill this gap that had been left by Mr Henry. As I say at paragraph 95 Dr Reay was unclear when asked about what Mr Harding had done at Hardie and Anderson, the firm that Dr Reay had also been at years previously. He had a sufficient understanding of what Mr Harding had done at the Waimairi District Council to know that it was almost entirely civil work, not structural work, and I remind you of the passage from the transcript I took you to before the adjournment where Mr Harding said coming back to structural engineering work after not doing it for a long time and as I've said before

Dr Reay seems to have proceeded on the basis that he had a need and Mr Harding was willing to fill it.

Now what Dr Reay repeatedly came back to in his evidence was that Mr Harding was a registered engineer. He had 10 years' experience since registration and at one stage, in my view astonishingly, it was suggested that he had more experience, or at least more years of experience, than Mr Henry and implying that Mr Harding was as a result better qualified than Mr Henry to undertake the work. Dr Reay's position seemed to be that it is part of being a registered engineer and being in a senior position that you take on responsibility. In effect Dr Reay was saying David Harding was expected to have that ability unless he put up his hand and said, I don't have it. And in that context I again remind the Commissioners that what Mr Harding had said about the culture in the place, not a lot of hand-holding and expected to do the work.

Now in the end on the evidence there are only two buildings that Dr Reay was able to point to as ones that might possibly have provided some justification for reposing this level of responsibility in Mr Harding and considering him appropriately qualified and one was the four storey hospital residential building I've already referred to, and the other is the involvement that Mr Harding had in the Westpark building after he started for the second time at Dr Reay's firm.

Now as the Commissioners will no doubt recall the Westpark work was started by Mr Henry before he left the firm, and you may recall that during the course of Mr Henry's evidence, after it became apparent that this Westpark building was being pointed to as an experience basis that justified placing responsibility in Mr Harding that I took Mr Henry to a copy of the Westpark calculations and that identified that a significant first part had been done by him and that he had already set up the ETABS programme. And I asked him to comment on the extent to which the work he had already done would have assisted Mr Harding when he was asked to take over that work. Mr Henry's response was that the building was a uniform one and I am at paragraph 98, the building was a uniform one essentially with the same properties on the top and bottom floors.

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He said, "Not only was the building itself a regular one, but this made the ETABS work very straightforward." He said, "...he had already set up the ETABS programme and done the first run of it to get the basic forces and do the preliminary design."

And when I asked him how much assistance Mr Harding would have derived from the work already done he said, and the transcript passage is set out in paragraph 99,

"… the model would be there sitting ready to go. If he'd wanted to change anything it would be straightforward enough to change the data that's already there so the – it would have been very helpful to him to have that model sitting there. You could have amended it, edited it, and run it again without having to set it up."

And when I asked whether doing ETABS on the Westpark building was the equivalent to doing it on the CTV Building his answer was emphatic,

"No, no definitely not."

And I am just going to pause here because of an issue that is in the closing that is going to be given by my learned friend Mr Rennie and you may recall that when Mr Harding was asked about these issues he initially thought that he had done the CTV building before he did Westpark and that, eventually he looked, he was shown the record and accepted that wasn't so, but he said when I cross-examined him on this that probably the reason that he had this confused in his mind was because CTV was the first time he'd had to do the ETABS from scratch. Now I just – I will come back to this but the closing that I've looked at yesterday from Alan Reay's team, has a reference to Mr Harding having redone from scratch the ETABS on Westpark. The transcript reference doesn't support that and I will take you to that later but that is not the position. Mr Harding made it quite clear in his response to me, if not before, that the first one he'd done from scratch was CTV in terms of ETABS work and on Westpark he picked up what he had taken from Mr Henry.

Now, then the question of a concrete code. I have referred to that already that is paragraph 101, I won't deal with that again.

And then at 102, again I've put in a passage from the transcript which came from an exchange between Your Honour and Dr Reay about why it was that

he thought Mr Harding was capable of being this principal designer. And Your Honour asked him,

"The question I really want you to answer is whether you think you did everything, you did anything wrong other than relying on Mr Harding?"

Dr Reay says, *"Well the difficulty is I believe I was right to rely on him at the time, but it was clearly the wrong decision."*

You then asked him Your Honour, *"And am I right, you thought that you were right to rely on him at the time, because of his years' standing as a registered engineer and because of work he had done with you on the Westpark Tower. Are they the main reasons?"*

Dr Reay said, *"Oh, and the other buildings that he had designed, small, albeit smaller ones, they had – they all have features that require code analysis and – or compliance with the code. I – and he'd been through the same education and training system that I had and I guess I expected, well I would have anticipated that he would he would have had a similar level of knowledge to myself, or in fact in terms of concrete design he was more au fait with the codes and with the latest, later thinking than I was in terms of buildings of this type."*

I think that is quite revealing.

And I say at paragraph 103, "The uncomfortable conclusion is that if, as Dr Reay said, Mr Harding was more qualified to design the CTV building than he was, this might well have been an accurate self assessment. In response to questions from both the Commissioners and various counsel, what emerged was that with a very limited number of exceptions, Dr Reay's career had been built exclusively around one and two level tilt-slab concrete industrial and commercial buildings and some cold form steel structures in which no doubt he had a high level of skill and a high reputation but that is where his work had been.

Now, Dr Reay also acknowledged, in answers to questions from Your Honour, that he was not involved in the design of the Aged Persons building nor Bradley Nuttall or Landsborough House. He said all of those, he left to Mr Henry, but he did say, and again I think this is of some interest in relation to the way he approached CTV, that on each of those jobs he was the lead consultant and because of that he was involved with Mr Henry in liaising with

him and with the architect and he said, "As a result to some degree he was involved in understanding the basis of what was being done." That he went on to say in effect, and this is my words obviously, however, beyond understanding the principle that the structures had been designed for, he relied entirely on Mr Henry for whether the buildings complied with the applicable standards, including the Concrete Code. He said he had not taken time to familiarise himself with the Code provisions because he was fully committed on other work and it was Mr Henry's responsibility to deal with those issues in the senior position he had been employed in. And that was largely consistent with the evidence Mr Henry gave from his side of the relationship about what Dr Reay's involvement had been. It seems to be at least two issues come out of that or at two points that come out of that just to note.

The first is this irony really that he was more closely involved with the very experienced Mr John Henry on these buildings than he was with the inexperienced, at least in this type of building, Mr Harding. Why? Because in one he was the lead consultant and the other he was not, and he did give evidence that that was how he preferred to work. As a lead consultant, he got to choose the various other consultants. He was, in effect, at the top of the pyramid organising it all, that was his preferred method of work so that led him to be more closely involved with Mr Henry than he was with Mr Harding. So it is based on his role in the relationship rather than, as I would put it, an assessment of the need to supervise and to know what is going on.

Secondly, the reference that he made to have been Mr Henry's responsibility to deal with these matters in his senior position is very similar to the language in relation to Mr Harding although of course in the case of Mr Henry it was well warranted on the objective facts, on Mr Harding, as I have submitted, it was not.

My ultimate submission on this question about Mr Harding's lack of experience and the lack of adequate supervision is at paragraph 105 and my submission, the consequences of that combination of a lack of experience by Mr Harding and lack of engineering understanding, structural engineering understanding, and the lack of any adequate supervision or mentoring resulted in a building that had a significant number of structural weaknesses

and a completely inadequate load path and these weaknesses and misunderstandings led directly to what happened on 22nd of February.

I turn next then to this question of the standard of supervision and review that could properly have been expected to be given to Mr Harding.

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And as the Commissioners will recall during the course of the hearing a number of structural engineers who weren't initially called for this purpose were asked about supervision within their firms and they were all relevant to this 1980s period. There was a range of them. I think the smallest was Mr Falloon's practice which was essentially a one person practice, or one principal, through to big national practices like Holmes and Becas but as I say at paragraph 106, at least as I review that evidence, not one of the witnesses questioned considered it appropriate to have allowed structural drawings to go out for a permit without a review by a senior and experienced member of that firm. Which is what happened here according to Dr Reay. It was not looked at before it went out for permit, and yet I reiterate the significance that in relation to the drag bar retrofit issues, Dr Reay acknowledged that he did pick up and apparently fairly quickly the issue about the connection problem between the diaphragm and the north core, indicating if he had looked at it before it went out he might not have picked up all of the more complicated issues that have been identified in this hearing, but he would've identified that. And most of those witnesses said that they, well most of them went much further than that, saying that the culture within their firms was one where there was constant discussion and review and in most cases a deliberately structured form of mentoring and supervision.

JUSTICE COOPER:

To be fair though, wasn't Dr Reay's evidence about the fact that he picked it up quickly put on the basis that it had been drawn to his attention by what Mr Hare had found. Once it had been pointed out, then he could see it.

MR MILLS:

Yes I accept that that is the context of it. I suppose I emphasise it in part because of his recognition it was a fundamental design error and the

description of it in that way, and of course I agree it does have to be seen in that context, but he didn't, it was his recognition, this was a fundamental issue which leads me to make a submission I suppose that although it is my submission that he did not indicate in his evidence a sufficient level of skill to have provided adequate mentoring and supervision for his staff.

JUSTICE COOPER:

Now if you're right on all that of course, there wasn't anyone in the firm who could check the drawings was there?

MR MILLS:

Not in the level of detail that was required. And of course you recall, and I will come to this and I'm certainly here and I'm sure in closing to my friends that he was entitled to rely on Council to pick up any issues of concern.

JUSTICE COOPER:

So what do you say he should have done in the circumstances?

MR MILLS:

Well I say he had two choices. One was to not take the brief at all which is what I said before. The other would be to outsource the peer review. That could've been done. He could've found somebody else who did have that level of experience to look at the permit, the drawings before they went into the permit. So this –

JUSTICE COOPER:

Well doesn't the, this point has to be looked at at the stage where the brief has progressed doesn't it? Because if we accept Dr Reay's version of what happened, he was relying on Mr Harding and Mr Harding didn't do what he should've done and told him that he was having difficulty formulating a proper design. So at the time the design was developed to a point where a building permit was going to be sought for it, the option of not doing the job is over.

MR MILLS:

Yes it is.

JUSTICE COOPER:

And the question that we're trying to grapple with is what then should have happened? Was it permissible to simply put the plan in for building permit and rely on the Council to check it? Or should he have sent it out for independent peer review? Those are the choices at that point aren't they?

MR MILLS:

Yes I accept that, yes so the (inaudible 12:10:18) proposition is it shouldn't have been taken on. But at that point –

JUSTICE COOPER:

Now all the evidence though is of what the practice of firms, however small, nevertheless big enough to provide the checking function in house. We haven't got any evidence suggesting that it was standard practice to send such designs out for review by another firm, have we?

MR MILLS:

No we don't, no, so the proposition that I would advance is as I've said, the lack of competence to do this should've been recognised at the outset. If it's going to be done then some regime has to be put in place to fill the gap that is there in the firm. So exactly what form that would've taken, it might not have just been sufficient to do it at the end of the process. It might have required finding some other way to provide mentoring through the development of this process, and the reason that we don't have any evidence on this is because there was no indication that this is what, this is the way firms are operating, to put a person with no previous experience of this kind of work in charge. But one has to, if you're going to do that, some kind of processes have to be put in place to provide what's required to ensure adequate competence is being brought to bear on this process. Now if it's being done, if that's not done and we deal with it only at the end stage where it's been put together to go out for permitting, then in my submission there's, it's not tenable in the, at least in the environment in Christchurch at that time to have taken the view that reliance

could be placed on the Council because, and this is something I come to later but the Commissioners will be aware of this, courtesy of Mr Nichols who we heard evidence from, we've seen the contemporaneous internal memorandum that Mr Bluck issued to the members of the building department telling them what their role was vis-à-vis the design engineer. This is quite specifically directed to be something less than a full design scrutiny of the permit drawings. Now this wasn't specifically put to Dr Reay, but it certainly was evidence from him and both proffered and in questioning about how closely he knew Mr Bluck, how many dealings he had with him. It's not, it's simply not conceivable that he thought that the Council under Mr – the engineering department under Mr – the building department under Mr Bluck was engaged in the kind of scrutiny that would allow something to be just put in by someone inexperienced, oh, that doesn't matter 'cos the Council does all this, we knew the Council didn't have the computer to run the ETABS.

JUSTICE COOPER:

Even that, that reasoning assumes that Dr Reay knew of Mr Harding's inability to do the job doesn't it?

MR MILLS:

It does, and that's why I have said and I can't put it any higher than this, that there is in my submission no objective basis on which a conclusion could've been reached that Mr Harding had the skills that were adequate to step into the shoes of Mr Henry and to be permitted to proceed with this building designs, very largely, almost overwhelmingly on the basis that he wanted to do it and he felt he could do it.

JUSTICE COOPER:

So that would be the real, that's the nub of the problem at that point, rather than at the point where you're suggesting it should've been put out for peer review?

MR MILLS:

Oh yes, I mean that's all finger in the dyke stuff down the line. The decisions that I'm submitting are rightly to be strongly criticised and indicate an inadequacy in this whole process relates to that initial decision to give this inexperienced Mr Harding, whose evidence was he had never done a structural design for a multi-level building, had never been fully responsible for an ETABS run, had not done structural engineering work for some time, who had been a civil engineer at the Waimairi District Council to say, effectively, you wanted, you came to do this, here it is, have a go.

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That's how Harding described it, giving it a go, and my submission is that viewed objectively that decision is indefensible and the notion that you just leave it to Mr Harding to say what he doesn't know is, of course, fraught with the problem that you don't know what you don't know and that was very much on display when Commissioner Fenwick asked him about parts of the Code of which he was completely unaware and he said oh, effectively, if I'd known that was there I would have used it. but he didn't know.

JUSTICE COOPER:

And do you say that the Council's entitled to assume that the plans that it receives will have been drawn by somebody competent to do them?

MR MILLS:

No I don't say that and I will make some criticisms –

JUSTICE COOPER:

You'll come on to that.

MR MILLS:

I do make some criticisms of the way in which the Council checking process was being run and, of course, here it has a particular edge to it because of the interplay between Mr Bluck and Mr Tapper which seems, which I'll be making a submission on as well, but no I don't think it's entirely satisfactory. I think there are issues about the in which the Council was dealing with the is.

JUSTICE COOPER:

Well that may be so but the Council, just on this point that we're on, the Council's not to know, is it, that, if it is the case, Dr Reay has put somebody onto the job who's not up to it?

MR MILLS:

No, although the evidence did emerge that, I think from Dr Reay, that, at least as far as Mr Bluck was concerned, that there was some element in the way he dealt with structural engineers which reflected his levels of confidence in them. So it comes forward from Alan Reay's firm. Mr Harding's signed off as the structural designer, so it seems, but it came from Dr Reay's firm, that was likely to have led to some assumptions about the quality of the work coming through, because it was, I think, uncontested this question about assessments about who the structural designers were was influencing the Council in the way it was dealing with aspects of the permitting process.

JUSTICE COOPER:

Yes that evidence, in part, was that the Council would seek and rely on design certificates from engineers in whom it had confidence.

MR MILLS:

Yes it was in part related to that yes.

JUSTICE COOPER:

But that didn't seem to happen here did it?

MR MILLS:

Well we haven't found one, I mean that's about all I can say on that, we haven't found one.

JUSTICE COOPER:

All right thanks, I'm sorry I interrupted you for a long time.

MR MILLS:

No, no, that's all right, no that's fine. Now I think I'm at –

JUSTICE COOPER:

You're actually at 107.

MR MILLS:

Yes I was going to say 107 but I think we've largely canvassed that and I've set out there the choices we were just discussing and then I say at paragraph 108: after deciding to abdicate all responsibility for supervision of the work, at least active responsibility I should say, the supervising of the work Mr Harding was doing Dr Reay, by his own account, took no steps to check the drawings before they were submitted for permitting. No other structural engineer the Royal Commission has heard from on this topic would have followed this according to the evidence they gave. And then I say even though Dr Reay may not have had a sufficient understanding to identify all of the defects in the building, it seems clear he was capable of identifying that key problem and I won't go over that again.

I turn now then to the issue about the reliance on LandsboroughHouse as a design template.

Now it's not disputed that it was given to or that it was used by Mr Harding as a design template. There was initially some dispute in the evidence, Dr Reay, I think, moved a bit on this as we went along about how it was that this came to Mr Harding. I think, having looked at my friend's intended closing that it's not going to be any matter of dispute now that Dr Reay did give the Landsborough House file to Mr Harding and told him to use it as a design template or words to that effect. So I don't then need to deal with some of the paragraphs that I had here before I read that intended closing.

JUSTICE COOPER:

Well you're making the submissions anyway even if –

MR MILLS:

I am.

JUSTICE COOPER:

We'll take the written submission as read in situations like that, Mr Mills, rather than saying you're not making it.

MR MILLS:

Sorry I shouldn't have put it that way. I don't need to go over would be more accurate.

Now it's interesting, and I make this point at paragraph 112, that Dr Reay said that he would have directed Mr Harding not only to the calculations for Landsborough House but the entire job drawings. The primary purpose was to assist Mr Harding with ETABS and Landsborough House was an example of a design process and drawings that would be helpful to him in understanding how that work would be undertaken. Now, as you're aware Commissioners, Mr Harding said he never saw the drawings. It's a bit odd that he didn't ask for them or look for them, but any rate he said he never had the drawings and, furthermore, he said they would have been useful. So whatever happened here it doesn't look as though they were in the file that was given by Dr Reay to Mr Harding.

And it's also, I think, apparent from a point that I make in paragraph 114 that in his reply brief Dr Reay was critical of Mr Henry for not having in that Landsborough House file all of the information that Mr Harding would need to follow what Mr Henry had done on Landsborough House, and you'll recall the background to that is that some of the calculations, some of the thinking that Mr Henry was doing, particularly about taking the corner deflections after the ETABS had produced deflections at the centre of mass, weren't all recorded, and Dr Reay was critical of this in his reply brief. Now quite apart from what seemed to me to be the complete unfairness of that when Mr Henry, as he pointed out, was not doing this to mentor an inexperienced person, it says that Dr Reay didn't look at what was in that file before he handed it over to Mr Harding to follow. That was the time to be critical that it didn't have everything.

I turn then to the errors, on the evidence it's undisputed, that Mr Harding made in following that Landsborough House template. You'll recall,

Commissioners, that during the course of his evidence Mr Henry expressed concern that Mr Harding had been doing the CTV design and had placed such a high level of reliance on the Landsborough House calculations when he had no experience at all of that kind of building. Mr Henry was also concerned about the design Mr Harding had produced and, as I say at paragraph 115, that included the low level of confinement in the CTV columns when compared to Landsborough House. He said that the column confinement was only 20 percent of the typical ties that he had used in Landsborough House and you'll recall his evidence that he was concerned about Landsborough House despite the fact that technically on the ETABS analysis it seemed to be within the deflection limits and he added additional steel to strengthen it.

He also found what he described as a very significant error in the way in which Mr Harding had calculated the corner deflections and this is the issue that I just touched on and you'll be familiar with so I won't go through it in detail, that the ETABS programme at that time was taking deflections at the centre of mass. Mr Henry knew that. He then did hand calculations to determine the deflections at the corners and Mr Harding was not aware of that. He acknowledged he just took what the ETABS programme came up with and proceeded on that basis. Mr Henry, and this is at the end of paragraph 115, also said there were some significant differences in the way he would have interpreted the Code for determining the design earthquake loading and the application of the structural type factors, including the building period and the relevant scaling factors.

Now on the question of the corner deflections Mr Henry, as you will recall, had gone through the calculations that Mr Harding had done, looked at the part in the calculations where he would have expected to have seen the calculations being done for corner deflections, didn't find them and Mr Harding acknowledged he hadn't done them.

1225

So that's paragraph 116 and you will also recall that Mr Henry said that the calculations he had done, he did his own preliminary work trying to work out the deflections that were actually there and he found much more significant corner deflections than what Mr Harding had found and then he said, and I've

set out the section of transcript at paragraph 118, he concluded that section of his evidence by saying,

"In this respect I believe that the eccentric and unbalanced structural configuration of the CTV Building and the characteristics that I have described in my evidence, made it susceptible to increase lateral deflection under severe earthquake loading in the east-west direction."

JUSTICE COOPER:

Now that's not, has that been disputed?

MR MILLS:

No.

JUSTICE COOPER:

No.

MR MILLS:

And it was interesting, and I really give the answer to it not being disputed, I think is in paragraph 119, and so Mr Harding acknowledged a number of the concerns Mr Henry had expressed. In particular he acknowledged that at the time he used ETABS he was unaware that it was calculating deflections only at the centre of mass. He admitted he did not know that in order to determine the corner deflections there needed to be a separate hand calculation and you may recall I put to him a question about corner deflections and wasn't it pretty clear that a building would deflect more at the corners than at the centre and he said that while it was apparent when he thought about it, that deflections are typically going to be greater at the corners, at the time he didn't think of this and he said this was because he was too busy trying to get the computer program to work and get any kind of result and he then said, and the transcript reference is there, "When it gave one that was below the code I was grateful." So that's where his focus was. Didn't even think about the fact, let alone –

JUSTICE COOPER:

I suppose that evidence is quite strong because, I mean it's an admission isn't it?

MR MILLS:

Yes it is. So not only didn't he do calculations for the corner deflections it didn't even occur to him at the time that one would expect deflections to be greater at corners than at the centre of mass and there's reference, even I as a mere lawyer have seen the reference in the code in the commentary that warns on that.

JUSTICE COOPER:

So if this scenario is as you say it was it might have been better if he'd never had the Landsborough House file.

MR MILLS:

Well it might have been. Yes I agree with that. I think that is one view one could take of it because I think it did give him an added sense of confidence and he said that. He felt he could do it any rate but he felt even more confident and comforted by the fact that he had this and I gave the passage in his response to Commissioner Fenwick about essentially following the dots with ETABS. So, yes, and this is back to this issue about the danger of expecting somebody to know what they don't know.

And I've referred to another part from the transcript at paragraph 121 about how he used ETABS but I won't take time to read that out.

Now what were the consequences of this failure to accurately assess the inter-storey deflections and that's the next section I come to beginning at paragraph 122 and of course as the Commissioners know full well the level of inter-storey deflections were critical to answering the question of whether the building could be designed as non-ductile. If the inter-storey deflections for the CTV building had been properly calculated then on the evidence that we've got it would have shown at best that the deflections were right at the edge of the permitted deflections and that while it wasn't the only, by any means the only serious design issue that's been identified with Mr Harding's work it did lead in my submission to what the Department of Building and

Housing identified as the likely initiator which was the columns on line F which of course was the corner, at least in part, at line 1 it was the corner, line 1, line F, those are the corner deflections. Now there's been obviously as you know debate about whether that's a correct identification of the initiator but I mention it really not to draw any firm conclusions on this but really just to bring home the significance of under-estimating the deflections and then designing the building as essentially a non-seismic building apart from the two shear walls with the very low confinement in the columns and the weaknesses in the beam column joints that have been referred to by a number of witnesses, and this flowed directly from his failure to understand the limitations of the ETABS program that he was using.

And I say at paragraph 123, in some respects what I say here reflects the view of Dr, you heard from Dr Jacobs about how an experienced designer should approach design. I draw attention to the commentary to 4203 which cautions the designer about the uncertainty of the precise properties of materials and structural elements and uncertainty about the interaction between building elements. Design involves a level of imprecision, is the message that I certainly take from that part of the commentary. So in my submission if the calculations had been done correctly by Mr Harding for the inter-storey drift then even if they had shown that they were just within the code deflections they would only have been just within those limits and to have then proceeded to design the building without either designing it for greater ductility or alternatively I suppose greater strength and rigidity and just barrel-on on the basis that, well it was within the deflection limits in the code, is not the way in which a competent and responsible engineer can be expected to act because it completely disregards that caution in the commentary, and does indicate, does reveal, as has been repeatedly revealed a lack of the deep understandings of fundamental design principles that are what make a building safe in the hands of a structural engineer.

I then turn to the question of the lack of an adequate load path which as I said before may well be emerging as even more critical than the individual design issues.

JUSTICE COOPER:

I'm sorry to interrupt you but going back to this issue about the Landsborough House file and the calculation of corner deflections that Mr Harding said should have been done on CTV –

MR MILLS:

Mr Henry said.

JUSTICE COOPER:

Sorry Mr Henry.

MR MILLS:

Yes.

JUSTICE COOPER:

And wasn't.

MR MILLS:

Yes.

JUSTICE COOPER:

Were Mr Henry's calculations of that factor on the Landsborough file, were they available to Mr Harding?

MR MILLS:

No I think that's the material that wasn't there.

JUSTICE COOPER:

Now that's, that's in the evidence is it?

MR MILLS:

Yes I think it's in the, it is in the evidence, yes.

JUSTICE COOPER:

Mmm. Might be helpful if we have that drawn to our attention in due course.

MR MILLS:

All right. Okay.

JUSTICE COOPER:

Because at the moment the way you've addressed it we have the reference to the fact that the plans weren't there.

MR MILLS:

Yes.

JUSTICE COOPER:

But this is a different point that I'm interested in.

MR MILLS:

Well this is the gap in the calculations -

JUSTICE COOPER:

Yes.

MR MILLS:

– that he refers to at, I think it's S, yes so this is paragraph 116, he looked at pages S15 and S16 in Mr Harding's calculations –

JUSTICE COOPER:

Yes.

MR MILLS:

– which I know is not what you're asking me about.

JUSTICE COOPER:

No.

MR MILLS:

That's where he expected to find what's missing and it wasn't there et cetera.

JUSTICE COOPER:

Yes.

MR MILLS:

I'll find for you, or someone will find for you, we'll give it to you this afternoon.

JUSTICE COOPER:

Thank you.

MR MILLS:

Now this question of the load path, and as I say at paragraph 125, "A related but more fundamental failing in Mr Harding's design for the CTV Building was its failure to provide an adequate load path through the Building. Ultimately this may have played the principal role in its collapse.

The fundamental concept for structural design is that any force or load that is applied to a structure must have a load path that transfers that force through the structure to the foundation soils. The force flow through this load path must satisfy the requirements of equilibrium and compatibility," to use these technical structural engineering terms.

1235

In designing for the transfer of seismic inertial forces in the east-west direction between each floor and the north shear core my submission is that Mr Harding did not allow for the in plane bending moments that are induced in the floors associated with the shear transfer between each floor and the wall on Line 5. That being the wall up at the north shear core end. The critical bending moment associated with this action occurred on the south side of beam on Line 4, which is the beam right in front of that north shear core, in the location between the finger walls on Lines C and C/D which have been frequently referred to in the hearing and I am sure the Commissioners know which ones those are, and the concern is that in ignoring this action it resulted in a load path that did not satisfy these equilibrium and compatibility

requirements that are fundamental to structural design. And as I have said that may be emerging through the evidence as possibly the most significant design problem of all.

Now, on other issues, as I say at paragraph 128, many of the beam column connections also show a lack of appreciation of the need to track loads through the details. Anchorage of bars is left dependent on the direct tensile strength of concrete, which is contrary to design practice for reinforced concrete structures. The details that were used were also likely to have been major contributors to the premature collapse of the building.

The forces required to connect the floors to the structural walls were also incorrectly determined. These should have been found using either the parts and portions force criteria in NZS 4203:1984, or the forces associated with capacity design and over-strength actions. Instead Mr Harding said that he'd used the equivalent static values which were very much smaller than the design actions that NZS 4203:1984 specified.

And as I say in paragraph 130, in my submission, in respect of this issue and others, Mr Harding proceeded blindly unaware of the risks in the design for which he had taken responsibility.

Finally on this part of the submissions, the south coupled shear wall.

In my submission Mr Harding by the end of the evidence that he'd given, had also demonstrated an inadequate understanding of the design issues involved in the south coupled shear wall. Commissioners will recall that several times during the course of his evidence he referred very positively to the lack of diagonal cracking in the coupling beams when in, as I understand it, this was evident that the south coupled shear wall had not responded in the way in which it ought to have done. The diagonal cracking would have been a good thing.

The diagonal coupling beams were in fact, I think it has emerged, were overstrength and this prevented that wall from acting as Mr Harding no doubt intended it to do. The result of that as the Commissioners know is that it doesn't dissipate as much seismic energy as it should have done and most of the yielding was forced into the bottom section which we could see in those photographs that Dr Heywood and Mr Frost showed us in the course of evidence.

And again, that inadequate design of the south coupled shear wall may well have had some effect on the performance of the building. I can't for myself make the submission any more strongly than that, that it may have had some effect but it certainly can't be ruled out, it may have had a greater effect than that.

I simply make the reference in paragraph 134 which I have really already dealt with in the discussion about, the discussion between Dr Reay and Mr Harding about that south wall. This is where a part of the submissions got out of order in the final putting together of them so I want to take you now to the section on the collapse theories which begins at paragraph 230 and that is on page 55. It seems logical to deal with this first before I go into the building permit issues.

Now, I don't think I need to spend a great deal of time on this, I don't think there is much more than can be contributed by way submissions but you will recall, and I say this at 230, that there were these five scenarios that were put forward by Dr Reay when he first gave evidence and then in addition there were four further issues that emerged in the course of the evidence, it says two at the end of paragraph 230 but that two in the last line there should be four.

Now in respect of the five scenarios that Dr Reay put forward in the course of cross-examination he accepted that he was putting them forward as no more than possibilities. He hadn't done any research or analysis on them himself. It appeared he was looking to the Royal Commission to do that work. To the extent they warranted this, the Royal Commission has heard evidence on them and given close attention to them. For example, the issue about the lateral load resistance of the south coupled shear wall. But in respect of other matters such as the vertical accelerations to which the CTV building was subjected which is of course an issue on which Mr Harding and Dr Reay and a number of his witnesses, or witnesses called by his legal team put a lot of responsibility, principal responsibility really. In my submission while those vertical forces may well have played a contributing role, the exact vertical forces to which the building was subjected are not known. And I put this to a couple of witnesses on the basis of views Professor Priestley has expressed that there are features of the building that would have had affected how those

vertical forces would have affected it, the live load for example and various other things that Professor Priestley had identified. And in the end in my submission what we do know without any doubt about the building is that it had serious design defects and it made it vulnerable and this was accepted in the end by most of the expert witnesses who dealt with this issue including Professor Mander.

232, I have referred again to what I describe as Professor Mander's interesting hypothesis on Euler buckling. He too, he accepted he was putting forward just another theory. So to the extent that there's been evidence around those issues the Royal Commission no doubt will give them further consideration but none of them were put forward as, this is the evidence that this happened, they were put forward as theories about what might have happened.

I turn then to the other four that emerged in the course of evidence and the first of them was the evidence of Mr Morris and I must admit, forgive the tone of the submission perhaps, it is fairly dismissive of this. Not dismissive of the fact that if there had been holes drilled in the beams that would – it's not dismissing that that would have been an issue of concern. What the submission is rather dismissive of is that there was no credibility that could be attached to the evidence that was given.

As I say at paragraph 235, the theory rested on the evidence of Mr Daniel Morris. Unfortunately the evidence lacked all credibility. On Mr Morris' own admission, he could not provide any firm detail at all about the supposed holes that may have been drilled and there is a passage from a question my friend Mr Rennie put to Professor Priestley which in my view captures the lack of credibility and reliability in this extremely well. The question as put to Professor Nigel Priestley was, "…there is some evidence suggestive that an unknown number of holes of an unknown number of dimensions were drilled on dates not precisely known in the late 1990s in the floor and/or the beams for cabling purposes." So I said it in the submissions, I say it again in my submission there is no need to say anything more about that theory.

I turn then to the internal staircase that was cut into the floor of the CTV levels of the building in 2000.

1245

This, as you'll recall, was also raised as a potential contributor to the collapse because of its interference with load paths. You've heard evidence from Mr Falloon, from Falloon & Wilson who did the work, and I don't think I need to go in any detail about what he did and didn't do because in the end we had, and I say this at the beginning of paragraph 239, we have Mr Ashley Smith saying in his reply evidence that the effects of that internal staircase were modelled in the nonlinear time history analysis that was run as part of the DBH process and they concluded that what was, that it did not prevent there being an adequate load path to transfer the seismic forces into the shear wall.

And then of course the Royal Commission also asked Mr Holmes, Mr William Holmes, their international peer reviewer to take a look at this. He did full calculations and concluded that it had no effect on the transfer of seismic loads to the south wall. That evidence has not been challenged. So I think that too as an issue that may have contributed can go the same direction as the previous one, although it was a more substantial issue I think, initially, that did warrant being looked at properly.

The next issue that emerged which was being suggested as a potential contributor related to the change of use that occurred when Going Places went into occupancy in the CTV building in 2001 and the suggestion was from Dr Reay that this increased the seismic and gravity loading requirements beyond those that it was required to be designed for in 1986. It was correct that the loading standards had changed since 1986.

The Council dealt with that issue in its opening, and I've set out what they said, paragraph 243, and the issue there really is a criticism to be made here, it's a criticism of the Council because I don't, it's not disputed that this did involve a change of use. The Council had its statutory powers under the Building Act and what I think is of concern here, although it will be disputed I think by my friend for the Council, one of my learned friends from the Council, is that the only contemporaneous record is the one that I've referred to at paragraph 249 which was this note on the check list that had been done by the Council employee which said, "Reasonable (sic) modern 1986 shear wall building – OK." Now in my submission that is the only contemporaneous record. It's the best evidence of what was done and there's no reason to doubt that that's what the decision to not exercise any of those powers under

the Building Act where a change of use had occurred. That's the reason why nothing was done, because of the assumption that as a reasonably modern building, it would be fine, it would be able to handle the greater loadings that were likely to come in, or in fact I think it did come in, when Going Places went into occupancy.

I've dealt, beginning of paragraph 250, with evidence the Commission heard from Mr McCarthy on this, and then at paragraph 251 Mr McCarthy gave evidence that the engineer who was considering the application would have been aware of the fact that loading standards had gone up, although he had said that that rule, that they were considered, sorry. At paragraph 250 Mr McCarthy said in evidence that buildings built after 1976 were considered to be equivalent to two-thirds of the applicable design code in 2002 when this change of use issue came up. He then gave this further evidence that I refer to at paragraph 251 that the engineer considering the application would have been aware that that was the Council's position, but of course that is entirely speculative and I continue to say that the best evidence on this is that record that I just took you to, and that's the basis on which I submit the decision was made.

Now that leads me to the submission at 252 that the Council did not have reasonable grounds to conclude that the building would in its new use comply with the structural requirements as nearly as is reasonably practicable to the same extent as if it was a new building. Which is the test under the relevant provision of the Building Act. There is no evidence of any consideration other than what is recorded in the checklist and this is limited to the age and general type of building.

I've set out there in 253 matters that in my submission were relevant to be considered, and there's no evidence that they were. Mr Rennie described the Council process as a "Missed opportunity in the history of this unfortunate building."

And I say at paragraph 255, in one sense that is correct. Though of course in hindsight it takes on a significance it would not have been seen to have had at the time this was being dealt with, but in my submission the significance of this is that it's another event in the history of this building that highlights the on-going consequences of a building being considered to be code compliant

because that brief notation by the engineer dealing with the change of use issue, clearly was assuming a relatively new building, code compliant in 1986. It wasn't code compliant in a critical respect. So that issue continues to come up. We get the same issue with the drag bar issue. The assumption that with one exception it's code compliant, and so on it goes. So that to me is really in the end probably the aspect of this that has the greatest concern in terms of what happens when it goes wrong at the outset.

I do note at paragraph 256 that it's rather ironical that Dr Reay and his firm are seeking to raise the Council's failure in order to place the responsibility with the Council, because by 2001 Dr Reay knew that there was a critical structural weakness in the building and it would not have been code compliant in 1986. If a building consent had been sought for the drag bar retrofit in 1991 the Council would have been well aware of that. They might well have looked at the change of use issue differently. Sorry it's been pointed out to me that of course, well, yeah, that it's the reference "by 2001" what I meant by that, of course he knew by 1991 but I'm saying by 2001 when this issue with the change of use comes up, Dr Reay knows that so you can put in 1991 and 2001 but they, either date, the point is that this issue is being raised by Dr Reay and his firm to point the finger at the Council, but Council was deprived of knowledge that it should have had, had a building permit been sought in 1991 for the drag bars, that may well have led to a different approach in 2001.

JUSTICE COOPER:

So in a sense you're saying by 2001 Dr Reay had known for 10 years?

MR MILLS:

That is what I'm saying, and the Council didn't. I just say it's rather ironic he's saying to Council, "You didn't deal adequately with the change of use issue."

Finally, before I go back to the permit issues, I touch briefly on this question of under strength concrete, and there was again a paragraph that went missing here during the final editing and I'll just read that into it in a moment. So as the Commissioners know, this issue of concrete strength which got a lot of attention in the DBH report is one that in the end in my observation and submission has really dropped away as one of high significance for the

Royal Commission and that's first and foremost because there was an issue around, which was raised by Dr Reay and his experts, around the adequacy of the testing of the collapsed concrete elements.

1255

The Commission then engaged Dr James McKechnie as its own expert to look at those issues and Dr McKechnie came to a conclusion that largely agreed with the concerns about the adequacy of the protocol that had been identified by Dr Reay's experts.

Now the upshot of that, and I've made this point at 257, is that it's not possible on the evidence that the Royal Commission has received to form a firm view on whether the concrete was under-strength or not but, and this is the missing paragraph, because both the original non-linear time history analysis and the further one directed by the Royal Commission did that non-linear time history analysis on the basis that the concrete was above the strength required by the specifications for the CTV building then it hasn't been necessary to take this further in any event because it's been ruled out as a non-complying contributor to the collapse by virtue of that.

A missing paragraph that was retrieved last night from the trash. Now we're back then to the building permit issue, which is at page 34, paragraph 135, and I wonder should be break there or should I just get started 'cos it goes for several pages certainly in terms of the written text. There's two aspects to this. One is whether it complied, and then the other part of it is whether a reviewing engineer at the Council ought to have picked up the issues of non-compliance.

HEARING ADJOURNS: 12.58 PM

HEARING RESUMES: 2.16 PM

MR MILLS:

I can take you first, if you'd like me to, to the references that you were asking about before the adjournment. Now there's several of them. The first one is at the transcript at 20100802.1 at lines 14 to 25 and that's Mr Henry's evidence about the calculations he did for Landsborough House and if you want to follow through all of the related material it continues onto the next page as well. Then from David Harding, that's in the transcript at 20120730.65, lines 16 to 9.

JUSTICE COOPER:

You're assuming greater speed on my part that I can bring to bear.

MR MILLS:

I attribute all sorts of powers to you, Your Honour.

JUSTICE COOPER:

Well you've got this one wrong.

MR MILLS:

20120730.65, lines 16-19, and that's where he referred to the fact that he hadn't seen those calculations and if he had he would have followed them. Then a further one from him, which is the acknowledgement that he didn't check the corner deflections, that's the transcript at 20120731.69, lines 24-27, and if the Commissioners want to see or be reminded of the calculations that Mr Henry did of the CTV deflections, which he did for himself for the purposes of his evidence, that's in WIT.HENRY.0001.29 and also .71 in the following pages which is the actual diagrams or graphs that he did and just to complete this totally if you want to see the criticism made by Dr Reay, which I mentioned, of Mr Henry for not leaving an adequate record that's in the transcript TRANS.20120731.124.

Now I'm about to deal with the section dealing with the building permit which begins at page 135.

JUSTICE COOPER:

No paragraph 135.

MR MILLS:

Did I say page, sorry, paragraph 135. And the first part of this deals with this issue of or the proposition that the CTV building did not comply with by-law 105 and the Code at the date of permitting. The detailed analysis of this issue comes next so this just sets out some general points about this. Now I don't need to repeat this other than simply noting briefly 135 again makes the point that the extent of non-compliance is fundamentally affected by this question of ductile or non-ductile design for this building and then I turn to the issue of the shear wall gravity load structure which was the concept by which this building was designed and as the Commissioners are well aware, and as I say at 136, this was based on treating the columns as secondary elements and designed them and the beam column connections using the non-seismic provisions of 3101 and, of course, Mr Henry gave evidence that that's the basis or the concept on which Landsborough House was also based, although he did add additional strength to the columns.

Now several witnesses, but the one that's referred to in 138 is Professor Priestley, regarded the failure of the columns and the beam column connections as integral to the collapse of the building and I've set out the excerpt from Professor Priestley's evidence but then added that, or just to capture it, Professor Priestley's evidence was that if the seismic provisions of 3101 had been applied here then at least on the time history analysis it showed that there wouldn't have been failure because that just captures the significance of whether it was seismic or non-seismic design that was required here for the columns and the beam column connections.

JUSTICE COOPER:

Was that referring to the first or the second (inaudible 14.22.23 – overtalking)

MR MILLS:

It would be the first one in his case, yes. The issue then of the concept of a shear wall protected gravity load system then gets a bit of attention in here in the next few paragraphs because it is, as the submission says, a hybrid structure and there are some interesting comments that are referred to in here from one of the seminars that Mr Harding went to at about this time, and I'll come to it in a moment, in a paper by Paulay and Goodsir.

So, first of all, to paragraph 140 where it's noted that the concept of a shear wall protected gravity load system is not referred to specifically, certainly not by name in the applicable codes, nor is the expression 'gravity only columns'. NZS3101 does contain provisions regarding elements designed for seismic and non-seismic loading as you're well aware and there are also provisions relating to members such as columns that are not designed for seismic loading but there's not reference, at least by name, of gravity only columns, because one makes these sorts of submissions with great hesitation knowing who I'm directing them to but, at any rate, no doubt I'll be told if I'm going wrong but that's certainly my understanding.

Then the Codes refer to shear wall structures and also to ductile frames and, as noted in paragraph 141, there is a reference that ductile hybrid structures in NZS3101 but still no reference anywhere to specifically what we're talking about here with the CTV building, at least not by name.

Now the comment is made at paragraph 142 that, and this is not related specifically to the meaning of hybrid structures in 3101 but, in effect, what we've got here is a hybrid structure and you may recall a Professor Mander gave some evidence on this and he said in the US this would be what we call a dual system because it's made up of shear walls and then non-ductile frames.

1425

So apparently that's how they'd referred to it there but for the purposes of this submission we're adopting the terminology hybrid structure.

At paragraph 143 the point is made that this seminar that Mr Harding went to in 1986 which included the seminar but also the Park and Paulay text, which we've been told repeatedly is essentially the Bible in this area, that there's nothing in there that we've been able to see that would, as we put it there, give grounds for Mr Harding's confidence or for Mr Reay's confidence,

Dr Reay's confidence, that having sent Mr Harding to this seminar he had learned about how to do this hybrid structure. There's a reference then in paragraph 145 to a paper, The Design of Ductile Reinforced Concrete Walls and Earthquake Resistance, by Professor Paulay and it's noted in that paragraph that there are actually significant cautions in that paper about the variable wall response of the wall configuration that's used here and Dr Jacobs also gave some evidence which seems to be supportive of this that when you mix your ductile and non-ductile elements in the way that was done here that there can be difficulty in understanding how the building's going to perform. So we get to that point, nothing that Mr Harding has been exposed to or referred to, other than Landsborough, which deals with the kind of building that he's dealing with her.

At paragraph 147 there's some text set out from a paper on the capacity design of reinforced concrete hybrid structures for multi-storey buildings, and again Professor Paulay is the lead author. I'm not going to go through that, I think to the extent the Commission want to read that it's there, but the passage that I do draw attention to is the one, the short one at paragraph 148 for two reasons.

The first is that it says, and this is 1986 as I recall it, at that point it's saying:

"In the majority of reinforced concrete multi-storey buildings lateral load resistance is assigned to both ductile space frames and cantilevered structural walls".

And the interest in that I think is that it's saying that the majority of reinforced concrete multi-storey buildings have this characteristic. Now of course the Commission's heard evidence from people like Mr Henry and Mr Hare that this shear wall protected gravity load system was very common in Christchurch at the time. I don't place too much weight on it but this is saying the majority of reinforced concrete multi-storey buildings aren't done in that way. Their lateral load resistance is assigned to both ductile space frames and cantilevered structural walls, and then there's more excerpts from it in the next paragraph which again I won't go through in detail but I do draw attention to the third paragraph there which is numbered 11 which is the very distinguished authors saying:

"The excellent seismic behaviour of well-balanced interacting ductile frame or structures, particularly in terms of drift control and dispersal of energy dissipation mechanisms throughout the structural system should encourage their extensive use in reinforced concrete buildings".

Now there's nothing in here that would encourage Mr Harding on the design he was embarking upon.

COMMISSIONER FENWICK:

If I can just intervene there because what you're talking about there is precisely I think what, the sort of thing that Murray Jacobs has done with some of the high-rise buildings. We're talking about 25, 30 storey –

MR MILLS:

Yes.

COMMISSIONER FENWICK:

- where they find that combining the structural wall with a structural frame, the frame is still at the top of the building and the wall is stiff at the bottom and combining the two you can get an expert interaction.

MR MILLS:

Yes.

COMMISSIONER FENWICK:

I don't think it's stretching it to suggest you can do this with a six-storey building where you're deliberately using weak columns or very flexible columns to get that interaction. So I think what's being referred to there, and I think also probably in the Paulay and Goodsir work is they're really looking at the 20-storey buildings. So I'm sorry to interrupt you but that's an aspect –

MR MILLS:

No, no. No I said I did this with hesitation.

COMMISSIONER FENWICK:

Wouldn't want you to go too far on that.

MR MILLS:

Yes.

COMMISSIONER FENWICK:

It's a multi, very much a multi-storey structure rather than the five/six storey structure we're looking at.

MR MILLS:

Yes. All right. Well I'm certainly not going to dispute anything that you say on these issues but what I would say about that is that there's nothing in here that's giving guidance to Mr Harding for what he was doing and some of this is material that was involved in the seminar that he was sent off to, or went to, whichever way round it was.

Now that does lead to a submission at 151 which, again, you may Commissioner Fenwick, place the same limitations around it but 151 says, the absence of guidance in relation to a non-ductile frame or structure together with the warnings set out in the article illustrates three things. First, the incompatibility of such a structure with the obligations of avoiding collapse and minimizing injury and death. Now that point will be developed more in the next section on the actual code provisions and the bylaw provisions but as I think the Commissioners will be aware from the questioning that Mr. Elliott did during the course of the hearing that this proposition that obligations for avoiding a collapse and minimising injury and death underpin the way in which these issues should be interpreted, but I will come to that. Secondly, the novelty of what Mr Harding was attempting to achieve and, third, the extent of his lack of competence to design such a building. So that's the general background on the question of permit and code, just some introductory points on it.

And I now come to the more, I suppose more technical question of whether areas of non-compliance that are now I think, I hesitate because it's possible

having read the closing submissions for Dr Reay and his firm that this may not now be as undisputed as I thought it was. I was going to say that I think there was no dispute anymore that there are areas of non-compliance and so the question is which if any should have been picked up by the Council reviewing engineers during the review process.

JUSTICE COOPER:

So we should note that there may be a dispute.

MR MILLS:

There may be. I'm not quite sure how to read the closing submissions on this point but, anyway, I'll put a question mark by 152.

Now at least as I understood the evidence and the review of the evidence that we've done for this closing, as I say in paragraph 153, during the course of the hearing the Council took the position that most of the areas of non-compliance that had been identified were not ones that a Council reviewing engineer could reasonably have been expected to identify and you will recall that Dr O'Leary and Mr O'Loughlin were both called to give evidence on that issue and supported that proposition. Dr O'Leary's evidence was that the non-compliant parts of the CTV Building would have been difficult to pick up in the time available to the checking engineer and essentially would have required an extensive peer review which it was not able to do.

Mr O'Loughlin took a similar position, this is paragraph 155, and he described the checking engineer's role as "*a scrutineer to look that the proper processes have been followed through*", not the designer. His opinion was that the scope of a Council reviewing engineer's role in the 1980s was limited, that for them to review drawings and calculations in detail was impractical and that their task was to check in general terms that matters had been dealt with by the designer. They could be expected to pick up basic structural issues and would certainly have been expected to be aware that this was a shear wall protected gravity load system.

Now that led Mr O'Loughlin to give the opinion, and I've dealt with this at 156, that in the case of the CTV building a reviewing engineer could not have been expected to have identified any of the areas of non-compliance with the

exception of the diaphragm connection and even, and you may recall this, that in Mr Harding's calculations he'd dropped a zero off one of the numbers which I guess if you knew what you were looking for you would pick up pretty quickly, but he didn't think that was something that they could've been expected to pick up either.

1435

Dr O'Leary shared Mr O'Loughlin's view that the imbalance between the south shear wall – sorry I shouldn't say shared Mr O'Loughlin's view. Dr O'Leary agreed, I think, with the proposition that was put to him that the imbalance between the south shear wall and the north core was something that could have been picked up. You recall Mr Nichols gave evidence that when he looked at this for the first time he was concerned about that imbalance when he was preparing his evidence for this hearing, he didn't like the "lack of equitability" I think was the term he used. And Dr O'Leary agreed that once you'd picked that up, then a reviewing engineer could be expected to lead onto other things as a result of that. Once you saw there was a potential problem with the imbalance, that would lead you on to other things and looking at the design, looking at the calculations to see how that had been dealt with. He also agreed that one of the further inquiries that might follow was to look closely at the connection of those shear walls to the rest of the building because that was a fundamental issue, and in the case of the CTV building, the inadequacy of the connection between the diaphragm and the north core would if viewed closely have been apparent. Interestingly, it has some bearing on the issues I'm going to turn to fairly soon on the Tapper discussions.

Mr O'Loughlin described the CTV building as pioneering. He described it as stretching the capacity of the Council staff to fully understand how it worked.

Then I refer to the issue that's already been touched on so I won't repeat it about Dr Reay's evidence about the reliance he placed and felt he was entitled to place on the Council to do a careful review, and that the permit meant it was fully compliant.

So the principal submissions that this leads to begin at paragraph 160. First, it's accepted, by counsel assisting at least, that not all of the areas of non-compliance that will be identified in the next section are ones that one would

expect would be picked up. But the further submission is that what could properly be expected is certainly more than Mr O'Loughlin and Dr O'Leary accepted in their evidence. I refer also to the very careful line of questioning by Your Honour about the Council's obligation in issuing a permit which is relevant in considering the standard that can be properly expected.

I say at 161 that again it's accepted that the responsibility for ensuring that a building is compliant with code and with the bylaw 105 was principally on the structural designer, which is the approach that the Council was taking at the time, and you wouldn't expect the Council reviewing engineer to be involved in the fine detail. But in my submission, and I think there's evidence to base this on which I'll come to in a moment, a Council reviewing engineer can be expected to have a high level of understanding about the way buildings work, an ability to read plans and understand calculations and to identify actual or potential problem areas, and once those are identified then they go back for assurances or further work or whatever from the designer. But I think that one can properly expect a fairly high level of, that kind of approach, from a reviewing engineer, and there was evidence from some witnesses that I think support that, and to foreshadow it, I think it's supported by what Mr Tapper did. I think it's supported by what Mr Nichols said about how he regarded his approach and while it's not in the 1980s, it was supported by Mr Henry who was also a Council reviewing engineer at one period.

The submission on the areas of concern and not all, I don't think necessarily non-compliance issues, but concerns that should've been identified by the reviewing engineer are set out in paragraph 162. The first one is the asymmetry issue between the north shear core and south coupled shear wall. The second is the inadequate connections between the floor diaphragms and that north shear core. The next one is the absence of complete calculations which should have caused some concerns including that dropped a zero that I referred to before. It should have been apparent that the building was prone to torsion and that that might lead to unpredictable behaviour. The inadequacy of the non-seismic columns and beam-column connections. This of course relates to how one interprets the requirements for seismic versus non-seismic, but if the Commission was to persuaded that these needed to be essentially seismic, then that certainly should've been picked up. Then the

next thing that should've been identifiable, we say in our submissions any rate, is that there would be a risk to life if the columns or the beam column connections failed. That relates to the bigger picture argument that you're aware I will be making. The absence of sufficient calculations on v delta should've caused concern. Council didn't have the data in front of it to be able to tell whether columns would remain elastic at v delta. And finally the reviewing engineer, in our submission, even if they could properly be treated as secondary elements, the columns and the beam-column joints, or connections rather, even if they could be treated as secondary rather than primary elements that there should have been recognition that the drifts might well have been excessive, and further information should have been sought to satisfy the reviewing engineer that they were not. Here, I think if that had been pursued, there would've been concern rather than comfort.

Now, as I said before, really the first measure, in my submission of what could be expected of the Council reviewing engineer is what we actually know about the reviewing engineer on this. It was Mr Tapper, and as I say in paragraph 163, far from failing to recognise concerns with the CTV building it is a matter of record that he identified a number of issues, including most significantly a concern with the diaphragm connection. And I think the Commissioners will recall that during the cross-examination of both Dr Reay and Mr Banks during that last section of the hearing process, they both accepted that the issue that is recorded in that 27 August letter from Mr Tapper, which referred to diaphragm connections was likely to have been the issue that Holmes Consulting Group identified in 1990, and was of course accepted by both Dr Reay and Mr Banks that at least in modern parlance, that was a critical structural weakness.

Now there are a number of other issues which Mr Tapper identified in that letter, some of which didn't go to these sorts of core design questions, and some of them were satisfied before the permit was issued. But he did also identify an issue with "stirrups", and that's referred to in paragraph 164, and having followed that through by reference to the drawings, that's a reference to the rectangular columns on the west wall, and you will recall that Professor Mander expressed a concern about those west wall connections to the columns. They were a contributor in one of his collapse scenarios.

1445

So Mr Tapper did identify some significant issues, particularly the diaphragm connection and I, in my submission there is no reason to set the bar any lower than what he actually observed in saying what should have been observed and what could reasonably be expected.

Now, we know as I say in paragraph 165, fortunately through Mr Nichols producing this, before he threw it out as he told us. He was having a clear out and came across this internal memorandum from the 1980s from Mr Bluck about the way in which the reviewing engineers were told to go about their work at that time and the, I think the key passage from it is the one that I have set out there and that memorandum to the staff of the Building Department said:

"You are entitled to rely upon the recognised expertise of a Professional Designer who is prepared to certify under his signature that a specific design for a conventional or innovative structure (or detail), complies in all respects with the intent of the provisions of NZS 1900 Chapter 8".

So that was the approach that was being taken by the Council and I think, and I will come to this, it was one of the causes of tension that has been referred to in the evidence between Mr Tapper and Mr Bluck. Mr Tapper may have taken a more demanding approach than that, but certainly in terms of what needed to be picked up and one could expect to have picked up before arriving at that point, my submission is that Mr Tapper is an appropriate yard stick.

Now, going on then with the way in which these things were actually being dealt with in the Council at the time, we also had evidence from Mr Henry and I refer to this at paragraph 166. Of course he is there a little later, he's not there in the 80s and I do emphasis that fact. He goes there in 1992 and he gave evidence about the interplay between Bryan Bluck and Graeme Tapper and their respective positions on building consents. And he said, and I have set it out there, the way in which he observed this operating, and I won't read all of it but the essence of it I think is where he says, Bryan was saying to Mr Tapper, "You've got to live and let live and keep things moving through and get things issued, get these building consents out", 'cos holding them up was big pressure." So that's the environment here apparently, at least according

to Mr Henry in the early 90s and he – there is no suggestion that it was any different back in the 80s although technically that is not the period he is referring to.

Now I say at paragraph 167, that while the general approach set out in Mr Bluck's memorandum isn't surprising nor is it a matter of concern, the way it was applied in the case of the CTV building does raise some concerns. And it includes both what appears to have been, and on the evidence was the case, that no design certificate was required and also Mr Henry's reference to Mr Bluck's approach of saying there was "big pressure" if consents were held up.

And interestingly both Dr O'Leary and Mr O'Loughlin also made reference to the pressure that went onto the Council checking staff in the 1980s as a result of the property boom. Mr O'Loughlin referred to the Council being busier than normal and appeared to accept that this would have shortened the time reviewing engineers had. Mr O'Loughlin also referred to time being of the essence for developers who were borrowing at high rates of interest and putting pressure on to get permits through. So I accept that all of that is part of the environment at the time. The extent to which one should acknowledge that the standards of the reviewing engineer, how they respond to that is a matter the Commission may want to reflect on but in terms of the standards actually applied.

I keep coming back to Mr Tapper and that that is an appropriate benchmark for what one can expect and I repeated that point at 169. Now Mr Nichols was also interesting on this and have referred to him also in 169. He described the situation where, despite the time constraints and not having a computer system, the reviewing engineer was competent to look at a design and note areas of concern that warranted further investigation or justification. And that is really the key to this it seems to me that Council reviewing engineers are expected to be good enough and rigorous enough to identify when further work, further assurance is needed from the designer. Not that they do the designing themselves but they are expected I think rightly and this is what Mr Tapper I think demonstrated.

And Mr Nichols said when he gave evidence his evidence what he had done and he said he looked to identifying critical points in the structure and he said, with experience he began to develop what he described as, "*intuitive*

familiarity" for different building designs and those that needed to be looked into further.

And as I said before, it was interesting that when he looked at the drawings for the CTV building for the first time in the course of preparing his evidence, and I have said this at 171, he very quickly identified "*a complete mismatch in terms of load sharing*" between the north and south walls. It was something he said he would have been really concerned about had he been checking the design and he wasn't surprised that Mr Tapper was concerned about it which he thought he was from reading his letter.

Mr O'Loughlin eventually, I think, also agreed that a good reviewing engineer would pick up the imbalance.

I then just touch briefly on the design certificate issue and speaking for myself I found this rather puzzling in the way in which the Council appeared to deal with this at the time where a design certificate was seen as an alternative to calculations. Either a design certificate or calculations, and I may be misunderstanding something here but they don't seem like alternatives because they seem to place responsibility in different places and I don't know whether the Council will be able to tell us anymore about that in their closing but..

JUSTICE COOPER:

Well weren't they alternatives expressed as such in the bylaw?

MR MILLS:

Yes but I am just saying I find it odd that they don't seem like alternatives. One places the responsibility back on the Council and reviewing staff –

JUSTICE COOPER:

Yes, all right, well I was just perhaps slightly misled by your observation, the approach that the Council at the time was more than –

MR MILLS:

(inaudible 14:52:59) I can see why I would have misled you, I apologise.

JUSTICE COOPER:

That is all right, it is just I was wanting to clarify what you were saying but if there was no design certificate sought in this case, that would be consistent with the fact that calculations had been asked for.

MR MILLS:

Yes it would yes, absolutely but –

JUSTICE COOPER:

And there was also some other evidence which said that, well you wouldn't ask for a design certificate from somebody unless you thought that it was going to be a good certificate in the sense that you were quite confident you could rely on it.

MR MILLS:

Yes well this does come back to this issue about what clearly does seem to have been evidence that there was different weight placed, depending upon who you thought you were dealing with from the Council's perspective. Yes, it's interesting that they were cast as an alternative because in terms of what one could reasonably expect from the reviewing engineer, unless I am missing something here, the calculations are going back the reviewing engineer and assume a capacity to analyse those calculations in an intelligent way. Otherwise they serve no function.

JUSTICE COOPER:

Well that is right, well yes.

MR MILLS:

So it does have a bearing on this question of what one can expect from a reviewing engineer.

JUSTICE COOPER:

One wouldn't – there'd be no point in asking for calculations if you weren't then going to check them.

MR MILLS:

No there wouldn't, and have the capacity to read them in an intelligent way. Now, just because this issue of design certificate has come up and had some attention, I have also referred in paragraph 175 to Mr Nichols' evidence about the way design certificates are treated during his time with the Council and he said, "If the design was certified by way of a design certificate, this was usually relied on and a permit issued." But as you know we have not found one here, and Dr O'Leary said that the way the Council met it's obligations under By-Law 105, at least in his experience, it required a design certificate so beyond that it's all a murk. Now this is the point –

1455

JUSTICE COOPER:

Given that, given the practice and the by-law provision to have one or the other on the balance of probabilities there wasn't a design certificate don't you think.

MR MILLS:

I think that's probably right, yes I think that probably is right because we know from that letter from Mr Tapper that the calculations were asked for.

JUSTICE COOPER:

Because he'd asked for the calculations.

MR MILLS:

Yes he did yes, yes.

JUSTICE COOPER:

Putting that alongside the fact that despite an exhaustive search design certificates have not been found.

MR MILLS:

It hasn't been found, yes that's true, although there are other documents that would indicate that there could well be more that are there somewhere or have been disposed of but I take your point I think the most telling thing is that the calculations were asked for and they were seen as an alternative to the design certificate.

The point Your Honour just raised about the relationship of this issue to the strengths and weaknesses of particular engineers is picked up in paragraph 176 and I won't dwell on it.

Now in terms of where the Council seem to be setting the bar for what could be expected of a reviewing engineer, and I say this at 177, no doubt the Council will reject this, but it did seem very low and to an extent that one began to wonder what the point was and as I said before it's clear what flows from a permit being issued. We've seen how the assumption that the building was compliant has continued to carry a tail behind it in the history of this building and the standard which seemed to be being promoted here, including in some of the cross-examination, the underlying assumptions that seem to be behind it, the standards seem very low and, in my submission, too low and more could be expected.

And I refer to those flow on consequences at paragraph 178.

Now I think I can skip over the next few paragraphs, I think that's all just mostly a matter of uncontentious record and pick it up at paragraph 183. And we now come to this issue around further examination of Mr Tapper's letter. So just to briefly recap that. The letter is dated 27 August, the permit is issued on 30 September with the sign off for the structural design from Mr Tapper on the 10th of September. So 27 August, 10 September, 30 September are three of the key dates here. Some of the concerns that Mr Tapper had identified in that letter had been dealt with, we've done our own analysis of that and looked at the drawings and looked at the issues that were raised in that letter and I've dealt with that in paragraph 183, but, as I've said before, among the ones that were not was the diaphragm issue.

And that does raise the question of if Mr Tapper was concerned about an issue which it seems to be accepted was a very significant issue, why did he sign off on the structural drawings, I mean the permit, during the permit approval stage.

And, of course, as you will recall the Commission heard evidence on this from both Mr Nicholls and from Mrs Pat Tapper, Mr Tapper's widow.

JUSTICE COOPER:

It may be obvious to you but I'm not sure it is to me. Why should we not assume that Mr Tapper was satisfied on the diaphragm issues having received the calculations?

MR MILLS:

Because there is nothing in the, there's no change I guess is the first point, no change that has been identified between what Mr Tapper looked at on the drawings and what went in for permit, which was finally permitted, finally given a building permit. So the issues that are shown on the drawings with the diaphragm connection on the evidence, there's no change that occurs between his concerns in the 27 August letter and the subsequent permit approval. So that seems to me to be the first issue of significance. Of course the issues on the evidence that support him still being concerned come from his wife, which I acknowledge is hearsay and I'll deal with that in a moment, but that certainly she said that he was certainly not happy with it, continued to be unhappy with it and the other aspect of it is that the calculations themselves don't include any calculations from Mr Harding of diaphragm capacity in the north/south direction and you remember Mr Harding said in his evidence that he thought there might have been some but they were missing but certainly on the evidence there wasn't anything in the calculations either that would have given the answer and one assumes would have dealt with any concerns about the diaphragm. So those are the matters, leaving aside what Mrs Tapper said in evidence, that lead me to submit that the concerns that Mr Tapper had identified in that 27 August letter would not have been met by the time he signed off on the structural drawings.

The submission that I make to you and I'll develop this obviously with care, and for that reason I will go carefully through the text at this point, is that what happened here was that Mr Tapper resisted the permit, as his 27 August letter records, and that Dr Reay has gone directly to Mr Bluck and persuaded him to

reign Mr Tapper in and the result of that has been the issuing of the permit. Now let me develop that.

Paragraph 187 I say that Mr Tapper, of course, was the reviewing engineer on the permit application. We know he had concerns and I don't need to dwell on that.

Paragraph 188 I deal with the evidence from Mr John O'Loughlin who gave evidence that it was no uncommon during this boom period of the mid 1980s that permit applications be put in before all the required documentation was completed and that seems to be what had happened here and Mr O'Loughlin said that this was in order to try and move things along more rapidly and under pressure, including the high cost of borrowing that developers were under speed was everything.

Now after Mr Tapper had raised those concerns that were set out in that letter we know, we've seen it, there was a document transfer form dated 5 September 1986 that went from Dr Reay's firm, signed by Mr Harding, that went to Mr Tapper and that was shown in the course of the evidentiary part of the hearing and that recorded that Mr Tapper had now been sent structural drawings S1 to S39 and I think it's S39 in particular that contained a lot of details that Mr Tapper had been looking for and, in addition, calculations were provided relating to the bond deck, that was a fire rating issue that had emerged and also these two pages, G78 and G79, had been forwarded and then, as I've already said, on 10 September the building permit was issued.

1505

Now I've listed down in paragraph 191 the concerns identified in that letter that had been met. This is based on simply work that we've done as counsel assisting. I don't need to go through them.

And paragraph 192 simply records the point I've already made about the diaphragm. And it's my submission that it's that issue about the diaphragm that led Mr Tapper to make the comment that Mrs Tapper referred to in evidence that the building was an earthquake risk.

Now among other evidence that in my submission supports the narrative that I'm putting to the Commissioners here was evidence from Mr Nichols, and I've referred to that in paragraph 193, and he said that when he reviewed the

permitted drawings in the course of preparing his evidence he was astonished at the weak appearance of the diaphragm connection with 664 mesh and D12s at 400 centres, he likened it in his evidence to the reinforcing for a house rather than a multi-storey office building, and Mr Nichols said he was not surprised that Graeme Tapper was concerned. Mr Henry also gave evidence that the diaphragm connections caused him concern.

Now in response to this question about why did Mr Tapper then sign this off, I have referred to the evidence that the Commissioners heard, the most immediately of course being from Mr Nichols and Mrs Tapper, but as I say in paragraph 195 in my submission that evidence is given context and credibility by evidence that the Commission also heard from Mr Henry, Mr Horn, Mr Leo O'Loughlin, Mr Fairmaid and also from Dr Reay and that gave it the wider context of the relationship between Mr Tapper and Mr Bluck, Mr Tapper and Dr Reay and Mr Bluck and Dr Reay, all of which is contextual that in my submission gives credibility to the evidence that the Commission heard most specifically from Mr Nichol and Mrs Tapper.

I won't repeat 196 because I've already made that point.

Now just then going through the detail of this. The letter from Mr Tapper was addressed to Alan Reay, Consulting Engineer – and I'm at paragraph 197. Mr Harding gave evidence that all correspondence into the firm went through Dr Reay and both Mr Henry and Mr Horn confirmed that. Dr Reay said that mail coming into the firm was opened by a secretary and the letter might have been passed direct to David Harding or if he had been given it, he Dr Reay had been given it, he might simply have passed it onto David Harding himself without reading it. On the possibility that it was handed by a secretary I simply note that would seem unlikely as Mr Harding's name wasn't listed on the letter as an addressee and it also, in my submission, seems unlikely, given evidence that the Commission has heard from his staff about the control that Dr Reay exercised in the office and it's inconsistent with the evidence about his reaction to designs from his office being questioned by Graeme Tapper which the Commission heard from several witnesses.

Now neither Dr Reay nor David Harding recall the letter at all but we do know that Mr Harding saw it because he agreed that the notation that was in that right-hand corner which said, "2503, received 1986," 2503 being the internal

file number for CTV that Dr Reay's firm was using, was Mr Harding's writing. So we know that he saw it. Mr Harding said he thought, although he didn't have any specific memory of it and was really dealing from normal practice, he thought he would have passed the letter onto a draftsman to address it because he regarded the matters raised by Mr Tapper as drafting details that were missing, and some of them were and they were dealt with and I've listed those earlier on.

Now the fact that Dr Reay had no recollection of receiving the letter or intervening direct with Mr Bluck is, in my submission, not surprising as I say at 199. There were many matters during the course of the hearing that Dr Reay was unable to recall and as I said earlier in this closing he was asked about how he remembered and how things stood out for him and it was clear from his evidence, as well as evidence of others, that he routinely dealt directly with Mr Bluck and that he did go to Mr Bluck around Mr Tapper and other Building Department staff. So in my submission this was not one of those stand-out events which would have been, on Dr Reay's account, the sort of thing he would remember.

Now we also know that the letter from Mr Tapper went back to the Council because the Council provided counsel assisting with the original of that letter. We don't know how it went back. Mr Harding couldn't explain it but that is a fact, that it went back to the Council.

I turn then to the evidence from Mr Nichols and Mrs Tapper. It's hearsay and so I deal first with the questions of the admissibility of hearsay evidence and of course as the Commissioners know under the Commissions of Inquiry Act the Commission has got extremely broad powers to admit such evidence as it considers appropriate but because this issue is significant and does involve some fairly, some fairly powerful and important questions the approach that I've taken to this is to look first at what would be admitted in a Court of Law under the Evidence Act.

And I've set out the applicable principles beginning at paragraph 202 – I don't imagine I need to go through those in detail because Your Honour at least will be well aware of them but let me just, for the sake of the wider audience, state some basic principles about the admissibility of hearsay evidence and of course the fundamental principle for all admissibility of evidence before the

Courts is all relevant evidence is admissible. That's the starting point. All relevant evidence is admissible. What is relevant evidence? Well the Evidence Act says it's relevant if it has a tendency to prove or disprove anything that is of consequence in the determination of a proceeding. That, of course, has to be adapted across to an enquiry which doesn't involve a determination of something in a proceeding but the general principle in my submission is a useful guide to what's involved here. Then the other fundamental principle of the admissibility of all evidence which I set out in 203 is that even if it's relevant it must be excluded if it's probative value, it's ability to prove something, or its value in proving something, is outweighed by the risk of an unfairly prejudicial risk in admitting it, an unfairly prejudicial effect. So that's the, those are the general principles. The specific issues around the admissibility of hearsay evidence are dealt with in three other sections in the Evidence Act and I've set those out beginning at paragraph 204 and they in turn refer to the admissibility if the circumstances provide reasonable assurance that the statement is reliable.

JUSTICE COOPER:

Can I just step back a bit and challenge the proposition that I think you're, is your starting point here?

MR MILLS:

Yes.

JUSTICE COOPER:

Because I'm wondering, if we go to Mrs Tapper's statement -

MR MILLS:

Yes.

JUSTICE COOPER:

- which I take it you're wanting to place before us – If I go to your paragraph 192, this is you say, "Mr Tapper made the comment to Mrs Tapper referred to in evidence that the building was an earthquake risk."?

1515

MR MILLS:

Yes, yes.

JUSTICE COOPER:

Now if that's the disputed evidence here, Mrs Tapper says, "My late husband told me he thought the building was an earthquake risk," that's direct evidence of what her late husband told her. That's not hearsay at all is it? Unless it's being tendered to prove that the building was an earthquake risk, in that case it would be hearsay. But if it's just tendered to show that one morning Mr Tapper said to Mrs Tapper, "I'm worried about this building, I think it's an earthquake risk." Then on one level that's just direct evidence of what he said to her?

MR MILLS:

Yes I think that would be right. This of course is not the principal piece of evidence that's –

JUSTICE COOPER:

Well can we focus on the principle evidence that you think needs to be considered as hearsay, because I think unless you actually, unless there's clarity about that I think you get off on the wrong track.

MR SMITH:

Well, I think there's certainly some hearsay evidence in relation to Mr Nichols.

JUSTICE COOPER:

Yes, well it may be another point.

MR MILLS:

Yes I'm just flagging that. As to Mrs Tapper…

JUSTICE COOPER:

See it gets back to evidence about somebody's state of mind which is an issue which comes before us in criminal cases, but what is there in Mrs Tapper's statement that relies on the hearsay rule?

MR MILLS:

I think, while I would prefer it otherwise, I think one of the passages is where she said, "He…" referring to Mr Tapper, "…told me he had not wanted to sign the building off at the Council, but he was under huge pressure to sign it off from Bryan Bluck who was above him in the Council hierarchy. Graeme said he was concerned about his job." He's reporting what Mr Bluck is –

JUSTICE COOPER:

Well the first part of that's probably hearsay isn't it?

MR MILLS:

Mmm.

JUSTICE COOPER:

So just read it again?

MR MILLS:

"He told me he had not wanted to sign the building off at the Council, but he was under huge pressure to sign it off from Bryan Bluck who was above him in the Council hierarchy." That's her interpolation. "Graeme said he was concerned about his job," which again really must be a reference from Mr Bluck he has been given to be given the basis to be concerned so embedded I think in that last sentence as well is a report of the interaction between Mr Bluck and himself.

JUSTICE COOPER:

All right.

MR MILLS:

So I think those aspects of it are hearsay.

JUSTICE COOPER:

So that's what we are focussing on?

MR MILLS:

Yes. So going back then to the Evidence Act. I've set out the provisions from the Act in paragraph 206 about the word "circumstances". Do the "circumstances" provide reasonable assurance of reliability? We've looked at the deciding cases because they're nearly all criminal and not really, haven't really I don't think advanced much beyond assisting with the actual wording of the section as to what's involved here. In the end it's a question of is there a sufficient assurance of reliability?

Now at paragraph 208 I deal with the evidence from Mr Nichols, and in the end while I've sought to summarise the evidence here for convenience, reference back to the actual transcript as we've just done is the ultimate touchstone for this. I have set out the transcript reference, but what Mr Nichols said was that at the time in question he was working for the Riccarton Borough Council. He heard through the engineers' grapevine that a new building in Christchurch had been the subject of some contention over the issuing of a building permit. He heard that Graeme Tapper and Bryan Bluck had been involved in what he described as a "particularly trenchant fracas" and that concerned the issuing of a building permit. Mr Nichols said he was curious to know what the issue was and, as a result, one day when he was in the central city, he went to take a look at the CTV building. Now of course it wasn't called that then, but that's the building that he understood it was about, that's where he went to. And he said this was about six months after he had heard about this blow up. He said he was standing looking at it, standing on the footpath when Mr Bluck came up to him and they got into a conversation and Mr Nichols said he commented to Mr Bluck that he had been studying the building and trying to understand how its structural mechanism worked because it was not a system he was familiar with and, in his opinion, it

superficially appeared to lack substance. He said he commented to Mr Bluck that the building appeared to lack any substantive lateral load restraint system in the south wall vertical plane. Mr Nichols said that in response Mr Bluck said to him that when he first saw the concept on the plans he had shared those concerns. He said it still gave the superficial appearance as the construction proceeded. Mr Nichols said that Mr Bluck had then said to him that the building design incorporated a novel technological approach and while he had initially had misgivings about aspects of the design he had been convinced by Alan Reay that his reservations were unfounded. And Mr Nichols was very firm that Bryan Bluck had specifically mentioned Alan Reay and that evidence was not challenged. It matters less here than it would in a Court of law, but nonetheless it wasn't challenged.

JUSTICE COOPER:

Well I'm not sure that it does matter less here than it would in a Court of law because if the argument that you're having to resist is that the, that a Royal Commission should not receive this evidence, I would've thought that seeing it's an exclusionary rule, one would have to apply it in full vigour if the evidence was to be excluded there'd have to be very good reasons.

MR MILLS:

Yes I wasn't clear enough. I was really thinking more about it from a weight issue, that it wasn't challenged. I think you might in a Court say well that was never challenged, it's the end of the matter almost but…

JUSTICE COOPER:

Yes I still think we're at crossed purposes here. The starting premise is that as a Royal Commission one has greater powers (inaudible 15:22:55)

MR SMITH:

Yes indeed, yes.

JUSTICE COOPER:

So, in that context if there's going to be insistence on rigor I would've thought that would include challenging by cross-examination something that was not to be, that the Commission was to be urged not to accept. I mean (inaudible 15:23:16)

MR MILLS:

Yes, yes I accept that and it was surprising that this was not challenged at all, and Mr Nichols was very firm on it, that it was Alan Reay that Mr Bluck had referred to.

Now you will recall that my friend Mr Rennie cross-examined Mr Nichols about what he understood was meant by the "novel technological approach" to which Mr Bluck had referred and Mr Nichols said he thought that Mr Bluck was referring to the way that the shear wall gravity protected load system had been used in this building. So that was Mr Nichols' evidence and in my submission it was very firm and very clear and very unequivocal as to what had happened.

Then Mrs Tapper's which we've already looked at in part is set out in paragraph 214, and I know time is running so I may just, unless you want me to read that, just leave it there. Her evidence was, a key part of it I think is what we've just been looking at in the transcript. What is interesting about it is that, and of course again with her there was no reference to the CTV building because it wasn't called that back then, but she had a pretty, had a very clear view about what the nature of the issue was and the detail that in my submission is sufficient to have without any doubt identified it as what is now called the CTV building, and the Commissioners will be aware that further evidence has been given by Mr Hutt which I think puts it beyond any doubt that we're dealing here with what is now the CTV building.

1525

So perhaps the other point just to be noted about her evidence is that, and this is at paragraph 214(f) that, Mr Tapper had told Mrs Tapper that the building he was concerned about had been designed by Alan Reay and as he went out the door for a meeting he said he was going to about this, he said he might not have a job when he came home that night and she knew he was meeting with Bryan Bluck and she surmised that it included Alan Reay but she

didn't know that of course. It was just her surmise. She said when her husband came back from that meeting, even though he had gone on and on about his concerns about this building, which as she said was unheard of, because he never brought his work home but this one he did bring home. After that meeting, he never mentioned it again. Then he signed off on the structural drawings.

Now, so that's the evidence that comes from Mrs Tapper and Mr Nichols and then as I said before, I think the surrounding evidence about the relationships between Mr Tapper, Mr Bluck and Dr Reay, there was further evidence about that. We heard from Mr Henry on that and I am at paragraph 218. He referred to the interactions between Mr Tapper and Mr Bluck. He said it was not uncommon for Dr Reay's firms designs to be closely queried by Mr Tapper and that Dr Reay and his firm did not like that. He then referred to the nature of Mr Tapper, high professional and ethical standards and so on. Not a lot of tolerance and that this would often result in difficult situations which Mr Bluck then had to deal with.

And at paragraph 221, I refer to Mr Henry's evidence that he said this was clearly an existing situation when he arrived at the Council in 1992.

Mr Leo O'Loughlin, and this is paragraph 222, also gave evidence on this, he referred to having heard a "heated debate on the pros and cons of jobs", between Messrs Tapper and Bluck. Mr Henry described the stand-offs as being so severe that Mr would have to go to the sick bay to lie down afterwards to recover.

And in relation to how Dr Reay would deal with issues which Mr Tapper might raise, we heard evidence from both Mr Henry and Mr Horn.

Paragraph 225, I record the evidence from Mr Henry, that it was not uncommon for Dr Reay to go over Mr Tapper's head to Mr Bluck when he could not get Mr Tapper's approval for the building consent. And he said Mr Bluck would come in agitated from communications with Dr Reay which resulted in very heated arguments.

At 227 I have dealt with the evidence from Mr Horn. It was of course disputed by others, this reference to Mr Tapper as the "Colonel" but Mr Henry did say that Dr Reay had a practice of resolving issues with Mr Tapper by effectively going over his head to Mr Bluck. He recalled this as a general occurrence.

Now, and I then noted at paragraph 228, that when Dr Reay said that he could not recall the conversation with Mr Bluck that this all refers to, and said he did not believe it would have occurred that was because, at least as I heard his evidence, because he said, "Well I would have taken Mr Harding with me." So in my submission there is nothing here which really is a clear memory saying, I didn't do this and so on. So, well if I had done it, I would have taken Mr Harding and didn't remember taking him so I can't have done it and in my submission the evidence is such that this would – as I said before would not have been a stand out circumstance and the surrounding evidence is strong and compelling that this did happen.

And so at paragraph 229, it is the concluding submission. I say that it supports the following conclusions, the various points of evidence that I have referred to.

First, designs were likely to receive close scrutiny from Mr Tapper, particularly those from Dr Reay's office.

Secondly, he had raised an issue in relation to the connections between the north shear core and the floor slabs which had a direct bearing on the gravity protected shear wall load protection system.

Third, the issue was not resolved before the permit was issued.

Fourth, because of its significance it was unlikely that he would have accepted it without substantial resistance.

It is likely therefore to have resulted in the involvement of Dr Reay who, on the evidence, did see the Tapper letter and on the evidence would not have reacted well to it.

I repeat again that the original came back to the Council and there are really only two candidates for this.

It actually says under (g) the only likely candidates but there are only two candidates in my submission. One is Dr Reay, the other is Mr Harding. It is one or the other and in my submission because of Mr Nichols' evidence and also because of the relationship that we've heard so much about between Dr Reay and Mr Bluck the person who did this is Dr Reay.

At paragraph 119 just in summary I set out the factors, the circumstances in terms of the Evidence Act that in my submission do provide a reasonable assurance that the statements are credible.

JUSTICE COOPER:

That number is obviously wrong, isn't it?

MR MILLS:

Yes so it is.

JUSTICE COOPER:

And also this is a paragraph I have been waiting for, I think it might have strayed really because it's – this paragraph is the conclusion of why, in terms of the Evidence Act, there are circumstances relating to the statement which provide reasonable assurance that it is reliable so it would be better placed several pages earlier.

MR MILLS:

It would, it might be why I had a number that didn't fit.

JUSTICE COOPER:

Maybe, but I've been looking for it and now I have found it. That is all right.

MR MILLS:

Some element of collective authorship in here no doubt has played a role. Anyway so that's all I have to say on that issue unless there are any questions and I think we are at the afternoon adjournment so.

JUSTICE COOPER:

No that is fine, thank you.

HEARING ADJOURNS: 3.32 PM

HEARING RESUMES: 3.48 PM

MR MILLS:

There is just one final issue I should mention on the issues around the Tapper etc discussions which I'd overlooked and this relates to the issue that was, I think probably was foreshadowed in some of the questioning around Mr Hare's work on the drag bar question. You will recall that the evidence was that in the course of dealing with that issue Mr Hare met with Mr Bluck and asked him about the building. You recall the evidence on that, and I think it's already been foreshadowed by my learned friends behind me that it's significant that Mr Bluck didn't raise any of the sorts of issues that he had discussed with Mr Nichols about having been concerned about it and so forth and, more significantly, didn't raise any issues about previous discussions with Dr Reay. Now my response to that is that, of course, he wouldn't because what he says, according to Mr Nichols, he was persuaded by Alan Reay that it was all okay so why would he express any concerns about the building. There's no suggestion here that Mr Bluck signed off or told Mr Tapper to sign off on a building that he thought was defective. Rather it is that he was persuaded that it was fine and from that point on there's absolutely no reason to have any surprise that he doesn't mention anything more about it when he's talking with Mr Hare. So that was just a final point I wanted to note on that.

I'm coming now to a rather dense part. I don't say that as a criticism of the material, but it is fairly dense and difficult material on code compliance and so what I'm proposing to do with this, unless the Commissioners want me to deal with it in some other way, is not to go through that in any fine detail but rather to lay out the approach to the interpretation of this issue which counsel assisting contend for. In other words the issues around the priority of Bylaw 105, the way to interpret the interaction and any areas of straight disagreement between the two codes, 3101 and 4203, and then simply from there to outline or to list the issues of non-compliance for which counsel assisting contend but the much more detailed part of this analysis, unless the

Commissioners wish otherwise, seems to me be, it's laid out there, it can be read –

JUSTICE COOPER:

Just take it as read and we can consider it. I'm happy with that, anybody else? Mr Laing do you see any difficulty with that approach.

MR LAING:

Well, Sir, we track my friend's submission quite closely so I don't think there'll be any difficulty you counter-pointing or, indeed, Mr Rennie's submissions as well on that topic so we follow the same sort of order but, obviously, if there was anything the Commission wanted to raise with us at the time that's fine.

MR RENNIE:

Yes, Sir, I concur. I think that the Commission is probably faced with ultimately putting the submissions side by side and it's likely to be a desk job rather than something assisted by oral interchange so….

JUSTICE COOPER:

All right, thank you. I think that's sensible.

MR MILLS:

It's probably a relief all around. All right then let me then take you through the issues I want to deal with and what I've done for my own purposes is to create, in effect, speaking notes for myself to just follow this through. I will refer you to the paragraphs in the written submissions as I go but I've, in a sense, re-ordered it to try to bring out the key points on this interpretation exercise that I'm going to spend a little bit of time on. So the submissions on this in the written submissions are paragraphs 258-440 and they proceed really on the basis of a series of propositions which, in my submission, are correct. And they are, as I've restructured them as follows. The two relevant standards which, as the Commissioners will know, are 3101 and 4203 did not have legal force in their own right in Christchurch at any relevant time. They were standards not things that had legal force in their own right. They only

had legal effect in Christchurch to the extent that they were adopted in whole or in part in Bylaw 105 and I've dealt with that at paragraph 278 of the submissions, probably some other places as well but that's dealt with there.

The Bylaw came into force on the 1st of December 1985 and was based on a Model Building Bylaw and it was adopted by the Christchurch City Council in the exercise of its powers under the Local Government Act and the Standards Act. Now the Bylaw, as a matter of legal analysis, is an enactment in what was then the Acts Interpretation Act 1924. It's within the definition of an enactment, and an enactment is said to include a regulation and a regulation includes a bylaw. So that's the way I get to the submission that a bylaw comes within the Acts Interpretation Act as it then was and the principles laid out there about how interpretation is to proceed when a Court is interpreting and, in my submission, that's equally relevant here. Of course the 1924 Act has now been replaced by the 1999 Interpretation Act but the principles are very similar.

JUSTICE COOPER:

I'm not sure that that applies any more, that a bylaw is an enactment, that it wouldn't matter.

MR MILLS:

No, although I think it does. I think we looked at both of them, both the current Act and the '24 Act. I'd need to confirm that.

JUSTICE COOPER:

But it doesn't, it's not relevant.

MR MILLS:

No it's not relevant but certainly under the '24 Act an enactment includes a regulation and a regulation includes a bylaw so that simply leads to the submission that the Acts Interpretation Act applied to the interpretation of this bylaw.

,Now I think the Commissioners already know but Bylaw 105 includes both NZS4203 and 3101 in their entirety in Schedule 2. As I think the

Commissioners also already know Schedule 2 is specifically said not to be part of the Bylaw but the Bylaw deems compliance with the Bylaw if those provisions in the schedule are complied with so, let me put that differently. It's deemed that compliance with 4203 and 3101 are compliance with the Bylaw but in the absence of evidence to the contrary. So that's the way Schedule 2 works. But, and this is significant in terms of the interpretation which I will be urging on the Commission, Schedule 1 has incorporated selected clauses from 4203 into the Bylaw itself and that process of incorporation of particular clauses into the Bylaw does give them legal effect directly as opposed to a means of compliance subject to evidence to the contrary and the Christchurch City Council's closing submissions you will see, when they are delivered, that they have got a useful background to the adoption of this model bylaw in Christchurch which is dealt with in that closing. Generally no disagreement with any of that.

JUSTICE COOPER:

Mr Mills, contrary to what I asserted just a few moments ago, I see at paragraph 273 of these submissions you do submit that the 1999 Interpretation Act applies and, indeed, from what I can see the discussion actually relies on that Act. Is that the right (inaudible 15.59.12 – overtalking) to take.

MR MILLS:

Well no this was a mistake. When we did the research on this we looked at the 1924 Act, we also looked at the 1999 Act. It's the 1999 Act that the gremlins have got in here and put it in here. It should be a reference, I should draw your attention to that, it should be the 1924 Act because that was the one that applied at the time –

JUSTICE COOPER:

When the bylaw had to be applied.

MR MILLS:

Yes and equally it works in the same way as is set out here in terms of being within the Act under the same, in the process that I referred to five minutes ago.

JUSTICE COOPER:

So 273 really should be referring to the Acts Interpretation Act –

MR MILLS:

Interpretation Act 1924 as should 274, yeah.

JUSTICE COOPER:

1924.

MR MILLS:

Correct.

JUSTICE COOPER:

Right and presumably the Section references are wrong.

1600

MR MILLS:

Yes I suppose they will be actually but we can easily correct those for you.

JUSTICE COOPER:

If you can let us know the reference.

MR MILLS:

We've got, we have research on this which is easily accessible.

Now the only area that on my review last night of the Council's submissions where we might part company on this is those submissions do say that the history of the adoption of the bylaw, and this will be developed more fully by the Council, if need be I suppose I can comment on it again, but the history of that they say contradicts the argument I am putting, or counsel assisting are

putting, about the way in which the bylaw alters the provisions of 3101 and 4203 and takes precedence over them where it alters them but I just note for your attention when you see the closing submissions, paragraphs 57, 58 and 62 in my submission in anticipation of it actually support the submission I'm putting to you that the bylaw has deliberately cherry picked provisions out of 4203 and chosen to give them direct legal effect through the bylaw and it has been a, I don't know, we don't know the background sufficiently to say, well this is why they took this one and that one and that one, but in my submission there's been a deliberate exercise in putting the two standards in their entirety into schedule 2, for carrying selected clauses across into schedule 1 and giving them legal effect and that underpins a significant part of the more general submission from counsel assisting about the ductile versus non-ductile issue because some of the provisions that were carried across I will be saying to you, and it's in the written submission, bring across the life safety issues and give them specific legal effect within the bylaw. And my submission to you is that's significant, that it does alter the approach taken in the standards on this issue about ductile versus non-ductile because they're bringing that across deliberately and putting it into legal effect through the bylaw.

Now in saying that I certainly recognise, as you will be aware, that that isn't the approach or the interpretation that was being placed on these provisions by almost all the structural engineers that the Commission heard from but then equally I would say that the, certainly I thought it was fairly clear from most of the witnesses that if they did make reference to bylaw 105 it had not occurred to them that there might be something in there that was different to what was in the two relevant standards and they were really, their Bible was the two standards but my submission will be that there are issues in the bylaw that do have an impact on the interpretation of the standards in Christchurch.

Now one other point to be made on this issue about how to approach interpretation in Christchurch at the time is that the more general loading standards in 4203, they're treated as a means of compliance contrary to proof to the contrary.

JUSTICE COOPER:

Subject to proof to the contrary?

MR MILLS:

Sorry, subject to proof to the contrary. So this is 4203 in the schedule, the second schedule, so 74 is treated as a means of compliance with the bylaw subject to proof to the contrary but 3101 was only a means of compliance with the concrete elements of the bylaw. There are concrete elements in the bylaw. So that's treated not as a general means of compliance but as a means of compliance for the concrete elements of the bylaw. So it's confined to that and, again, that has some implications, in my submission, for interpretation.

This distinction which is drawn in the bylaw between the general structural design method and the detail to design particular construction materials, here of concrete, which is set out in clause 11.1.5 of the bylaw, has got particular significance in relation to the issue of whether the columns can be defined as secondary elements, and that issue is developed in the written submissions at paragraphs 281 and 282. And it's relevant here, it harks back to the point I've just made, that the reference to secondary elements is only found in 3101, not 4203, and I hark back to the point I just made that 3101 is only a means of compliance with the concrete elements of the bylaw. So in terms of the general provisions 4203 is the relevant standard and you'll see that point also developed at paragraph 283 of the written submissions.

Mr Elliott is just reminding me that there is a definition of secondary elements in both 4203 and 3101 and there is, I think again you'll hear submissions on this from my friend Mr Rennie, or at least it's in their written submissions, which I think are saying that this argument that the definition of secondary elements in 4203 is the relevant one here, is not correct because the way in which we're putting that argument says that there is a conflict between the definition of secondary elements in 3101 and in 4203 and for the reasons we're putting forward the definition in 4203 must take precedence. I think the argument that's put forward in the submission for Dr Reay and his firm says, no, that's not right that the reference to secondary elements in 4203 and 3101 actually have different meanings and so the premise for saying that they're in conflict and therefore 4203 takes dominance doesn't arise because there isn't

a conflict between them but you'll see that more readily when you see the written submissions from Dr Reay and his firm but certainly the premise for my submission is that it is the definition in 4203 which is brought into the bylaw and has, is the controlling one.

Now I then turn to other aspects of interpretation and how it should be approached and begin with what we say are the principal purposes of the bylaw and of course under the Acts Interpretation Act it's the, one looks for purpose, one reads text in light of purpose, to use the modern language of the current Act, but it's the same principle under the old Act, and the submission is that the principal purpose here was first that in the structural design of the building collapse had to be avoided and, secondly, the probability of injury or loss of life was to be minimised. And that's been carried through from 4203 specifically into the bylaw as part of this cherry picking exercise and it's been given legal effect.

Now the next point which is probably not quite in order but the next point I make in terms of how to interpret these issues is that if there's a conflict between 3101 and 4203, 4203 is the latest standard. It's two years later than 3101, and it is of course the more general standard and leaving to one side entirely the bylaw for a moment just interpreting the two standards.

1610

If there is a direct contradiction between those two provisions then my submission would be that the later standard would take precedence in that interpretative exercise. And that is discussed at paragraph 283 of the submissions and also I think at 286. Then the conclusion that follows from that is at 290. So that's –

JUSTICE COOPER:

But that is not based on chronology though is it because it is based on an assertion in the standard itself.

MR MILLS:

Sorry excuse me?

JUSTICE COOPER:

It is based on an assertion in the standard itself rather than chronology.

MR MILLS:

Well yes it is based on both aspects in my submission. Yes the standard says that itself, but also in general a later matter dealing with the same issue if there are any, then one would generally give precedence to the later statement. That is the submission in any rate.

JUSTICE COOPER:

Okay but I couldn't see it in 283 which was the first paragraph you referred me to.

MR MILLS:

I better go back and have a look at this rather than my notes.

JUSTICE COOPER:

286 is the second part of your proposition.

MR MILLS:

Yes I was just going to say 286 is the second part.

JUSTICE COOPER:

That is why I intervened and said, well that's the bylaw itself, or the standard itself saying that.

MR MILLS:

Yes agreed, yep. So then, I'd just identify the principle areas of non-compliance, principle areas of non-compliance for which Council assisting contend and they are set out at paragraph 260. This is jumping around a little bit because I have reorganised it, and they are symmetry, the connections between the diaphragms and the north shear core and the reinforcement of the columns and beam columns connections. So those are the principal

areas which Council assisting says at the time of permitting did not comply with the people requirements of the bylaw and the submission is, and you will see it there 260(d) that even after the retrofit there was non-compliance.

JUSTICE COOPER:

The other respects in which the building did not comply, which you mentioned in sub-paragraph (b) there, are they not particularised because they are less significant?

MR MILLS:

They are particularised but they are less significant and I am just looking for those and there are two of them which were identified which we accept having seen the closing from my friend. Yes, yes it is 318 set out all the ones that were initially contended for., And I think the ones which, it is now accepted, weren't non-compliant, were (f) the adequacy of the R60s at 250 millimetre spirals and cranked splice regions. We have seen the submission on that from Dr Reay and his firm. I accept that, and the other one which we accept now is (e) the anchorage of spirals on columns. So they can be crossed off that.

JUSTICE COOPER:

Is that also on the basis of what is being said by your learned friend Mr Rennie?

MR MILLS:

Yes, it is yes. We think he is right on this and so they can be crossed out and of course the spandrel panel seismic gap is just in there for completeness but no great weight is being placed on this. This was just really a shopping list so the principal ones are those first four really I think, (a)(b)(c)(d) oh, and (h) of course.

JUSTICE COOPER:

(g)?

MR MILLS:

Yes, yes (g) and (h), yes.

JUSTICE COOPER:

Thank you.

MR MILLS:

Now in terms of this argument about whether the building had to be designed in accordance with the seismic or the non seismic provisions of the standards. The argument really for the submission that is set out in great detail in this part of the submissions and which I am going to take as read, the basis for it is that Bylaw 105 is, as I have said before, carries through and gives legal effect to these two principles out of the standards that collapse shall be avoided and the probability of injury or loss of life shall be minimised and you will recall that when Dr Jacobs gave evidence he wasn't giving evidence really about the bylaw, but he certainly read the relevant standard provision as placing great emphasis on that and that led him to take the view ultimately that the columns weren't secondary elements, columns and beams weren't secondary elements, at least as I recall his evidence. And Professor Priestley at one point as well also said that's in some of the background correspondence we have seen, placed great emphasis on, collapse should be avoided probability of injury of life should be minimised and so what counsel assisting is submitting here is because the bylaw has cherry picked those provisions and put them into the bylaw that this very substantial debate amongst structural engineers that the Commission heard in the course of the evidence about when the things have to be designed for ductility, when can they be designed for the non-seismic provisions, that that is changed under the bylaw and that the carry across of the specific provisions means that if you are dealing with elements where their collapse would lead to the probability of injury or loss of life, then in order to comply with the requirement of minimisation that the building had to be designed in accordance with the seismic provisions of the standards. Now I appreciate that that's not necessarily going to be what as I said before what most structural engineers in Christchurch at the time were viewing as the position, certainly this building

wasn't designed in that way, but that is the submission that I'm putting to the Commissioners.

Now the written submissions then really at the beginning of paragraph 265 under the heading of "Bylaw 105" pick up those issues in detail and I don't intend to deal with those orally.

The overall submission on the interaction between the two codes and the dominance of 4203 is captured at paragraph 290. It is submitted that these provisions establish the principle that in interpreting the two codes 4203 is to prevail over 3101 where there is inconsistency. It's the nub of that point.

The more detailed development of the operation of clause 11.5.1 (d) of the bylaw, you'll find that at paragraphs 292 to 300.

And the ultimate conclusion from that, that the building was required to be designed for ductility, you'll find that at paragraphs 301 to 310.

And there's a further submission that the building was required to comply with the requirements of capacity design, and you'll see that developed at paragraphs 311 to 316.

And I think the key submission on the requirement for ductility as applied to the CTV building is at paragraph 308 which says: "It is submitted that clause 11.2.5.2 of the bylaw makes it clear how much ductility the CTV building was required to possess."

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"The building was designed to dissipate seismic energy by ductile yielding. It was therefore required to have adequate ductility. Adequate ductility would have been provided where the special provisions for ductile yielding detailing in 310A, 3101 were met and they were not".

Now one of the arguments that's been put up in opposition to the interpretation which has been urged on the Commissioners is that this interpretation would read out of effect the provision in 3101 that permits non-seismic columns and that's dealt with at paragraph 310, and paragraph 310 sets out the response to that from counsel assisting as to why that isn't the case and it says it is submitted that the answer to this question, that it would read out of existence and therefore can't be correct, that permission to have non-seismic columns is provided by clause 11.2.5.2 of the bylaw which allows the non-ductile requirements to apply to small buildings. So the submission

is, no it doesn't read it out of effect. It limits it to that proviso that you'll find in that clause in the bylaw.

The argument for why the building had to comply with capacity design you'll see set out at paragraphs 311 to 316.

And the summary conclusion on that is at paragraph 315 which says the effect of these clauses is that designer of a building subject to capacity design was required to identify the points of energy dissipation and design, the remaining structural elements to be stronger and so on.

And then at 316 the fact that Dr Reay and Mr Harding failed to comply with the requirements of capacity design in a number of important respects is developed more fully later in the submission and I won't take it beyond that.

The issue of load paths is touched on in paragraph 319. It's not strictly a code compliance issue but a significant one in terms of fundamental engineering principles.

There is this issue of asymmetry, is obviously one that is contentious, the submission that this building did not comply and was required to comply with symmetry and the Commissioners will be well aware of the language around that which is set out, I think it's at paragraph 333, which is that it complied as nearly as practicable with symmetry, sorry it's 320 sets out the provision, which is also carried into the bylaw.

What I just draw your attention to on this without going into it in much further depth is that Mr Harding's explanation for the decision to design in the way the building was done, which Dr Jacobs described as being asymmetrical, at least in the east-west direction, was that it wouldn't be architecturally acceptable and the submission that's developed in here is that asymmetry and the requirement of the code about asymmetry, and the requirement of the bylaw about symmetry must have more teeth to it than that. When it says that it has to be as near as practicable, that there needs to be a bar that is met before one moves away from the requirement of symmetry, and Mr Harding's very simple view that just because there was an architectural issue with this you could throw symmetry out the window cannot be what that provision in the standards, nor as carried through into the bylaw, can mean and in our submission the impracticability requirement is not met and there has been a

code and bylaw, more importantly a bylaw breach, in relation to the asymmetry of this building.

The diaphragm connection issues, you'll see those developed at paragraphs 337 to 365 and in the interests of time I won't detail them.

The issue of non-seismic detailing of columns and beam column connections is developed at paragraphs 366 to 422.

And the key submission ultimately, which is at 366 points (a) to (d), is that there are four grounds as it says there as to why the seismic provisions of 3101 should have been applied to the design of the columns and beam column connections and any one of these grounds if accepted would be sufficient, and you'll see them set out, their capacity design, failure of the columns was a risk to life, it's not open to the designers to treat them as secondary elements, but if they were able to be treated as secondary elements the prescribed drift limits were exceeded.

But again, again and again this general submission I'm putting to you does come back and rely heavily on clause 11.5 1(d) of the bylaw with the obligation to avoid collapse and minimise the probability of injury and death and the submission that reliance on the non-seismic provisions of 3101 can't meet those obligations in relation to this building. Now there's a lot more detail and no doubt a lot more that could be said and if it was going to be dealt with in detail I'd be asking my co-counsel Mr Elliott to deal with that but unless you want that done I'm proposing to leave it for the Commissioners to read.

JUSTICE COOPER:

Yes.

MR MILLS:

You'll hear more on this from the Council and from Dr Reay's team and I will turn now to deal with the issue of building assessments which I think I can deal with relatively briefly.

JUSTICE COOPER:

Thank you.

MR MILLS:

Now on the issue of building assessments. Sorry I didn't touch on best practice and I won't do it in oral submission because I think it's clearly set out. You'll see that dealt with at paragraphs 441 through to 475. No doubt you'll recall the evidence on this, a lot of evidence given by Professor Mander on this question of best practice. It is part of the Commission's terms of reference but I think what's set out there is probably sufficiently clear on what we're saying about it. Unless you want me to take you through it at this point I'll just leave it to be read.

JUSTICE COOPER:

Thank you.

MR MILLS:

Turning then to the question of building assessments. This is dealt with at paragraphs 476 to 554, and while there are specific issues about this in relation to the CTV building as the Commissioners will be aware a number of the issues that have emerged are ones that have been common to earlier hearings that the Commission has had about the difficulties with the stickering system and the way in which it's been interpreted by recipients of green stickers and so on and I do not need to canvass that again. I know you've had a hearing this week which has been dealing with assessments as well. So just let me try to short circuit this by touching on the issues that were distinctive about the building assessments on CTV. Now just for the chronology on this, two of them were, there were two assessments done by the Council, one was a level 1, one was a level 2.

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They were both done after the September earthquake. One was done on the 5th of September, the other on the 7th. There was a further one done for the owner. This is the one done by Mr Coatsworth, which was, as far as the owner was concerned, was effectively being managed through Mr John Drew. That was done on the 29th of September. There was a follow-up inspection on the 19th. After Boxing Day there were one Council level 1 and one USAR damage assessment, both on the 27th of December and in terms of another issue in

the terms of reference there was no remedial work that had been done prior to the building collapse on the 22nd of February.

The Commissioners will recall the issue about the level 2 assessment that the Council did on the 7th of September and the fact that it required an engineer. No engineer was involved. Technically that wasn't a level 2 assessment at all. So that's a sort of a quick overview just to refresh memories really, apart from anything, as to what happened here.

Now the submissions that the Commissioners have heard about the weaknesses with the stickering process that you've heard before, they are given again at paragraph 490 and 491, the concern about the green stickering process and 491 just refers to the evidence from Mr Kehoe that in the United States concerns over the green stickering issue have lead to the wording being changed from "safe to occupy" to "inspected" but that no doubt has been covered off in other hearings as well.

I think there are issues with the post-earthquake assessments on the CTV building that have again highlighted shortcomings in training and inadequate understandings by some of those involved in the assessment process and you'll recall the evidence from Mr Simpson from the Council who was involved in the post-September assessments and what he said is dealt with at paragraph 492 of these written submissions.

And it's also I think evident in the different views of the three building inspectors about what they were supposed to be doing. That's referred to in paragraph 493 of the submissions.

And that leads to a submission which is at paragraph 494, which is this: that it was apparent from the evidence of Mr Kehoe that although New Zealand has guidelines from the New Zealand Society of Earthquake Engineers it does not appear to be the more detailed information that is available in the USA to assist in the assessment of buildings such as FEMA 306 or the ATC 20 Field Manual and the urging that that needs to be addressed.

There was as the Commissioners will no doubt recall confusion amongst the three Council staff who did the post-September assessments about what they were doing. That's dealt with at paragraphs 495 to 503 and this is this issue about not having an engineer as part of the level 2 assessment but going ahead and doing it any rate.

And one of the concerns about that that emerged, which is dealt with in paragraph 499, is that they went ahead apparently and did the level 2 assessment without an engineer, knowing by that point that it required an engineer, but on the assurance that they got from the building manager, or the person they thought was the building manager, and we don't know who that was, it may have been Murray Wood who died in the collapse, that there would be an engineering inspection to be arranged. It may have been Mr Drew, but in any event on that assurance that there would be an engineering inspection done they apparently concluded that it was okay to sign off a level 2 without an engineer being involved in that.

Now the concern that that creates, and again we're short on some evidence, but it's set out at paragraph 500, which is the way in which the occupants of the building interpreted what had been done and you'll see the section, the quote there from an email from Murray Wood, which went out to the occupants, the CTV staff, within an hour of the inspection by the Council staff giving this assurance to the occupants that they'd had these three engineers through and I think there's little doubt on the evidence that that among other messages that came through to the occupants lulled them into a false sense of security about the extent of the assessment of the building and it may in some cases have lead to some people being there who would have not been there. There were some people who were going to move out. They could have gone earlier. Who knows? But it's the same issue that you've seen in other hearings. This just had rather more tragic consequences here potentially.

Further issues about some confusion in the Council processes are referred to at paragraphs 504 to 506 which includes the evidence that the Commission heard from Jo-Ann Vivian about a phone call she put to the Council. It's set out in 505. I won't read it. It indicates confusion of information flows and paragraph 506 makes the obvious submission that no doubt has already been well taken on board by everyone involved in what's happened, that adequate information systems really need to be up and running as fast as possible.

JUSTICE COOPER:

It really needs to be developed before an earthquake rather than after it.

MR MILLS:

Yes it does. Absolutely. Now of course the issue that got the greatest attention in this part of the hearing was the assessment that was done by Mr Coatsworth and that's dealt with at paragraph 507 to 538 and again at 548 to 554 and rather than going through that I'll just highlight what I think are the issues of significance that emerged from the evidence around Mr Coatsworth's assessment.

The first one, and again this is probably familiar territory to the Commissioners by now, it was of course a damage-based assessment that he did and we say in the submissions that there's no criticism of that. It was what was being done all over the city. As a damage-based assessment it was reasonably thorough and competent. But there were a couple of issues around it that do attract some criticism in this submission. The first one is that it's not clear that Mr Drew adequately understood the limitations on the nature of a damage-based assessment. Mr Coatsworth put the proposal to Mr Drew as to what he was going to do, not vice versa, and we've again got this issue of potential miscommunication between engineers who know what they mean and lay people who, on the face of it, do not unless they're told clearly.

The second point about the damage-based assessment which is made at paragraph 512 is that damage-based assessments do proceed from the assumption that the building was code-compliant when it was permitted and proceeds really on the basis of a set of assumptions associated with that and of course here that was dangerously wrong. And that of course leads into the question that's been raised before about the importance of structural drawings in doing an assessment of a building.

Now the history of that in the present case is set out at paragraphs 513 to 525. I won't go through that in detail, the Commissioners will no doubt remember this, but it became an issue principally because in his initial report Mr Coatsworth had flagged access to the structural drawings as being something that would be useful. And at the time that that was raised he couldn't get access to the drawings because of the post-earthquake events but then subsequently Mr Drew found that you could get access to them but he never drew that to Mr Coatsworth's attention and so we have this again,

this rather unfortunate sequence where I think Mr Drew is saying, well it was never brought to my attention sufficiently that it was all that important. It's not really flagged that way in the report. On the other hand Mr Coatsworth's saying, well, you know, in effect, if you'd told me they were there then I would have looked at them.

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So they were never looked at, even though eventually they did become available and, in the course of the evidence, it was accepted that, and I say this at, or this is said at paragraph 518, "Mr Coatsworth accepted that if he had seen the structural drawings it was likely that he would have picked up the inadequate connections between the north shear and the floor slabs". Now remember, of course, no permit was ever obtained for the drag bars so they would not have shown up on the structural drawings. They would have revealed it in its original form and would have caused the same alarm probably to Mr Coatsworth that it had caused for a number of other people who had viewed that connection and he accepted that he likely would have picked that up if he'd seen the structural drawings.

And Mr Kehoe, and this is at paragraph 521, also thought that if he had, if Mr Coatsworth had seen the drawings he would have been likely to have identified a concern with that connection.

Now that leads to a submission, which is at paragraph 522, that while it's accepted that the majority of engineers at the time would have proceeded just as Mr Coatsworth did that, in future, at least with inspections of multi-level buildings that are owner-initiated and are outside the emergency response period that they should be required to include a review of the structural drawings. And, in addition, with the Council level 2 assessments that would be highly desirable and that, of course, requires, I think the drawings to be available electronically, an issue that has been dealt with or touched on in previous hearings.

Now 523 also just records some evidence from Mr Kehoe about the position in California which the Commission, I think, is aware of. Possible alternative to this issue about structural drawings having to be available and so on which did create an incentive system for building owners prior to earthquakes to get surveys, desktop surveys of their building done so that they could then be first

in the line really to get them reopened after an earthquake and I imagine that's been raised in other hearings but it is a matter that does seem worth another hard look to see whether that might offer something in New Zealand.

In the end counsel assisting, while expressing some criticism of various aspects of what occurred here, don't make any strong criticism of the way Mr Coatsworth did his inspection. The submissions do observe that Mr Drew took a rather more casual approach than was wise and I think we saw the way he dealt with his evidence. He was probably in the language risk-positive rather than risk-averse. Some things should have been done here that would have been better but the criticism that's made in the submissions is relatively mild. But there are areas that we think could be improved.

One of the other areas of some criticism of Mr Coatsworth is that he didn't get inside the lift shaft and you'll recall the evidence from Mr Graeme Smith who did get inside the lift shaft and saw those vertical cracks. It would have been a good idea, one would have thought, given Mr Coatsworth had identified the significance of the north core connection, to have done that as well but he did not.

Then, of course, the other evidence that the Commission heard on stickering was from Professor Mander who recommended closure by fiat. That issue got refined, I think it's fair to say, in the course of the evidence but the Commission knows full well what the evidence was on that and that doesn't need anything further here.

So there were also some recommendations that Mr Coatsworth had made to Mr Drew about further inspections that should have been done. One of them was the removing of the pinboard lining on the level 1. They weren't carried out. Again probably a slightly too casual approach on this but, as you'll be aware, Mr Drew's evidence on that was CTV was going to move out. I think he said that the person he was dealing with at CTV went white when he suggested that they would have to take out this pinboard because it meant CTV would move out so again just a fact in the sequence but no great criticism I don't think can fairly be made of it. So unless there's any questions on that I will now try and move quickly as well through the construction issues.

JUSTICE COOPER:

Mr Mills, I'm not wishing to stop you moving quickly but it's obvious to me we'll need to be here on Friday so unless, I say that just in case it influences you in the choices you make.

MR MILLS:

Yes, all right, I don't think I'm leaving out anything that requires really close word by word reference so I probably will deal with the construction issues slightly more carefully because there is at least one issue there that may have played a role in the collapse sequence and there are some rather troubling issues I think around what happened on the construction site. So I'll deal with that now.

So this begins at paragraph 555 on page 116 of the written submissions. And I think it's not a matter of dispute that there were some poor quality construction issues. Some were identified in the original DBH report and others, I think, have emerged in the course of the evidence. The principal ones are listed at paragraph 556 of those written submissions and I'll just read them out.

The first one was what we've described here as the bent back reinforcement bars in the precast beams that were connected to the north shear core and the Commissioners will recall a photograph of that which showed the very strong steel wrapped back around the end of the precast beam and it was a beam that was designed to go into the side of the north shear core so that's one of the obvious construction errors that occurred. No clear explanation for that but if one was looking at how did this all work that would certainly be on the list of things that went seriously wrong and that happened on every level except level 2. So the intended connection of that beam into the north shear wall, which was to have the steel going into the wall, didn't happen. Instead the steel was wrapped around the end of the beam which just bumped up against the shear core as far as one can tell from the photographs that DBH had in its report.

The second one that we've listed here is insufficient spiral reinforcing through the beam column joints and the Commissioners will be probably more aware of this than I am. The difficulty, first of all, in getting that spiral to go up through the beam column joint, very difficult construction requirement but,

secondly, the collapse evidence indicated virtually no evidence that the spirals had been carried up through the beam column joints. Now there's an issue as to how much difference it would have made but, nonetheless, and the answer's probably not a lot, but the fact is that it wasn't carried up.

The next one we've listed is insufficient attachment of the column C18 to line DE and that's the column that was featured several times which is right up near the north shear core.

And then the fourth one is insufficient spiral reinforcing to properly contain and centre the vertical reinforcing bars and you may recall the photograph that was put in at one stage of the hearing which showed those vertical steel reinforcing rods had gone right off to one side of the concrete cover, almost to the edge, which appears to be because of insufficient spiral reinforcing to hold them in place when the concrete is poured.

So those were the particular construction defects that we identified plus this very important issue of failing to roughen the smooth ends of the precast in situ concrete interface which has been identified, I think, as a potential contributor to the failure of the building.

Now you will no doubt recall that at least initially, I think it was Mr Scott primarily, described the construction site in relatively glowing terms.

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But my submission is that that is not correct and that this was, when one pulls together the various threads of evidence that came from different people, this was not a happy, or let me put that differently, this was, in some respects, a troubled construction site and I'll expand on that now. And I think somewhere along the line one of the witnesses, one of the expert witnesses referred to troubled sites not infrequently leading to problem buildings.

Now, first of all, financial difficulties. I say at paragraph 558 that the financial difficulties which beset the parties involved in the CTV project are likely to have had their genesis in the nature and timing of the project. It was, as I've said before, in that mid '80s design, speculative design-build project, fixed price, very high interest rates – 26 percent was mentioned by one of the witnesses – there was no principal tenant signed up at the time and it was not long before the 1987 sharemarket crash so the context of this is not terrific and it does suggest at some point there might have been some pressure on to

get this moving and to not do things quite as well as they should have been done. Now Mr Brooks initially recalled that in spite of financial problems affecting Prime West which, by this time, had purchased or bought out Williams Construction, he said they were paid in full but he conceded that after the takeover of Williams Construction by the Richmond Smart Group in April 1987 there were financial problems and he accepted that that could have affected the workmanship on the project and he referred to problems with suppliers and subcontractors not being paid. He then eventually did say that the situation that developed in 1987 was one which had an unsettling effect on everyone and, as a result, he accepted it could have manifested itself in poor quality workmanship. Mr Scott also, in the course of giving his evidence, referred to a change of culture within Williams Construction when Smart Group took them over and you will recall that there were Court proceedings issued at one point by the Smart Group against Mr Brooks and Mr Scott and Mr Shirtcliff and, as best we can tell, the CTV building was only about half completed at that time. One can assume, I think, that that would have had an unsettling effect on some key participants in this building. It certainly wouldn't have helped matters.

And then in September, of course, September '87, the sharemarket crashes. So that let to Richmond Smart Group going into statutory management. By this time we've got Union Construction has taken over part of the job from Williams Construction, or has taken over the job from Williams Construction. Angus Group has the majority shareholding in Union. They go into receivership. They've got statutory management for Richmond Smart, receivership for Angus and then soon after the CTV job finishes Union Construction gets wound up.

So, again, what emerges from this is troubling when one is thinking well how did things go wrong, as they clearly did in some respects, on the construction front. I don't want to overly exaggerate the construction problems but there clearly were some construction issues that emerged on this site and that leads to the, I suppose, submission on the inferences that can be drawn here which is at 564 about a troubled site.

Then there was evidence given about the supervision on the site and I deal with that beginning at paragraph 565 and that was, I think, principally

evidence given by Mr Brooks, Mr Bill Jones who was the foreman, and then, to some extent, by Mr Shirtcliff and the first point that emerged, and it won't be unusual to the CTV site I don't imagine, is that most of the people who were building the CTV building had begun life as carpenters and they had sort of worked their way up to this sort of building and that they were not trained for this kind of more demanding level of work although, no doubt, they had many skills. Mr Brooks said that he thought that management was demanding more of the type of foreman, given the background that Mr Jones had, that management were demanding more of him than was appropriate because they weren't trained to carry that level of responsibility in a building of this kind. That's paragraph 566. And you may recall that he compared it with his experience at the Ministry of Works contracts where there was always a Clerk of Works on the job and he commented on how incredibly helpful that was in providing oversight and really supporting the foreman on the job because that Clerk of Works would have a higher level of expertise, and that is why Mr Shirtcliff was ultimately brought in at least in part.

Mr Jones also agreed this was the first job of this kind on which he had been a foreman and he wasn't getting as much supervision as he was accustomed to, and I set that out at paragraph 567.

Now when Mr Shirtcliff was brought in, according to Mr Brooks, he was intended to provide guidance and mentoring to the various foremen on various Williams Construction jobs in Christchurch and then, this is touched on at 569, Mr Brooks said well he wasn't up to the job and although they expected him to visit the CTV site daily he clearly didn't. We heard Mr Shirtcliff on that. He didn't regard that as his job. Said he was focused on other things and so I think the evidence was that he contributed virtually nothing to lifting the standards of supervision on the CTV site.

Paragraph 571 refers to Mr Shirtcliff saying that he accepted that he essentially left it to others. He thought Mr Jones was competent so he left him to it.

Now then we come to a reference which has not been explained, which I refer to a paragraph –

JUSTICE COOPER:

There's no evidence that Mr Shirtcliff was on the site more often than he said is there?

MR MILLS:

No there isn't, no there isn't, all the evidence supports him really.

JUSTICE COOPER:

So whatever Mr Brooks was assuming was happening wasn't.

MR MILLS:

Yes, no I think the evidence is all on Mr Shirtcliff's side on this that he was hardly ever there and whatever was expected by others it wasn't materialising. So there's also a reference that I note at 574 which we picked up from one of the Council inspection records that in August 1987 a new foreman had been appointed and we've not been able to get to the bottom of that and we asked Mr Jones about that and what he said was there was a period when he may not have been on site. Now if that's the case, and we've got Mr Shirtcliff spending very little time there, Mr Brooks by then has gone to Union, Mr Jones said there was a period when he was not on the site. Again we're looking at a serious absence of adequate management of what was going on. And it looks to me as though I'm not going to quite get to the end of that so if you want me to stop there I will.

COURT ADJOURNS: 5.00 PM