Canterbury Earthquakes Royal Commission

Te Komihana Rūwhenua a te Karauna

UNDER **THE COMMISSIONS OF INQUIRY ACT 1908**

IN THE MATTER OF **CANTERBURY EARTHQUAKES ROYAL COMMISSION**

Before: The Honourable Justice M Cooper
Judge of the High Court of New Zealand

Sir Ron Carter
Commissioner

Associate Professor Richard Fenwick
Commissioner

Appearances: S Mills QC, M Zarifeh and M Elliott as Counsel Assisting

D Laing and N Daines for Christchurch City Council

R Raymond for LSC Consulting

G Jones and S Goodwin for Powell Fenwick Consultants

H Smith and K Benson for Ballantynes

H Matthews for C S Luney

TRANSCRIPT OF HEARINGS ABOUT INDIVIDUAL BUILDINGS (EXCEPT CTV AND PGC) WHOSE FAILURE RESULTED IN LOSS OF LIFE

COMMENCING ON 27 FEBRUARY 2012 AT CHRISTCHURCH

JUSTICE COOPER:

Today the Royal Commission enquires into the circumstances of the failure of the building at 43 Lichfield Street. Linda Arnold was sitting in her vehicle when a concrete panel fell from the building during the earthquake on the 22nd of February and she died as a result of the injuries she suffered. The Royal Commission extends its deepest sympathy to her husband Peter and son Alastair who I understand are here today.

MR ELLIOTT:

Your Honour, the building that was situated at 43 Lichfield Street also known as the Anderson building was part of the complex of four buildings owned by the retailing company J Ballantyne and Co. I will start by producing just an overhead view of the scene Your Honour BUI.LIC43.0027.2. Your Honour will see the red box with 43 Lichfield Street in there. Lichfield Street heads east to west and Colombo Street is further along.

JUSTICE COOPER:

So where is the main Ballantynes store? Is that at the eastern end of that block?

MR ELLIOTT:

If the photograph could be rotated 90 degrees to the right. The Colombo Street if one was to go further along Colombo Street then turn left that's Cashel Mall and the front entrance to Ballantynes from the mall it's in that direction which is on the northern side of that block of buildings.

JUSTICE COOPER:

Yes that's what I thought.

MR ELLIOTT:

And Lichfield Street is to the south of the four Ballantynes buildings and we're looking at one of those which is 43 Lichfield Street which appears in the boxed area. That's orientated north/south.

JUSTICE COOPER:

Okay thank you.

MR ELLIOTT:

And Your Honour the next photograph I'll show, if one was to be standing at the bottom right-hand corner of the red box and looking inwards towards number 43. That's the next photograph I'll show, and that's WIT.CUS0001.8. So standing on Lichfield Street on the opposite side looking at the frontage, or in fact looking at the corner of the building, and Your Honour will note the building there is in fact seven levels. There's a basement level as well. There's a retail section which can be entered from the ground and I think another level above that and there's parking levels directly above and that building was a seven level ductile framed building with precast, pre-stressed floors supported on transverse frames with seismic beams. There were four levels of carparking above the two levels of retail space.

WIT.CUS0001.7 shows the same building looking directly from the south and in particular note the three rows of spandrels at the top which I'll refer Your Honour to again shortly.

So following the 4 September 2010 earthquake there was a level one rapid assessment. That was on 5 September and that noted minor damage and resulted in a green placard. Powell Fenwick Consultants Limited carried out inspections of the building on 5 September and 19 November on behalf of the owners. Although significant cracking to internal linings was noted which required repair, these were not a structural concern and the owner of the building then proceeded to have the required repairs carried out.

After the Boxing Day aftershock there was a further level one rapid assessment on behalf of the council and again this noted minor damage and resulted in a green placard.

In the 22 February 2011 earthquake the building suffered widespread and significant damage indicating that the building had been pushed close to its capacity for seismic loading and that damage included failure of transfer beams, column connection, column beam hinging, shear displacement of beams and beam elongation.

Photograph 0024.4 shows the state of the building following the earthquake. Your Honour will see that the spandrels to the southern side of the building are gone. It appears that only some of them fell on 22 February and others were subsequently removed by USAR. I'll refer Your Honour to plans shortly but there were three rows of spandrels and in each row there were two separate spandrels joined between the columns which Your Honour can see to the left just off centre and then to the right and there's another three separate spandrels which remain in place to the right.

I refer Your Honour back to WIT0001.8. The Commissioners will see it in its pre-earthquake state those spandrels extended along the southern side but they also extended right along the eastern side of the building and that will become relevant as there were some differences in the plans as to the way in which the spandrels were connected on the southern side as opposed to the eastern side. Your Honour will note in that photograph too there's a car parked in the parking space, in fact there are two cars there, and I'm about to show a photograph of that area post 22 February. That's 0027.8 and if the upper photograph could be highlighted please. So that's at the front of the building on the southern side and Your Honour will see what appears to be at least one of the longer spandrels directly over Ms Arnold's car.

So Your Honour although the building itself remained standing the pre-cast, or some of the pre-cast concrete façade panels on the south fell and it would appear that this was in part due to the absence of pre-cast ties which I will refer Your Honour to shortly from the spandrel to the floor topping. Linda Arnold was sitting in her car near 43 Lichfield Street speaking on her cellphone when the earthquake struck and at least one of the concrete spandrels that fell from the building crushed her car killing Mrs Arnold.

1010

Your Honour there will be some discussion about the plans so I'll just highlight one or two sections of the plans for the Commissioners. Firstly, 0023.14. These are behind tab 2 in the Commissioners' bundle. These are in fact documents I think produced by Chas S Luney Ltd as opposed to plans. They just show in diagrammatical form how the building was to look and if the top diagram could be highlighted first please. Top left. The Commissioners can perhaps see there the top left is the diagram of how the building was to look with the upper three levels. It appears that Mrs Arnold's car would have been in the vicinity of that first tree in the front between the two elongated windows which is directly below the longer panels directly above.

JUSTICE COOPER TO MR ELLIOTT:

Q. There's a, on that frontage there's a further set of panels at the end. Is that at the eastern end?

A. Yes Your Honour.

Q. So there's, on each floor there's three panels on this frontage. Is that right?

A. Yes Your Honour – of different size, different lengths.

Q. Yes, yes.

A. Running between columns.

Q. Yes and the one that we're most concerned with here is the longer, central one?

A. That appears to be the case Your Honour, yes.

MR ELLIOTT CONTINUES:

The building to the left was an existing carparking building which I think was then connected to the newer Ballantynes' building with ramps running between them. That was an existing Council carparking building.

And then just referring to the section of the plans which will have most attention during the day, 0023.18. So if the centre panel S5 could be enlarged please. Your Honour that is the centre of the three panels, S4, S5 and S6 were the three panels at each level, S5 being the longer panel in the

middle with three to be installed. And according to the plans at least it says that would have weighed approximately six tonnes.

In the bottom left of that document there are two, described as typical sections, and if those two bottom left could be enlarged please. So they're sections of the pre-cast spandrel panels and there are two, one of them relates to S1, S2 and S3 which the panels at that top of that page. Those ones, the evidence will be that those ones were to be affixed to the eastern side, whereas S4, 5 and 6 were to be affixed on the southern Lichfield Street side. So the typical section to the left there refers to 1, 2 and 3 and the one on the right refers to 4, 5 and 6 and there is a difference between those two diagrams, namely the, on the left diagram there's a horizontal, described as a seating bracket which runs off just about two-thirds of the way down to the left and the Commissioners will see that there is no similar bracket in the right-hand detail and Mr Cusiel is giving evidence about that and his evidence will be to the effect that there was an omission so that that seating bracket did not appear in both. The effect of that Your Honour was that, Commissioners, was that the panels on the southern side were secured by four bolts, two at each end of the panels secured to the columns and they can be seen in BUI.LIC43.0027.9 … 0027.9, rotate to the right please, 90 degrees. So Your Honour we're looking there at the, the gap left by the central panels. That's the right-hand side of it, the points at which the panels were to be secured appear there on the right and the Commissioners will note that the upper panel still appears to be in place suggesting that it was removed at some point after 22 February.

1020

JUSTICE COOPER:

So this is a police photograph taken shortly after the earthquake is it?

MR ELLIOTT:

Yes Your Honour, I don't know what date it was taken. It's a police photograph. The Commissioners will note this is somewhat different to the

other buildings we've been examining in recent weeks in that it's not a unreinforced masonry building, it's a more modern building, or was a more modern building. I understand it's now been deconstructed and it's not a case of a structural element failing. This was a non-structurally important element which has failed although the building remained intact. So the issues which the Commissioners will be hearing about today are firstly the failure mechanism of the building and in particular what caused the concrete panels to fall. There will be some evidence about the building itself and its state, but the particular focus is on those panels.

JUSTICE COOPER:

Mr Elliott, just to confirm the implications of what you're saying to us. If it's right as it appears to be the case that the third of these longer panels remained in place after the earthquake, it was on the evidence fixed at the column in exactly the same way as the two that fell off?

MR ELLIOTT:

Yes Your Honour.

COMMISSIONER CARTER:

Mr Elliott, there is another difference in those two sections and that concerns the reinforcing steel that's shown on the left-hand section and not on the section through this spandrel that fell. Are you intending to just draw our attention to that?

MR ELLIOTT:

Commissioner are you referring to the section in the bottom left of the diagram?

COMMISSIONER CARTER:

Yes, I am. I'm referring to the section that is shown for S1, S2 and S3 which shows a number of reinforcing bars bent out of the spandrel, go into the

topping of the floor, and that is absent on the spandrel panel S4, S5, S6. I just wondered if that's something that you've drawn attention to?

MR ELLIOTT:

No Sir, that's not something that I had picked up. It may be something which Mr Cusiel could comment upon and Mr Smith.

COMMISSIONER CARTER:

Thank you.

MR ELLIOTT:

The second issue Commissioners, whether the way that such concrete panels are attached or designed requires any particular review, and whether the inspection of the building after a large earthquake should include the inspection of such concrete panel connections.

The witnesses today in order of being called. Firstly Mary Devine, the managing director of Ballantynes. Ms Smith will I think will lead her evidence. Secondly Hannah Clarke and then Stuart Winterbourn from Powell Fenwick Consultants, structural engineers, and Mr Jones will lead their evidence. Thirdly Mr Cusiel, the engineer who prepared the plans and also carried out an inspection post September, some inspections, and Mr Raymond will lead his evidence. Mr Pitt from Luneys and Mr Matthews will lead his evidence. Then Mr McCarthy from the Council, Mr Laing to lead his evidence. And finally Mr Smith to conclude. So if there are no further issues I call upon Ms Devine.

MS SMITH CALLS

MARY MONICA DEVINE (SWORN)

Q. Is your full name Mary Monica Devine?

A. Yes it is.

Q. And you're the managing director of Ballantynes. Is that correct?

A. Yes it is.

Q. Miss Devine you've prepared a statement for the Commission. Can I get you to read that please from paragraph 2.

WITNESS READS BRIEF OF EVIDENCE

A. "The Anderson building located at 43 Lichfield Street was constructed in 2002. The Anderson building was a design and build by Chas Luney and Co. The structural engineer was Lovell-Smith and Cusiel Limited. There was a basement level, two levels of retail space at ground level and level 1, and four levels of carparking above that. The entrance to the carpark was via the Council's carpark at 33 Lichfield Street and ramps which connected the Council's carpark to the Anderson building carpark."

EXAMINATION CONTINUES: MS SMITH

Q. If I can just stop you there for moment. Can I get you to refer to document BUI.LIC43.0027.2 please.

WITNESS REFERRED TO DOCUMENT

Q. Now we have touched on this before, but I wonder whether it might be useful using the mouse which is in front of you, just to identify the various Ballantynes buildings, starting perhaps with the Anderson building that we're talking about?

A. I don't actually have a mouse. I think the key point is actually Ballantynes was always four buildings in one, so where the arrow is currently pointing, is the – and what we refer to as the Anderson building. So there was an entrance off Lichfield Street, and then it bordered the Guthrey Centre as such, so if you think of it from a ground floor perspective, you could walk through the entrance of Ballantynes,

through the Anderson building and then through to the Guthrey Arcade. The building alongside here where the arrow is pointing we refer to as the Stables building, one of the original buildings for J Ballantyne and Co. Behind that is another building which we referred to the Moule Estate which goes right through basically to Cashel Mall.

Q. And in some documents that's been referred to as the 1950s building. Is that right?

A. Yes that's correct. And then the large square building on the corner of Cashel Mall and Colombo Street we refer to as the Pratt building.

JUSTICE COOPER:

Q. The which building?

A. The Pratt building. So they're the four buildings that constitute J Ballantyne and Co.

EXAMINATION CONTINUES: MS SMITH

Q. And the Pratt building is sometimes referred to as well as the 1965 building. Is that right?

A. Yes, that's correct.

Q. Thank you, if you can continue reading your statement from paragraph 4 please.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "On the 5th of September 2010 the Anderson building was issued with a green placard following a rapid assessment. The rapid assessment noted minor damage only. Before the retail floors of the Anderson building were reoccupied we arranged for an independent assessment of the building. On the 5th of September 2010 Ballantynes verbally engaged Powell Fenwick consultants to inspect all of its buildings, including the Anderson building, and to assess the suitability of the buildings for use."

EXAMINATION CONTINUES: MS SMITH

Q. Ms Devine if I can get you to stop there for a moment, Hannah Clarke from Powell Fenwick will give evidence that she was asked to carry out

a walk-through inspection of specific areas only as defined by Mr O'Connell from Ballantynes. Is that your understanding?

A. Yes it is our understanding in engaging Powell Fenwick we were seeking their professional advice on the integrity to be able to reopen that building. We were aware that Mr O'Connell will have highlighted specific areas but we would assume with an assessment that the building in its entirety was considered.

1030

Q. Thank you if you can continue reading from paragraph 6 please?

WITNESS CONTINUES READING BRIEF OF EVIDENCE

Q. "On the 6th of December, 2010 Powell Fenwick verbally advised Ballantynes that the buildings were all safe to occupy and that any cracking was of cosmetic nature and did not affect the structural strength and integrity of the buildings. Powell Fenwick advised that a more detailed report would follow."

Q. And if I can stop you there and refer you to BUI.LIC43.0049.1. Now is this the one page report that Ballantynes received from Powell Fenwick?

A. Yes that is correct.

Q. And it notes Ms Devine that the building was not in immediate danger of structural collapse. Is that correct?

A. Correct.

Q. And that there was no urgent attention required to ensure the ongoing stability of the building?

A. Correct.

Q. At the bottom of that report Powell Fenwick recommended that a more detailed inspection be carried out. Was that done?

A. That was subsequently done.

Q. And when was that done?

A. That was at a later date. Sorry I can't recall specifically.

Q. That would be the report that followed in early December but which related to an earlier inspection that had been carried out. Is that right?

A. Yes that's correct. It was the December report that we received.

Q. Thank you, if you can continue reading at paragraph 7 please?

A. After we received Powell Fenwick's advice the store reopened on the 10th of September, 2010. In early September Bill Binns from the council and Chris Keith-Gillon of the council's parking division undertook a walk-through inspection of the carpark areas of the Anderson building. I assume that this was part of the council's inspection of their carpark buildings which included two decks of the Anderson building which it leased from Ballantynes. Some flaking around the concrete columns on each side of the ramp and to level 10A of the carpark was noted. This is one of the ramps that joined the council carpark with the carpark in the Anderson building. As the building was engineered by LSC Consulting (formerly Lovell Smith and Cusiel Limited) we asked it to look at the concrete columns. Matt Cusiel advised that there were no structural concerns. He said that there was ample core concrete on the columns to support the vertical loads from the parking levels above and it was his opinion that the ramp could be used safely for normal service. His advice to us was recorded in an email dated 23rd September 2010. On the advice of Mr Cusiel access was not permitted to level10A and level 8A until remedial works were completed to ensure contractor safety. The remedial works required the contractors to be on the ramp and we did not want them hit by vehicles using the carpark. Mr Cusiel confirmed that the upper decks could still be used safely.

Around this time when we were laying hard flooring on the first floor of the Anderson building we lifted the carpet and found some cracks. We asked LSC Consulting to inspect. Matt Cusiel inspected the cracks on the first floor and also from the floor below by lifting ceiling tiles to view around the columns and the flooring. He said it was likely that some stress in the floor topping would have occurred but that the crack width was not wide enough and there was no vertical displacement to suggest that the steel in the floor would have yielded. He said he would issue a statement but advised we could complete the flooring work. His advice to us was contained in an email dated 23rd of September, 2010.

On the 19th of November, 2010 another inspection of Ballantynes buildings was undertaken by Powell Fenwick. This inspection was more

detailed. It was not the result of any particular event. It simply followed on from the assessment undertaken after the September earthquake with a view to specifying the repairs that needed to be undertaken. Powell Fenwick's conclusions from both inspections were presented in a report dated 14th of December, 2010."

Q. If I can just stop you there and refer you to that report which is BUI.LIC43.0007.1. Is that a copy of the report that you're referring to?

A. Yes that's correct.

Q. Hannah Clarke from Powell Fenwick will give evidence that the further inspection was carried out just to specify the repairs that were required to the damage that she had noted in September. Is that your understanding?

A. Yes that's correct.

Q. Did the report however go further though than just listing the repairs that were required?

A. Yes there is reference in this report to other elements and some external elements of the building as well.

Q. So if we look at that report in paragraph 2 immediately under scope of report it says that "the scope of the report is for the building owner to be made aware of any structural issues that may have occurred to the building elements outlined above." When she's talking about those building elements, what do you consider she is referring to? So she's referring in that second paragraph to the building elements outlined above. Perhaps if I can refer to the subject matter of the letter.

A. We assume that she was referring to basically all buildings as I outlined in my initial summary, all buildings within J Ballantyne & Co.

Q. And is that because the subject matter of the report lists all of those buildings?

A. Yes correct.

Q. Did the report note for the company that any areas had been excluded from the inspection?

A. No there was no exclusion noted in the report.

Q. And did it note that the inspection that had been carried out was simply to identify repairs only?

A. No it did not detail that.

Q. If I can get you to refer to paragraph 3 of the report Ms Clarke refers there to structural, assessing the structural stability for use and identifying any possible ongoing issues. Is that correct?

A. That's correct.

Q. Thank you Ms Devine if you could continue reading from "It said...", paragraph 11 of your brief.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "It said that the damage observed was all superficial and not of structural concern and that the main structural elements which were visible appeared to be in good condition with little signs of movement or damage. It specifically noted that there was no structural items noted that required immediate attention to prevent ongoing damage to the buildings. Powell Fenwick did not recommend a further detailed assessment of the buildings to be carried out. Some minor non-structural remedial work was recommended.

We engaged LSC Consulting to advise on the repairs required to the Anderson building. By a report dated 22nd of December, 2010 Dick Cusiel recommended some repairs to the Anderson building. Mr Cusiel noted that he was confident the Anderson building would continue to comply with the required building code. He listed the damage to the building as noted by Powell Fenwick and listed repair procedures."

Q. If I can just get you to stop there and we'll have a look at LSC's report which is BUI.LIC43.0008.1. Is that the report that you're referring to?

A. Yes it is.

Q. Now you've said there that Mr Cusiel has listed damage that had been noted by Powell Fenwick. Is it fair to say that he's actually gone further than some of the damage that they had identified?

A. Yes he has gone further.

Q. In what respects?

A. Particularly he's noted I think the personnel stair to the City Council carpark upper level.

Q. And what about paragraph 2 of that report in relation to the concrete columns?

A. Yes, that's also additional.

Q. And if I can get you to look at the paragraph immediately below paragraph 5 in the first section, he's also referring isn't he to longitudinal cracking?

A. Yes correct. Yes there were additional elements that were identified by Mr Cusiel.

Q. Mr Cusiel will also give evidence that he undertook inspections on the 23rd of December, the 19th of January and also the 2nd of February. Do you know the reason for those inspections?

A. I don't know the specific detail. I'm not aware of.

1040

Q. Thank you. If you could continue reading from paragraph 12, "As noted in his report."

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "As noted in his report some of the repair procedures had already been carried out. The remaining items were a fixing on a stair to the level 4 landing had pulled out of the concrete. Mr Cusiel noted that the fixing was not required and recommended it be removed and the area patched."

Q. Ms Devine I think you mentioned there that level 4 landing, I think you mean level 14 is that right?

A. 14, yes I did. Apologies.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "Some diagonal cracks below the ground floor in the pre-cast wall panels, none more than .2 millimetres wide. A 3.5 millimetre crack in the bottom south corner of the west wall at ground level and cracking at the join between the south wall and eastern-west walls of the goods lift at the upper parking level. Mr Cusiel recommended these cracks be injected. These repairs had not been completed prior to the 22nd of

February 2011. We had provided the specification to AW Interiors for costing. This was part of the costing that was being prepared for our insurer for all of the post-September 2010 earthquake repairs. As advised by Powell Fenwick these works were minor and non-structural remedial works. Powell Fenwick's advice was that the building was not in danger of structural collapse and could be used, and Mr Cusiel's advice was that the building still complied with the required building codes. On Boxing Day Ballantynes evacuated the store and remained closed until 29 December 2010. The Council carried out a rapid assessment on 26 of December 2010 and minor damage was noted. The Anderson building was given a green placard. Ballantynes engaged Powell Fenwick to inspect its buildings again. On the 27th of December 2010 Powell Fenwick undertook a visual inspection and reported that the buildings were not in immediate danger of structural collapse and were safe to occupy. It noted the parapet adjacent to the Guthrie Centre owned by Peter Guthrie Holdings was unstable and advised that this should be cordoned or propped. This only affected one of Ballantynes' buildings, known as the Moule building. Repairs were completed before the Moule building was reoccupied on the 29th of December 2010."

Q. And I think we've established the Moule building is also referred to as the 1950s building?

A. Yes, correct.

Q. And did the report that you received from Powell Fenwick following the inspection in December note that any areas had been excluded from its inspection?

A. No there was no note of any areas excluded.

Q. Thank you. If you can continue reading from paragraph 15 please.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "The Anderson building was damaged during the 22nd of February 2011 earthquake. Two of the three pre-cast concrete façade panels on the Lichfield Street side of the building detached. The remaining panel was later removed. One of the concrete panels fell into Linda Arnold's car

which was parked outside the Anderson building. Ballantynes was in contact with Ms Arnold's family in February 2011 and has been since to offer support and assistance but we'd also like to publicly extend our condolences to her family for their loss. On the advice of engineers the Anderson building has since been demolished."

CROSS-EXAMINATION: MR ELLIOTT

Q. Ms Devine you mentioned there that two of the three façade panels detached.

A. Mmm.

Q. I'll just show you a photograph, BUI.LIC43.0027.9. If the photograph could be enlarged please. Does that photograph depict the state of the southern side following the 22nd of February earthquake so far as you recall?

A. Yes as far as I recall it does.

Q. That seems to indicate the top panel remained in place.

A. Mmm.

Q. Is that your recollection?

A. Yes that is my recollection.

Q. And that was later removed by USAR was it?

A. I'm unsure who actually removed the panel. I'm not aware of actually who did it. It obviously subsequently has been removed.

Q. Thank you and WIT.CUS0001.8 please. Do you recall whether the panels had fallen away right across the left-hand side or just at any particular part?

A. No I do recall the middle panels falling, falling on the subsequent, on a veranda of our Anderson building.

Q. So you know whether the panels to the left-hand side fell as well?

A. No I don't recall that.

Q. There's an awning in place there.

A. Mmm.

Q. Above the entrance where, that's where the public had access to the southern side.

A. Correct.

Q. Was there any discussion with any engineer about inspecting that awning or any other part of the exterior there?

A. My recollection on that day was that awning was, was smashed as well. There, I don't believe there was specific reference into the brief that was provided to look at that awning specifically.

Q. Ms Clark says in her statement that she wasn't asked to inspect the carpark areas of the Anderson building. Would that be right?

A. We believe there wasn't specific instruction provided. The recollection of our property manager is we were looking at the structural integrity of the building as a whole. So we weren't, but we did not specifically highlight that the carpark building should be addressed.

Q. Was it Mr Cusiel's firm's role to inspect the carpark?

A. It was felt I believe at the time to get them involved because they were involved with the original construction. So, yes, we probably leaned on their interpretation of what happened on the carpark levels.

Q. And Ms Clark says she wasn't asked to and did not inspect the exterior of the Anderson building fronting onto Lichfield Street. Would that be right?

A. There was some comment made to the exterior. Again we didn't, we weren't specific I think in the brief of what should be included or excluded.

Q. Did any of the engineers say to you, well we should carry out some inspection of the exterior as well as the interior?

A. Not to my recollection.

Q. Was there any discussion from any of the engineers about having a look at the building plans to do a more detailed assessment of the building?

A. I note Ms Clark made reference that building plans were not provided in her report but obviously subsequently, I think in March when I think Stuart Winterbourn requested the plans, the plans were provided. So I'm just unsure whether that was actually a specific request at that time or not but subsequently, yes, plans were provided for subsequent assessment.

JUSTICE COOPER:

Now I'm proposing to call on Mr Laing next followed by Messrs Raymond, Jones and Matthews in that order. Does anybody wish to suggest an alternative order – and in the normal course I'd come to you last Ms Smith. All right? Mr Laing.

CROSS-EXAMINATION: MR LAING – NIL

CROSS-EXAMINATION: MR RAYMOND

Q. Ms Devine, just a couple of points of clarification really. If we could pull up please 0027.8 and before I just ask you about that photo you said that you, you were shown a photo by Mr Elliott of what you understood to be the position on the 22nd of February with the two panels which had fallen off. Are you able to say how soon after the event you observed that?

A. Within about 30 minutes.

1050

Q. And so now referring to the photos on the screen, you would have observed what we can see there with the two search and rescue workers in the top photo?

A. Yes, I do remember observing that.

Q. If we zoom in on the bottom photo, please, we can see steel framing behind Mrs Arnold's car. To your knowledge is that the framing for the awning?

A. It is just my visual recollection at the time, I would assume so. I remember noting that the awning had fallen as well so I would assume that that would – but I – I'm sorry I couldn't be more specific.

Q. That's okay, and if we look at that photo there it appears that on the left one of the panels has been dragged away and there was another panel beneath that more crushed. Were you able to make any observation of that when you saw it?

A. This is obviously a subsequent of like –

Q. Yes.

A. – a photo to the actual event, because it wasn't as clear as that on the day that we could see obviously the concrete panel had fallen on the car, but it –

Q. If we look at the top photo which seems to have been taken earlier?

A. Yeah.

Q. And that would be more consistent with when you saw it?

A. Yes, correct.

Q. And you would have observed that two panels had fallen. Was it your understanding at that time that the top panel which is curved and we can see behind the two workers, was one of those panels and there was another one beneath that. So in other words they'd fallen one on the other?

A. Again I couldn't be specific. It was noted when we looked up we could actually see that two panels had dislodged, it wasn't clear from our view of it, we were approximately 100 yards away so it was difficult to actually have a specific view of whether it was two panels. One would assume that that was the case though.

CROSS-EXAMINATION: MR JONES

Q. Miss Devine, Mr Paul O'Connell was your property and maintenance manager. Is that correct?

A. Correct.

Q. And it was Mr O'Connell that had all of the direct dealings with Powell Fenwick Consultants Limited regarding the inspections to be carried out wasn't it?

A. Correct.

Q. So you have no first-hand knowledge do you of the conversations between Mr O'Connell and the Powell Fenwick staff do you?

A. No sir, no I don't.

CROSS-EXAMINATION: MR MATTHEWS - NIL

RE-EXAMINATION: MISS SMITH

Q. Just one point, which is in relation to the exterior inspections. Did you specify, I think you've given evidence that you did not specify what the engineers were to look at in the inspections. Is that correct?

A. Yeah, one would assume and my involvement with the company since joining, when we sent professional advice and particularly on the ability to reoccupy the building, that when you are seeking professional advice that a number of elements are considered and that as a client we wouldn't be specific that we are obviously engaging that advice because of the expertise that they would provide.

Q. And it's correct to say isn't it that Powell Fenwick did undertake an inspection of the exterior of some of the buildings at least?

A. Yes, you will see in one of the reports obviously there was that specific comment in regards to the Guthrey parapet which was a building next to us.

Q. And if we can just have a look perhaps at the earlier report of the 7th of September which is BUI.LIC043.0049.1?

WITNESS REFERRED TO DOCUMENT

Q. And you'll see there in the bullet points under the other damage that was noted in the building, there's a reference to tiles erupting at north above canopy?

A. Mhm.

Q. Is that in relation to the Pratt building or the 1965 building?

A. I'm unsure what it's specifically referencing.

Q. But it's an exterior –

A. It is an exterior element that has been referenced. I'm unsure what actual building it is specifically referring to.

Q. And then if we look at bullet point four, "loose flashing to section of southern stables parapet on a building". Again that's an exterior element to the Stables building which is adjacent to the Andersons building. Is that correct?

A. Yes that is definitely an exterior element that has been identified.

COMMISSIONER CARTER:

Q. Just a point of clarification about floor numbers. We've noted floor level 10 and floor level 14 referred to. Can you just clarify how these floors were numbered?

A. Yeah, it was just unusual due to the way the Council building carpark levels were numbered. So where we came in which was our basically second level, was a higher level for the Council building, so the levels of 8 and 10 for example in reference to the Anderson carpark levels, was to coincide that with the Council carparking levels of their carpark building, of which there were a number before you actually got to our level, you know, joint levels.

Q. Was your first carparking level approximating to level 10?

A. Unsure.

Q. All right, we can find that out at a later stage.

A. Sorry.

JUSTICE COOPER ADDRESSES MISS SMITH:

Ms Smith, you can perhaps take instructions on that.

QUESTIONS FROM JUSTICE COOPER - NIL

WITNESS EXCUSED

MR JONES CALLS

HANNAH ELIZABETH CLARKE (AFFIRMED)

Q. Your name is Hannah Elizabeth Clarke, you reside at Christchurch and you're a structural engineer. Is that correct?

A. Yes it is.

Q. You've prepared a witness statement for the Commission, I would ask if you could please commence reading that at paragraph 1?

WITNESS READS BRIEF OF EVIDENCE

A. "My full name is Hannah Elizabeth Clarke. I am a structural engineer for Powell Fenwick Consultants Limited. I have a Bachelor of Engineering degree with Honours. I am a member of IPENZ and I am a chartered professional engineer with IPENZ as well, CPEng. I have eight years post graduate experience.

Following the 4th of September 2010 earthquake I was asked to carry out a walk-through inspection at the Ballantynes' building of the areas requested by the client, Paul O'Connell. In terms of the nature of the inspection that I carried out on the 6th of September 2010 it was a visual walk-through inspection just of the specific areas that were defined by Mr O'Connell. Mr O'Connell led me around the areas of the building where he wanted to be inspected. This did not include the carpark levels of the Anderson building. My report following this inspection is dated the 7th of September 2010."

EXAMINATION CONTINUES: MR JONES

Q. If I could just ask you to pause there, for the Commission's benefit, sir, the complete reference to that document, the last digits are 0049.

A. Thank you Miss Clarke, if you continue.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "In the areas I was asked to inspect I did not observe any issues that required urgent attention to ensure the ongoing stability of the building. Following receipt of my report dated the 7th of September 2010 Ballantynes requested that a further inspection of the same areas be carried out for the purposes of specifying repairs that were necessary in

terms of the damage. I conducted a further visual inspection of the retail areas on the 19th of November 2010 for the purposes of specifying repairs to the damage noted during the inspection on the 6th of September 2010. I was not asked to inspect the carpark areas of the Anderson building and Mr O'Connell outlined that the original building designers for the Anderson building had inspected the carpark floors and were preparing a specification for the minor repairs required for these areas. My report following this inspection is dated 14th of December, 2010.

The areas that I inspected show relatively small signs of damage. There was some damage to the internal linings particularly in the south east corner and the kitchen area of the tearoom. The floor finishes and ceiling tiles which bridged across the seismic joint with adjoining Moule building also showed signs of damage. This sort of damage is to be expected for items which span across this gap. The nature of the damage observed was non-structural.

I was not asked to and I did not inspect the exterior of the Anderson building fronting on to Lichfield Street on either of my inspections prior to 22nd of February, 2011. In terms of the risk posed by further aftershocks following 4th of September, 2010 I was aware that aftershocks would continue for a period of time. The expectation was that these aftershocks would lower in magnitude and be less damaging than that of the 4th of September earthquake. I do not recall accessing any information from the council on building standards or inspections around this time and my recollection is that there waS none available. I do recall some discussion in early December 2010 around proposed changes to the earthquake prone building policy in terms of the level of strength required if an earthquake prone building was to be strengthened. Similarly I did not receive any information from any other party that related to building standards or the inspection of buildings following an earthquake.

The building plans were not provided by Mr O'Connell. When it came to drafting my second report I used the first floor fire safety features plan

from 2001 to draw a basic site plan to define the floor building area. The Anderson building was designed and constructed in early 2000 and as such should have complied with earthquake prone building policy issued by the Christchurch City Council. In the same light due to the recent design and construction of the Anderson building I would not have expected it to have had any earthquake strengthening carried out yet. I have been asked to comment on the general failure mechanism of the building in particular the failure of the concrete façade panels.

Prior to this Royal Commission enquiry I had no knowledge of the damage sustained to the building in February 2011. The knowledge I now have is based on the photos provided under the secure login and conversation with my colleague Stuart Winterbourn who inspected the building post February. I understand the building was a two way ductile frame building and in February the damage was observed as being close to the capacity of the building. The precast façade panels appear to have failed by loss of connection. Having not viewed the damage personally I cannot comment further. As mentioned above I was not instructed to inspect the concrete panel connection. During the visual inspections of the retail areas that I was asked to inspect there was no sign of any structural damage. The brief to Powell Fenwick Consultants excluded the carpark areas as these were being carried out by the original design engineers so panel connections were not viewed during our inspection.

I have been asked to comment on whether the design and/or fixings of such concrete panels has been a problem with other buildings and requires review. I have inspected other buildings and seen photos of others in the media where precast panels have lost connection as a result of the excessive forces experienced during February. I have been asked to comment on the spandrel panel, their design and fixing. As to my previous comments the carpark did not form part of my brief for inspection. Accordingly I did not inspect these areas after the September earthquake. However to attempt to answer the questions it would have been impossible to know whether the spandrel panel had

starters in it to the floor slab without looking at drawings. An inspection of the spandrels would likely have shown any damage to the fixings if there was any damage present. If there was damage visible to the exposed fixings a further review would have been conducted which would have involved obtaining the drawings to determine whether there was any alternative fixings for the spandrels or whether they relied entirely on the exposed fixings. A visual inspection of the spandrels would not have involved a review of the suitability of the fixings if they were not damaged. Inspections were to determine damage causing diminished capacity not a full building analysis to determine where buildings sat in terms of compliance with today's standards or suitability of detailing secondary elements."

1100

CROSS-EXAMINATION: MR ELLIOTT:

Q. Ms Clarke, your first inspection of the building on was it 5 September?

A. 6 September.

Q. 6 September. What was the purpose of that inspection?

A. The purpose of the inspection was to inspect specific areas. I was to meet with Paul O'Connell, the property manager, property and facilities manager for Ballantynes and he had some certain areas of concern that he wanted us to inspect and just conduct a general walk around inspection of the building.

Q. And you produced a letter dated 7 September 2010 to Ballantynes?

A. I did.

Q. And that said preliminary indications are that this building is not in immediate danger of structural collapse?

A. That's right.

Q. Were you referring there to the Andersons building?

A. I had seen the basement and the two retail floors of the Andersons building and from what I've seen of the structural elements in there...

Q. So, but you didn't inspect all of the building?

A. I didn't inspect the upper floors no.

Q. Was it possible to conclude that the, at least even on a preliminary basis that the building wasn't in immediate danger of structural collapse without looking at the whole building, do you think?

A. I think given the level damage noted, yes.

Q. You said in your evidence that you weren't asked to and did not inspect the exterior fronting on to Lichfield Street. Is there a reason why you didn't suggest that type of inspection to the owner?

A. Again I was looking at specific areas that Mr O'Connell was interested in. Looking, there was some reference made to the original design engineers conducting some inspection and given the level of damage or lack of damage at that time, no there wasn't anything that made me believe I should be inspecting those areas.

Q. Right. As I said in the opening the position here is we have an appendage to a building which is not structural in nature but which is fallen from the building causing death. Do you think that the inspection of non structural, potentially hazardous appendages is something which should be incorporated even into initial inspections following an earthquake?

A. Where they can be seen.

Q. You've referred in your evidence to inspecting other buildings and seeing photos of others where precast panels have lost connection as a result of excessive forces. Are you able to tell the Commission anymore about the particular mechanisms of failure there?

A. They were different kinds of panels and different connections with completely different kind of different building types I suppose so not truly comparable to this kind of situation but certainly the connection of precast panels tends to be something that's done with a relatively brittle connection because I guess they are essentially just clipped on to the side of the building and that's only designed to a certain force level when the building designs are carried out. So I guess conceivably you'll get to a level of earthquake where that can't be taken and certainly that seems to have been the case around town on numerous buildings where panels have collapsed outwards on to the footpath and the like.

CROSS-EXAMINATION: MS SMITH

Q. Ms Clarke, you've indicated that you addressed certain areas only of the building is that right?

A. Yes that's correct.

Q. But none of the reports that you've addressed to Ballantynes had indicated that that's what you were doing.

A. The reports that I sent to Ballantynes were sent to Paul O'Connell who was my contact within Ballantynes who defined the scope of our areas. So between conversations with him and the report that was being provided to him I believe he was aware of our scope and we were dealing to that scope.

Q. But if we're just looking at perhaps learning for the future, somebody picking up for example your report of the 14th of December from the company might consider that you'd actually looked at all of those buildings and all the parts of those buildings. Do you accept that?

A. Yes I take note to that.

Q. And you've given evidence that you were simply focused and that November inspection on the repairs that had to be carried out, but it's right isn't it that actually your inspection and the focus of your report went further than that?

A. Can you re-ask the question sorry?

Q. So you've given evidence that you were simply focused on the repairs that needed to be carried out when you were inspecting in November. Is that right?

A. Yes.

Q. But in actual fact your report went further than that and the nature of your inspection went further than that didn't it?

A. Yes it did. It was of the same defined areas that I'd been through with Mr O'Connell and that and as I clearly stated in my evidence that excluded the carpark areas because I believe the original building

designers had already inspected that, were already involved with remedial works to those areas so I covered other areas.

Q. But the nature of your report was to make Ballantynes aware of any structural issues and to assess the structural suitability of its buildings for use, wasn't it?

A. Yes of the areas defined by Mr O'Connell.

Q. And what you're saying in evidence is that even if you had looked at those specific areas, the spandrels is not something that you would have inspected?

A. Not specifically. If I had have walked past them and seen some damage I would have made comment to that damage in my report.

Q. And Powell Fenwick undertook a further inspection following the Boxing Day aftershock which noted that the buildings were able to be used. Were you involved with that inspection?

A. No.

RE-EXAMINATION: MR JONES – NIL

COMMISSIONER CARTER:

Q. Just in respect to the spandrels themselves, I think you've noted that this building was a moment frame resisting –

A. I believe it was.

Q. So were the spandrel panels two metres deep which is a fair proportion of the storey height, maybe two thirds of the storey height bolted to the column, would you expect those to affect the behaviour of the moment frame?

A. I wouldn't expect them to affect the behaviour so much as they'll go for the ride with moment frame. The moment frame will sway and it will go for the ride with that so you'd want some tolerance in the connections of those spandrels to enable that movement.

Q. So you didn't consider them to be a part of the structure that you were examining?

A. No and I didn't have the drawings at that time either around how they were connected.

QUESTIONS FROM JUSTICE COOPER: NIL

WITNESS EXCUSED

COMMISSION ADJOURNS: 11.13 AM

COMMISSION RESUMES: 11.29 AM

MR JONES CALLS

STUART MICHAEL WINTERBOURN (AFFIRMED)

Q. Mr Winterbourn you are Stuart Michael Winterbourn of Christchurch. You are a structural engineer. Is that correct?

A. That's correct.

Q. Thank you. If you could now please read to the Commission the statement of evidence that you've prepared.

WITNESS READS BRIEF OF EVIDENCE

A. "My full name is Stuart Michael Winterbourn. I am a structural engineer employed by W2 Limited which is my own company. Up until June 2011 I also worked part-time at Powell Fenwick Consultants Ltd. I have a Bachelor of Engineering Degree with Honours in Civil Engineering, am a member of IPENZ, am a CPEng structural engineer and have the qualification of international professional engineer. I have 14 years experience as a structural engineer and I graduated from the University of Canterbury in 1997.

On the 25th of March 2011 I was instructed to carry out a visual inspection of earthquake damage to 43 Lichfield Street following the February earthquake. I was instructed to assess the ongoing stability and comment on the possibility for repair if possible. A number of walk-through inspections were completed prior to me issuing my report dated 30 March 2011."

MR JONES:

Just pause there Mr Winterbourn. Sorry, just for the Commission – just to clarify Sir, that's an incomplete reference in the brief. It should include the suffix point 16.

JUSTICE COOPER:

Thank you.

EXAMINATION CONTINUES: MR JONES

Q. Thank you Mr Winterbourn if you can carry on reading, "The initial focus."

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "The initial focus was to make the building safe for inspection which included propping to the ground floor and level 1 as well as removal of high level façade panels to Lichfield Street. My instructions were to focus the inspections on the assessment of damage to the building in light of the possible repair versus demolition question and global stability.

My observations of the earthquake damage are recorded in my report under the heading, "Earthquake Damage." As I stated in the report the damage was widespread and major structural elements had been stressed beyond the point where they could be repaired. In terms of remedial work possible my recommendations under the heading "Remedial Work". Essentially my opinion was that demolition and reinstatement would be cheaper and more practical than attempting to re-use the remaining parts of the building. It was also my opinion that there was a serious risk that the building might collapse and that demolition should be expedited.

At the time of inspection that I carried out on the 25th of March 2011 I had not received any information from GNS or any other source about the likelihood, location and extent of any further aftershocks. I had not received any information from the Christchurch City Council relating to building standards or the inspection of buildings following an earthquake. I had not received any information from any other party relating to building standards or the inspection of buildings following an earthquake. At the time of inspection in March 2011 I had access to the building plans which were recovered from the building itself.

I was aware of the Christchurch City Council's earthquake prone building policy however this building is a modern building and as such I expected that it would have been designed to the code at the time that it

had been built and the earthquake-prone policy would not apply. As it was a modern building no structural strengthening had been carried out.

I have been asked to comment on the general failure mechanism of the building, in particular the failure of the concrete façade panels. I noted during the inspection that the concrete façade panels on the south face were connected with weld plates which I did not consider an appropriate detail at the time due to the lack of movement tolerance in the connection. Such a detail would attract large loads to these connections and as such I concluded that this displacement caused the failure of the welds and subsequent collapse of the panels. On review of the drawings from what I could see the connections had been constructed as shown on the drawings.

I instructed the removal of a high level panel on Lichfield Street that had not fallen as it was precarious. However I was not on site at the time of removal of the panel and did not inspect it once it had been removed. From recollection I believe it was Smith Cranes that removed the panel.

I have been asked – " and that was during the time of the USAR operation.

Q. So do you wish to make an addition to paragraph 11. Is that correct?

A. Yes please.

Q. And sorry if you can just read, just the addition that you wish to make.

A. Okay. "I believe it was Smith Cranes under the instruction of USAR that removed the panel."

Q. Thank you.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "I have been asked to comment on whether the design and/or fixing of such concrete panels has been a problem with other buildings and requires review. I'm not aware of specific examples but I am aware that building displacements have been more than expected and this needs to be considered for the protection of secondary elements."

CROSS-EXAMINATION: MR RAYMOND

Q. Mr Winterbourn I just want to see if you can help us clarify an inconsistency in the documents.

A. Sure.

Q. First of all if we could bring up please 0016.1 and we'll zoom in on a paragraph in a moment but this is minutes of a meeting with CERA which I understand you attended. Your name is second from the bottom in the right-hand column. Do you see that?

A. Yes, yes I was there, yep.

Q. And it's a meeting at CERA's offices on the 3rd of August last year.

A. Yep.

Q. And that was a meeting regarding the ground floor slab in the Anderson building. Is that right?

A. Yeah it involved the ground floor slab of the Anderson building, yes.

Q. Now at section 2, if we could zoom in please on section 2 under "Current Observations." The third bullet point there refers to, "Investigation has shown that there is a lack of topping steel in the top 65 millimetres of the slab leading to the redundancy of the slab being significantly reduced." See that?

A. Yes I see that.

Q. Would you agree that topping steel can sometimes interchangeably be used with the description of the same thing, mesh?

A. Yes sometimes mesh can be used as topping steel.

Q. Because you had already inspected the building by the time of that meeting on the 3rd of August hadn't you?

A. I inspected the building a number of times. This was during demolition of the building.

Q. Okay and I want to refer now to a report that you prepared on demolition methodology, 0015.1. And just to identify that document, it's from W2 Design, your then company. Is that right?

A. That's correct.

Q. Dated 3 August 2011 and was that to a demolition company which was going to undertake the work?

A. That's correct, yes.

Q. And in paragraph 2 of that first page, if we could zoom in on that please. The first sentence, “Intrusive survey has confirmed that no reinforcing extends from the concrete beams into the floor topping, and no reinforcing steel (other than mesh).” See that?

A. Yes.

Q. And then in the final sentence of that paragraph, “It is also evident on site that the mesh does not behave in a ductile manner.” You’d agree wouldn't you that that paragraph suggests that there was mesh in that topping? You’ve referred to it in two places.

A. Yes there was mesh in the topping.

Q. So the minutes of the 3rd of August from CERA which we’ve just looked at where they refer to a lack of topping steel, and we’ve already agreed can also refer to mesh –

A. Well, by topping steel I'm referring to, to reinforcing steel which isn't, it’s not mesh.

1139

Q. Well you've referred to mesh in paragraph 2.

A. Mesh –

Q. What I'm trying to establish Mr Winterbourn is that you had observed mesh –

A. Yes.

Q. – in the slab?

A. It certainly was mesh in the slab but no additional reinforcing.

Q. And the extent to which the CERA minutes suggests that there was a lack of topping steel if that is meant to be a reference to mesh, those minutes would be incorrect?

A. That, yeah, the reference, the CERA reference to topping steel would be a reference to additional reinforcing that was not mesh.

Q. You've read Mr Cusiel’s brief of evidence?

A. Yes I have.

Q. And you will see where he's discussed this issue?

A. Yes.

Q. And he has referred back to his drawings and has confirmed the reference in your report is correct that there was mesh in the top 65 millimetres of the slab and you would agree with that?

A. I agree there was mesh, yes.

CROSS-EXAMINATION: MR MATTHEWS – NIL

CROSS-EXAMINATION: MISS SMITH – NIL

CROSS-EXAMINATION: MR LAING – NIL

CROSS-EXAMINATION: MR ELLIOTT

Q. Mr Winterbourn, I'm just going to ask you some questions about your observations of the damage.

A. Sure.

Q. In that area, and I think you refer to that in paragraphs 10 and 11 of your statement. Is that right?

A. Yes, that's correct.

Q. So you say in your statement that you noted during the inspection that the concrete façade panels on the south were connected with weld plates. Can you just tell us what you mean by weld plates?

A. A weld plate is – comprises of a cast in piece of steel in both the panel and the piece of structure that it's connected to and another piece of steel connecting those cast in plates which is welded.

Q. I'm just going to show you a photograph BUI.LIC00032.1.

WITNESS REFERRED TO PHOTOGRAPH

Q. Do we see any of the weld plates there. Could you use the mouse?

A. Yes, so these steel plates which hang out are what I'm referring to as weld plates which have a bolt in the middle of them also. It's my recollection that that is welded to the column and from memory the plate was welded as well as bolted to the panel.

Q. Mr Smith is in the Commission here and he's prepared a report talking about the mechanism of failure and he will comment on that. We're just trying to get some evidence from you to help with that process.

A. Sure.

Q. So your point is that these weld plates were not an appropriate detail at the time due to the lack of movement tolerance in the connection?

A. Yes.

Q. That's right. And were you able to draw any conclusion about the actual mechanism of failure, how it is that the panels came off (overtalking 11:43:07)?

A. I – that – the panel in this location and this location had already fallen –

Q. Just pause there, you're indicating the top right?

A. I'm indicating the first two levels of panel from the ground. They were not present.

JUSTICE COOPER:

Q. In what we might call the central section?

A. The central section. The top panel was still there but I could visually see that there had been a failure of the weld which I concluded was due to a displacement of the frame relative to the panel which caused the weld to essentially unzip and it's my assumption that that is what happened to the other two panels to cause them to fall.

CROSS-EXAMINATION CONTINUES: MR ELLIOTT

Q. I don't suppose you've seen any of Mr Smith's reports have you?

A. No.

Q. He says in the first of his report, notes that they were unable to inspect the collapsed panels and unable to reliably determine whether the bolt failure was a tension pull out of the TCM20 anchors from the pre-cast panels, or a shear failure of the bolt. Can you comment upon that by reference to what you saw?

A. I do not believe it was a pull out failure. From what I saw it would be more consistent with a shear failure of that bolt.

Q. So what did you see that would indicate that?

A. Well if there was a pull out failure of a bolt I would have expected to see damaged concrete surrounding it which I didn't see.

Q. And was that observation the same at each of those points of connection?

A. Well as I say that I was only able to inspect the top panel because that was still there, and it hadn't failed fully, sufficiently to fall, so the other two panels I can't comment on how it fell because that had already occurred.

Q. I'm just asking about your observations of the damage at those locations where the panel had been though.

A. Well that wouldn't be possible to tell how the failure had occurred, because that is something that happened in the façade panel itself rather than the connection which is left to the building.

Q. It appears from this photograph that some of those plates are missing.

A. Ah, yes.

Q. For example in the central –

A. Yeah, I see that.

Q. Was that the case?

A. I don't recall.

Q. – they were missing in some cases or –

A. Could well be but I don't recall that level of detail.

Q. What would the absence of those from some locations suggest to you about the mechanism of failure?

A. Well that would indicate that in that particular location the connection stayed attached to the panel and therefore the weld failure would have occurred at the column rather than on the panel, but it could well have been the case for that panel that the failure occurred in at least some of the other three connections that remained and in the one that was pulled off hadn't failed and it just went for the ride when the panel fell.

JUSTICE COOPER ADDRESSES MR ELLIOTT:

Mr Elliott, it's not clear to me, perhaps I'm the only one in the room but – it's not clear to me where the area of the missing plates.

WITNESS:

A. It's just here.

JUSTICE COOPER:

So that's one.

MR ELLIOTT:

That's one missing, that's the only I can see that is missing, is here.

JUSTICE COOPER:

Yes, so that's on the central column, the top most one.

CROSS-EXAMINATION CONTINUES: MR ELLIOTT

Q. In addition to what you've said so far are there any other observations of the points of failure that you can tell us about that might assist in working out the mechanism or have you told us all that you recall?

A. In terms of the façade panels?

Q. Mmm.

A. That's – no, I've told you all I can recall.

Q. And you didn't get to look at the collapsed panel on the ground at all?

A. I didn't look at it in detail. It certainly would have been there when I was there, but I was – that wasn't my area of focus.

CROSS-EXAMINATION: MR JONES – NIL

COMMISSIONER CARTER:

Q. Yes, just another point on the question of these cleats, these steel cleats.

A. Yes.

Q. I notice on the drawing that they're shown as having a slotted hole, presumably to allow some movement, or some allowance for tolerance. Would you expect that to be the case?

A. I would expect, that that would be how it was detailed, except from my recollection this cleat had been welded up and so therefore any slot in

the hole would only have been a construction tolerance to allow for placement of the panel and then once welded there was no tolerance at all for movement.

1149

QUESTIONS FROM COMMISSIONER CARTER:

Q. So your thoughts are that the cleat that was a part of the panel and the cleat that was fixed to the column were actually welded together at the conclusion of the erection process?

A. Yes, that's my recollection.

Q. Now just one other question. Would you expect as a structural engineer that the panels fixed in this way, rigidly fixed in this way would alter the behaviour of the building, in fact start to become part of the structure of the building?

A. Yes I would.

QUESTIONS FROM JUSTICE COOPER - NIL

WITNESS EXCUSED

MR RAYMOND CALLS

DICK CUSIEL (AFFIRMED)

Q. Mr Cusiel, your full name is Dick Cusiel is that correct?

A. Correct.

Q. And you're a structural engineer living here in Christchurch?

A. Yes.

Q. And you have a copy of your brief of evidence in front of you. If you could please just read from paragraph 2.

WITNESS READS BRIEF OF EVIDENCE

A. "I graduated from the University of Canterbury in 1964 and I've been working as a structural engineer since that time. In 1967 I moved to Melbourne and worked there for three years before returning to Christchurch in 1970 to take up a position as project engineer for the development of the QEII pool complex. I was at that stage working for Bill Lovell-Smith Sullivan & Associates. I took over the practice in 1980 and the company has become LSC Consulting Limited. Since 1970 I have been involved in a wide range of commercial and industrial engineering projects throughout Canterbury.

I am giving this evidence to the Canterbury Earthquake Royal Commission in relation to a building at 43 Lichfield Street known as the Anderson building, "the building." Counsel assisting the Commission, Mr Zarifeh, wrote to the company by letter dated the 25th of November 2011 and I briefly responded on the matters raised by letter dated 12 December 2011. I wish to expand on those matters by way of this brief and provide what further information I can to the Commission at the hearing. The head contractor for the construction of the building, for Ballantyne & Co. Limited was CS Luney Limited. LSC Consulting was engaged by CS Luney as structural engineers for the project, the architects, the in-house architects with CS Luney. I was personally responsible for the design of the structural elements for the building. The design work was undertaken in June 2000. The Anderson building consisted of five stories above the ground level. The ground level and level 1 were retail premises for Ballantynes. Level 2, 3 and 4 and 5

were all parking. The building also had a basement. The Commission has provided me with photos of the building which I can refer to. These were taken after the February 2011 earthquake. I produce as DC1 two photographs of the building prior to the earthquakes.

The building is a ductile concrete frame structure with pre-cast pre-stressed proprietary concrete floors. The building is described in the design features report I prepared for the CCC dated 8 December 2000, BUI.LIC43.0023.1. The carparking levels had fascia panels around the perimeter as shown in DC1. These were pre-cast concrete panels fixed to the columns with four number M20 cast in ferrules. As previously advised the design codes used were NZ3101 concrete design, concrete structure standard and NZ4203:1992 general structural design and design loading for buildings. I refer to the drawings labelled SP7 for the pre-cast spandrel panels, BUI.LIC43.0023.18. The drawings detail a typical section through the pre-cast spandrel panel for both the corner spandrels and the spandrels which run the full length of the face of the building as can be seen in the photos taken from ground level on Lichfield Street. The relevant drawings are the two drawings at the bottom left of SP7. I return to what might have been the failure mechanism further below.

4th of September 2010 Earthquake. There was no issue with the building insofar as I'm aware in the period from its construction to the earthquakes in 2010/2011. I was overseas at the time of the 4 September earthquake. I'm aware that my son who is in practice with me, Matt Cusiel, has requested, was requested to inspect the buildings by other engineers who had carried out an initial inspection. There were relatively minor issues in relation to the ramp which connects the CCC Lichfield Street carpark to the Anderson building carpark. On inspection on 23 September 2010 it was observed that the concrete had spalled at the connection on one of the columns at the top of the ramp. No flexure or shear cracking in the column was evident. There was ample core concrete in the column to support the vertical loads on the parking level above and the ramp could be safely used. Matt was also involved in a

brief inspection of the floor level at level 1 of the retail section of Ballantynes. A small area of the floor on level 1 was visible because some lino had been lifted for replacement. A surface crack in the floor was visible but by the time Matt inspected it the lino installer had ground the surface of the floor and the edges of the cracks had threaded. This caused the crack to look more severe than it really was. As a consequence of this a further inspection was undertaken from the ground floor by removing the ceiling tiles and looking into the ceiling space for any damage that could be observed from beneath level 1. There was no damage which was able to be seen from the underside of the floor.

December 2010. I refer to a report from Powell Fenwick dated 14 December 2010, BUI.LIC43.007.1."

JUSTICE COOPER:

You can omit those document references, thanks.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "This report refers to several Ballantynes buildings. It therefore includes the Anderson building. I have noted the description of the damage to the building and have no further comment other than to note that it was effectively non-structural in nature. My firm prepared a report for Ballantynes dated 22 December 2010. This report is in relation to the September 2010 inspections. I inspected the building on 23 December 2010, 19 January 2011 and 2 February 2011 and observed a crack in the wall adjacent to the ramp and observed several diagonal cracks, estimated to be not more than 0.3 millimetres. I also observed a diagonal crack in the ground floor slab over the entrance from Lichfield Street. I did not consider the cracks to be significant and the cracks did not compromise the structural integrity of the building."

EXAMINATION CONTINUES: MR RAYMOND

Q. Just pause there Mr Cusiel. We've had reference already this morning to those inspections which you've just identified in paragraph 19. Were those inspections carried out at the request of Ballantynes?

A. Yes.

Q. As a consequence of not the Boxing Day earthquake because that hadn't happened as at 23 December so –

A. That's right.

Q. – just a continuation of your earlier inspections?

A. Just when, when Phillip, no Paul O'Donnell, O'Connell noted more cracking he would get in touch with me and ask me to have a look.

Q. And did he get in touch on three occasions because you've noted three different inspection dates there?

A. Yes.

Q. And you went to the site, met with him?

A. Met with him.

Q. And he specifically took you to points of interest, concern to him?

A. That's right.

Q. Which you noted and reported on?

A. Yes.

1159

Q. Thank you if you could continue please paragraph 20.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "We have had no engagement of CCC other than the issue of concerning the ramp between the Lichfield Street carpark and the Anderson Building noted above. The building had been green stickered by the council. I note for completeness that on 20 October 2010 I had a walkover with another engineer from our firm with Philip Richards of Ballantynes as there was some discretion by the possibility of building office accommodation on the top level. I did not note any damage to the spandrel during that walkover.

Mesh in the floor topping. In the preparation of my brief of evidence I have had an opportunity to consider other documents which have been

filed with the Canterbury Earthquake Royal Commission. There are two documents I wish to refer to at this stage. There was a meeting held with CERA on 3 August 2011 to discuss demolition methodology for the building. At that meeting, comments were made in relation to the mesh in the top 65 mm of the slab."

Q. Just pause there because we've referred to this document just a moment or two ago and we've also referred to the next document which was read into the record. If you could just continue at paragraph 24 please?

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "The CERA document refers to a lack of 'topping steel'. That phrase is often used to describe 'mesh'. The CERA minutes tend to suggest that there was no, or at least a lack of, topping steel (mesh) in the slab. However, the W2 Design report confirms that there was mesh present (highlighted in bold above). There therefore appears to be an inconsistency between the two documents. I have reviewed the drawings for the building and confirm that there was mesh (topping steel) in the top 65 mm of the slab. I produce as DC3 the relevant drawings which confirm this. I conclude that the reference in the W2 Design report is correct and the CERA minutes are in error. It is possible that the reference to topping steel was intended to be a reference to reinforcing steel other than mesh, which is correct. It was suggested the lack of topping steel reduced the redundancy of the floor slab. Whether that is a reference to mesh or to reinforcing steel, as the floor consists of flange supported TT section, moment redundancy by the provision of more topping steel/mesh (or reinforcing steel) would have been negligible. This issue however is not directly relevant as it has nothing to do with the spandrels.

The design connection for the concrete façade panels, spandrels and possible failure mechanisms. The design concept for fixing the spandrels to the structure was to have cast in ties into the floor topping. So, the ties were cast into the precast façade panels and then on site were to run into the concrete topping. The floor topping was to be

poured over the ties, thus locking the façade into the structure. This design concept is detailed in the drawing entitled 'Typical Section Through Precast Spandrel Panels' S1, S2 and S3 on drawing SP7 (bottom left-hand detail)."

Q. If you just pause there and we'll pull up 0023.18 please. This is drawing SP7 and in the bottom left-hand corner is the typical cross-section for S1, S2 and S3. So just to confirm as Mr Elliott said in opening the detail we can see in the bottom left drawing, the spandrel panels S1, S2 and S3, was for the panels at the side of the building which we've already seen in photos remained intact after the 22 February event?

A. That's correct.

Q. With the cursor which you've got there in front of you or the mouse, can you highlight please for the Commissioners on that typical section the, what we call the steel tie in between the spandrel and the floor slab?

A. That L shaped bar which I show here.

Q. And that's also described with reference to H12 being the size of the steel?

A. Yes H12 at 300 centres.

Q. And so just talking us through that, the vertical part of the drawing going up is the spandrel?

A. That's the spandrel, correct.

Q. And at the left the floor slab, if you could highlight that?

A. Yes floor slab is in that area here.

Q. So the idea was that the tie in, the H12 steel, would be cast into the concrete panel in situ so it would be preset into the concrete panel, delivered to site, affixed to the building and then the concrete topping for the floor slab would be poured over that steel to lock it into the floor slab?

A. Correct. Those pre-cast panels came with the angle erection cleats shown below the horizontal ties which were then seated on the double T unit then the concrete topping was cast in place to tie the panel in.

Q. And you can also see on that drawing reference to TCM20 concrete inserts as well?

A. That's to panels four, five and six.

Q. Okay so those TCM20's were not on the spandrels for S1, S2 and S3?

A. No.

Q. Right we'll come back to that second drawing if you could just pick up again from your brief at paragraph 26, second sentence.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "This design concept is detailed in the drawing entitled "Typical Section Thru Precast Spandrel Panels" S1, S2 and S3 on drawing SP7 (bottom left-hand detail). This construction method was carried out in relation to the corner spandrels which can be seen on Levels 3, 4 and 5 in the photos before the Commission.

From the photos that were initially provided to me by Mr Zarifeh after the event all of the spandrels facing Lichfield Street have been removed so I am not sure which panel or panels actually fell off the building during the 22 February earthquake.

Q. Just pause there we've heard from Ms Devine who saw the building only I think half an hour after the event and it was the bottom two spandrels which had fallen off and the top spandrel remained and indeed there's other photos confirming that. Is that your understanding?

A. That's right.

Q. If you just continue please from however?

A. However, the three levels of spandrels facing Lichfield Street appear to have all been constructed in the same manner and according to the details on SP7. In particular, the drawing entitled "Typical Section Thru Precast Spandrel Panels" S4, S5 and S6. This is the drawing second from bottom left on SP7. What is not detailed, is the precast tie from the spandrel to the floor topping."

Q. If you look at that detail S4, S5, S6 now on the screen, can you please highlight with the mouse and the cursor where the steel tie should have been?

A. Should have been there.

Q. So as on the previous drawing that we referred to for S1, S2, S3 a similar location running in an L shape down the spandrel and into the floor topping?

A. Yes but not along the whole length of the panel. It would have stopped by a metre short of the end to allow rotation of the beam to which the panel was attached but essentially that would have provided the horizontal restraint of the panel.

1209

Q. Because it would have locked the panel into the floor?

A. Would have locked it into the floor diaphragm.

Q. And in addition to that design philosophy you had also drawn, or had drawn TCM20 concrete inserts? Can you please indicate with your mouse again for the Commissioners where that is?

A. TCM20s, they're built into the panel near the end to allow engagement of the angle connection cleats with the panel.

Q. And so when we say cleats, we've seen photos of the remaining cleats on the building. They're the cleats you're referring to?

A. Yes, and I would say Mr Winterbourn said that there were welds around the washers which connected the bolt, sorry the washers through which the bolts passed into the weld plates, they were not welded. There was always the notion that there was going to be freedom of movement laterally.

Q. Yes. The TCM20s by themselves, would they be – they have proven not to be sufficient to hold the spandrels in place in the event of a significant seismic event obviously.

A. No.

Q. And that was never the intention that they be the only form of restraint?

A. No.

Q. Now as I understand it there was a member of staff in your office who was the draftsman for these particular drawings. Is that right?

A. Yes.

Q. But you then reviewed them and indeed these details prior to submitting them to the Council for consent?

A. That's correct.

Q. And it's your wish in evidence that you take responsibility for the omission which is evident on the drawings?

A. Absolutely.

Q. If you could pick up please from paragraph 28?

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. It is, regrettably, this omission which in my view has contributed with the significant force of the earthquake to the spandrel falling away from the structure. The panels were affixed with weld plates and angle cleats to the columns. However they were primarily there for the purpose of construction to put the panels in place while the floor topping was poured. They were unlikely to have been sufficient to keep the panels in place in the event of a major earthquake. It was not until I received the letter from the Commission dated 25 November 2011 that I became aware that a woman who was sitting in a vehicle on Lichfield Street was killed in the earthquake when a concrete façade spandrel fell from the building and landed on her vehicle.

EXAMINATION CONTINUES: MR RAYMOND

Q. So you were saying that it was only you became aware of the letter from the Commission?

A. Yes.

Q. That the spandrel had fallen from the building and landed on the vehicle.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. This came as a considerable shock to me. Having since considered the drawings and noted the omission the matter has weighed very heavily on me and will always. I extend my very sincere condolences to the family of the victims for this extremely tragic event.

EXAMINATION CONTINUES: MR RAYMOND

Q. You don't need to read that last paragraph Mr Cusiel. So just a couple of points before we finish. You were requested to attend a meeting on

Monday the 13th of February with a Mr Wayne Carlisle and George Haddow of Luneys. Is that right?

A. I was.

Q. And that was Monday the 13th of February?

A. Mhm.

Q. And was that the offices of White, Fox and Jones?

A. It was.

Q. And Mr Matthews was at that meeting?

A. He was.

Q. Had you been invited, by those who contacted you for the meeting to contact your own solicitor or counsel to attend that meeting with you?

A. I wasn't.

Q. When you went to that meeting were you told that you were entitled to and indeed should have a solicitor or your counsel present?

A. No I wasn't.

Q. So at that meeting is it correct that you were invited to explain to Luneys essentially what the design philosophy was for the building?

A. Yes.

Q. And before you did that did you gain an impression as to whether in fact they had reached their own independent view as to what the design philosophy was?

A. I don't think so.

Q. So you gave it to them? You told them?

A. Yes.

Q. Did they also ask you whether or not in your opinion they should have picked up the omission in the drawings?

A. They did ask.

Q. And you proffered your opinion on that as well?

A. I did.

Q. So it was you that had pointed out the gap between the spandrel and the floor slab in the north and south panels and the lack of it, a seismic gap which they refer to in their evidence on the east and west panels?

A. Yes.

CROSS-EXAMINATION: MR JONES – NIL

CROSS-EXAMINATION: MR MATTHEWS – NIL

CROSS-EXAMINATION: MISS SMITH

Q. Mr Cusiel, I just want to go back very briefly to the inspections that you undertook on the 23rd of December, the 19th of January and the 2nd of February. You have indicated that you specifically looked at points of interest as noted by Mr O'Connell of Ballantynes. Is that correct?

A. That's correct.

Q. But you've said in evidence that the purpose was to assess the structural integrity of the building?

A. No, I think it was to assess the consequence of those cracks on the building.

Q. Right, and your conclusion was that those cracks didn't compromise the integrity of the building as a whole?

A. That's right.

Q. So to reach that conclusion about the integrity of the building as a whole you would have had to have regard to the areas that were pointed out to you by Mr O'Connell. Is that right?

A. That's right.

Q. But also you would have had regard to your knowledge of the building and its construction. Is that correct?

A. Yes.

Q. And presumably other areas of the building that you looked at?

A. All these cracks there in the basement packing area and – were not related to structural movement above that level.

Q. But you didn't notice in your inspection any other areas that had been damaged at all?

A. No.

Q. And your conclusion was that the Anderson building was safe to be used and could continue to be used by Ballantynes?

A. Yes, after the previous inspections.

CROSS-EXAMINATION: MR LAING

Q. Mr Cusiel, I just want to ask you some clarifying questions about various documents that were submitted to the Council. Firstly can I look at the design features report, BUI.LIC43.0023.1.

WITNESS REFERRED TO DOCUMENT

Q. Hopefully you can read it, but we can get it enlarged. It refers to a new parking retail building for Ballantyne and Company Lichfield Street, Christchurch. I assume that this relates to 43 Lichfield Street. Would that be correct?

A. Correct.

Q. Looking at the bottom of that form, could that be enlarged, the last few lines from provisions, for parts and portions? Could you firstly tell me what parts and portions are?

A. Parts and portions are non-structural elements which ah, which affect two buildings.

1219

Q. Yes and you refer there to the seismic co-efficient for the pre-cast concrete panels on the south elevation and what are the, well they're not calculations as such are they, this will be the co-efficients?

A. They're co-efficients which are multipliers for the weight of the panel to be applied to the horizontal loading on that panel due to seismic load.

Q. Yes now document would have been submitted to the Council before the building consent application or at the same time?

A. Along with.

Q. Along with, and that's dated, I think you can read up there, 8 December 2000?

A. Mmm.

Q. Could I then ask you to look at another document please. BUI.LIC43.0050.13. Sorry there's a little delay while we find the document.

MR LAING ADDRESSES JUSTICE COOPER – LOCATION DOCUMENT

MR LAING

Can we just try that again please BUI.LIC43.0050.13.

COMMISSION ADJOURNS: 12.22 PM

COMMISSION RESUMES: 12.30 PM

CROSS-EXAMINATION CONTINUES: MR LAING

Q. The document that's in front of you. That's a producer statement PS1 design, isn't it? And can you look at the number there? It says 46 Lichfield Street. Was that intended to mean 43 Lichfield Street?

A. 43.

Q. Yes and at the bottom of that form we have a date. Can you read that date for me please?

A. 16th of October 2002.

Q. Yes thank you. Now I'd like you to look at what I think is an identical form but dated earlier, 0050.16. Now you'll note at the top of the form the PIM number there which I think is the same.

A. Correct.

Q. It also refers to 46 Lichfield Street, you've clarified that, and down the bottom is the date 24 April 2002. Can you explain to me why we would have had two forms with different dates? It's otherwise the same.

A. I can only assume that the, the earlier item had been lost so I reprinted the PS1 which through my computer system automatically comes up with the date that it got reprinted.

Q. Yes, yes. Thank you. Now just finally can I ask you to look at another document which is a PS4 producer statement, BUI.LIC43.0050.4.

A. Yes.

Q. Now is this a document which would be provided to the Council on completion of construction works?

A. It is.

Q. And can you look at that address there. It says 46 Lichfield Street. Again, is that intended to mean 43 Lichfield Street?

A. Should be 43, yes.

Q. Yes. Thank you.

CROSS-EXAMINATION: MR ELLIOTT

Q. Mr Cusiel just firstly, I've spoken to members of Linda Arnold's family and would firstly like to just acknowledge that you've given evidence in which you volunteered the omission in the plans and to thank you for the condolences that you've expressed in evidence today. Just a few questions for you. Firstly, have you read the reports prepared by Mr Peter Smith for the Royal Commission?

A. I have.

Q. I can, I'll refer you to one or two sections in a minute, but is there anything in those reports that you disagree with in particular?

A. No there's not.

Q. In his first report Mr Smith reaches a conclusion that the panel fixings as detailed on the drawings, that's S4, 5 and 6 did not comply with the current code which was NZS4203 1992. Do you agree with that?

A. Yes.

Q. Mr Smith also expresses the opinion that inter-storey deformations are likely to have contributed to the failure but it is evident that other failure modes occurred as the panel's connections were significantly under strength and the earthquake shaking was in excess of the code design requirements. Failure was almost inevitable. Do you agree with that?

A. I do.

Q. I just need to ask you one or two questions about the inspections that were carried out following the 4 September earthquake and before the 22 February earthquake. You carried out three inspections. Is that right?

A. Yes I did.

Q. Did you carry out any inspection of the exterior on the Lichfield Street side?

A. No I didn't.

Q. Was there any inspection from inside of potential damage to the connections between the spandrels and the columns on that southern site?

A. No, no there wasn't, no.

Q. In hindsight at least do you agree that that type of inspection should really involve looking at plans of a building so as to make a determination about the safety of a building and its parts?

A. I think if any damage had been evident it would have been prudent to have checked back through the design documents. If there was no, no damage evident I think a visual observation would have been, would have sufficed.

Q. In Mr Smith's first report he makes some recommendations. Firstly, he talks about structures designed to ductility 6 and there's some quite technical commentary here which I won't get into, but he makes, he concludes that the requirements of NZS1170.5 2004 and 3101 2006 have restricted the ability to design reinforced concrete frame structures to ductility 6. Do you agree with that?

A. Yes.

Q. Are there any other comments that you would want to make about that particular recommendation that might assist the Commission?

A. No I think this was a much later period of course. The building wasn't designed to that particular code.

Q. And finally Mr Smith talks about the separation of non-structural elements and he makes the point that as the failure of the bolts resulted in collapse of the panels it would seem appropriate to provide a margin of safety beyond the ultimate limit state of deformations when detailing the connections for pre-cast panels, when any deformation in excess of the ultimate limit state deformations would result in the panels falling from the building. I take it you agree with that?

A. I agree with that.

Q. Are there any other comments you could make on that issue that might assist the Commission?

A. Very much more tolerance has to be applied to the connections to allow for the differential movement between the frame and the, the connected panels. We had, we had 60 millimetres which really converts into a 20 millimetre leeway each way which is obviously not enough.

RE-EXAMINATION: MR RAYMOND

Q. Just a couple of points Mr Cusiel. Mr Laing has raised the issue of PS1s and PS4s. So, producer statements for design and construction review. Is that right?

A. That's correct.

Q. And the PS1 design statement is effectively a sign-off from you that it has been designed in accordance with the Building Code and the Building Regulations?

A. Correct.

Q. The relevant legislation, and PS4 likewise confirms that it's been constructed to that standard?

A. To the standard in the documentation.

Q. And at the time that you produced both of those statements you have already at consent stage submitted the drawings relevant to the building?

A. Yes.

Q. And in this case as we've heard with the omission which you've noted in your evidence?

A. Yes.

MR RAYMOND TO THE COMMISSION:

Can I qualify the next question Sir by noting that I didn't put this earlier and if my friend wishes to seek leave to cross-examine on the point you may do so.

JUSTICE COOPER:

Yes.

MR RAYMOND TO THE COMMISSION:

I won't object to it in other words.

RE-EXAMINATION CONTINUES: MR RAYMOND

Q. In your opinion Mr Cusiel should have the Council in circumstances such as here where there's two different design philosophies relating to

the same building element, the spandrel, have been in a position to pick up the omission and raise that with you?

A. I think so.

1240

Q. And that's on the basis that they have engineers employed at the council to review plans and details of this nature?

A. Yes.

Q. And I take it there was no such contact?

A. No.

Q. Now just another issue which has arisen and Mr Elliott has raised the evidence of Mr Smith yet to be given but he's filed an addendum to his first report which has been made available to you hasn't it?

A. Yes.

Q. And in that report he raised the question of what appeared to be an additional fixing provided from the floor to the panel. Do you remember that in his addendum?

A. No I'm sorry I...

Q. Well if we can put up please a photograph which will help your recollection 0024.6. That is some sort of cleat which same photograph as attached to the addendum from Mr Smith do you recall that?

A. Right yes.

Q. And it was earlier supplied to you by Mr Zarifeh, counsel assisting the Commission, and is annexed to a report from the police?

A. Right.

Q. And there's been some issue about whether or not that formed part of the connection of the spandrels to the building which we're concerned about?

A. I could not identify any detail on our drawings which might have said where this panel, this connection was.

Q. And Mr Zarifeh has written to you about that cleat and you've confirmed that you cannot identify, identify the cleat. You weren't aware of similar cleats. They were not installed at your direction and you're unaware of the date of installation?

A. That's correct.

Q. And if we could look at 0024.8 please? Similar connection which likewise you're, you cannot identify as being part of the design of the spandrel -

A. Not part of the spandrel panel no.

Q. If we could pull up please 0024.3?

A. Can you just go back there? If that picture was turned round 180 degrees. Maybe it's the connection of the side wall panels, the bearing cleat.

Q. I'm just going to come to that and show you a photo because we have identified where those connections were.

A. Okay.

JUSTICE COOPER:

Q. Is that what you wanted done to the photograph?

A. Yes. I think it could possibly be an angle seating bracket anchored into the face of the panel and sitting on top of a beam.

RE-EXAMINATION CONTINUES: MR RAYMOND

Q. If we pull up document 24.2 this is a red placard building risk assessment produced, completed by Mr Fairburn dated 20 March 2011. Do you see that?

A. Yes.

Q. And is it your understanding that Mr Zarifeh has been liaising with Mr Fairburn to try and identify whether or not the cleats that we've just referred to were taken by him on or about that date 20 March 2011 and relate to a different part of the building entirely?

A. I think that's correct.

Q. So if we look then at 0024.3 Mr Fairburn has further clarified and produced a document which is on the Commission's secure website which indicates that he was taking those photographs which we've been referring to and which have made their way into Mr Smith's addendum in relation to the lower panels which we can see faced in brick.

A. Yes that seems more likely.

Q. And he was concerned with the connections where the left panel connects to the Christchurch City Council carpark pretty much behind where that flag is fluttering, is that right? Is that how you've understood the final position?

A. I think so.

QUESTIONS ARISING: MR LAING

Q. Mr Cusiel, can I take you back to your design features report please BUI.LIC43.0023.1. And if we just highlight the bottom few lines please again. Now in your design features report you have first of all provided design loading and then structural ductility factor and seismic loading. The bottom there for parts and portions you've provided information about the seismic coefficient haven't you?

A. That's correct.

Q. Are those seismic coefficients correct in retrospect?

A. I think so.

Q. So there's nothing on that form that a council engineer would find amiss is there?

A. Not on that form no.

Q. And would you accept that the council's engineer or anybody looking at that document on the face of it could conclude that it looked correct?

A. This, yes certainly be entitled to think that it was correct.

Q. And you told me that the seismic coefficient for parts and portions was correct?

A. Yes.

Q. So anybody looking at that document could be forgiven to thinking that you had carried out your design in a very professional way and you were providing information that the council could rely on?

A. Yes.

Q. Now if we go to the, back to the producer statement PS01 and we'll look at the 15th October, it doesn't make any difference that's 0050.13. Sorry BUI.LIC43.0050.13. Can we try .16? Now this is a fairly standard form

document isn't it, and it was developed as you see at the top of the page there, there's a number of organisations mentioned there, Association Consulting Engineers New Zealand, New Zealand Institute of Architects.

A. Yes.

1250

Q. And IPENZ as well, see that?

A. Mhm.

Q. And you state in that document your company has been engaged by J Ballantyne and Co to provide structural design of the new parking retail building in respect of the requirements of clauses B1 of the Building Regulations. And then down further you refer to the drawings, various number of drawings there and then you say, you certify as Independent Design Professional holding a current policy of professional indemnity insurance, I believe on reasonable grounds that subject to site verification of the following design assumptions, and all propriety products meeting performance speculations, the drawings specification of the documents according to which a building is proposed to be constructed, comply with the relevant issues of the building code. And then you sign it.

A. Mhm.

Q. And you date it. Now that document clearly was one that you provided to the Council to be relied on by the Council, wasn't it?

A. Yes, but not exclusively.

Q. So, well you tell me Mr Cusiel, what elements would the Council not rely on?

A. Well the Council would inspect the drawings, pick up any anomalies, and refer them back to the engineer either to discuss or change.

Q. So are you saying that your error was so obvious that the Council should have picked it up? Is that your evidence?

A. If the Council had inspected them they almost certainly would have said yes, that's something amiss.

Q. Do you know whether the Council looked at your drawings or not?

A. I presume they do.

Q. Yes. So I just want to be very clear about this. Are you saying that you made such a major error that even the most cursory look at the documents should have indicated something was wrong. Is that your evidence?

A. Yeah, I guess so.

Q. But you're also saying aren't you, that you intended the Council to rely on the certificate?

A. Yes, but not exclusively.

Q. Not exclusively. So we're in a situation where one of your staff members carried out the design, you checked it, you provided the PSI1 to the Council, and now you're now saying that the error was so obvious that the Council should have picked it up?

A. Yes.

Q. But you're not aware as to what checking the Council in fact did at the time?

A. No I'm not, no.

Q. Did the Council come back to you with any questions or queries about the design?

A. No.

Q. Did they not come back to you about matters relating to ventilation?

A. Ventilation is not in my area of expertise.

Q. So it's not something the Council – you would have –

A. I would not have been –

Q. Involved in it?

A. – involved in it.

Q. I'm going to ask you to look at a document please BUI.LIC43.0050.22.

WITNESS REFERRED TO DOCUMENT

Q. Now it's hard to read, but could I ask firstly that items one and two on that document be highlighted. And that refers to – you see that number one Mr Cusiel, Producer Statement design?

A. Mhm.

Q. And number two Producer Statement Structural Elements and it's got your name, it's got checked, there's a cross there, Cusiel, T T and I can't read the next – could be flange or ...

A. Flange support.

Q. Yes. So that in fact indicates that the Council engineer did in fact look at your design doesn't it?

A. Is that an engineer or is that –

Q. Well it doesn't matter we –

A. No, no is it -

Q. It's a Council, I think it's a Mr Harrow.

A. Peter Harrow, yes.

Q. P-E-R-H. That's – was Mr Harrow working at the Council at that time?

A. Yes he was.

Q. Yes, and look if you go down to, it seems to be, it's after 27, so could I have 27 onwards highlighted please. So you see number 11, Design Features Report has been ticked?

A. Yes.

Q. And 29 Ductility Factor as well.

A. Right.

Q. Now does that suggest to you that Mr Harrow did look at your plans and specifications?

A. Yes.

Q. And clearly the defect in the drawings wasn't picked up though, was it?

A. That's right.

Q. Just coming back to this issue about design certificates. You have been in practice for a very considerable time, you have?

A. I have.

Q. Isn't it the case that for most purposes a design certificate from a reputable structural engineer is going to be accepted by the Council unless there is some very unusual or anomalous thing wrong with it?

A. Yes, but I don't think that absolves them from checking the drawings.

Q. I think my point is though Mr Cusiel, is that the error left your office and Mr Harrow obviously didn't pick it up either, but doesn't that suggest to you that it may not have been an obvious error?

A. Well I really can't comment.

Q. If it was such an obvious error, isn't it something that you would probably have picked up yourself?

A. Yes, and I have admitted I made a mistake.

Q. Yes.

A. So I've made a mistake. I'm not trying to implicate the City Council, but it is a fact that I feel they may have picked it up.

Q. Yes. But isn't it the case that on the face of it you produced two different detailing for different spandrels and you've told me that the, your seismic co-efficient calculation was correct and so wouldn't that be the sort of error that could slip through the system?

A. Yes and it has.

1300

Q. Yes.

A. But you know, I'm not trying to blame the Council. I have accepted full responsibility for this, so there's no need to hammer the point really.

Q. No. Well I've got no further questions and thank you for being such a clear witness.

MR RAYMOND ADDRESSES JUSTICE COOPER:

There's little utility sir to go over the same point. The concession's been made. It's more a matter of submission.

QUESTIONS FROM COMMISSIONER CARTER:

Q. Just a couple of questions Mr Cusiel. The, first of all, I was a little I suppose confused as to whom your employer was. The certificate we've just seen says that you're working for Ballantynes. I had the impression that you were employed as a design and build contract, that the design responsibilities were carried by the contractor and they have employed you. Could you just clarify who you were working for?

A. Well I, I submit in my, my fee quote to C S Luney and I thought I was working for them.

Q. So, and they had, they employed the architect who I presume you work in closely with to produce the design?

A. They have in, in-house architects.

Q. Did they, did whoever did employ you and let's assume it was C S Luney for the moment, did they ask you to carry out supervision functions?

A. Yes.

Q. So you had the opportunity to examine the panels and to see how they were erected?

A. Yes.

Q. The other point I was just interested in. On the photograph, perhaps we don't need to show it, but the panel was about 10 metres long and there was a panel intermediate to that length, column rather I should say, so the panel spanned three columns, one at each end and one in the centre?

A. No, no, no. Only one column at each end of the panel.

Q. Okay so there were, if we looked at the face of the building, could we have a look at drawing 43, I think – the actual photograph of the building after the, the panels have been removed. They show the columns quite clearly.

DISCUSSION – APPLICABLE PHOTOGRAPH

JUSTICE COOPER – PHOTOGRAPH 34A.6

MR CUSIEL:

We could see one column in that photograph – the eastern end.

JUSTICE COOPER TO MR CUSIEL:

Q. Just wait for this other one. You want the top photo enlarged?

A. Yes please.

QUESTIONS FROM COMMISSIONER CARTER CONTINUE:

A. There are three separate panels on that elevation.

Q. Yes (inaudible 13:04:19)

A. Starting on the left, from the left-hand column to the middle column.

Q. Yes.

A. And then the next panel from the middle column to the right-hand column.

Q. Okay, that's the 10-metre length?

A. Yes.

Q. Okay thank you. That clarifies that. Now just one other point with respect to the slots on the – did you actually observe whether they had been left free to move? There was a question that they'd been welded up so that they were rigid.

A. Yeah.

Q. Do you know, can you help us on that point?

A. I'm pretty sure that they were not welded because there was a specific requirement that there was a slot in that panel with the notion of getting the, the seismic movement accommodated.

Q. Yes and I think you've commented that the free movement would be 20 millimetres either side of the –

A. That's right.

Q. – bolt which was, which would have to allow for the inter-storey drift?

A. Yes.

Q. Provided the bolt was accurately located. So what sort of tolerance would you expect you'd need to place a bolt in, in a panel?

A. Probably much more than that. But the panels were cast in the yard so you could probably get with them within 10 millimetres but it didn't leave enough room.

Q. But the question then arises as to what accuracy the spacing of the two main columns that it's connected to might have. There could be a tolerance inherent in the weld plate that was welded into the columns that would have to be accommodated within that slot?

A. That's right, unless the pre-cast panel was made after measurement of the space available.

Q. We're going to hear from the contractor so I'm, perhaps he might give some thought to that question before we hear his evidence.

QUESTIONS FROM JUSTICE COOPER - NIL

WITNESS EXCUSED

COMMISSION ADJOURNS: 1.06 PM

COMMISSION RESUMES: 1.46 PM

MR ELLIOTT RECALLS:

STUART WINTERBOURN (RE-AFFIRMED)

Q. Mr Winterbourn, thank you for staying back until after the lunch adjournment. I just wanted to raise one or two matters of clarification which Mr Smith has raised.

A. Sure.

Q. And that is about the angle cleats.

A. Yes.

Q. Now I just refer you to document 0024.4 which is the photograph of the building following the earthquake.

A. Sure.

Q. Of 22 February. And at which point all of the panels on the southern side had been removed.

A. Sure.

Q. Or had fallen in the earthquake. And I'm just asking you about the angle cleats which appear there fixed to the columns and were part of the mechanism holding the panels.

A. Sure.

Q. In place. Understand that?

A. Yes I do yes.

Q. And is it right to say that when you examined the building the top panels were still in place?

A. That is correct.

Q. That is you could see them from the building side?

A. Yes.

Q. And I think also is it the case that the left-hand side panels were also in place when you inspected them?

A. From memory yes they were.

Q. But the two central lower panels were missing?

A. That's correct.

Q. You gave evidence earlier on that the angle cleats were welded to the back of the panels that you saw. Is that right?

A. Yes that's correct.

Q. And in the meantime Mr Cusiel has given some evidence that based on the plans at least there was to be no welding. Do you understand that?

A. Yes I do.

Q. So having heard that is it still your position that you saw welding in place at one or more of those angle cleats that were –

A. Well my memory of it was that that it was a fully welded cleat and the reason why I think that to be the case is because I remember thinking that there was no tolerance at all in the cleat to allow for movement which is how I deem that it had failed. I don't recall seeing a bolt but it may well have been there but I do recall remembering that the cleat was welded both to the panel and to the column.

Q. Just refer you to the plans using document 0023.18 and if the bottom right-hand diagram could be enlarged please. Can you just indicate with your mouse where you saw welding?

A. Sure. So there was certainly welding in this area between the angle and the column so I could see it on the side, on these three or two horizontal and one vertical side of the cleat. My assumption would be that there would also be a vertical weld which I couldn't see in behind, and then my recollection was that this connection was welded also and whilst I can't remember if there was a bolt there or not, if there was a bolt then the weld would have been around the washer to the angle.

Q. Just for the record when you refer to this connection you're referring to what appears to be the only connection between the spandrel and the cleat?

A. Sorry could you...

Q. You refer to this connection, you're referring to what is apparently the only connection between the spandrel and the cleat is that right?

A. Yes that is correct yes.

Q. And did you see this type of welding on one or more of the cleats that you looked at?

A. Well I don't recall, I don't recall them being different. Yes I don't. From memory it was consistent detail but in saying that I wasn't closely inspecting all the cleats.

Q. And just finally I'll refer you to a photograph, another photograph 0024.6. Did you see any of these during your inspections?

A. No I didn't.

Q. And did your inspections only involve the southern spandrels or the eastern as well?

A. Well I mean I inspected all of the buildings in the complex actually but yes I, I mean I had a pretty thorough inspection of the whole building but I did not see those cleats.

CROSS-EXAMINATION: MR RAYMOND

Q. If we could have that up again please, 023.18. If we could zoom in please on the typical connection detail. You see the wording at the top left box Mr Winterbourn, describing six fillet weld all around the weld plate. Can you indicate with your cursor what you would anticipate that would entail?

A. Well I think it's a little bit open to interpretation but my expectation would be that it would be a weld all the way around the connection to the column.

1356

Q. Yes, so you would expect and you saw that the weld plate, where it connects to the column had been welded?

A. Yes.

Q. And that is as indicated on the drawing, but you go on to say that you think that the TCM20 insert was also welded?

A. Yes.

Q. Did you actually see that to your recollection, not making any assumptions now, hindsight, but can you actually remember seeing that?

A. All I remember thinking that – I remember, I don't have a picture in my mind of that connection fully welded, but I remember referring to that

connection as being fully welded in my determination as to why it had failed.

Q. Did you record that anywhere in a report?

A. I don't believe so.

Q. So do you accept that you might be mistaken in that recollection, because Mr Cusiel's clear that that shouldn't have been welded. Whether it was or not may be (overtalking 13:58:00)?

A. It is possible, yes.

CROSS-EXAMINATION: MR MATTHEWS, MISS SMITH, MR JONES – NIL

WITNESS EXCUSED

MR MATTHEWS CALLS

RUSSELL IAN WESLEY PITT (SWORN

Q. Your full name is Russell Ian Wesley Pitt?

A. Yes it is.

Q. Could you read your statement of evidence commencing at paragraph 1 please?

WITNESS READS BRIEF OF EVIDENCE

A. "My full name is Russell Ian Wesley Pitt. At the time that Chas S Luney Limited, Luneys, was undertaking the building work for Ballantynes at 43 Lichfield Street, I was the project manager for Luneys managing project at Christs' College. Shortly after this I moved into the contracts manager's role at Luneys.

Counsel assisting the Commission has written to Luneys by email on the 8th of February 2012 asking for a statement outlining Luneys' involvement in the building and a response to the issue raised by Mr Cusiel in relation to precast ties from the spandrel panels to the floor topping. Mr Cusiel of LSC Consulting undertook the design of the structural elements for the building. He was engaged by Luneys for that purpose. Luneys had used Mr Cusiel over many years and have high regard for Mr Cusiel's engineering advice and professionalism. The plans were submitted to and approved by the Christchurch City Council. Regular Council inspections occurred during the construction.

Spandrels facing Lichfield Street rising up from the ground floor at the base of the building on Lichfield Street are precast panels three of which contain arch windows each of which is individually made up of two precast panels. The panel section detail and fitting detail for those ground floor panels at first floor is shown on Mr Cusiel's plan SG6 as section 12. What is evident from that section 12 in the drawings and as reflected in the construction is a small gap approximately 20 mm which has been designed between the back of the precast panel and the framework of the building including the first floor level floor slab of the carparking above. The design at section 12 shows this as a deliberate gap which I assume was to allow for movement, likely to include seismic

movement in the structure. That same design of the 20 mm gap between the precast panels and the structure, including the floor slab has been continued on the engineer's plan at section 1 which is the plan of the precast fascia spandrels to face Lichfield Street. This design feature, the 20 mm gap between the facia panels and the structure on the front face Lichfield Street of this building is constant from the ground level upwards. On the engineer's plan SP7, there was a typical cross section of the precast spandrel panels S4, S5 and S6 which shows these spandrel panels and their connection by weld plates and the TCM20s of concrete inserts cast into the panels, then being bolted onto the building columns. With each of the panels being secured by four such bolts this method – "

EXAMINATION CONTINUES: MR MATTHEWS

Q. If I can just stop you there, the reference is 0023.18 to the SP7 plan which we've seen extensively.

WITNESS CONTINUES READING BRIEF OF EVIDENCE

A. "This method of securing concrete panels by TCM20 concrete inserts cast into the panels themselves and then being bolted onto the columns or other structural elements of the building was at the time the common method of construction and of fixing such panels. There was at that time nothing unusual in that design.

East-west spandrels – the design and construction of the panels and their method of fixing was specified by the engineer to be different for the east and west sides of the building. No gap was provided for between the spandrel panels and the floor slab or any other element of the building, so that the spandrel panels were up against the structure and floor slabs. The design for fixing of these spandrel panels was different and shown on typical section of precast panels S1, S2 and S3, plan SP7. That provides for reinforcing steel ties to be cast under the spandrel panels, following the placement of the panels, spandrel panels, those ties would be cast into the concrete floor slab.

Construction – all spandrel panels were precast in accordance with the plans but east and west facing panels have reinforcing steel ties cast in. The Lichfield Street facing panels had TCM20 concrete inserts cast in for bolting. Luneys Construction of the building followed Mr Cusiel's design and drawings. My understanding is that the floor slabs were poured leaving a gap on the east and west sides of possibly up to a metre but was poured fully to the front Lichfield Street side. The gap on the east and west sides was to allow for the side spandrels to be installed and for their ties to be subsequently cast into the remaining construction of the floor slab. Detailed inspections by the engineer occurred throughout the construction of this building. Those inspections would have occurred pre-pour for each floor slab where the gap left on the east and west sides for the spandrel ties to be placed and covered by the subsequent concrete pour would have been plainly visible as was the complete pour of the slab to the Lichfield Street end. This would have been obvious throughout the construction process as the erection of the spandrels occurred at a late stage in the construction process and after initial pour of all the floor slabs had been undertaken. Given the method that was specified for the connection of Lichfield Street facing spandrels by bolting in the gap designed between those panels and the floor slab, Luneys would not have anticipated there being reinforcing steel ties from the spandrel panels across the gap and then cast under the floor slab. The detail for the east and west side spandrels did not provide for them to be bolted, but provided for them to be secured by reinforcing steel, ties to be cast under the floor slab. The building design meant that there were in fact no columns or other structural elements to which those spandrels could be bolted in any event. I am not aware of there being any questions of Mr Cusiel nor discussions with him at the time regarding the difference between the methods of attachment of the spandrels. That does not surprise me. The construction followed the two different design methods for attachment. That appeared to follow a different engineering design choice between different sides and elements of the building. There was nothing unusual

in the design to what was then common building practice with each appearing to have a different method of attachment relevant to the design, the building design. There was no reason for Luneys to question the reasoning for those design differences. It was not until January 2012 that Luneys became aware that a fatality had occurred when one of the spandrels fell on a vehicle in Lichfield Street. Luneys extends its sincere condolences to the victim's family."

1406

CROSS-EXAMINATION: MR RAYMOND

Q. Mr Pitt, as I understand your brief you didn't have any direct involvement with this building at the time.

A. No I did not.

Q. You were working at Christ's College during the construction.

A. That's right.

Q. So you've gained your knowledge and understanding of what you've just described in your brief of evidence from what you've been told by other people.

A. In reviewing the drawings and shortly after the, what we call the shell works I stepped into the contracts manager's role and ran some of the internal fit out works for the building.

Q. But that came after this construction phase.

A. That came after that, that's correct.

Q. I take it you don't have any engineering qualifications.

A. No I don't.

Q. We've already heard from Mr Cusiel that there was a meeting with Wayne Carlyle of Luney's. He's part of your company, the company?

A. Yes Wayne's part of the company yes.

Q. And he's a builder by trade?

A. Ah, yes I believe he is.

Q. And George Haddow, Development Manager at Luney's?

A. That's right.

Q. And they were at this meeting with my client, Mr Cusiel.

A. I believe so yes.

Q. You believe so, you know so don't you?

A. I was not present at the meeting but yes I'm aware that the meeting happened.

Q. Now you refer to what you've described as design features at paragraphs 5 to 8 of your brief consisting of what you note as a deliberate gap to allow for movement, and you assume seismic movement, in the structure. Remember that evidence of yours?

A. Yes.

Q. And you note that this feature's consistent with the ground floor levels.

A. Yes.

Q. Before you met with or your company met with Mr Cusiel, you hadn't identified the difference in the design philosophy between the east and west and the north and south sides had you?

A. I don't believe so, no.

WITNESS REFERRED TO BUI0023.18 – BOTTOM LEFT-HAND DRAWING

Q. Are you able to identify on that drawing where this gap is?

A. It doesn't show it on this drawing it shows it on, I believe, SP6 – this mouse is hard to drive. The gap is up there although you cannot see it on this drawing.

WITNESS REFERRED TO BUI0023.10

JUSTICE COOPER ADDRESSES MR RAYMOND – SG6 HAS SUFFIX 12 – 34A.12

CROSS-EXAMINATION CONTINUES: MR RAYMOND

Q. Thank you sir, there are different numbers on mine but if the bottom left-hand drawing has been referred to in the evidence as being one of the panels. Sorry, Mr Pitt if you could just let go of the mouse that's causing some problems with finding documents thank you. Can you highlight on this drawing where the gap is please?

A. That's the gap. You see a dotted line?

Q. Yes.

A. That's the gap running up here.

Q. And is that what Mr Cusiel pointed out to your colleague when they met?

A. I don't know but I expect so yes.

JUSTICE COOPER:

Q. Just point it out again please.

A. There's a dotted line and then there's the face of the panel and there's a gap.

Q. So it's the dotted line behind the precast fascia panel and we're looking at section 12 on the SG6.

CROSS-EXAMINATION CONTINUES: MR RAYMOND

Q. So who is it within Luneys who can say that at the time this was constructed, not now in a meeting with Mr Cusiel 10 years later but at the time, identified the different design philosophies and therefore was not alert to a possible omission?

A. Sorry?

Q. Who was it within Luneys who, at the time, you say would have identified this difference in design philosophy and, therefore, not be alerted to the design deficiency that we now know about?

A. We didn't, as such, pick a difference in the design philosophy we just picked a difference in the two details shown on the plan. So, as a builder, we've got quite clear black and white direction on what we're to do.

Q. So when you have a spandrel delivered to site with an L-shaped D12 bar sticking out the bottom of it –

A. Yes.

Q. – which is going to be tied into a concrete floor slab on one side of the building, doesn't that ring alarm bells for you that there is an absence of such a feature on the spandrels facing the north and south?

A. Um, the main difference that I see and if I can answer that from my own personal experience is that on the Lichfield Street side we've got concrete columns which are out on the face of the building so that

allows a detail where we can fix direct to those columns, whereas on the two sides those columns are approximately a metre or 1500 in from the edge so fixing to those columns is not an option. So, therefore, slab ties were used. As a builder we don't have the codes and calculations that were shown earlier we, no I'm sorry but they're a different language to us. We don't have any knowledge or training on those.

Q. But you would have recognised that the L-shaped bars in the pre-cast spandrels for the east and west sides had an obvious design feature which was effectively locking in that spandrel to the structure by use of the floor slab pour. You would have recognised the wisdom and the strength of that design?

A. Yep I'd recognise that that's a good method to secure those in.

Q. And then when you go to construct the spandrels for the south side facing Lichfield Street, that's missing. There's no pour, concrete pour on the floor which locks it in. Do you accept now, with the benefit of some hindsight in looking back on this that you should have been alerted that this heavy six ton spandrel was being held by only four TCM 20 bolt inserts.

A. If I can sort of perhaps move onto the next step.

Q. Well I'd prefer you just answer the question actually.

A. Okay we'll you're asking me now whether in hindsight 10 years on and 10,000 earthquakes I believe on whether I would think that the TCM 20 is not a particularly good detail and the answer to that is yes I don't in hindsight but 10 years ago with none of the experience we've had in the last 18 months I don't believe I would have questioned it and the people on site didn't either.

1416

Q. Well regardless of the earthquakes and what was learnt from that it was still nonetheless a reasonably significant departure from the east and west sides. It's got four bolts essentially holding up a six tonne. Spandrel. You don't think and I'm not asking you to consider the earthquakes but looking back on the design as circumstances are on the ground then that you should be alerted and spoken to the design

engineer about the apparent difference between the two philosophies and whether it was adequate?

A. No I don't believe so. They're 20 mm bolts. They are a fairly big bolt. They're not a half inch bolt, they're a 20 mm bolt so I don't think I would have questioned it no.

Q. Do you employ engineers within Luney? Did you at that time?

A. No, all engineering was contracted out.

Q. And having had the design deficiency and the philosophies pointed out to you by Mr Cusiel recently, do you accept that in fact you or your company has not given any independent consideration, applied any independent process to come to your own view about how you could have missed this design feature?

A. Well I don't quite follow what you're asking.

Q. Well you've relied on Mr Cusiel for your evidence haven't you? You haven't come to this objectively and applied any objective rigor to how you could have missed this. You effectively asked Mr Cusiel how did you design this? How could we miss this haven't you?

A. My understanding is that the question was asked of Mr Cusiel to provide plans and sections because Luney have ceased construction some years ago and you know find it hard to locate that in their archiving and certainly from the Luney's existing management I was asked to give my opinion as to whether I would have picked it and to what I saw the differences were which I'll answer previous to you.

Q. Differences pointed out to you by Mr Cusiel?

A. The differences in what would have satisfied me i.e. columns on the front that were available to fix to, no columns on the sides.

Q. Well just moving on when you say in your evidence under your heading "Construction". "My understanding is that the floor slabs were poured leaving a gap on the east and west sides." Where have you derived that understanding from?

A. I contacted the person who was the foreman on this site at the time. He now works for another firm. I had a telephone conversation with him and that's where I've had that information from.

Q. So your evidence is that there was gaps I think up to a metre either side where the L shaped D12 bars could be clearly seen by yourselves obviously but also City Council inspectors and indeed Mr Cusiel's firm?

A. Yes.

Q. And then you go on to say "Detailed inspections by the engineer occurred throughout the construction of the building". Where have you derived that information from?

A. It's common practice but again you know we would never have obtained a PS4 without those inspections being conducted.

Q. Have you got any records which detail these inspections or are you relying on Mr Cusiel again?

A. Luneys will have records of those, yes.

Q. Were they available to you when you prepared your brief of evidence?

A. No they weren't no. I have worked with Mr Cusiel before myself and you know those inspections have to happen to get a PS4.

CROSS-EXAMINATION: MR ELLIOTT

Q. Mr Pitt, just for the record counsel assisting the Royal Commission contacted Helen Castelow, she works with –

A. Yes she works for Luneys yes.

Q. And the question that was directed to Luneys was to provide a statement outlining Luney's involvement in the building and in particular a response to the issues raised by Mr Cusiel in his brief which was attached in relation to the precast ties in the spandrels to the floor topping and then could that response please include the following (1) whether the contractor noticed that these were not detailed on some spandrels as they were on others, (2) why this was not raised with the engineer, (3) whether the contractor noticed that there were steel ties in situ for some spandrels when delivered to site and not others when installing the spandrels and pouring the slab, (4) why this was not raised with the engineer. And that request was made pursuant to section 4C of the Commissions of Enquiry Act. The effect of what you're telling is that you don't have the most direct knowledge of the answers to those

questions but you have been able to give an opinion of what you might have thought had you been on site?

A. Yes and I've been able to speak to a couple of people that have been involved in that process.

Q. Would you just give us the names of the people who can provide the most direct evidence of those answers to those questions?

A. Paul Blackler.

Q. And who was he?

A. He was at the time that this part of the contract was constructed the contracts manager.

Q. So with Luneys?

A. No he's now with Mainzeal. And Jay Anderson.

Q. Jay?

A. Anderson.

Q. Anderson. And what was his position?

A. He was a leading hand I believe at the time of this construction which is like a junior foreman if you like.

Q. Where is he now?

A. He's with HRS I believe.

MR ELLIOTT:

Your Honour, we will direct questions to those people and bring that information before the Commissioners.

JUSTICE COOPER:

Thank you.

CROSS-EXAMINATION CONTINUES: MR ELLIOTT

Q. Just then one or two questions about the opinion that you've expressed. I think that one of the supporting if not the only supporting point that you gave for not seeing any concern with the difference between the south and the east was the presence of columns on the south?

A. Yes that's right.

Q. But the absence of columns on the east?

A. Yes.

Q. Can I just refer you to the plan? I might be misreading it so I will just ask you to comment, document 0023.17.

A. Do I have –

Q. That will appear before you. And it appears that the eastern side of the building is the lower part of that diagram.

A. Yes.

Q. I'm not sure if you can see. Is it not the case that there are columns apparently to be located along the line F?

A. They're only small columns that only go to just below the height of the panels. I can see them on this SG6, on detail 11 I can see one and you'll see that, I haven't got a scale rule in front of me, but it only goes within about 50 mm of the top of the panel and these would obviously be poured after the panels were placed. There's starters shown on these. You can see it on section A directly below that there are starters coming out of the panels and into these columns so these are poured after the columns are placed and after the floor slab is placed as well and they don't go full height so they won't you know, again I'm not an engineer but unless it goes from floor to floor it's not really going to hold a lot.

Q. I see so the presence of those columns on the plan doesn't cause you to change your view about there being no particular concern about the differences between the south and the eastern connections?

A. No starters coming out of a panel are difficult to construct because you have to stop the floor slab pour, place your panel then pour that last strip afterwards. So the contractor always like a connection that we can take delivery of the panel and bolt it straight to the building or you know we don't have to do a temporary bracket or cleat or whatever to hold it until we pour some concrete in so...

1426

Q. Thank you. There's been evidence this morning about some welding of the angled cleat but I suppose you can't give any comment on that because you didn't have any direct knowledge?

A. Sorry, yes – no I can't, no.

Q. But we could direct enquiries on that question to those people you've named, could we?

A. Yes, they would be the people I would ask.

Q. And just as a more general question. Is it Luneys' position that it would never turn its mind to whether there are potential irregularities in a plan or is it something which you would be alert to?

A. Sorry, you're asking me whether – we ever question a plan or whether...

Q. Yes, so if you found yourselves looking at a plan and there was something which appeared to be inconsistent or which may be a mistake, you would do something about it?

A. Yeah, absolutely. We like to, you know, and I would like to think that – that we are thorough and we do, or I don't work for the firm anymore either, but we would question everything, but we only have the – we're only builders, we're not qualified engineers so we can only look at it from a commonsense point of view and – so we're looking for something that's blatantly obvious I suppose and, now knowing what we know having seen other precast buildings around town and seeing corner brackets pull out et cetera et cetera, absolutely, it's blatantly obvious. Back then I don't think it was.

Q. I appreciate that you're not an engineer and builders may not be engineers but there may be some commonsense observations that might lead to a relevant observation and what you're saying is that is something that Luneys would be alert to?

A. Are you asking me whether we should have been alert to this?

Q. No, just generally.

A. You would expect every builder in town to be alert to this now. I don't think you would back then. We've learnt a lot from the last 18 months.

Q. And is there anything you can say to the Commission about whether the building industry as a whole is alert to the possibility of floors and plans?

A. My understanding is that even since this design was done, which is a reasonably new building, is that processes of changed a lot now. People like Mr Cusiel are asked to submit peer reviews with their design for a

consent. All those things I believe have changed., I'm not first-hand at all of that sort of stuff but I – so I believe that things have changed quite a bit anyway, but I'd imagine there will be a lot more to come.

Q. Again you may not be able to answer this because you weren't there, but are you aware of whether there were inspections of the building during construction by the Council?

A. Specifically I can't say yes there was, but very confident there would have been, because you cannot get a code compliance certificate without those inspections.

Q. And your comment in paragraph 10 that there was at that time nothing unusual in the design, and then I think you refer to it later on as common practice. Is that right?

A. That's right for TCM insert.

Q. Would that be right though in the case of panels like this which were six or eight tons in weight and 10 metres long, or wouldn't that observation apply to smaller and less heavy attachments?

A. Well TCM is a common method for creating a fixing into a panel. They come in ranges of size but commonly 12, 16 and 20 mm. A 20 mm is getting a fairly big connection. So, and I don't believe that we would, you know, that's, it's not a tremendously big panel as far as panels go.

RE-EXAMINATION: MR MATTHEWS – NIL

COMMISSIONER CARTER:

Q. Just a question in general about tolerances in cast in situ construction. I think if you will have observed the connection detail –

A. Yes.

Q. - that we've had on the screen? And the two angles that were forming one side of each of the connection pieces?

A. That's right, yes.

Q. One was cast into the column and the other was effectively bolted onto the spandrel onto the bolt connections just referred to. So there was an ability for the column to be slightly out of position because it was a

slotted hole in the cleat that was attached to the – or to be attached to the spandrel.

A. That's right, yes.

Q. My question to you is what sort of order of accuracy would you expect a column like this to lie within in terms of the actual position?

A. You would like to think that you would get it within 5 mm. I would have thought, given the modern equipment we have. Luneys have the ability, in-house we had our own structural shop at the time. It was our own crane sitting on site so certainly anything that required remedial work to perhaps achieve a more accurate tolerance wouldn't have been too hard for Luneys to have done that. It's not like we had to go to a sub-contractor or hire a crane in from a crane hire company. We had our own tower crane on site, so.

Q. Thank you. And the spandrel beams would have been poured by a sub-contractor supplying precast units I presume?

A. No, they were poured in Luneys' in-house precast –

Q. (overtalking 14:32:49).

A. Yes.

Q. Were they poured in a steel form, that would control – accurately control their length?

A. No. Luneys had and continued to do after that a lot of precast work. Luneys' beds were put on (inaudible 14:33:06) concrete, although they did have some steel form beds so exactly where they're poured I could not answer.

Q. Perhaps we could enquire of those gentlemen that you referred to.

A. I don't think either way would have made any difference to the accuracy of them. We did a lot of precast on our concrete beds and we achieved very good standards with all of that.

Q. Would the casting of those spandrel beams be delayed until the actual positions of the columns were known?

A. I'm sorry I can't answer that.

Q. Not necessarily?

A. Not necessarily.

QUESTIONS FROM JUSTICE COOPER - NIL

WITNESS EXCUSED

MR LAING CALLS

STEPHEN JAMES MCCARTHY (SWORN)

Q. Your full name is Stephen James McCarthy?

A. Yes it is.

Q. You have prepared a brief of evidence?

A. Yes I have.

Q. You have it with you?

A. Yes I do.

Q. Could I ask you to start at paragraph 5 please?

JUSTICE COOPER ADDRESSES MR LAING RE MR MCCARTHY'S POSITION

EXAMINATION CONTINUES: MR LAING

Q. Yes, you're the Environmental Policy and Approvals manager of the Council?

A. Yes I am.

Q. You've worked at the Council since 1 May 2006?

A. Yes I have.

Q. And during the state of emergency following the 4 September earthquake you were one of the building evaluation managers for the Christchurch City emergency operation centre?

A. Yes I was.

Q. Probably don't think I need to ask you to read paragraphs 2, 3 or 4, but can I ask you to start at paragraph 5?

A. Certainly.

WITNESS READS BRIEF OF EVIDENCE

A. "My evidence will address the following matters. The Civil Defence emergency management response in relation to the building after the 4 September 2010 earthquake; Council involvement with the building subsequent to the lifting of the state of emergency on 16 September 2010; whether 43 Lichfield Street was assessed as earthquake prone for the purposes of s 122 of the Building Act 2004; the effect of any

strengthening undertaken; the application of the Council's earthquake prone policies of 2006 and 2010 to the building events between 4 September 2010 earthquake and 22 February 2011 earthquake.

On 5 September 2010 a level 1 rapid assessment was carried out and the building received a green placard. Following the Boxing Day earthquake on 26 December 2010 a level 1 rapid assessment was carried out and the building received a green placard. The building was built in 2002 and was not considered likely to be earthquake prone."

1436

EXAMINATION CONTINUES: MR LAING

Q. Now at the time you prepared your evidence I take it that you hadn't seen Mr Cusiel's evidence.

A. That's correct.

Q. And therefore the issue relating to the spandrels was not something that you were aware of at that time.

A. That's correct.

Q. Can I just ask you a few questions about some documents that have already been referred to. Firstly, the design features report, BUI.LIC43.0023.1.

A. Yes.

Q. It will come up on the screen in a minute. Now that's got a reference that was received by the Council on 8 December 2000. What was the purpose of obtaining a design features report?

A. Design features reports are received to add information that we would otherwise receive in a producer statement. They detail features of the building that we might need to know about and create a picture of the design parameters that the engineer would have taken into account in preparing the designs and formulating the plans.

Q. And to your knowledge that was something that was required of any significant building consent application at the time.

A. It was.

Q. Now you've heard evidence this morning about the structural checklists and I'll ask this to be brought on the screen as well – 0050.22. If we could have the top one-third of the document enlarged please. Now you see up there Project Number 15010061.

A. Yes I do.

Q. And across on the same line Reviewer PRH. Do you know who that is?

A. That's Peter Harrow. Peter Harrow was our senior engineer at the time.

WITNESS REFERRED TO DOCUMENT 0050.21

Q. And that's lettered 23rd April 2002 to Charles S Luney Ltd.

A. Yes it is.

Q. And see there the reference to the project number, Mr Harrow's name at the bottom.

A. Yes.

Q. And then there's reference to the need for further information. You see that?

A. Yes I do.

Q. And one of the things referred to is need for calculations or a producer statement.

A. Yes.

Q. And I take it that having, from your review of the file, a producer statement was provided.

A. Yes it was.

Q. What is the reference to details of safety barriers and upstands. Can you recall what that refers to?

A. I believe that was looking at subsequent information that came in. That was about the safety barriers that stopped the wheels of cars bumping over and hitting panels on the side of the building. So those are the metal strips or the concrete strips that need to be put in there just to protect those outside panels so those were subsequently provided.

Q. If I can, without going through all the many documents there are on the building consent file I would like to ask you some questions though about the procedure at the time the Council followed and, firstly, there would be the design features report.

A. Yes there would.

Q. And then that would be accompanied by a producer statement.

A. Yes it would.

Q. That's a PS1.

A. Yes it would.

Q. The Council would issue a building consent.

A. Yes it would. It would be accompanied as well as the PS1 it would have the details of design, the plans of the building.

Q. Yes and thereafter there would be inspections as the work progressed.

A. Yes there would.

Q. And then finally when the project was complete the Council would require a PS form which is the construction review producer statement.

A. By the engineer yes.

Q. And that asked if the Council was satisfied then that the project as built complied with the plans and specifications a Code Compliance Certificate would be issued.

A. Yes it would. We would also receive information from the contractor, electrical certificates, other trade matters that would support that issuing of that Code Compliance Certificate.

Q. Yes so a number of producer statements would be required before the Code Compliance Certificate was issued.

A. Yes or certification from tradesmen as well yes.

CROSS-EXAMINATION: MR RAYMOND

WITNESS REFERRED TO STRUCTURAL CHECKLIST 0050.22

Q. Zoom in on the top four entries. The first column, are you able to assist us with what that reference is 501, 511, 506 relates to.

A. Those are standard comments that our engineers draw against which go subsequently into the consent.

Q. So what's 501, for example, mean, are you able to tell us? Producer statement design.

A. No I can't tell you exactly.

JUSTICE COOPER:

Q. What sort of thing?

A. Pardon me?

Q. What sort of thing do these numbers refer to, can you give us an example?

A. So one would expect with a producer statement it would say, um, that would trigger a requirement that all of the works are done in accordance with the engineer's specifications and design and it's likely to also say that it must be done under the supervision of the engineer.

Q. So these are conditions essentially?

A. Yes they are.

CROSS-EXAMINATION CONTINUES: MR RAYMOND

Q. So 501 relates to a condition which will be imposed and form part of the consent?

A. That's correct.

Q. The third column has above it in the little heading box 'checked'.

A. The third column?

Q. The third column, yep.

A. Oh yes, yes.

Q. And alongside Item 1 producer statement design, unlike all the other boxes, it's marked with a cross.

A. Correct.

Q. What does that indicate? That it hasn't been checked.

A. No it indicates that the producer statement isn't provided with the documentation we have, so I think if you were watching the previous one there's the previous pictures that came up there was a letter that went from Peter Harrow to Luneys that asked for the producer statement. So that was item one in that letter.

Q. Just indicates on this checklist that it's not there.

A. That's right.

1446

Q. And Mr Cusiel being the design engineer?

A. Yes and so it leads to a request for additional information.

Q. Peter Harrow according to that letter you've just referred to where certain items were requested I think was referred to as the co-ordinator or some such words for the planning team?

A. Yes for the engineering services team yes.

Q. Is he an engineer?

A. Yes he is.

Q. So this checklist of things to be done or consents to be imposed.

A. Yes.

Q. Conditions to be imposed on the consent I should say, during that process I take it the plans themselves are also subjected to a review by the design engineer for any obvious deficiencies?

A. That's correct.

Q. And that is why applicants for building consents are charged some would say not inconsiderable fees?

A. Yes.

Q. And you have two engineers or at that time two engineers employed by the council to facilitate this review process?

A. At least two engineers yes.

Q. And so you would reject the notion I take it that it's just a rubberstamping process?

A. Yes I would.

Q. There is some independent objective scrutiny applied to the plans?

A. Yes.

Q. We've heard Mr Cusiel frankly acknowledge that he missed a defect in a detail of a design prepared by someone in his office prior to it going to the council.

A. Yes.

Q. You would accept then that likewise the engineers within the consenting team missed the same detail obviously, otherwise they would have pointed it out?

A. Yes we certainly would have liked to have picked that up. It wasn't obvious to our engineers otherwise they would have picked it up. You

can see that they've gone into some detail going through the, globally through the design and if they've picked it up certainly they would have asked for additional information.

Q. And generally in this whole process which my friend Mr Laing has taken you through with receipt of the design features report, the issue of the PS1, the issue of the building consent and so on the council's role is effectively a second line of defence to pick up on things which as in this case the design engineer might have missed?

A. Yes there's a whole lot of checks in the process, isn't there. There's the engineer, the builder, the council. We're all doing our best to pick up issues and yes.

Q. And it follows in this case given the answers you've just given that for whatever reason the second line of the checks at the council end effectively failed?

A. Yes I would like to explain the reason perhaps is that we did have confidence. We, when we make decisions and when we review designs we do a risk profiling on the job and when you've got very competent engineers as indeed Mr Cusiel is, competent builders, builder designers as is Chas Luneys was in this case, you do a level of checking and that level of checking will vary according to the risk profile of the job.

Q. You started that answer with a yes.

A. Yes I did.

Q. And regardless of the years of experience and details supplied the same fees are paid for the same checking process, correct?

A. Correct.

CROSS-EXAMINATION: MR ELLIOTT

Q. Mr McCarthy, Mr Smith gave evidence in his report, said in his report that the panel fixings as detailed in the drawings which we've heard about today didn't comply with the current code NZS4203 1992 and Mr Cusiel agreed with that. Does the council also agree with that?

A. No reason to contest that in any way.

Q. Mr Raymond has questioned you about the processes and the council's position about what took place there. Stepping back from that and looking at the position more recently including under the newer Building Act, is there anything that the council does differently now or in hindsight would do differently now so that this sort of thing would not happen again?

A. I think we've all learnt lessons about areas which we would focus on. Obviously stairs last week and I guess these sort of façades, new built façades will be something that we will give further attention to. I think though the way the industry is going, the way the legislation is going, we will put more emphasis on receiving a second tier of engineering review so PS2s, peer reviews of the engineers and I think the engineers will probably welcome that because they would like that additional assurance I think, so we've already started to go that line of engineers asking for a second review of their designs and so that's I think where the industry will end up.

Q. Secondly and finally, just turning to the period after 4 September 2010 when the council was embarking upon its inspection process. We have a building here in which a non structural but hazardous appendage has fallen.

A. Yes.

Q. Did the inspection process contemplate looking out for non structural but hazardous appendages?

A. The inspection process depends on the design. They're checking against the design criteria so when they go on site they look, they're looking at the features that are actually in the plans. So the inspector would be unlikely to question the fixing of a spandrel panel. But I do note that we've done something in the order of 15 inspections on this particular job. It was a many stage job and throughout the inspector has noted that he has reviewed the engineer's certification so we know that the engineer has been on the site and been looking at all of the critical things that he used to check which would have been identified in the conditions to the consent and in the specification. So there's a, the

approach really is to try and get as much oversight as we can. So clearly our oversight would not be as in depth as the engineer who's actually on the job so much more often than we are.

Q. Thank you. My focus was really on that post initial earthquake period.

A. Okay.

Q. When the council goes out to inspect buildings generally and would you agree that one of the learning points here would be that as part of that type of inspection there might be some specific focus, not just on damage, but on potentially hazardous albeit non structural appendages as part of an assessment?

A. I think the practical reality is that they would only be unearthed by an engineer who would be doing a much more detailed engineering evaluation. We of course pick up on the obvious damage in our rapid assessments but clearly a much more detailed evaluation would be needed to pick up on some of the issues that we've looked at today.

1456

RE-EXAMINATION: MR LAING – NIL

QUESTIONS FROM COMMISSIONER CARTER – NIL

QUESTIONS FROM JUSTICE COOPER– NIL

WITNESS EXCUSED

MR ELLIOTT CALLS

PETER SMITH (SWORN)

Q. Mr Smith, you've prepared two reports for the Royal Commission, one dated December 2011 and then an addendum report dated February 2011?

A. Correct.

Q. And I think the addendum report was prepared following receipt of Mr Cusiel's brief of evidence in which you were able to focus your attention more particularly on the difference between the connections on the eastern and southern sides. Is that right?

A. Correct. When we prepared our original report there was a scarcity of information and possible suggestion that there had been fixings made after the, or during construction which overcame the deficiency of the original fixing in the panels.

Q. All right, well I'm just going to refer you firstly to the building plans 0023.18.

WITNESS REFERRED TO BUILDING PLANS

Q. And if the bottom two left diagrams could be enlarged. So we're looking there at the two typical sections of the precast panels with the panels on the left, referring to the connections for the eastern side and the right referring to the southern side. Is that right?

A. Correct.

Q. And you've heard evidence today about that. Did you carry out some analyses in relation to the compliance of the right-hand design –

A. Correct.

Q. – the code applicable at the time? And what calculations did you carry out and what conclusion did you reach?

A. We looked at both the panel strength and the fixing capacity for that particular longer – well S5 and S6 which are the two, one is the, S5 was the, about 10 metre long panel and S6 the six and a half metre long panel. The panel strength for the longer panel is about 27 percent of the current code at the time and the fixing capacity about 15 percent.

For the shorter panel it was close to adequate panel strength and about a third of the fixing capacity.

Q. So when you refer to longer and shorter panels you're referring to S5 and S6 directly above –

A. Correct.

Q. – the diagram on the plan there?

A. Yeah. S5 is the longer of the two panels, the centre panel on the south elevation, S6 is the left-hand side panel on the south elevation.

Q. Having heard the evidence today do you have any particular comment on the differences between those two connection diagrams?

A. There's a clear different approach to securing the panel between the rods which are anchored or cast into the panel and then subsequently cast into the floor and the bolted connections which are adopted for S4, S5 and S6 as drawn.

Q. And the evidence has been that the connections of the panels along the eastern side involved four bolts, two at each end of the panel. I'm sorry on the southern side?

A. Southern side, yes.

Q. Four bolts to it, two at the end of each panel?

A. Correct.

Q. Do you agree with that?

A. That's correct, yes.

Q. And did you carry out some analysis of photographs just to look at those points of connection and to try to work out what the mechanism of failure might have been?

A. Yes we did. I must say it's very difficult to try and assess the actual failure mechanism from the photographs that are there, but probably the photo, I think it's BUI.LIC43.0034A.6, in the top photo. Now on that photograph one of the features of the failure which appeared to us to have significance is that the cleats appear to be still at right angles pretty much to the column. Where there's two cleats which have been removed or pulled out. One is there at the central column right-hand side, and there seems to be another one on the left-hand column, right-

hand side, that's at the second level, but most of the other cleats appear to be reasonably perpendicular to the column, indicating that it was probably a shear failure of the bolt rather than an outward load on the connection.

Q. Just pause there, please, so what do you mean by shear failure of the bolt?

A. Basically that the column or the distance between the, what's the best way of putting it – the connection was placed into shear which is an action where a positive force is transferred through from the panel to the column and that that force exceeds the strength or the displacement capability of the connection and fails the bolt in a shear action.

Q. Do you mean the bolt broke?

A. Yes. But in shear, not in tension.

Q. And what about those cases where the cleat is missing?

A. Where the cleat's missing it rather suggests there's been a failure of the weld for whatever reason. That maybe a (inaudible 15:03:36) again it's difficult to say whether the left-hand or right-hand side initially failed and then that failure led to a subsequent secondary failure of the – those connections or whether that was part of their initial failure, it's very difficult to tell.

Q. So when you say failure of the cleat, you can't be more specific about what failed?

A. I believe that the weld failed at those locations where the cleat is missing.

Q. Is that the weld to the column?

A. That's the weld between the angle which we are referring to as a cleat and the angle which is cast into the column which is shown on – I've got as BUI.LIC43.0034A.14 and down the bottom right-hand side the typical connection detail. Could be expanded? Bottom right-hand side, typical connection detail. That shows that there was an angle, a short length of angle cast into the column and those lugs are the means of securing that angle into the column. It then shows that there's a short length of angle which is used to connect the column to the panel, or the panel to

the column. There's an insert in the panel which a bolt is placed to tie that cleat to the panel and the connection between that cleat or the angle cleat and the column is achieved by welding around the angle cleat at that interface with the column.

Q. So in the case of where it's missing, the cleats remain connected to the panel and the panel's carried it down?

A. I assume so.

Q. Do the plans so far as you interpret them contemplate any welding in the vicinity of the bolt or the point of connection with the panel?

A. I don't believe so. The weld, that weld note is possibly confusable, confusing, but I think the intent is reasonably clear that the bolt's to be placed centrally in a slotted hole. I think the unfortunate feature of the connection is that once the washer has been placed it's not really possible to tell how centrally located the bolt is in the slotted hole, so that for an engineer to inspect whether that movement is provided would require the washer to be removed to do so.

1506

Q. If there had been some welding in the vicinity of that bolt, what would the effect of that have been?

A. It would essentially lock the connection up so that the failure would take place with a lot less inter-storey drift or other movement between the columns.

Q. Were there any other particular observations that you wanted to make on the evidence on that connection issue that we've heard today?

A. I think nothing other than it's very unfortunate that oversight was not detected by um the local authority on reviewing the plans, by the contractor in constructing the work and by the engineers who oversaw the construction and, tragically, it is when that backup system fails that an error in the design phase ends up being built into construction.

Q. I'll just take that point by point. So, firstly, I was going to ask you about some of the evidence that Mr Pitt gave. He made the point that "the method of securing concrete spandrel panels by TCM20 concrete inserts casting of the panels then being bolted onto columns or other

elements was at the time a common method of construction and in fixing such panels there was, at the time, nothing unusual in that design". Do you agree with that?

A. I agree in the principle of using that form of connection. It was certainly a favoured connection by contractors. I would have hoped that an experienced contractor would have looked at the 10 metre long panel in particular and questioned whether there wasn't some further fixing required.

Q. So what sort of things do you think would have been evident to a contractor who is not an engineer, (inaudible 15.08.53) essentially raise some concern?

A. It's really the distance or the length of the panel being secured and the distance between fixings which is quite significant.

Q. Mr Pitt also gave some evidence about a 20mm gap between the precast panels and the structure. Did you hear that evidence?

A. Yes, correct.

Q. Did you have any particular comment to make?

A. No I think, I don't really think that's a particularly significant issue, although I guess contractors and engineers look at these things differently. I interpret that to provide a little bit of construction tolerance as the panel has to be fitted up after the floor had been poured and it's possible for the floor to project beyond the column face along the length of the wall and, therefore, having some tolerance there is a sensible design feature.

Q. You referred to local authorities. Assuming that there were qualified engineers within the local authority and assuming they were looking at the plans is the discrepancy between those two points of connection in (the north?) something which you believe should have been evident to those engineers?

A. I think in reviewing documentation and we have reviewed documentation for territorial authorities to some extent it's important to identify the sort of unique features of a building. I think if we were reviewing this building one flag would have been the high level of

ductility that's been assumed in the design. That inherently means larger displacements and you would, therefore, want to look closely not only at the detailing of the frame for that level of inelastic demand but also the connection of any secondary elements such as precast panels to ensure that they were adequately fixed and had sufficient movement. One would hope that in doing so the connection of the longer panel in particular would have been identified as being possibly inefficient.

Q. In fairness to the Council, this is not an observation that you had made in your first report though was it?

A. Correct.

Q. What was the reason for that?

A. I don't think, ah, it's not a matter of expecting the Council always to pick up these points. I think it is, if an error is made on the plans there is the chance the Council, the contractor and the site staff identifying that error. I don't believe one can look at an oversight such as this and sort of look to blame the Council directly for that.

Q. Turning to the post-September earthquake inspection period. Would this difference between the two connections and the absence of reinforcing steel and the connection on the south, would that have been evident, do you think, from a visual inspection internally?

A. It's possible that the lack of the tie from the panel to the slab that was used on the east side would have been evident to have been missing on the south side but I don't think I'd expect an engineer to be looking for that. I'd think if the wall was undamaged, in other words if the spandrels along the south wall didn't show signs of damage, I wouldn't expect an engineer to try and investigate that further. If there had have been signs of damage to either the connections or the panels on that south wall then perhaps further investigation would be appropriate and hopefully it would have been detected.

Q. Would this be an example where looking at the plans would put an engineer in a better position to make an assessment about the safety of a building and its surroundings?

A. Yeah certainly reference to the plans is really the only way an engineer can be confident of what was intended to be provided. But also I guess it's arguable that that length of panel one might wish to look at how it's secured and identify that there's a large distance between the fixings.

Q. You make some recommendations arising from your review.

A. Correct.

Q. The first relates to structures designed to ductility 6. I think we're entering quite a technical area, is that right?

A. Correct.

Q. Do you want to say anything further than what's in your report or could the Commissioners simply refer to that?

A. I think there have already been some changes to the codes which have discouraged the use of ductility 6 in buildings. It's an area which, no doubt, the Commissioners will turn their mind but there have been some examples of buildings designed for ductility 6 performing less than desirably.

Q. Is it your position that the requirements of the more recent code will ameliorate that type of problem?

A. There's certainly been a move to correct that in the codes.

Q. Do you think more is required or has enough been done?

A. I think that probably needs a study of buildings as to why some buildings haven't performed as well and I think generally the current codes have made appropriate changes.

Q. You also refer to the separation of non-structural elements and you make a recommendation there. Would you explain what point you're making there?

A. I think that the Christchurch earthquake has drawn the profession's attention to the need for the connections of secondary elements, such as these precast panels, to be able to accept not only the deformations that occur in a limit state event but some margin beyond that so that in a limit state event these panels cannot fail, fall from the building.

Q. So are you, in effect, making these type of appendages even stronger?

A. Not necessarily stronger but more able to accept movement. There's no way that a precast panel on the side of a building will stop the building deforming. The fixing must be able to accept the deformation that takes place in the building without failing the connection.

1516

Q. Those recommendations were made in your report of December.

A. Correct.

Q. Having now received the further evidence from Mr Cusiel and hearing the evidence today are there any more recommendations that you would make?

A. I think the only one that I would add and it backs up the comments of Mr McCarthy is that I do think the public interest and the public safety probably justify a greater level of structural review than has happened in a lot of local authorities not being unduly critical of Christchurch. I know some local authorities simply accept the producer statement design which really is only a statement for the designer, believes he designs the building properly. For some level of independent peer review by another professional does seem the need for public safety.

CROSS-EXAMINATION: ALL COUNSEL – NIL

QUESTIONS FROM COMMISSIONER CARTER:

Q. Just in respect to the shearing loads on the bolts. Presumably if there's a mechanism of failure then the bolts would have been subjected to the acceleration forces of the weight of the building itself not just of the –

A. Yes the defamation of the building yes.

Q. And would, we know where there were high vertical accelerations which would be a multiple of the spandrel weight itself as well.

A. Yes.

Q. Would that have been a significant component?

A. It may have. It could be. It's like the straw that broke the camel's back. You've already got these panels are supported on those bolts anyway so the dead weight of the panel is on those bolts and shear before the

earthquake. It's quite possible that vertical acceleration could have been a contributing factor. Equally I think it's possible that plastic elongation of the frame may have taken up some of the defamation capability in the connections.

Q. There is no, in the photographs we've seen there's seems to be no evidence that a bolt was left hanging in the cleat.

A. Correct.

Q. Presumably the bolts must have sheared to disappear. There is not the evidence there at all.

A. That was our conclusion.

Q. It's just interesting that mild steel plates were capable of only 10 mm thickness, were capable of guillotining the bolt effectively.

A. Indeed.

Q. But nobody actually has, I presume nobody has seen or looked closely at the cleats themselves.

A. I think one lesson from this just adding to the previous comment is I think if we ever have another significant failure in an earthquake it's important that the actual evidence is investigated because there could be other lessons which we may not pick up from photographs and for a professional to inspect the actual failure before it's been removed or tampered with beyond recovering of anyone that's injured. I think that's quite important.

QUESTIONS FROM JUSTICE COOPER – NIL

WITNESS EXCUSED

JUSTICE COOPER:

This may be a case where some parties at least may wish to make submissions. I don't know how counsel feel about that but if they wanted to we would receive submissions from counsel just addressing us on what factual inferences we might draw. Mr Raymond, do you think that would be appropriate?

MR RAYMOND:

No there was a note to ask about. There was two areas that I thought that there might be some benefit in making submissions. Firstly the role of the Christchurch City Council in this particular case although just the benefit of Mr McCarthy's concessions just made that this is less of a point but still brief submissions and secondly the evidence adduced by Luneys in the context of having met my client.

JUSTICE COOPER:

Well I think if we did call for submissions they would be from you Mr Raymond, from you Mr Matthews and from you Mr Laing. So that would be the Council, Luneys and Mr Cusiel. I don't see the need for any other submissions Ms Smith because I don't think there's any suggestion that we would express ourselves in anyway criticising Ballantynes, and I think the same applies in the case of Powell Fenwick. So if those parties that I've identified wish that Mr Cusiel, Luneys and the Council wish to do so we would receive submissions in writing by the 12th of March. I haven't asked you what your opinion is Mr Elliott. Did you wish to disagree with what –

MR ELLIOTT:

No Your Honour.

JUSTICE COOPER:

Mr Laing, is that alright?

MR LAING:

Yes sir. I did wonder. I was not contemplating making submissions as such but equally if my friend Mr Raymond particularly had something to say which was adverse to the council I may want to respond to it.

JUSTICE COOPER:

Well you should confer with him to see if that's going to happen. It ought to be reasonably plain I think where you might be coming from as a result of the way the hearing's gone.

MR LAING:

Yes certainly.

JUSTICE COOPER :

So that will conclude our hearing and once we receive those submissions and there may also be some further information that we're able to gather and we just have to use our discretion at that point as to whether we open that up to any further hearing or submissions from the other potential witnesses that you're going to make enquiry of Mr Elliott.

MR ELLIOTT:

Yes Your Honour, thank you.

JUSTICE COOPER:

Otherwise I just observe that we'll be expressing our views in our final report when that is released later in the year, and we'll adjourn now until 9.30 tomorrow morning.

COMMISSION ADJOURNS: 3.24 PM