WEEK 4 - DAY 10

COMMISSION RESUMES ON TUESDAY, 15 NOVEMBER 2011 AT 9.30 AM

JUSTICE COOPER INTRODUCES COMMISSION AND LOCAL GOVERNMENT SUBMITTERS

FRANCES SULLIVAN (AFFIRMED)

EUGENE BOWEN (AFFIRMED) (VIA VIDEO LINK WELLINGTON)

MR BOWEN:

Local Government New Zealand thanks the Commissioners for the opportunity to make this submission. Local Government New Zealand makes this submission on behalf of the National Council, representing the interests of all local authorities of New Zealand. As you can appreciate we represent a diverse membership across districts, rural communities, regions and metropolitan areas in their delivery of local democracy. LGNZ is the only organisation that can speak on behalf of local government in New Zealand. This submission was prepared following consultation with local authorities. Where possible their various comments and views have been synthesised into a relatively short submission. In addition, some other councils have chosen to make individual submissions and the Local Government New Zealand submission in no way delegates from these individual submissions. By way of background, in developing a view on, for the Canterbury Earthquake Royal Commission Enquiry we've drawn on three high-level principles that, if you like, underpin every submission that the National Council makes on behalf of councils. We would like the Royal Commission to take these into account when they consider this submission. Those principles are, firstly, local autonomy and decision making. We believe the community should be free to make the decisions directly affecting them and that council should have the autonomy to respond to community needs. Our second point is particularly important in this context and that is that local differences require local solutions. We tend to avoid one size fits all solutions which are often engineered for the particular circumstances of councils across the country.

Leaky homes is a very good case in point. Local diversity reflects differing local needs and differing local priorities and, finally, we are a strong advocate for cost sharing for national benefit. Where activities undertaken locally produce benefits at the national level we believe these benefits should be recognised through contributions of national revenues. Now against those three principles I would note in this particular case our primary focus here is the Building Act 2004 and, in particular, the matters relating to earthquake-prone building policy. I cannot put it more simply than that local authorities are creatures of statute and they can only implement existing regulation. However, providing they have the regulatory mandate and the necessary information at hand, in this case about earthquake hazards, they can act. Currently, regardless of risk and regardless of DBH guidelines suggesting property owners should strengthen to as near as 100% near building standard, NBS, as is reasonably practical territorial authorities cannot require building owners to strengthen to more than 33% NBS and we have a legal opinion to support this view and that legal opinion, done by Simpson Grierson, is fairly unequivocal. The key thrust of our submission today, therefore, is the need to develop the definition of a moderate earthquake. In particular, territorial authorities consider there was a case to review the definition of a moderate earthquake, to increase requirements for seismic strengthening of earthquake-prone buildings. Many would support a minimum requirement of 67% NBS. Some would support a higher standard. Changes to the law on earthquake-prone buildings were introduced with the intent of reducing casualties in a major earthquake. A national specification for seismic strengthening avoids uncertainty and avoids the real possibility of costly litigation for territorial authorities on the degree to which buildings should be strengthened. A regulatory approach to seismic strengthening would recognise the Government's national interest in earthquake events by addressing externalities that are implicit in the existing definitions. These include social and economic cost, cost of injury, loss of life, social and economic disruption and the loss of amenity. However, it is also important that some flexibility is maintained to enable territorial authorities to develop locally appropriate policy which takes into account their priorities and risk. We

strongly advocate a risk-based approach. If we define, rather I define risk as the likelihood of occurrence times the magnitude of consequence or the graveness of consequence, while all locations in New Zealand are at risk of earthquake this risk varies from one place to another. This together with the varying intensity of development, the various, the differences in population density is the fundamental reason why a one-size fits all approach is not appropriate. We advocate maintaining the options of pursuing a passive or active policy approach and of the local determination of compliance timeframes. We believe these are appropriate mechanisms to enable local communities to reflect their decisions on acceptable levels of risk. There are some local authorities that support nationally established timeframes for upgrades of buildings with special post-disaster function and buildings which contain people in high density. I note also that other councils are concerned about their inability to mitigate risk of falling hazards from buildings that do not meet the criteria of a dangerous building, under s 121 or an earthquake-prone building under s 122. Wellington City Council is among these councils. In summary in our submission we've drawn your attention to the Ingham/Griffiths technical report on unreinforced masonry buildings and to the recommendations for a cost-effective strategy and incentives to implement upgrades in buildings across New Zealand. We strongly support the development of a country-wide risk-based strategy to implement earthquake-prone policy. This coupled with central and local incentives LGNZ believes would be a cost-effective approach to ensure that the risk of injury and death or damage to properties is addressed. I thank you for your time. I welcome your questions.

QUESTIONS FROM COMMISSIONER FENWICK - NIL

COMMISSIONER CARTER TO MR BOWEN:

Q. I think we will probably today try to explore the matters that you touched on there, particularly in regard to the independence that local authorities might seek to care for their own communities and what the implications of a national standard would mean in limiting that and I'm interested to

hear what thoughts come out of today about timeframes which may be one of the matters you're referring to. Is that correct?

A. That is correct. If I was to summarise it, we would welcome a stronger national expression of interest which would enable those councils with an appetite to pursue this to do so.

Q. And that may leave some who find it difficult to do that with, leaving their community's exposed to greater life risk?

A. The extent to which we can develop a shared set of incentives I think will largely, will to a large degree also impact on the timeframes that communities adopt. We believe this is a national issue requiring a national declaration of interest. Equally there is a strong appetite across councils to address this.

Q. Okay well we'll explore those matters as the day develops I'm sure.

JUSTICE COOPER:

Q. Mr Bowen you told us that you'd had extensive consultation with local authorities in developing this submission. Can you just tell me about the process that you followed?

A. May I ask Frances Sullivan who is, in fact, the author of this submission to talk to this point?

Q. Yes, thank you.

MS SULLIVAN:

Thank you Mr Chair. Usual process for us is to formulate a draft submission and send out to all local authorities for a response. We did that but albeit in a somewhat limited way we did just ask them the question, in this instance about the 67%, really just to focus their attention on that thinking that that would be an area that they would have most opinion about. So normal process is for us to do that. We forward our submissions out to chief executives. They put it through their system and we get a response. The responses from local authorities were relatively small but not surprisingly small and they were all supportive of an increase in seismic strengthening to 67% for those who came back. We also use our own intelligence and our own

connections within the sector to support what it is that we're putting out to the sector before we make a submission on a final submission.

JUSTICE COOPER TO MR BOWEN:

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Q. There's a tension between establishing that strengthening should be to 67 percent of the new building standard and putting that in terms of a minimum requirement as is in paragraph 11 of this submission with the principle of local autonomy and decision making but I'm, and I'm not sure how you would want us to resolve that Mr Bowen.

A. As I said earlier, there is an appetite by the support or from the support of the 67 percent. I believe there is a consensus of appetite across councils to address this issue and to develop it with their communities. What we're really asking by the raising of the standard to 67 percent NVS is the opportunity for councils with that appetite to proceed.

Q. So it would be –

A. Sorry, as I said before, at the moment we cannot and have been challenged in attempting to pursue requirements above 33 percent, as councils.

Q. So what you're arguing for is a clear statutory right to require strengthening to 67 percent of the new building standard as opposed to a law which requires that across the country as a minimum?

A. We are asking for the minimum to be expressed in regulation, through an amendment to the Building Act.

Q. So that would mean that the earthquake-prone policies of councils throughout New Zealand would have to stipulate for seismic strengthening to ensure that their building stock was 67 percent of new building standard, is that right?

A. No, that is right, within the flexibility around timeline and with the flexibility, within the flexibility about the adoption of a passive or active approach. If I might take one example of a strong case, sorry a Council that strongly advocates a passive approach, that is Oamaru which has some of the most impressive heritage buildings in the country and the

architecture of Oamaru is very much a part of community value and a part of the definition of that place. It is the view of the Council that antiquity, history, history and architecture, are all important aspects of local value. Napier would be another case where a community is very strongly architecturally defined and we would seek the flexibility for councils to reflect those community values.

Q. I'm just trying to follow how that would work. So that it sounds like where councils were going to require the strengthening of existing buildings it would have to be to at least 67 percent of the new building standard but –

A. Yep, we're seeking a basis in law for making just such a requirement.

Q. Yeah but then councils would not be required to require such strengthening in places like Oamaru and Napier, is that what you're saying?

A. There we're asking for discretion around implementation but I would observe that the very creation of the requirement will in itself require a community discussion because the bar has been lifted and you, therefore, need to consult the community on just how quickly and just how extensively that requirement is implemented and, as I said, the two factors in this discussion, the two factors in the calculation, are intensity – that is the magnitude of harm – in low population areas the requirement would be less pressing; and the second, of course, is the high geotechnical variability across the country. Christchurch notwithstanding there is still a basis in science presuming legitimately that earthquakes will be more likely in some places than in others.

Q. All right thank you. now I don't know whether either of my colleagues have questions arising from that.

QUESTIONS FROM COMMISSIONER FENWICK – NIL

QUESTIONS FROM COMMISSIONER CARTER – NIL

COMMISSION ADJOURNS: 9.47 AM

COMMISSION RESUMES: 10.00 AM

JUSTICE COOPER:

Well morning everyone my task will be to remember who you all are at various points in this discussion which is going to follow. Mr Kelly good morning to you. Does everybody know Mr Kelly from the Department of Building and Housing? Perhaps it would help if you all just ran through your name and your organisation so we get that established at the outset. It might help, we have transcribers offsite I should say who have the difficulty. They normally transcribe Court proceedings when it obvious, comparatively obvious who is talking but with a session like this it is going to be difficult for them. I may intervene at points and just announce who is talking. If I'm doing that it's for the benefit of the transcribers and in the hope that we can get a reasonable record of this discussion but it may help them if you start starting with you Mr Kelly if you could just say who you are and what your organisation is.

MR KELLY:

Good morning sirs. David Kelly, Department of Building and Housing. The deputy chief executive with responsibility for building quality. That's the technical work for the department.

MS TOWNSEND:

Suzanne Townsend, Department of Building and Housing DCE to check the policies.

MS SULLIVAN:

Frances Sullivan Local Government New Zealand.

MR HAZELTON:

Glen Hazelton, Dunedin City Council.

MR MCLEOD:

Neil McLeod, Dunedin City Council.

MR MITCHELL:

Peter Mitchell, Christchurch City Council.

MR SCOTT:

John Scott, Wellington City Council.

MR PETTY:

Ian Petty, Gisborne District Council.

MR SKIMMING:

And George Skimming, Wellington City Council.

MR MCCARTHY:

Steve McCarthy, Christchurch City.

MR CUMMUSKEY:

Patrick Cummuskey, Auckland Council.

MR DELEUR:

Bob DeLeur, Auckland Council.

DR IRWIN:

Marion Irwin, Auckland Council.

JUSTICE COOPER:

The issue, well can I just say I will endeavour to get the discussion going as it were and then I'm hoping that a conversation will develop during which it will be important that people don't interrupt each other but otherwise I'm hoping that there will be an exchange of views and ideas which will shed further light on the issues that we've been discussing this week and last week but I'd like to start with the concept of seismic strengthening of unreinforced masonry buildings which has come to be spoken of in terms of percentage of new building standards and the issue I have is how easy that is to assess how

practical that is when the buildings and I'm not an engineer so others may put this better than me but when the buildings are generally not constructed like modern buildings. They are brittle and non-ductile. So this approach of strengthening standard which is based on how a new building might perform. How practical is that as a concept and would it be better to take some other approach? Who'd like to start off with that?

MR MCCARTHY:

Sir, I was interested firstly to note Jason Ingham's findings of some quite a large representative sample of unreinforced masonry buildings in Christchurch that the buildings that have been strengthened between 34 and 67% of those 72% were seriously damaged or collapsed in the earthquake. To me that evidence suggests that certainly supports the thought that 67% would be an appropriate target level for unreinforced masonry buildings and –

JUSTICE COOPER:

I suppose I'd like. I don't want to interrupt you. I'd like to come on to what standards should be aimed for but I'd like to start at the beginning about how good is it as an idea never mind what percentage is or the standard. Is it actually a useful analytical approach to be comparing the performance of unreinforced masonry buildings with the new building standard. That's really I think a logical starting place.

MR MCCARTHY:

I think at this stage it's the only option that we're actually faced with. We have historically done that and certainly there are, there is evidence of success in that approach and certainly it's the approach the engineers have suggested is appropriate so there are but I guess I'd refer to some of my learned colleague at this stage. I am struggling a bit with the question.

JUSTICE COOPER:

Mr Petty, do you have a view on that issue?

MR PETTY:

I think yes in the light of no other analytical method there's not a lot of choice. Whether it's the best method or not may be argued but the setting it at a percentage of a standard is fraught with danger and as I said in my presentation yesterday morning we have buildings that were still being strengthened or judged on NZS1900 which has been superseded for a large number of years right up until the implementation of the earthquake prone building policy. New building standard is encapsulated in the Act. If new building standard changes there's a new standard to judge on. We don't get moribund with redundant standards and strengthening buildings that may have to be done again. In essence of a better analytical method and the IEPs may not be the best analytical method but this is the best we've got at the moment.

JUSTICE COOPER:

When you say the absence of any other analytical method is that a comment about the current state of the law or is it a comment about the state of engineering knowledge and know how. I suppose I'm really asking whether we'd be better to start again with some other approach and recommend we might recommend that the Act be changed, to provide for something else.

MR PETTY:

I think it's a comment on the state of engineering knowledge of how strong is a brick wall. You know whether it's got lime mortar or cement mortar how good is a brick? What kind of state is the mortar is? How strong were the bricks when they were originally you know fired? All that kind of stuff comes into play and unless you do destructive testing of brick strength you've only ever got an approximate value of that NBS.

JUSTICE COOPER:

Mr McLeod, do you have a view on this subject?

MR MCLEOD:

I don't know that we're aware of any better solution sir. The tagging the assessments to a new building standard does as Mr Petty said have the advantage of moving with time. We in Dunedin also have the same issue where perhaps buildings in the past have been strengthened but they may have to be done, be strengthened again should the standard move on. I can only concur. We have no better method available to us that I'm aware of.

JUSTICE COOPER:

What about you Mr Scott?

MR SCOTT:

In Wellington we would just support what the others had said.

JUSTICE COOPER:

Yes. Does anybody have a different view?

MR DELEUR:

We tend to go back to the basic principles around the strengthening of buildings and the one big question I have based on the information that's come out of Christchurch today and I guess it relates somewhat to your question whether or not we're dealing with this particular issue in terms of unreinforced masonry buildings in the best possible manner today and is 67% 1010 actually the most effective way of dealing with these buildings or should we be thinking about something else and when I sort of consider unreinforced masonry buildings in their real context and where the failures in Christchurch have occurred, and I make mention of this yesterday, how did those failures occur, where was the most damage attributed to and certainly what I've seen to date the biggest failures occurred where, in fact, we had parapets

collapsing onto verandas and verandas collapsing onto footpaths and killing people and I just personally think it's worthwhile analysing exactly where we can get the best value for the dollar in terms of upgrading those buildings and whether or not saying something needs to be upgraded to 67 percent is where we get the best value. I think, personally, there should be some engineering solutions there that, in fact, we address the specific issues relating to those buildings.

JUSTICE COOPER TO MR DELEUR:

Q. Yes and such as by identifying particular parts of buildings which might typically need strengthening and what actions might be involved –

A. Exactly right.

Q. – in a typical strengthening exercise.

A. Exactly right, yeah.

Q. Which, I want to be told if I'm wrong about this but couldn't you do that without actually talking about percentage of performance of, making a comparison to the new building standard.

A. Well look I personally think you can do it. It's an engineering analysis of a building. What's required, what strength is required in the building, the support a veranda or a parapet. In fact, how do you deal with parapets in the future? What do you do to strengthen them? Percentages don't actually attribute to anything. Percentages are just percentages. It's a means of saying well it needs to comply with the national building code but, in effect, are we actually addressing the issue of the actual building itself. Is 67 percent strong enough? Should we go to 100 percent in that situation and an engineering solution in terms of those particular items on the building or construction parts of the building can be sort of engineers, an engineering solution can be provided.

COMMISSIONER CARTER TO MR KELLY:

Q. I wonder if we could be helped by having some recognition of how the concepts of improving the strength of our older building stock have progressed over the last 20, 30, 40 years. I think Mr Kelly might be able

to help us with this one. The wording of the Act in terms of defining a moderate earthquake says what, at first sight, seems to be a fairly sensible thing to do and that is to strengthen to a third of a level that you don't believe was understood by engineering community and also the concept of the duration of the shaking is also part of that description. When were those, what was the status of the design standards now we know as 1170.5 or it's predecessors 4203 and before that again, when was that wording first introduced because it's something that we are contemplating the actual interpretation that's put on those words by the engineering community of today that have got a completely different design model that they're working to than was used in the past and if you could help us by just letting us know when that concept was first brought in.

A. I understand from council behind it was 1968.

Q. 1968. Well then I think what has happened is that that supposedly clear description of a standard has been at least running in parallel to a very much more sophisticated understanding of how the building we design today will perform in regard to its material properties and to its ability to distort and move without falling apart in the, under the actions of the design earthquakes that are described in our loading codes today. Now those buildings had a, what we now refer to as a ductility, an ability to actually sustain a level of loading continually applied for a certain period of time in shaking the building, generally trying to shake it to bits. What we have with the URMs are buildings that don't have anything like the material properties that we now build into and are implicit in our understanding of the strength of a new building today and yet we're still using a concept that was written forty odd years ago. I wonder if any of the Council representatives here today can actually say to what extent they understand this distinction between the behaviour capability of a very old building with the behaviour capability of a building designed today and if they aren't understood what does a third of today's new building requirements mean to someone who's trying to cause the

survival of an old building that has nothing like those same property characteristics.

A. Perhaps I can just respond with a couple of comments, Commissioner. I think you're absolutely right in terms of the change over time, the sophistication of techniques for new buildings. To go back to Justice Cooper's initial question in terms of is it useful to have a percentage of the current code or current standard, just a terminology, what we would talk about, referring to NZS1170 is actually it's a percentage of the loadings that buildings are subject to as are required of the current code rather than a standard per se.

JUSTICE COOPER:

Q. I don't quite, yes well perhaps you need to take that a bit further because what do you do then, you identify the percentage of the loading you then have to take another step don't you and –

A. Can I just just, sorry to just butt in there. New building standards I think its, you're talking about earthquake actions not earthquake loading, actions include a displacement ductility –

Q. Yes, yes it does.

A. – as well as not just the forces which are often referred to as the loading so I think that definition has caused problems, if you don't mind.

Q. Yes I accept that, I accept that. I accept that.

A. So to come back to I think having a percentage of whatever is a useful starting point but I think the point that you've identified, and others have, is that in unreinforced masonry buildings it has limitations in that you then get to that point where it can have catastrophic failure. The current philosophy is not to have catastrophic failure so I think it's useful to explore whether there needs something more than a percentage and whether there are techniques that can be applied that prevent that catastrophic failure. At the present time I think Sir Ron's question to the councils is someone could, a chartered professional engineer could probably say this meets the percentage test but it doesn't necessarily prevent catastrophic failure and that I think is the limitation we have that

we need to get past so I think we need something more than we've got but it's not chucking that out necessarily, I think it's adding some other tests around that.

COMMISSIONER FENWICK:

Q. Can I just follow up on that. New building standards, as you say, we check an ultimate limit state.

A. Yes.

Q. But there are built into the new buildings and the associated material standards there are high factors of safety for the ultimate limit state.

A. Yes.

Q. Strengths are typically about 70 to 80 percent of the average strength, displacement capabilities are about two thirds of the expected displacement capability which means that when we design for the ultimate limit state we actually have a very high factor of safety against collapse and we wouldn't expect collapse to occur until you get of the order of twice that magnitude.

A. Yes.

Q. Now when we look at a URM building and we apply the ultimate, or proportion of the ultimate limit state forces, there is no material standard which goes along which says you should be taking 70 percent of this and only two-thirds of this displacement so, and, in fact, there's no material standard at all because those materials are not permitted to be used and even if one goes to reinforced concrete structures the details that were used before are now excluded. So I'm really at a loss as to know what a percentage of new building standard implies in terms of the performance of a new building.

A. Mmm.

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Q. Presumably built with the same materials to new standard because we don't have those standards so I think this percentage new building standards can be completely misleading. Another problem is when you

go to different engineers and you ask them how you interpret this you get very different answers.

A. I agree and I think that's my point –

Q. I think some clarification's needed.

A. I think there is a limitation in our current approach, I don't know what the answer is, but I believe there is a limitation in what we've got and we do need to revisit it.

Q. Have you considered the Californian approach to have a standard for existing buildings which separates the two?

A. Sorry I haven't been in touch with all of that, I don't know enough detail really to comment, I'm not sure what that achieves, but yes, we would certainly look at that, I'd need to understand that a bit more about how they achieve that.

JUSTICE COOPER TO MR HAZELTON:

Q. Have counsel's encountered – I think we've had some suggestion that they have, difficulties in working out this percentage new building standards approach. In practice I imagine that some of you at least will have had to preside over arguments about what it means. Is that a fair statement, Mr Hazelton.

A. This was a debate that actually came up during subsequent discussions to the hearings, in our earthquake-prone building policy most recently and it was a discussion that probably went over most of the heads of the people in the hearings panel.

Q. Yes.

A. And certainly you know not coming from an engineering background myself it was quite confusing to me but Lou Robinson from – an engineer in Dunedin brought up this matter that we shouldn't be using new building standard and gave a very long number of reasons why we shouldn't be, but in the end because it was the most common approach that was the approach that the panel adopted.

Q. Yes.

A. He saw major problems with applying that to older buildings in the Dunedin context.

Q. Does anyone else care to comment on that?

MR CUMMUSKEY:

A. If I might comment, in terms of the experience that we've had up in Auckland, it is my understanding that the purpose of developing the IEP by the New Zealand Society of Earthquake Engineering was a relatively robust one, which took into account a lot of the factors such as regional variation and seismicity, the performance, approximate performance of older style construction.

Q. Yes.

A. But that there were some inherently subjective categories which have led to a fair amount of variation in our results, in particular there is what is known as the F factor, which has very – meant that IEP results vary quite considerably from engineer to engineer and therefore in many cases it is always required that there be some form of peer review and additional work to ensure that we are being consistent with such an approach. Therefore I understand that there has been further work by the NZSEE and other entities around revising that IEP procedure to deal with some of that subjectivity.

Q. Yes. Well are there are any other comments or offerings that people have on this particular aspect of our work.

MR PETTY:

A. I think in the absence of anything else and we've strengthened a reasonable percentage of our buildings, that the percentage of NBS seems to work. We had an earthquake that could be just about at the level of the test that's in the Act and buildings that have been strengthened to two-thirds and we've got two-thirds rightly or wrongly, we've heard a lot of comment that it's wrongly, but our – those buildings suffered no damage, virtually no cracking, a couple of little hairline cracks but virtually no damage whatsoever, whereas buildings that

hadn't been strengthened or buildings that had been strengthened to a percentage of NZS1900, suffered some quite considerable damage so in our view, strengthening worked, now I think the February Christchurch earthquake was well over what you'd expect any strengthening to withstand.

Q. Yes.

A. And so it's kind of –

Q. You say that your earthquakes are better earthquakes to generalise from than what happened here on the 22nd of February? It was certainly a better earthquake for me, I'd much rather be in my position than Mr McCarthy's.

JUSTICE COOPER:

Many earthquake engineers of course were in Christchurch at the time for the occasion.

MR MCLEOD:

Sir, if I may, Neil Mcleod, Dunedin, I don't know what the answer to this question is, but I do know that it will be left to territorial authorities to try and implement whatever the decision actually is so I would implore you sir, to come up with a simple widely understood solution that can be easily applied.

JUSTICE COOPER TO MR MCLEOD:

Q. Yes.

A. Something that has complicated engineering attached to it just for a decision made by a territorial Authority will be difficult to implement.

Q. Yes. Well I'm conscious of that also and we would want, if we were going to suggest any change and nobody's to take anything from what we're saying this morning, but that would be one of the objectives actually to get something that was simpler and more readily understood if we were going to recommend change.

COMMISSIONER CARTER:

I just wish to ask another matter for - Mr Cummuskey's got the floor.

MR CUMMUSKEY:

Sorry just another brief point, around the actual intent of the IEP procedure, is that it is an initial evaluation procedure and particularly up in Auckland we are using it as such, not as any definitive statement. It was always meant to be something that is followed up by further research, further engineering analysis, so it is recognised that – more work needs to be done and we cannot reasonably portray it as the last word on what the status of the building is or its performance.

COMMISSIONER CARTER:

The matter that I just wished to draw to DBH, its attention, is also the use of the duration description in the term, we know that unreinforced masonry buildings behave in a brittle way and so the consideration of repeated oscillations means something different to a building that is unable to be distorted time and again without coming to grief, so just if it is your intention to have a look at the matter that we've raised here about the definition for the moderate earthquake, I would ask you to also think through the duration aspect as far as it might apply to brittle structures which despite how much we do to them, would probably remain something of a more brittle nature than a new building. I'd also comment and commend the councils for giving us almost a universal view that they do favour strengthening to a you know very positive extent. I think that's helpful, thank you.

JUSTICE COOPER TO MS SULLIVAN:

Q. Well I was going to move on then and just change course slightly because of this issue that appears to arise under the legislation as to what it means, in terms of the authority that is conferred on councils where – the impression I have certainly of those parties who have given evidence to us in the hearings, that Gisborne seems to be the only local authority of the view that the powers enable strengthening to 67% but I

think there are others who may not have given evidence in the hearing that share Gisborne's view. Can you tell us about that?

A. About powers?

Q. About powers, yes.

A. Well perhaps if I could just respond to that because I was quite interested in that discussion yesterday myself and I've got a copy here of the legal opinion that we had completed by Simpson Grierson at the time that this legislation was put out into the arena. This – actually this opinion is about liability because fundamental to all of this, there are always issues about liability. Followed on a discussion also with Ian Petty from Gisborne District Council last night, basically the decision that as I understand it, and Ian, I'll get you to speak to this in a moment, their decision says that if you follow the consultative process as is outlined, which is a special consultative process under the Local Government Act

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then if anyone challenges that particular policy it is unlikely that that challenge would win but what the legislation doesn't allow you to do is to require beyond 33% or also to enforce beyond 33% so as I take it in the situation that Gisborne found itself in was that nobody challenged their policy. Ian would you like to comment?

MR PETTY:

Yes I guess we've got our legal opinion from Brookfields as a result of fairly firm challengers from insurers after the earthquake. As, our policy says that if you're doing substantial work on a building you must do your strengthening work at the same time if it's earthquake prone and of course repairs come under section 112 and therefore they're substantial building work. We have a lot of buildings owners who were required to repair their buildings and we have a lot of building owners with policies that said to the requirements of the council. Obviously insurers were left in a position where they were paying for strengthening which they viewed as betterment and they didn't like very much. I had numerous meetings with representatives of different insurance brokers

that our policy was ultra vires and we couldn't enforce this and that precipitated the legal opinion from Brookfields which we handed out to anyone who asked for it and one of the comments in that legal opinion is that this could be challenged by way of determination. No determination has been asked for to date so the route to challenging the, our 67% was clearly there and yet no challenge was made.

JUSTICE COOPER:

Well I don't want to turn this discussion into an argument about what the correct interpretation of the Building Act is because I think it's plain that clarification is required and would be useful so supposing we were to recommend clarification there does seem to be general agreement with the proposition that there should be power to require strengthening if the new building standard approach is persisted with to 67%. Nobody seems to disagree with that am I right?

MR MCLEOD:

Yes sir you are.

JUSTICE COOPER:

Now having said that, having sat through this hearing and heard people from different ends of the country and having drawn to our attention the special circumstances that apply in Napier and Oamaru and perhaps other places as well there might be difficulties in making a 67% standard mandatory. Can, the alternative approach would be to have the 33% as a lower bound whilst contemplating and the specifically conferring power on councils to require strengthening to any higher figure that they sought and could establish by the normal consultation round with its ratepayers what do people think of that approach?

MR MCLEOD:

Too confusing. Please just pick a number and have the whole country go for it.

MS SULLIVAN:

I think if I just draw your attention to Mr Bowen's submission which is you know if we're talking about risk where there is a national interest we would really be looking for something to be established at that level nationally.

JUSTICE COOPER:

As a mandatory requirement?

MS SULLIVAN:

As a mandatory requirement. It becomes too difficult for local authorities to have those discussions with their community. They address the issues with their community the cost of four well-beings the economic, the environment, culture, social and this is why you see some of the decisions that you get. If we are looking at something like that I think we would make a plea for a national one. I think Auckland wants to add something.

MR MITCHELL:

I think respectively you'd have the status quo today just carry on to the future.

JUSTICE COOPER:

Well we've had many local authorities in submission tell us or adopt the position that the only thing stopping us having such a policy is because we've been advised we can't lawfully require 67% so are you saying that perhaps I misunderstood your point.

MR MITCHELL:

I think your proposition sir was that 33% was the base and the council could go up higher and the highest becomes legally accepted but I think the point in that Local Government New Zealand was referring to and the point Neil has articulated still leaves the council throughout the country then having to shift off that minimum of 33% and I think that's my comment around that essentially what we've have today.

JUSTICE COOPER:

Though it's not though Mr Mitchell because many councils perceive that the 33% is the extent of their power.

MR MITCHELL:

I accept it as does Christchurch City but I think it seems to me you're putting forward a system whereby you have a base of 33. Councils could choose to go higher. If they went higher that would leave the enforceable which is not the case today in Christchurch City's opinion but I think having that getting the councils to then in terms of, I think councils would prefer to have just a higher baseline figure full stop. The other alternative may be and you mentioned a couple of specific areas. The other alternative which occurred to me and of course this can be just as problematic is in fact you have a higher baseline figure but you have exceptions for Napier and the stone buildings around Oamaru but that in itself then gets quite difficult but I don't know. Maybe it is some way it seems to me addresses the national interests concern that's been coming up but recognises that there are perhaps particular parts of New Zealand where and I'm thinking of the stone buildings in Oamaru because one of the problems you get with heritage buildings is the strengthening in itself the process even if the money was there and the will was there to do it can effectively destroy the heritage nature of some of these buildings because of the type of materials or the way the strengthening is physically carried out so that, that was just another idea that came to light. Maybe there are exceptions set by regulations. I'm not sure of the detail. I know it then takes a lot of the issue away from councils throughout the country but recognises there are particular areas and I think in other areas of New Zealand like we do perhaps recognise there are special circumstances from that.

MR SCOTT:

Yes I suppose Wellington's view would be if you were going to have exceptions it should be criteria based rather than area based.

JUSTICE COOPER:

And if I understand that that would, the criteria might be established in the statute but their application might be left to the local authority

MR SCOTT:

Correct or to the department to ensure national consistency.

MR MITCHELL:

I think Napier's one of our neighbours. Certainly there's a lot of very impressive art deco buildings there. One thing I think we've always got to be cognoscente of is that strengthening occurs inside a building generally and if it's not going to master heritage features outside a building which would be very unlikely then the strengthening probably can be achieved. When you've got a protected interior it becomes a lot more difficult.

MR CUMMUSKEY:

If I may just add another brief point.

JUSTICE COOPER:

Yes.

MR CUMMUSKEY:

In regards to us talking about these percentage upgrades we again should be clear on what we're actually talking about. First of all there is the threshold 1040 at which a building is defined to be earthquake-prone and that has been set at one-third and then there is the level that when a building is defined earthquake-prone and a notice issued that we can require strengthening to. So we have been talking about those two things as almost the same thing quite a bit.

MS SULLIVAN:

And, sorry, just before we go on as a point of clarification when you were talking about councils understanding of their powers, um, let's be clear I believe that all councils in New Zealand know that they can establish policy to set strengthening beyond 33 percent. What they can't do is enforce that. So if it's challenged they can't then require it to happen so that's the distinction.

JUSTICE COOPER TO MS SULLIVAN:

Q. Well where do they get the power to set the policy from?

A. The policy, as I understand it, and I'll just read the sentence out of the legal opinion that we've got here and it says "The territorial cannot enforce a high level of strengthening contained in a policy".

Q. Mmm well I find it difficult that you can't –

A. "Enforcement is by using powers under s 124".

Q. I find the reason the policy can't be enforced is because the law doesn't allow it to be enforced and it would be, in my view, odd were the law to contemplate the making of a policy which, by the same law, could not be enforced.

A. Well I think you'll find that's why they're not, they don't have other things in their policies is because they know that they're not actually going to be able to enforce it anyway.

Q. Well that's fairly interesting then.

MR PETTY:

Without trying to get too deeply into an argument about this, and I'll forward the Brookfields legal opinion through to Sarah Jamieson when I get back but the issue that Brookfields based their legal opinion on is that the Act requires "A notice has to say how the Council intends to remove or reduce the danger". So if the removing or reducing the danger is by strengthening the building to 67 percent Brookfields opinion was that this was, therefore, a legally enforceable standard.

JUSTICE COOPER TO MR PETTY:

Q. Well that is a policy which, at least as currently advised, must, in my view, derive its force from s 129 which is about how you remove dangerous buildings and rather than from, yeah measures to avoid immediate danger, rather than an earthquake-prone power under s 124.

A. A notice, a notice issued under 121 in respect of an earthquake-prone, dangerous or insanitary building says that the Council must show how they're going to reduce or remove the danger so on the taking effect of the notice, rather than the 129 provision.

Q. Yeah well this is another difficulty which, I think, affects the Act and that is that in this part of the Act danger is generally treated as something different from earthquake-prone so that there are various issues in here which will be exercising our mind the subject of recommendations in our final report but I don't really want to turn the discussion into one involving rival legal arguments unless somebody really has the, sees the point in doing that.

COMMISSIONER CARTER TO MR CUMMUSKEY:

Q. I'd like to just expand a moment on the point Mr Cummuskey identified and that is the definition of an earthquake-prone building and what that then triggers. So if one comes to the position where one can do more than 33 percent, the threshold identification level, you're left with a contradiction in the sense that a building which is close to 33 percent and is determined to be earthquake-prone, therefore, has the possibility that it will be upgraded to some much greater strength yet a building which was very close to that level but just slightly better would be left in the community for later consideration perhaps, I'm not sure how that would be handled, but perhaps you'd like to expand upon that aspect as to whether or not that group of buildings between 33 and 67 percent at the moment can be dealt with?

A. It is definitely something that has been noted in consideration of this issue but given the expected cost of upgrading just our ones that are going to be less than 34 percent, then adding on top of that the 34-67 percent, would be quite considerable. What could quite likely happen is

that those that are less than 34 percent, those being the worst that we'd be targeting and would be enforced under regulation, yes we would their upgrade to 67 percent whereas those that are 34 to 67 percent would be left to the market to decide. That is my understanding of the situation but yes there is definitely a –

Q. Yes thank you, so it's regarded as a prioritisation really for improvement, thank you.

MR MCLEOD:

It should be noted, if it hasn't already become obvious that increasing the threshold for the definition of earthquake-prone buildings from one-third to two-thirds will come with a cost. There will be a significant cost because you may well start to bring in buildings that are not unreinforced masonry so I don't know what the numbers are likely to be but there is inevitably going to be an increased cost to the country.

JUSTICE COOPER TO MR HAZELTON:

Q. Mr Hazelton I think about quarter of an hour ago you wanted to say something on this question of whether if the law were changed 67 percent should become mandatory or whether matters should be left discretionary above 33 percent.

A. No I think probably Neil and subsequent discussions covered it.

Q. Right.

A. The only point that I'd probably make is that if it does become 67 percent there will be a number of buildings that it is completely economically unfeasible to do that to, particularly things like churches is one of the problems that was noted in our policy, and that if that is the case we need to be ready to explain to religious parishes with very small numbers of congregations how they're going to pay the millions of dollars to do that or whether we're happy to see all of the churches in Dunedin removed.

Q. Do you think that, I understand that in Gisborne had that policy for rural churches, I understood that you had something similar in your policy.

A. We do for rural churches but given you know the cathedral and the Octagon, others that are in high pedestrian use areas, we wouldn't want to, it would be a difficult sell to say well an earthquake-prone building has to be upgraded to 67 percent but actually we'll let this one go at 40 percent when there's large numbers of people walking past that risk is quite high.

Q. Well this has sent the discussion in another direction it occurs to me and that is as to how you confer with the ratepayers or with the citizens and explain what is at stake in terms of risk. Do, has it been your experience that there has been a genuine engagement with the community on the issue of risk and what the community is prepared to accept as a risk of loss of life and/or injury in the event of an earthquake?

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MR MITCHELL TO JUSTICE COOPER:

A. Perhaps there are two comments, firstly and this follows on from the comment I made I think in response to a question from Mr Mills yesterday, I don't think for the person in the street there is a good appreciation of risk factors or the risk around unreinforced masonry buildings, from that perspective I think, for those in terms of the submission process and certainly from Christchurch City's point of view, you tend to find a pattern of a number of property owners, heritage groups, fire service or professional reasons and then it tends to evenly split between 50% against 50% for and that's what hearing panels, or certainly from Christchurch's point of view, would be faced with from that point of view, but making it difficult. The second point I want to make is that Christchurch City has at present, working through the issue with rock fall on the Port Hills and of course we have told 514 property owners to vacate their houses and we are currently going through with the council a process around working that through, and risk factors of life risk, and what is an acceptable life risk in terms of – because the advice is in the future whatever we do, someone may still die because of rock fall on the Port Hills somewhere at a point in time and, so that

discussion I think is reasonably and certainly from our council's point of view novel, we have brought over an expert from England specifically for that one topic alone and also you then need to ensure that whatever life risk you settle on as a council fits within a national framework because we are sensitive and certainly talking to our colleagues in central Government in Wellington, very sensitive that decisions are not made in one part of the country about life risk, which then means other settlements are all of a sudden on the same measure in a high risk area from that point of view.

Q. Yes.

DR IRWIN:

Can I just, Marion Irwin from Auckland.

JUSTICE COOPER:

Q. Yes.

A. I just want to say that in Auckland it is very difficult to engage the public on earthquake at all. Just don't want to know, we had a very - we had a little bit interest after the quake. Already I'm afraid we don't think it can happen here so engaging them on strengthening buildings in case there is one, it's really hard to get public engagement at all.

Q. Yes.

MR KELLY:

Sir, if I could add a comment from the department's point of view, we don't think that people are generally aware of the risk. I endorse the comments of the other people. For that reason we think disclosure of information is very important. If I pick up Wellington City Council, I understand, make publicly available their assessment of buildings, those buildings that are determined to be earthquake-prone, we believe that's a good approach and we think that that should be encouraged more wide-spread and in part of our policy review we'll be thinking whether that should be a requirement. Certainly there's some anecdotal evidence that occupiers of commercial buildings are starting

to ask those questions about what is the standard of my building, particularly as they're reviewing their tenancies.

MR PETTY:

If I could just add to that I think the public awareness is increased, certainly in Gisborne is increasing almost as in post-quake as insurance companies put up the premiums on URM buildings, or partial URM's and we are seeing in the city not wholesale, but large scale migration from buildings that maybe earthquake risk to buildings that are safer and I made that point yesterday when we've got one building that's been lifted to 100%, even though it doesn't need to be, it's not earthquake-prone, and it's already fully tenanted before the work's been done. So in that kind of, in a small community like ours that gets out and people are aware that you know, more at risk buildings than the buildings that have been strengthened.

JUSTICE COOPER TO MR SCOTT:

Q. Yes. And Mr Scott, we've heard anecdotally also that in Wellington perhaps to a lesser extent, but nevertheless to a recognisable extent, this is having an effect on decisions that lessees are making when it comes to renewal, in making their plans for the future.

A. Yes, we've definitely seen that. Also I think the Dominion Post who has taken strong interest in earthquake-prone building process from time to time, and just during the week there was an article on a Café owner who's been evicted by the landlord who's subject to one of our red notices, so those articles keep the, not the interest up but the awareness up, and specially after the February earthquake my team of three or four people fielded, you know, maybe 1000 queries in the three to four weeks following. Definitely the same is in Gisborne, we are seeing some commercial tenants demanding upgrade to 100% and we are seeing sort of the residential type tenancies, people making decisions about whether they want to stay in those buildings.

Q. Yes.

A. My team has also fielded a number of queries from Government departments, chief executives in the city, asking us if their building is safe and should they keep their staff in the building and we have had several schools who have made the decision not to use their buildings until it's been strengthened so there's a bit of a stand-off between them and the Ministry of Education, so all of those things are just continuing to raise the awareness and there was a bit of a public campaign just before we put our list of earthquake-prone buildings on the web and again, just the interest is continuing. It's always increasing.

MR McCARTHY:

Perhaps I can just echo Mr Scott's –

JUSTICE COOPER:

Q. Yes Mr McCarthy.

A. – thoughts that there are industry factors and the full disclosure of the strength of the building leads to number of outcomes, one of which is the insurance companies are obviously very interested, before they will give insurance on those types of buildings. Tenants in Christchurch are intensely interested in the level of strength of their buildings and many of them won't even contemplate going into buildings that don't meet a standard far in excess of 50% at the very least. The other thing that's happening is that a number of owners are driving the strengthening works, the repair works to 100% because they see that as a very good letting factor and they're getting a flood of tenants to those repaired buildings to 100%, but certainly people are also looking at new buildings and saying, "I'd prefer to go into a new building than an old building that is up to the required strength," so there's a whole lot of factors for obvious reasons in Christchurch, people are definitely scared of going into buildings that don't meet the standards.

MR MITCHELL:

And we've also heard Mr Chair, that employees, there were a number of law firms that were in the – some high-rise buildings in Christchurch which are still standing, where the employees are apparently saying to their employer, “We do not want to go back into that high-rise building at all,” from that point of view, so I think there is, and certainly in this city employees are a very important factor for the employer in terms of where they are going to be based from that point of view too.

MR SKIMMING:

George Skimming from Wellington, I mean the Health and Safety and Employment Act has also had a bearing on employer / employee relationship in that they've got to provide a safe environment, and the fact that employers now are becoming much more aware of the status of the buildings that they’re housing their employees in, and that's had an effect.

MR DELEUR:

We've only had a very small number of property owners come back to us about after we publicised the list of buildings that we had, URM buildings in Auckland. Anecdotally we do hear feedback, there is some resistance in the market in terms of occupying buildings that are less than the strength that they should be. However I think consideration should be given however to overall 1100

cost of upgrading to 67% or beyond. Certainly a very big factor when in fact some of the information that we haven't provided for instance for an unreinforced masonry building two storeys in height potentially costing 250,000 to 300,000 to upgrade to standard. Now some of those buildings the capital value currently is round about that factor so investing that sort of capital in a building where potentially over the next 20 years with an increase of population of up to one million people in the Auckland region you could see, well see an awful lot of those buildings being redeveloped and upgraded throughout, through that process where we see higher density living starting to occur in Auckland so some big considerations here and timeframes I think is

something the Commission really need to consider very hard in terms of applying for instance, potentially, a higher standard of upgrade.

JUSTICE COOPER:

Yes and you would be urging more time rather than less for the upgrade to occur?

MR DELEUR:

Well I think like the prediction I think for Aucklanders by 2045 there will be an increase of one million people in populous for the Auckland region so we've got to be reasonable in terms of, again we highlighted yesterday the need for further analysis of the real risk for the Auckland and north region and I think we've got to be guided by you know what are the facts around it? What is the information that we currently have and how far do we go in terms of upgrading our buildings where potentially our Z factor remains low. If it changes then that's another consideration. We then need to look at the expansion rate of Auckland region in total over the next 30 years and what that means in terms of the risk and potentially where the growth is going to occur in the region so it's certainly part of the far wider picture than for instance just saying well let's just upgrade from 33% to 67%, far wider picture.

JUSTICE COOPER:

Mr Cummuskey you were going to say something?

MR CUMMUSKEY:

In regards to the information that we are receiving and how we communicate it while we recognise that we should make every effort to inform the public as best as we possibly can we need to ensure that the information that we're receiving is being handled responsibly and at least in our experience in Auckland what we've found is that there is a certain level of misinterpretation of the information that is being provided. For instance when we provided the media with a list of unreinforced masonry buildings with the caveat that these were not earthquake prone because they had not had an engineering

assessment yet the media then ran with a title of these are Auckland's earthquake prone buildings so thereby increasing the amount of public panic so we want to ensure that as we work through this process we can do so in a reasonable manner working with building owners to ensure the best outcome in a manner that is not subverted by misrepresentation of the data we do have at any point in time.

JUSTICE COOPER:

One of the systems that's adopted in some jurisdictions overseas is for building to be rated for safety and with some form of notice placed on the building which notifies people of the standard of the building if they enter it and I think we heard from the mayor of Wellington about that approach. Would you Mr Scott share your views on how that works?

MR SCOTT:

There's nothing that we've actually implemented yet but we would see some sort of testing or validation through the BWOF or Building Warrant of Fitness process. At the moment we undertake audits of building warrant of fitness certificates once every three years. We would, and we require an annual sort of sign off from the building owner. We would probably see something similar happening but on a much longer timeframe so maybe once every five years or so they'd be some sort of building assessment but that's about as far as we've got in terms of our thinking.

JUSTICE COOPER:

Is that with a view of saying, to comparing the seismic performance of the building with that of a new structure or structure built to a present codes?

MR SCOTT:

Again we haven't really explored in too much detail.

JUSTICE COOPER:

Has any other council been thinking along these lines?

MR MITCHELL:

I think Mr Chairman one of the, it would be relevant there's a provision in the Canterbury Earthquake Recovery Authority Act which goes along the lines of the Chief Executive of that authority this could be for councils may require any owner/insurer of a building considered to have considerable structural damage in the Canterbury earthquakes to carry out a full structural survey of the building before it is reoccupied or business or accommodated by the owner or any member of the public. Now behind that CERA and the City Council clearly are working closely together to give a practical effect to that full structural survey. To my knowledge that's the first time in New Zealand building law we've had a requirement like that in an Act of Parliament and I think it supports Mr Scott's comment because I really was heading along the same lines the building warrant of fitness system which is already in the, has a logical place to if you like clip that on to –

JUSTICE COOPER:

It would be quite a retrofit though wouldn't it? It's not easy to see how that would –

MR MITCHELL:

Agree and of course at the moment it's around the sense the electrical in the building but I think from a New Zealander's point of view it seems to me a measure that could be communicated to the public in the sense we're accustomed to getting a warrant of fitness for our car. We have already a system for warrant of fitness of buildings, the sonic system but not the structural and at the end of the day the structural for the user is probably the more important aspect of the building rather than well yes the lifts are working is nice to know but at the end of the day if they're not you just simply walk out and I think we're talking about the fundamentals here around simply there's requirement firstly the owners get a full structural survey and we've had experience of that in Christchurch already then secondly they publicise it and

then also councils will follow on through the LIM process and also when purchasers look at purchasing buildings as well.

JUSTICE COOPER:

Mr Mitchell, you've described a situation which has been adopted in this city as it recovers from its disaster and the question in my mind is how acceptable would be such a system were it applied generally throughout the country as a matter of legislative policy and its hypothesis in areas where there's been no disaster or earthquake. How's it likely to play out in those districts?

MR MITCHELL:

Well probably with great pressure on the local MPs I would suggest initially but again –

JUSTICE COOPER:

Has it been enacted yet? I just want to know what stage. No I'm talking about in the scenario you're developing.

MR MITCHELL:

Well it may be the other possibility is that the building control system in New Zealand recognises differences for regions of New Zealand. Snow requirements and double glazing are different for the South Island from the North Island. It may be that you could have a process whereby the power to require a structural survey is a given for the Wellington region or the Canterbury region not necessarily for north of the Bombay hills or perhaps Dunedin. There are existing mechanisms to address that sort of concern from that perspective.

MR PETTY:

If I could make a comment we specifically addressed this signage on buildings as part of our recent provision of our earthquake prone building policy. It was a submission made by local architects that we should put a sign on all buildings. The committee considered it. The problem that we had is similar to

the publication problem that Auckland had in that our buildings are identified as potentially earthquake prone and we didn't want to go putting notices on buildings saying that they were potentially earthquake prone when in fact a detailed analysis or an IEP may prove that they're not so the committee decided to stick with the discovery through the LIM process or discovery on 1110 enquiry. Now we will tell anybody who rings or comes into the public counter what the status of the building is but then we will explain it about its potential rather than put a notice that can't be quite so explanatory on building frontage.

JUSTICE COOPER:

If you were going to go down the notice route it would have to be after there had been a proper analysis of the performance of the building and because otherwise you might simply be misleading the public as opposed to telling them what the real position was.

MR CUMMUSKEY:

Your Honour if I might just ask a point of clarification in regards to your initial question were you asking about a continued notification to building owners through a process similar to warrant of fitness or more in regards to the placarding of buildings that are deemed to be earthquake prone because again we've been talking about two different matters.

JUSTICE COOPER:

Yes well I'm not sure if I want to commit myself to answering that question but what I was thinking I suppose was where it might be judged that a building was earthquake prone or if not earthquake prone it was certainly well below the standards that would be met by a modern building constructed under the current rules that there might be some announcement of that fact to members of the public so that people theoretically could choose whether they wished to work in that building or visit it and that would be some sort of palliative if the position were reached that we decided as a society we can't actually afford to make all our buildings safe so the response is well we tell people about the

risks they be running in occupying and using that building. Now I'm very conscious that there are all sorts of issues with such a policy and I'm just wanting to get people's end reaction to it and one of the issues is of course that it's one thing to provide for the safety of people who are entering a building and using it and what about people who are passing by and might be affected by its collapse who haven't chosen to go into buildings but they have chosen to use the public footpath. You know there are all sorts of issues whichever you look in this area.

MR MCLEOD:

If I may just perhaps put this into perspective from Dunedin's point of view. The suggestion that perhaps a category or a classification could be assigned to buildings by way of a warrant of fitness type system. Dunedin currently has approximately 1300 buildings that have specified systems and therefore have building warrants of fitness. I would imagine that if we were to include buildings that are potentially earthquake prone or unreinforced masonry buildings or any other class of building many of which will not currently have specified systems but would then need to be included in that mechanism. I'd imagine that we would go from about 1300 buildings up to probably 3000 maybe 3500 buildings. I'm once again not wishing to be a merchant of doom and gloom but there's a significant cost to the community to do that sort of work so once again I would urge that the decision be made based on science and research rather than anything else.

MR MCCARTHY:

And while fully supporting the concept of a building survey just put it on the table the estimate of cost is something in the order of 10 to $15,000 for a detailed engineering evaluation that would support the placement of a placard of that nature on to a building so there are some significant issues.

JUSTICE COOPER:

And I suppose the question of resources to be able to set such a system up would come into it wouldn't it? These are, you are not to take anything from

the fact that we are raising this subject but these are, we've been at this task now for some months and people say things to us and we need to reflect on them.

COMMISSIONER FENWICK:

One quick point I take it the objective in retrofitting a building is to provide large safety rather than protection of the building itself. I mean the two are linked but if that is the case I think there's a requirement isn't there for the Act to be changed to include part of the building rather than a building as a whole if you get danger from chimneys and parapets and so on on buildings where the rest of the building may be up to standard but the part is not. Does someone want to comment or disagree with that?

MR KELLY:

Sir I would. I think it's a very sensible solution. I think there are a number of these factors that need to come together. The previous discussion around whatever level percentage needs to go hand in hand with the timeframe I think someone else has made and the other one which is about the interim securing, protection of parapets I think is very sensible and something that we do need to do.

MR MCLEOD:

Sir if I may there is just one other consideration which I'm a bit loathed to bring up but if you're going to carry out earthquake strengthening then it's a severe disincentive to have to also do means of escape from fire and accessing facilities with disabilities so we in conjunction with I suspect, we in conjunction with probably many other local authorities sir use a bit of discretion in this matter and if someone comes to us and wants to upgrade their building from an earthquake strengthening point of view we would not make them go the full section 112 track and do means of escape for fire and accessing facilities with people with disabilities.

JUSTICE COOPER:

This is another issue that's been brought to our attention and we, I think we are of the view that we need to consider carefully whether or not the seismic upgrading should be uncoupled from any other issue because of the, it comes down to a question of cost I think in the end and the sort of mounting and more onerous requirements one has to potentially pick which of, where the money is best spent if I may put it that way.

MR MCLEOD:

Sir our view on the matter is that it's always better to have some upgrading then no upgrading.

JUSTICE COOPER:

Yes.

MR MCLEOD:

And while it would be much better to have the whole building done for everything if the owner has a limited amount of money then we prefer that they spend it on it on the building than not spend it on the building.

JUSTICE COOPER:

Yes.

MR PETTY:

Can I just add a comment to that?

JUSTICE COOPER:

Yes Mr Petty.

MR PETTY:

Certainly this is easily solved by an insertion of a piece in 112(2)(b) and if you add after means of escape from fire or access from people with, for persons with disabilities something like structural upgrades to earthquake prone building required under a notice under section 124 you solve these difficulties

because if you are doing fire rating improvements you don't have to do anything else. If you are adding facilities for people with disabilities you don't have to do anything else so surely the improvement of a building for structure, earthquake prone, for earthquake structural improvements should be viewed the same way. We have the unfortunate, we've dealt with the issues in Gisborne much the same way as Mr McLeod outlined before but I was in the unfortunate position where someone informed me that I had to tell them that they needed a lift in the building because they had more than 400 squares upstairs and according to the Act that was correct and we had to process that building consent in that manner and then the insurance company paid for the lift and I had great difficulty with that which is really betterment for the building so I think that needs to be encapsulated in legislation and not left to a general 112 exclusion.

JUSTICE COOPER:

Yes. Well we have had in the submissions areas issues drawn to our attention about improvements that could be made to legislation but below the level of the broad sort of policy issues we're discussing there seems to be some gaps and things that could be fixed which we'll be giving our close attention to.

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MR MCCARTHY:

Can I perhaps just –

JUSTICE COOPER:

Q. Yes Mr McCarthy.

A. A more immediate issue that Christchurch has is that a structural repair on a building occurs, and it could be quiet substantial. That triggers these 112 provisions as well and so we have to consider that and it does, a lot of the building owners seriously object to having to even consider accessibility, fire egress, when all they want to do is to effect a substantial repair to the building to make it safe to occupy so our approach has been to negotiate a timeframe with them to consider

these other matters, so that can effect that immediate repair, so I guess I'm just echoing the issue and just saying it translates in our world to many thousands of buildings and every consent that comes in for a commercial building at the moment, we are having to go down the consideration of accessibility, fire egress issues when I suspect that much of the – many of the building owners certainly don't want us to, and do criticise us for that.

JUSTICE COOPER TO MR MITCHELL:

Q. We've also had drawn to our attention issues that can arise in applying the provisions of the Act, with respect to change of use. Is that something, I think for Mr Mitchell, your submission has raised that as an issue.

A. Well I think it did in terms of examples we gave around changes of use that we thought as a council should trigger upgrading requirements, but because of the way – and it will always be the case with any classification system, acknowledge that, there are you know more people intensive users but which do not trigger, there are low level things which do and that gets to be a very difficult situation. I think the other comment around the alteration issue, I think the fire is obviously a life risk issue from that point of view and probably for all councils a higher risk than earthquakes and I think that clearly in this city given the Ballantynes fire in 1947 that is always a very sensitive topic from that point of view. It is for all councils but again, it'll be like this earthquake, will be for years, decades to come, that issue of that fire in the city if you I've here or were brought up here was always a high priority issue from that point of view. I think the disabled access, and again I'll speak personally, not for the council, because this may be – the disabled access, and I'm assuming in means of escape from fire that does include disabled people clearly, but the Disabled Act says standards I think have increased over the last few years and I think you heard from Mr Arts last week expressing some unhappiness with the City Council. I think because of the fact that he was being advised around the

requirements that he needed to put in and I think that you've got the life safety issues of earthquake and fire, you've then got what could be suggested to be more on an amenity, a value issue, for disabled people coming in is an absolute requirement and maybe there's some balance that needs to be reflected there from that point of view, now and I acknowledge the Disabled Assembly Rule, castigate me for that but I think, but I think that is, we just need to be careful if we're talking about this issue as well.

Q. Are there any other comments on that issue?

MR DELEUR:

Well I think section 115's certainly been quite a contentious issue for many, many years and the department a couple of years ago I guess David would have clarified a lot of the issues round what is actually a change of use and what isn't, so it's certainly a lot clearer now than what it ever used to be, but potentially it still causes some huge problems when people apply for a building consent for an alteration or which involves a change of use, to the establishment of a small restaurant in the ground floor of a building which only occupies about 30% of the ground floor and we then ask for the building to be structurally upgraded as a result of that change of use for that part of the building, so it is an issue and it does draw in all the other factors like access for people with disabilities, it does draw in the fire engineering requirements etc so it does get blown out, so if we're looking at I guess upgrading buildings in terms of importance, fire would be the top most one. If we're looking at upgrading buildings for specific for seismic strengthening then I think we need to prioritise one or the other where we actually go with this, so seismic strengthening, if we deem that to be really important we shouldn't be drawing in the other factors as well such as access for people with disabilities plus fire, because the cost, the overall cost of then upgrading the building becomes so much more really it doesn't become viable anymore, so it's certainly a big consideration.

MR SKIMMING:

George Skimming, Wellington City Council, I know when we started in, way back in 1972 with the survey and then subsequent strengthening of these buildings, we ignored any fire upgrading and access for the disabled, but as we got through the process, you know, we were heavily criticised by the New Zealand Fire Service and latterly that disability assembly people for not considering them and what was considerable upgrading of a building although it was for seismic reasons, so we were, you know caught between the rock and the hard place if you like, so it does have an effect on property owners' willingness to strengthen their buildings if they're going to be confronted with additional cause for upgrading for disability and fire protection, no question about that.

MR PETTY:

If I could just add a little bit to that, that we've found generally that when people are strengthening, especially if they're having to install a diaphragm, and if that's a ply diaphragm, that when they re-gib that it's not hard to get them to add a piece of fire protection to that ceiling even if it's just future proofing and they've got no intention of changing the use upstairs at the same time and for us, because we ask for 67% and that's round our change of use standard anyway, that we say to them, well look if you go and put your piece of fire protection in, you've got another step to future proofing if you want to put apartments upstairs in the future, you are part way there and we've had very, very good take up on that. I just think the other issue is that while we're looking at parts of the Act, that 121 needs to be looked at in the ubiquitous, except in the occurrence of an earthquake in brackets, needs to be dealt with in some way that if a building is severely damaged in an event and may be subject to you know collapse from an aftershock, that the dangerous building provisions of the Act was a lot more immediate than the earthquake-prone provisions, and people have embedded in their consciousness that earthquake provisions are a long time period stuff that it would be nice to be able to issue a notice on the building that may be damaged and could come down in an aftershock and there needs to be – that needs to be reworded somehow.

JUSTICE COOPER:

And there's the issue also of what, reducing or removing the danger means under section 124 in relation to an earthquake-prone building. Mr Kelly, Mr deLeur mentioned that you'd given some clarification on these change of use provisions, do you know what is being referred to and what form did the clarification take.

MR KELLY:

I'm not aware in detail but we have issued determinations, I mean – this area has apart from the councils, we historically had a lot of determinations, requested around these change of use and I think it's through those determinations there's been a lot more clarification on what the level is.

COMMISSIONER CARTER:

A question really for local Government New Zealand, you talked about the consultation that you performed and before you responded to our enquiry, I'm just wondering did you detect any differences between rural authorities and major urban authorities, most the people we're hearing from are urban authorities, would you be able to advise us if there was any distinction in the

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sort of responses you got because these communities might have lower growth rates and different perceptions of affordability.

MS SULLIVAN:

Yes, at the risk of generalising, yes, the answer is there is a difference and that's common element of any legislation that's put in place where you have a larger number of people you have a better resource local authority and so it's much easier for them to implement legislation that's put in place. There are a couple of examples that I was thinking about as the conversation was going on. I think the distinction that I guess I'm hearing is there's one between the resourcing that's available to a local authority and the other is the awareness of risk in that community. This comes through very strongly when you hear

Gisborne and Wellington speak, in particular. But I know there was one particular community, I just can't think who it is at the moment, but let's just choose Hawera for an example which said, "Well, you know if you make a requirement around earthquake strengthening up to 67% that's okay but timeframe, flexibility around timeframe otherwise we will end up with a lot of empty buildings in the middle of our, in the middle of our main community, you know in the middle of our business sector." And they don't necessarily have the choice of where to go, they don't have the same market sort of influences in a community like that so it's a much more difficult proposition for them to work through in their community. So I guess really in general the answer to that is yes.

JUSTICE COOPER TO MS SULLIVAN:

Q. A community like that might be prepared if properly consulted to accept more earthquake risk than a, than another community?

A. I believe that would be the case.

COMMISSION ADJOURNS: 11.32 AM

COMMISSION RESUMES: 11.52 AM

JUSTICE COOPER:

Yes, well I understand Mr Petty has had to go to the airport and we asked to see him to thank him for the contribution that he has made on behalf of his Council to our proceedings.

COMMISSIONER FENWICK:

Yes in about 1990 there was a proposal put forward when they were developing the Earthquake Action Standard at the time that urban centres should be designed for a higher level of earthquake actions than smaller centres on the basis that if you have an earthquake in the centre you can overload the hospitals, transport system and so on. Of course in Christchurch we had 6600 and nearly 60 injuries which are associated with the earthquake

so certainly the hospitals were overloaded. So I'm just wondering how people would react. Should we have a higher standard or perhaps not so much with earthquake design, perhaps earthquake retrofit of buildings in the larger centres to allow for that sort of mass large scale effect and the effect this has on the economy? I don't know who would want to answer that first.

MR DELEUR:

Well I'll lead off because it's a very interesting question because our view certainly is that where you've got a concentration of populous that's where your biggest risk lies. So the corner dairy in the middle of a rural suburb made out of unreinforced masonry wouldn't constitute the same risk to the same number of people as it would in a built up area in, for instance, Auckland city in this particular instance. So I think there's definitely some merit in having some differences between the two. What it means in real practice in terms of upgrading the building, however, do we want to set a lesser standard or not or is our focus in terms of time frames potentially different between a rural area and a large built up central business district. So I think it's certainly something that's worthwhile considering. I mean I wouldn't be able to give you an answer right at this point of time but I think it's something which has got some merit.

MS SULLIVAN:

I think, if I could brave a statement on behalf of the sector, and it is a rather brave statement, we finished on, you know, people's tolerance for risk, acceptable levels of risk. I think the New Zealand community and the local government sector overall is still starting to, well not, it's really starting to develop it's conversation around risk and get a very good understanding of what risk is and this is not just associated with hazard, it's associated with how you deal with things like climate change and the uncertainty around climate change for example. So more and more we're starting to hear conversations about risk management rather than just, you know, anything that has a great deal of certainty around it. What you're proposing, I think, would be, I think the sector as a whole would have some comfort with that. I

think the standard, you know the feedback we got, would be that the seismic strengthening standard might be a national, I'll use the word 'national' standard, but that the compliance timeframes could be different for larger metropolitan areas for example as against maybe a smaller community which would struggle with the resourcing.

MR MITCHELL:

I think also too it would go some way towards addressing, and I think you touched on this in your comment, the impact on the national economy because, at the end of the day, from central government's point of view the billions to rebuild Christchurch is compared to a much lesser amount elsewhere, so from that type of risk mitigation if you like for central government it would also have merit in being investigated from that perspective as well.

COMMISSIONER CARTER:

Do you think that the councils themselves need to understand that risk exposure better. I'll just comment that GNS Science, in its work that has been published, actually notes the level of risk that they are building into their seismicity models. I wonder how many councils are aware of what that risk level is.

MR MITCHELL:

I think from, and certainly speaking for Christchurch city, and I made the comment before around rock fall because we've had to, GNS Science have told us they want the Council to settle on a level of risk and they can then give recommendations around what work is to be done and so they don't want to operate in a vacuum and so I think up till now it hasn't been an issue that councils have certainly had to face on any sort of day-to-day basis, I think, and again I don't expect it is a high priority. I think it's certainly an issue though where it's becoming of increasing point of discussion and for us, at the moment, happens to be right in our face, particularly around the rock fall issue, but, of course, it's relevant to this discussion as well. But I think there

needs to be a, it would seem to me, a general educational exercise for local government as a sector from people who have some knowledge in that area because I think, at the end of the day, it can get quite complicated when you're talking about figures like one to a thousand, one to 10,000, one to a million and within that there are millions of dollars sitting as you go higher from that point of view.

COMMISSIONER CARTER:

Well you have done quite a bit of work on your lifelines assessments and in that area, more than I've seen from others I suppose but I just wonder whether you feel that this is part of the national standard's advisory work that the public as a whole, and councils in representing them, need to have some understanding of a consistent approach to the exposure to risk from all sorts of possible events, not just earthquakes.

MS SULLIVAN:

If I could just add something and quite specific to the earthquakes this, in terms of this piece of legislation, and I'm sure everyone will go "no you're not right" because I'm not a technical expert on it, but my understanding is the seismic risk is built into this through the Z factor and that's established nationally. So unless it's, unless it's there and they, if there's a review of the seismic risk factor I think councils would welcome that but if it's outside of that then there's this issue of, you know, how do you manage with that at a local level when nationally a standard has said something that might be a little bit different.

COMMISSIONER CARTER:

I suspect the understanding is there in the technicians that are technical experts that are doing the work but perhaps we need to do a bit more to explain that to the general public.

MS SULLIVAN:

Yes.

MR MCLEOD:

I believe you're absolutely correct. I don't think the vast majority of the public realise that one-third new building standard in Wellington is significantly higher than one-third new building standard in Dunedin. I don't think that the ratepayers, the taxpayers generally understand that there is that difference throughout the country.

MS SULLIVAN:

And certainly I don't, oh sorry, I don't think people can then take that next step and say that one-third means 10 to 20 percent more chance of collapse, I think I'm repeating that correctly, as against two to, Glen can you tell me exactly what it is, two to five if it's at 67 percent. That's the risk conversation is really around that, as I understand from the engineers.

MR CUMMUSKEY:

In regards to the information provided by GNS we definitely pay attention to that where we've received any reports and we have been using whatever we receive but one of the issues is around the actual information that they have been provided with to conduct those assessments. In my own discussions with members of GNS, particularly the risk profiling of Auckland is based on what has been limited data as mentioned in our presentation yesterday and talked about today as well. So while there is an understanding at present as to what our risk is it could be improved on with further data.

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JUSTICE COOPER TO MR CUMMUSKEY:

Q. What steps does local government, well looking at Auckland and I know the Auckland Council's just been created but historically to what extent did the councils in the Auckland region take steps to ascertain what the level of seismic risk was or to investigate natural, the, the, to investigate that proposition for themselves, investigate that issue for themselves?

A. We, with the development of our earthquake-prone building policy for Auckland City Council and the other territorial authorities that now make up Auckland Council we commission GNS to accumulate what data that they could for the Auckland region, prior to the development of our policy, and then we incorporated that into our policy.

Q. Yes.

A. In terms of geological assessment in the Auckland region the focus has predominantly been around our volcanic hazard which is far more apparent than any risk of earthquake but we do, particularly now in the wake of Christchurch, recognise that it is an area that could be targeted more and we have asked GNS to also provide an update when that resource becomes more available.

COMMISSIONER CARTER:

Q. Did you have to commission that work and therefore pay for the service?

A. Yes.

DR IRWIN:

Yes. There has been very broad, very broad brush regional looks at our liquefaction potential, ground shaking, very broad brush mainly taken off geological maps I believe. In, in terms of the seismic risk including consequences GNS did a report which, as Patrick says, is being upgraded but when you look at the number of casualties predicted, the number of fatalities predicted in there it was well below what was actually observed in Christchurch on this, for an equivalent earthquake so really inadequate and needs more work.

COMMISSIONER CARTER TO MR CUMMUSKEY:

Q. I wonder if you could expand somewhat on, on matters that you've drawn to our attention regarding the beneficiaries of improving the performance of existing building stock and that we realise has got funding implications and you have, a number of you have drawn our

attention to the fact that the beneficiaries are not just the person who owns the building that may have less damage resulting to it but also the public who, who will value the improved strength, be less exposed to danger themselves and also who value the ambience that's created by a lot of the historic and heritage buildings that council seek to retain. Those are public values. In your, in your considerations to the extent that the rate payer or the tax payer might be contributors to the cost have you done any work on evaluating that ratio of, of good, of public good to, to private good. Have any of you been getting at that topic yet?

A. In Auckland it has definitely been an area of concern as I highlighted in our presentation yesterday. The information around cost of upgrading is a key area of deficiency and I have not found that any authority or any organisation within New Zealand has such data and therefore we are unable to do a lot of the quantification of what the impact will have and thereby a lot of the follow-on assessment of what would, essentially preserving our heritage and other amenity values, how that would factor into it.

Q. Perhaps this is an area that, you mentioned research on this, more scientific work, perhaps there's some research needed on the financial implications too and something that could get some, grab the attention of the general public is in the process of this evaluation?

A. In Auckland I've been working quite closely with Jason Ingham from the University of Auckland and back when I first met him one of the issues that came to my attention was the fact that he was looking into this issue of cost but that the raw data around upgrades was rather hard to obtain. First of all finding people who had been through the full process and were aware of all the, the aspects of the cost and then actually obtaining that data as from consultancies was often apparently deemed to be a proprietary bit of information and as a result he, it is my understanding he has been unable to develop, or his PhD students have been unable to develop any broad picture of what the cost is. As we can appreciate the variability in each building case means that you need to have a broad sample of data in order to be able to draw any firm conclusions

about what we're actually facing. So towards that end in Auckland what I've been pushing is for building owners that have been getting in contact with me, or I've been getting in contact through the earthquake-prone building project to encourage them to fill out a questionnaire, to elaborate on how they've perceived the process, where the cost lies, to put together that raw data to then give to the University of Auckland to carry out such an analysis and that is something that I've been pushing quite strongly to expand and hopefully get some results.

JUSTICE COOPER:

Does anybody else care to comment on that. Mr Scott?

MR SCOTT:

Wellington's in a very similar situation I think to Auckland. It is an issue. A lot of concern has been expressed by building owners and particularly heritage building owners. However, we haven't got any information and the Mayor yesterday talked about a review that we're doing of our policy but not just of our policy but a much broader scope review over the next year or so and this is one area that we were looking to do some work in but we are some, some way away from getting anything that's useful at this stage.

COMMISSIONER CARTER:

The counter factual appears to me to be an interesting case to observe. You know, if you do allow certain values to disappear what is the community's judgment of that and I mean Christchurch is a tremendous example right close to us here now of the enormous deprivation that's resulted from this extreme event but I'm not suggesting other communities necessarily model that but at least it's a recognition that if you allow some of these values to go unsupported the consequence might be way below what the people would wish for.

MS SULLIVAN:

Could I just say on this, I think, you know, the default really is, and I think you're already aware of this, the default for that conversation is people's willingness to pay, if you wanted to put some sort of incentive in place for example and that's often worked through, through our local government process but if you don't have the imperative, if the, if that sense of risk isn't strong for people that obviously influences their willingness to pay. So you hear in the conversation with Gisborne where they're very aware of what the hazard is, what the risk is, what the impacts of it might be socially, economically to what their environment looks like you hear that willingness to pay and a willingness to put things in place in their community and what's happening there. In other parts of New Zealand where that, where that imperative isn't so strong it's much harder to have that conversation about what might you pay for it which, as I said, translates into a default way of factoring in some sort of benefit.

COMMISSIONER CARTER:

I think once you start exploring this a number of possibilities emerge as to how funds can be identified and the values. I have had reported to me one American city that decided that nearly all of its green space was being owned by developers who intended to convert it into a built environment and the public, as a whole, got behind a local council initiative to buy out areas of this 1212

city that would remain green open space and they created a bond issue on the basis of preserving that quality and it was successfully floated and the policy was produced. So we may not have that same resource available to us here but I am suggesting that ideas of how, centred around a desired end result, might produce thoughts of funding that are doable but there does need to be some concentration of thought on the top

MR CUMMUSKEY:

Particularly in the Auckland situation through the result of our previous regime of earthquake-prone building assessment in the 70s and 80s, combined with the economic climate at the time, we've seen quite a substantial degradation

and of destruction of our what would now be considered heritage building stock in that area which has been, since it occurred, quite a cause for lament amongst a portion of our populous. Now, obviously, we potentially face the same situation now across the country but then we have the long recognised issue of where is that cost going to come from while we do have building owners that see it almost as their civic duty to preserve heritage to bear that increased cost by themselves for the good of the public, there are obviously those that do not wish to do so and what is the justification for us to demand more of the public purse in order to preserve those heritage features.

MR HAZELTON:

The case for Dunedin for the fact that we've probably implemented a number of incentives already for heritage building owners in particular that focus on earthquake strengthening actually comes from a bigger equation that the earthquake strengthening is part of what we see as an overall package of re-use for buildings and that's where we've had probably the most traction with council is around the fact that if funding the re-use of the building which contributes to economic vitality, the maintenance, the look and feel of the city and enhance public environment and, you know, we're just saying well we need extra funding to go into earthquake strengthening as part of that otherwise they won't be able to re-use the building and the building will go as part of that. So we haven't gone in specifically with most of the things that we've been doing and saying oh we need this money for earthquake strengthening. We've been saying it's part of the overall package of protecting the look and feel of the city, the outcome in the DCCB. Thank you.

JUSTICE COOPER:

Any other comments on that issue?

MR MCCARTHY:

Perhaps I could just reiterate what Mr Mitchell said yesterday. Historically Christchurch has really valued its heritage, its major heritage features, and has funded, by way of grant, quite an amount of strengthening work and

preservation work on many of those buildings and the Arts Centre and Canterbury Museum, the Cathedral to name but a few and historically they have been quite generous. There will be a further iteration of that because, clearly because of the loss of so many heritage features Christchurch is going to have to seek to retain as many of what remain as we possibly can. So I'm sure the Council will consider those aspects and I think that that element of public good, I think, has always been recognised in Christchurch by way of contribution but a percentage I certainly can't give you. I think all of the councils will give further consideration to that as a result of your question.

MR SKIMMING:

In the early 70s you know Wellington was really successful in having buildings either strengthened or demolished, so successful were we that there was a public alarm over the number of open spaces that were appearing in the city and the big gaps in our streetscape that we had to enact an ordinance to, an open space ordinance to stop or slow down that type of event and, you know, the public were totally supportive of the Council providing funding to allow owners to have a better assessment of their building for earthquake strengthening and to help them with architectural design for improving their buildings and I mean over a period, I think it was about five/six years, Council had something like 2.5 million dollars in inducements to help owners and I don't think there was a lot of public comment or resentment to the fact that we were using public money for that, to that end.

JUSTICE COOPER:

Right now if I could just take things in a slightly different direction. Much of the discourse on earthquake-prone buildings focuses on council policies and what councils do or should be doing and I'd just like to raise an issue about the potential for placing some obligation on owners or agents of owners of buildings that maybe earthquake-prone or have some critical structural weakness. When that information is known to the owner or perhaps consulting engineer employed by the owner should there be some obligation on those parties to advise the council of that fact. This has potential

application in the situation where buildings are being assessed after earthquake events but also more generally situations may arise where the building is going to change hands, it's the subject of some quite careful attention by structural engineers or others who are advising the owner or the prospective owner about the state of the building. Should there be some obligation in circumstances where structural weaknesses are encountered for that information to be passed to the local authority and in a legislative environment that would protect those persons and over-ride obligations of confidentiality that they might otherwise have felt subject to in respect of their respective clients? Does anybody care to comment on that speech?

MR MITCHELL:

I'll perhaps start, sir. I think it's a good concept. The information I referred to before, the structural survey and CERA, that is certainly now flowing through to the Council. I think Mr McCarthy made the comment yesterday that Christchurch will have the advantage over other councils in the sense it'll have on files a very good stock of very current engineering information for a lot of structures in the city and certainly we've had discussions with CERA around how we ensure that information is not lost and filed away and had to be publicly available from that point of view. I think it's also, and I made the comment to you yesterday when I spoke, around councils, when information comes identifying issues with buildings, councils will then be in a position where their practice is, like a complaint, they will respond to it, they will follow up and so, therefore, leaving aside the policy for one point, it's that turnover of information and keeping it before the council because I think your comment 1222

that at the end of the day we are talking about public safety and people's lives here and that is the critical starting point from my point of view and I think it probably will, you also touched on the legislative background to it. It will require that because otherwise, I expect this goes on all the time, one of the buildings that you will be looking at I think a situation may have occurred where there is a report halfway through the life of the building. There's questions around, which I understand didn't come to the territorial authority,

and you know we, we hear all the time and it was touched on before by Auckland City about getting access to consultant reports that could be quite valuable for the long term and I think it would require a framework to simply say, this is what the law requires. That in turn I expect we'll end up with as always perverse outcomes around how the reports are then worded and phrased so they become so bland they lose their value from that point of view but I think certainly it's an issue that needs to be discussed and I think also the, the charter of the Professional Engineering Association it will, from their point of view and their code of ethics, they will be in the situation of saying to the building owners, look, it is just the law of the land. The important thing is here its public safety at stake, therefore it's important the council knows about it and, yes, it will end up on LIMS because one of the things we find, and we find this and I have had, around the red stickers in the east and to my point of view they go on LIMS because people later on would like to know the history of, that's the whole ethos behind LIMS. I've had some interesting conversations with Parliament's Regulation Review Committee about whether or not we should be doing that and they sometimes have a different view about that and I think, it's this information, the public arena on these structural safety issues is critical.

JUSTICE COOPER:

Q. Just before I ask others to comment, the situation that you began addressing under the Canterbury Earthquake Recovery Act is one where as I understand it CERA is empowered to require and has required land owners to in effect do a condition survey and tell the council what the answer is. I imagine that if a policy like that were to be made nationwide there might be many objections raised and, but, but perhaps that's a possibility. Short of that though life goes on, commerce goes on, information comes into people's hands. If it relates to an unsafe aspect of a building should there not be some obligation on people to advise the council in a statutory environment that made it clear it was a matter of obligation and so there might be sanctions if they did not comply with the obligation but the corollary of that would be that

they would be protected from allegations that would otherwise be made against them for disclosing that information to the local authority. That's the, and this is this sort of ongoing daily sort of thing –

A. Yes.

Q. – that I'm talking about rather than, in response to a disaster. Does anybody have any comment on that possibility?

A. Well perhaps sir I can just, just one final comment. I think, and perhaps I'll get Mr McCarthy to follow in terms of our experience around building owners and the structural survey.

Q. Yes.

A. Because it hasn't caused any outcry in the city, not publicly anyway but I think the, I agree with the point you've been making in the sense of having the requirement and also I would expect that again the requirement would be it's not, they're not in breach of contract for confidentiality reasons and also the other area that tends to come up is around defamation for example, writing a report but again we have, there are examples in the Local Government Official Information and Meetings Act now where councils have released information. The fact we're releasing it does not render us liable to defamation for simply producing a report that we hold from that point of view. So, again, there are precedents for that around here. It's not one of those situations I think where Central Government will be going, oh, we've never done this before and we're crossing a line here we don't want to go into from that perspective.

[Speaker not known: Well perhaps Steve just around the structural survey and how it's working].

MR McCARTHY:

Briefly, I think this links to our earlier conversation about the structural survey of buildings and one would expect if there were a structural survey and in the same way a warrant of fitness is issued on a car that a building would undergo a check, a survey of a pre-described form every five or 10 years and where

there were a critical structural weakness or a defect in the building that may relate to seismic action or it might relate to lack of maintenance that that in fact would be disclosed to the council. It could be done in conjunction with the building warrant of fitness process so it would be part of, it would be linked to the annual forms that they send into the council but it would be over a longer timeframe. So I would see there would be, quite a value in that but equally if during the course of normal events if the critical structural weakness were exposed at any time one would expect as an adjunct to that, that that would be immediately notified to the council to ensure that there was remedial action put in place.

MR CUMMUSKEY:

The required provision of such information to the council where a external entity is something that Auckland Council will support and in fact through the implementation of our policy I have been requesting that of any building owners that I am dealing with or any engineers. An issue, however, that it does touch on is in fact how we manage that data. Not only from a data integrity perspective as from what I understand there are issues, particularly with councils who have not digitised that data and how it is accessed in a situation where it is most needed but also around how it is most effectively managed in a dynamic fashion. The situation we have at Auckland Council not only, well for one thing there is the amalgamation and the fact that we're having to deal with a multitude of different systems but in fact with any of those systems they require a very specific level of knowledge as to how to actually utilise them to good effect. Therefore there's quite a likelihood that such reports when provided could end up sitting on a property file and will only come out when you have an incident occur. So it is something that I've raised in various situations that for us to effectively not only implement these earthquake-prone building policies in the long term, perhaps beyond our effective lifetimes at council, we need an appropriate means of storing and utilising this data. Ideally also the opportunity exists with modern technology to look at more of a national approach, one that harmonises the information

that we have and provides organisations such as the DBH with far greater access to such information for national purposes.

JUSTICE COOPER:

Yes, well if such a reform took place it would certainly be necessary for the local authorities to ensure they had proper systems in place to do what was intended with the, with the information and in such a statutory environment I imagine there would be strong criticism if down the track something happened in relation to a building and the problem had been identified as one that –

MR DELEUR:

I think it would also need to be very clearly identified as the property owner's responsibility in respect of any defects that become apparent for a structural analysis of the problem.

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JUSTICE COOPER TO MR DELEUR:

Q. Well the, it would fall to be pursued then by the council and no doubt that's what the council would be saying in various ways ultimately with the ability to exercise its enforcement powers under the legislation but the concept that I'm talking about at least would oblige those who knew information about a building to give it to the Council and my question is whether you think, I'd like to know whether people think that would be useful or whether it would just be more administration to no avail.

A. Yeah it is my personal view that it needs to go that one step further. So typically what we see, and I think what I saw yesterday coming to Dunedin, is buildings really falling into a state of disrepair through lack of maintenance.

Q. Which building's this?

A. Well particular buildings, I saw some photos yesterday which Dunedin City Council had shown.

Q. Oh I see yes.

A. But in our own instance within the Auckland city CBD area over the last three or four months we've had three failures of verandas due to lack of

maintenance and what I'm really suggesting is where analysis of the building does take place that, in fact, those defects, such as lack of maintenance on the building, potential for verandah collapses, potential for building collapses, parapets collapse, if they're identified it shouldn't be up to the local authority to then chase the property owner to make sure that they effect the work. There's a responsibility on the property owner to undertake that work but, as we see so very often in local government, is that all these things come back to local government to implement and to enforce and there needs to be certainly in the direction that we're taking with the Building Act at the present time is the shift from the responsibility from the local government back into the sector. Now I think this actually provides a good opportunity to head in that direction as well that, in fact, there is an obligation on the property owner to make sure their buildings are maintained, to provide for safety of the public that are entering the building or passing by on the footpath. It is not something that the local authority should be charged with to make sure that every verandah is safe in their area. There's also surprise, there's a property owner's responsibility here, that's what I'm alluding to.

Q. Are you of the view, Mr DeLeur, that it is not, that is not clearly the law at the moment.

A. I'm certainly of the view that in creating a earthquake-prone, dangerous and insanitary policy that the obligation is placed fairly and squarely with local government to certainly undertake the IEP process at the present time. There's actually no real wording in there at all to say that there is then an obligation where the building falls below a certain standard for the property owner to undertake a structural analysis of the building to make sure that, in fact, the building is actually safe to occupy. Because, as we've heard around this room, certainly an IEP report doesn't spell out, in a lot of instances, what the real state of the building is because there's a lot of other factors in there.

MR MITCHELL:

I think, sir, I think the general law would say the property owner has the primary responsibility for the safety of their building, just like anyone of us owns a house. The responsibility starts somewhere. It has to be with the owner of the property. The councils certainly have a role in terms of situations where that doesn't occur. I think Mr DeLeur reflecting the situation that councils sometimes find themselves in that the responsibility of the owner tends to get overlooked and the first port of call, eg: from the media, seems to be to the territorial authority from that point of view and I think that's, and occasionally you've seen that in Christchurch around well where was the building owner in terms of a particular issue from that perspective. The other comment I'd make is we've seen occasionally situations where building owners will endeavour to contract out of their responsibilities as a building owner around the maintenance of the building. They'll shift it onto the tenant and I think your suggestion previously around information being provided to the council I think would clearly need to say that that should not happen, the onus needs to be on the building owner. There's not point in, because I think what we've found is you might have a block of shops and owned by one person but then the lease provides for the 10 tenants, you're responsible for the maintenance of your part of that lot. That, in practice, is impractical and I think where you started from would be it would need to be quite clear it is on the owner, the owner cannot effectively contract out of their obligation on that point.

MR SKIMMING:

Yeah, I think you're suggestion's a good one in that if there are areas or things have become, are critical weaknesses in the building I think the owner is obliged to advise council and the reason why I say that is that you know over my time in Wellington City Council I've come across a lot of irresponsible owners who, for one reason or another, will continue to allow a building to be occupied without proper fire alarms, without proper emergency lighting and it's only through some interested party that they advise council and we're able to make sure that that's rectified. And the same thing if it was a critical structural weakness and we've had occasions where that actually happened where a

structural engineer was engaged by an owner to do an assessment of a building, found a critical structural weakness in a part of the building that from time to time housed over 200 people. But not only was there an advice that this was a critical weakness there was also an advice on how this was to be fixed and by which date. So I think it's important that in saying that the owners are obliged to advise of a critical structural weakness it's followed by how they're going to remediate that problem to the council and by what dated.

JUSTICE COOPER:

Steps proposed to deal with it.

MR SKIMMING:

Yep.

MR DELEUR:

Another –

JUSTICE COOPER:

And apply for any necessary building consents as well I supposed and pay the prescribed fee.

MR CUMMUSKEY:

Another point, if I could raise it, is around the issue given that as part of all of this we also consider heritage values that for a long time, particularly those who have been dealing with the preservation of heritage, have been dealing with the issue of demolition by neglect which has been recognised as a likely continuing factor in what is going to result in the fabric of our city. When we start issuing earthquake-prone building notices there is, of course, the possibility that building owners may use that to further justify such a state of affairs and in Auckland at least we have quite a number of, in some cases, very landmark buildings which are in exactly that state where no appropriate maintenance has been carried out. There are obvious risks but there really seems to be no legislation that allows for the adequate preservation of that

heritage and the addressing of the risks that are there, apart from perhaps by deeming them a dangerous building, closing them off and letting them to rot or fall apart in silence.

MR MITCHELL:

Because the land owners allowed to allow their land to go to waste.

JUSTICE COOPER:

Yes, well I suppose with the development of earthquake-prone policies, I mean we haven't really reached the point where many of the councils policies have actually reached the point where they have to be enforced and that will be the stress test of the current system it seems to me because if the policies are enforced and notices are issued one response might be that what is provoked is not the repair of the building but its demolition.

MR CUMMUSKEY:

Which, obviously, from a heritage perspective if a building is scheduled and valued by the community that is obviously not a desirable outcome.

MR MCCARTHY:

There's another issue as well which is abandonment of buildings which, from a council point of view is often worse because it can sit there unoccupied for a long period of time before it gets to that very unstable state where it does present an immediate public safety issue so that abandonment is an issue.

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JUSTICE COOPER TO MR HAZELTON:

Q. Well the examples that Mr Hazelton showed us yesterday, I don't think they were of abandoned buildings so much were they Mr Hazelton as just buildings that had been allowed to fall into a state of disrepair. They were partly occupied?

A. They were partly occupied, both of them had ground floor tenants but not upper floor tenants.

Q. And potentially those collapses could have been such that they actually went through the floor of the unoccupied level.

A. One of them if the parapet had of fallen in the other direction he would have fallen on rush hour pedestrian traffic in the morning. We were lucky.

COMMISSIONER FENWICK:

Possibly one, one further thought, what level of percentage new building standard, whatever that means, should one go for. I'll just point out that the Christchurch earthquake, if you live in the Heathcote Valley or on the hills the accelerations and forces that you would have been subject to would have corresponded roughly to about a seismic hazard factor of .8. Currently, before May, the seismic hazard factor for Christchurch was .22. So just put that in mind, it's about four times as high. If you were in the CBD the accelerations and forces would have been round about a seismic hazard of .4, possibly a wee bit above it. Now, of course, our seismic hazard factor's been increased from .22 to .3. So when you're trying to judge the performance of the buildings in Christchurch which have been retrofitted what co-efficient do you compare it against or do we anticipate that the sort of earthquake that might arise somewhere else will exceed the 500-year event for which they were designed at any rate. There is a major problem in trying to relate the performance we see here to the performance you might expect in other, other centres. It just sort of puts out at a, as I see it, a major problem interpreting just which level you go to. Not having said that I think, Auckland I'd love them to see the, take the precautions of protecting their parapets and chimneys and falling hazards. That would be a major step but again you can't exclude the possibility of a significant earthquake there which as I point out could well exceed the expected levels in certain locations in certain areas. So that's just more or less a thought. I don't know if anyone wants to comment on that but it's something to bear in mind. A big range of values. We don't know what values you're going to be subject – what sort of earthquake you're going to be subjected to, if it's large scatter. So in Christchurch we've got the complete

range from virtually nothing down to a seismic hazard probably twice the order of what it is designed for in Wellington.

MR DELEUR:

Well it's the quandary we've got at the moment, hence our real reluctance about introducing 67% as a standard for remediating buildings to because it's exactly what you say. It is very unclear to us at the present time, based on the information that we've got to date, is what is the real seismicity, for instance, of Auckland and the surrounding region. So we need more understanding of that before we start implementing something which may well not meet what the real requirements may be for the future. Like, the alarms and that we would send our community into a certain direction that when more of this information becomes available to refer to research that we then find we're actually well short of where we actually need to be pitching this.

DR IRWIN:

One of the things about our seismicity that doesn't seem to get recognised very much is that people talk about the volcanic hazard and yet what we're told, the first signs that a volcanic eruption is coming is earthquakes and getting shallower and shallower and shallower as the magna rises. So we may be seismically inactive at the moment, seismicity changes. Christchurch knows that very well and so some of those things need more looking at as well. It's not a simple problem.

COMMISSIONER FENWICK TO DR IRWIN:

Q. There is always of course the actions that you can take, look for the biggest gain you can get for the minimum cost and, you know, attaching parapets, falling hazards –

A. Absolutely.

Q. – does not disrupt the internals of the building and so it's fairly simply done.

A. Some of it needs doing whether you get an earthquake or not as we've seen.

Q. I'm not suggesting, the unknown facts should not stop that, that would be the last thing. But one needs to bear in mind you never know what's coming and how big it's going to come.

JUSTICE COOPER:

One of the problems with the current approach in the reference to new building standard is, as it's designed to do of course, it takes into account the hazard factor, the z factor so when the seismicity of an area increases such as has happened now in Christchurch I presume, as a matter of logic, it must be the case, that there are buildings that would have complied with the relevant standards on the 21st of February which if they've survived now do not comply because the z factor has been raised and how are those buildings to be dealt with and is the z factor at the level it will be now and next year?

MR MITCHELL:

Well I think the answer to that sir is probably not. It was always put as an interim z factor pending the work of this Royal Commission and what may come out of – that's my general understanding in terms, but the Department will be better able to comment.

JUSTICE COOPER TO MR KELLY:

Q. Mr Kelly?

A. No, I don't think it was put in as an interim pending the Royal Commission. It was based on the best science and engineering advice that we could get and give to Government, based on GNS but also based on very experienced engineers throughout New Zealand. So that factor is, we've been consulting on that factor and proposing to confirm that factor based on that advice. The best advice we have is that the seismic risk will be elevated for some time. Yes it might change over time.

Q. Beyond three?

A. Sorry?

Q. Beyond three we were told –

A. No.

Q. We've been told by GNS that their current thinking is that it should be at 0.34.

A. Those are the discussions we're still having with them. I think it's fair to say there's differing views between the scientists and the engineers.

Q. Yes but I mean the precise point at which it lands and how long it lands there –

A. Yes.

Q. It is not really germane, my point is that so long as you have a set of controls which is based on cross-reference to the hazard factor fluctuations in the hazard factor, I should say changes because fluctuations is the wrong connotation but changes in the hazard factor are going to have significant implications for buildings that have hitherto thought to be complied, compliant with standards.

A. I think that's quite right sir. Also the, in 2008 there was some changes to the standard 1170 that Sir Ron referred to. That made some changes as well. I think Dunedin increased the z factor so it did bring more buildings into the definition of earthquake prone. But the corollary of that -

Q. But Dunedin's 0.13 isn't it which is the sort of lowest you can get.

A. Mmm, it was lower than that before – from my understanding. So it does bring more buildings –

Q. In a different, in a different standard if was lower.

A. Yeah and what it comes back to then is you've got more buildings and it comes down to the local authority how active their policy is in dealing with that and certainly the department's view is that we support an active policy.

MR HAZELTON:

And the challenge for building owners is, is when those things do change and they have invested that they feel it's a complete waste of time, that they'll have to do it again and in maybe another 10 years they have to do it again

and part of that might just be, well, that's the nature of the best and you have to, that's just part of owning a building but when you're talking about very,

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very significant sums of money I think there's a lot of frustration in that and I don't know how best to balance that.

MS TOWNSEND:

That's one of the issues around the upgrade standard versus getting a threshold when you talked before about whether a policy should just be about a minimum standard and what you can enforce. One of the things about the economics of a policy is about in saying that you actually should upgrade as much as you technically and financially can in order to deal with the fact that standards do change and risks do change and you need to invest in the building to the best you can in order to ensure that you minimise the risk you have of having to do it again.

JUSTICE COOPER:

Well we'll, I'm thinking of bringing the discussion to an end at this point but just let me ask whether there are any issues that people would like to get off their chests rather than responding to us relevant to the terms of reference of course.

MR DELEUR:

Just picking on a, just as a final comment, just picking up on a comment that Commissioner Fenwick made previously about really spending money in the right places and focusing on things that would really make an immediate difference such as parapets, verandas, chimneys, fireplaces. Now I read a recent health report which indicated that 600 people per annum currently die through particles, smoke inhalation annually and chimneys pose a real risk for residential properties, cause a huge amount of disruption if there was an earthquake. There's ready funding available to the Government for retrofitting insulation into houses. I believe there's an absolute opportunity here to address first of all chimneys that are likely to collapse in such a hazard but

also to replace open fires with really solid fuel heaters which prevent or meet the current emission standards so we're addressing two things at once. We're actually addressing the earthquake prone chimneys as well as regressing really some real health effects to our community at the present time whose fires, open fires that really cause smoky emissions and cause health hazards to people.

JUSTICE COOPER:

Just on the subject of chimneys and just so that knowledge of this becomes more widespread in the course of our enquiry we have come across tragic set of facts whereby following the September earthquake a chimney was removed down to roof level and the brick fireplace itself in the area of the chimney below roof level was retained, as I think people do as an ornamental feature and it collapsed in the February earthquake killing an infant who was playing in front of it so dealing with the hazard posed by chimneys is probably not satisfactorily dealt with by leaving reinforced masonry structure that these brick chimneys are remaining below roof level. Something to be aware of.

DR IRWIN:

I've got another issue which is related but probably quite a big debate in itself and it's around how we deal with buildings of different importance levels because some buildings just have to be standing and usable after a quake, hospitals being an obvious one, fire stations, the EOC or the alternate EOC. Now one of the things that from talking to various engineers in Christchurch that came up was that sometimes those real important buildings stood but they were endangered by a building that was next to it and so they were unusable so we need to look at how we define an importance level for buildings and you've got to make sure that those buildings up to 100% of code is actually not good enough because 100% of code is designed to protect life and limb but actually it's got to be usable afterwards so and the other thing is around timeframes if you're going to define one of these buildings as necessary for response really in my opinion you need that now because you just don't know when it's going to happen so in my opinion we need to look at

how we define importance levels and how we manage those really important buildings. I understand there's been some debate around things like malls for example and changing the importance level of those because of the number of people that are there. Now some of those you might just need to stand so that you can get the people out but the ones that you need to use afterwards you're going to have to make sure that they're better than current codes because you need them to be usable afterwards so I think there's another whole debate needs having around how we manage that. My background I'm actually in the civil defence and emergency management team at Auckland so I'm very aware of these issues.

COMMISSIONER FENWICK:

The percentage building standard requirements does go some way to that doesn't it because if it's an important building it's classified as a three or four and therefore that attracts a higher design action. A very good point. It's a good point you're making. I'm just whether that's a fine enough division when we get down to it whether you know crowds or perhaps a small crowd of 100 or so people attracts a greater percentage requirement than another building and the other point you made of course is that that doesn't give you any protection against the unsatisfactory building next door that's going to drop on you and stop you using it.

MR CUMMUSKEY:

If I might just say an additional point along those lines we have in a new document that have published noted the fact of the effect of one building on another particularly what has been seen down here in Christchurch and at present there do not seem to be any particular solutions to addressing this problem of building pounding or threat of collapse onto a building that is in other ways perfectly fine and I'd just like to raise that as being an area that we would benefit greatly from any information to an effect that we can actually address this problem.

JUSTICE COOPER:

Yes. All right is there any other issues that people would like to raise at this point? Well if not I will bring it to an end. We have later in our enquiry issues dealing with the post earthquake assessment of building and also necessary changes to design rules under the current code. Your participation in these hearings does not mean that we would not welcome seeing you again if you wanted to on those future occasions. Our hearing schedule is on the website if you are still contingent on the receipt by us of the Department of Building and Housing report on the CTV building because we had to set the hearing on that building down on a tentative basis but the current programme will suffice in the meantime if you are interested in further participating in the enquiry. I think it's been immensely valuable to us to receive the different perspectives of a range of local authorities and hear about the different priorities and issues that they face and it's been a very good example from our point of view of the benefits of consultation and we are very grateful that you have all taken the time you have to contribute to our work and we thank you for your contributions and that includes participation in the discussion this morning so thank you all very much. We are going to adjourn until three o'clock I think Mr Mills when we're going to hear from Mr Jury on behalf of the New Zealand Society for Earthquake Engineering in relation to the 2006 guidelines what they are trying to do and how they go about it so if anybody here is interested in staying they would of course be very welcome to hear that.

COMMISSION ADJOURNS: 1.03 PM

COMMISSION RESUMES: 3.01 PM

MR MILLS:

As you know, sir, we're now going to hear from Mr Rob Jury from Beckett Carter on behalf of the New Zealand Society for Earthquake Engineering and the request was made following some earlier discussion about the New Zealand Society of Earthquake Engineering Guidelines that the Commission here, some more comment on this and Mr Jury's going to address those issues.

JUSTICE COOPER:

Yes, Mr Jury, good afternoon. Could I just ask you to make an affirmation.

ROB JURY (AFFIRMED)

Just a few details to establish my credentials to be here today. I'm a Structural Engineer. I graduated from the University of Canterbury in 1978 with a masters degree in civil engineering. I have spent my whole career in the structural engineering consultancy field and my passion is earthquake engineering, designing, assessing buildings for earthquake and assessing seismic hazard and risk. I'm a Fellow of the Institution of Professional Engineers and also of the New Zealand Society for Earthquake Engineering. I was a member of the New Zealand Standards Structural Loadings Code Committee that developed NZS4203 1992 and also its successor AS/NZS1170 which included the development of the current earthquake loading standard. I have also been a member of several Earthquake Society study groups over the last 20 years, including a role at the time as convenor of the study, the Society's study group that produced the guideline document that you have been referring to over the last couple of weeks. In this submission I am representing the Earthquake Society which has a membership totalling 700, a number of whom are internationally based. I am making this submission on the basis of my experience as convenor of the Society's study group and I believe that the views I am to express are consistent with those shared by other members of that study group. The Earthquake Society would like to thank the Royal Commission for providing this opportunity to make this particular submission.

JUSTICE COOPER:

We're very pleased to have you Mr Jury and if other issues arise in future the door will always be open.

MR JURY:

Well members of the Society have listened with interest to the evidence presented to the Commission over the last couple of weeks. During the presentation of that evidence the Society's guidelines have received comment and some criticism which we do not believe is warranted and we welcome this opportunity to respond to this. We also believe that the Society's views on various issues may assist the Commission in its deliberations. First a little background into the development of the current NZSE Guidelines, that's the Society guidelines. In 1968 legislation was introduced to deal with existing buildings of assessed high earthquake risk. The scope of the legislation was limited to buildings of unreinforced concrete or unreinforced masonry. High risk buildings were defined as those that would have their ultimate capacity exceeded in an earthquake that would subject the building to seismic forces equal to one-half of those specific in the then current loading standard NS1900, Chapter 8, 1965. This was a level much below what the Earthquake Society pushed for at that time. No requirements for the level of strengthening were stated if they were required and the driving force behind this legislation was the New Zealand Ministry of Works at the time and the Earthquake Society. As soon as the legislation came into effect the Earthquake Society commenced the development of a Code of Practice to assist local authorities in its application. The Society's Guideline, referred to as 'The Brown Book' was published in 1972. In 1976 the first of what are referred to as the 'modern earthquake loading standards' was published. The legislative requirements for earthquake risk buildings remained essentially the same as enacted in 1968, so still in accordance with the 1965 standard. In 1985 the Society established another study group to review the situation and prepare further guidance and recommendations. The driver here was to promote a consistent approach throughout New Zealand and provide recommendations for strengthening levels. A new Earthquakes Loading Standard was published in 1992. In that same year an Earthquake Society study group was again set up to review the 1985 guideline document, consider the latest assessment and retrofit techniques and to provide provisions in limit state format, which was what was in the 1992 standard. This document was published in 1995. The legislation at this time was still essentially unchanged from that that existed in

1968. Members of the New Zealand Society of Earthquake Engineering Reconnaissance Teams who had seen the damage from, first, the Northridge earthquake in 1994 and then the Kobe earthquake in 1995 became concerned about the observed poor performance of relatively modern buildings designed prior to the introduction of the modern earthquake design standards and began to push for a change in the legislation. In 1996 the Earthquake Society received the support of the then Building Industry Authority to begin development of a new guideline covering a wider range of buildings and to provide backup to the new legislation. This support has continued with the development of Building and Housing. In 2004 new legislation was passed with new earthquake requirements for existing buildings. This coincided with the introduction of the current earthquake loading standard NZS1970.5. In 2006 the latest Society recommendations were published. The reason for –

JUSTICE COOPER:

Q. Excuse me, Mr Jury, I think you said 1970.5.

A. 1170.5.

Q. Right thank you.

MR JURY CONTINUES:

The reason for providing this background is to show that the Earthquake Society has been at the forefront of the development of provisions for dealing with at-risk buildings and earthquake for over 40 years. Over that time the Earthquake Society has continually lobbied for improvements in the seismic performance of existing building stock. At times this effort has been frustrated by a lack of a perceived need, as New Zealand had luckily not had a large earthquake affecting a large urban area since the 1931 Napier earthquake and the priority was considered to be elsewhere. Of course all that changed in February of this year. Members of the Society, over several decades, have been well aware that it would only be a matter of time before there would be an earthquake in New Zealand that would severely test our older building stock. Just reflecting on the 2004 Building Act. That represented a significant

advance in the journey towards obtaining a reasonable level of security in our building stock. For the first time buildings of all material types, not just unreinforced masonry, were included in the definition of earthquake-prone buildings. The level of seismic resistance that constitutes an earthquake-prone building was raised significantly above that that had been in previous legislation, in the order of four to five times and perhaps more in some cases. The level has been make effectively timeless as it refers to a percentage of the current earthquake standard, whatever that might be in the future. Territorial authorities were required to develop earthquake-prone building policies. It was no longer optional. There are also requirements for earthquake relating to change of use of buildings and for alterations of buildings. However, there are still areas of concern for the Earthquake Society. The Society lobbied for a much higher level for the earthquake-prone threshold. It also lobbied against the inclusion of the collapse criterion in the definition of earthquake-prone buildings as it believed that this was unworkable from an engineering stand point. Also, as for the previous

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legislation no universal strengthening level is specified. The lack of any mention of any strengthening level has created the situation where there is a legal argument around whether it is possible for territorial Authorities to insist on more than 34% NBS, New Building Standard. From the Earthquake Society's point of view this uncertainty is unnecessary but also more on that later. The Earthquake Society guidelines, this document has been referred to continuously over the last couple of weeks, there are several aspects of the Society's guidelines that have been discussed, perhaps with a note of criticism as I mentioned earlier. I will go through some of these now and address them. It has been suggested that the guideline document is out of date, does not adequately cover structural retrofit and that other documents are being prepared, may soon replace it. The guidelines were developed primarily to address assessment. Although the title suggests that it also covers the improvement of buildings, this is more around assessing what improvement has been achieved rather than detailing specific retrofit details. There is one chapter that covers retrofit techniques but it was always the

vision, the retrofit techniques would be covered in other companion documents as and when they were developed along with the retrofitting technologies. The Earthquake Society believes that buildings meet 67% New Building Standard should be considered to present a potential earthquake risk that is likely to be acceptable. The implication is that those buildings that exceed this level are likely to achieve an acceptable performance. The reason why some reduction below 100% of New Building Standards is accepted is partly pragmatic, but it is also in recognition that is relatively easy to be conservative in new building design with very little impact on cost. This is not necessarily the same for existing buildings which are being considered for improvement. In terms of the strengthening level, the Society's guideline recommends upgrading to as near as is reasonably practicable to that of a new building, but not less than 67% New Building Standard. However from a pragmatic point of view the Society considers it is more important and realistic to identify the high risk buildings and reduce the risk they pose to a more acceptable level than to necessarily attempt to ensure that all existing buildings comply with the latest standards. The identification of and elimination of non ductile failure mechanisms and critical structural weaknesses is in itself of greater importance than the actual calculated assessment in strengthening level. Building failures during earthquakes and this has also been the experience in Christchurch, really occurs solely because the design forces have been underestimated, more often than not poor performance results and some obvious configurational or detailing deficiency. On the question of percent New Building Standard or percent NBS, the question has been posed as to what is 100% NBS, that is defined in the Society's guideline document and whether who would actually lead to a significantly lower performance in earthquake than could be expected for a new building. Those preparing the guidelines were quite clear on this point. A 100% NBS is intended to be as the lay person would interpret it, that is the expected performance should be similar to the minimum requirements of the building code or a similar new building. There are important differences though between the design of new buildings and the assessment of existing, and these lead to some changes in the approach and provisions that may give

the impression that undue concessions are being given to existing buildings. This is not the intention. The differences are subtle, but nevertheless are considered valid. The objective for assessment of performance of an existing building is to predict the level at which a particular limit state is likely to occur and that compares with the objective of new building design, which is to preclude a particular limit state from occurring. Less stringent assumptions and used in design also reflect that the building exists and therefore actual workmanship and material strengths for example can be checked. For these reasons it is considered acceptable to use probable rather than dependable strengths for example. The Society believes that the concept of percent New Building Standard introduced in the 2000 guidelines has been an extremely successful one. It does allow the consistent message to be pushed across assessment methods of varying complexity and accuracy and appears to be accepted by building owners and the public at large. It can be updated as more information comes to hand or as more assessment is completed. The Earthquake Society believes that the criticism that it has heard regarding the validity of the guidelines approached a calculation of percent new building standard for existing buildings, should be considered in context with what is achievable in a seismic assessment process. In this regard the accuracy in some of the percent NBS scores that we see being quoted, should reasonably also reflect what is achievable and not go to several significant figures. It would appear that some questions on percent NBS arise from the thought that the guidelines do not necessarily reflect the resilience required of modern buildings but earthquake loading standard. We do not agree with this view and believe too much has been made of the margins to collapse of 1.5 to 1.8 mentioned in the commentary to the loading standard. These are very indicative numbers and they tend to oversimplify the issue as I will discuss later. The percent NBS number is simply a means to an end, the guideline document broadly defines buildings into three categories, earthquake-prone, earthquake risk which also includes the earthquake-prone buildings and the remainder. The percent NBS number does however provide the ability to advise on where in the various ranges a particular building might sit. If the New Building Standard changes as is quite possible and as has recently

occurred in Christchurch, it is apparent that the percent NBS score for a building must also change. When the legislation contained within the 2004 Act was being formulated it was clear to the Society that a simple method of assessing buildings was required for initial screening purposes and the initial evaluation procedure, the IEP was developed. It is a qualitative procedure relatively coarse in nature, and developed to allow an initial assessment primarily from the street. We would estimate that the IEP assessment method is now being applied to well in excess of 5000 buildings throughout New Zealand. I have been personally involved in more than 2500 assessments for Wellington City Council and property portfolio owners, and have found it to be surprisingly robust at sorting out what might potentially be very poor performing buildings. The Earthquake Society would like to stress however that the IEP is not a tick box process that can be carried out blindly, it relies on the judgment of engineers experienced in the assessment of seismic performance of buildings. If the assessor for example is aware of issues that are not specifically covered in the IEP process as documented, these must be addressed from the final score given. The importance of this should not be underestimated. However after so much experience it would not be unexpected the process could be beneficially tweaked. This will be addressed in the upcoming review but it is not expected that the process will change but rather there should be more explanatory notes to allow the assessor to make value judgments on a more consistent basis. On the issue of risk, while it is true that the relative risk numbers against percentage NBS achieved given in the guidelines had their origin in the expected probability of an accidence of earthquake shaking levels, these types of numbers must also stand scrutiny from a judgment perspective. Risk can be considered on many levels. It could be the risk of collapse, the risk of injury, the risk of a certain level of damage. Christchurch has confirmed to us that when a large earthquake strikes, buildings with low seismic resistance perform appreciably poorer than those with high resilience. It would certainly be useful to carry out a statistical analysis of the Christchurch damage and collapse data to test the difference in the level of risk, but the factor of an excess of 25 times the risk for an earthquake-prone building compared with a new building seems to us to be

about right. Severe earthquakes are low probability, high impact events. We should not be surprised however that there might be relatively long time periods between events of much lesser scale. This is the nature of seismic risk, it is only relatively uniform when taken over a very long time period, much
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more than one lifetime period. On the question of unreinforced masonry. Criticism has been made of the approach used from the guidelines for assessing unreinforced masonry buildings, citing that it is too complex. Many
10 unreinforced masonry buildings have highly decorative and illustrated facades and it was considered necessary by those developing the guidelines that it was important to have a method that was able to deal with these complex shapes. It was thought that tools to address the more simple cases would be developed from the general methodology by consultants on an as and
15 required basis. The very prescriptive approaches of the US were studied and rejected in favour of the approach followed. Much good work on the seismic performance of unreinforced masonry buildings has been carried at the University of Auckland over the last couple of years. However, it must be recognised solutions currently being offered from that research are only the
20 simple cases and require road testing and practice. The observations of some is that these latest assessment methods for the face load and stability of unreinforced masonry walls look very optimistic. We believe they should be used with care. There has been some suggestion that current assessment methods for unreinforced masonry may not be adequate and at 100 percent
25 NBS, as I discussed earlier, may not be achieved. While there has been some significant damage to masonry buildings in Christchurch it is difficult to Judge the adequacy of current procedures other than point at the good performance of some strengthened buildings, including the Arts Centre - although it was extensively damaged it did not lead to fatalities; Christ's
30 College and the old government building on the square, just to mention a couple. Minimum standards, seismic standards are provided in the current Building Code for brittle and low ductility buildings. These types of buildings are penalised up to 40 percent against more resilient building systems. It is

against this standard that the percent NBS for these structures is measured, not the standard for a ductile building. I think now those are the points that we would like to raise out of the questions that have been raised regarding the earthquake study group but I thought I would also like to talk about assessing actual performance of buildings and how that might be used in codes etc. so assessing the seismic performance of buildings and then what is acceptable is extremely difficult. Can I have the first slide please? Doesn't look as though we're going to get the first slide.

JUSTICE COOPER:

We've got the, we're looking at something called 'The Structural Fragility Curve'.

MR JURY:

That's the one, Your Honour. Okay so consider, for example, that diagram. This shows a somewhat simplistic view of how the performance in a particular building or group of buildings might be predicted against various damage states or various levels of earthquake shaking. In this instance the earthquake shaking you're shown is ground acceleration but it could be equally measured as structural response. What is important to note is for any level of earthquake shaking - and I've shown a line going up I think from 0.6G – there are a variety of potential damage outcomes for any particular building type, each with its own probability of excedence or risk. If the actual damage observed for a number of similar buildings in actual earthquakes was plotted it could be expected that the data points would be quite spread so the neat lines shown would, in reality, be quite broad bands. Therein lies the difficulty in predicting building performance using techniques more suitable for design. The damage state shown on that figure could be re-titled 'limit states'. Prior to 1992 there was only one limit state considered for design and that was referred to as the ultimate limit state. In 1992 an additional limit state, the serviceability limit state, was added and in 2004 a second serviceability limit state was added for important post-disaster buildings, one that was consistent with the ability to continue operations for important buildings. For assessment

of buildings we have typically only been interested in the ultimate limit state as this is the one that is more related to life safety. The use of specific specified limit states is useful for design and perhaps for assessment but the reality is the buildings must perform to an acceptable level in any earthquake. The larger the earthquake the more damage we're prepared to accept and there will become a point that in an extremely severe event collapse might even be tolerated. The risk of an extremely large event occurring is, hopefully, low enough that it can be accepted but this is not the same as saying it can't happen. In 2006 the Department of Building and Housing embarked on a general code review. As part of this exercise a group, including members of the New Zealand Society for Earthquake Engineering, attempted to address the question of what is acceptable performance. The first step in this process was define a continuum of performance for various aspects that might be important to society, including structural damage, but there are many aspects. The result of this exercise is shown on the next slide or the next figure which is entitled Table 5.1, sorry 5.2. 5.2, it's broken into two I think, it will be broken into two parts.

JUSTICE COOPER:

Q. 5.2A The Event Effect General – is that right?

A. That's right and also the following chart which is 5.2B Event Effect Structural.

Q. Yep.

MR JURY:

An attempt, well we provided a continuum of potential performance as shown on those figures. What it does is it creates a matrix which relates for any particular impact measure that you might like to list, you can divide that up into various levels of effects and write a short description, prepare a short description on what each one might be and that defines how the performance might adjust across a continuum. I only show this slide to simply indicate that the resulting matrix is a complicated one if you try to include everything. The next step in the process is defined on the next figure and that is to define what

is acceptable performance at increasing levels of earthquake shaking, so that is that diagram there, yep that's right.

JUSTICE COOPER:

Q. What's its heading?

A. The heading is Tolerable Impacts Structural.

Q. Well before you get onto that, just going back to 5.2B, the one that's Event Effects Structural, can you explain why some few of the boxes are coloured with a white, well have a white background. What's that telling us?

A. The colouring is a means of going to the next slide and trying to assess how it fits in the matrix of acceptable performance. So I'll come to that in the next figure if you would like.

Q. All right, so if it's white, just going back to the next, the Tolerable Impacts Structural, if it's white on the preceding diagram that means it's everyday does it, is that right?

A. No, not quite. The white area is just another colour in the continuum. It just so happens that there are no white boxes in the figure entitled Tolerable Impacts. I will explain, yes.

Q. All right well you explain.

A. On the diagram which is entitled Tolerable Impacts Structural what this attempts to do is for six levels of earthquake shaking shown from extremely low to everyday and four potential importance groups, one to four, across the top of the page loosely corresponding to the current importance levels in the current code, so one is temporary buildings, two is our general office type building, general buildings, three is buildings

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containing people in crowds and four are our important buildings that have a post disaster function. The progress performance level for each place in the matrix has been chosen from the chart in table 5.2 under the performance requirements and those are listed in the table across the bottom which falls, talks about impact levels nought to six. So what this provides is an indication of acceptable performance, one view of it,

of what acceptable performance might be for a say a typical building. So the importance group two buildings in running down that list you would expect to have somewhere in the order of 10% of the buildings exceeding that impact level six in an extremely low event. In a very low event you would expect to have 10% of the buildings exceeding the impact level five. In a low seismic event you would have an impact 10% buildings exceeding impact level four and so on down the chart. It is our contention that this sort of scheming provides the most complete picture of acceptable performance that it's possible to get and even in this I think that there is a need to also include levels of shaking even higher than the 2500 return period event to provide a complete picture. I just note for example that if you go back to table 5.2A general effects the very top line is relating to access egress and if you go across that line you see that egress out of a building in this scheme is only guaranteed for only up to high impact so only up to shaking in the order of one in 25 and so the indications are that say for example in the Forsyth Barr stairs the fact that access was lost which is, was considered unacceptable and in other buildings around Christchurch based on this scheme that would have been acceptable performance but obviously I think on reflection and looking at the effects of the Christchurch earthquake that probably was not acceptable performance and therefore it would need to be adjusted in the overall scheme. It would not be practical though for engineers to have to design or assess buildings specifically for all lines on the chart. What they need are relatively simple rules to follow the data unduly complicating the design process. Specific designs for two or sometimes three limit states of facts all that can be justified. There needs to be confidence though that all performance objectives are likely to be met even though they may not have been specifically covered in the design or assessment process. I have raised this issue because I believe it may be helpful to the Commission in putting the Christchurch earthquakes in context. If buildings perform to acceptable or tolerable levels in what was arguably a severe earthquake of very low to extremely low likelihood of

occurrence as predicted before September there would be little justification for increasing design low levels in Christchurch for example. There are a number of our society members who are questioning the need even to raise a design level to the extent they have been based on the observed performance of buildings that could be expected to have met current building standards in the Christchurch earthquakes. In summary the Earthquake Society has been unstinting in its efforts to improve the seismic performance of existing building stock over many decades within an environment a lack of earthquakes it has not encouraged expenditure in this area. This has replied a pragmatic approach. However the society has always been quite clear on what has been necessary to achieve this task and believes its recommendations have always pushed the boundaries of the latest research on estimating building performance. This is not to say that the job is anywhere near complete. It is just important that the baby not be thrown out of with the bath water and that we build on the considerable platform that we already have. The Earthquake Society has already advised that it is to update the 2006 guideline document as a result of the Christchurch earthquakes and to include the lessons learnt from those earthquakes. It is meeting with the Department of Building and Housing in early December to look at the programme for carrying that process out. I'd like to thank the Royal Commission's for its attention and would be happy to answer any questions that you may have.

JUSTICE COOPER:

All right well Mr Jury thanks very much for that. I won't ask you a question at this stage but I wasn't aware really that there had been strong criticism of the guidelines but perhaps you're understanding things in a different way from me. To question something is not to criticise it and I think what has been said is that it may be being looked to as for example as a guide to retrofit of URM buildings to an inappropriate extent in some quarters and you make the point well that's not really what it's set out to be and I mean I think we understand that so the, we're very grateful that you have taken the trouble to come and

point out what you have pointed out but I don't think that the baby was in much danger of being thrown out.

COMMISSIONER CARTER:

Q. I just add to that certainly I think the society has been looked upon by many including ourselves as an extremely valuable guide to the whole process of earthquake design. It doesn't mean to say however that everybody understands what you're doing completely and I think there is room for improvement in listening to questions and seeing if they can be answered in a way that makes them more understandable. Certainly I was one who was grappling with the rather emotive concept that the 33% level was 25 times more likely to have serious conditions than was the design earthquake and I can perhaps use what you've produced to describe my dilemma in trying to rationalise that in my mind. When you talk about the one every 25 year event I understood that the 500 year design event was equivalent to a 10% chance in every 50 years roughly, not exactly but roughly, there's to be a 10% chance that a building built, designed to that standard would sometimes on average within a 50 year standard time would have a 10% chance of experiencing the earthquake for which it was designed. If I look at the one in 25 period that's a 20th of the time span. In fact comparing it to a 50 year event my mind said a 20th of 50 years is two and a half years so I would expect to see earthquakes being experienced by buildings every 25 years of that order of magnitude that would be occurring in the 25 year event. I don't think our history seems to show that that's happening. Perhaps you could explain to me why my thinking is adrift from yours?

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A. Thank you Sir Ron. I think the, the issue really is that we have been extremely fortunate in New Zealand over the last 50 years in that we certainly have not seen the activity that would be predicted by the hazard predictions of many researchers. If, we, we do have a look at a much longer horizon though and we could expect to, over a much longer period we would certainly in Wellington expect to have a number of

these events and approximating on average the 1 in 25 year type risk which is an annual occurrence of 1 in 25. So I agree that it is a very low number, or a high, high likelihood number and that it hasn't occurred in, in the recent past but I'd like to suggest that in the future it could well.

Q. All right that's obviously an opinion that's been delivered by people who specialise in this sort of thinking. The other thought that I've been wondering about was the, in the question of the structure of URM buildings being brittle in nature and therefore having virtually no ductility the way in which an engineer takes up the design standard for a building to be built today which will have high expectations of being able to hold together way beyond its elastic state seems rather, I find that strange that we would be able to relate such a building form to a URM building form and it raises in my mind the question of whether you need to be more definitive about the load levels that a URM has to withstand than just giving it a percentage of a, of a building which will be nothing like a similar building to that that's built today. So just my concern is not around earthquake-prone buildings totally but just around the URM segment and I just wondered if you could describe to us how, how that is usefully done by engineers today?

A. I think that the, although the current building code does not cover unreinforced masonry buildings for obvious reasons it does provide some guidance on what the building code expects to be a minimum standard for a very brittle structural system and so in that regard it is possible to use the, certainly the loading standard to come up with what might be a design load for a very brittle system like an unstrengthened, unreinforced masonry building. So it's using that process that enables the engineer to at least determine what he believes the design loading should be. He then has to make recourse to specific recommendations on unreinforced masonry to determine how the masonry performs under that sort of load level.

Q. Yes, exactly.

A. And that, New Zealand has been going a little bit from the guideline document but quite a bit from overseas publications et cetera.

Q. Do you think some work examples might be helpful in that area. I mean we, we want to try to avoid this being a sort of a black box science and the only people who can understand it are the people that are performing the calculations because I don't think that's fair on, on the councils and the other community, the building owners if they just have to, you know, trust me I know what I'm doing sort of approach.

A. I, I agree totally and that was the, the reason for the rationale behind the very large research project that was undertaken at Auckland University over the last few years was to, they put a lot of effort into trying to understand the performance of unreinforced masonry buildings and to come up with means of retrofitting them in a way that was readily understood and could be readily applied by practitioners and be understood by the public at large. So that work is to be published yet.

Q. So is NZSEE happy with that, with the way that programme is developing. Are you part and parcel of that?

A. I personally am part and parcel of that. I'm on the steering group for that research. We have yet to see the full documentation. It is coming together well but I think it still needs further work before it can be used with confidence.

JUSTICE COOPER TO MR JURY:

Q. Mr Jury forgive me because I'm not by training an engineer but I'm trying to understand how one uses this percentage NBS concept in the case of URM buildings as well and I think in answering Sir Ron you observed that there is material in the loading standard, NZS1170.5 which relates to brittle structures and that those are the parts of the loading standard to which reference would appropriately be made in assessing the percentage NBS performance of a URM building. Is that, is that right?

A. That's correct.

Q. Now is there anything in these guidelines, the NZSEE guidelines which makes that point and can you refer me to it?

A. Sure. The main, the main reference in the guidelines is in terms of the available ductility that you can assume when you're assessing an unreinforced masonry building.

Q. Yes.

A. If you go to section 10, do you have the document there?

Q. Yes, yes I do.

A. Section 10, 10.1.

JUSTICE COOPER REFERRED TO GUIDELINES

A. This section basically sets out how to carry out an assessment of the unreinforced masonry building.

Q. Yes.

A. And if you go to page 10.6.

Q. Yes.

A. This section gives a number of, defines a number of the terms that have to be defined in order to be able to apply NZS1170.5, the loading standard. So it says for example that it's considered appropriate to take the SP factor equal to one for unreinforced masonry. It also tells you what damping level to take, 15% and it does that in lieu of the ductility factor. So it assumes ductility factor of 1, with a damping of 15% or a ductility of 1.5 with a damping of 5%. These are numbers all which are used in 1170 to determine loading.

Q. Well in 10.2.6(a) we are told in the first paragraph that it's very difficult to determine the deflections of an unreinforced masonry structure at the end of its elastic phase and that the determination of a ductility factor is corresponding fraught with difficulty and the next paragraph begins with

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the statement analysis should assume that the response is elastic. Now none of that is doing what I thought he might do having regard to the statement you made a few minutes earlier that one should be making some sort of cross-reference to provisions of 1170.5 that they're with brittle structures. Now maybe I'm not understanding it, but you can see the sort of difficulty I'm having?

A. Yes, the ductility factor of one to an engineer would suggest it was a brittle structure, an Sp of 1 corresponding with that would be an indication of a brittle structure.

Q. Right.

A. Maybe what might happen, what might help is the – in the introduction to the guidelines there's a –

Q. Well it maybe, is it 3.17?

A. Yes, it's figure 3.1 on page 3.2.

Q. I see.

A. It might be 3.17, I'll have a look – 3.17 1.13 is the diagram I've been looking for, on page 1.13. So figure 1.1 indicates how the guidelines are intended to be used in conjunction with the code for New Building Standard so along the top line we have new buildings design, going through the building, new building design standard, using the materials standards and either meeting the criteria or not, the next line down is what was proposed for existing buildings, so with existing buildings we do an evaluation, we have a modified risk philosophy, we use the new building standards by putting in these modifying factors which are the ductility factor, the Sp factor, the damping factor as appropriate, we then use material standards in loose terms that are appropriate to the system being used and then we come out with a criteria that supposedly is matching or is consistent with so it can be compared with New Building Standard.

COMMISSIONER FENWICK:

Q. If we come back to the new buildings, we determined a design strength which is typically about 70%, 80% of the probable strength, we have a deformation limit which is generally about two-thirds of the limit that we would expect to result in the general loss and strength of that member, now we do that so that you sustain the ultimate limits, take the high level of certainty, and you've got a high margin against collapse which occurs at an advanced stage. Now what I don't understand from these is how those levels of conservatism and the strength and in the deformation

capability are carried through to the assessment, it looks to me as though it's being assessed just for the ultimate limit state without consideration for the factors of safety which go into that to provide the additional capacity to make sure that you've got a very low chance of failure at your ultimate limit state and the fact that you've only got about a probably better than one in chance tentative failure, that's something which is twice as high as the ultimate limit state. Now to me there seems to be a mix-match between what's been done in assessing the retrofit, it's performance against what would be in the new building, so my question is have we got a 100% of New Building Standards in assessment, I don't think is equivalent to a 100% of a building designed to the current code, because you seem to be missing out those additional conservative factors in your assessment. (Overtalking 15:56:17).

A. Sorry Professor Fenwick – I think the point that maybe being missed here is the fact that these buildings or buildings with a assessed ductility of one, are certainly being designed to the ultimate limit state as per the loading standard but they're being designed and checked for a load that's 40% higher than for a normal building and that 40% penalty is intended to take with issues that you'd mentioned into account.

Q. Where does that 40% (overtalking 15:56:59)?

A. Is it enough, there's a good question.

Q. No, no, where does that 40% come from, you've taken (overtalking 15:57:06) -

A. That 40% is the –

Q. - ultimate limit state values, code values, you're applying a – you're allowing for a difference in damping factor now where does the additional 40% come from?

A. The additional 40% factor penalty for those buildings compared with a typical new building comes from the difference in the Sp factor.

Q. No, the Sp factor is one, should actually be higher, but the Sp factor is one for an elastically or nominally elastically responding structure. There's (overtalking 15:57:45).

A. I would effectively suggest that's not correct.

JUSTICE COOPER:

Q. Well hang on, at page 10.6 of the guidelines doesn't it say that it's appropriate to take Sp 1 equals one for unreinforced masonry?

A. Yes it is and that what gives the 40% penalty against a typical building.

COMMISSIONER FENWICK:

Q. No, I'm sorry, ductility of two according to the loading standard then you can use a .7 Sp factor, but for elastically responding it is defined as one, my belief that factor is too low, but you can only do that when you've got a significant ductility in your structure can you start using an Sp factor and that is because the ductile structure can take a lot more punishment several times over and the elastically responding structure cannot, it will go, it will start to fail in the first inelastic cycle.

A. I'm not sure how to respond but I have to say that I disagree with that assessment and I think that the penalty is provided against the standard building so the unreinforced masonry building is being considered that is to a standard that is 40% higher in terms of lateral load than the typical building.

Q. And if you're –

A. Irrespective of how it's been calculated and what factors have been applied, it's been subjected to loading that's 40% higher.

Q. Are you indicating that a nominal – sorry, a URM type building has a greater ductility than a nominally ductile concrete structure where the Sp factor is .9 for a nominally ductile which is normally ductile 1.25, structural ductility factor, so that's inconsistent with that assumption.

A. Well all I am suggesting is this –

Q. Can you – is that, is my explanation questioning wrong there, do you disagree with those factors in the concrete standard?

A. I don't disagree with your last statement certainly, but I think that you've got to be careful that the building code defines a minimum performance standard and it's important to evaluate it against that, and the

performance standard that the building code defines for a brittle structure is the values of around of 1 and Sp 1, or ultimate limits state in order to provide the – some degree of assurance that it will perform beyond what a normal building would perform beyond in the effect if subjected to a larger earthquake.

Q. What we're interested to know is that we're talking – a building doesn't know how it's been designed or how it's been re-assessed, it has a specific capability and your using design techniques to actually make

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an assessment of it. I just wonder whether it would be helpful to clarify this point whether or not we could do some comparisons of particular test cases just to see whether the answers that you two would come up with are different or not. They may well be looking at these numbers and applying them in a different fashion or maybe there is a difference. I think it's important for the Commission to understand that and perhaps we could ask you to help us in resolving that in the next few days. Is that possible?

A. Could I make another comment?

Q. Yes.

A. Unreinforced masonry buildings that have been strengthened to the high level did perform well in Christchurch –

Q. Yes we understand that.

A. – even though the level of load was significantly above what they had been designed for.

Q. Yes we understand –

A. So there is no evidence that the performance objectives were not achieved by following the approaches that have been outlined.

Q. There's certainly some useful examples that we're aware of and have had reported to us from the Christchurch event. We're also aware that every earthquake is unique in its situation, that the way the shaking may have affected some buildings may have favoured them or may have demanded more from them, so it's important that we don't read too much into the one event. But also we're interested to know that

throughout New Zealand not just the engineers but also the councils understand the level of margins that they're building in through these design techniques. So, you know, we're prepared to work on the subject a bit longer until we feel that we're comfortable with our knowledge and we're also interested to, if you can relate perhaps within some of the diagrams you produced to us, where you think a 33 percent strengthened and a 67 percent strengthened would fit in the diagrams that you've shown us. Looking at the black and white version there is it possible to show us where you think that behaviour might relate on the tolerable impacts page?

A. That's quite difficult to do quickly Sir Ron because it's not only a matter of the loading it's also a matter of how the buildings will perform certainly. I think that in terms of this chart the impact level three is probably the best one to look at because that's functionally effective for up to seven days so I suspect that for a 33 percent in a typical building that line would be well below the one in 25. The impact level four, which is severe building unsafe to occupy for up to one year, and I suspect in the Christchurch context that means demolition, I would say that would certainly be below the one in 100.

Q. All right thank you that just helps me to scale my thinking a bit.

JUSTICE COOPER:

Q. Mr Jury I just want to understand this or try to understand this 40 percent figure and what it represents in your view. Could you just run me through that.

A. Certainly. In the New Zealand Loading Standard, Earthquake Loading Standard, the format of the derivation of the design load involves a factor called the S_P, the performance factor, and that takes on values between 0.7 for buildings which can be shown to have a ductile capability of at least two of 0.7 which rises as the ductility decreases, rises to one at a ductility of one. So when only ductility one is available then the S_p value is one. So the relationship between 0.7 and one that's a 40 percent increase from 0.7. It's less if you go in the other direction

but I say the appropriate way to look at it is going in the upwards direction from 0.7 to one and so that's a direct factor, that's a direct factor that is applied to the loading.

Q. And what's the basis of the S_p factor?

A. The S_p factor is a structural performance factor. It was introduced to deal with quite a few aspects and it came from the base that previous codes prior to 1992 dealt with a particular load but called it a 150 year return period load. When the code was developed in 1992 the technologies and the philosophies around it at that time were suggesting that the standard should be more around the one in 500 year but, of course, in going to one in 500 year with a bland number the actual numbers rose quite considerably. It was then looked at quite carefully about what was actually being achieved. Was it necessary to raise the design load by that extent in order to achieve what would be considered to be acceptable performance and very much on a qualitative process at the time it was decided to introduce an S_p factor of 0.7 and in 1992 it applied across all buildings. So it remained like that until 2004 when the new code was brought out and it had been changed so that 0.7 applied to buildings that had a reasonable amount of ductility, more than two was the definition, and then it varied linearly as you reduced the ductility up to one. So it was a reflection that buildings –

Q. No just, sorry, okay, yes keep going.

A. It was a reflection that buildings don't necessarily perform exactly as you design them to do so, to do and it was a, and that's why it was called a structural performance factor. There were various reasons for the inclusion of it in the Code commentary of the time, a number of them, like a sustained number shake, number of cycles of shaking, duration of shaking, factored a non-ductile structure might be less tolerant to multiple excursions into the inelastic range than a more ductile structure etc, etc, but the overall objective was that it was a performance factor that reflected actual performance against design levels and in 1995 or 1992 Code it was very much a qualitative number, it was chosen for expediency at the time. In 2004 a bit more work was done around it and

I think that with the dataset we now have from Christchurch or should have from Christchurch on the performance of buildings we'll get even more evidence about whether it's appropriate or not at that level or even including it at all. But when we look at tall buildings in Christchurch they performed extremely well on the whole and the ductility demands in them were very low, even though some of them are going to be demolished, the ductility demands that they sustained were quite low for that very large earthquake.

Q. Can I just come back to how this works. I understood you to say that you would have this S_p factor is 0.7 for ductile buildings is that right?

A. That's correct.

Q. Then you were talking about and S_p factor of two, now what sort of buildings would that be applied to?

A. No it was a ductility of two.

Q. Oh ductility.

A. It's a ductility of two. So that's the level at which the S_p factor of 0.7 is considered appropriate.

COMMISSIONER FENWICK:

Q. Can I just comment there it appears that you think it's valid to compare a URM which has got very little elastic response, if any, with a ductile structure in terms of assessing the capacity of the URM. Is that correct? You're saying we can use an S_p factor of 0.7 when we're comparing the loads even though you're comparing a ductile structure with a non-ductile structure, or have I misunderstood what you're aiming at?

A. You'd have to repeat that sorry.

JUSTICE COOPER:

I'd understood the S_p factor for unreinforced masonry buildings is one.

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COMMISSIONER FENWICK:

Q. But when you're comparing are you saying it's designed for a higher load than a new building using the same materials because we can

compare it with an Sp factor of .7 and 1 over .7 of course gives you a factor of the 40% increase in strength that you're implying. So you're basing the URM assessment, you're saying it's got 40% increase in strength compared with a new building which has an Sp factor of 2. But shouldn't we be comparing it with a new building which has an Sp factor of 1 which has got similar properties to the URM building you're comparing it with?

A. I'm still trying to understand your question because if I try to interpret it, I think you're asking what is the difference between an unreinforced masonry building for which MEW f) of 1 might apply and a reinforced concrete building for which one might also apply?

Q. Well if you want to assess its performance in the ultimate limit state which I think is what you're trying to do I don't see how you can take something which has an Sp factor of 1 and then compare it to a structure which has a structural ductility factor of 2, which has an Sp factor of .7. I don't see the logic in changing between 1 and .7 when you're doing that comparison.

A. I think, I think what we're saying though is it not, that we are saying that the structure with a ductility of two has resilience and has the ability to perform better than the masonry structure. Therefore we can design it for a lesser load and achieve the same thing.

Q. Absolutely but you're -

A. So I think that the comparison point is the non-ductile structure with a Mew of 1 and a Sp of 1 compared with a ductile structure with ductility of two and an Sp of .7.

Q. But in terms of interpreting NZS1170.5 if you have an elastic structure and presumably the URM structure or what you've got is an elastically responding structure the Sp should be 1. Now I fail to see how you can then say we're penalising that by designing for a 40% higher load because it's not, it's the Sp equals 1 that surely is the required load. There is no ductility as such in that structure.

A. I think that's where we obviously have a difference in opinion. I think that the, the design, the design load is, if you gear it around a typical

building the design load is with an Sp of .7 and a ductility of two. The minimum requirement from the Building Code for a brittle structure is a MEW of 1 and an Sp of 1.

Q. And a URM is not a brittle structure. Is that what you're saying?

A. Yeah, no that's the requirement. A MEW of 1 and an Sp of 1.

Q. I think we'll have to. I wonder if you can perhaps supply us with some written documentation to that effect when you make this comparison. I'm still a bit loss as to where this 40% increase in strength comes from. Can I just ask one more, one more point, see if I've got this right. When you are assessing a building or assessing its capacity you are checking just the ultimate limit state comparison. When you're designing a new building you're assessing it for the ultimate limit state but there are certain factors built in which ensure it will survive that with a very high level of assurance so we assume that the deformations can be 50% greater than the deformation limits we apply, we assume that the strength will be, you know, is only 70% of the average strength we expect. Now are those the same when you're not applying as I see it those additional factors when you're assessing your building, your building for retrofit purposes. Have I got that correct or have you got some different interpretations?

A. I think in terms of the concrete standard you've probably got that correct but if you look at the steel standard that has a different level of consideration for these effects you're talking about and so it's standard is even different again from the concrete standard. So I think it's all a matter of trying to decide what the minimum standard is and I'm saying - that the minimum standard apparently prescribed in the Building Code is the one that I had outlined. What has been done in the concrete standard, I don't know what that leads to in terms of performance. It may be a very high performance. I think it is different from what is achieved by the steel standard and what, what needs to be decided is what is the acceptable minimum standard.

Q. Do I take it from that then that you do not believe that the 1.5 to 1.8 margin indicated in the commentary, in the guideline, the

commentary to NZS1170 should be there. In fact we should be taking that 1.8 or 1.5 as 1 should we. Is that your interpretation?

A. It's a very indicative number Richard, Professor Fenwick. It's a very indicative number. It's, it's, I'm sure that you could justify an even higher number than 1.5 to 1.8 for typical well detailed buildings.

Q. What I'm trying to get –

A. It's, at the 1.5 level it might be quite appropriate for a well-detailed retrofitted unreinforced masonry building and in fact we are assuming that it is I guess. I don't know where the data is to support that other than looking at the buildings that had survived the Christchurch earthquake.

Q. In terms of assessment then you apply a 1.5 factor to your assessment or you just apply a 1 factor -

A. Absolutely not -

Q. You don't require a margin above the ultimate limit state. Am I correct there?

A. Only the 1 factor not the 1.5. The 1.5 is in the commentary. It's not in the code.

COMMISSIONER CARTER:

Q. What matters here is the load that the person making an assessment of a URM uses in order to equate to whatever the percentage number is, be it 67% or 33%. What I'm keen to do and what I suggest as a way to make sure we're all understanding the document and the way to use the document is if we could take a couple of examples that are of URM buildings, relate them to a building on a site, a building of the type you would be using the NBS to produce and just see what sort of force, loadings that you would expect the URM to withstand. So if we could clarify that I think the, the questions that are being raised may actually lead us towards some clarity around the descriptions that are used either by yourselves or by us. The, the main thing we want to do is make sure that we and others who read our report and who are following your guidelines come to the same conclusion and, and I'm

sure we're all in agreement that that's the purpose of making sure we know that we're talking about the same things. So might I suggest that you help us to actually achieve that understanding.

A. Certainly.

Q. Is that a practical proposition?

A. That is practical, yep.

JUSTICE COOPER:

Q. Well I was going to suggest that, without wanting to disagree with that, I'm not sure how, what would be involved with that but I would, I wonder whether we might ask you some questions which would give you the opportunity to set out your argument and we could have a look at it and then, and then perhaps it might lead to that other, other step. Would that, that would require some further, further process. Would you be happy to participate in that or prepared to?

A. I'd be prepared to participate in that, certainly Your Honour.

JUSTICE COOPER:

All right then. Thank you very much. Now Mr Elliott did you have a question you wished to raise.

MR ELLIOTT TO MR JURY:

Q. Mr Jury can you hear me?

A. Certainly.

Q. You'd be aware that the initial evaluation procedure occupies an important place in the various earthquake-prone policies that the councils have adopted around New Zealand and I just wanted to ask you one or two questions about the application of that procedure. I'm just referring to page 3.1 of the document and it's 4B-A.47. I'm going

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to ask you some questions about the two paragraphs in the second half of the page firstly, "The NZSEE is envisaging the IEP would be applied by experienced earthquake engineers with specific training and the next

paragraph those carrying out these evaluations would be chartered professional engineers or equivalent and again sufficient, relevant experience in the design and evaluation of buildings for earthquake effects to exercise the degree of judgement required and specific training" so what does the NZSEE define as sufficient, relevant experience to administer this procedure?

A. I think a somewhat glib answer is that it relates to the CPENG qualification that an engineer who's CPENG should know whether he has reached the required standard that he can stand in front of a building and feel comfortable about providing a score so that's the relatively glib answer. I think if we had seen a lot of EIPs being done by relatively inexperienced people and that would not meet the objectives of the society's guidelines I don't know whether I have answered your question adequately enough.

Q. Possibly not because the document sort of implies there are some engineers who may not be able to carry out this procedure effectively and can you give me an answer that isn't glib if an engineer was to ring up the NZSEE and say well have I got the relevant experience or not could you not define for them what that would be?

A. That's a tricky question I think. I think it will depends on the engineer, the building that he's been asked to assess and a whole lot of things like that. I mean a lot of these assessments are being done for wooden houses which might be quite within the capability of most engineers to do but a lot, a number of them are being done for multi-storey buildings and the same person may not be experienced enough to do that. I think it really is up to engineers to decide. It would be good if there was a register of engineers for different types of buildings. I don't, that doesn't exist at the present time as far as I'm aware.

Q. What about the other point of specific training? Is there currently a process in New Zealand whereby that type of training is administered?

A. There is not.

Q. Is there a training package available which could be administered?

A. There is not as far as I'm aware.

Q. There's reference in the first point to the exercise of a degree of judgement so does that imply that this is a quantitative more of an a qualitative, sorry reverse those exercise?

A. The IEP is very much judgmentally based, it's very much a qualitative not a quantitative process. It may have the appearance in its format that it's a quantitative process but it is not it's a qualitative process.

Q. How long is it anticipated that an IEP would take for a person who had the relevant experience?

A. An IEP can be done with different levels of information but if you don't have the drawings and therefore you are doing an assessment from the outside it might take a matter of an hour or two of assessment and an hour or two of preparing the assessment report.

Q. There's going to be a separate hearing in the Royal Commission about the post earthquake inspection of buildings but the issue may arise before then in relation to some specific buildings so I will just ask you one or two general questions if the Commission allows.

JUSTICE COOPER:

Yes but bear in mind that we have a very detailed report from the NZSEE about that very thing.

MR ELLIOTT:

I have not read that Your Honour.

JUSTICE COOPER:

Q. Mr Jury, are you aware of the report that's been provided by the society on post earthquake inspections of buildings?

A. Not in detail. I am aware of some of the issues that have been covered but not in detail.

JUSTICE COOPER:

Well I just wonder, well you embark on this process Mr Elliott and we'll see where we get to.

MR ELLIOTT:

Q. Well Your Honour it may be in the report but the question was just in the case of an engineer who may have been called upon by a building owner to give advice about structural integrity of a building following an earthquake and that's for the purpose of deciding whether or not it should be opened up to people where does that engineer look for guidance about making the assessment. Is it this 2006 document and in particular the IEP for example?

A. There is a society document isn't there? There is a society document and there has been training provided for people who thought that they might get involved in this sort of assessment after an earthquake. It's different from the IEP assessment.

JUSTICE COOPER:

Q. Well Mr Jury thank you very much we'll send you some questions which are designed to tease out this issue that, the subject of the exchange between you and Commissioner Fenwick and we look forward to your ongoing input in that process. Thanks very much for your time this afternoon.

A. Thank you for listening.

JUSTICE COOPER:

Now Mr Mills there's nothing for us to do this afternoon is there?

MR MILLS:

No there isn't sir that's the end of this part of the hearing process.

COMMISSION ADJOURNS UNTIL 28 NOVEMBER 2011