HEARING RESUMES ON MONDAY 10 SEPTEMBER 2012 AT 10.00 AM

TRAINING AND EDUCATION OF ENGINEERS

JUSTICE COOPER:

Good morning everyone. Just make sure that I know everybody who is here, on my left are you Joanne McGregor and David Prentice, Mark Spencer, John Gardiner, Professor Buchanan, Stuart George, Win Clark, Andrew Cleland and Derek Bradley, and Peter Millar is also here. Welcome to you too. Mr Zarifeh, how do you envisage proceeding?

MR ZARIFEH:

Your Honour, how I envisage proceeding is that if the panellists are sworn in and then I will deliver a brief opening just outlining what I envisage will achieve today, or hopefully achieve, and then my proposal would be that we hear briefly from each of the panellists, perhaps starting with Mr Cleland from IPENZ and then perhaps just working around in the order people are sitting. Just to hear for – I envisage between one and five minutes if it requires that long, just each person introduce themselves and say in a couple of sentences their background and what they bring to the discussion and just to highlight the points they have made in submissions already filed or if they haven't filed submissions the points of concern to them, the idea being not that they will be argued or discussed now but simply highlighted and named if you like and then the Commissioners can make a note of anything that arises that they want to look into further and then really in Your Honour's hands after that but just to go through the main topics and obviously have everyone who wants to have any input into each topic speak to them and reply if necessary.

JUSTICE COOPER:

All right, so would you think that you – perhaps you should open first and then we'll –

MR ZARIFEH:

Yes Sir. Commissioners please, the hearing today will enquire into aspects of the management essentially of the engineering profession and this arises from the requirement in the Commission's terms of reference to enquire into the adequacy of current legal and best practice requirements for the design and construction of buildings in CBDs in New Zealand.

The Commission under its terms of reference has to consider also the extent to which the knowledge of seismic events is used in setting those requirements and the roles of central and local government and the building and construction industry and other elements of the private sector in developing and enforcing those legal and best practice requirements, and the Commission is also required to consider how those matters are dealt with and considered internationally.

Now these requirements in the terms of reference in my submission are important matters. Some of the Royal Commission's hearings into building failures and in particular the recent CTV hearing have highlighted some serious questions including:

Firstly, should an engineer be required to undertake additional training and/or qualification before that engineer can design high-rise structures or structures that have some particular complexity to them.

Secondly how can we ensure that an engineer does not work outside his or her areas of competency.

And thirdly should a reviewing engineer be required to notify a Territorial Authority of a critical structural weakness that could affect the safety of users of the building, and as the Commission will be aware those three issues came up as I say in the CTV hearing and there are issues that I submit feed into the topic – the area to be discussed today.

In anticipation of this hearing the Commission has received a report from IPENZ which as you will be aware is the Institute of Professional Engineers of New Zealand and that's entitled *IPENZ Standards and Regulations for Building Construction in New Zealand*. This includes information about IPENZ's role as both the registration authority and the professional body for engineers. It also includes the education and competency requirements for

the registration as a chartered professional engineer or as a CPENG as it's commonly referred to and the role of learned professional societies. And all of these issues will be touched on in today's hearing.

The Commission has also received information from the Universities of Canterbury and Auckland on their academic requirements for engineering qualifications and their views on future requirements, and we have Professor Buchanan from Canterbury University here who will, I am sure , will speak to those matters.

Some 22 submissions have been received in relation to this hearing, from individuals and from organisations or entities covering a range of issues in relation to the engineering profession, and those submissions or submitters include IPENZ and ACENZ which is the Association of Consulting Engineers of New Zealand, the Ministry of Business Innovation and Employment, SESOC the Structural Engineering Society, Opus, Mr Derek Bradley who's on the panel today, Mr David Brunsden who we heard from last week, Mr John Scarry who is an Auckland structural engineer, from BECA, who is represented today, the Cement and Concrete Association of New Zealand, the New Zealand Concrete Society, New Zealand Historic Places Trust and Joanne McGregor who's from the construction company, C Lund and Son Limited and she's here today.

I haven't mentioned all of the submitters, most of them, but their submissions are on the Commission's website and I anticipate that most of the panel and the Commission will have had a chance to read those submissions.

All of this material has been considered in the formulation of a number of topics that have been distributed under the heading hearing topics with some questions under each topic. Those questions really designed to stimulate debate about the particular areas, not intended obviously to limit it to those issues and I'm sure there will be many more questions that can and will be asked by panellists or by the Commissioners. And the same really goes with the topics, really in the Commission's hands, maybe and I accept that some of the topics that are stated run into each other and that may be possible to deal with them together and that's very much a matter for the Commission.

Just if I can briefly outline the topics that are in that hearing topics schedule and some of the issues, I'm not going to go through them all obviously that I anticipate will form the basis of discussion.

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Firstly, the regulation of the profession raising issues such as:

Should more be done to encourage engineers to attain CPENG registration?

Is the current assessment process for CPENG registration robust enough?

Should it include the kind of in-depth examination such as required in the USA and UK to ensure better technical abilities? – That's a submission Mr Bradley makes.

Does the present system for assessing the ongoing competence of CPENG engineers lack transparency and should it include the development of scopes of practice? That's a Minister of Business Innovation in Employment submission.

Is more assessor training required? And that's a submission of Mr Bradley.

Should the CPENG Register record such scopes or areas of practice, and that's an NMBIE submission.

The second topic is recognising specialist skills. Issues such as:

Should there be higher entry requirement for engineers engaging in particular areas, such as the design and analysis of high-rise or complex structures?

The assessment of structures pre and post a disaster, and emergency management which is an area Mr Brunsden explores in his submission.

Should there be a tiered chartership within the structural discipline? and that's a submission of Mr Bradley and also Opus have made.

If there was, how would that be defined and how would it be audited?

The third topic listed is the Code of Ethics.

Do the IPENZ and the CPENG Ethical Codes require tightening up? – to use the words of Mr Trevor Robertson when he gave evidence on ethical issues in the CTV hearing a couple of weeks ago.

Should there be an obligation of disclosure to territorial authorities and others, perhaps of safety issues such as critical structural weaknesses? And, as I've

indicated already, that was an issue that very much was highlighted in the CTV hearing where a critical structural weakness that was detected, if you like, in 1991 became known to a large number of people but never to the territorial authority.

And should the requirement for an engineer to work within his or her area of competence be more closely defined and enforced as Minister of Business Innovation in Employment suggests?

The complaints and disciplinary process – does that require any change at all?

Are the current processes sufficient to ensure that incompetent or poor engineering, if you like, is identified and dealt with?

Is there any restriction felt on people in reporting such engineering?

The fourth issue is the issue of training.

Should there be a structured programme of supervised practice after graduation, as MBIE propose, leading to CPENG registration?

Is continuing professional development adequate?

Is it encouraged and supported by employers or all employers?

Should it in fact be prescribed by IPENZ?

Engineering education perhaps forms part of that topic. Is there merit in the view expressed by Canterbury University that a Masters Degree in Earthquake Engineering should be required as the entry point into structural engineering and geotechnical engineering professions or by Auckland University that such a degree should be required before specialists can design complex structures? And, as I've said, a view supported by MBIE and Opus in their submissions.

And the last topic which is said in the notice of hearing to be this afternoon and that can be fluid perhaps. It's going to have some of the panellists from this morning – Messrs Cleland, George, Clark, Gardiner, Prentice and Spencer to be joined by David Shepherd from the New Zealand Institute of Architects and Peter Millar who is already here from Tonkin and Taylor and is

joining in this session as well and the idea is that that panel or that topic that will be discussed is the Professional and Learned Societies.

Issues such as: Is Standards New Zealand ineffective in keeping design standards up-to-date so that it's falling more on these societies to try and provide design guidance to fill the gaps, and that's a SESOC submission.

Should the processes of the Society's be formalised and subject to review, and is there a need (and this again is a SESOC submission) for a clearer distinction between the roles of industry guidance and standards for the building code and more support given to the appropriate people (and appropriate is underlined in their submission) and that's perhaps an area for discussion to be involved in developing each of these.

And, finally, should there be more interaction and how can that be encouraged between the engineering and construction related professions, in particular structural engineers and geotechnical engineers, structural engineers and architects?

So that's a brief summary of the topics that I submit will require discussion and, as I say, there may be more and there certainly will be more questions to be raised. With that, Your Honour, as I suggested at the outset if we can have the panellists sworn in and then move to hearing very briefly from each of them, perhaps starting with Mr Cleland.

JUSTICE COOPER:

We don't want this discussion to be attended by too much formality but we have invariably asked people to swear or make an affirmation to tell the truth and in these panel discussions I have done everybody at the same time. If I can just ask you to listen to what I'm about to say and then I'll read your name out and the correct answer to the question is yes.

Do you, each of you, solemnly and sincerely truly declare and affirm that the evidence that you will give the Royal Commission shall be the truth, the whole truth and nothing but the truth?

MR BRADLEY **[YES]**
DR CLELAND **[YES]**
MR CLARK **[YES]**
MR GEORGE **[YES]**
PROFESSOR BUCHANAN **[YES]**
MR GARDINER **[YES]**
MR SPENCER **[YES]**
MR PRENTICE **[YES]**
MS MCGREGOR **[YES]**
MR MILLAR **[NO AUDIBLE RESPONSE 10:17:40]**

JUSTICE COOPER GIVES EXPLANATION OF THE MICROPHONE AND AUDIO SYSTEMS TO THE PANEL IN ORDER THAT THEIR EVIDENCE MAY BE CLEARLY PICKED UP AND TRANSCRIBED.

So can I ask in the order in which you are sitting just to introduce yourselves and tell us a little bit about the matters of interest to you in this hearing. Can we start with you Mr Bradley.

MR BRADLEY:
My name is Derek Bradley. I am a structural engineer working with Compusoft Engineering. I am also, well for the past five years have been a practice area assessor for the Chartered Professional Engineering Examination and have been involved in a joint SESOC IPENZ workshop to help develop the core competencies for that examination.
I have made a submission primarily on the training of engineers, specifically the Chartered Professional Engineering Examination and in my experience as an assessor and as a practising engineer it is my belief that the current system lacks robustness with regard to determining the technical competency of candidates and that there would be benefit in adopting a more formal examination of technical competencies as well as a tiered examination or professional qualification, the outline of which is in my submission.
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In addition to that I, as a practising engineer, have encountered engineers working outside of their area of competency and also perhaps not working to a level of which there would be a chartered level within their practice area, and have concerns over the ability of the current system to identify substandard work as well as some concerns over the training that is available for engineers. That's it.

DR CLELAND:

I've been with IPENZ now for 12 years as chief executive following 23 years as an engineering academic. In that academic time I held the role of programme director for technology and engineering programmes at Massey University, so that's akin to the dean of engineering position at the University of Canterbury and for the avoidance of doubt my own technical expertise was in food engineering with a specialisation in refrigeration engineering. So I'm not a structural engineer, to make that clear.

In terms of the perspective I might bring today, I actually led the drafting of the 2002 Chartered Professional Engineers Rules, so I have familiarity with how they work collectively which may be useful to the discussions today. I've also been, since 2001, New Zealand's lead representative to the meetings of the International Engineering Alliance which is where we do our international benchmarking for both accreditation and competence assessment, so again I can share some perspectives from that, and in that context I was one of the group which prepared the International Competence Standard and Accreditation Standard exemplars over the period 2001 to 2007.

And then the other thing which I have is some background around assessment processes which may be helpful.

The background of IPENZ itself obviously is the professional body, longstanding professional body. Our primary role is to set and enforce professional standards. Accreditation has been going in New Zealand for 30 years and competence assessment through IPENZ for about 60 years. So what we want to do today is really to bring forward what we're currently doing but with the culture of learning. We're always seeking ways to improve so it's really helpful from our viewpoint to hear the perspectives today and find out

things that we can do to improve, and as we go I may be able to explain some of the things already in train for improvement as we go forward.

So I think that's probably all I need to say by way of introduction, but just to signal I have prepared notes on each of the question areas which may be useful later.

MR CLARK:

Yes, Win Clark. I'm a chartered professional engineer and I'm representing the New Zealand Society for Earthquake Engineering. My particular perspective is as a structural engineer with over 40 years' experience. I've been involved with using many forms of materials and construction for buildings, involved with training and development of structural engineers. I've experience as an IPENZ competence assessor of candidates applying for CPENG and registered engineers prior to the current regime. Currently I'm the executive officer of the New Zealand Society for Earthquake Engineering.

The areas that I would like to be discussed concern the spectrum of capability over the engineering profession. Is it too wide and how do we manage those with a lower than acceptable level of competence? Is this more of an issue for structural engineers because of the consequence of getting it wrong can be costly as well as fatal? And the design loading event – that's earthquakes – really happens. Is there a formal requirement for certain works to be signed off by CPENG? Or is there a consideration of a higher qualification or recognition or calling it a recognised engineer? The practice can always be better. Now is a golden opportunity to review the practice and processes to identify the issues and put in place better. We must also recognise what is done well and build on that. A greater level of technical leadership is required in the building industry today. To develop better practices and standards and assessment and technical guidance.

MR GEORGE:

My name is Stuart George. I'm representing the Structural Engineering Society of New Zealand. The Structural Engineering Society is a collaborating technical society within IPENZ and we have 1440 members, mostly structural

engineers. My own background is I'm a practicing structural engineer for 34 years. I am a director of BGT Structures and I'm a member of a whole range of technical societies including IPENZ, SESOC, ACENZ, The Concrete Society, The Earthquake Engineers, The Timber Design Society, ERA, Auckland Structural Group, The Institute of Building. I also assist IPENZ as a structural engineering practice assessor for CPENG applications.

My own perspective for this hearing is I hope to bring the perspective of a practising engineer which is possibly a little bit distinct from some of the academic and bureaucratic members of the panel.

Some of the key issues I'd like to hear discussed today is, (1) the broad range of specialties that fall within the structural engineering banner. We believe that only one engineer is only likely to be an expert in a small number of these areas and we like to discuss how that's dealt with by the CPENG registration and the building design process. SESOC have been putting in a lot of work on lessons learnt from the Canterbury earthquakes and you'll know they've made some detailed submissions on the technical procedures that we thing improvements are required. "Technical" meaning codes and design procedures. But we'd also like to be heard on the procedural matters that lead to the design of the building and we've been particularly looking at this in a positive vein and looking at ways where errors and omissions can be eliminated and designs can be improved, rather than simply resolving problems after they have arisen.

We'd like to hear some discussion around comparing the building engineering process with bridge engineering processes and aeronautical engineering processes because there's some analogies between those different fields of engineering and there may well be lessons learnt by doing that comparison.

We'd like some discussion around producer statements. This is, producer statements, most people understand are an informal process used to design and review buildings and their construction.

We'd like to talk about QA procedures and engineering design offices and design reviewers' offices.

We'd also like some discussion around the need for a structural engineering audit body.

And finally the resource consent process, we believe that can be used to improve the structural engineering design of large structures.

PROFESSOR BUCHANAN:

Yes, good morning. My name is Andy Buchanan. I'm a professor of civil engineering at the University of Canterbury. My background's in education and in practice. I started as a student. I graduated from Canterbury 1969. I worked for a year. I went to California, did a Masters degree. Came back to New Zealand, worked for many years for Holmes Consulting Group. Went back overseas and did a PhD, not in earthquake engineering, in timber engineering. Came back to New Zealand. I ran my own consulting business for three years and joined the university in 1987. So I've been at the University of Canterbury for 25 years. I'm a structural engineer. At the university the topics that we're interested in here are structural engineering, geotechnical engineering, and earthquake engineering which really covers both those and more. There's no-one here from the University of Auckland. I am speaking wearing the University of Canterbury hat, but I'm, we're in close contact, frequent contact with Auckland and anything that comes out of this will be very much discussed with them because there are only two civil engineering departments in New Zealand and we work very closely together and there's a lot of strength in that partnership. Also, as I say, there's the geotechnical engineering. I'm certainly not an expert in geotechnical engineering but my colleagues at Canterbury and Auckland are very much involved in this as well.

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I guess of the people in the panel I am the one that represents the educators and what we – at the universities want to do, is we want everything we can to support the education of engineers at several levels and I am thinking of three levels in particular, we are talking about young engineers, young school graduates who come into the system and they are looking to do their first degree in civil engineering which will include structures, geotech earthquake engineering, so those new people who are going to graduate from us and they are going to join the profession as new recruits, not knowing very much, well

they will know all we've taught them but certainly there is an awful lot more they have to learn on the job and we all know that.

In addition to those new young students, we offer a service in CPD, Continuing Professional Development, to earlier graduates and this is something that we want to expand at the university to increase the opportunity for practising engineers to come back to the universities and learn, become educators in a whole lot of new stuff because there is a lot of new stuff, things are changing rapidly and in terms of current practising engineers I put them clearly into two categories.

There are those who have come through the New Zealand system or who have come from countries where earthquake engineering is an essential and fundamental part of structural and geotechnical engineering, but there is another group of people that we also have to talk to and these are largely the immigrant engineers who may have come from Australia or from the UK or from Continental Europe, from countries where earthquake engineering has been touched on in their education but it really hasn't been covered in any depth and I think there is a real, there is a need to support those people and make sure that they've got the capabilities and I can see now what, as consultancies are recruiting people from other parts of the world they are finding that some of those people have got the skills that are needed and some don't, and I suppose really what I will be wanting to talk a bit more about is engineering education and I perhaps paint it like this.

In a civil engineering degree in New Zealand we don't just do structures and geotech. Civil engineering education is a very broad field because it includes fluid mechanics and transportation, traffic engineering, environmental engineering, fire engineering, a whole range of topics are included and there needs to be a debate about how specialised a civil engineering graduate should be in structures and geotech. In some parts of the world you can do a bachelor's degree in structural engineering rather than in civil engineering and we need to talk about that. And even within the structural engineering area, we talk about structural engineering, geotechnical engineering, there is a huge body of knowledge there and there are, the people I mentioned before who may have done structural engineering degree in the UK or in Australia

they will be extremely proficient at engineering in mechanics and structural analysis and structural design but the whole area of education for earthquake engineering is another, it is a big step, it is not another course that you take, it is not another five minutes, because there is so much specialised structural engineering in the analysis side and structural dynamics and the design side and ductility and load damage systems in the assessment of earthquake resistance of buildings and retrofitting and strengthening of buildings and some of those topics are covered at our masters level and some of them aren't.

So, and then to sort of conclude with what was really the thrust of our, the University's submission is that the structural earthquake engineering content of a bachelor's degree in civil engineering at Canterbury and Auckland, has slowly shrunk over the last few decades because there are lots of other important things to put in and if you put something else in you have got to take something else out and our view is that the pendulum has swung too far and there needs to be more structural engineering and more earthquake engineering put back in. But if you are going to do that you have to leave something out and there are two options here. We either do that by offering a specialist earthquake engineering bachelor's degree, or we do it by offering this additional material at the masters level and the masters level is rather a nice way of doing it because if we do it at the masters level we can offer these courses in block mode and we can make them available to the practising engineers that come in and take part of all that.

And my last comment I would make is that what the University has done since the earthquake, we have done two particular things. We have the University of Canterbury, we have put on the books a suite of new earthquake engineering degrees, bachelors, not the bachelors degree, a masters, a taught masters degree, a research masters degree, a post-graduate certificate and a PhD in earthquake engineering are all new on the books. We haven't got any new staff to teach these things but we are hoping to attract more people into larger classes. And the last thing I just want to mention is we have set up a new centre which we are calling the UC Quake Centre, and one of the roles of the UC Quake Centre will be to offer education beyond those post-graduate

qualifications to the earthquake engineering industry around New Zealand and I've got with me Mr Greg Preston in the audience, who will be wanting to meet many of you and explore those possibilities of working with IPENZ and SESOC and the Earthquake Society and the Concrete Society and others to enhance the education so I will stop there and I will look forward to being part of the discussion.

JUSTICE COOPER:

Thank you very much. Mr Gardiner.

MR GARDINER:

Good morning Commissioners. My name is John Gardiner, I am a fellow of the Institution of Professional Engineers. I am currently in the role of manager of determinations within the Ministry with responsibility for issuing determinations under the Building Act plus a range of other issues associated with changes as a result of the Canterbury earthquakes, particularly earthquake prone building policy work. Prior to joining the Ministry and the Department I was Deputy Chief Executive of IPENZ until 2005 with responsibility for engineering practice matters. I was there for seven years and was involved in some of the design of the existing regime but also recognised things have move on a bit since I have left IPENZ in December 2005.

The Ministry's perspective in this hearing is that we are of course, we have policy responsibilities for the Building Act 2004 as well as some of the occupational regulation that underpins the building activities in New Zealand, principally the chartered Professional Engineers Act, as well as some other ones.

So, the Ministry's view that has been articulated in our submissions and other submissions, provided in response to other submissions, to date, probably there's things come down to three key issues. One is the competency development and assessment system for professional engineers in New Zealand. The system is quite a robust one but I think there are some arguments that perhaps it should become a little bit more robust. The

particular area that we have focused on in some of our submissions is the issue of disclosure in so far as the assessment being done in a particular context of an engineer's practice area, that being the context in which they are assessed and that context also then being published in some means on the website so that people do know what is this person's area of practice. Now it is also recognised that more and more you go into degree of granularity around practice area the costs accumulate so there's a balance to be struck between providing sufficient information for the market to work properly and people to be able to make informed decisions about selecting an engineer versus the costs of having too great of information out there. But the current situation is not acceptable, there needs to be more disclosure than what is currently available to the purchasers of engineering services.

The second key issue is relating to the code of ethics and of course what we've got is an outcome of having two regimes in place with the IPENZ regime for those of its members as well as the CPENG regime for those who are chartered professional engineers which results in two different codes of ethics in some respects although they share some genetics, similarities so they are not totally opposed but it does create some confusion for some people.

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I think you've seen through some of the submissions that you've heard at previous hearings, the actual practical application of the code of ethics amongst the profession is perhaps not as clear as it could be. Not quite certain why that is, if I look back on some of the information that IPENZ have published and other stuff, there's quite a good guidance there in the practical application of Code of Ethics but nevertheless I think we've seen some people confused about obligations and what would appear to be some contradictory and conflicting requirements which I think needs to be sorted out because a Code of Ethics is an important part of any profession and it's sort of, a most important tool for the regulatory part of it.

And the third bit that's the slightly – I was going to say longer term stuff the other ones are longer terms as well, but the training and the education of engineers was something we need to make sure that as a country we invest

the right amount of resources and that those resources are spent appropriately. There's no doubt about it that the scarcest resource in New Zealand for the next 10/15 years is probably going to be structural engineers and we need those structural engineers to be the world's best to help us rebuild this city and I think there needs to be some work done to actually just – to make sure that our basic graduates are coming out with the best education that we can provide.

So that's the three key points of our submissions and what we want to focus on today.

JUSTICE COOPER :

Thank you.

MR SPENCER:

Good morning, my name's Mark Spencer. I'm with Beca Carter Hollings and Ferner Limited. My current role is general manager of the building structures group. I'm a chartered professional engineer and also a technical director of structural engineering at Beca.

The perspective I bring is one of managing the building structures team in a large multi-disciplinary consultancy. We employ quite a large number of structural graduates each year ranging from those with pure bachelor's degree through to those with masters and doctorates. I've also got some experience working overseas and feel I can share some observations international project work.

Our two submissions have really covered off some of our own observations around, or sharing what we do within Beca as far as quality assurance processes go and training and professional development of our graduate structural engineers.

The key issues I think it would be good to see covered today: independent verification of design work both internal and external or independent; how New Zealand practices benchmark against international practices; mechanisms for communicating lessons learnt to the industry and also

monitoring frequent non-compliance or errors to identify CPD needs, so sort of a gap analysis type approach; and organisational versus individual controls.

JUSTICE COOPER:

Mr Prentice.

MR PRENTICE:

Good morning, my name's David Prentice. I'm Chief Executive of Opus International Consultants. I'm an engineer. I did a civil engineering degree at the University of Edinburgh and I also did a PhD in structural engineering there as well.

I guess following on from Professor Buchanan's comments, as you hopefully tell from my accent I am one of those immigration, immigrant engineers sorry, so perhaps I can bring a slightly unique perspective to that discussion as well because it is an important point actually, I think, that Professor Buchanan has raised.

I guess the particular perspective that from an Opus perspective that I'd like to bring today is like Mark beside me, Opus are a very large employer of engineers in New Zealand. To put that in perspective we currently have around 1800 staff, many of which are engineers in New Zealand. We've got 510 staff, who are members of IPENZ and of those 255 are CPENG or higher.

So really in terms of the key issues or the topics that we'd like to see discussed here today, and then go over some of the comments that have come earlier, are four key topics, the first one, and they're all mainly around training and education.

And the first one is post graduate qualification of structural engineers.

And then that leads onto post graduate training of structural engineers and that's both in-house, through formal and informal mentoring but also external, formal courses as well.

The third point is that CPENG accreditation process, we'd like to see a discussion around that today and particularly around the robustness and transparency of that with respect to structural engineering. And again I would echo some of the comments that were made from Derek Bradley earlier that,

and just confirm that we are very much in support of a two-tiered approach on that going forward.

And finally the last point is around the CPENG practice areas and the suitability of those in their current format for structural engineers.

JUSTICE COOPER:

Thank you, now Ms McGregor.

MS MCGREGOR:

My name is Joanne McGregor. I trained as a structural engineer at Canterbury University. I have some structural design experience but I've not practised as a structural engineer. I have 24 years' construction and business experience with C Lund and Son, and in that time I have carried out various roles in commercial construction on and off site so I can give a perspective from a contracting and construction point of view.

We would like to see some discussion around stronger technical support for the design and construction communities, greater collaboration with – between commercial sector contractors, subcontractors and the design sector; better delivery of training at both a technical and professional level; and a stronger presence by the Department of Building and Housing in an overall and moderating role.

I would like to talk for a few minutes about technicians and to sort of explain why my focus is on that.

How we will have responded to the damage and destruction caused by the Christchurch earthquake in five or 10 years will largely be driven by education and training. In order to improve and continue to be the best we can both in the design office and on site will take a collaborative approach that crosses boundaries and engages with professions and trades. There will be a strong focus by the design community on improvements, professional development and training for structural engineers, but mostly in regard to structural design and structural analysis. My focus is on following that through with changes to trade practice and better drawings and specifications by designers for the trades. To that end I have a personal interest in promoting the importance of

greater numbers of New Zealand trained engineering technicians and I have participated in a number of industry wide initiatives around the importance of training more engineering technicians. I've worked with experienced New Zealand trained technicians extensively and I have, and our business has, and a broader and building construction industry has significantly benefited from the advice, the skills and the experience of those technicians. I've experienced first-hand the value they add to the engineering and construction community.

This rebuild provides the opportunity to train both professionals and technicians and we should make the most of that opportunity. A design practice, be it for structural engineering, architecture or building services is generally led by senior architects or senior engineers. Generally I believe they have a team of technicians and less experienced architects or engineers supporting them. These technicians and other engineers can be contracted in or seconded or they can be employed.

A structural engineering technician should have the BEng Tech qualification. This qualification teaches many of the same design and structural analysis principles as taught by the university in the BE, but the technician learns those principles for a different purpose and in a different context. In the design office the technician's focus is on understanding the structural engineer's concepts and design but he follows that through, or she, with documenting and drawing the work and correctly dimensioning detailing connections, junctions, buildability and later on construction monitoring. It takes a thorough and disciplined approach and it's important.

As building contractors we also employ technicians as site engineers, draftspersons for the workshop and component drawings we do, and for quality control. The technicians are employed in a number of roles, for sub contractors, suppliers, building consent authorities and building owners. By working in a number of fields both in construction and design, technicians build up their understanding of trade practice, complete documentation, good detailing, good specifications and buildability.

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In this respect senior technicians particularly can have more knowledge than architects and engineers whose focus is more on the overall design.

A good pool of experienced New Zealand trained technicians existed 15 years ago, but it no longer exists and we can have, as contractors, an issue with incomplete documentation. E2AS1 has been the catalyst for a huge improvement in the standard of detailing for weather tight design. This does need to be followed through to the rest of documentation presented for building consent, and if this was the case we believe that this would result in more complete documentation held by the building consent authorities that is closer to an as built record of the building than is currently the case.

MR MILLAR:

I'm a late inclusion so I've prepared some notes but I think you've had copies of those, but I'll just add a couple of perspectives. I'm a geotechnical engineer and technical specialist in that area. I'm also a senior manager of a specialist consultancy in geotechnical engineering and been involved in many building projects as well as a range of large civil engineering works. I've had various roles with the technical societies, and am frequently involved in providing expert witness when things go wrong. I'm recently involved in undertaking assessment of foundation options. Testing is part of my role as a member of the advisory group for the MBIE, including some testing at the stadium recently.

I just want to add a few points to what has been said up until now, in that I personally believe that engineers often specialise too early, and I'd like to see more emphasis really on engineers getting a bit of experience before they actually do specialisation. And so I like Professor Buchanan's advocacy of specialist training post-graduation, providing block courses at the university, and also strong involvement of the technical subgroups. I think that's where the best value comes for the industry.

I just make the observation that I believe over the last 25 years there's much stronger working relationship between the specialist disciplines than there was historically, and that's really good, and that's probably the large part due to the

interaction and joint activity of many of the technical subgroups. So I'd like to see a lot of emphasis there.

Just a couple of broader observations around this, Sir, if I can in that I think there's some real issues around engineers being put under some pressure in regard to minimising design by value engineering workshops, and I think that's an area that deserves consideration. And I also think there's a need for better dissemination of lessons learnt. We often have mediations and arbitrations and a lot of the outcomes of those are not actually published, and I think it would be great if we could find a way of learning those lessons.

JUSTICE COOPER:

Right, well there's a bit to discuss. Unless anybody has a better idea, I think it might be logical to start with the educational process which comes before all these other events occur. Is that a convenient place to start? And I'm talking about the university training of engineers. So we've got submissions from the universities and Professor Buchanan you talked about a, the possibility of having a bachelor's degree in structural engineering and the option which I infer you're in fact pursuing at Canterbury of loading into the post-graduate field the real academic qualifications and specialisation in structural engineering. Could you just expand on that a bit?

PROFESSOR BUCHANAN:

Yes Your Honour I'd be pleased do to so.

At Canterbury we offer a four year Honours degree in engineering, a bachelor of engineering with honours and there's a similar system. Auckland is different but similar, and both universities the, in the four years, year 1 is an intermediate year which is, it's an introduction to engineering and it's a catch up from high school and some chemistry, physics and maths. There's a certain amount of engineering in it but not with any depth. There's a difference between Canterbury and Auckland because at Auckland they will have decided to, which branch of engineering they were going into, whereas at Canterbury they won't. But then at Canterbury we have our three professional years, and in the first two of those, so this is in years 2 and 3 of

their engineering degree there are no choices. If you've selected civil engineering as opposed to electrical or mechanical or chemical, this is what you get and it's some structural engineering, geotechnical engineering, fluid mechanics, transportation engineering, environmental engineering, it's a broad portfolio and it's only in the fourth and final year that the option is given for specialisation. And in that specialisation, even if those, for those people who want to be structural engineers or structural and geotechnical engineers, in that one year there's, even if they dig in and take nothing but these specialist courses, they can't learn enough to become an expert structural engineer, let alone an expert earthquake engineer, just because the content isn't there.

Nevertheless we've got to be a bit careful here because it's a question we've got to think about where the bar is, where are we setting the bar, because if for example we compare our New Zealand bachelor's degree with a bachelor's degree in the United States for example, where they do less than we do because they have a lot more English language and liberal arts requirements in their engineering degree. In a New Zealand university you do nothing but engineering but we are so broad that it's not specialised and I think we have to go, think of a few of the comments from the panel. I mean Win said, no perhaps –

JUSTICE COOPER:

Peter Millar.

PROFESSOR BUCHANAN:

– Peter said it's a mistake to try and specialise too early. What we do see in some overseas universities, we see there are degrees in structural engineering. Some universities have a degree in building engineering which is, which is just, it's engineering and architecture and building services. But I think really the universities are, we need advice from the profession, from industry and from the Royal Commission in terms of, are we doing enough? Our view is that we're not, I guess this is more my personal view, my personal view is that a bachelor, a BE graduate from Canterbury, even though it's an

excellent BE degree compared with any other degrees in the world, but I don't believe that graduates of that degree have the knowledge to be an expert earthquake engineer. We're going to have to do something to put more earthquake engineering content in, and as I say there are two ways of doing it. So perhaps I'll just stop there because I'm repeating myself. What more would you like?

JUSTICE COOPER:

Well you've talked about the content of the bachelor's degree but why have you decided that the better option is to pursue increased specialist knowledge by means of post-graduate qualifications, rather than expanding the content of the bachelor's degree, perhaps making it a bit longer?

PROFESSOR BUCHANAN:

Yes well, there are three possibilities here. First of all making the bachelor's degree longer, it doesn't, I don't think we, there wouldn't be much support for that because it would mean the people who want to exit at that particular level to pursue other aspects of civil engineering, you don't want to force them into more expensive study and that would be difficult.

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The natural extension is to add another year. Just a little bit of international background and Andrew might be able to confirm this, but engineering education worldwide is based on something called the Bologna Convention which is what's called the three plus two option and I am looking at Andrew you correct me if I am wrong, but this has been largely accepted in Europe and elsewhere which is a three year bachelor's degree with a two year masters option, and this is quite widely accepted and we have a number of people have asked us, and IPENZ have asked us from time to time what about moving to the Bologna option, the three plus two option, and we've said well, what actually makes more sense in the New Zealand context would be a move to a four plus one option whereby we still are looking at the five year masters degree but we don't want to dilute our bachelor's degree by putting graduates out after three years and so that's the kind of proposal at the

University of Canterbury has made. I think perhaps it would be worth Andrew just responding to that?

JUSTICE COOPER:

Yes Mr Cleland?

DR CLELAND:

Yes, it is perhaps a little more complex than that. There are two international systems, the Washington Accord and then there is a somewhat emerging system in Europe which is driven around Bologna. There was hope that the Bologna and the Washington Accord systems would come together but at this stage they are staying steadfastly apart. The Washington Accord system has an exemplar graduate profile and in 2009 that was upgraded to bring it very close to alignment with the end output of a Bologna qualification and each signatory to that accord was asked for a plan as of June this year of how we were going to move to that new graduate profile. New Zealand has submitted that we would wish to lengthen our degree to 4.25 years and that has been agreed with all our engineering deans across the country and we have signalled that by 2019 it is our intention to have a 4.25 year qualification in place as a means of meeting the Washington Accord exemplar. Now that is different, it still remains different to the system which is run by a body called ENAEE which is the European Association for Engineering Education Accreditation, I can't remember the exact detail, so that is where we are at the moment is thinking along those lines.

JUSTICE COOPER:

What is intended to be achieved by that change?

DR CLELAND:

So the change is to ensure that we are fully conformed and the two elements that were of concern, or one was that in lifting the graduate profile, one was to build up the contextual knowledge so that engineering was seen to be acting in service of society, and from a New Zealand content, the second element

was to ensure that all students got both a cap stone design experience and a cap stone research experience with the crowding of the programmes those two were not evident in every single programme so the new graduate profile by the Washington Accord clarified that both those competencies were necessary.

JUSTICE COOPER:

That's I take it, focusing, well it doesn't sound to me like it is focusing any particular engineering discipline, is that right?

DR CLELAND:

Correct, I mean we cover from software engineering through my own field of food engineering, civil engineering, electrical, electronics, et cetera so it covers all those ranges but those were seen to be the broad competencies of an engineering graduate under the Washington Accord. If I could just comment, the accord, so you can get a sense of it, is broadly speaking the English speaking western world plus interestingly both India and China are looking to move that way and of interest is that Russia is now a member of the Washington Accord as well although to pick up Professor Buchanan's point, it submits a five year qualification which clearly well meets the Washington Accord standard.

COMMISSIONER CARTER:

I think there is also some desire by the New Zealand Government to make New Zealand conform to Washington Accord standards. Can you expand upon where that is?

DR CLELAND:

Yes well the tertiary education strategy of government says that all our qualifications should be to an international benchmark standard so that drives right through the whole of the qualifications framework in New Zealand so we are simply listed with everyone else in that respect.

COMMISSIONER CARTER:

And they've selected Washington Accord or has IPENZ selected Washington Accord?

DR CLELAND:

We've chosen Washington Accord because that is where we see our trading nations going as I have indicated it is East Asia plus the English speaking world is where it is dominant.

JUSTICE COOPER:

So getting back to what this Royal Commission is all about, it's unclear to me from what you've said how any of that enhances knowledge and understanding of structural engineering matters?

DR CLELAND:

Yes I think there are two approaches to pick up from Professor Buchanan. One is to essentially create what we would call a minor within the civil major. So in other words, this is quite a common degree structure where there is a second strand so you could have a bachelor of engineering honours majoring in civil engineering with a minor in structural engineering which can be recorded. So if one wished to emphasise it and signal to the market that would be the route and then students would maximally choose options in structural engineering within their bachelor's degree.

The other point in terms of post-graduate education, one could certainly offer at masterate level but there needs to be incentive because students with loans will leave as soon as they have an employable qualification so if you wish people to stay for a masterate they would have to see that there is a type of employment which is not accessible with the bachelor's degree. So effectively to incentivise people to go to a masterate, one would expect that to be advantageous in terms of getting some practice and quality market later in their career, so incentivisation is tremendously important.

DR BUCHANAN:

I would just like to perhaps reinforce that Your Honour. The University of Canterbury has been pushing for some time for more of its graduates to do masters degrees but with student loans and financial hardships and once someone gets, as you say a employable degree they will take it. And so if there is to be a move in that direction it would have to be done with the support of industry. We would have to have employers who were saying, when approached by a prospective employee, go back for another year, or a year and a bit and do your masters degree. Without that it wouldn't happen.

JUSTICE COOPER:

Mr George do you have a perspective on this aspect of the discussion?

MR GEORGE:

I think from our point of view the University training is only the first step in the whole process of engineering training so I don't have any disagreement with what Mr Buchanan is saying. I think more specialised degrees are helpful and encouraged within the industry, but master of engineering papers not uncommon. A number of our engineers have moved on to post-bachelors training and I think that is generally encouraged and beneficial to the industry.

JUSTICE COOPER:

Mr Prentice?

MR PRENTICE:

Yes, I think Professor Buchanan's comments there at the end were particularly pertinent in so far as I think we have to be careful to look at the external market place as well, in any of our discussions here today. So I mean we have looked at, if you look at the two options that we've just been discussing, that's what we had in our submission as well and we'd support both of those going forward if we are looking at for the training of engineers. So one of them is to have a dedicated structural engineering course, but of higher priority for us we believe is to have specific, whether they are one year,

whether they are two year, that's another debate. It's specific block courses, and I think the reason for that is if you look at, if you look at the demand for structural engineers over the last 10 to 20, 30 years in New Zealand, there literally hasn't been that demand. So that's what I'm saying I think. Any, any, however we go forward from here we must take into account the fact that we have an industry that will go through upturns and downturns and I think if we put all our eggs in one basket, if you like, and put develop a specific course on structural engineering, we may find the demand isn't there for those structural engineers in five to 10 years time.

MR SPENCER:

I suppose from my perspective, as I mentioned in my introduction we employ people from a broad spectrum I suppose of pure bachelor's degrees through to masters and doctorates and what's proving particularly effective for us as a consultant is to have that range of skill sets. It isn't necessarily the person with the highest qualification that's the most effective consultant because we're a consultancy business I suppose so we do need a range of personality types, skill sets and we do, we do value and require those people with more specialised skills, certainly with the sort of projects that we get involved in.

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COMMISSIONER CARTER:

I would quite like to hear the panellists discuss the balance between high level structural design skills and very competent technician training. I know that Andrew has been through a programme recently in which they have been looking at the balance and the needs within the country for technicians and professional qualifications and I think Ms McGregor might also have something to say on that. Where we split within a design office between the work that has to be done by the high level analyst and the degree that's needed to support that as compared to the person who can then take that forward at a pretty high level in a technician ranks. Andrew, can you ...

DR CLELAND:

Yes, thank you Commissioner Carter. We've recently rebuilt the New Zealand Diploma of Engineering, the NZDE, which is a 240 credit programme offered nationally, followed by a New Zealand Diploma of Engineering Practice which is 120 credits. That's one full-time year equivalent of work experience so effectively a student would take three years of study experience, one of which is practical, to get those two Diplomas. So that is the replacement for the NZCE.

As well as that we have offered primarily through what are called the Metropolitan ITPs or Institutes of Technology and Polytechnics, a three year Bachelor of Engineering Technology in the civil discipline and those people were also now entering the job market and they're certainly capable of doing some of the simpler structural work one would find in the residential sector for example and then we have the technicians who sit underneath that. So effectively we have people graduating with three levels of skill – technician as we call it, technologist and professional engineer levels and then a Master, as we've talked about, would be a fourth tier on top of that if we were to think about a tiered structure of educational development.

JUSTICE COOPER:

Ms McGregor do you wish to add anything at this point?

MS MCGREGOR:

The only thing I would say is I don't agree that the diploma is the equivalent of NZCE. It's somewhere between the Diploma and the Engineering BEng Tech. The old qualifications and there is structural analysis and there's quite technical subjects covered in the Bachelor of Engineering Technology that aren't covered by the diploma and I think if you want a senior level technician they need some of that in their training.

COMMISSIONER CARTER:

I would just like to just hear the thoughts about the usefulness of technician and technologists who may cover a wider field so you might have very

specialised engineers in advanced structural engineering but the technician support staff can work across a wider range of occupations than purely that's a bit more high level specialised work so you may get the balance in that way. Is there any thoughts on that topic, the proportionate level of highly qualified structural engineers, taking up Mr Prentice's point, that there may be the cyclic nature of the industry may mean that you're overstaffed in specialist structural engineers which you can't have employment for but the technician would work on a wider range of subject matter?

MR PRENTICE:

I think that that echoes some of the comments that were made earlier by Andrew and I think that if we were to go down the path of just putting all our focus into developing the highly specialist training then we would do that at the expense of what is very, very important right across the rest of the industry which is a generalist civil engineering degree and whether we're talking about graduates or whether we're talking about technicians, the importance of that can't be diminished. So, you know, for instance we put a lot of focus into that in Opus and don't know if many other consultants do in terms of having a cadet scheme and we will continue to do that going forward.

JUSTICE COOPER:

I suppose putting the university training at the forefront of the discussion may skew it a bit but when we get to the stage where somebody is a graduate and then turns to professional qualifications there are concerns about the breadth of the potential practice area of somebody who is IPENZ qualified and beyond that the range of things that somebody who is a CPENG might undertake compared with their real ability to be undertaking such work. It's rather a laboured sentence but Mr Bradley you have some concerns in that area don't you?

MR BRADLEY:

Yes I do. My concern is basically there is a lot of post-graduate study and knowledge that needs to be gained on the job and there's no formal sort of

way in which that is examined and there are different practice areas that require different levels of knowledge within the profession, so some person might not need to know how to do a 40 storey building or a bridge or what not and there needs to be methods in which they can still operate and maybe not have to go to the next level of training. But conversely there needs to be some training available or some way of assessing people who do wish to do complex bridges or multi-storey buildings, and at the moment the system we've got doesn't really examine that in the sort of rigor that equivalent overseas qualifications appear to.

JUSTICE COOPER:

So what would you change if you were given the opportunity?

MR BRADLEY:

I believe that there is a lot of benefits in obtaining or going for a tiered system whereby you have a couple of levels, whether it be two or three or something that needs to be determined. I mean not all structural engineers work in doing design. There is a managerial or site component to that and they might not need to know, you know, excessive amounts of design skills or analysis so there's benefit in obtaining or tailoring some qualifications for people who go down that route. Again there's also people who do work along the lines of less complicated structures and people that do complicated structures, so a tiered system would accommodate the different levels and requirements of each of those practice areas. On top of that a lot of, currently this term of 'practice area' which is quite difficult to sort of nail down. It's a very sort of subjective idea. A lot of people aren't, you know, will have a different perspective of what their practice area is from another person. It's difficult to enforce, you know, a practice area or assess someone on a specific practice area and expect them to continue to work in those. I mean people's careers develop and they may, you know, work from one practice area and then sort of morph into another and the assessment that we have at the moment doesn't really, sorry, it doesn't really give the people confidence, well in my opinion, it doesn't have enough, you would not get enough confidence that

people have enough understanding to do higher levels of design work. In a technical examination similar to what they do in America or Britain would go some ways to alleviate that. And again in practice areas, going back to this term of a 'practice area' it covers a lot of different things but across varying practising areas most of them use the same sort of structural principles, fundamental analysis or design philosophies or skills or base design abilities and there would be benefit in sort of adopting some sort of a fundamental sort of basis of an engineering assessment where you know that anyone who has achieved that level has a prerequisite basis that it can then use to go to the next level and at this stage I don't think that is examined prop..., well in enough detail.

COMMISSIONER CARTER:

If we take the UK Institution of Structural Engineers to qualify or get membership in that Institution done by exam, correct?

MR BRADLEY:

Sorry.

COMMISSIONER CARTER:

Is the Institution of Structural Engineers UK is an exam?

MR BRADLEY:

Yes.

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COMMISSIONER CARTER:

Now that examination doesn't distinguish between people who are more expert than others do they, you either pass the exam or you don't, so I'm just not sure that you have described yet how you'd get the tier system working through an examination process?

MR BRADLEY:

The Americans have a system whereby you do have different levels of qualification. You have one level if you want to work on certain types of structures, and you have a higher level if you want to do sort of high risk, high occupancies or hospitals you know that sort of buildings and it varies from state to state. And obviously the British one is just you pass or you fail, and I'm not sure that is the process that we would want to take in New Zealand. I believe that there perhaps could be you know, two, a smaller one or less detail and a one with a much more detail which would be a little bit more difficult.

COMMISSIONER CARTER:

The American system's a license is it not, you know you cannot undertake the work unless you have the appropriate license?

MR BRADLEY:

That is my understanding.

COMMISSIONER CARTER:

All right, so where would that be based here, in the CPENG process?

MR BRADLEY:

I think that'd be the appropriate place for it. All you'd do is just have, what you could do is have two different examinations, one for a lower level and one for a more – a high level for complex structures.

COMMISSIONER FENWICK:

These could be a written exams, is that what you're saying?

MR BRADLEY:

Yes and those exams can have a degree of variation to reflect people's different backgrounds and then you could have a series of questions and you

could do different choices, and cover a broad spectrum of engineering specialities if you like.

JUSTICE COOPER:

Would that – how would you go about acquiring those qualifications. I understand sitting an exam, but would you need to go back, would the universities need to respond to such a system?

MR BRADLEY:

Well in both the British system and my understanding of the American system, they have a series of courses and workshops that are required to be passed or attended by an engineer before they get to their professional qualification examination, and once – those things have a sort of tailored set of information that you need to know which can be beneficial to the candidate themselves as well because they know what they need to achieve, whereas in the current system that we have you don't really know what level of knowledge you need to have for your practice area. It's just you go and you think you have enough, you then apply and then the assessors determine whether you do or not. So if you went down that route and then a series of workshops and/or post graduate study courses could be developed in conjunction with professional technical societies and the university, and as Professor Buchanan mentioned, a modular based masters course could be ideal for something like that. I'm not sure whether a masters degree itself would be required to get to that next level but certainly a modular course would enable people to adopt courses where they see they have gaps in their knowledge and they could tailor that around their working commitments during the day.

JUSTICE COOPER:

Somebody's going to have to be specifying the content of this additional qualification. Who's going to do that?

MR BRADLEY:

I see that as being a joint and between the profession, it's technical societies and the universities themselves. I guess one of the key things that need to be

done is identifying the gaps in the knowledge that's out there at the moment and that'd be a bit of a challenge but once that could be achieved you can – I think if everyone worked together you could actually achieve and tailor courses to suit the needs of what is needed for the country.

JUSTICE COOPER:

Right, this is a quite a big discussion I think. Who would like to comment, Mr Clark?

MR CLARK:

Thank you, in the discussion that has been held, I don't think there has actually been enough emphasis put on the mentor training that an individual engineer gains from working in a design office after gaining a degree and from the society's point of view we would basically like to see the degree, a four degree kept relatively wide. The individual then enters a design office and is mentored moving through to CPENG.

The mentoring would be provided by a senior structural engineer and I'm talking about the structural engineering to achieve the level of understanding, not only the technical detail but also the art of structural engineering. How does this whole body of knowledge come together to be able to design a building, a complex structure. And this I believe can only be achieved in that level of detail by practise under a person who is well versed in all of these issues. To be able to recognise those – that level of understanding, we would suggest that the recognised engineer, structural, be brought in to provide that level of understanding. To achieve recognised engineer status you would need to have practised for a number of years and carried out a post graduate qualification.

Now there are obvious practical issues in going down that path which has been indicated this morning that when an individual has completed their preliminary degree, got into employment, what is the incentive for them to undertake this additional qualification to become a recognised engineer? So therefore there would have to be some requirement that particular complex projects would be signed off by a recognised engineer. This would then give it

a level of status so that people would endeavour to reach that level and that level of understanding of structures, all the issues associated with them, the management of the design process as well as the technical issues, that the dynamics of buildings and their earthquake resistance. Thank you.

JUSTICE COOPER:

Thank you. Mr Cleland.

DR CLELAND:

Sir, I actually have some slides I've prepared, would you be willing that I could show you, it just sets out some information that might be helpful to background this discussion.

JUSTICE COOPER:

Yes, but not now, we're a bit (inaudible 11:27:30).

DR CLELAND:

I can come back after the break if that would be helpful.

JUSTICE COOPER:

We've got two minutes but can you do that?

DR CLELAND:

I don't think it would take two minutes, perhaps five.

JUSTICE COOPER:

Can I just – these ideas that have been put on the table by Messrs Bradley and Clark, comments from anybody, Mr Spencer.

MR SPENCER:

Yes, I would like to make a comment, I just – one would imagine that in a sort of rapidly responding or perfect market that client procurement would preclude the need for this sort of thing that it would become known which firms have

the requisite skills to undertake particular projects but it's interesting to note that that doesn't seem to happen so I certainly support the idea that there's some measure of regulation or higher standard required because we've certainly observed instances where it's been mentioned a number of times today, people are operating beyond their field of competence and managing to do so in a repeated fashion.

COMMISSIONER CARTER:

This is a topic which I'd like to perhaps come onto further when we come back. Just to give you a moment to think about it though, is that engineering organisations can be challenged to be too introverted, we talk to each other about what could be done and there isn't sufficient understanding of what's going on in our profession by the public on a wider context. In this matter that you've just described there is the question arises how does an owner, an employer of engineering services make the selection, and there's a lot of criticism that it's too much based upon the price of the service rather than having an adequate knowledge of the needs that the owner, employer has for the service and who can best satisfy those needs so some other jurisdictions do better I think in helping clients understand how to choose the appropriate level of skill for their job and I would like to hear some comments on that in due course.

JUSTICE COOPER:

I think it's common across professional fields that the public make assumptions as to competence because of the letters that somebody is able to put after their name and that may or may not be a valid assumption.

HEARING ADJOURNS: 11.30 AM

HEARING RESUMES: 11.47 AM

JUSTICE COOPER:

Now Mr Cleland, do you want to take us through these slides that you referred to earlier?

DR CLELAND:

Yes if I could, Sir. Thank you. The reference is GEN.CLE.001.2. So what I wanted to do here was just TO explain some things. In this page I've actually gone back to the document you saw, ah, the questions that were given on Friday but I want to start part way down that page if I can, where I think it's the fifth bullet point starts with, "Benchmarking of a New Zealand Competent Standard."

The Act requires us to actually internationally benchmark our standard which we do through the APEC Engineer and Engineers' Mobility Forum Agreements which involve 20 countries and their exemplar in fact uses the construct of a self-defined practice area and I'll explain why in just a minute. They review us. They last reviewed in 2006 and we will be reviewed again in 2013 but it's the next point I think that's most important.

Effectively worldwide there were two constructs for assessment and the concept here is that competence is effectively informed doing and one construct is to say we want to look at your very recent work samples and then we'll corroborate that so we will look at your actual work, your real work with corroboration from referees, interactive assessment and you can supplement that by controlled written assignment. And the other construct is assessment simulation which is where you get examination and some standardisation, and broadly speaking examination helps more when the knowledge level is above the highest academic qualification but it does require scale. So what we find is that in New Zealand we have operated for 60 years with assessment based on work samples, that particular model, and both models are used around the world and they are not mutually exclusive. You can supplement assessment on work samples with examinations so all those things are possible.

I just wanted to highlight then towards the bottom 2009 we commenced the review of the assessment process. So some of the changes that are in place there are greater use of interactive assessments which is basically corroboration where the people discuss their work samples, encouraging assessors to use controlled written assignments where they have weaker design evidence. We also now publish candidates' names when they are up for assessments so that anyone can in fact comment on their work if they so wish, and some of the issues that Mr Bradley spoke about around moderation we've got our senior assessor group who are doing extensive training and moderation. So part of our continuous improvement programme is in that space. And I would just comment there that it's entry level competence and it's well below the level of much commercial building work, and that's the problem that Mr Bradley referred to is that CPENG sets a standard that is lower than is required for a lot of complex work.

If I could then perhaps move to the next page please. Now just to try and give you some information here on the fields and practice areas. I've just given you some information there on some of the fields and about 30-50% somewhere in that range of CPENGs are in fact doing work that is covered by the Building Act so CPENG is much more general but what I've done down the bottom of the page is just to give you four examples of practice areas and these are all people who, senior engineers who have appeared before you and they are people who are basically competent with unreinforced masonry but also more widely competent and you get a sense of the variation of people's activities. You'll see, for example, in the first one Road and Carpark Geometry and Landscaping. All of them actually have some geotechnical work within them so those are just examples, four examples, I took out of practice areas just to give you a sense of the difference between a field and a practice area. And the reason that practice areas go with assessment by work samples is that everyone's work experience is unique, so if you want to assess off their work samples then everyone's jobs that they are assigned through their employment are different and so effectively assessment of work samples tends to work against the standardised assessment.

But if I go to the next page if I may please. What we have in the little diagram is effectively a construct we already use so our candidates present a practice area for assessment for CPENG on the left-hand side but if in fact they want to be assessed in what is a prescribed practice area, that enables us then to get some sort of standardisation of an assessment and effectively you get yourself into unidentified sub-class. And if you go down three bullet points we actually have two of those in progress already so, for example, the term 'recognised engineer' – it's been used loosely here today – but the term 'recognised engineer' under the Building Act is related to dam safety so we have about 30 people who have gone through, had a prescribed practice area of dam safety and have then been recognised in that way, and then under "Occupational Safety and Health Regulation" we also have design verifiers. So they operate under the Machinery Act for example and so those are people who have a standardised assessment down that route.

So what I wanted to indicate is once you get to a prescribed practice area that then becomes much more amenable to have a standardised assessment and, for example, examination can well be a useful tool in that respect. I have given there some other examples which were in the discussion paper. You could do this for damaged building assessment, the strengthening method design and so on but 'structural' itself has been indicated as too broad.

The last point I want to make on these slides was just towards the bottom. It talks about, you'll see inset "Engineering Technician, Technologist, Professional Engineer" and then "higher levels". In the International Exemplars effectively the difference between those is defined in terms of the complexity of the engineering problems that people at those levels can resolve. So there are four terms used, each of which have quite detailed, or three terms, each of which have detailed definitions.

So a technician is seen as being able to resolve what is called a well-defined engineering problem and don't get hung up on the words "well-defined". They are simply a descriptor which has a definition. A technologist at the broadly defined level and a professional engineer at complex.

So if in fact we decide that the current complex level which is still based on entry with a BE and four to seven years' work experience is too low then one

could define a higher level. For example very complex or whatever words we want to use and assess at a fourth and higher level. So the key point I want to make is that the form of assessment and the standard are actually, can be de-coupled so you can in fact can assess whatever level of complexity of the engineering issue that can be resolved and have a tiered system but then, depending on what that system is, the degree of standardisation, the right assessment methods to assess for those competencies might be variable. So a combination of face-to-face assessment of work samples and of examination is indeed possible, so there simply is a spectrum between individual assessment right through to standardised assessment and it's a matter of picking the tools correctly in that space and just a signal from an IPENZ viewpoint we're very, very open. I mean our goal is to assess everyone as thoroughly as we can so we're very, very happy to look at using different types of assessment tools.

JUSTICE COOPER:

That last question at the bottom of that page, "Are perverse effects of CPENG plus better or worse than reliance on self-certification of level of competence relative to task". There's quite a few challenges in that question aren't there?

DR CLELAND:

Indeed there are Sir and that's why I thought it was a good point to finish on the slide and the industry people of course see these very directly as well so they may wish to comment.

JUSTICE COOPER:

So how does this fit with what you were talking about Mr Clark?

MR CLARK:

Yes it does. I think what we are finding is there is an understanding through the industry as to what we need to do to improve it and this is the, and certainly as far as the Society is concerned is a move in the right direction.

1157

JUSTICE COOPER:

Well I am not sure that you are talking about a move are you Mr Cleland, rather possible options for expanding the current system or developing it?

DR CLELAND:

Sir, I mean the question of doing assessments in prescribed practice areas, whenever a regulator comes to speak to us then we simply get on with that. For example we are in discussions with the New Zealand Transport Agency at the moment and they want to use our registers of technician, technologists and professional engineer level to underpin their regulation for vehicle safety. So we would simply get on with that discussion straight away. If there was a desire to introduce a fourth level the question is that the way the Act is written it talks about a competent standard for chartered professional engineer, so we are applying a common entry standard across all fields of engineering at present and so if we wish to move to having a higher level then we'd need to get advice but we think regulatory, sorry legislative change may be required.

JUSTICE COOPER:

Yes, Mr George, do you wish to comment on this?

MR GEORGE:

Yes I do, from a SESOC point of view this is a slightly different view to other people in this panel that the CPENG qualification is an appropriate quality mark but we still see it as an entry level professional qualification. I support the panel in that CPENG is a useful tool and it should be used as the requirement before engineers can sign producer statements but the main issue is that we don't believe that CPENG alone is going to make a significant difference to the quality of building design. The reason for this is that even though you may have gained your CPENG qualification and you may have been examined in the 12 elements that lead to the issue of that qualification it is no guarantee that the applicant is an expert and knowledgeable in all fields within their practise area description. Even the practice area descriptions that were given as an example on those slides are incredibly broad and there's a

huge amount of knowledge required for someone to be an expert in everything in those fields that were described on the previous slide. CPENG alone is not an adequate mechanism for ensuring a building design and construction meets the objectives of the code so I think we need to look further than just relying on the CPENG as a mechanism for ensuring that building designs are meeting objectives of the building code being robust and well designed.

JUSTICE COOPER:

And looking further, would involve some additional qualification or obligation to undergo a period of mentoring, what would it be?

MR GEORGE:

Where we are trying to direct this argument is into a procedural matter in designing a building where building designs are reviewed within a design office with a robust quality assurance system and those designs are then peer reviewed by an independent practice or the independent – the peer reviewer should be at least equal or at a higher level of knowledge than the original designers, and then that peer review process also requires QA procedures to ensure that is robust. So we are supporting what is sometimes called the producer to statement regime where a designer issues a PS1 design review issues a PS2 and both the processes before they are issued require a high level of quality assurance.

JUSTICE COOPER:

Yes well this is a subject that is very difficult to put clear boundaries around. I suppose, our intended emphasis today is really on what qualifications people should have for various roles. We are going to later this week talk about how the regulatory system works and how, what hoops people should have to go to before plans are approved and that sort of thing. So, the question is really you say CPENG is entry level, should there be something in addition to that or do you go straight from that observation to saying well in the consenting process there needs to be more assurance, quality assurance at that stage?

MR GEORGE:

Yes both of those are true. We again believe CPENG is entry level and we do support a two tier or higher level of CPENG qualification but once having achieved the CPENG then you have to start looking at the rigour of the design process.

JUSTICE COOPER:

Mr Gardiner, do you have an opinion that you would like to share on these issues?

MR GARDINER:

I think I have but firstly I'd just like to ask a question to help me understand the slide that's still up on the screen. Am I correct in assuming that the prescribed practice area would only be done in response to regulatory need or would, if the profession decided to develop its own prescribed practice area you would do that?

DR CLELAND:

At the moment that has just been done in regard to a regulatory need but ultimately CPENG is also business enabling. One of the things we need to keep in mind is that CPENG acts across all disciplines of engineering so if there was a valid argument put forward we would certainly look at that possibility. We are very open to discuss – I mean ultimately our goal as registration authority is to serve the public of New Zealand and the goal of the Act is to create a mark of quality that helps New Zealand so if there was a strong case we would certainly look at it.

MR GARDINER:

And then Sir just referring to Mr George's comment before I sort of make my own, am I – I think there is, my observation is probably there is three systems which intersect here and there is a bit of confusion between them, you know, there is the competent system around the person doing the work and the

things that underpin that. There is the regulatory system and that is the focus of the next couple of days, not really here, but I think what Mr George was talking about is that third system and that's the work place practices, the design office activities of ensuring quality building work outcomes because I think engineering is generally practiced in a team environment, an office environment with its own checks and balances and did I hear correctly that you were more moving to the fact that probably wanted more focus on that as being the way of ensuring better design outcomes than necessarily another registration level because those two things can trade off against each other to a certain extent.

MR GEORGE:

Yes that is definitely the area where we believe there can be a significant improvement in building design quality by focusing on those design office practices for quality assurance systems. That is correct.

JUSTICE COOPER:

How does that work because design offices are presumably very varied in terms of their size and the talents within them. How does this give lead to assurance and quality of the output?

MR GARDINER:

That is going to be the comment I was going to make in so far as where designing a system to cater for a variable range of engineering practice structures, I think we have (inaudible 12:06:07) it is very competent organisations with their own systems for delivery of competent engineering work and you know, I think broadly that system works all right but we also got to take into account those small sole practice operations that put into the New Zealand economy but how do we ensure that they deliver quality engineering services when they haven't got all those other attributes that you'd normally expect of good internal robust processes, peer review et cetera, and they are the ones, you know, perhaps where the Ministry is more

concerned about is making sure that those ones are the ones that deliver the right outcomes.

JUSTICE COOPER:

Well, we as a Royal Commission, of course we've been focused on commercial buildings in central business districts.

1207

MR GARDINER:

And some of those small practitioners are also in that particular space as well.

JUSTICE COOPER:

Yes.

MR GARDINER:

Not necessarily the big companies that are doing all the commercial work in New Zealand, particularly in provincial New Zealand.

COMMISSIONER CARTER:

Well I think (inaudible 12:07:19) there are quality assurance process that single person practices can pursue and I think that this needs more recognition that quality isn't a function of the numbers of different disciplines that might exist in a larger firm but it's a procedure by which a quality end product is produced. It may involve external reviews for example or you know –

MR GARDINER:

IPENZ itself produced a practice some years ago around looking at the quality assurance and structural engineering practices which is I think a very good document. It was after my time so I know (inaudible 12:08:03) there but what I think, you know, if we had a high degree of adoption of those principles in that

practice note many of the problems we would be talking about would have been addressed.

JUSTICE COOPER:

Do we have that practice note in the materials that we've had from you Dr Cleland?

DR CLELAND:

I'm sorry Sir, amongst the huge volume we've given you, we haven't given you that one to my knowledge.

JUSTICE COOPER:

Sounds like it's pretty good.

MR GARDINER:

I suspect it could be captured off the web if you wished to see it. It is available on our website.

JUSTICE COOPER:

What's it called?

MR GARDINER:

It's practice note 14, *Structural Engineering Design Office Practice* and it was issued in August 2009.

JUSTICE COOPER:

Mr Clark in talking about a recognised engineer stepping into the frame in a structural engineering area, you were thinking that such a person might have a role in respect of defined complex projects I think is what you said. Now what sort of approach to the definition of that set of structures would you advocate. How do you define it?

MR CLARK:

Could you just repeat that?

JUSTICE COOPER:

Yes, when you addressed us before the morning adjournment, you were talking about a recognised engineer/structural which would be an addition to the current framework.

MR CLARK:

Correct.

JUSTICE COOPER:

And you thought or you postulated that such a person might have a role in respect of the design of defined complex projects or maybe if not a design role than a checking and approving role in respect of defined complex projects, that's what my note says anyway, maybe I was –

MR CLARK:

No, no that's –

(overtalking 12:10:14)

JUSTICE COOPER:

Words in your mouth, so that leads to the question of how do you, what is a defined complex project? How are they to be defined?

MR CLARK:

Well you could define this sort of project on the value of the project, that would be one mechanism for identifying major projects. The risk profile of the particular project. I think there are a number of criteria that could be defined which would identify the size of the project whereby a recognised engineer would have to be required to sign off and there could be a requirement from the local authority, the Territorial Authority that for a building over this, whatever these criteria were, would need to be signed off. That, in the

understanding of the recognised engineer that the work had been carried out by people who were knowledgeable and that the various systems, quality assurance et cetera had been carried out.

JUSTICE COOPER:

And in order to become a recognised engineer, one would have attained some further mark of merit or knowledge, understanding?

MR CLARK:

Yes, that's right, you would have had a period of practice on major projects as they would be defined and yes, post graduate qualification as Professor Buchanan was suggesting, a Master of Seismic Engineering for example.

JUSTICE COOPER:

Except it wouldn't need to be at the University would it?

MR CLARK:

Good question. I think at the moment where we have the two engineering schools in Auckland and Canterbury, I think my feeling would be and that of the society, that yes it would be a university qualification.

JUSTICE COOPER:

Mr Bradley, I inferred from what you were saying that you envisaged some sort of examination system, whether it's in this particular, whether it's about registered engineers, structural or the qualification to actually design the buildings rather than check them, but I thought your – you were speaking of something that might be administered by the profession rather than something dependent on further university qualification?

MR BRADEY:

Yes I was, but I see no reason why there couldn't be university input into that.

JUSTICE COOPER:

Yes. I was thinking of whether there's any analogy to be drawn with the medical profession where fellowship of one of these colleges that recognised specialist expertise. It's not something the universities do, it's something the profession takes to itself and looks after and you don't get it by simply acquiring theoretical knowledge, it's the result of hands on experience with the problems that speciality has to confront.

MR BRADLEY:

Yes I agree.

DR CLELAND:

Can I comment on that Sir, because I think there are some interesting parallels here. The – a week ago a review of the Health Practitioners Competence Assurance Act was actually announced and one of the things they're grappling with is the need for multi-disciplinarity and people working within teams which their current model which is based around scopes in fact interferes with, so they're actually up and reviewing in this space. So I've given the web address so that their consultation document can be obtained. The medical system is actually a little more complex and I have to say I have personal knowledge of it in that my wife was the New Zealand manager for the Royal Australasian College of Physicians for some time, but effectively of their base degree which is common they then go through a set of work experiences which are highly structured and paid for by the State, primarily within hospitals but starting now to move out towards general practice. And then for the medical specialisations they, the colleges effectively become the administrators of post-graduate qualifications. So it's typically seven years for a medical speciality and the examination is in two parts. It's effectively an examination of the body of knowledge, part way through those seven years which is a written examination, and then they do examination by simulation with diagnosis of patients typically at the end of that. Obviously the medical profession has much greater problems in recording evidence compared with

engineers and that they have to make decisions in an instant of time so they make greater use of simulation in their examination process. So effectively they operate those sorts of processes.

The other difference is that they have quite a structured approach where people effectively go into these things called scopes and in the absence of written standards in a scope effectively the person is examined on all knowledge within the scopes. So scopes are quite prescribed and they're examined across all that knowledge – any of that knowledge in that scope they can be expected to know and encounter in either their written examination or their so-called clinical examination. So that's their system there but as I say, their review is now asking questions about whether in fact the need for practitioners to work across the boundaries of scopes which is occurring in their practice in fact sits with the scope system so their review has just commenced a week ago.

JUSTICE COOPER:

Yes well probably a silly idea for me to bring up another profession altogether, but I suppose my concern is anyway that how do we make the system better in terms of designing buildings, and it's hard to see that that is anything other than a question about increased expertise and specialisation. Does anybody have a different view? Should we be de-emphasising speciality or emphasising it. Mr Spencer.

1217

MR SPENCER:

I think it's difficult to disagree with the premise that you need to establish what somebody doesn't know as it were. So the problem is, just hearing the debate today, and really what's behind Derek's position, that there are people out there loosely practising that are unaware of what they don't know. So I suppose a higher level test, whether that's a written examination as is is used in certain instances overseas or whether it's a more comprehensive and thorough evaluation of their work practices, really attempting to drill down into

their knowledge reserves I'm not sure, but it does seem that some more thorough evaluation of their competence is needed.

COMMISSIONER CARTER:

Is this perhaps because testing for the capability of buildings to withstand earthquake is very, very rarely done in practice. In other words we're reliant on something that remains unknown until some event that might not even occur within the structure's life occurs. Whereas most other matters in engineering even major structures, those large long span bridges for example, are tested to their design level or something near to it as soon as they're completed, so is this something that differentiates seismic engineering from other engineering practice, that can only be handled by testing the knowledge of the people who produced it and those that checked to see that it's satisfactory? I just wonder whether that's a distinguishing feature of seismic engineering?

MR SPENCER:

If I could just add one further comment. I suppose, I do perceive in the current environment that the evaluation of existing buildings for example is quite a specialised field and arguably prior to sort of two years and six days ago there would've been a pretty small number of practices that claim they had particular expertise at the evaluation of existing structures. Whereas I would think there's actually a large number of engineering practices doing that work right now.

MR PRENTICE:

If I could just make a comment on your last point there. I actually, I don't believe it is actually limited to structural engineering. For instance if you look at many other structures, we have been talking about buildings here but you could look at dams or you could look at tunnels or you could look at long span, you know, multi-span bridges. You wouldn't put a generalist civil engineer who's only been in the job five to 10 years onto the design of one of those

structures. So I guess I just wanted to make that comment when the questions was just raised there.

COMMISSIONER CARTER:

So Andy, a lot of different training needs in this area?

PROFESSOR BUCHANAN:

I'm listening to this discussion with interest, and it's not easy clearly. I was trying to make a sort of picture of where this is going because I guess at the academic end it's relatively straightforward. We have stepping stones. We have qualifications for technologists, for technician, for a bachelor, masters. PhD and the universities and polytechs are set up to deliver that with examinations along the way, so it's relatively well structured. But in addition to that you've then got the consulting office because there's a huge amount of on the job learning and mentoring which is very important for people to learn how to put into practice the technical stuff that they've learnt, so in addition to the university stream you've got the consulting office that the jobs, and then in addition to that you've got IPENZ and the certification which, where you've got the CPENG being the entry level after bachelors degree and a certain amount of experience and the possibility of a recognised engineer within that column, and then you've got other players because in the regulatory environment we've got as Stuart mentioned, when a building is issued for building consent application is made you've got your producer statements which are from the designer and the peer reviewer in different levels. So two things going on in my mind. In the, wearing my university hat we in the educational fraternity we're, we need to keep looking at what we're doing but we're not, it's not broken so we don't need to, we don't need to drastically effect it but we still do need to know where to put some more emphasis on earthquake engineering, that's certainly coming in there. But the much more difficult question which is addressing the panel and the Commission I can see is for these special buildings that Win's talking about, should we or can we or should the

profession or the industry or the regulatory environment be requiring certain people to do certain jobs, or permitting them to do certain jobs. And I really haven't got an answer for that.

JUSTICE COOPER:

Well let's ask this question because I think it arises. Does, is there anybody here who thinks that the current CPENG system is adequate without change, considering the demands of structural engineering design in New Zealand?

PROFESSOR BUCHANAN:

Perhaps I could just rephrase the question Your Honour because are you, are we asking whether CPENG is a satisfactory point for entry level into becoming a professional engineer, or is the question whether or not merely having a CPENG being a chartered professional engineer, is that sufficient to allow the design of a huge complex building which houses thousands of people? Those are sort of two different questions and I'm not quite sure which one you're asking?

JUSTICE COOPER:

Well, I'm not sure why you say it's two different questions, because at the moment providing a client was prepared to pay you to do it, if you're a CPENG with a recognised area of practice in structural engineering you could do it, couldn't you? Isn't that, isn't that the current system?

DR CLELAND:

Sir it would be up to the building consent authority as to whether it chose to accept your documentation in terms of a producer statement. It's a requirement is only imposed if it's done by a building consent authority. So a building consent authority right to this day can accept a statement from any engineer as now we have a high level of compliance that producer statement authors should be a chartered professional engineer but is by no means universal at all. So it's really in the hands of the building consent authority as to whether they regard that as acceptable.

PROFESSOR BUCHANAN:

So perhaps Your Honour that would, might be a starting point at least. And if building consent authorities were to require that a producer statement must be produced by somebody who's a chartered professional engineer, that would raise the entry, the low level bar. It still hasn't addressed the top question, but it might.

JUSTICE COOPER:

Well maybe I'm not having much luck asking the question, let along getting an answer. The building consent authority, you're saying it has a choice to refuse to accept a producer statement from somebody even though he or she is a CPENG. Is that the position?

DR CLELAND:

I think if it's offered in evidence they have to accept it. The weight in which they apply to it is their judgement (overtalking 12:25:53) on this.

JUSTICE COOPER:

They go off and have some checking process if they've got doubts. Is that the way it works Mr Gardiner?

MR GARDINER:

Yes normally.

JUSTICE COOPER:

Well checking processes run by building consent authorities don't universally inspire confidence, particularly at this stage in our inquiry.

MR MILLAR:

In the area that I practise there are a number of regulatory authorities that have lists of accepted engineers and they apply those in addition to CPENG and that requires a process of interview and recognition to practice and they won't accept a producer statement from people who don't sit on that list and

they have different tiers at which they define what levels that you can operate at. Now that's been a system that hasn't been well supported by the engineering profession because it's been done by individual regulatory authorities and it's quite difficult and expensive to apply that throughout the country. But it does provide a model anyway.

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JUSTICE COOPER:

But some would say that it would be better to get the design right in the first place rather than have such a big emphasis on what you do to get it right when it might be wrong. What do people think about this? I suppose putting it another way if I can have another go, is there merit in proposals such as those we've heard from I, I think we've heard from Mr Clark that there is a category of projects in respect of which CPENG should not be the minimum qualifications and that something reflecting greater expertise should be the minimum qualification. Mr Spencer?

MR SPENCER:

I'd like more time to reflect on that, I think that's essentially what I did say in response to a previous question that a higher level might be required. Now the interesting thing to reflect on there and again just thinking back to my introductory comments I talked about organisational versus individual controls. The concern I would have I suppose is that if we put that higher qualification in place that that person becomes sort of the de facto signatory for all outputs from an organisation and that wouldn't necessarily achieve the sort of objective I don't believe. So I am not sure how this could work but whether certain organisations are deemed to have the right sort of processes in place because then you can talk about things like whether they have certain quality assurance programmes in place and so on might be certainly an alternative approach to coming up with a different bar I suppose for certain types of complex, larger more complex projects.

JUSTICE COOPER:

Right Mr Prentice?

MR PRENTICE:

Just on that point there, I mean I will reiterate the point I made earlier. We are very much in support of a two tier system to the extent that if you actually look at our submissions we have actually, I guess put a line in the sand there so I think to answer your question earlier if we did go down the path of trying to differentiate, then where would we draw that line? And it's actually, there are principles that are in place already so what we are suggesting is a couple of different classes in terms of structural engineering capabilities and that first class could be buildings which are less that 10 metres in height which are not classified as irregular and have a fundamental transitional period of less than 0.7 seconds, as class one. Then anything that doesn't necessarily fit within those categories would require a different class and therefore a higher level and a higher degree of skill in terms of a structural engineering capability. And you then look at that and you say how does that person gain that skill and I think we've had a good discussion around that this morning, whether that is through separate block courses provided at university level then supplemented by expert advice and mentoring within a design office then I think it is a combination of both. But I do reiterate that these are, that's just a line in the sand and perhaps as to maybe go down a different line of debate.

JUSTICE COOPER:

Well I am not sure what you mean by that Mr Prentice. What you've said, I think it is paragraph 4.2 of your submissions. You are not just being provocative there are you, I mean this is what you –

MR PRENTICE:

No I am not, no I am not.

JUSTICE COOPER:

- this is what you are telling us.

MR PRENTICE:

Yes it is, yep. I guess what I am trying to say is that's our view and there may be some other views from the expert panellists.

JUSTICE COOPER:

Well, yes, Mr Gardiner?

MR GARDINER:

If we just roll back to probably give minutes ago when you posed the question which I can't quite recall the formulation of it.

JUSTICE COOPER:

Nobody liked the question.

MR GARDINER:

No. I suppose, I think what we are saying is there is nothing wrong with the existing system, it gives us all the tools, you know with the CPENG and the framework so I don't think anybody is suggesting that the current system doesn't enable what people are talking about. It is there now with the ability for the practice areas. It is then a case of should there now be that higher degree of competency required for a particular subset of building (inaudible 12:32:20) and I suppose then the question has to be – you have to then work through is saying okay, are the people who are going to commission these sorts of buildings that have that particular period or whatever the criteria are, likely to employ the right people anyway because they are big corporate players and you know if you go to Opus or Beca's or whoever, these are the competent practitioners in the space, therefore you don't need to do it any other way or have we got a risk at some people who want these buildings could go and choose the lowest cost conforming engineer and that is when, I think there is an argument of possibly having a specialised categorisation of engineers.

JUSTICE COOPER:

It is pretty hard at least intellectually to defend a system which is actually simply reliant on acquired reputations isn't it? Doesn't it have to have some objective standard to which others can aim or will we always just have Beca Carter, Holmes Consulting Group and Opus and others that I apologise for not mentioning but surely there has to be a system that is open for others to enter. Does anybody – is that an understood question? Yes, Mr Clark?

MR CLARK:

I think there does need to be a combination of the two. That's because of the nature of structural engineering and all the facets that come together to make a competent structural engineer that it needs to be developed over time by practise. However there needs to be benchmarks set and that can be, that individuals can then relate to as to if they have achieved that or not and I think the existing system that the structure of it is appropriate. All I think we are suggesting is that there should actually be another level and how that level is set and measured and how people then achieve it is obviously another issue.

JUSTICE COOPER:

Yes but I suppose, well I think you are agreeing that those issues should be preferable to something which is objectively measurable.

MR CLARK:

Yes definitely those benchmark elements need to be defined and so that people can measure themselves against it and be certified as having achieved that level.

JUSTICE COOPER:

Mr Bradley?

MR BRADLEY:

I have got a comment. It seems to me that under the current legislative framework with the licensed building practitioner scheme that there is the need for another qualification because under that scheme there is restricted

building work for certain type of structures and I believe that there are definitions of those types of structures in that and what we are saying here is that CPENG is being an entry level qualification doesn't necessarily qualify you to do some of those buildings which are in that category, so by inference something would be required to bridge that gap.

JUSTICE COOPER:

I am not sure if I am following you. I thought you were making some analogy to the licensed building practitioners?

MR BRADLEY:

No, unless my understanding of the legislation is not quite right I am sure someone will correct me if it isn't. Sorry?

JUSTICE COOPER:

The correction is coming I think. Yes Mr Gardiner?

MR GARDINER:

(inaudible 12:36:28) well I think restricting building work is a concept only applies to domestic construction or residential stuff so currently there is no linkage, the regulatory regime of having a certain type of competency of people to do particular work in the commercial space apart from the recognised engineer for the dam regime. I think –

MR BRADLEY:

I stand corrected.

MR GARDINER:

– part of this discussion is about whether there should be a linkage there.

JUSTICE COOPER:

Yes.

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MR BRADLEY:

Mine, I must've been misunderstood. I understood there to be, or certainly in the future the idea that there would be for engineers.

DR CLELAND:

Sir could I just comment briefly? From an IPENZ perspective, I mean one of the things that has come through, we've been asking since 2005. We really think there is a public benefit in what we can call critical work and I'm not using the work restricted, but critical work to be done by a registered person, and we have advocated since 2005 that the building consent authority accreditation process that could be built into it so that we do get that level of certainty. A second element that hasn't been mentioned is the issue of information and Mr Gardiner spoke about this earlier. From an IPENZ perspective we got demands early on where people wanted field information which we felt was too broad to be helpful, but since 2006 and it took right to 2011, we've been building up good quality practice area information on every single registrant. They get reassessed every five years so it took till 2011 to get everyone. So our intention is to give more information because information in itself, as has been indicated, also helps manage risk. So our intention is to start displaying on the register people's practice areas. And now that we have authentic information it's only been available for a few months, and our other position is that we're quite happy to investigate a high level competence. We should realise that that high level competence may not be in all 12 elements of the CPENG competence standard. We may not need to look for high levels of communication, things like this. So it may only be for example quite specific. It may just be the design aspect of very complex structures that needs to be at high level. It's not all the competences, it may just be that one.

JUSTICE COOPER:

Is that what applies with respect to the current classification which applies to registered engineer, is it for dams?

DR CLELAND:

Recognised engineer for dams, yes. The people there specified dam safety and they're assessed by a specific panel and the view is that you need, it would be very rare to get onto recognised engineer if you weren't something like 15 years out, which indicates they're assessing at a high level competence for that particular element.

JUSTICE COOPER:

Yes, well I suppose my question was are they, is that a qualification which is assessed just on a small subset of the considerations that you otherwise take into account?

DR CLELAND:

Yes. There are only 30 of them, so when they come through, any form of CPENG assessment process, they declare dam safety and then that quite specific assessment of their dam safety knowledge is undertaken at that point.

JUSTICE COOPER:

So this would be a same focused inquiry if there was a second tier qualification in the field which we're interested in?

DR CLELAND:

Sure, yes.

JUSTICE COOPER:

Did you say there were 13 or 30?

DR CLELAND:

Three zero. And there's something like 20 design verifiers.

JUSTICE COOPER:

So the recognised engineer in the dam sphere, is that something you can only do by experience? There's no, you don't have to go back to university to acquire any related knowledge?

DR CLELAND:

In that field it's a very small practising community so the people with expertise work within the society on large dams, and as they build up their expertise then the most expert in the society become our assessors to assess the others in that particular competency, which is being able to assess the quality of a dam safety assurance programme.

JUSTICE COOPER:

Well there seems to be a general agreement about the broad direction that we should be considering if may put it that way. There's nobody who says the present system couldn't be improved in the kind of way that we've been discussing?

COMMISSIONER CARTER:

I think we could move on to see if there's any views on this matter, item number 3 and that is the code of ethics, and we're talking about training now here. So Code of Ethics seem to be produced. Do we have an active, activity going on to make sure people understand the Code of Ethics or is it just something that's presented for all members to commit to follow. I mean, you know, some of the examples have, seem to be quite useful to, for people to be able to gauge how the code of ethics applies.

DR CLELAND:

Sir we provide from time to time information and updates so that as cases come in that we're asked questions, we will publish advice in our newsletters to members and sometimes through disciplinary cases there are

interpretations which are then published as well. So as we see a need, there's no systematic regular publication but there are periodic publication of these. For example I picked up one the other day which was written in May 2003 which was called *Ethical Obligations in Structural Engineering Safety* So there was advice done in May 2003. So these things are done periodically but that we wouldn't say we would publish every month. It's, there may be two or three newsletters in quick succession then nothing for several months. So it's really as we see a demand in the profession for information.

COMMISSIONER CARTER:

Should we assemble a dossier of knowledge that's available now with the Internet. Someone could access all advice that's been accumulated over the period of time. That might be helpful I don't know. I mean if we're going to make the, well the code of ethics has assumed an extremely important part of this process of that engineers are obliged to follow and we must do what is necessary to make sure that they really understand this and commit to it. It could at times be seen as just a sort of an afterthought that arises when something has happened but hasn't been particularly regarded at the time as a matter for the code of ethics but it turns out it in reality it was, and it was an important matter.

DR CLELAND:

That's correct Sir, and also in your, looking at your previous transcripts there's one completely missing version of the code of ethics which hasn't, which is the 1995 version which I don't believe has been discussed with you at all. There were versions pre and post 1986 but in 1995 the code of ethics was changed to five principal statements and guidelines and so that sat there for a period of time. And in 2002 the CPENG minimum standards were brought in place and then in 2005 the IPENZ minimum standards were brought in alignment with CPENG, so there's another stage in it. And part of the issue has been that there was a view moving from '86 to '95 to try and make it much more principle based, which then with very specific information which needed to be in the guidance notes and since 2002, in 2002 it became more

prescriptive but I think a really interesting question that's arisen, and looking at the discussions that have been held before you, is it now it's still too principle based and we need to be more specific, and we've certainly got some views in that space.

COMMISSIONER CARTER:

Yes well more than educating the Commissioners, it's really important to educate the profession and I just wondered whether any of the practising engineering firms feel that there's anything more that would be helpful for them to disseminate information amongst their staff?

MR PRENTICE:

I will make a comment. They're not, obviously with the earthquakes in the Canterbury over the last couple of years it has given us all an opportunity I think to take a step back and look at some of those real key questions, and I think from our perspective, I mean we absolutely do prescribe to the IPENZ code of ethics but we feel that perhaps it could be just sharpened up and tightened up in some areas just to provide a little bit more guidance to some of our staff.

COMMISSIONER CARTER:

The code itself or the guidance?

MR PRENTICE:

The guidance.

COMMISSIONER CARTER:

The guidance, okay. That seems to be consistent with what Andrew's saying.

JUSTICE COOPER:

It's an ethical rule, I take it, that engineers should not work outside their field of competence, is that right?

DR CLELAND:

Yes, and that's been enduring through all the codes, pre '86 to the present day. In 2002 there was an extra element added which is, "Not knowingly permit engineers whose work he or she is responsible for to breach that requirement." So in 2002 it was broadened to include supervision.

JUSTICE COOPER:

Is there a feeling that this ethical rule is not, or is breached more often than would be desirable?

1247

MR BRADLEY:

I think in a lot of times it's breached unintentionally, as I was mentioning before a lot of people stray outside their areas of expertise without actually realised they're doing it. It comes back to a knowledge thing and an experience so I think in a lot of occasions it's an unintentional breach.

MR SPENCER:

Perhaps just to expand on that I think if you can illustrate it with a point with an example, somebody who thinks they're adequately qualified to assess an existing five storey building might do so because they know how to design a five storey building.

JUSTICE COOPER:

Mr Gardiner, do you have some views on this don't you?

MR GARDINER:

Yes, and I think there's probably two bits to the Ministry views. One is the expression of the two Codes of Ethics to give them some single name, probably in the fact that the two sit alongside each other, can create some confusion, I think are useful to sort of help reconcile that, but I think yes the experience of some of the people who have submitted before you and in

particular the CTV hearing is that a lot more guidance, structured guidance is required for the engineering profession, I don't think anybody's wilfully breaching the Code of Ethics but I think there is scope for and I think as Sir Ron indicated, sort of bringing all the guidance, because there's some really good guidance out there, bringing it together, perhaps some more structured sort of training, an education for engineers and it perhaps becoming a bit of the focus of the competence assessments of the assessors of asking a few sort of probing questions in that particular nature to ensure that the candidate engineers have really thought about the ethical issues. My observation is that many engineers don't really think too much about it because it's – you know and that's not saying that they don't, I mean ethically but they don't have cause to think too much about it, it just becomes implicit with what they do so bringing it to the attention a little bit more in the assessment process, the training process could lead to a better position.

COMMISSIONER CARTER:

In regard to this period seen here in societies, it's only the IPENZ that is really actually looking after this particular area. I think the others are more technically focused, would that be right Stuart?

MR GEORGE:

Yes that's correct.

JUSTICE COOPER:

Why is it thought necessary to have different Codes of Ethics for IPENZ and CPENG?

DR CLELAND:

I don't believe they are different in the application. The minimum standards in the IPENZ code are identical to the minimum standards in the CPENG code. The difference is the IPENZ code has the principles and the guidance which is seen as aspirational, and then the minimum standards are exactly the same as CPENG. So our view is that there is no difference.

JUSTICE COOPER:

But there are two codes?

DR CLELAND:

Correct, so in 2002 we did the CPENG code, minimum Code of Ethics which are the standards and in 2005 we added a part 3 to the IPENZ code 2 – and we made it clear that what people would be judge on in terms of disciplinary actions was part 3 which are effectively the same standards. Where it says chartered professional engineer that is crossed out and the word member is inserted so effectively the standard is exactly the same.

MR GARDINER:

I agree with Andrew's analysis, the only sort of comments I would make and I think it's in our submission is that the obligations to public safety are a little more clearly expressed in the IPENZ codes than in the CPENG one, from our observation.

DR CLELAND:

Sir, if I could comment as the writer of both. Obviously we improved in 2005 but the standard we put in is rule 43 which then goes into the IPENZ code, "a Chartered Professional Engineer must in the course of his or her engineering activities take reasonable steps to safeguard the health and safety of people". So effectively that was the – was written in 2002 and translated. The 1995 IPENZ code for example only had the statement, "members have a duty of care to protect life and to safeguard people". So we've come down to that much more specific wording about taking reasonable steps to safeguard health and safety and that is the testing ground in both. It may be in the guidance document, the CPENG rules don't have guidance and the IPENZ document does have guidance and I think that represents one as a private bodies documentation and the other one is – are rules which have the power

of regulation and therefore it's it not appropriate to insert guidance within them.

JUSTICE COOPER:

What if an engineer is – becomes aware of somebody outside – some other engineer operating outside his or her scope of practice? Is there an ethical rule which obliges the discovering engineer to take any action?

DR CLELAND:

Addressing that at me Sir or at everybody.

JUSTICE COOPER:

Either really, the – you'd be a good person to start I imagine.

DR CLELAND:

I think the answer is that one needs to look at the rules in their entirety and if in fact they – there is nothing in rule 46 that requires that so the only requirement where they would have to do something was if in fact they thought health and safety was at risk through that incompetent activity or that activity outside competence so they would have to apply it in that fashion at present so there is no specific obligation under the CPENG code. The IPENZ rules and this takes you to the other regime, and not the IPENZ code of ethics but the IPENZ rules, imply that IPENZ members have a duty to the profession as a whole to essentially bring to notice matters where they see of concern. So there is an obligation under the incorporated societies rules which on members to act, but not in the Code of Ethics of either.

JUSTICE COOPER:

Wouldn't it be better if there was?

DR CLELAND:

That's certainly a matter we want to look at. There're actually four matters we want to look at and that is one of the four matters as to how we would frame that.

JUSTICE COOPER:
What are the other three?

DR CLELAND:
The first one is really the – we've talked about it already, rule 43 is really to what extent do you need to disclose if you come across something where you think there is a risk to health and safety, what is the appropriate level of disclosure? Whether it's guidance or a rule change. You've talked about the second, the reporting poor practice, sorry you've talked about the fourth one which is operating outside competence. The third one is where you see poor practice what is your responsibility, and the fourth one which I think is really critical is concerns raised by new knowledge. An engineer does a design and new knowledge is discovered, whether by Professor Buchanan's team or someone else and what was previously regarded as a good practice is brought into question and what is the responsibility of the engineer trolling their way back through the jobs they've done in the last 40 years to saying, now that practice I used may or may not be regarded as a good practice now, does this have any effect in terms of health and safety. And of course they could have changed employers and have no records whatsoever of the job left, so I think that's a really interesting question of the impact of new knowledge in reviewing past work. So those are the four that we really want to give some careful attention to.

JUSTICE COOPER:
In the legal profession it's different now from what it was 40 or 50 years ago, but there seems to be quite cultural readiness to complain about professional standards of other practitioners. There's a real reluctance in the engineering

profession, isn't there, to adopt a critical posture with respect to other engineers. That's not necessarily a bad thing but do you – I'm just thinking of how the complaints process works. Are there resistances that have to be overcome here, is there – does the system work or is it something which engineers are very reluctant to become involved in?

1257

DR CLELAND:

Certainly we get approached by engineers who will provide us information but don't wish to be a complainant. So I have a delegated authority where we receive information to deem the matter to be a complaint and I exercise that authority quite regularly and so that converts it to a complaint so that is evidence in favour of what you're saying that they are reticent.

Another issue that we have is that insurers will often in fact apply confidentiality so if you have a building which has been repaired so it's no longer a risk, all the problems have been fixed up, then there's no significant and immediate risk to health and safety, therefore the insurers apply their confidentiality requirement over the top and the engineers then tell us that they are bound by that confidentiality agreement on the settlement on insurance and they can't break it under our current Code of Ethics because there is no significant and immediate risk to health and safety so where buildings are fixed the insurance industry does have a significant role and some of the consulting engineers can perhaps talk about that more than I can. So those are certainly elements and then the third element is that those who know will, generally speaking, be those doing peer reviews and they get caught between the grounds I'm doing a peer review of your work, I'm doing a thorough job, I want to come and discuss it with you and try and help you improve your piece of work versus I turn into the complainant. So our view for a long time has been the people who don't have such a stake in the game are the building consent authorities because they see a lot of this and so we've focused on them as being a place where information can flow back quite

readily to overcome some of those other issues which mean that engineers themselves don't necessarily make complaints. The last thing I'd say in this respect is that we encourage engineers when they see low level problems to actually get on and educate their peers. It's much better they work in an open culture and try and educate people so that we don't have to collect everything in a disciplinary or complaints process. We'd much rather they were helping each other to improve their practice.

JUSTICE COOPER:

I suppose in some circumstances the stronger the stance taken in the ethical rules, the easier it might make things for engineers who do have knowledge but who are facing pressures from underwriters or others with a commercial stake to overcome those pressures and do the right thing. We've had to consider this issue in the context of building inspections after the earthquake where there've been instances of knowledge coming into people's hands, not just engineers, but others and wondered whether some sort of statutory protection for people in those circumstances would be desirable. Has IPENZ ever given that possibility consideration?

DR CLELAND:

I'd have to go and check the Act and its wording in terms of how complainants are protected. At the moment the way we operate the person making the complaint has to become identified and I'd have to check into the Act whether it's possible for us in fact to have what would loosely be anonymous complaints. Ultimately it becomes, even when people wish to be anonymous, it's pretty clear where complaints come from because they have the knowledge of the issues one generally speaking will be personally known to the engineer who is the respondent.

JUSTICE COOPER:

It's brought us to 1 o'clock. We will adjourn now till 2.15. Over the adjournment you're welcome to suggest matters for further discussion if you

wish to otherwise I think we're probably in a position to move on to the issue of the interrelationship between the learned societies and co-ordination of the various activities of these groups which is on the schedule for today but I'm certainly open to dealing with matters people want to raise with us this afternoon.

HEARING ADJOURNS: 1.02 PM

HEARING RESUMES: 2.16 PM

MR ZARIFEH:

In the panel is Mr David Sheppard who is next to Mr George, between Mr George and Mr Gardiner, the president of the New Zealand Institute of Architects.

JUSTICE COOPER:

Thank you. Mr Sheppard, everybody else has made an affirmation to tell the truth, you won't have any difficulty with that I know. Do you solemnly and sincerely truly declare and affirm that the evidence you will give for Royal Commission shall be the truth, the whole truth and nothing but the truth.

DAVID SHEPPARD AFFIRMED

JUSTICE COOPER:

Now I'll just explain that some of the people off-sites are making a transcript of everything that is said today and that is dependent upon your voice being picked up so if when you're talking you'll need to just make sure that you're in reasonable proximity to the microphone and they're directional so you have to be in line with it really.

Now I left people with the thought before lunch that if they would like to nominate particular subjects that we haven't discussed to their satisfaction they should bring them up. Is there anything in that category?

MR BRADLEY:

Yes, I'd just like to make a brief statement concerning the identifying breaches of the Code of Ethics and expanding a bit on what Andrew mentioned before. With regard to making, potentially making a change to the rules or the, you know, identifying those who breach the Code of Ethics, I still think there will be an issue with engineers being reluctant to identify other engineers and there's several reasons for that. It could be from commercial relationships, you know, being seen to be you know a pain in the arse if you know what I mean, excuse my language.

JUSTICE COOPER:

I don't think we've had that word in the transcript to date Mr Bradley.

MR BRADLEY:

Sorry. But I still think there will be a reluctance so I think there needs to be other mechanisms in place that can identify those who are perhaps working outside their areas of competence and one thing that has sprung to mind is the potential for doing audits and I don't know whether this is something that needs to be – is going to be covered later in the week and if so feel free to stop me, but what I'd like to mention is an idea being – you could form a group of auditors and audit a certain percentage of consents on some sort of timeframe, within two or three years or what not, and then identify people who are not working to the required standard and that would have the benefit of – that auditing group would then take it out of the hands of individual engineers to identify those in breach of the ethics and they could actually do that and the benefit, and a benefit of that would also be that the engineers, sorry training needs could also be picked up by that group of auditors because they would see the deficiencies that are being – in the designs and the gaps in knowledge amongst the engineering community so it would have the benefit

of enabling people to tailor engineering training and also pick up those who are in breach of their ethic, more ethical requirements. That's all.

JUSTICE COOPER:

Yes, any comments on that suggestion?

MR GEORGE:

The structural engineering society do support an audit body which we believe should be formulated by MBIE and possible IPENZ and we think that audit body should be over-viewing both the design process and the design review process.

JUSTICE COOPER:

Any other comments on that, Mr Clark?

MR CLARK:

The society would agree with an audit body. The difficulty we see is that the members of that audit group would have to be well versed in structural engineering and the current requirements. Therefore they would need to be practising and one of the points that Mr Bradley suggested was that they would need to be independent and not be practising structural engineers. We would see some difficulty in how that would actually work and that would have to be worked through as to how you keep the audit group competent and yet not compromise their ability to service the public.

COMMISSIONER CARTER:

Could it be combined with an overview service that could be accessed by building consent authorities? In other words to review submitted designs for projects that the authority considers require a higher level of examination and the same?

MR BRADLEY:

Yeah, I agree it could, there definitely could be some cooperation between the BCAs and auditing group, maybe that could help them tailor it or reduce the timeframes. If the BCAs are seeing particular firms who are consistently submitting sub-standard designs then perhaps they need to be audited at a more regular interval.

COMMISSIONER CARTER:

Yeah, obviously be quite a bit of work to be done looking through it and wondered whether Mr Gardiner wanted to add something on the topic.

MR GARDINER:

I think there's some merit in the idea but also I think we probably need to look at sort of what is the specific problem that we're trying to solve here because there are possible other solutions and probably the preference would be that if we're going to have resources dedicated to this sort of review type stuff, maybe best off directed towards educative type solutions rather than an audit review type stuff. I think there does certainly need to be some audit thing but we – you end up sort of having a lot of policemen out there, whereas we'd probably want a lot of educators more than we've got policemen in the system.

MR BRADLEY:

Yes, sorry, I guess the concern is there is a lot of education going on in the current peer review process and I know a number of engineers go through and fine educate someone if they come across a sub-standard design, but I guess the – my concern would be that there are a number of instances that we're aware of where a design has gone through and is being peer reviewed and errors or mistakes haven't been picked up and there is no – all the auditing processes or the majority of the auditing processes out there at the moment are more a procedural base rather than actual physically making sure that things are done right, ie checking calculations, or along those lines so this

is more of a way in which that closed loop can be broken and it's – I don't see it as being as a policeman type thing. I mean it would be – at set intervals it would be whatever deemed appropriate but it's not going to be every week or every year. It'll be a number of years sort of thing and it's just more of a check and balance on the performance in the industry, with the added benefit of helping to tailor training needs.

JUSTICE COOPER:

Later in the week, or from tomorrow onwards we're focusing more on the regulatory system and this subject has come up now because it does have a relationship to the Code of Ethics issues that we were discussing before lunch but certainly we have been thinking in our deliberations about further checks and balances in the system at some stage, whether it's for particular kinds of projects or more generally something around the building consent processes which offers another element of checking on what is there now and I think Mr Bradley described it as something that would, no Mr George talked about an audit body in the design process and in the design review process having a role to play so there is possibly a need for something which supplements the existing resources required by building consent authorities in that field. How do you respond to that Mr Gardiner?

1426

MR GARDINER:

I suppose there's the range, our objective here is to raise the overall quality of structural engineering in New Zealand and there's the range of various things that we've discussed earlier today and this afternoon that all headed in the particular direction and there are some choices within all those things and in the case of choosing the right set of tools to be able to improve the quality of structural engineering I think needed a bit more thinking about whether an audit style mechanism would be one of the best ways of doing that. I'm just trying to think in terms of how can you then, with some degree of confidence, that a bad practice would be picked up, you know. Audit inherently is a sampling style mechanism. You're not looking at all the work. You'd sort of

see that it could be a very high cost system for comparatively low returns whereas other systems could be with slightly lower costs with higher returns. I'm not sort of making that judgement now but I think it's a part of the consideration.

JUSTICE COOPER:

Mr Spencer.

MR SPENCER:

I've just got a thought on this I suppose. I wonder if we could take a leaf from what the architects are doing and some of what we do through our internal verification processes which, when they work best, are employed early in a pro-active fashion where you look to have something akin to I suppose the urban design review panel system, so it's not so much an audit but a presentation of the project and in a technical sense it might talk about the sorts of design philosophy that's going to be adopted, the types of resources that are going to be brought to bear on the job and I think that would be quite a pro-active way I suppose of getting better outcomes as opposed to something that felt like a stick-type audit process.

COMMISSIONER FENWICK:

Is this sort of a preliminary project report is it? Set out the basis of the design.

MR SPENCER:

Set out the basis of the design, but I think akin to the urban design review panel if it's a reasonably august group I suppose, they will drill in and establish whether the team has the wherewithal to deliver the project and perhaps make recommendations about accessing additional expertise and so on if that was felt to be necessary.

JUSTICE COOPER:

I'm not sure how widespread that practice is. It's an Auckland thing isn't it?

MR SPENCER:

The urban design review panel? I believe they've introduced it down here in Christchurch as well but, yeah, I suppose I'm thinking that that would probably be something you'd only bring to bear on a certain scale and complexity of project, not routine work. It would be too onerous I think on those smaller projects.

JUSTICE COOPER:

Can you comment on that Mr Sheppard?

MR SHEPPARD:

Sir, that approach has been adopted in several cities around the country. It started in Wellington. After a few years of hard thinking it was set up in Auckland and has been running for more than 10 years. Hamilton I think has recently introduced it and we have been running, or the City Council has been running urban design panels for about four years now. I am a convenor, one of two convenors of those panels and last year the City Council here elected to continue with the process. As part of the blueprint plan the City Council is now introducing a rapid fire urban design panel for every building that's going to be built or designed in the central city. There's a five day turnaround. Basically I think you could say it's a ticking the box process. It's going to be largely being set by architects and planners, landscape architects, more to see whether it fits in with the (inaudible 14:31:29) location rather than getting into the technical detail of the building. I can see a parallel that this has a lot of appeal to me I think. You just get the basic guidelines set down and then it goes through the normal processes after that.

DR CLELAND:

Sir, can I comment as well please. I think in this concept we need to think about how this sits alongside the occupational regulation because what you end up doing in most of these circumstances is you look at the work of a team

in a building and it's an integrated system and you want to make certain that works and so our experience is that if you're looking at a process where you need to audit at that building level and I take the caveats from Mr Gardiner to make certain it's worthwhile, and then from that information flows down to look at the work of the particular natural persons who are part of that team. So I think it's actually important that in fact it's done around that and if you're going to audit it in that way it's done at a building systems level and then the outcomes of that would flow through to occupational regulation.

And in occupational regulation really you've got three things you can do – one is simply education and counselling which is really saying, "Look on this job you're below the standard" and you can look at how that can be addressed. The second stage up is actually an early call in for re-assessment. The CPEng Act allows us to call in people at any time, so we received information which said that someone was, um, their practice was in doubt we could in fact call them in for re-assessment and that's not a disciplinary process but they simply get a notice and we would call them in and re-assess them at that time and they would pass or not in that assessment process. Then, of course, your last action if it's particularly serious you go to a disciplinary process.

So the whole idea is to keep that open culture of learning out the front but if it's bad you do need to go to the disciplinary process and it's a matter of finding a way to make that work. Now in our view we've indicated that we believe the commercial work we need consolidation of building consent authorities. We've even talked about one national building consent authority for commercial work and obviously to have the right processes in place, a much simpler, the smaller number of building consent authorities you have. So picking up Mr Gardiner's points if we got down to a much smaller number, could be as low as one, building consent authorities for commercial work, then that in fact would lead to an approach where you can have this learning culture alongside the disciplinary culture in bad cases.

JUSTICE COOPER:

Well that's another issue to be discussed later.

MR MILLAR:

Sir, an area of greatest learning is from our mistakes and a lot of these things picked up through the review process but when things go wrong one of the issues that I personally have concern about is the fact that often those learnings aren't published because they're settled through mediation or otherwise with confidentialities and I think that that's where we have a huge amount to gain by finding a process whereby, not necessarily the settlements are sorted out but certainly the major learnings that we can gain as an industry can somehow or other get into the general arena that engineers can draw from.

JUSTICE COOPER:

Have you got any suggestions Mr Millar?

MR MILLAR

I think that's something we have to turn back to you Sir.

MR BRADLEY:

Well one approach that you might take is lobbying the insurance industry to publish sanitised information on types and number of claims. I mean if you're getting a dozen claims of tilt panel design that's then defective then obviously there needs to be some training in that area. Locations and engineers don't need to be published. It's more of a strictly learning thing. Just that information isn't getting out there into the community at the moment.

MR PRENTICE:

If I can just make a comment to follow on. I totally agree with actually what you've just said there. I actually believe there needs to be a bit of a culture shift right across this entire area. While I agree about the need to do some form of an audit – whether we're talking about a sharp stick or a carrot – some form of an audit. At the end of the day we really shouldn't need to do that if we had the right culture there in the first place. I believe there is an issue. I do

believe that the engineering industry generally doesn't like to be seen to raise complaints about other fellow colleagues, and I think what it comes down to is the process and I think, I will put this back to Andrew.

1436

I think you potentially need to look at this as more of a learning experience so we need to look at what the outcome is here rather than the actual process itself and I might be talking about a Utopian state but I believe that that's ultimately what we should be trying to get to. What are the outcomes we are actually trying to achieve here rather than the process that we go through to get there, and that all comes back to exactly what you've just said there, which is about understanding how the mistakes were made in the first place and how we can learn from that, but I don't know the answers either.

DR CLELAND:

Sir if I can tell you we do have a mechanism called CRoMiE, CRoMiE stands for confidential reporting on matters in engineering and it was based off a syringes in the UK called CRoSS which is confidential reporting on, I can't remember the two S's but one is structures, which was copied from the Institution of Structural Engineers and the idea was to try and create a mechanism where people could report their learning experiences along the lines that have been discussed by our colleagues and we could then present those in a way, as a learning experience. The reality has been we get relatively little information comes through that CRoMiE portal, how we are reliant on people putting things in there and we advertised it exists and people seem to know it exists, it's just no one, or very few people lodge material into that. So that is a mechanism that could work but we also believe the building consent authorities do have a slightly different role in that they exist in the public interest in that role. They are appointed in the public interest and information flows from them would be tremendously helpful to help because every piece of work flows through a building consent authority to have so, to have means of creating information for those in an efficient manner because we don't want to add cost to no purpose but efficient information flows and effective information flows from the building consent authorities are helpful

because it also helps, as we will go into in the discussion in a few minutes, if we see similar things occurring around the country that then creates a CPD opportunity and the other thing that can go with the CPD opportunity is that if we can link it back to assessment that is valuable because if there's something going wrong, we don't want people to just go on a two day short course to catch up. What would be ideal was at the end of that two day short course they actually do an assessment and that assessment then forms evidence against their next reassessment to CPEng and that way we start to close the loop. So the whole question of learning from these things, we are very, very low at the moment on the amount of CPD that has assessment at the end of that and that would be another place where we can make advances in these areas 'cos then we know the learning has occurred because a person can attend 50 hours of CPD a year and learn nothing or they can do 10 hours of CPD and learn a fantastic amount and it is actually the assessment that helps tells us this.

JUSTICE COOPER:

Any further comments on that issue, yes Mr George?

MR GEORGE:

Can I just make – one more observation is, if you are talking about an engineering equivalent of the urban design panel, there is already an opportunity there that just could be taken advantage of to get a similar effect and that is the resource consent process. Currently if we come along and we want to design a new 40 storey building in Auckland there will be a resource consent process but it is a session, a bit similar to what we are sitting through now, as a panel of people and some people making submissions but those resource consent hearings are completely void of anything to do with the structures, they talk about dust, they talk about construction noise, they talk about traffic, they talk about ground water drawn downs now is very popular in Auckland but there is no talk about but there is no talk about how a robust building structure can be incorporated into the design and it is even detrimental in that effect because what actually happens is the architects in

the first six months of a building project develop, are focused on getting resource consent and they work with the traffic engineers and a few others and develop a concept for a building. There is no – little or no structural engineering input at this stage and then once that resource consent is granted the structural engineer is in a position where he's trying to dovetail his structural system into something that is already locked into a resource consent and that process can actually hinder a good engineering design. So what SESOC are suggesting is that the resource consent process could be expanded to include the requirements for a structural engineering concept on how a robust building structure can be adopted within a building design. It is a bit similar to what Mark was saying for the Beca system but it's sort of going into a more public forum. So I think that is an opportunity that could be considered. It is equivalent or similar to an engineering urban design panel.

JUSTICE COOPER:

Yes, well that is interesting. Most people these days try to get out of the resource consent process, you seem to be bucking a bit of a trend there, but Mr Sheppard, what, how do you see this, there is quite a difficult issue and again it is difficult to know whether it's an issue for today or like many other things, later in the week but there is a point at which there needs to be a meeting of minds between an architect and the structural engineer isn't there and coming at this from the point of view of education and training, you – does that happen early enough do you think, or is it too general a question?

MR SHEPPARD:

Your Honour I think there is variation in the way architectural engineering that the professions do practice these days and it depends very much on size of practice, the type of interests each practice has. My own part I grew up with mentors like Sir Ron Carter and I think I've always personally had a great interest at sketch design stage to have (inaudible 14:43:05) to know at that stage if I am going to build the building, what materials I am going to have. I think as we come closer to today's practice, especially with the designer using a lot of computer assistance, the younger members of the profession, do in

design anyway, tend to believe when they have a nice image of a building that that is the design, that the structure will follow. So I think we are moving into an area where a time when the engineering and architectural professions are slightly, diverging slightly. But at the risk of using my own practice as a general application, I believe that our practice, along with most other practices, believe that right from the outset you need to – and as soon as you know the scale of the project that you put together a team and we have always enjoyed bringing the structural engineer, quite often the environmental engineers, mechanical engineers in at the beginning. There is nothing worse than getting right through into documentation and the mechanical engineering advisor wanting twice the amount of vertical duct space just in behind the lift and that is when the engineer has a problem and when the architect has a problem too because by that stage you've made a lot of promises, usually to your client that you can deliver a building of say 1000 square metres, you suddenly need 1100 square metres for these things. So as a matter of practice and in our submission to the Commission earlier in the year we said that best practices adopt structural engineering and architectural advice, take those on board very early in the piece. We have great satisfaction in developing a building that expresses its structural content, how it is built. I think we've – there are a lot of buildings around where you look at them and you wonder what, you know, there is no indication of what is in behind those panels or what is holding what up and so I think it would be, it's, there is a move afoot in many practices to back to structural honesty and the need – the interest, the most successful buildings around the country and overseas are those which go a long way towards expressing, articulating, if I can use that word, how the building is made and I think that would be a very healthy thing for us to all adopt.

1445

But there is the danger that the, unless you are coaching and very closely involved with the schools of architecture, don't know so much about the schools of engineering, but the schools of architecture are falling behind in terms of training people on the technical side and the computer I think has the images you can download, are wonderful but they leave a lot to be desired in

terms of the technical knowledge and the ability to build those buildings. Therefore we certainly stress the need for, as a matter of policy, we bring a structural engineer in as a core member of the team even for small buildings. And in the last 18 months we still are winning commissions in Christchurch but we, because of the geotechnical, the TC1, 2 and 3 soils conditions, we're talking right from day one with an engineer, even a structural engineer on a house, what options do we have? What, how shall we go about it? Light, weight, heavy and these are very fruitful discussions to avoid spinning your wheels later on.

JUSTICE COOPER:

We had a submission from an architect, Mr Guy Marriage, are you familiar with him?

MR SHEPPARD:

Yes, yes.

JUSTICE COOPER:

Who suggests that as a society we should be looking at degree courses which combine both architecture and engineering and he tells us that this is not uncommon in Europe and that I infer he thinks that unless some expedient like that is adopted we may be bound to repeat past mistakes. Do you care to comment on that? A big subject I know but?

MR SHEPPARD:

The architecture schools have fallen a little bit behind. I think the structural emphasis on technical and structural information has fallen by the wayside a little bit. I think the schools are now starting to realise this. Guy Marriage, who I know, teaches at Victoria University. He would probably be aware of that situation that's occurred, but certainly 40 years ago the schools of engineering had structural engineers on their staff. This wasn't to train us to become –

JUSTICE COOPER:

The architectural schools you mean?

MR SHEPPARD:

The architectural schools. There was an excellent structural engineer at the school when I was there in Auckland. This is not to train us to become amateur engineers so much as to alert us to what you learn in physics. Physics used to be a subject in the intermediate year to get into the school of architecture. You had to pass physics 1 as a prerequisite to get into the rest of the architectural course. You had the weights, balances, levers and so on. The engineer in the staff used to then spend time with us on, in studio work, the design work and there was a year's subject on structural engineering and so we learnt the rudiments of it, but this was always destined to remain, would be outside our competency. At least we had some understanding and some feel when we were building a building of again what was likely to hold what up, and bracing shear, matters like that.

JUSTICE COOPER:

So has that been dropped now? Do you not, I take it from what you say that there isn't the requirement for physics?

MR SHEPPARD:

I don't believe physics is a requirement. You go into a, you're chosen from your schoolwork. You go into a three year process for the Bachelor of Architectural Science, and then you go on from there to a Bachelor of Architecture in the remaining two years. But I think in some cases that's now termed the Master of Architecture. I'd have to be, I'd have to check on that. But the structural engineering content of most of the courses has certainly dropped. It's not, it hasn't been as strong as it was 20, 30 years ago.

JUSTICE COOPER:

Is there anyone here who thinks that's a good idea?

DR CLELAND:

Could I just affirm what I know of the Victoria School of Architecture?

JUSTICE COOPER:

Yes.

DR CLELAND:

They did have a three year Bachelor of Building Science which was then traded in to move through to the five year bachelor and I agree it's now a masterate and what they've done is they've dislocated that, so the Bachelor of Building Science is still available as a three year degree but it doesn't articulate into architecture. So the architectural studies and the building science have been much more separated. However, the staffing there still has I think something like six engineers in that school of architecture who are teaching under the architecture programme.

JUSTICE COOPER:

Well is there any more discussion on that issue? Other matters that people wish to raise? Yes Mr Gardiner?

MR GARDINER:

I have sort of wondered, and it may be one that's more appropriate in the next couple of days. This morning we had a discussion around the identification of high level of competency in the structural engineering world using facility under the CPEng to identify a group that's got a more advanced competencies. The discussion did then move onto what's probably the next step should there be a part of building work which is then restricted to only those people, and it relates to the conversation we've just been having partially prior to the architects' one is around should if there are these lists of the more, I'm trying to think of a phrase, the structural engineers who are capable of doing the buildings with a high return, 10 second period, whatever, should in fact there be a mandated that only they can do that particular work?

JUSTICE COOPER:

I inferred that that was the tenor of the discussion, but Mr Clark is that right?

MR CLARK:

Yes.

JUSTICE COOPER:

Anybody else of a different view?

MR BRADLEY:

I would've thought that having those people in a supervisory role, responsible for approving, that within their organisations would be acceptable as long as they do a general overview and know what's going on, and that would be appropriate. Similar in the way that many firms don't have everyone as a CPEng, but they do have some CPEng or senior staff who are appropriately qualified to review and approve work.

MR GARDINER:

There are some choices, you know, if you use the concept of the recognised engineer under dams, they're actually reviewing some other engineer's work essentially. So that, that could be a review activity that those specialists do.

JUSTICE COOPER:

Yes.

DR CLELAND:

Sir I think the linkage here is restricted building work must be carried out by a licensed building practitioner, and both registered architects and chartered professional engineers are deemed to hold a design 3 licence which is the highest level licence. But restricted building work is currently, as was indicated earlier, just residential work. So at the moment we have the

anomaly that structural work and fire design work for commercial buildings is not restricted building work and therefore it's a building consent authority discretion as to whom they will accept work from. But for residential structural and fire work, then a licensed building practitioner in the right LBP class has to then sign the memorandum saying they did or supervised the work which is Mr Bradley's point. So we do have that anomaly and it would be certainly worth doing the public policy work to explore that anomaly to see if there is a better regulatory design.

JUSTICE COOPER:

Any other observations in this issue? Other matters for discussion? Mr Prentice, anything further from you? Mr Spencer? Mr George? Mr Clark? Mr Bradley? Did I leave anyone out, Mr Gardiner? Mr Millar? We had this rather broad heading, "Co-ordination and Roles of Engineering Professions Learned and Professional Societies". I'm not sure that we need to spend a lot of time on this.

1456

It's obvious to me as a non-engineer and even more obvious no doubt to my colleagues that they're very dependent on the learned societies and they've made a great contribution to our – well to the building industry generally. Are there features of the current system which are – by which those societies inter-relate and get their points of view understood and advanced, can this – can their role be enhanced by things that we should be recommending, Mr Clark?

MR CLARK:

Thank you. The biggest issue for the New Zealand Society for Earthquake Engineering is basically resource. We're a voluntary organisation and a lot of the work that has been put together over the years is possibly a voluntary effort. Some sections of it have been completed under contract and we have certainly been supported significantly by EQC in funding and by DBH.

However with the current work load that practitioners are under, we are finding it difficult to get timely input into the work that the society would like to do and should be doing. There is a significant issue and it'll I'm sure get worse with being able to obtain sufficient resource to do the work that we feel is appropriate and is of value to the industry. The other aspect is leadership, we feel that the engineering – the construction industry or the design and construction industry, there is an issue on leadership, leadership in the technical sense in what the industry needs to identify to be able to provide the guidance for practitioners and constructors in their work. We feel that there needs to be a broader authority which has a very strong technical capability to be able to provide guidance for the construction industry in New Zealand. Those are certainly two significant issues that we have, there are some issues concerning the aspect of reviewing the involvement of Territorial Authorities, their capability technically to be able to carry out reviews of building consents and when they should actually be involved in that process. There is an argument for example in the – for the performance of a significant building structure in that the form of that building, its regulatory vertically and horizontally, if the consenting authority does not have any input until it gets the building consent documentation, there is very little opportunity to go back to the designers to be able to get them to reconsider perhaps a more viable structural form or architectural form for that building, so there are issues in that area as well. Thank you.

JUSTICE COOPER:

Thank you. Mr George.

MR GEORGE:

Thank you, along the same lines as Mr Clark I would like to comment about the Standards New Zealand. Structural Engineering Society, that Standards New Zealand is sometimes ineffective in keeping its design standards up to date and we've given an example of NZS3603 I think it's a timber code was published 19 years ago and what seems to be happening is it's falling more and more onto the technical societies to support Standards New Zealand in

writing and developing those codes and filling the gaps and we have the same problem as that we're more or less reliant on volunteer time as the input to develop those standards and we're finding the time, the people and the volunteers harder and harder to find. So I think we need to look at that and find out how we can as an industry better support standards in developing building codes and that may involve some other system of supporting the volunteers or paying volunteers to do that work that's necessary to keep the standards up to date.

JUSTICE COOPER:

Yes, well again as an outsider looking at it I have felt that if the system wasn't a voluntary one, but which did involve payment, it ought to be possible to provide more structured and regular basis by which standards are written and updated than currently appears to be the case. Mr Millar, do you have anything to say, you're not – is it the New Zealand Geotechnical Society that – have I got that name correct.

MR MILLAR:

That's correct.

JUSTICE COOPER:

Do you hold office in that group?

MR MILLAR:

Not currently, I previously did.

JUSTICE COOPER:

You have. What do you think about this general subject though, is the environment, does it give the respect that ought to be given to these societies in recognition of this great deal of voluntary effort goes in?

MR MILLAR:

I think it's exactly the same as the other societies. They rely heavily on a few who provide time and as a consequence it takes a very long period of time to get recommended procedures and guidance documents out into the industry and that's – that's improved in recent years because of support from organisations like EQC and – so that's been a great help but it still is a very slow process.

JUSTICE COOPER:

Yes, and Mr Spencer, do you have a perspective on this from your point of view as a busy practitioner?

MR SPENCER:

I'll just echo the same observations I suppose that – the very people that are most in demand for leading some of our technically challenging work are the right people to contribute to these sorts of initiatives so even in a large firm they can – it can be a pretty short list of real experts that I think can lead these sort of technical initiatives.

JUSTICE COOPER:

Mr Prentice.

MR PRENTICE:

Pretty much support exactly what Mr Spencer said.

JUSTICE COOPER:

So if there is to be an enhanced leadership role for somebody dealing with these technical matters, what are the choices Mr Gardiner?

MR GARDINER:

(inaudible 15:04:46) round that question for a minute before I'm answering. I think to start, just an observation that I'd like to make and endorse that I think, and it's been said by everybody here that there's been a few number of

engineers who have been doing some amazing voluntary effort over the years which we all very grateful as a nation to and it's difficult then to – 'cos it's inherently a voluntary society that we operate. Membership of these technical societies is not compulsory, it's voluntary and then when you join up to one of these societies you can at the very minimum choose to pay your annual sub and do no more, be a taker, and then there are some people, some of them in this room who very much contribute to that. How you then overcome that issue in inherently a voluntary regime is very difficult to do that and I think this – and I think (inaudible 15:05:40) been mentioned by Win and EQC have got a responsibility as the holders of some moneys to fund some of these societies to help deliver the codification of good practice and to pay for some of these volunteers' time to actually do this stuff and probably you know if look at what we've done, probably a little more is required in support Geotechnical Society, SESOC and New Zealand's Seismic Earthquake Engineering particularly looking at the workload ahead in this space.

1506

JUSTICE COOPER:

So the recipe seems to be that you've just discussed is for the current system better resourced. Is that ...

MR GARDINER:

I think so, yes. For the documentation around good engineering practice and guidance as to how to do things. Geotechnical Society guidelines, NZSE, the IEP, SESOC have got some guidelines.

JUSTICE COOPER:

There's no, as I understand it, there's no technical capacity in Standards New Zealand. Is that right?

MR GARDINER:

Probably not best for me to answer. I don't think they are resourced to do a lot of the technical work themselves. They bring that in –

JUSTICE COOPER:

Or any of it in this field. Is that as you understand it?

MR GARDINER:

That's as I understand it, yes.

JUSTICE COOPER:

So they wouldn't be necessarily a good candidate to take on this role of enhanced leadership?

MR GARDINER:

I think we're possibly talking about two different sorts of qualifications. I think what standards is more appropriate to codify is different than say what New Zealand Society of Earthquake Engineering is around, say, the IEP type stuff. The societies are very good at writing practice of guidance around how to do a particular task, whether it be assess a building for earthquake prone, assessing ground conditions, so there is two distinct activities here – one it's best done through a standards or other process and a process which is best done by the profession documenting its own good practice and sharing it.

JUSTICE COOPER:

Mr Clark, you're wanting to say something I think.

MR CLARK:

From the Society's point of view we would be more than happy to support standards and I can't see any problem about them extending their mandate to carry out more of the practice type documentations as against just the straight standards and, yes, my understanding is that they have little technical capability and it's the project groups that they set up they then draw that technical expertise into and the Society would be more than happy to help provide that expertise into those study groups of standards. I think the Ministry I think has quite a strong role here to provide that technical

leadership. It's the standards and leadership are different and it is more the aspect of leadership, being able to give direction as to what documentation is required, what standards are required and to be able to draw on the industry as to what they actually need to be able to produce quality work. So, as I was suggesting, I believe the Ministry should be able to or should develop more technical capability to give that leadership and guidance.

MR MILLAR:

Sir, often the issue really is around support and systems and programming and management. There's often the technical people and the willingness to do this but just the other support components of it are a critical element that could be supplied by standards or any other organisation but that's the area that often is lacking. People are willing to give time but the real problem is around the supporting components of it in terms of just getting the documents assembled and out the door.

JUSTICE COOPER:

That is an aspect of the problem but again it's different from the problem that Mr Clark is identifying I think and also Mr George as well whereby you have a standard in common use that hasn't been reviewed for 19 years and there will be a variety of reasons for that but if there was more central leadership that's a situation that might not have occurred perhaps. Am I right Mr George?

MR GEORGE:

Whether it's a leadership or lack of resources or the pressure from the industry I'm not quite sure why that particular standard has been so long in being reviewed but I should add at the same time there's been parallel guidelines sort of published by other industry groups in timber engineering which may have in some ways defaulted as a standard because the Standards haven't updated their standard but there has been a lot of technical information come through about timber design over the same period of time so I don't know if that's a changing role or why it's happening in that way.

COMMISSIONER CARTER:

There's a suggestion that we could do more to incorporate international standards instead of trying to write every standard for New Zealand as a special case and I'm just interested to hear the comments from you. The merits that were quoted in doing that would be to draw upon a wider research base and to make our standards more universally applicable and to reduce the cost of producing them here if more information was available from the international basis. Is there any reason why we should not be doing that for example?

DR CLELAND:

I think we are in fact. My understanding, and you could confirm this tomorrow with Standards directly, is that the starting point is to look at an ISO and, failing that, to look at Australia and New Zealand and then, failing that, to write a New Zealand specific standard so I believe those processes are already in place and that's why Standards New Zealand as part of the ISO network worldwide. So we have made good progress in that space.

COMMISSIONER CARTER:

But would that, for example, be useable for our timber design standard?

DR CLELAND:

They can be done that way. If I could perhaps share with you one slide. There is actually a wider issue here which is how innovation and new knowledge affects the regulatory system. If I could perhaps ask for, with your permission, GEN.CEL.001 at page 10 this time and this is the same document you had earlier. The page numbering has changed from my printed version, one more page on sorry. The page numbering must have changed. What I've tried to do here, the first point there really just confirms Mr Sheppard's point and there's some interesting reasons why architectural and structural engineering are different, depends on which side of the English Channel you were when the Industrial Revolution occurred as I understand it but we're not

here to study history but I think the second point is the one I wanted to focus on and what we end up is a staged approach with innovation and new knowledge so someone will try something for the first time. When you get that first use then there is no regulatory structure 'cos it's the first time that it's been done and so what you're really looking at is the quality assurances by convincing some peer reviewers. Then as you move forward you start to get emergence of collegial agreement and you might then get loose form of guidance notes. That can move on to acceptance in a practice community so a Code of Practice. You can then go through an external validation process, apply the standards process to it and get a voluntary standard and then, lastly, it can get incorporated into regulation and become a regulatory standard. So all of those are basically ways in which knowledge can be incorporated.

The next point is really important here is that an adverse test result could lead to an immediate need to discontinue a previously accepted method and we did have an instance of this in the structural community where there was a test result, and Professor Buchanan can probably tell us the exact result, which led to the Structural Engineering Society Management Committee issuing guidance immediately and structural engineers in effect stopped the practice of using that particular piece of technology almost immediately and so part of the argument in fact is that you rely on your Code of Ethics and when things happen fast it takes longer for regulators to respond. So what you end up doing is using that whole suite of things in different ways and so what can happen is standards, for example, voluntary standards as (inaudible 15:15:30) been spoken, can get out of date in which case guidance notes are placed over the top of them to say this is how to use that but ultimately it does come down to have a successful system you need both user acceptance and regulatory suitability.

1516

Now I just added a note there at the bottom that our disciplinary committees who are also volunteers by the way and put in many hundreds of hours as our investigating committees are broadly speaking trying to consider whether in fact an engineer had behaved reasonably they would take into account

everything and they might set a standard higher than the regulation by taking into account the non-regulatory advice circulating in the practice community. So that is a sort of broad shape of it so I think if you look at resourcing then one of the questions that arises is that, who are the beneficiaries of this work and the beneficiaries are directly the building owners and the building users, but indirectly then there is a commercial arrangement at the time you build the building and one could argue that the engineering companies make some margin in terms of using these devices so they could pay but it is all quite defuse at that point, but the only place that government has decided to collect money from building owners is in the building levy and the building research levy is the second one. The building levy is there to support the regulatory system so one of the key questions is have we got enough flow of money from the building levy to support these activities which are actually critical to the health of the regulatory system.

JUSTICE COOPER:
And who decides how much money is available from the building levy?

DR CLELAND:
I think Mr Gardiner should answer that question.

MR GARDINER:
(inaudible 15:17:10)probably more appropriate to ask tomorrow, because that is part of the system but there is that, it is set by government in terms of a price per dollar value.

JUSTICE COOPER:
Some years ago there used to be law reform committees that were set up and academics and practitioners who had an infinity for certain areas of the law would meet together and write reports for law reform purposes and I think there were four of five such committees and it was all voluntary and then the forms at the time, that was replaced by what we have now which is the Law Commission which just has a – I think Government sometimes asks it to

report on things and otherwise it uses its own initiative and this is a full time, fully paid, specially established body. Is there any room for something equivalent in the field that we are discussing? Or do you all see one way or another a continued reliance on something like the present system only perhaps better resourced?

MR CLARK:

The present system has certain advantages because it is able to respond to the issues of the moment by the people that are actually practicing and I think that is an important aspect to it but as we've indicated resourcing is becoming more of an issue. Yes, I think what you are proposing would certainly be well considered but the other aspect is that we have a Ministry and that there is the opportunity to look at their capability to expand in a technical way to be able to provide that direction, that leadership.

JUSTICE COOPER:

Any other comment on this issue, Mr Cleland?

DR CLELAND:

Sir the Prime Minister has a Chief Science Advisor and many engineers of course would wish there to be Chief Engineering Advisor but the purpose of the Chief Science Advisor role is really to try, again act in that, a leadership role, unfettered by a regulatory responsibilities and the like so it is a resource, in that case it reports straight to the Prime Minister but I think most people will say it has been effective for example, in leading transformation in our innovation system and things like that and as well as that provide science advice.

Now engineering is much broader than just the construction industry so one of the arguments that people have advanced is that good engineering knowledge in a leadership sense is actually important to good Government and one can't get that from the normal policy machine because what you want is the free thinking of thought leaders who are active in the profession. So the model of having an office similar to the Chief Science Advisor covering all

disciplines of engineering, not just construction, not to replace the role of the regulator but to be that free radical, to provide that leadership function is certainly a model that could be investigated.

COMMISSIONER CARTER:

The Prime Minister does have in his own department some very highly skilled people who are advising him on a range of issues, social, educational, I think transport being one, even in that area, might be some help.

DR CLELAND:

Yes there's some very good people in DPMC and I understand some people thought the chief science advisor's role to be placed in the department of Prime Minister and Cabinet. I mean I'm not privy to those discussions but I've simply heard that that was a discussion. But whether the science advice role should be science, engineering and technology more generally is also an interesting question.

JUSTICE COOPER:

Are there any other comments that people would like to make on any subject? Mr Bradley you may wish to go, you may go now. Any other observations from anyone? Yes Mr Spencer?

MR SPENCER:

I would just endorse Sir Ron's comment about adoption of overseas standards where possible. The other benefit wasn't mentioned on the way through there was a lot of the software that's available these days has automated design modules and so on and the very thorough capacity design approaches I suppose that we adopt in our country, tend to lead us to some quite, just still using hand methods a lot I suppose for our designs which is not perhaps an internationally competitive way to be approaching things. So we are very occasionally losing the benefits of a lot of the advances and the smart, arguably black box componentry of some of these automated analysis and design programs. It's just one comment I thought worth making.

MR CLARK:

Can I suggest that that can be quite dangerous?

MR SPENCER:

Yes I would agree.

MR CLARK:

In the fact that what is needed is well qualified, well practised, knowledgeable engineers who can look at a structure and understand how it's going to behave dynamically in an inelastic manner, and it is able to survive. What is the toughness of that structure? You don't get that out of a computer.

COMMISSIONER FENWICK:

You don't get it out of computers in New Zealand standards but one of the other problems is of course that there isn't, I mean there have been attempts to modify some of these overseas standards to the New Zealand code but you then run into the trouble there aren't enough that you can sell to justify the capital cost in doing it. Look, I endorse your remark wholeheartedly. I think, you know, that you need to think your way into the structure and a computer will not do it safely for you. I couldn't agree more. I mean that's, and I think it's a critical issue and one of the problems with of course people becoming much more familiar with automatic software for analysis and all sorts of things that you tend not to see –

MR CLARK:

To think about the structure, yep.

COMMISSIONER CARTER:

Just one, one final comment from me. I just keep reminding myself that what we've been looking at in the last several months is an extreme event which has tested what was being done for the last many years. Just in our minds are we keeping our comments related to what exists today, rather than

limitations that may have flowed through into the system because things were not done as well as they could've been in earlier years. So I don't know whether that opens anyones, opens up any points that anyone else would like to make, but I think we're just reminding ourselves we've got to be, and we're talking about what we do now with our system. It's to improve the system that we have today, not to improve the system that we had 10, 15, 20 years ago.

MR CLARK:

No that is right and we have to look forward rather than looking back. But even so I think as we move forward we still need that intellectual capability to understand structures and how they will perform. It's, and that only comes from practice. Obviously we need to have a basis of engineering science, but that has to be then complemented by the practice. And that will be the same in the future, I'm sure.

JUSTICE COOPER:

Very well then, so that will conclude our discussion for today. Thank you all for your contributions and we will resume again at 9.30 tomorrow.

HEARING ADJOURNS: 3.26 PM