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Justine Gilliland
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Dear Justine

Submission on the Royal Commission Discussion Paper: Training and education of engineers and organisation of the profession

I attach a copy of the Ministry of Business, Innovation and Employment submission on the Royal Commission's Discussion Paper: Training and education of engineers and organisation of the profession.

The Ministry has discussed the submission with IPENZ.

We are happy to discuss the submission with the Commission and supply any other information if that would be helpful.

Yours sincerely

A handwritten signature in black ink, appearing to read 'D Kelly', written over a horizontal line.

David Kelly
Deputy Chief Executive Building Quality

Copy to: Dean Burke Director Earthquake Recovery Programme



Ministry of Business, Innovation and Employment Submission on the Discussion Paper: Training and Education of Engineers and Organisation of the Engineering Profession.

1. Purpose

- 1.1. The Royal Commission has requested submissions on the above Discussion Paper.

2. Context

- 2.1. The Ministry of Business, Innovation and Employment's Building and Housing Group (formerly the Department of Building and Housing) was one of four submitters to the Royal Commission on the topic of training and education of engineers and the organisation of the profession. Subsequently the Royal Commission requested input from the Institution of Professional Engineers New Zealand (IPENZ) who supplied a technical report setting out the history and the current requirements for education, ongoing competence and assessment of engineers. The Universities of Auckland, Canterbury, and Unitec also provided input on the educational framework.
- 2.2. The Royal Commission has now issued a Discussion Paper seeking input on specific issues, and options for change. A public hearing will follow within the weeks 3 and 10 September.
- 2.3. The submission is laid out following the structure of the questions posed in the Discussion Paper.

3. Engineer Registration and Competence

<p>1. <i>What additional information, if any, should the CPEng Register disclose about a CPEng and how would this information improve, or potentially improve, earthquake building performance? What are the advantages and disadvantages of providing this information?</i></p>
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- 3.1. There is a link between having additional information on the CPEng Register and improved earthquake building performance. Engineers are involved in design, detailed engineering evaluations and the specification of remedial works to damaged buildings. To be effective in this work requires the right skills and competence and currently CPEng (who undertake regular competency assessment to retain the title) covers many types of engineering practice some of which is irrelevant in earthquake building performance.
- 3.2. The Ministry of Business, Innovation and Employment (the Ministry) considers that the CPEng Register should contain information about the area of practice of the engineer. There is a need for consumers in a business as usual sense to be able to identify and select engineers for projects on the basis of known and assessed competence for the work they wish to have undertaken. Given the

imbalance between numbers of CPEng and Members of IPENZ both categories should have their area of practice listed and any additional assessed competence. This may need legislative or regulatory change. The Register currently does not supply information to potential consumers on areas of practice. The Ministry in the previous submission to the Royal Commission suggested that scope of practice should be defined. The area of practice would be an interim step. Candidates for CPEng assessment need to advise their area of practice so the right assessors can be lined up.

- 3.3. It should neither be difficult or costly to put the areas of practice in the register and specifically what the CPEng has been assessed on. For those who are not CPEng but Members of IPENZ it would be a self identified area or scope of practice. As Membership of IPENZ is a one off and then a lifetime award unless removed, there is a significant risk the area or scope will rapidly be out of date so there would need to be a rule that it be updated regularly.
- 3.4. There has always been a role for engineers in advising on a range of building and construction projects from small domestic projects to large complex projects. The events of Christchurch have lifted the profile of engineers in the minds of the public. To provide public assurance on their selection of an engineer for their project the Ministry has advised for example Canterbury home owners in the Port Hills and on TC3 classified land that they need to secure the services of CPEng who have an area of practice which covers geotechnical advice. At some future point the register should also include other competency such as assessors for the purposes of post disaster rapid assessment and subsequently detailed engineering evaluation.
- 3.5. The need for information about the post earthquake or other event rapid assessment and the detailed engineering evaluation assessment is critical should there be a need in the future for the mobilisation of trained resource for a disaster. The public need to be confident that engineers with the right skills are deployed efficiently and confident that these engineers have the right skills for this work and these engineers have been assessed as competent. It is unlikely to be costly to enhance the register to accommodate the recording of assessed as competent to undertake rapid assessment and detailed engineering evaluations of multi storey residential and commercial buildings. There is little in the way of disadvantage although it will be important that competence is assessed as maintained.

2. *Comment, if possible, on the processes that Building Consent Authorities, and any other entities that have significant dealings with engineers, take or should take in reporting substandard performance of engineers to the Registration Authority which could underpin a future case taken by the Authority against a CPEng. What are the benefits, disadvantages and costs of creating mechanisms for reporting and recording poor performance in addition to those already available?*

- 3.6. There are mechanisms for Building Consent Authorities to lodge complaints about poor practice from engineers:
 - 3.6.1. with IPENZ, if the engineer is registered as a CPEng or otherwise registered with IPENZ and subject to IPENZ rules; and

- 3.6.2. with the Building Practitioners Board where the CPEng is carrying out work as a Licensed Building Practitioner (CPEng are deemed to be Licensed Building Practitioners under the Building (Designation of Building Work Licence Classes) Order 2007).
- 3.7. There is currently no regulatory requirement for a Building Consent Authority (BCA) to lodge complaints if they receive incompetent work. The Building Consent Authority options are limited to rejecting the application for Building Consent, discussing the issues with the submitter or voluntarily lodging a complaint with the appropriate professional body.
- 3.8. The Building (Accreditation of Building Consent Authorities) Regulations 2006 provides that a Building Consent Authority must have a system for choosing and using contractors for building control functions. The regulations specify what that system must cover and includes monitoring and reviewing performance and regularly assessing their contractors' competence.
- 3.9. BCAs can only refuse to grant a building consent if the BCA is satisfied that the design does not meet the Building Code or if the design needed to be prepared by a Licensed Building Practitioner (and the designer is not an LBP) because it contained Restricted Building Work. The ultimate responsibility for the quality of the application for the building consent is the applicant and their advisors. The role of the BCA should be a check. Any identification of non compliant design and subsequent construction work by the BCA needs to go back to the applicant and their advisors. If a BCA becomes aware of sub standard work by an engineer or other registered professional there is no regulatory authority for them to address this by way of complaint to a disciplinary body, simply a voluntary option. Consideration may need to be given to a legal authority for such complaints.
- 3.10. Many engineers who are practising are not Chartered Professional Engineers (CPEng). This maybe because CPEng was not seen as an attractive option for mid to late career engineers or there is no cross recognition for engineers who are members of overseas registration bodies. IPENZ report that there are 3000 CPEng and then a substantial cohort of Members who are not CPEng registered. The latter group are not subject to a regular assessment process by IPENZ. IPENZ Membership is a lifetime award on a one off assessed basis. Therefore for this group there is no ongoing competence assessment or evidence that they are up to date with changes in approach or new requirements.
- 3.11. Licensed Building Practitioners are required to evidence their continued competence every two years to maintain their license and CPEng every 5 to 6 years depending on assessed competence which could lead to more frequent assessment. There is a need to drive more IPENZ Members towards CPEng supplemented by a clear statement of area of practice so that there is assurance (as there is for other professions in the building and construction sector) of continued competence.
- 3.12. There should be little in the way of additional costs for the recording and reporting of non compliant work. The question is who sees it or what bodies see it as their role to lodge a complaint and then follow through. There will be costs associated

with making and lodging complaints and the costs of many more investigations and disciplinary hearings. However this would need to be considered against the costs of sub standard work which may not become apparent for many years. There is an imbalance as the costs of the reporting are low, the costs of disciplinary action including investigation fall to IPENZ for Members and CPEng and can only be recovered in limited circumstances. There is an unquantifiable benefit to the profession if it is seen as having integrity if issues with performance issues of engineers are seen to be addressed. Currently the costs of non compliant work fall to the community and building owners down the track.

- 3.13. IPENZ has established Confidential Reporting on matters in Engineering (CRoMiE). This is a totally independent, confidential, reporting system for people employed or associated with engineering. It is not for complaints about individuals but provides an opportunity to highlight wider problems or threats to safety. Any safety issues are referred to someone who can do something about them. It may be appropriate for IPENZ to publicise this more widely and regularly.

3. *Provide well supported views and or evidence about the potential magnitude of the problem of engineers practising outside their scope of expertise and what regulatory measures may be better employed to deter such behaviour?*

- 3.14. There is little hard evidence of engineers practising outside scope or area of practice. This may be due to the fact that scope or area of practice is not identified publicly for the majority of engineers so it is difficult to measure or identify. The previous submission on the Training of Engineers and the Organisation of the Profession from the Ministry (Department of Building and Housing) traversed the grounds for publication of defined scope of practice and this Ministry continues to hold this view.
- 3.15. In small town New Zealand there is the risk in using someone because they are known and local as opposed to using them because they are known for their competence in that area of construction. Anecdotally it has also been identified in Christchurch that the business opportunities of both detailed engineering evaluation and assessment and subsequently recovery work, have resulted in examples of engineers over-claiming competence.
- 3.16. The IPENZ Code of Ethics/Ethical Conduct sets the expectation that engineers will practice safely. It is not an objective of the Chartered Professional Engineers of New Zealand Act 2002 unlike Plumbers and Electricians. The Code of Ethics/Ethical Conduct also sets the expectation that engineers will practice within their self identified area of competence which is not a particularly robust control. Driving more engineers to register as CPEng and increasing the expectation that a CPEng will be required for certain work as the Ministry is now doing may drive an increase in numbers applying for CPEng. IPENZ has a critical role to play in driving up the numbers who are CPEng. Areas of focus could include current Members of IPENZ who are not yet CPEng, graduates through appropriate work on professional development to support their transition to CPEng and members of equivalent overseas engineering registration bodies.

4. *Comment on the effectiveness of the current disciplinary procedures. What balance should be struck between deterring adverse behaviour and ensuring that people are not deterred from entering the profession?*

3.17. The Ministry considers that the current disciplinary approach strikes the appropriate balance between deterring adverse behaviour and deterring people from entering the profession. The problem is the engineers for whom disciplinary action is almost irrelevant as they practice without the benefit of being assessed for competency or assessed against the scope of their practice. IPENZ do cancel memberships in certain circumstances.

5. *What are the key issues that arise from a voluntary registration process? How aware are consumers of engineering services of the differences between CPEng and non registered engineers? What are the costs and benefits of formally requiring registration to enable an engineer to practice? Are there any other ways of formally requiring registration to enable an engineer to practice? Are there any other ways of increasing knowledge among consumers of the merits of acquiring services from CPEng over non registered engineers?*

3.18. The legislative framework envisages a voluntary approach to registration of engineers. The difficulty of voluntary registration is ensuring that there is something in it for the volunteer to engage in the process. As long as unregistered engineers have no limits on practice then there is little in the way of incentives to participate in CPEng assessment. The opportunity at times of shortage of engineers is to use the CPEng as an active marketing ploy. The Ministry's advocacy of using a CPEng for particular work may help incentivise engineers to participate in assessment and registration.

3.19. Consumers of engineering services historically are predominantly the big players with significant purchasing power and robust procurement which includes competency assessment. By definition many complex construction projects need multiple engineering disciplines and the major companies have their preferred engineering suppliers. It is only latterly in Christchurch that we have seen large numbers of individual home owners looking for engineering advice particularly geotechnical advice. The Ministry in its written guidance has advised home owners to secure the services of a CPEng Geotechnical. There is no such classification but understanding that the engineer must have that competency and then asking for that evidence is a step towards achieving more informed consumers.

3.20. The Ministry has considered if the provisions in the Building Amendment Bill no 4 relating to the mandatory disclosure of information by building contractors carrying out residential building work should be extended to the provision of design and engineering services. The provision of such services is covered by the Consumer Guarantees Act 1993 and therefore there is no need for provision of information such as envisaged in the Building Act amendments. The Ministry has a significant consumer education campaign planned and the principles of that campaign will support consumers making effective building and construction professional services choices and understanding their rights.

- 3.21. The Ministry is of the view that there needs to be substantial progress made towards securing all possible Members of IPENZ in the areas of geotechnical, structural and civil engineering assessed through the CPEng system. Should members continue to be working on the rebuild there needs to be assurance that the engineer is working within their competence consistent with the Code of Ethics/ Ethical Conduct. As in the previous submission to the Royal Commission on the Training of Engineers and the Organisation of the Profession the role of assessing overseas qualifications should lie with IPENZ as more overseas personnel get involved in the rebuild.
- 3.22. The engineering profession needs to be challenging those it considers are over claiming competence or performing poor work. The BCAs need to be active in challenging inadequate work both in the performance of their role as Building Consent Authorities but also in ensuring that in the interests of efficiency they get applications for building consent which are complete and accurate when they are submitted. There may need to be additional legal authority for BCAs to be able to lay complaints. The Ministry will investigate this.
- 3.23. The Building Act provides for the introduction of risk based consenting and the timing for this is when the sector is ready. This envisages that for complex multi storey residential and commercial buildings the building consent will be supported by a comprehensive quality assurance process. To be successful this will need competent engineers and other building and construction professional services personnel. The BCA would need to be satisfied that the quality assurance was robust. The Ministry has also been progressing a national on line consenting system which will support more effective consents processing including consistency of decisions.
- 3.24. The Ministry will continue to consider when specialist recognised engineers are required, such as in relation to dam safety under the Building Act 2004 and the Building (Dam Safety) Regulations 2008, and if further regulation is needed.
- 3.25. In the meantime all Ministry guidance under section 175 of the Building Act 2004 will drive the public and other purchasers to a CPEng where engineering input is required. IPENZ could be more active in encouraging its members to engage in the CPEng process. The Ministry as part of its outcome monitoring of the Chartered Professional Engineers Council's Board will monitor and report on progress towards growing the cohort of CPEng assessed engineers. If there is no discernable progress in CPEng take up then it may be appropriate to consider compulsory registration.

4. Training and Education of Engineers

1. *Should a graduate programme of development (continuing professional development) be prescribed? There are a number of questions underpinning this question*
 - *Where would responsibility lie for the prescription of a graduate programme?*
 - *How would a programme be quality assured?*
 - *Compare the advantages and disadvantages of this approach to the status quo, which includes the tacit approval of employers of course selected (since the employer pays)*
 - *How would a prescriptive approach manage the differing needs of engineers in their respective workplaces, if any?*
 - *How would competency requirements be provided where those skills are considered valuable by the New Zealand public but have less or no value to an employer? Who would pay?*
2. *Comment on, and where possible, provide evidence or well supported analysis on the issues raised above by the Royal Commission.*

- 4.1. The Ministry has already, in its previous submission noted the need for a clear path for graduate development. IPENZ would be the appropriate body to put such a plan in place. The Government has recently made additional funding available for the training of additional engineers and increase the rate to University suppliers of Bachelor level engineering education to more effectively cover costs. There is a lower proportion of students enrolled in bachelors' level engineering courses in New Zealand than in comparable jurisdictions such as Australia and other OECD countries. There was also a forecast shortfall of engineers even before the Canterbury earthquakes.
- 4.2. The Ministry is of the view that New Zealand should remain aligned with the Washington Accord as required for engineering training. Post the Bachelor Engineering degree the application for CPEng is the first opportunity to quality assure competency, any training and its application. This could be a gap of 5 to 7 years and there are no assurances that the graduate is getting the right training or development. There may be merit in a more structured graduate membership class for IPENZ and that could have steps through which graduates could go as their professional development advances. There may be costs associated with this approach but the offset may well be more engaged graduates and quality candidates for CPEng.
- 4.3. Employers use a mixture of training courses and on the job mentoring and the development of their people is inevitably at a cost to the employer whichever route is taken. Employers are going to take a pragmatic route to choosing courses, based on reputation of the supplier and the need to know or be up to date. For example when the Ministry changes or sets new expectations e.g. seminars on the technical categories for foundation systems in Canterbury were well attended.
- 4.4. The public good training and education such as building assessment after earthquakes can be driven through the Code of Ethics/ Ethical Conduct and the

CPEng requirements. The issue is the immense variety of engineers. Structural, civil and geotechnical engineers who stepped up in the Christchurch earthquake sequence to perform many roles and one cannot legislate for that willingness. What is required is to harness that willingness and to provide appropriate training for rapid assessment and record those who are trained and have an effective means to mobilise them if a disaster strikes in the future. In a separate submission on Building Management after Earthquakes the Ministry suggests that there needs to be a trained team available for deployment as required in disaster situations. The costs of such training proposed to be shared between central and local government. The competency to rapidly assess buildings post earthquakes or in other events should be assessed after training and recorded on the IPENZ register.

3. *Comment on the current process of development of continuing professional development course options. In particular, what roles are taken by employers, engineers and education providers in determining the appropriateness of content to be taught and demand for courses?*

4.5. The Ministry has and will continue to provide training and education as a key component of managing and leading change in the Building and Construction Sector. The Ministry has co-branded training and education with IPENZ and will continue to do so. There is an active relationship with tertiary providers to influence course content and this will continue.

4. *Should CPEng re- registration, with its associated competence assessment, be required at shorter intervals than the current 5-6 years, and what are the associated issues? Could some other method of competence confirmation be implemented mid-term instead?*

4.6. The Ministry considers that the frequency of re-assessment of CPEng is acceptable at 5 to 6 years and considers the flexibility to re-assess at greater frequency depending on competence is appropriate. For some engineers involved in really big projects design through to completion of construction may well take 5 to 6 years. The issues associated with building the design are often critical learning points. The fact that the opportunity to assess at a greater frequency is actively used by IPENZ is evidence of proper consideration. The approach strikes the right balance between cost to comply and ensure ongoing engagement especially as the registration scheme remains voluntary. Too frequent assessments could lead to engineers reverting to solely membership of IPENZ and ongoing practice. This would be to the detriment of the profession.

5. The Role of Professional Societies in the Engineering Sector

1. Comment on the efficacy and efficiency of the conduct of the engineering learned or professional societies in respect of the:

- *Interactions between structural engineers and geotechnical engineers and others and between engineers and architects on the construction of buildings*
- *Engagement by learned or professional societies, both internally and with one another for the purposes of bringing attention to and resolving contentious issues and achieving improved outcomes across the industry*
- *The appropriateness and durability of, and risks that could arise through the engagement of volunteers (society members to informally inform or develop policy and or standards of practice and the*
- *Standing of any guidance or advice issued by societies, and monitoring and consequences (if any) of non compliance*

- 5.1. The legislative base for the regulation of engineers and registered architects is broadly similar. Neither legislative base has a focus of safety - it is more of an assessment of competence in order to use a title. Practice is then governed by Rules and Codes of Ethics. The Ministry monitors the performance of the respective Boards and intends to change the monitoring to be more outcome focussed. One potential outcome sought could be evidence that the two boards are working together and leading or putting in place mechanisms for the effective working together of registered architects and CPEng or Members of IPENZ as appropriate.
- 5.2. There is anecdotal information that structural and geotechnical engineers work together well in the interests of construction of a robust and lasting structure. There is similar level of information that architects create the concept and engineers try and make the concept work as a robust and structurally sound building. It is critical to the success of complex construction that all players are well skilled and work effectively as a team within their scopes of practice to the common goal of a building which is robust and structurally sound. It is also critical that the construction team remain together throughout the construction of the building. Having the key engineering and architectural professionals on site to monitor the construction to approved drawings and resolve problems with appropriately engineered solutions is critical to a successful conclusion. Construction management is a significant skill shortage. The opportunity to dispense with designers and engineers' services during construction may save money in the short run but could prove costly long term.
- 5.3. There has been considerable benefit from the existence of and the work of the learned and professional societies supporting the engineering profession. An example of a professional society is IPENZ and this organisation exists to support the advancement of the profession of engineers. Due to diversity of engineer disciplines they are not as able to contribute to the identification and resolution of building and construction problems as learned societies. The learned societies such as New Zealand Society of Earthquake Engineering have a focus on advancing knowledge. The Ministry has consistently used the learned societies to confirm the identification of problems and then identify and develop solutions.

The Ministry uses the learned societies to identify experts in particular fields to contract them to do work for the Ministry. The Ministry also contracts with the learned societies to peer review the Ministry's work such as Section 175 guidance issued under the Building Act 2004.

- 5.4. Membership of some learned societies enables the member to use the relevant initials after their name which may be taken to signal a competence which is not accurate. Those who have earned the title Fellow of the learned society are more likely to have the required competency as judged by peers but it is known that in some cases the award is for service and is not a measure of competency. It is not clear that the learned societies can or do play any role in identifying sub standard competence.
- 5.5. The willingness and availability of the learned societies to work on the contentious issues is a real strength. They apply considerable skill and knowledge and their international networks to problem resolution. The regular conferences have been a great opportunity for engagement with world experts on issues for New Zealand. The Ministry always has representation at NZ based learned society conferences and as funds allow learned society international conferences and meetings on building and construction issues including earthquake engineering. For example the Ministry is funding a member of its Engineering Advisory Group to Sacramento and San Francisco in tandem with a member from a learned society. The learned societies' peer review process is robust.
- 5.6. There has been debate which has been driven by industry interests, the Ministry's job is to ensure that such debate does not compromise the issue of Guidance in a timely fashion. The learned society advice is sometimes co-branded with IPENZ or the Ministry. It can also be given more force by the Ministry's adoption of the advice and subsequent publication as section 175 guidance under the Building Act or incorporated as part of the verification method for compliance with the New Zealand Building Code.
- 5.7. There is an industry expectation that the learned society advice will be followed if there is no alternative Ministry advice as it represents best practice. There are no consequences in a legal sense to not following learned society advice or following section 175 advice under the Building Act however in a dispute this would be a critical factor in assessing the appropriateness of the work.
- 5.8. The loss of the input from the learned societies would be to the detriment of the New Zealand building and construction sector.

6. Discussion

- 6.1. The Ministry would be pleased to discuss this submission with the Royal Commission.