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To: Canterbury Earthquakes Royal Commission
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This submission addresses two papers currently out for discussion: **Building Management after Earthquakes**, and also **Training and Education of Engineers**. I believe that the two subjects are inter-related, for reasons as noted in the submission below. As such, this submission is applicable to both discussion papers.

I am an architect, registered in both the UK and NZ, and have practiced for over two decades in the field of architecture. Currently I am working for Victoria University, at the School of Architecture, as Director of Building Science – however, as I have not discussed this submission with colleagues, the opinions expressed here are my own, and not of my employer. This submission is therefore solely from myself, as a private individual.

1.0 Use of Powers

In a process such as the emergency evaluation of buildings after seismic disasters, the use of engineers having, in effect, power of god over any structures still standing, is an extremely powerful tool. The concentration of absolute power in the hands of someone trained to see only structure, and not understanding issues of design and the provenance of history and theory, is unwise. The abuse of these powers, unchecked and not responsible to due process, is simply wrong.

The royal commission notes that in regards to engineers, it does not see a need to question the content or duration of the tertiary education offered. However, it also notes that comment on the education of engineers is welcome. I hereby provide some comment relating to this subject, that I believe goes to the crux of the problems over the evaluation of buildings.

I have no issues with the competence of trained and certified structural engineers in the scope of their roles as engineers. However I have very strong concerns that some of the structural engineers who responded and took part in emergency decision making over the future of heritage buildings, quite clearly overstepped their marks in terms of approving buildings for demolition.

2.0 Building Demolition Authorisation

The Royal Commission will have heard of many instances where one engineer will have said a building can be restored, and another engineer says the building must be demolished. This deeply concerns many members of the public, and I believe has also deeply concerned the members of the Royal Commission. While the prime case is the Cathedral, numerous other instances exist. Building owners, in effect, have in numerous cases gone to a 'tame' engineer who will give them the response that they want to have. The speed with which building owners set about demolishing their buildings after the Feb 22 seismic event was, in retrospect, a disgraceful action by people who knew that they stood just inside the edge of the law. The declaration of a state of emergency gave them a window of opportunity to sidestep due process such as Resource Consent applications, and they took that by demolition on a large scale.

News records show that excavator machinery was being used to demolish buildings immediately after the quakes – within days or even hours. The Royal Commission does not

appear to have followed up whether these demolitions were authorised by an engineer, the council, or anyone at all, other than the owner and the demolition companies owning the machinery. The opportunities for demolition were simply taken, in some cases, without any due process being followed, under cover of the process of a state of emergency.

3.0 Suitable training for decision-making

Bodies that are normally statutorily bound to be involved in the decision making process prior to demolition, such as the local authority and the Historic Places Trust, are shut out (either partially or fully) by the emergency procedures, and thus the normal checks and balances of whether buildings have sufficient heritage value to be retained or not are bypassed and abandoned. The concentration of this power in the hands of an engineer, trained in structural logic but not necessarily trained at all in history, theory, or architectural design, is arguably the wrong response to a building with significant heritage values.

4.0 Education

The Royal Commission seeks feedback on whether the formal training of engineers should include emergency management (section 6.3) and also the role of professional societies in the engineering sector (section 7). Specifically, it asks for comment on the interactions between engineers and architects on the construction of buildings (section 7.2). I note that little (if any) information has been received by the Royal Commission in relation to the roles, responsibilities, education and training of architects. I believe this is an omission that needs correcting.

4.1 Engineering degree

An engineering degree concentrates on a structural response to the built environment. First year papers include chemistry, physics, mechanics, mathematical modeling, and two maths papers. Papers in second year include subjects such as waste water treatment, infrastructure management, fluid mechanics, structural design, transportation and surveying. Third year papers specialise on subjects such as geotechnical or fire engineering (sourced from University of Canterbury websites). After the first 3 years, a BE is gained. Typically 1 or 2 more years are then spent in study, to gain a Honours or Masters degree, and then a significant period is spent in practice before the title Engineer can be achieved.

4.2 Architectural Degree

By contrast, a degree in architecture takes a more holistic viewpoint towards the built environment. Victoria University has a first year course in Architectural Studies concentrating on communication, design, maths/physics, sustainability, history/theory, built environment technology. By second year, papers include construction, structures, design, history/theory, and environmental science. Third year papers focus on design integration, urban design, pacific environments, construction, and practice/management (sourced from Victoria University websites). At that stage, Architecture students have gained a BAS. A further two years is spent in gaining a MArch(Prof), and then a similar 2-5 years of work in practice is required before gaining registration as an Architect.

4.3 Degree comparison

It can be seen quite clearly that the workload of both degrees is very similar, and so both sets of professionals are highly trained in their field. Both sets of professionals also have to continue their learning with an ongoing record of Continuing Professional Development, for the entire length of their working lives.

It can also be seen however, that degree structures are markedly different, and thus the graduates of an engineering school have very different attributes than those graduating from an architecture school.

The architecture degree concentrates on two key areas that an engineering degree does not: history / theory, and design. This gives an architect a far more well-rounded education, with awareness of all the issues involved in the built environment, rather than just a more black and white assessment of judging a building to be safe / unsafe. The engineer's educational background, by comparison, makes them keenly focused on exacting tasks such as the

analysis of whether a building is safe or not. It does not however allow them to be in a position to analyse whether a building is worthy of retention, in the aspect of architectural merit.

While there is undoubtedly and appropriately a total focus on safety, buildings can be made safe (ie cordoned off) and mothballed until an expert with the appropriate knowledge comes along to make decisions about the building's future. An engineer is not necessarily the right person to make that decision.

4.4 Specialist conservation architects

While there are some courses on offer at a school of architecture that focus on the conservation of architecture, graduates with a conservation focus are few, and therefore trained conservation architects are rare. The title "Conservation Architect" is self-appointed and not regulated, but indicates that the person using that title has a particular interest in, and possibly (but not always) specialist training in the conservation of buildings. By comparison, the title "Registered Architect" is protected by law under the Registered Architect's Act.

Most architects do indeed have a good, and in many cases, excellent knowledge and understanding of the cultural, heritage, and significance of the buildings around them, considerably wider in scope than that of most engineers. They are therefore able to give a different viewpoint on the relative merits of buildings. I believe that it would be appropriate for the Royal Commission to think seriously about involving the mandatory use of architects, possibly outlining a role for Conservation Architects, and also using architectural criteria for the evaluation of buildings in terms of their wider socio-cultural attributes, as well as the focus which currently is solely upon the safety / engineering evaluation.

One possible route to ensure that adequate attention is paid to these other (and arguably, highly important) aspects of heritage buildings, is to look at incorporating a structural assessment of buildings listed as heritage. At present, the heritage assessment focuses primarily upon the historic background, the architectural heritage, and the social history behind the listing of the building as heritage. An assessment of the structural stability of the heritage aspects of the building could be an invaluable resource.

5.0 Areas of Expertise

Of most concern to me in these discussion papers are the cases where engineers have undertaken and completed work outside their area of expertise. The Royal Commission notes that they have become aware of such instances, and certainly the public was aware of many such instances as well. On occasions these engineers were from out of town, ie perhaps not particularly in tune with the geotechnical issues and seismic issues that Canterbury has. Large scale approval of demolition was undertaken by certain engineers, some ill-qualified to do so, and often against the advice of other engineers who were more qualified and experienced in that field. Due to the powers extended to the authorities at the time, this activity was not properly policed, and the engineers involved have not been made accountable for their actions.

As noted, engineers and architects typically have different, and complimentary attributes. When working together on a building, both sets of professionals will normally work closely together, combining their talents to produce a finished building design. Although it will vary depending on the type of building, the role of architect is typically that of lead consultant, and the architect is normally the most knowledgeable about the building process. The role of the engineer is often a relatively smaller role in the overall building process, but it is a crucial role, given the need for safe building construction.

It should be noted however that the level of knowledge about the building, by the architect, is normally wide-ranging and extensive, frequently (and typically) far more informed than that of the engineer, and yet in the current system it is entirely unused. It should not be dismissed. I believe that there is a strong case for architects to be involved more extensively in the building safety evaluation process, and would urge the Royal Commission to recognize that the considerable talents of architects have a crucial role to play.

I also believe that there is a case for a new professional to arise, that of the person who is trained in both architecture and engineering. This is not uncommon in some countries overseas – in Belgium, France, Germany, for instance, students can graduate from some universities with the title *arkitekt-ingenieur*, noting their specialization in both areas of expertise. The qualifications and training for such individuals could include the emergency management procedures noting in the discussion documents. While such training would perhaps need a new qualification – possibly a degree in Architectural Engineering (as an example), this should be within the remit of existing Schools of Architecture and Engineering already in New Zealand. I believe that there are some individuals who could fulfill this role (although admittedly relatively few at present), but that new courses of training over the coming years should be focused on a conjoint system, producing a wholly more rounded engineer / more technically proficient architect.

6.0 System of Placarding buildings

While the system appeared initially to be working well in the September seismic event, there were clearly issues with the clarity and ease of understanding the coloured placard system, not least by members of the public. The system of having three primary colours – Red, Yellow, Green, is undermined when there is more than one type of Red placard, or when green placards are issued by different parties. Clearly the Royal Commission will be aware of this confusion and no doubt will have some suitable response, involving clearer signage, less ambiguous wording, and potentially more / different colours.

I propose that the system of placarding could be extended at this time, to indicate architectural value of the buildings. In a similar manner to that which currently exists, whereby engineers make an initial inspection, and provide a rapid visual assessment of the structural worth of the building, it is proposed that an architectural assessment of the building could also be established. There is a worth to the building stock, not just in terms of financial cost, or engineering safety standard, but a very real heritage value and a social value that the community places on the building. At times of crisis, such as we have seen in Christchurch, all other values tend to have been put aside, either through neglect or via deliberate action.

At present, the desktop assessments being undertaken for the Council by contracted engineers in Wellington are processing buildings (ie assessment Pre-Earthquake, rather than post-earthquake), and issuing them with red or yellow placards giving a certain time before the building's seismic standard must be addressed. There is an equal advantage in an architectural assessment of a buildings worth, which could, and perhaps should also be carried out in the relative calm before an earthquake hits. In a similar way to the engineering assessment, where a building owner can dispute the findings of the initial earthquake-proneness assessment, this process could also be disputed if need be.

7 Conclusion

I thank the Royal Commission for this opportunity for the public to make submissions on the discussion documents. The Commission has a unique opportunity to have a major effect on the quite seriously dysfunctional aspects of the Building Act and the Building Code, although these discussion papers did not raise this as topics for discussion at this point. I trust that the Commission will permit that topic to be raised and discussed at some point as well, and trust that the points made in my submission here today are of use to the findings of the Commission. If you have any questions, please do not hesitate to get in contact with the writer.

Regards

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