Submission to: **Canterbury Earthquakes Royal Commission**

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[redacted]

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To: Canterbury Earthquakes Royal Commission
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This submission addresses the paper currently out for discussion:
Roles and Responsibilities.

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. Efficacy of Building Regulatory Framework

I believe that there are large structural faults with the building regulatory framework in New Zealand. The Building Act covers all buildings in New Zealand, as it should. The Building Regulations apply to all buildings in New Zealand, as they should. The Building Code, however, clauses B-M etc, cover all buildings, but provide examples predominantly for only a certain sub-set of the New Zealand residential market. The residential scale examples are all noted as Acceptable Solutions. All other means of building are classified as Alternative Solutions. This is the first, and biggest anomaly: that to a large extent, all Commercial, Industrial, Institutional, Retail buildings, as well as many common Residential buildings, are all viewed / designed as Alternative Solutions, particularly when it comes to matters such as Structure and External Moisture.

2. Restricted Building Work

The second large anomaly occurs with the use of Restricted Building Work (RBW). Certain segments of work on Residential building projects, are classified as RBW, and by law it is mandated that this work must be done only by Licensed Building Practitioners (LBP). However – only Residential work has RBW, and thus only Residential work requires LBP. This means that all non-Residential work is not Restricted, and because it is not RBW, it does not require to be undertaken by LBP. The majority of deaths in the Canterbury earthquakes occurred in buildings that are not residential, ie in buildings that would not have Restricted Building Work, nor are such buildings required (now) to be built by people with LBP certification. There is little logic requiring that the most important, most dangerous, and most expensive work in New Zealand is not Restricted. If building work is desired to be reliably constructed, then it should be designed by competent designers and built by competent contractors.

3. Licensed Building Practitioners

The third large anomaly occurs with the Licensing of LBP. This applies to both Design and Site License classes. The holder of a Site License, intended to be used by the person running the site of a building project, is currently banned by law from signing paperwork relating to that building project. This Site license, presumably issued to the person with the greatest amount of appropriate experience and control of the project, is therefore pointless: as without the ability to sign documentation, and take charge of the project, they cannot be in charge.

The other side of that issue is with the Design License classes. The people in the industry with by far the most training, experience, and ability in terms of building design, are Architects and Engineers. They are however expressly forbidden by law from registering as LBP. Although the Building Act notes that they are automatically deemed to be equivalent to LBP, they are not allowed to appear on a register of LBP. A more appropriate response should be that they do not have to be on both registers, but to actively forbid this under law appears to be a legislative *non sequitur*. The training and experience of architects and engineers is actually far higher than that required by LBP Design Class 3, and the role of architects and engineers on site is normally in a leading position, often managing the project and in direct contact with the owner, BCA, lead contractor etc. Their effective banning from registering as LBP in both the Design class and the Site class would seem to be not only restrictive, but entirely counter-productive.

4. LBP Design Class

These anomalies in the NZ regulatory system add up to potentially serious problems, which may be representative of the fact that we have just had a massive leaky building problem in NZ. Although the leaky building issue started years before the regulating of LBP, it is symptomatic of ill-qualified and un-experienced persons being involved in the design and building of houses in New Zealand. The majority of the single detached suburban houses in New Zealand are not designed by architects (anecdotally, suggestions are around 5-10% of houses are designed by architects), have little (if any) engineering input, and presumably will in the future be designed by people mainly qualified with a LBP Design classification, mostly Design Class 2. The majority of these houses will be by volume builders, will contain RBW, will largely or entirely fall within the confines of E2/AS1 and NZS 3604, and will be built by workers who have attained the most minimal LBP certification. These houses will, in the main, just meet the minimal standard as defined in the building code, and are generally of the lowest possible quality that can be achieved within the lowest possible budget.

5. Architects and Engineers

At the other end of the scale, the vast majority of New Zealand's large-scale buildings such as office towers, hospitals, and multi-story developments are designed by Architects, working in teams with Engineers and other building professionals, along side some of New Zealand's most competent major building contractors. None of this work is classified as RBW, so none of the workers undertaking work such as foundations, roofing etc will have to be LBP; little of the external envelope will fall within the confines of the Accepted Solutions (most of the building will be an Alternative Solution); the designers are by law forbidden from registering as LBP; the people running the project are not required to have LBP qualifications and even if they were required to, at present if they have a Site License, they are not allowed to sign any documentation. This situation is illogical and untenable: the Building Act should be changed.

6. Alternative solutions

Decisions regarding the effectiveness of Alternative Solutions are judged by BCAs, which are staffed by people who do not have to have any qualification, nor is there any qualification for them to attain. Regardless of this, with the exception of the two prominent buildings at the centre of the Canterbury Commission's enquiries, these types of buildings are largely not problematic, despite the lack of regulated checks and balances now associated with the simple houses noted above. It could be argued therefore, that it is not the regulation that has resulted in adequate building stock, but the use of (or lack of) competent and well-coordinated design and construction teams.

Alternative Solutions are not shown as Acceptable Solutions in the NZ Building Code: essentially they have to be invented afresh for each new building design issue, and then the validity of the Alternative Solution for each building design issue is assessed anew. This assessment of this validity of each Alternative Solution is assessed differently by each BCA, and some BCAs are more willing and able to review Alternative Solutions than others. There is a document proposed by the DBH on how to review Alternative Solutions – this was sighted

by me around 2007, at which stage it was some 64 pages long, as to how to evaluate a single Alternative Solution.

While the document may have been streamlined and may be reduced in size by now: given that any multi-story moderately complex building may contain numerous such Alternative Solutions, the amount of paperwork and possible extent of administration (and room for mistakes) is extensive. The assessment of Alternative Solutions is not a simple thing. A 64 page document for the assessment of each and every Alternative Solution is clearly not the answer. Some more standardized method of converting Alternative Solutions into Acceptable Solutions is obviously the answer. Instead of just having a B1/AS1, there should be a B1/AS2, AS3, AS4 etc.

7. Multi-Unit Residential

In between these two extremes (small scale residential, and large scale commercial) sit the buildings that do not quite fit into either camp. Buildings such as multi-story, multi-unit residential developments that have caused significant issues around New Zealand with the leaky building crisis. This is a relatively new area of design typology in New Zealand, and the design and construction of these is effectively sailing in uncharted waters. Because they are residential, they are expected to involve RBW, be carried out by LBP trades, and yet they often do not fall neatly within the E2/AS1 / NZS3604 bracket.

These buildings will, presumably, need to be designed by people certified as LBP DC3 and yet there is not a requirement for them to be designed by architects. The building is required to comply with the Building Code, and yet there is no specific part of the Code for it to comply with as an Acceptable Solution. There is, in effect, no set building code for these buildings to work to. The use of Alternative Solutions is mandated, as the construction and cladding falls outside the scope of the standard sections of the Building Code, and so the evaluation of a proposed Alternative Solution often requires the use of a Peer Review by a Façade Engineer – a job title for which there are few applicants. Designs for multi-story, multi-unit Residential developments therefore vary considerably. Construction standards for multi-story, multi-unit Residential developments therefore also vary considerably.

8. Standards and BRANZ

The building industry body in New Zealand, BRANZ, focuses on the small-scale residential market. It does not focus on large scale buildings, nor on multi-unit residential buildings. The development of standards, regarding compliance guidance, relates not just to performance of buildings in earthquakes, but in all aspects of the building code. Standards New Zealand does not have a standard for the design of Multi-Unit residential buildings. New Zealand is alone amongst civilized nations in having little in the way of housing standards for minimum size of rooms or quality of accommodation. Most countries in Europe do have considerable housing standard regulation. Britain has not updated its standards in this area since 1961. America has an “International Building Code” which has some small amount of standards based info. New Zealand has not developed standards as yet, around this key part of our building infrastructure. Our country needs to urgently rethink the purpose and funding of both BRANZ and Standards NZ.

9. Building Consent Authorities

All BCAs are not equal. It is apparent that smaller BCAs do not necessarily have the expertise to deal with projects outside the realm of Residential houses. Their focus is typically on small, detached, suburban houses, which presumably largely comply with the Acceptable Solutions such as the extent of E2 / AS1. When faced with applications involving Alternative Solutions, BCAs in smaller districts may be inclined to farm the assessment of these details out to larger BCAs, as it is outside their scope of expertise. This may be particularly apparent in the case of structural engineering cross checks, as many small authorities may not have adequately qualified structural Engineers on their staff.

A more recent practice would be that of requesting the Engineer applying to get a Peer Review. Some certainty to all over the timing and need for Peer Reviews is needed, not just in terms of Engineering input into Structural assessments, but also in a wider sense: how does the Peer Review fit into our building regulation framework as a legal part of the Building Act. At present, it sits apart, and is open to misuse and misunderstanding.

10. Seismic resistance in buildings

The Commission asks “what skills are needed in the private building sector to ensure seismically resistant buildings?” This needs to be rephrased – small-scale suburban Residential buildings constructed to NZS3604 require little specialist skills to ensure seismic resistance. NZS 3604 has already had sufficient seismic input, so that if kept within the boundaries (of 3604) then seismic issues are already addressed and taken into account for. Non-Residential buildings are however a very different story, and require significant specialist skills, normally design input from a certified Structural Engineer. The seismic resistant design work has to be demonstrated, and is shown in the form of calculations from the Engineer. These calculations will have to show compliance with New Zealand Standards.

The greater question that needs to be asked and answered, is: “what methods are there of making sure that buildings are occupiable after an earthquake the size of those experienced in Canterbury?” The current situation, where buildings protect their occupants from harm, but then have to be destroyed afterwards, is an economic nonsense and an ongoing catastrophe for New Zealand. Our building stock needs to be completely resilient to seismic action, and our cities should be able to withstand repeated seismic events without collapse. The rewriting of the Act to provide a raft of measures for complete seismic resilience is the first step needed along the way.

11. Conclusion

I thank the Royal Commission for this opportunity for the public to make submissions on the discussion documents. I 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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