30 January 2012.

The Commissioners
Canterbury Earthquakes Royal Commission
PO Box 14053
Christchurch Airport
Christchurch 8544

Dear Sirs,

Education of Engineers.

1. General Comment.

This submission comments on New Zealand Engineers education and achievements as viewed by a science graduate who has studied and worked with engineers in New Zealand, Australia and North America.

New Zealand engineers are as intelligent and capable as any in the western world. Our engineering schools produced dedicated and motivated graduates well versed in structural engineering in the 1980's and proud of their professors Park and Paulay at the University of Canterbury.

I have no doubt that the work of these engineering graduates would withstand the intensity of earthquakes suffered by Christchurch. Other centres in New Zealand suffered larger earthquakes with minimal building failure in centres such as Wellington, Hawkes Bay and Gisborne in recent decades. Recently and substantially constructed Post Offices, prisons and government offices stood numerous earthquakes and will do so for many years yet.

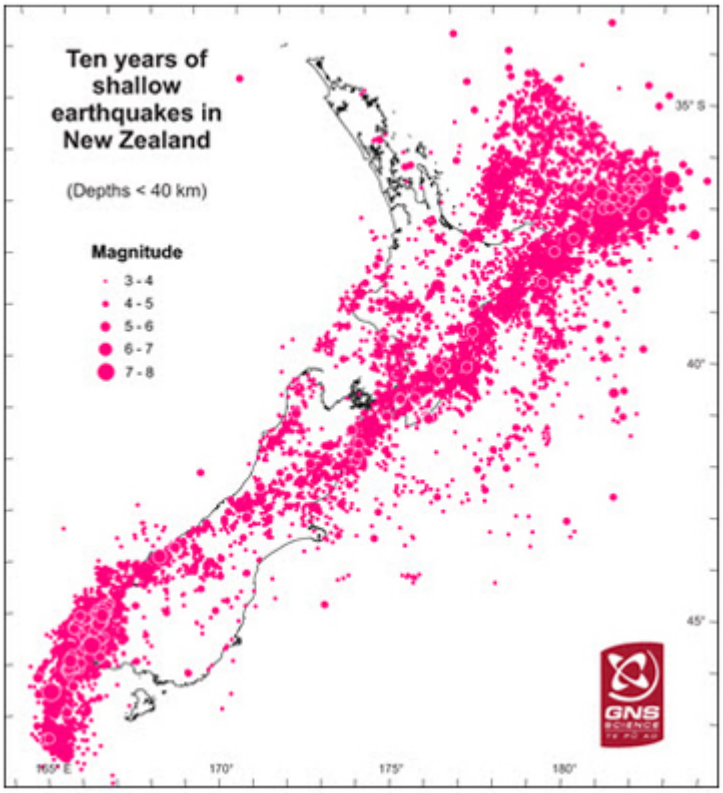
2. Building Failures.

Some recently constructed buildings failed spectacularly. Why? We know that many civil engineering graduates are capable and competent. We also know that other factors beyond technical competence impact on the construction industry and the people within it. These can be summarised as:

a. Commercial pressures from; developers, employers, businesses, product purveyors and landowners.
b. Political pressures; from local and central government individuals and organisations.
c. Ethical considerations; cutting corners, making a larger profit, environmental compromise, bending the truth, turning a blind eye, lack of inspection and certification to reduce costs, lack of diligence, a liberal interpretation of a contract or resource consent requirements.

Buildings collapsed, some had inadequate reinforcing steel in their columns, others were constructed on fill known to have been over old riverbeds, others on land subject

to liquefaction and still others constructed using old world technologies and not subject to upgrade despite earlier earthquakes (1). The Anglican Cathedral was damaged several times since its construction by earthquakes in 1881, 1888, 1922, 1901 and 2010 (2). To say that Christchurch was rarely subject to earthquakes and its buildings should not meet modern earthquake standards flies in the face of reality to the point of massed public deception. Engineers and politicians need to think in geological time and not in terms of living memory since settlement.



Source: Geological and Nuclear Sciences, New Zealand.

My contention is that engineers need to be educated in more than a technical competence in structures, maths, fluid mechanics, geophysics and chemistry. They need to know and understand how to deal with and have avenues for reporting coercion, corruption, poor professional performance and professional negligence. This is a professional "culture" to develop more extensively and intensively. The current culture, sadly, has some within the engineering profession subject to a, b and c, of the previous page. This leads to sub professional conduct and poor engineering practice. Various avenues need to be available to rectify the situation so that competent and capable engineers flourish. Those subject to or practicing points a to c previously, are held to account, fined, deregistered, dropped from the profession or jailed.

Engineers need to have professional courage, practice it and be prepared to stand up and be accountable. There is a cost to this in their health but a greater cost if their professional work fails. Avenues supporting such accountability need to be within the Engineers Act of Parliament to give them legislative support. The current level of engineering legislation failed too many Cantabrians' for any person to claim it as safe effective and efficient in this regard.

3. Engineer Accountability.

The Institution of Professional Engineers of New Zealand (IPENZ) has accountability mechanisms for engineers (3) and records of current complaints (4). Their fines and censure are light in my view but better than nothing and are published on their website. It would be better if those responsible for an engineering problem assumed liability equal to the level of loss from the structures failure inclusive of the lost or ruined lives arising there from and also bore the cost of prosecution if found guilty. This would be fair, would result in bankruptcies, have accountability and engender greater professional care. Engineers need to know that they are accountable. This element of education seems lacking with some in the profession at present.

IPENZ also has an environmental code of ethics (5). The code of ethics seems to be paid lip service by some in the engineering profession and lacks genuine "teeth". This is the public's loss and goes beyond tarnishing the good competent members of the engineering profession. This needs to be rectified.

Suggestions.

i. Ensure that engineers are educated in and have acceptance of their wider ethical responsibilities to society as much as they have a grasp of their other competencies.

ii. Improve engineering culture to engender greater accountability, reporting of sub-professional practices and a wider acceptance of having to deal with the consequences of failed designs at a personal level.

iii. Give effect to engineer cultural improvement by legislative change and empowering IPENZ, and or others, to recover losses from those engineers found responsible for failed designs or sub professional practice by the end of 2012.

Yours sincerely

Paul N Baker.

References.

1. Geological and Nuclear Sciences data in; http://www.geol.canterbury.ac.nz/earthquake/

2. http://en.wikipedia.org/wiki/ChristChurch_Cathedral,_Christchurch

3. http://www.ipenz.org.nz/ipenz/finding/cpeng/search/disciplinary.cfm

4. http://www.ipenz.org.nz/IPENZ/finding/complaints/current-complaints.cfm

5. http://www.ipenz.org.nz/ipenz/who_we_are/ethics_inc.cfm#part3