

Submission to the
 Canterbury Earthquakes Royal Commission
 Education and Training in the Construction Industry

I, Joanne Macgregor, make this submission on behalf of C. Lund & Son Ltd. C. Lund & Son Ltd has traded for 56 years as main contractors, builders and joiners in Canterbury and occasionally in the South Island outside Canterbury.

C Lund & Son Ltd has completed many new projects and many strengthening/redevelopment projects in Christchurch. We are hopeful that many of our buildings, despite being damaged by the Canterbury Earthquakes will continue to be a part of the permanent landscape of Christchurch.

I trained as a structural engineer at Canterbury University, I have some structural design experience and I have 24 years construction and business experience.

How well we have all responded to the damage caused by the Christchurch Earthquakes five to ten years from now will largely be driven by education and training. In order to improve and continue to be the best we can be both in the design office and on site will take a collaborative approach that crosses boundaries and that engages with professions and trades. There will be a strong focus by the design community on improvements, professional development and training for structural engineers. I would like to make the focus of this submission on following that through with changes to trade practice and better drawings and specifications by designers for the trades.

SPECIFICATION AND DESIGN

The construction industry in New Zealand is well organized into trades. Work is specified and documented by designers by trade, work is carried out by business' represented by trade organisations.

TRADE	DESIGN AND SPECIFICATION BY
Preliminary & General	Lead Consultant
Demolition	Structural Engineer
Excavation	Structural Engineer
Concrete Work	Structural Engineer
Precast Concrete	Structural Engineer
Proprietary Flooring	Structural Engineer
Reinforcing Steel	Structural Engineer
Structural Steel	Structural Engineer
Blockwork	Structural Engineer
Metalwork	Architect
Metal Windows and Doors	Architect
Aluminium Composite Cladding	Architect
Carpentry	Architect

Joinery	Architect
Roofing	Architect
Plumbing	Architect/Services Engineer
Drainage	Services Engineer
Mechanical Services	Services Engineer
Fire Protection	Services Engineer
Lifts	Services Engineer
Electrical Services	Services Engineer
Security Services	Services Engineer
Communication Services	Services Engineer
Plasterboard Linings	Architect
Grid Suspended Ceilings	Architect
Tiling	Architect
Floor Coverings	Architect
Painting	Architect
Glazing	Architect
Site Works	various

Trades have traditional demarcations that can go back many hundreds of years. The first trades were stonemasons and carpenters. Trade demarcations do not align well with the performance requirements of the various sections of the New Zealand Building Code – Structure, Durability, Weathertightness etc. Good specifications prepared by designers recognize and understand the limits of trade knowledge and fulfill the Building Code requirements with good design, good specifications and complete instructions for each trade.

A significant change over the past 20 to 25 years has been how design consultants are engaged for projects. Often design fees are competitively bid. I don't believe design consultants have the luxury of taking a risk approach to their fees, ie they don't get paid more for designing a more complicated more "risky" project, they simply price a percentage or lump sum fee that reflects the time it will take to design and to detail. I believe that if one designers fees are less than a competing designer it is more likely that they have had to limit the scope of their work so as to limit the time it will take to complete their work. Competing for fees on an open ended scope of work can lead to an incomplete design. For example, often a structural engineer is only engaged to provide design for the basic structure (reinforced concrete, structural steel and precast concrete trades only). Structural engineering advice is still required for many of the architectural and services trades but is not sort and therefore not given. Expensive and dangerous failures are a possible consequence.

Any structural engineering that may be required for other trades that are specified by the architect or services engineer is sometimes included in the contract documents loosely as a contractor responsibility by way of a performance specification written by the architect or the services engineer. Some knowledge of the structural design, structural systems and structural analysis (which only the structural engineer for the project has) may be required to completely design and specify work for these other trades. This has resulted in inconsistent standards of installation for some trades. We request collaborative working parties be established to recommend improvements for the design and specification of the following trades. We request priority is given to technical training to assist the design community with delivering on these improvements:

Suspended Ceilings – Better specification of ceiling bracing requirements, better specification in to regard to loads from ceiling height partitions on suspended ceiling systems. Better design and specification for separate bracing and support of services plant and equipment. Recommendations as to when advice or specific design by the structural engineer may be necessary.

Partitions and Proprietary Partitions over a nominal height – Better specification of bracing systems to ceiling height partitions. Better understanding of the stiffness of full height partitions, better design/detail of full height partitions that takes into account building movement/ structural deflections under load. Recommendations as to when advice or specific design by the structural engineer may be necessary.

Stonework – Our experience at the Christchurch Art Gallery taught us that traditional fixing methods and many proprietary fixing systems for stone cladding and stone veneers do not adequately take account of seismic loads. Proprietary fixing systems are often developed overseas and it follows that they would not take seismic loads into consideration. We arranged for purpose made brackets to be designed and fabricated for that project. It is very possible that had that trade been fully subcontracted that the subcontractor would have relied on proprietary systems that would not have performed in the Christchurch Earthquakes. It is usual for stone and masonry claddings to be specified by the Architect. This practice needs to change – We believe fixing systems for stone and masonry claddings need to be investigated and specified by the structural engineer for the project. We believe fixing systems for complex heavy stone and masonry claddings need to be specifically designed and specified by the structural engineer for the project. Please arrange for recommendations and guidelines to structural engineers for the specific design of fixing systems for stone and masonry cladding.

Movement joints-Seismic Joints: Recommendations and guidelines for the specification of movement joints. Recommendations as to when advice or specific design by the structural engineer may be necessary.

Façade Systems: Recommendations and guidelines for the seismic design and specification of façade systems. Recommendations as to when advice or specific design by the structural engineer may be necessary.

Sealants – exterior jointing: Recommendations for improvements to detailing of exterior sealant movement joints as a result of the damage observed to precast cladding systems as a result of the Christchurch Earthquakes. Recommendations as to when advice or specific design by the structural engineer may be necessary.

Services Plant and Equipment: Better design and specification for bracing and support of services plant and equipment. Recommendations as to when advice or specific design by the structural engineer may be necessary.

We request that there are some standard Terms of Engagement developed for designers just as there are standard conditions of contract for contractors. Terms of Engagement for designers need to address all the coordination aspects of a complete design for all the trades. Many trades need a multi disciplinary approach in order to achieve a complete design and specification for every trade. The Construction Industry Council Guidelines for Contract Documentation should be taken into account in the standard Terms of Engagement for designers.

Local authorities granting building consent need to take into account that some design is best to be finally completed during construction.

We request priority is given to technical training to assist the design community with delivering on these improvements.

CONSTRUCTION

Over the past 25 years there have been many changes in how construction projects have been organized and managed. There has been a strong trend away from direct employment on wages by the main contractor of particularly building tradesmen (carpenters, foreman and skilled industry hands), specialist construction machinery operators, and experienced trade trained construction supervisors to project management by the main contractor of subcontractors and labour only subcontractors. Some of the labour only workforce in the construction industry is non English speaking. The contract to contract nature of subcontracting makes it more difficult to maintain skill levels and good levels of training for building tradesmen and construction supervisors in the construction industry in general.

There are good training programmes available for new tradesmen, more apprenticeships should be encouraged. There is no training or training programmes currently available to properly match the skills and experience required of licensed building practitioners however. This needs to be addressed urgently.

Over the past 25 years there has been a strong trend to off site fabrication to reduce construction programmes. Precast Concrete, Structural Steel and Prenailed timber components that are fabricated off site all feature strongly in any new commercial building. Construction has to be exact on and off site. There is more opportunity for error. Starters for grouted sleeves can be in the wrong place, there can be missing on site connections, missing or out of position cast in fixings and installation issues with mechanical fixings.

To address that greater investment in technical training is essential. There are only a handful of technical structural draughtsmen and site engineers trained to technician level each year in New Zealand. These graduates are desperately needed in all areas of the construction industry In New Zealand. It is a good career option for young new Zealanders but we currently rely on overseas trained technicians who are unfamiliar with our codes and our methods of construction. Technical draughtsmen and site engineers get the detail correct, they understand the design and they understand construction, they are an extremely important link in our industry between the design office and the construction site and they are vital to getting it right. Technical draughtsmen are employed by both the design and construction community. Site engineers are employed by the construction industry.

We request priority is given to technical training to assist the construction community with delivering improvements to construction practices that we will need to make.

It would be helpful if there was a more balanced approach to technical drawing in schools, the recent change away from technical drawing to graphics has led to too greater a focus on developing ideas, research and design. As a consequence students do not understand all the opportunities that exist for them.

STRENGTHENING OF DAMAGED HERITAGE BUILDINGS

We have experienced frustrating delays on damaged heritage buildings as consultation continues with "heritage experts".

The influence of the opinions given by heritage building advocates, experts and consultants that are often required by local authorities or by local authority process' should be reduced, these opinions place far to greater an emphasis on retention rather than safety, good structural design and good economic use. The Historic Places Trust seem to have a more pragmatic practical approach to keeping heritage buildings but this is lost within the bureaucracy of local

authorities and consent process'. Delays caused by 'heritage building' advocates has led to more damage and more loss.

We request that owners of heritage buildings in Canterbury are only required to consult with experts who have a desire to retain heritage buildings as much as that is practical, who have training and understanding in good seismic and structural design, and experts who have training and understanding in safe methods of construction and deconstruction for carrying out strengthening works on damaged or weak buildings. We request that consultation with other heritage experts is at the discretion of the building owner. Please let owners of heritage buildings get on with saving and strengthening their buildings.

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Director

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