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Royal Commission of Inquiry
into Building Failure Caused by the Canterbury Earthquake
Level 1
Unit 15 Barry Hogan Place
Addington
Christchurch

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Transmitted by email to: Canterbury@royalcommission.govt.nz

Attention: Commissioners

Dear Sirs,

Submission Concerning Post-Earthquake Experience of a Large Engineering Consultancy

Introductory Comments

We have set out below Beca's immediate post-earthquake assessment experience in 2010-2011 together with comment on our preparedness for this situation. We have appended the background notes we supplied with our post 23rd December 2011 earthquake assessments when we gave them to our clients. They represent the culmination of our experience to that time.

Summary

- The New Zealand engineering profession (NZSEE, IPENZ) had developed good response systems before the September 2010 earthquake.
- Individuals within Beca were au fait with the systems, but this knowledge was not widespread among all offices.
- Very few structural engineers in Beca had undergone recent post-earthquake damage assessment training.
- Internal systems which were compliant with the NZSEE guidelines being followed by Civil Defence were implemented within 24 hours of the 4th September 2010 earthquake. These were strictly enforced, and were consistent with our Quality Assurance systems.
- The key role of property management companies in the response phase was not recognised by the Civil Defence system, and the property managers had no prior knowledge of the post-earthquake assessment process.
- Response to the 4th September 2010 earthquake was a very valuable dress rehearsal for the 22nd February 2011 earthquake.
- Without the continued access to mobile telephone and internet services, the level of service we delivered would not have been possible.
- We carried out far more post-earthquake assessments outside the cordons and the formal Civil Defence system than within, and many of these were ahead of the implementation of Civil Defence's systems.

- We adopted the Civil Defence rapid assessment forms as part of our deliverables to commercial clients, and voluntarily submitted these to Civil Defence.
- We noted that there were misunderstandings regarding the status of, and reasons, for the rapid assessments amongst the public, building owners, engineers and Council officers.
- Keeping ourselves informed hour-to-hour of changes in Civil Defence policies and requirements was difficult, but became much easier when professional engineers were assigned liaison roles - initially by IPENZ.
- Post-earthquake assessment briefings and de-briefings conducted by Civil Defence after the 22 February 2011 earthquake were excellent.
- The Critical Buildings group was an excellent initiative.
- Enquiries on behalf of clients as to assessed status of properties within the cordon were frustrated by backlogs in the updating of Civil Defence systems.
- A significant part of our role proved to be providing assurances to clients, to their staff, and to our own staff after the earthquakes.
- Civil Defence requirements for consulting engineers to take responsibility for owners entering damaged buildings to retrieve contents were unreasonable.
- The institutional knowledge gained of the post-earthquake environment will remain for many years. Beca mobilised staff from our Australian and Asian offices to help in the assessment. The on-the-job training experienced, particularly by our younger engineers, will have prepared them for the rest of their careers.

Introduction

Beca structural engineers were as well prepared as any to respond immediately after the Christchurch earthquakes. We had institutional history from our intensive involvement in Kawerau after the 1987 Edgecumbe earthquake, senior members who had been part of post-earthquake reconnaissance internationally (including as recently as the Padang earthquake in Indonesia), USAR Task Force engineer colleagues, and seniors who had been on the NZSEE and IPENZ study groups who had formulated the post-disaster assessment guidelines. We were connected to the senior Civil Defence people, and second-guessed what would be the likely response. Naturally, the welfare of own local staff (approximately 200) who had been seriously impacted at work and home by the Christchurch earthquakes was our first priority. Heroic commitments by staff enabled them to start responding to clients within hours of the major events, with the experiences and systems from the 4th September 2010 event being very valuable for after the 22nd February 2011 event.

Nevertheless, a majority of our structural engineering staff had no prior training or experience in damage assessment, or knowledge of the likely systems that would be put in place by Civil Defence.

Although the 22nd February 2011 earthquake impacted the logistics of Beca's business much more than the 4th September 2010 one, the first one taught us more institutional and preparedness lessons than the second one.

Our response to the 4th September 2010 earthquake

Our Christchurch structural team leader was receiving calls from clients for assessment within an hour of the earthquake. Apart from one property on the periphery of the CBD, our initial response by seniors concentrated on the airport (terminal buildings and runway) and a major suburban shopping mall. There was no formality in the reporting to the clients, and no placarding. Our Christchurch team was unaware of the NZSEE/DBH guidelines for post-earthquake assessment. Later in the day, they were made aware of these in a nationwide teleconference, and a senior team of earthquake engineering specialists was organised to arrive on the first available flight the next morning.

Beca's offices in the PWC tower in the CBD were assessed late Sunday morning, and an operations centre was set up in them to coordinate the many requests being received. A chance encounter with property manager Colliers who were in the same building resulted in an immediate arrangement for us to support them. They also set up a comprehensive operations centre.

Beca chose to complete the Christchurch City Council's Level 2 Rapid Assessment forms for all its assessments for clients from the Sunday, augmented by a covering letter with detailed explanations of what we had and had not done. Copies of the forms were hand-delivered to Civil Defence daily, and a list of the buildings we were dealing with was provided to John Buchan of Civil Defence that evening. Where placards, or changes to placards were recommended, we had these signed by Civil Defence personnel, and affixed them ourselves. A small proportion of our available staff were assigned to voluntary work with Civil Defence. A much larger group were directly involved on specialist tasks associated with wastewater and bridges.

It was noticed that a number of other consultancies were posting non-standard placards on buildings under their own names/authority – particularly outside the CDB.

It is interesting to note that at a meeting of consulting engineers hosted by IPENZ and ACENZ in the Hotel Grand Chancellor in the late afternoon of either the 8th or 9th of September, a number of Christchurch consultants, to the surprise of their Wellington colleagues, railed against the just-announced decision of the Christchurch City Council that damaged earth-quake prone buildings should be strengthened to at least 67% of New Building Standard.

We found that a number of clients asked us to give presentations to their staff on their re-commencement of business – to talk about the difference between structural and non-structural damage, and to re-iterate what to do in the event of a major earthquake.

From about the 9th September 2010, a transition to business-as-usual began, although many staff from Beca offices outside Christchurch were brought in to meet the demands.

Our response to the 22nd February 2011 earthquake

Our Christchurch office was evacuated immediately after the earthquake. Some staff went to help immediately at the nearby PGC building site.

Alternative premises for our structural engineers were secured by late afternoon by our Auckland-based corporate services. A team of experienced structural engineers from Wellington and other

offices were mobilised overnight. Contact with all Christchurch staff was established in line with protocols formalised after the 4th September earthquake. Priority was given to checking the houses of staff. The structural engineers were operational from their temporary offices in Bealey Avenue from the Wednesday, and commenced Level 2 inspections on properties outside the cordon. On the Thursday, a large contingent of Beca structural engineers from all New Zealand offices had been mobilised, and about half were made available to Civil Defence for the beginning of their suburban placarding. Staff throughout Beca surrendered their laptops which were driven to Christchurch along with vehicles, IT network gear, and personal protection equipment.

Importantly, Beca engineers could be advised to sign the Civil Defence contracts without delay/concern because these had been seen by Beca lawyers (and not objected to) some two years previously when the IPENZ Post-Earthquake Response committee had developed them.

Beca civil engineers were also quickly mobilised for assisting at the Bromley wastewater plant, for bridges, and for water reservoirs. Beca electrical engineers were used for aspects relating to the substations serving the eastern suburbs.

Senior Beca staff assisted with the critical buildings group set up within the Arts Centre. A senior Beca engineer made a point of attending most morning and evening briefings so that the wider team would have the latest information.

The pre-inspection briefings held by Civil Defence were thorough and appropriate for the professional engineers attending.

The use by Civil Defence of experienced consulting engineer volunteers to allocate inspection tasks at the headquarters worked much better than when council officers were initially doing this. This was because the consulting engineers were good judges of which volunteers were best for particular tasks – such as checking previous assessments.

The warranting of non-council CPENG (or equivalent) engineers to undertake placarding worked very well – particularly as it very efficient to undertake placarding at a considerable distance from the Civil Defence headquarters. Beca lodged all assessment forms regularly through the days that followed.

It was somewhat difficult to get authoritative information on the changing rules re access behind cordons. The requirements around the roles and responsibilities of professional engineers accompanying building tenants to recover business documents were considered contrary to sound practice.

Many clients were requesting information from Beca on the (placarding) status of their buildings, particularly within the cordon. It understandably took some time before assessment placarding information was recorded in the Civil Defence digital databases, but valiant efforts were made by their staff to keep folders updated in the foyer.

Beca has a very positive view of the immediate post-earthquake response of Civil Defence. Because of the prior involvement of our engineers with the development of the assessment systems, including the placarding, we were able to predict to a reasonable extent how Civil Defence's would be organised. Also, because of strong personal relationships between our senior staff and many of the Civil Defence people in senior roles, we were able to keep ourselves

reasonably well informed. Both earthquakes demonstrated the need for Civil Defence to allocate a senior person to liaise specifically with the private sector consulting engineers. Consulting engineers represent a very large resource in the post-emergency period – both to Civil Defence, and to the wider business community than just the CBD.

Our response to the 23rd December 2011 earthquake

After the strong local earthquake on 23rd December 2011, no Civil Defence state of emergency was declared. Many clients asked Beca to inspect their buildings soon after. Beca's offices had closed for the Xmas/New Year period the evening before. Nevertheless, our Christchurch staff responded. Discussions were undertaken with the Christchurch City Council building officers, and it was agreed that Beca would again use the Level 2 Rapid Assessment forms, and that any buildings assessed as needing to be Yellow or Red placarded would be immediately referred to the Council for its officers to affix the placards. Beca realised that building owners may affix Beca's Level 2 forms as de facto placards, and documentation was immediately prepared for giving to the owner with the completed assessment forms. This clearly stated the limitations of the rapid assessment process, and what further steps the owner should take. This documentation is an attachment to this submission.

Structural engineers from our Christchurch office worked till Xmas Eve to assess buildings, and on the following Tuesday (a public holiday) they were mostly relieved by a large team from other Beca offices who worked through the week to satisfy client's requests. It was noticeable that, although little new damage was observed, the assessments gave peace of mind to owners and tenants.

Closure

We thank the Royal Commission for the opportunity to provide further amplification of our views and would welcome the opportunity to amplify our observations and comments.

Yours sincerely

Mark Spencer

General Manager - Building Structures



on behalf of

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on behalf of

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Important Note: Structural Inspection

1.1 Background

Beca has carried out an inspection of the following building following the 7 January 2012 earthquakes

Building Name	
Building Address	
Date:	

1.2 Basis of inspection

This Level 2 rapid assessment has been prepared based upon limited visual inspection, and is intended to record the damage caused by the aftershocks of 7 January 2012. In all other respects, it is not intended to supersede previous more detailed inspections and reports. Its scope is confined to assessing the likely effect of observed damage upon the building lateral capacity, to establish the degree to which this has been diminished (relative to the building in its undamaged state). It does not serve as a substitute for an IEP (or more detailed seismic assessment) which provides an assessment of the building against current code requirements and hence quantifies the risk presented by the building relative a building designed in accordance with modern codes.

1.3 Earthquake Prone Buildings

We will attempt to review work Beca has completed on the above building including highlighting again if this is an earthquake prone building. If Beca has no history with the property the onus is on the Manager or Owner to highlight any inspection history and make known who and when inspections have been undertaken.

1.4 No State of Emergency, therefore no placard system operational

No state of emergency has been declared and as such, the emergency placard system has not been activated. Beca will not apply placards as part of this inspection.

1.5 No observed reduced capacity

If our inspection indicates **no apparent reduced capacity** this **does not** mean that the building is declared safe to occupy by Beca. This means that the building appears to be in no worse state than before 7 January 2012. The **ultimate decision on whether to occupy the building remains with the building owner and the tenants.**

1.6 Diminished Capacity

If our inspection indicates diminished capacity, then our recommendation will be to carry out a full IEP assessment. This will need to be prioritised and scheduled once the initial response is over.

1.7 Badly damaged buildings

If we have any concern in relation to the level of damage, we will of course highlight this to you. Beca will refer your building for further inspection to the Christchurch City Council who have the authority to declare a building unsafe under the Building Act or to CERA who may require further detailed work or demolition under the Canterbury Earthquake Recovery Act 2011.

1.8 Further clarification

If you require further clarification on the important points above, please contact one of the following:

Jonathan Barnett; Acting Section Manager Beca Christchurch Structural: 027 207 0860

Mark Spencer; General Manager Beca Structural Engineering; 021 370 756

Craig Price; South Island Regional Manager; 027 488 4123

2 Scope of Services

- a. Our building inspections will be initially limited to structural inspections in accordance with the Level 2 Rapid Structural Safety Assessments guidelines identified above. While these guidelines assume that the inspections will be carried out for a territorial authority during a state of emergency, our work will be carried out for you (instead of for a territorial authority), and will continue to be carried out, in line with the guideline, after the state of emergency has been lifted. Our inspections will be for the sole purpose of providing an urgent assessment of the damage to key structural elements of a building that may pose a risk for life safety and access purposes, and are based on an internal and an external visual inspection of key elements of the structure readily accessible at the time of the inspection. The assessment may include recommendations for work to be done under urgency where there is a need to demolish or secure the structure to ensure the safety of the public or protect adjacent property.

We will be passing the Level 2 Assessment forms to the Christchurch City Council and/or CERA. We believe from discussions with the Council that these reports will fulfil their requirements for Level 2 assessments for these buildings and the Council will not separately inspect these buildings.

- b. Beca and its employees and agents are not able to give any warranty or guarantee that all defects, damage, conditions or qualities have been identified and further post disaster engineering advice should be sought regarding a detailed inspection of the building and the detailed repair and remedial work required on the building to restore functionality and Building Code compliance. Beca liability for any loss, damage, costs, or claim arising due to, or in connection with the assessment for any particular building and any related advice is limited to direct property damage and shall not exceed the fees rendered by Beca for that particular building assignment.
- c. The inspections will not cover building services systems however such inspections and any advice on detailed repair or remedial work for these systems can be undertaken in association with other post disaster engineering advice at your request.
- d. The terms of this letter and the conditions of engagement described below will continue to apply to all services performed by Beca in respect of the buildings for which this commission applies unless and until new written conditions of engagement are entered into.

3 Conditions of Engagement

The conditions that will apply to our Services are the ACENZ/IPENZ Short Form Model Conditions of Engagement (Commercial), dated April 2007 (the "Conditions"), with the following two modifications:

- Point 2.b. above under our scope of services prevails over the Conditions, including the amount of our liability; and
- Although we will apply the standard of care in accordance with clause 2 of the Conditions, such standard will be applied in the context of the scope of services above, including the urgency we will need to work, the limited nature of the inspections, and the limited information available to us.

4 Acknowledgement

I confirm I have read the above and will liaise with and advise the building owner/tenants accordingly.

Building Owner/Manager	Name: Signature:
Beca Engineer	Name: Signature:
Date	

Beca Staff Present:

Name	Signature