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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

**31 July 2012**

Transmitted by email to: [Canterbury@royalcommission.govt.nz](mailto:Canterbury@royalcommission.govt.nz)

**Attention: Commissioners**

Dear Sirs,

**Submission Concerning Training and Professional Development of Graduate Structural Engineers**

## **1 Introduction Comments**

This submission is made by Beca Carter Hollings & Ferner Ltd, on behalf of the Beca Group of companies. This submission focusses on the training, technical and professional development opportunities available to graduate structural engineers in Beca.

As a large multi-disciplinary engineering consultancy, Beca invests in the training and professional development of our graduate engineers. For our New Zealand-based graduate structural engineers, Beca offers a structured professional technical development and informal training opportunities which are built on our long experience of structural design in a seismic environment.

## **2 Beca Graduate Development Programme**

### **2.1 Structural Graduate Induction and Buddy Programme**

All new Beca employees are given an induction programme comprising a series of training modules which introduce Beca's business processes, quality assurance management system, health and safety practices, and available technical resources. Graduate structural engineers are provided access to Beca's graduate structural handbook, and Beca's structural knowledge repository (see Items 3.3 and 3.4).

Beca implements a "buddy" programme whereby new employees are assigned to a more experienced member of staff to assist their transition into Beca. In terms of technical work, the buddy is expected to be able to direct the graduate engineers to the relevant technical resources and expertise within Beca.

### **2.2 Beca Structural Graduate Training Workshops**

Graduate structural engineers (and overseas-trained engineers who are inexperienced with seismic design practices specific to New Zealand practices) are invited to participate in the six-monthly structural graduate training workshops. The structural training workshops are facilitated by some of

the more experienced Beca staff and serve as a forum to share expertise gained on recent Beca projects.

Beca's structural graduate training workshops are tailored to provide new graduates with basic structural training in Beca technical and business processes. For example, the 2012 Structural Graduate training conference covered the following topics, amongst others:

- Structural sketching and draughting.
- Construction monitoring and contract administration.
- Seismic assessment and retrofit.
- "Seismic engineering 101".
- Diaphragm seismic and strut-and-tie design.
- Structural analysis for civil, industrial and building structures, using Space Gass and SAP2000.

### **2.3 Beca Graduate Conferences**

The first and second-year graduates (not limited to technical staff) in Beca are invited to a more general Beca-wide annual conference. In addition to developing internal networks, this conference provides an avenue for graduate engineers to learn from Beca senior staff on a range of communication, management and business-related topics such as technical innovation, presentation skills, client-relationship management, and risk management.

### **2.4 Formal Career Development Review**

Beca's formal career development review is generally held six monthly for graduate engineers in the first two years of employment. The review allows graduate engineers to have a structured discussion and planning of their personal and technical development with their managers. This includes setting the pathway for graduate engineers to attain their various competencies for achieving Chartered Professional Engineer (CPEng) status. The regular reviews also provide opportunity for feedback on performance and technical development.

Development can be planned and achieved through targeted project involvement, specific training courses, mentoring and self-study. In Beca, personal development of graduate engineers forms an integral part of our business planning, and is a key performance measure for the business.

All graduate structural engineers are generally rotated into different roles and projects to ensure a well-rounded development in various practice areas such as: construction monitoring, structural design, documentation, client communication, etc.

### **2.5 Mentoring Programme**

A mentoring programme is in-place in Beca through which senior staff provide guidance on career and professional development to younger staff. Graduate engineers who are working towards their CPEng qualification are paired with the relevant mentors to actively guide them to set and achieve the required professional goals. The mentoring programme is also a channel for graduate engineers to learn from senior Beca staff with specific expertise and competencies.

## **2.6 Beca's Learning and Development Courses**

Graduate engineers are given the opportunity to enrol in the wider Beca group's Learning and Development courses, designed to build their consultancy skills. These courses are provided to improve business writing, presentation, time management and job management skills – the professional skills that are generally not directly covered in their university curriculum.

## **3 On-going Training and Technical Development**

### **3.1 Informal on-the-job trainings**

Informal on-the-job training occurs over the course of projects. Being in a large consultancy firm, Beca graduate engineers are exposed to a range of projects across multiple market segments, and work with different Technical Directors with a range of expertise and experience.

Graduate engineers are provided resources to up-skill and learn-on-the-job under the supervision of more experienced senior staff, particularly important when the graduates are working in practice areas beyond their existing competencies. Technical "gurus" in the larger Beca group are also generally available for project queries, either via informal meetings, or online video conferences.

Work verification and review of work, across all levels, is an integral part of the work culture and quality system in Beca. These verification and review sessions provide significant opportunities for informal technical training for graduate engineers, and the "best of Beca" expertise is typically included in these sessions.

Beca staff, not limited to graduate structural engineers, are encouraged and required to document and share all projects lessons and learning, either from work verification, on-the-job research and development, or from lessons learnt from mistakes, etc.

### **3.2 In-house and external training opportunities**

Formal and informal lunch-time training presentations on various technical and non-technical topics are regularly held in all offices. These presentations are used to brief the team on external conferences, industry products, end-of-project reviews, and specific technical training (eg. Revit 3D modelling, health & safety, etc.).

When the opportunities and needs arise, Beca engineers are also regularly sent to participate in external training, seminars and conferences, including those organised by the IPENZ, learned societies (NZSEE, SESOC, NZCS, etc.) and universities. Beca structural graduates are generally given the opportunities to attend at least one or two external training seminars and conferences in their first two years of employment.

Beca is also a current member of the IPENZ's Professional Development Partner (PDP) scheme. Beca graduate engineers are encouraged to enrol in various IPENZ Continuous Professional Development (CPD) courses and, when relevant, the training costs are covered by the business.

### **3.3 Beca Structural Engineering Knowledge Repository**

Beca has a well-established structural engineering knowledge system which stores the lessons, project experience and productivity tools from various past Beca projects and technical development efforts.

Verified design tools, examples, standard design procedures and guidelines within the Beca structural knowledge system are accessible by Beca technical staff via an online intranet website. A managed structural knowledge system allows a quality control process to be in place. Thus, Beca engineers can use the available tools and guidelines with some confidence.

As part of the larger Beca structural business development, technical guidelines on commonly used technical tasks such as Initial Evaluation Procedures (IEP), foundation design and seismic assessment have been published internally. These guidelines become a reference point for the graduate engineers - in addition to the existing industry standards and guidelines, and technical support from senior staff.

### **3.4 Beca Structural Technical Groups**

Beca has active structural technical knowledge groups focusing on specific topics such as structural analysis, bridge seismic design, seismic assessment and tank seismic design. These technical groups run active intranet websites and online forums where technical questions are posted and debated by members with a range of technical expertise.

Some Beca technical group members are nationally and internationally-recognised experts in their fields, and have active linkage with code committees, learned societies and research entities. These Beca in-house 'technical experts' are an invaluable technical resource for the Beca engineers, and frequently contribute to technically challenging projects.

These technical groups also organise regular workshops and seminars to share technical knowledge such as lessons learnt from projects, specific advanced design methodologies (eg., displacement-based design, base isolation, etc.). These workshops and seminars are also an avenue to up-skill Beca structural engineers (not limited to graduates).

Many Beca engineers are active contributors to the industry in terms of technical development, research initiatives, management committees of industry organisations, and knowledge-sharing. Beca engineers regularly present and share our technical knowledge and lessons learnt via external conferences and technical publications.

### **3.5 Intra-section and international exchange**

Beca has an informal intra-section and international exchange programme in place. This provides graduates the opportunity to be rotated to different business units covering different sectors and geographical locations. This allows graduate structural engineers to gain experience in a range of projects from civil infrastructure to industrial plants and multi-storey commercial buildings.

As Beca operates and works in various countries across the Asia Pacific region, Beca engineers are given the opportunity to participate in overseas-based projects or to transfer to Beca offices

abroad. Such cross-country collaboration provides exposure and experience to Beca graduates on some larger scale structural engineering projects uncommon in New Zealand.

## 4 Closure

Beca's career development philosophy is built on the philosophy that each individual owns his or her career. Hence the training and technical development opportunities are designed to provide a supportive and active-learning work environment to our graduate engineers whilst ensuring consistency and quality for our technically complex work.

It is worthwhile to note that the professional development programme and quality processes in Beca are also critical in up-skilling overseas-trained engineers who are unfamiliar with the seismic design specific to the New Zealand practice.

We thank the Royal Commission for the opportunity to provide information about our training and professional development of graduate structural engineers and would welcome the opportunity to amplify our observations and comments.

Yours sincerely

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