



Ref: 6571L02

05 February 2016

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Dear [Redacted]

## **St Gerard's Stage 1 Seismic Strengthening Structural Engineering Consultancy Services**

Further to our recent discussions we are writing to you to summarise the wider project issues and our proposed Structural Engineering Services associated with the project.

We have called the project "Stage 1" in terms of the strengthening work in that the target %NBS is only 34%, just sufficient to prevent it from being classified as Earthquake Prone. This is a strengthening level we would not normally recommend in that it lifts the building only to what is currently considered a minimum level of safety, and as well does not provide any buffer to future changes in codes/standards that may drop this %NBS level again. However in unusual circumstances such as this we feel that the stage can be an important first step along the road to sustainable heritage management of the complex. The demands on us will be to come up with a scheme that can be "added to" in the future without significant re-work of what is done in Stage 1. In this case there is not the budget to firstly come up with a 67% plus scheme and then de-tune it to 34%: we will instead be needing to use our experience and some innovation to further this goal.

Our assessment of 34%NBS will be for an Importance Level II or "normal" building. This assumes that no more than 300 people can gather together in the church at once, and that the regulating authorities don't believe the building should be Importance Level III due to its heritage status. We believe that in terms of preservation, skilled choices of strengthening method can control damage better in the more likely range of moderate earthquakes the building will experience than simply increasing the design load levels by 1.3x for the IL III classification.

As discussed, we wish to cover three aspects of the strengthening process below: firstly our engagement terms and the options we propose, secondly the timing of associated degradation investigations to ensure the materials in the building can outlast the design life, and thirdly the involvement of the remainder of the design team to develop the final documentation.

The target of our work covered by this proposal is to establish a budget from which to fundraise for the project. The more work we carry out at this stage, the lesser design risk will need to be factored into the budget estimate. The design risk is a product of the amount of analysis/design we have done, the experience of the person putting together the estimate, and the extent of structural investigation carried out. This third item will be discussed in the following section. In addition to design risk, there will also be a construction contingency appropriate to this type of building to deal with the inevitable unforeseen extras that arise when parts of the existing structure are opened up.

We initially propose to carry out only “Developed Concept” as the minimum level of work we feel is appropriate. This will require the person/parties putting together the estimate (QS, Contractor or combination thereof) to have significant skill in estimating for the staging/sequencing and disruption/make good allowances which will not be fully described in the documentation. We have also outlined the additional fee we would require to carry out full Preliminary Design, the more usual stage design is progressed to for budget costing. We would obviously prefer to do the more extensive scope as it allows us more time to consider options and properly define the issues. However we understand the difficult funding framework you are in and hence give you the option.

For the Monastery, we will first analyse the existing structure to properly understand its existing strengths: a Detailed Seismic Assessment (DSA). This best allows us the opportunity for finding areas where we can complement or manipulate its existing capacity, rather than adding a whole new seismic system to the building. For the church however, given it is more earthquake prone and structurally a simpler building, we will instead progress straight to the concept design, in which we will analyse the existing capacities with the new strengthening in place.

### **Durability**

In addition to the structural strengthening, we will need to consider the durability of the concrete in the building: we would not want to design or worse strengthen the building without addressing this if we found that corrosion of the underlying reinforcement or “concrete cancer” was soon to onset. Visual examination of the building suggests that its paint and the thick plaster may have preserved the underlying concrete. However we would not want to proceed much beyond Preliminary Design without investigating this issue. Investigations would involve a specialist taking invasive samples from the outside of the building in several locations and chemically analysing for carbonation and chloride ingress. As with any risk, we would encourage this to be undertaken as soon as funds permit, as the costs are likely to be substantial, say \$15-20k.

## Design Team

Any strengthening project requires more than just the Structural Engineer to carry out the work. Regulations insist as a minimum a current Fire Report is produced, and the building to be upgraded to as *near as reasonably practical (ANARP)* to current code levels. We discuss the team members and their input required below:

- **Architect** - to attend on the making good requirements around the strengthening interventions, but more importantly form a holistic project thinking and co-ordination role for the design team
- **Heritage Architect** (which may be part of the Architect) - to provide critique to the design options, guidance as to the relative importance of various features, and provide written documentation support to the Resource Consent application. They will also guide consultation with the various heritage regulators.
- **Fire Engineer** – it is essential that a skilled Fire Engineering Consultant is employed to properly assess the current risks, and where appropriate to use the ANARP argument to justify areas which will not exactly comply. A heritage building gives the greatest scope for the ANARP argument, however the building's mixed use with gathering, working and sleeping all within the same structure may be challenging.
- **Geotechnical Engineer** – the work by Tonkin and Taylor to date is sufficient, with our experience of Wellington rock conditions, to allow us to complete Preliminary Design. However they may need to be further involved beyond this, and possibly carry out further investigations, depending upon the strengthening solution selected.

As part of setting up the budgeting, we will need to project fees to completion. With an agreed concept and pricing both ourselves and the above consultants should be able to estimate these fees. The exception to this may be Resource Consent, for which we all are a little at the mercy of the extent of detail that may be required by the regulating authorities.

For you to benchmark our structural fees beyond what is proposed below, we would look to align them to 10% of the structural portion of the work, covering all stages. We would be happy for a Quantity Surveyor experienced in this type of work to review this on your behalf, for probity's sake.

### 1.0 Scope of Engineering Services

#### 1.1 Monastery Partial Detailed Engineering Assessment

- Weigh the structure
- Develop a wall-based 3D computer model to analyse the distribution of loads.
- Derive the primary wall stresses under lateral loads.
- Carry out an analysis of the first floor and roof transfer diaphragms.
- Review the key gable walls for face loading.
- Review tie forces in the timber structure at roof level.
- Brief summary report.

### 1.2 Monastery Developed Strengthening Concept

- Preliminary Calculations for the key defining elements in the strengthening design
- Extrapolation/interpolation to cover the whole scheme
- Workshop to review the proposals and brainstorm alternatives
- Further calculation to complete concept or preliminary design
- Sketch documentation to allow a budget to be established by a Quantity Surveyor or builder experiences with complex heritage retrofit.

### 1.3 Church Developed Strengthening Concept

- Preliminary Calculations for the key defining elements in the strengthening design
- Extrapolation/interpolation to cover the whole scheme
- Workshop to review the proposals and brainstorm alternatives
- Further calculation to complete concept or preliminary design
- Sketch documentation to allow a budget to be established by a Quantity Surveyor or builder experiences with complex heritage retrofit.

## 2.0 Conditions of Engagement

The Conditions of Engagement shall be in accordance with the ACENZ Shortform Model Conditions of Engagement (Copy enclosed)

## 3.0 Professional Liability

The liability of the consultant to the client in respect of our services shall be limited to \$500,000. We have professional indemnity insurance in place to cover this amount. We advise that we exclude any liability on any matters relating to Asbestos or contaminated ground.

## 4.0 Payment

### 4.1 Monastery Partial Detailed Engineering Assessment

Lump sum fee of \$15,000 plus GST payable on monthly pro rata basis during the design phase.

### 4.2 Monastery Developed Strengthening Concept

Lump sum fee of \$12,000 plus GST payable on monthly pro rata basis during the design phase.

Additional \$10,000 if this were to be taken to the Preliminary Design phase.

### 4.3 Church Developed Strengthening Concept

Lump sum fee of \$15,000 plus GST payable on monthly pro rata basis during the design phase.

Additional \$10,000 if this were to be taken to the Preliminary Design phase.


### 4.4 Work Beyond Scope of Work (with prior agreement of client)

On a time basis, valid until December 2017;

Director	\$220/hour plus GST
Associate	\$180/hour plus GST
Senior Design Engineer	\$160/hour plus GST
Design Engineer	\$130/hour plus GST
Senior CAD Operator	\$140/hour plus GST
CAD Operator	\$1200/hour plus GST
Disbursements at cost	

We trust that this provides the information that you require and adequately represents our discussions to date.

Yours faithfully



Alistair Cattanach  
DIRECTOR  
160205 AGC/JDC/AWT

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