

UNDER

THE COMMISSIONS OF INQUIRY ACT 1908

IN THE MATTER OF

ROYAL COMMISSION OF INQUIRY INTO BUILDING  
FAILURE CAUSED BY CANTERBURY  
EARTHQUAKES

KOMIHANA A TE KARAUNA HEI TIROTIRO I NGA  
WHARE I HORO I NGA RUWHENUA O WAITAHA

AND IN THE MATTER OF

THE CTV BUILDING COLLAPSE

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STATEMENT OF EVIDENCE OF PETER HIGGINS  
IN RELATION TO THE CTV BUILDING

DATE OF HEARING: COMMENCING 25 JUNE 2012

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**STATEMENT OF EVIDENCE OF PETER HIGGINS IN RESPECT OF THE CTV BUILDING**

1. My full name is Peter Robert Higgins. I live in Christchurch. I am the Southern Regional Manager for Construction Techniques Ltd.
2. Construction Techniques Limited was contacted by John Drew, the CTV Building Manager in early 2011 and requested to provide an estimate of costs to repair cracking in various elements of the building.
3. I made two visits to the CTV Building in February 2011.
4. References to "Levels" in this statement are consistent with those adopted by the Royal Commission. Our appended correspondence relate to the convention applicable at the time of inspection. Thus "Level 5" was previously referred to as "4<sup>th</sup> Floor".
5. The first visit was on 8 February 2011. I met John Drew at his office on Level 5 (4<sup>th</sup> Floor) of the CTV Building at 1pm. Prior to that meeting I had not received any reports or other information about the Building. We went to the north end of the Building where the shear core was and Mr Drew showed me typical crack damage in the stairwell at the North end of the Building and the Level 5 bathroom end wall at the North end of the Building.
6. We also went up to Level 6 (5<sup>th</sup> Floor) and Mr Drew pointed out the cracked column and beam outside the lift doors facing Madras Street. We then returned to Mr Drew's office.
7. Mr Drew told me during that first visit that a structural engineer had visited the building. At the completion of this first visit and while still in his office, he located the report by David Coatsworth of CPG (**the CPG report**) dated 6 October 2010 [BUI.MAD249.0082.1] and emailed me a copy for future reference. [BUI.MAD249.0455A.RED.1].
8. Because I had not seen the CPG report prior to my first visit to the CTV Building, my inspection at that time could only be preliminary and relied on Mr Drew pointing out examples of crack damage.

9. Once I had had a chance to review the CPG report I undertook a second visit to the CTV Building, which took place on 14 February 2011. The CPG report did not quantify the scope of work that was required and the purpose of my second visit was to determine the approximate quantity of the reported crack and spall repair in order to provide an initial budget estimate for the remedial works based on the CPG observations.
10. The main areas that I looked at during my second visit, guided by the CPG report, was the crack outside the fire escape in the south shear wall, the Level 2 beam cracks on the North face of the building, the stairwell walls, the cracked column on Level 6 outside the lift shaft and the adjoining lintel beam spall/crack. I did not form any view about the nature of the damage in these areas as the purpose of my visit was simply to quantify the scope of works required and prepare an estimate.
11. The cracks that I observed in the stairwell walls were generally horizontal and were consistent with construction joints as illustrated in photograph 3 in the CPG Report **[BUI.MAD249.0082.14]**. My recollection is that there was a thin plaster render over the concrete in the stairwells which had cracked with the joint movement and this render would need to be removed along the crack line for setting up and injection of the construction joints. I saw cracks on both sides of the stairwell as well as in the North Shear Wall.
12. The cracked column and adjoining beam that I inspected on Level 6 outside the lift shaft appears to be the same column that appears in photograph 4 of the CPG report **[BUI.MAD249.0082.14]**. I have recorded six horizontal circumferential cracks in this column with concrete spall in the overhead lintel beam adjoining this column approximately 1200-1500mm out from the face of the column above the window. I have provided the Royal Commission with a scanned photograph which I took of this column and the adjoining beam and I have drawn along the lines of the cracks with a pen **[BUI.MAD249.0454]**. I have not been able to find the original photograph in my records.
13. I have also recorded that the Level 2 beam on the North elevation over the entry off Madras Street had five near vertical or diagonal cracks in it above the glass entry area of approximately 1 metre. This is shown in photograph 5 of the CPG Report **[BUI.MAD249.0082.15]**.

14. My notes also record that the South Shear Wall had one fine, near vertical or diagonal crack in the wall adjacent to the fire escape landing of approximately two metres. This is the same area shown in photograph 2 of the CPG report **[BUI.MAD249.0082.13]**.
15. On that second visit to the CTV Building I was only able to access parts of the Building that were identified in the CPG report or were pointed out to me by Mr Drew. I did not visit any other areas which were occupied at the time or were inaccessible. The inaccessible areas included the lift shaft and columns or beams above ground level, unless these were in public spaces. I did not look at all of the columns. External assessment of the building could only be carried out from ground level. External scaffold or access platforms would be required for a full inspection.
16. We did not remove any wall linings. It was our practice following the 4 September 2010 earthquake to note in estimates that until wall and floor linings, paint and plaster render were removed and the surface laitance along the line of any crack was ground back, it was difficult to quantify the scope and therefore a cost of the repair work. This is the reason that a "budget estimate" was submitted and this was a typical approach at this time.
17. I submitted a budget estimate to Mr Drew on 15 February 2011 **[BUI.MAD249.0456]**. He then telephoned me on Friday 18 February 2011 noting that my estimate had omitted any quantification of the cracking in the lift shaft. I advised Mr Drew that this cracking was not included in the estimate because I had not been able to access the lift shaft during my visits. Mr Drew then requested that the budget estimate be amended to provide a contingency for approximately 80 linear metres of cracks in the lift shaft walls and to resubmit the estimate on that basis. I had no other information as to the basis of the 80 linear metre figure but was prepared to incorporate this figure on the basis that the initial budget estimate would be refined as matters progressed.
18. I did not have an opportunity to resubmit the estimate with this amendment prior to 22 February 2011.

Signed:  \_\_\_\_\_  
**Peter Higgins**

Dated: 2-7-2012



**Madras Equities Ltd**

**249 Madras Street**

Damage Report

4 September 2010 Earthquake

Christchurch

6 October 2010

BUI.MAD249.0455A.RED.1

**From:** on behalf of [John Drew](#)  
**To:** [Peter Higgins](#)  
**Subject:** Fwd: 249 Madras Street Structural Engineers Report  
**Date:** Tuesday, 8 February 2011 1:52:03 p.m.  
**Attachments:** [Report\\_101006.docx](#)

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----- Forwarded message -----

**From:** **John Drew** <>  
**Date:** Tue, Oct 12, 2010 at 1:35 PM  
**Subject:** Fwd: 249 Madras Street Structural Engineers Report  
**To:**

----- Forwarded message -----


**From:** **David Coatsworth** <[David.Coatsworth@nz.cpg-global.com](mailto:David.Coatsworth@nz.cpg-global.com)>  
**Date:** Fri, Oct 8, 2010 at 5:18 PM  
**Subject:** 249 Madras Street  
**To:**

Call me if the report needs any further explanation. I would be interested to hear what the EQC guys had to say.

David Coatsworth



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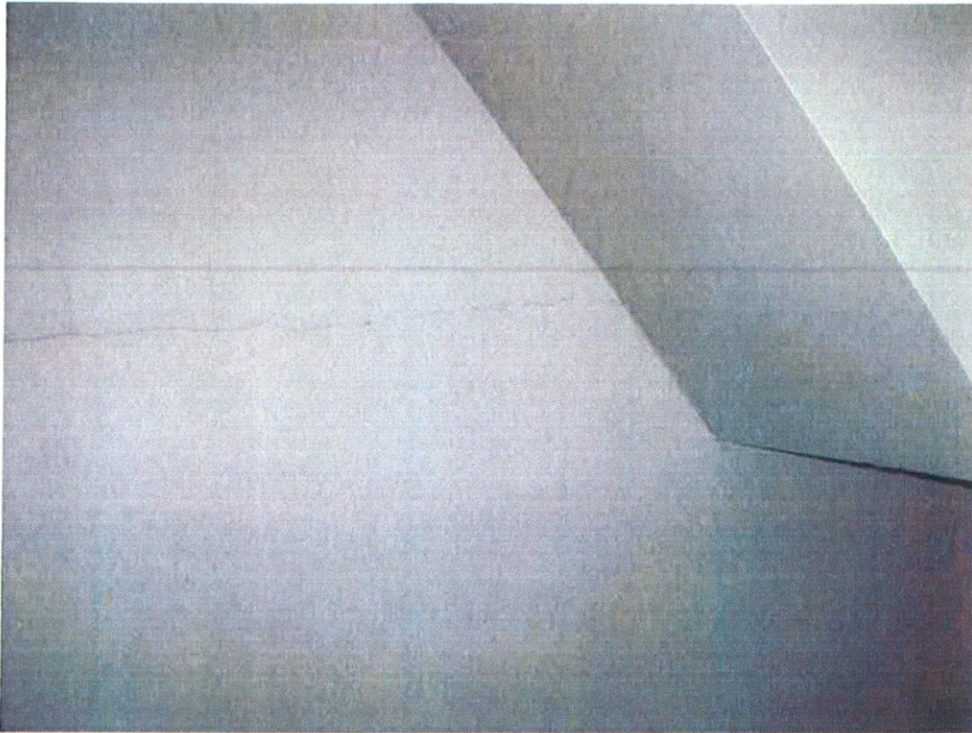
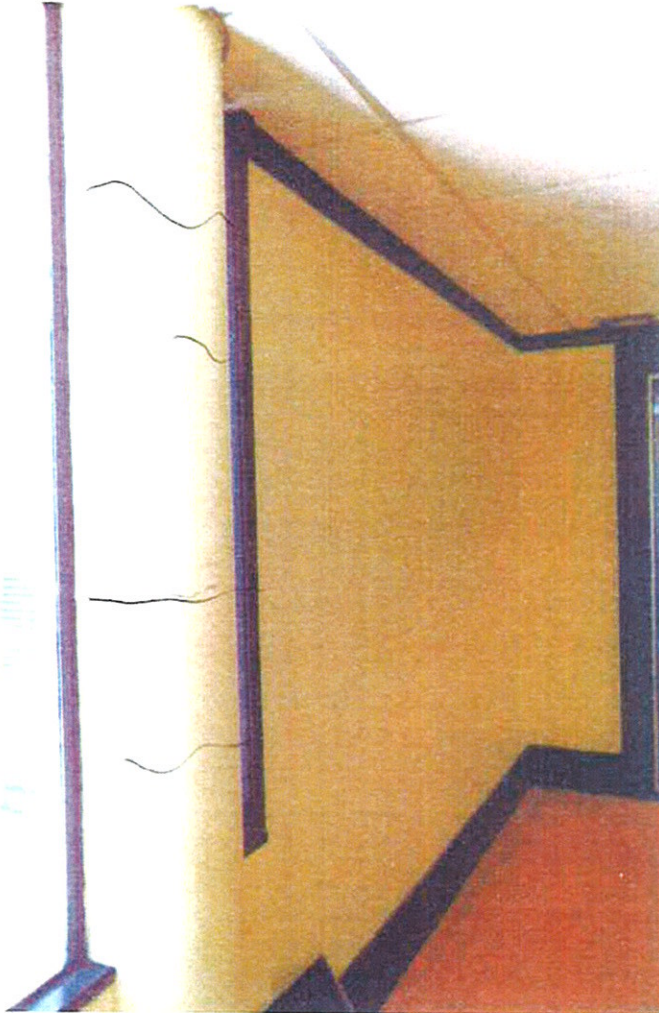


Photo 3 Cracking in floor level construction joints in stair well



Photo 4 Cracking in top storey column adjacent to lift lobby.





L5. Approx 500  $\phi$  x 6 cracks circumferential.  
Bear lintel overhead.



Photo 5 Cracking in first floor beam north elevation over entry.



Photo 6 Spalling of plaster off ends of spandrel panels.



Photo 1 South Elevation of Building



Photo 2 Cracking in south shear wall (not visible in photo) under fire escape landing



BUI.MAD249.0456.1

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### Facsimile Transmittal

<b>To:</b>	<b>Madras Equities Ltd</b>	<b>Fax: By Email</b>
<b>Attention:</b>	<b>John Drew</b>	<b>No. of Pages: 3</b>
<b>From:</b>	<b>Peter Higgins</b>	<b>File ref: C971</b>
<b>Date:</b>	<b>15 February 2011</b>	
<b>Concerning: CTV House 249 Madras St – Structural Crack Injection</b>		

Dear Sir,

We refer to our meeting on site at CTV House on 8 February 2011 and the CPG Consulting Structural Inspection Report dated 6 October 2010 calling for epoxy injection of cracks > 0.2mm in concrete shear walls, columns and beams..

Following a brief site inspection and preliminary measure we estimate cracks highlighted in the CPG report to be in the order of 80 linear metres made up of:

- Stairwells Horizontal cracks           64m
- 5<sup>th</sup> Floor Column                           9m
- 5<sup>th</sup> Floor Overhead beam               1m
- GF North Elevation beam at Entry   6m  
80m

While we could not measure all cracks fully due to the plaster render and need for external scaffold access we have made an approximation based on a visual inspection of the areas highlighted in the CPG report. Once the plaster render is removed the extent of work requiring injection may vary but this can only be determined as the works proceed.

In addition to the epoxy injection requirement the 5<sup>th</sup> Floor overhead beam is likely to require minor breakout of defective concrete and reinstatement with a structural mortar.

#### A. Crack Injection

It is understood a structural crack repair material is required to seal and bond the cracks and we propose Sikadur 52 low viscosity crack injection epoxy. The epoxy resin will be injected via surface packers fixed at close intervals along the line of any cracks or joints and the epoxy product mixed and injected through an air-operated pressure pump. We attach a copy of the Product Data Sheet for your further information.

It will be necessary to expose the surface to solid substrate along the line of the crack to seal it and the client should be aware that this ground line will remain visible unless covered by architectural coatings. We would need to seal both sides of the crack with a Sikadur 31 epoxy mortar to prevent leakage, drill and install packers at 100-200mm centres to allow

transmission of the epoxy resin material into the crack, inject and after it has hardened clean off by grinding the surface flush.

If we cannot access both sides of the panel to seal the crack there is a risk that the resin may weep to the back face and will be unable to achieve full resin penetration. If the back face crack width is sufficiently wide there is also the risk that the resin may drain to that face.

Based on an identified quantity of 80 linear metres and crack widths up to 0.2-5mm we envisage approximately 5 working days to grind the surface, apply Sikadur 31 mortar seal, affix surface packers, inject, remove after product has cured and grind flush subject to clear and unrestricted access. We envisage the resin would need to cure and harden at minimum overnight or even several days if in cold weather. For the damaged overhead beam we estimate one additional day for the breakout and mortar reinstatement.

### Budget Estimate

Due to the nature of remedial work there are a number of variables (e.g. crack width, depth, leak source/path, work location, preparation) and the client would only be charged for times and quantities expended based on the schedule below. Site personnel would record on a Daily Log form the hours and quantities for checking and confirmation. These Daily Logs would form the basis of the Payment Claim.

Our rates to carry out approximately 80 LM of wall crack injection using Sikadur 52 resin (to cracks 0.2-5.0mm wide and 150mm deep) and Structural Mortar are as follows:

1. Establishment, H&S, QA, Procurement LS		\$ 2,400.00
2. Labour	100 mhrs@ \$45/hour	\$ 4,500.00
3. Materials		
• Sika 52 Epoxy	50L @ \$44/litre	\$ 2,200.00
• Sika 31 Epoxy Adhesive	30L @ \$18.70/litre	\$ 561.00
• High pressure Surface-Packers 500 No.	@ \$5.10 each	\$ 2,550.00
• Thinners/Acetone	5L @ \$16.32/litre	\$ 81.60
• Sika Monotop Primer	1 x 4kg kit @ \$54	\$ 54.00
• Sika Structural Mortar	2 x 25kg bags @ \$62	\$ 124.00
• Misc. Injection/Repair materials	Allow Cost + 10%	\$ 250.00
4. Plant		
• Vehicle Running	5 days @ \$50	\$ 250.00
• Internal Scaffold	5 days @ \$75	\$ 375.00
• Injection Pump	5 days @\$80/day	\$ 400.00
• 12 cfm Compressor	5 days @ \$80/day	\$ 400.00
• Surface Grinder	2 x 5 days @ \$35/day	\$ 350.00
• Mix Drill	5 days @ \$35/day	\$ 175.00
• Hammer Drill	5 days @ \$35/day	\$ 175.00
• Extract Fans	5 days @ \$50	\$ 250.00
• Wet/Dry Vacuum	5 days @ \$50	\$ 250.00
<b>Indicative Cost</b>		<b>\$15,345.60</b>

Recommend structural crack injection and repair allowance of \$15,000.00 + GST.

**Clarifications**

- All services, floor linings, plaster render, ceilings, fittings and other items that interfere with the injection processes to be removed and reinstated (where required) by the Principal.
- Safe access to be provided by the Principal including scaffold or other approved access mechanism to access 5<sup>th</sup> floor overhead beam and column externally, and Ground Floor beam at Entrance. We have allowed for internal access in stairwells only and made no allowance for any external access that will be required.
- We have made no allowance for painting, plastering or reinstating wall linings or floor coverings. Our scope is limited to structural works only.
- Preparation of wall surfaces will be using diamond grinding to expose the concrete substrate along the line of cracks. This surface ground line will remain visible unless covered by paint, plaster render or other architectural coatings.
- We have assumed the use of shrouded grinders for surface preparation but note it should be expected that there would still be some dust effect even allowing for the use of industrial capacity vacuums.
- We have assumed a reasonable working area is accessible daily allowing continuity of work.
- No allowance has been made for working outside normal working hours.
- It is understood that the Principal would make available one carpark for the site vehicle for the duration of remedial works.
- We have assumed the Principal has arranged to uplift any local authority permits or fees for strengthening works.
- We have not sighted any General Conditions, Special Conditions of Contract or the Subcontract Agreement. We will require to discuss and agree the effect these may have on our budget estimate.
- Our standard payment terms are nett in full on the 20<sup>th</sup> of the month following invoice. It is not appropriate to hold retentions on this application of a proprietary system.
- We hold \$10M PLI and \$10M MVI, but make no provision for any other insurances, bonds or guarantees. The existing structure is to be insured by the Principal.
- This estimate remains valid for 30 days from the date hereof.

We trust this budget estimate is sufficient for your immediate budgeting needs and thank you for the opportunity to present a remedial solution for this project. Should you require clarification of our budget estimate or please contact the undersigned in the first instance.

Yours faithfully,  
**Construction Techniques Ltd**

Peter Higgins  
**Southern Regional Manager**

*Attachments:*

- *Sikadur 52 Technical Data Sheet*
- *Sika Structural Mortar Technical Data Sheet*