E-MAIL COPY

Canterbury Earthquakes Royal Commission

Komihana a te Karauna hei Tirotiro i ngā Whare i Horo i ngā Rūwhenua o Waitaha

26 August 2011

Attention: Peter Marshall
Managing Director
Warren & Mahoney Architects
PO Box 25086
CHRISTCHURCH

Email: peter.marshall@wam.co.nz

Dear Mr Marshall

Royal Commission of Inquiry into Building Failure Caused by the Canterbury Earthquakes: Information Request

The Royal Commission has obtained access to a number of documents that relate to remedial work recommended by Holmes Consulting Group (**Holmes**) in or about January/February 1990, in respect of the CTV Building. A report was prepared by Holmes for the Canterbury Regional Council which was, at the time, contemplating a purchase of the CTV Building. A copy of that report is **attached**.

Amongst the documents we have obtained is a handwritten note from Grant Wilkinson, who was at the time working at Holmes, to Warren & Mahoney. This note appears to indicate that Warren & Mahoney had been engaged by Alan Reay Consultants Ltd or the then owners or receivers of the CTV Building. A copy of that handwritten note is **attached** to refresh your memory.

The remedial work that Holmes recommended identified, as an area of concern, the connection of the structural floor diaphragm to the shear wall. The relevance of this issue to the Royal Commission's inquiry into the collapse of the CTV Building will be self evident.

You will see that in the handwritten note Grant Wilkinson asks: "*Do you need anything else from us on this job?*" Would you please advise what the response was to this query and whether there is any other information Warren & Mahoney is able to provide to the Royal Commission that relates to the concerns identified in the Holmes report. In particular, the Commission needs to know whether the remedial works recommended in the Holmes report were carried out. If you have any information about this the Royal Commission wishes to receive it.

This information is required by the Royal Commission under s 4C of the Commissions of Inquiry Act 1908.

Would you please provide this information by no later than **Friday 9 September 2011**.

If there are any issues you would like to discuss with Counsel Assisting the Commission, please contact **Stephen Mills QC on 741-3013** or **Mark Zarifeh on 741-3014**.

Your assistance is appreciated.

Yours faithfully

Stephen Mills QC
Counsel Assisting
Canterbury Earthquakes Royal Commission

HOLMES CONSULTING GROUP
STRUCTURAL AND CIVIL ENGINEERS

STRUCTURAL REPORT

OFFICE BUILDING
249 MADRAS STREET

Prepared for

CANTERBURY REGIONAL COUNCIL

by Holmes Consulting Group, Christchurch

in association with Buddle Findlay Limited
and Schulz Knight Consultants Limited

January 1990

Holmes Consulting Group Limited,
61 Cambridge Terrace,
P.O. Box 701,
Christchurch, New Zealand.
Telephone: (03) 663-366.
Facsimile: (03) 792-169.

Offices in Christchurch, Wellington, New Plymouth, Auckland.

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1.0 INTRODUCTION

Holmes Consulting Group Limited were engaged on 24th January 1990 by Buddle Findlay Limited and Schulz Knight Consultants Limited to prepare a structural report on the office development located at 249 Madras Street. The building was completed during 1987 and is currently untenanted.

2.0 PEOPLE INVOLVED WITH CONSTRUCTION OF THIS BUILDING

Developer	Prime West Corporation
Contractor	Williams Construction Limited
Architect	Alun Wilkie Architects
Structural Engineer	Alan M. Reay Consulting Engineer
Mechanical Consultant	
Electrical Consultant	
Soils Consultant	Soils & Foundations Limited

3.0 CONCLUSIONS

Due to the limited time available for the report, our review has been limited to a brief inspection of the building and documents, and approximate calculations. No materials testing has been undertaken, and inspection has been limited to such areas as were readily accessible. Given these qualifications, our conclusions are as follows:-

1. The building is in a condition appropriate to its age and the contractor-as-developer form of construction.

2. The layout and design of the building is quite simple and straight forward and generally complies with current design loading and materials codes.

3. A vital area of non-compliance with current design codes, seen in the documents, is in the tying of the floors to some of the shear walls. This item is under review with the original consultants, but if confirmed will require potentially expensive remedial work. However, this cost is a matter for discussion between the current owner and their consultants.

4. Apart from ongoing maintenance costs which should be minor, no major costs are anticipated in association with the structure, subject to 3. above.

4.0 SUMMARY OF INVESTIGATION

A full set of Architectural drawings, and some structural drawings were made available from Alun Wilkie Architects.

In addition, we were able to view the full design, documentation, Soils Investigation and complete set of drawings at the office of Alan M. Reay Consulting Engineer, on 26 January 1990. The original design engineer was unavailable for comment, having since left the company, but Mr Geoff Banks was available for comment on aspects of the design.

We have spoken to Mr Bryan Bluck, Buildings Control Manager at the Christchurch City Council, to discuss any concerns relating to the building permit and construction process.

An inspection was made on 30th January 1990. Levels 1 and 4 were unavailable for inspection, but the remaining floors were taken as representative. Access was gained to the Lift Machine room, Cooling tower and onto the roof.

5.0 DESCRIPTION

1.	No. storeys and occupancy:	5 storeys office (floor to floor height typically 2600 clear) and ground floor parking.
2.	Gross Floor dimensions:	approx. 31m x 22.5 m.
3.	Foundation type:	Shallow strip footings and foundations pads, with large foundation walls under structural shear walls.
4.	Suspended Floors:	200mm overall insitu concrete on metal tray, supported by precast concrete beams on insitu columns on a 7.5m x 7.0m grid generally.
5.	Roof construction:	Lightweight metal cladding on steel purlins and beams, supported on insitu concrete columns.
6.	Floor Design liveloads:	2.5 kPa typically (minimum load level required by NZS 4203 : 1984).
7.	Lateral load resistance:	This is via a reinforced concrete coupled shear wall on the south face of the building, and a system of reinforced concrete walls around the service core on the north face of the building.
8.	Exterior Cladding:	400 deep x 100 mm precast spandrel panels with glazing between, or on West elevations 140 mm blockwall to level 4 with metal cladding above perforated for windows.
9.	Exterior maintenance:	No allowance for a Building Maintenance Unit has been made. Access for external cleaning is through windows. With opening windows restricted to a single pair approx. 1.0 m wide per 7.5 m bay, this is limited, although the spandrel panels are sufficiently wide for a person to stand safely.

6.0 STRUCTURAL DESIGN ASPECTS

6.1 Foundations

From the soils investigation report prepared by Soils and Foundations Limited, we note that settlement was highlighted as a potential problem, particularly in the north-east corner of the site, causing differential settlement concerns. The pad and strip foundations were sized using the recommendations of the report on maximum allowable stresses. However the recommendations of the report on a maximum pressure to limit settlement appear not to have been followed. It is not known whether any ground improvement work was undertaken to compensate for this.

However, inspection of the site revealed no sign of any significant settlement. Given that most settlement occurs within a relatively short time of construction, this should not become a significant problem in the future.

6.1 Gravity Structure

From our perusal of the drawings, and our investigation of the building, it appears the gravity structure is sound and complies in all respects with the appropriate design loading and materials codes. Furthermore it was noted in the documentation that although only a 2.5 kPa standard office live load was called for, the floor will withstand a live load of up to 3.4 kPa. This would be subject to further confirmation.

6.3 Lateral load resistance

Resistance to lateral loads is via reinforced concrete shear walls.

The shear walls themselves appear to have been generally well designed to the requirements of the correct design loading and materials codes. The building was apparently analysed using a 3 dimensional computer analysis programme checked by a static hand analysis.

An area of concern however has been discovered in the connections of the structural floor diaphragm to the shear walls. While this is not a concern on the coupled shear wall to the south of the building, connections to the walls at the North face of the building are tenuous, due to penetrations for services, lift shafts and the stairs, as detailed on the drawings.

The result of this would be that in the event of an earthquake, the building would effectively separate from the shear walls well before the shear walls themselves reach their full design strength.

Discussion has continued on this matter with Mr Geoff Banks of Alan Reay Consulting Engineer , and it currently appears that there may have been some provision made for this during construction. However, no documentation apparently exists, so it would only be safe to assume that this aspect fails to comply with current design codes.

6.4 Roof

Due to its light weight nature, the roof is prone to deflections, particularly in wind. A brief check shows that the deflections should be within allowable limits, as prescribed in the current codes. However, in our experience, movement may be quite perceptible and disconcerting for the occupants and in extreme wind, may cause damage to ceiling tiles.

Furthermore, it was noted on inspection that the internal butynol lined gutters at roof level have only one downpipe with no provision for an overflow. This is a potential problem in the event of a blockage to a downpipe.

6.5 Fire Escape

On the south face there is a steel cantilevering fire escape. This is currently in good condition but it should be noted that this type of construction is prone to corrosion and should be the subject of an on-going maintenance programme.

7.0 CONDITION REPORT

As expected for a building of this age, the structure appears generally in sound condition. Although mainly concealed by carpets and ceilings, those parts of the structure accessible to view reveal no signs of distress.

Standards of workmanship are adequate although finishes and details appear to have been given the minimum of effort. This is commensurate with the type of development and the time at which it was built.

There has been some water damage to ceiling tiles at level 5 adjacent to the wall between the lifts and the stairwell. This is probably due to a failed flashing.

During the inspection it was noted that there is evidence of cracking on the end of the spandrel panels on either side of the fire escape. The finish in these areas is different to the rest of the panels. It appears that the crack has formed at the interface between the spandrel panel itself and the beam supporting it. In the worst instance this crack may propagate above floor level and cause waterproofing problems.

The roof is mainly in good condition, although several panels of the Trimdek roofing have been dented quite badly. Furthermore, there is evidence of some ponding in the gutters which appear to have minimal fall. (refer to section 6.4 for further comment).

The Trimdek cladding should be subject to a performance guarantee. This would have to be checked with the current owners.

HOLMES CONSULTING GROUP
STRUCTURAL AND CIVIL ENGINEERS
Offices in Christchurch, Wellington, New Plymouth, Auckland

MEMO

JOB NAME 249 Madras St.
JOB No W8165

DATE 01/02/90

To: Warren & Mahoney
Attn: Kerry Mason

Kerry

Martin Clarke advises that the cost to carry out the remedial structural works (as per attached sheets) will be approx $14,000 + GST.

Do you need anything else from us on this job?

Regards

Grant Wilkinson

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MEMO

JOB NAME 249 Madras St.
JOB No W8165

DATE 01/02/90

Remedial Works

Steel angle required
2 per level at 5 levels.

- 4 levels have suspended tile ceilings in good.
- 1 level has plasterboard & paint ceiling

- assume all levels have carpet.

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