



CHRISTCHURCH CATHEDRAL
DAMAGE ASSESSMENT REPORT
PREPARED FOR
CHURCH PROPERTY TRUSTEES
FEBRUARY 17TH, 2016

EXECUTIVE SUMMARY

Holmes Consulting Group has been engaged by Church Property Trustees to complete a further review of the Cathedral. The purpose of the review has been to update the damage assessment of the building following the February 14th 2016 aftershock.

A rapid external visual survey has been completed on site. Significant additional structural damage has occurred as a result of the recent aftershock and there is continued degradation due to weather and infestation.

The building remains in a severely damaged state. There is no one section of the remaining building that is undamaged and which could be considered a stable element in its own right. Collapse of all or part of the nave, transept or apse could occur should another aftershock of significant duration occur.

Our evaluation of the building capacity is that it has significantly less than 33%NBS in its current form. For example, the building would now be unlikely to survive an earthquake of the strength and duration of the September 2010 Darfield earthquake, without partial or even full collapse, even though it caused relatively little damage at the time.

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INTRODUCTION

Holmes Consulting Group LP has been engaged by Church Property Trustees to complete a visual post earthquake damage assessment of the Christchurch Anglican Cathedral.

The cathedral has suffered structural damage as a result of the series of earthquakes that have been occurring in Christchurch since December 26th 2010. The building sustained further damage during the recent February 14th 2016 aftershock.

This report summarises the findings of a visual post earthquake damage assessment undertaken by Holmes Consulting Group on the February 15th 2016.

SCOPE OF WORK

The scope of work for this project included the following:

1. Visit the site to perform an external visual survey of the building.
2. Review the damage observations against prior records to assess any change in condition.
3. Report on our findings and recommendations.

LIMITATIONS

Findings presented as a part of this project are for the sole use of Church Property Trustees in its evaluation of the subject property. The findings are not intended for use by other parties, and may not contain sufficient information for the purposes of other parties or other uses. Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report.

OBSERVED DAMAGE

The site was revisited on the afternoon of February 15th 2016 by Stuart Oliver of Holmes Consulting Group.

This visit was not a complete damage evaluation. Instead, a general walk around and a review of key indicators was completed for comparison to earlier records. The interior of the building was accessed for a short period of time to enable a rapid visual inspection of the transept arches.



Review of available GeoNet strong motion data which indicates that the Christchurch CBD experienced moderate ground motions during the February 14th aftershock, albeit the duration of significant shaking was short (i.e. < 10 sec).

This review has confirmed that the building has sustained new significant damage as a result of the recent aftershock as detailed below:

1. Additional loss of material from the west wall with consequential additional damage to the west porch below. (refer Figure 1 below)



Figure 1: West wall, February 15th 2016

2. Significant increase of earthquake damage to the badly damaged south aisle walls. Crack widths in masonry piers were observed to have significantly increased and additional spalling of ashlar has occurred. (refer Figures 2 & 3)



Figure 2: Exterior of south aisle wall, February 15th 2016



Figure 3: Interior of south aisle wall, February 15th 2016



3. Offsets previously observed in the south transept gable have significantly increased with consequential additional damage to ashlar (refer Figure 4). Additional damage to the north transept gable was less significant.



Figure 4: Interior of transept south gable, February 15th 2016

4. Damage to the transept arches has noticeably increased. Significant quantities of new rubble were observed to have fallen onto the floor of the crossing and this has caused additional damage to the pulpit. (refer Figures 5 & 6).



Figure 5: Interior of west transept arch, February 15th 2016



Figure 6: New fallen debris on the floor of the crossing, February 15th 2016



5. Cracking to the north and south walls of the apse have noticeable increased. Figure 7 below illustrates the state of damage in the north apse wall.



Figure 7: Interior of apse north wall, February 15th 2016

Markings on ‘tell-tale’ crack indicators have faded and can no longer be read. It is recommended that new markings are made to facilitate future inspections. This excludes the crack indicator on the west porch where falling hazards associated with the badly damaged west wall are such that access to this area should be avoided.



There is increased general deterioration due to the effects of weathering and general infestation by both animals (particularly pigeons) and plant growth. In addition to this, significant quantities of pigeon droppings were observed inside the cathedral and this will accelerate deterioration and is a health hazard.

CONCLUSIONS & RECOMMENDATIONS

Our conclusions and recommendations are as follows:

1. Significant additional structural damage has occurred as a result of the February 14th 2016 aftershock. Damage observed included additional collapse of portions of the west wall, general increase of crack widths and structural offsets, and fallen debris on the crossing floor. In addition there is evidence of ongoing deterioration due to infestation and weather.
2. The building remains in a severely damaged state. There is no one section of the remaining building that is undamaged and which could be considered a stable element in its own right. Collapse of all or part of the nave, transept or apse could occur should another aftershock of significant duration occur.
3. It is recommended that markings on 'tell-tale' crack indicators be reinstated to assist with future inspections (excluding west porch).
4. Our evaluation of the building capacity is that it continues to be significantly less than 33%NBS in its current form. For example, the building would now be unlikely to survive an earthquake of the strength and duration of the September 2010 Darfield earthquake, without partial or even full collapse, even though it caused relatively little damage at the time.

Report Prepared by:

A handwritten signature in blue ink, likely belonging to Stuart Oliver, is positioned below the text 'Report Prepared by:'. The signature is stylized and fluid.

Stuart Oliver
TECHNICAL DIRECTOR