Appendix A – CCC Engineering Assessment (Miyamoto Cardno)

Our Ref MI1108045

Contact: Matthew Harris / Michael King

25 October, 2011

Brigitte de Ronde
Strategy and Planning Group
Christchurch City Council
53 Hereford Street
Christchurch, New Zealand 8011

Subject: Christchurch Cathedral "Make Safe" Prior to Reconstruction

Dear Ms. De Ronde,

This letter is a follow-up to our collaborative effort to create a suitable "Make Safe" plan for the Christchurch Cathedral. In preparing this methodology we have reviewed several documents and performed a site inspection of the current condition of the building.

We have reviewed Holmes Consulting reports dated 15 October, 20 October with regard to Required Scope of Reconstruction and Propping and Concept Interim Make Safe Works. We also have had several discussions with Stuart Oliver of Holmes Consulting regarding these documents.

The enclosed Miyamoto + Cardno's "Make Safe" approach for the Christchurch Cathedral will lead to a safe structure (to minimum 67% of code) with minimal time, cost and exposure to unsafe reconstruction conditions and allowing full 100% code strengthening works to follow. The first ("make safe") phase will incorporate the use of post-installed reinforcing cores and temporary steel braced frames at the weak and damaged exterior walls, respectively.

Rather than deconstructing and rebuilding of all the weakened and damaged walls of the Cathedral, the Miyamoto + Cardno's rehabilitation approach (see attached) will utilise a combination of performance based engineering and unique retrofitting techniques to strengthen the damaged Cathedral to a minimum level of 67% of that required for an equivalent new building. This approach will eliminate the time and cost associated with large scale deconstruction and reconstruction while also preserving the Cathedral's historical significance.

Unlike conventional wall strengthening concepts, reinforced cores can be installed inside the walls identified as weak from the roof down without having to enter the Cathedral therefore minimising the contractor's exposure to the unsafe interior conditions. This technique also does not alter the appearance of the structure thus preserving its historical significance. Reinforced cored wall retrofits are considered a "tried and true methodology"; which is currently already being employed in other Holmes Consulting projects throughout New Zealand.

Temporary steel braced frames will be utilised at walls which have been identified as needing reconstruction. These steel frames will act as temporary shoring and provide seismic resistance while the identified walls are being reconstructed. These steel frames will be installed on the exterior of the Cathedral so as to minimise the contractor's exposure to the unsafe interior conditions.

We have previously provided the attached proposal for Miyamoto + Cardno to move forward in a collaborative effort with Holmes Consulting to structurally strengthen the Christchurch Cathedral. Based on our experience, Miyamoto + Cardno believes that this rehabilitation scheme is the fastest and most cost effective solution.

Miyamoto + Cardno Ltd.
125A Waterloo Road | Hornby | PO Box 13 212 | Christchurch 8141 | New Zealand
Telephone: 03 366 5428 | Facsimile: 03 379 9227 | International: +64 3 366 5428
www.miyamotocardno.co.nz

Miyamoto + Cardno believe that the Christchurch Cathedral can be saved, using modern techniques, while providing resiliency for future earthquakes. While the "make safe" plan is being implemented, the team can then determine requirements for the second stage, i.e. reconstruction and rehabilitation. Several options should be explored during this stage in order to determine what is required to restore the structure. We anticipate that this process could take nine months to a year for design and two to three years for implementation.

The Christchurch Cathedral provides an important link to the history, culture and character of the city of Christchurch. Today's construction and structural technologies can provide a path to reconstruction and rehabilitation of this great structure, and lead the way to bringing Christchurch back to the city it was before the earthquake.

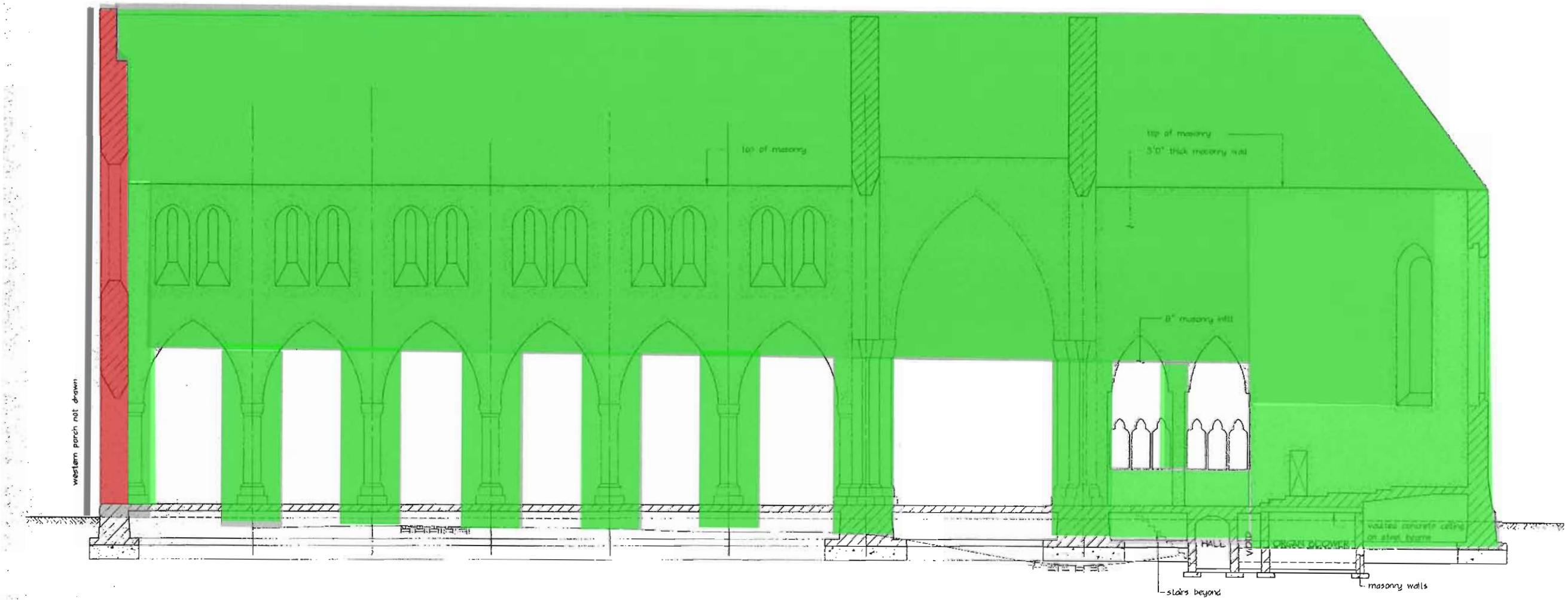
We trust that this report is sufficient for your needs, however should you have any queries or require further input from us, please do not hesitate to contact the undersigned.

Yours faithfully

Matthew Harris
MIPENZ CPEng(NZ) IntPE(NZ)
Chartered Professional Engineer for
Miyamoto + Cardno
Matthew.Harris@miyamotocardno.co.nz

Michael King
SE (USA)
Structural Engineer for
Miyamoto + Cardno
Michael.King@miyamotocardno.co.nz

Attachment: "Make Safe" Schematic Plan and Details
17 October - Proposal Letter
Miyamoto + Cardno - Capability Statement



longitudinal section nave (3 / SK-1)

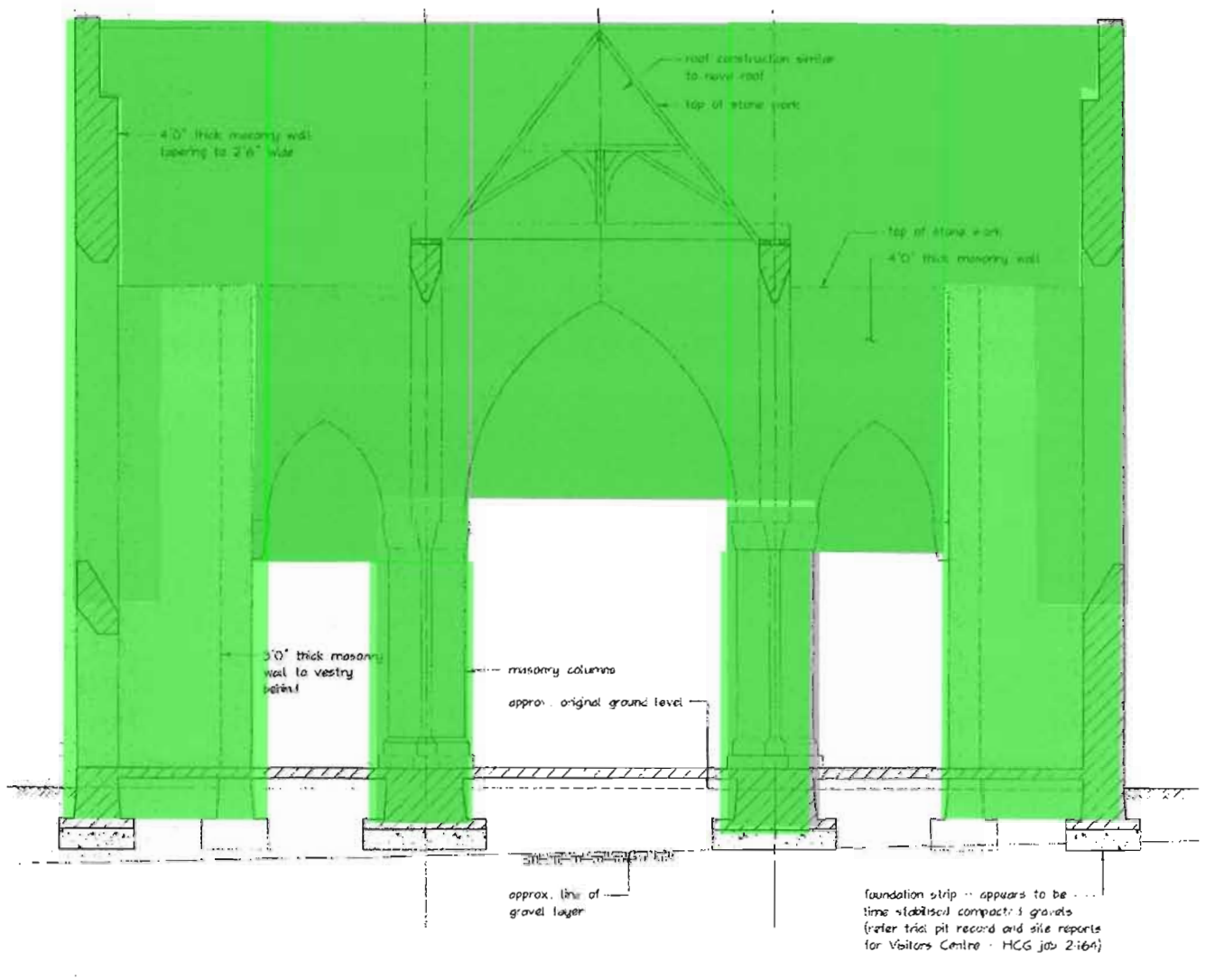
LEGEND:

- Elements need to be deconstructed and reconstructed
- Elements can be repaired insitu but require propping
- Elements can be repaired insitu
- Centercore Installation Locations
- Temporary Exterior Steel Frame

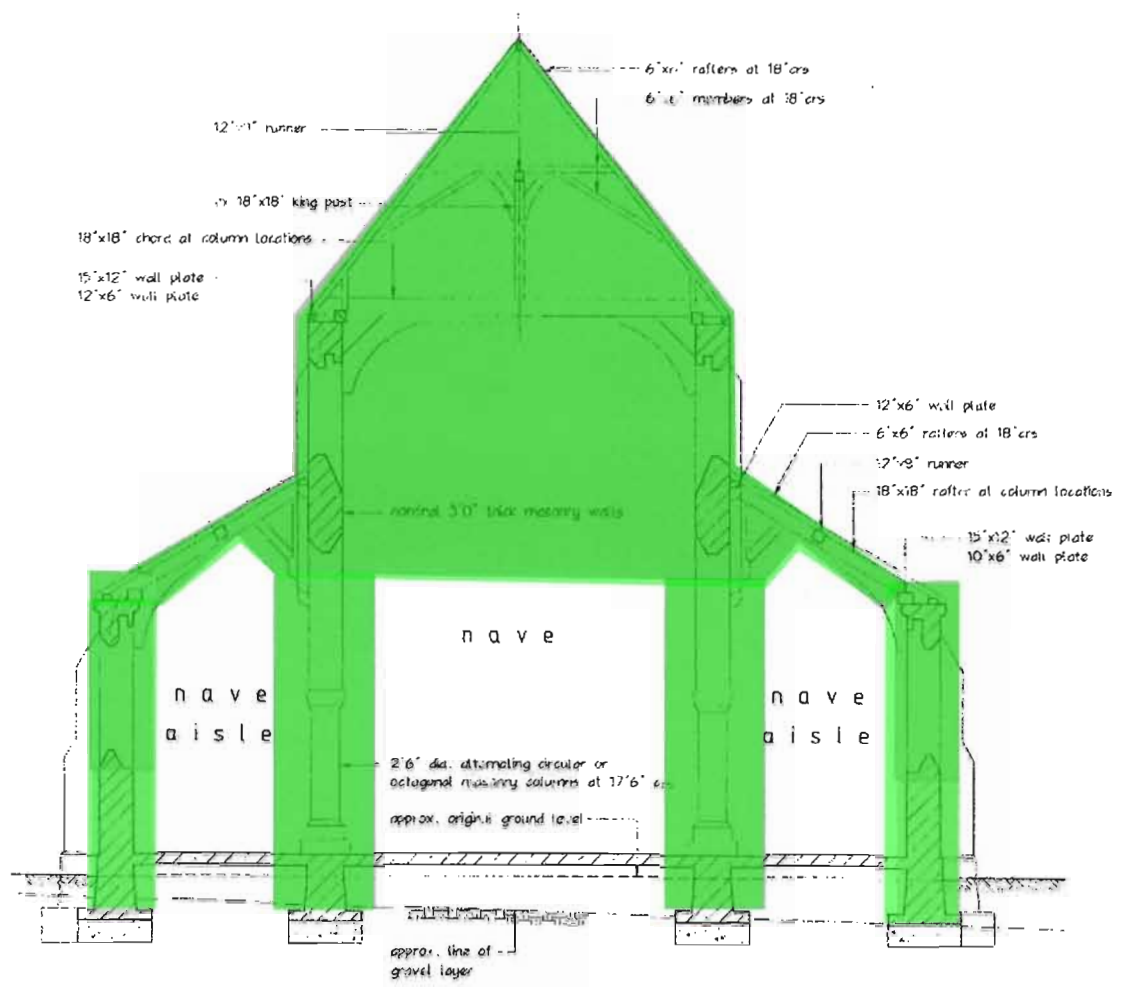
Project Name: *Christchurch Cathedral*

Date: 19 October 2011

Sketch Number: SK1



longitudinal section transepts (1 / SI-1)



typical cross section (2 / SI-1)

LEGEND:

- Elements need to be deconstructed and reconstructed
- Elements can be repaired insitu but require propping
- Elements can be repaired insitu
- Centercore Installation Locations

Project Name: *Christchurch Cathedral*

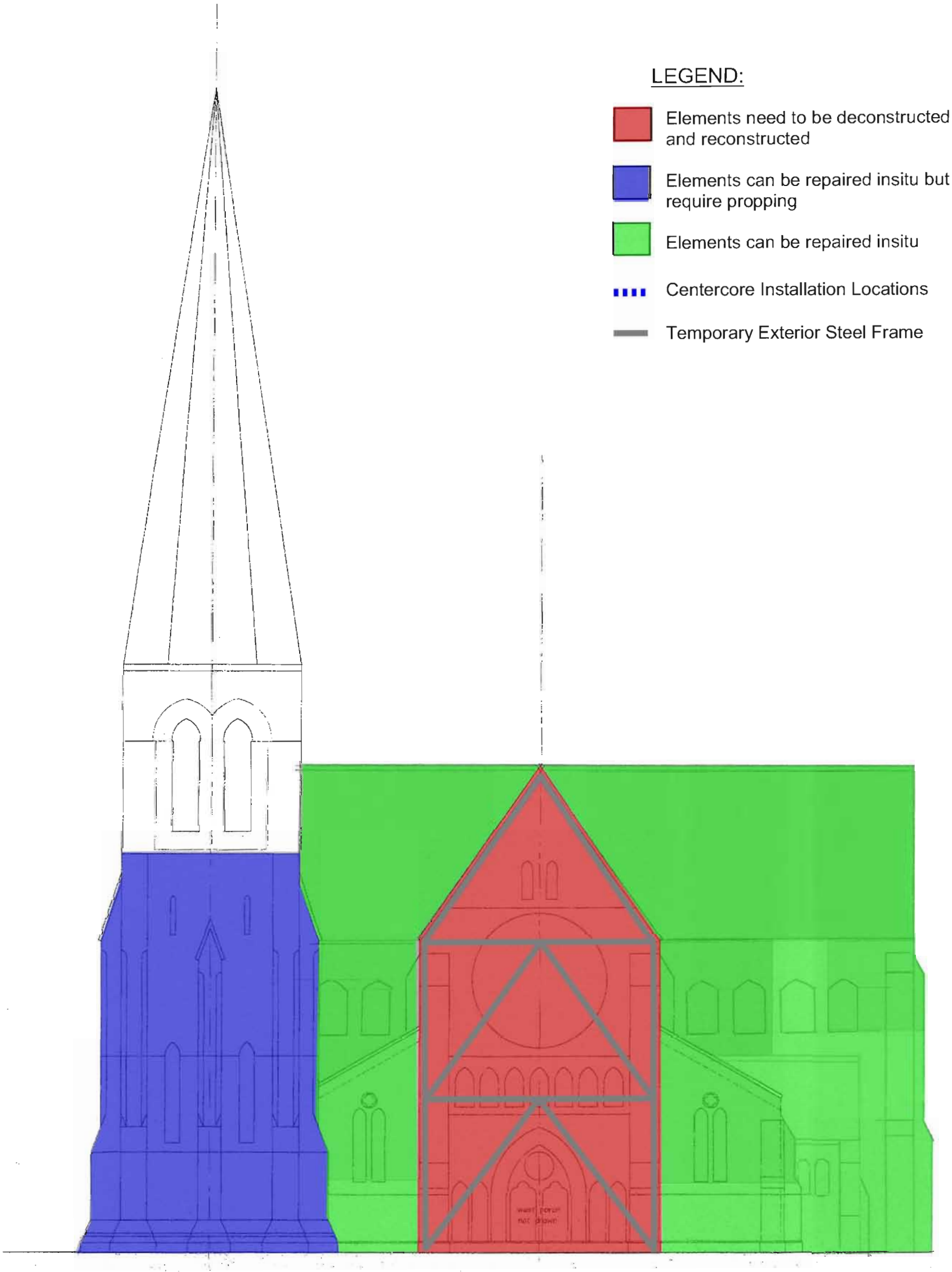
Date: 19 October 2011

Sketch Number: SK2

Project Name: *Christchurch Cathedral*

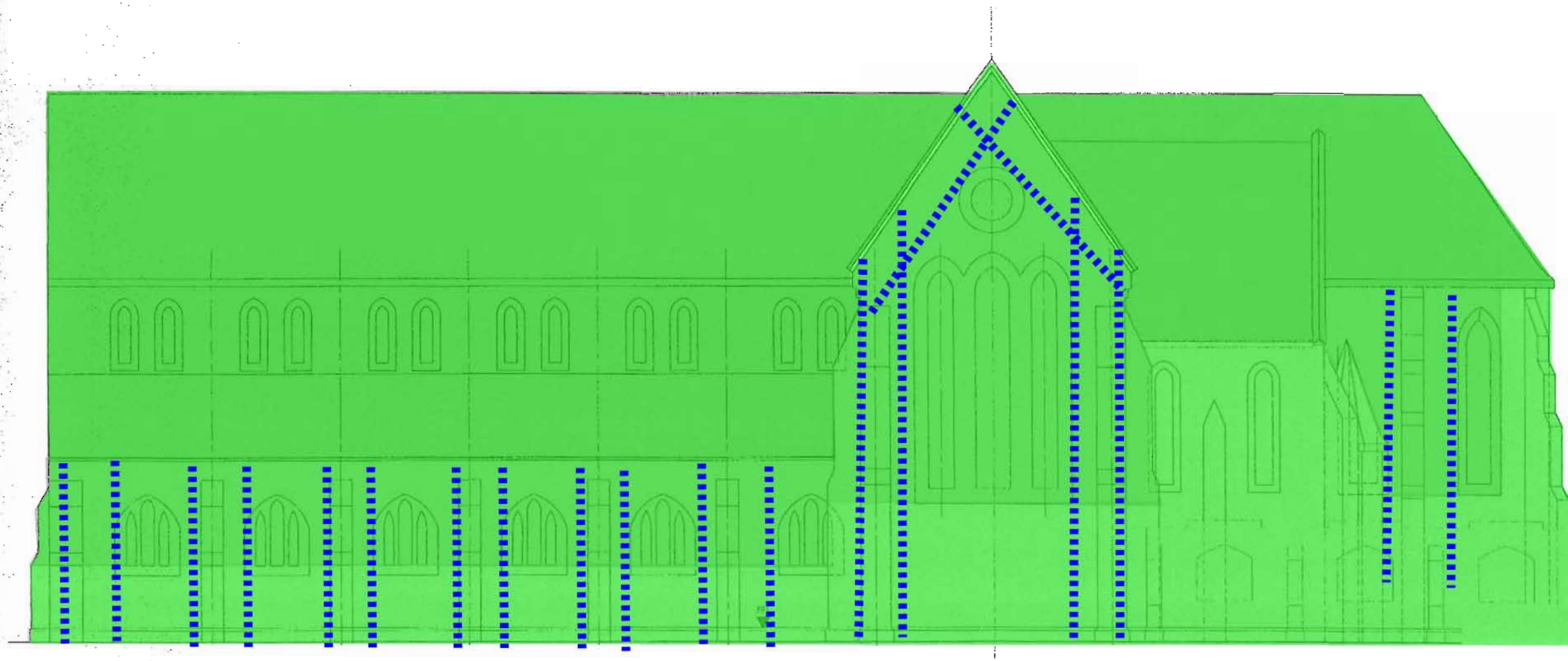
Date: 19 October 2011

Sketch Number: SK3



LEGEND:

- Elements need to be deconstructed and reconstructed
- Elements can be repaired insitu but require propping
- Elements can be repaired insitu
- Centercore Installation Locations



south elevation

Project Name: *Christchurch Cathedral*

Date: 19 October 2011

Sketch Number: SK4

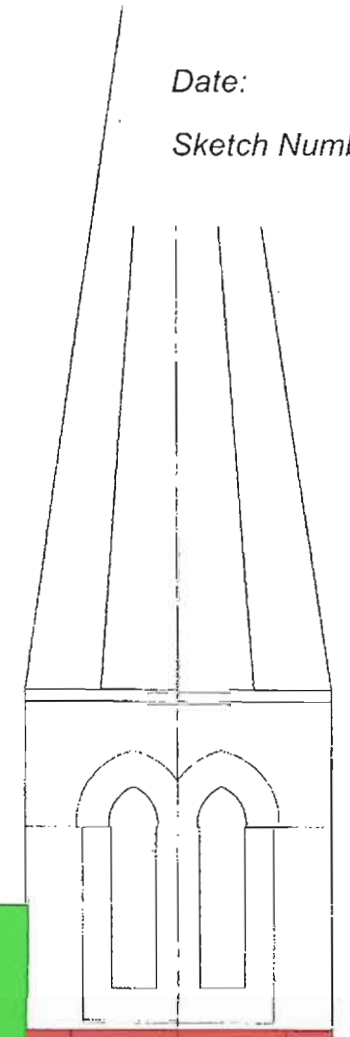
LEGEND:

- Elements need to be deconstructed and reconstructed
- Elements can be repaired insitu but require propping
- Elements can be repaired insitu
- Centercore Installation Locations
- Temporary Exterior Steel Brace

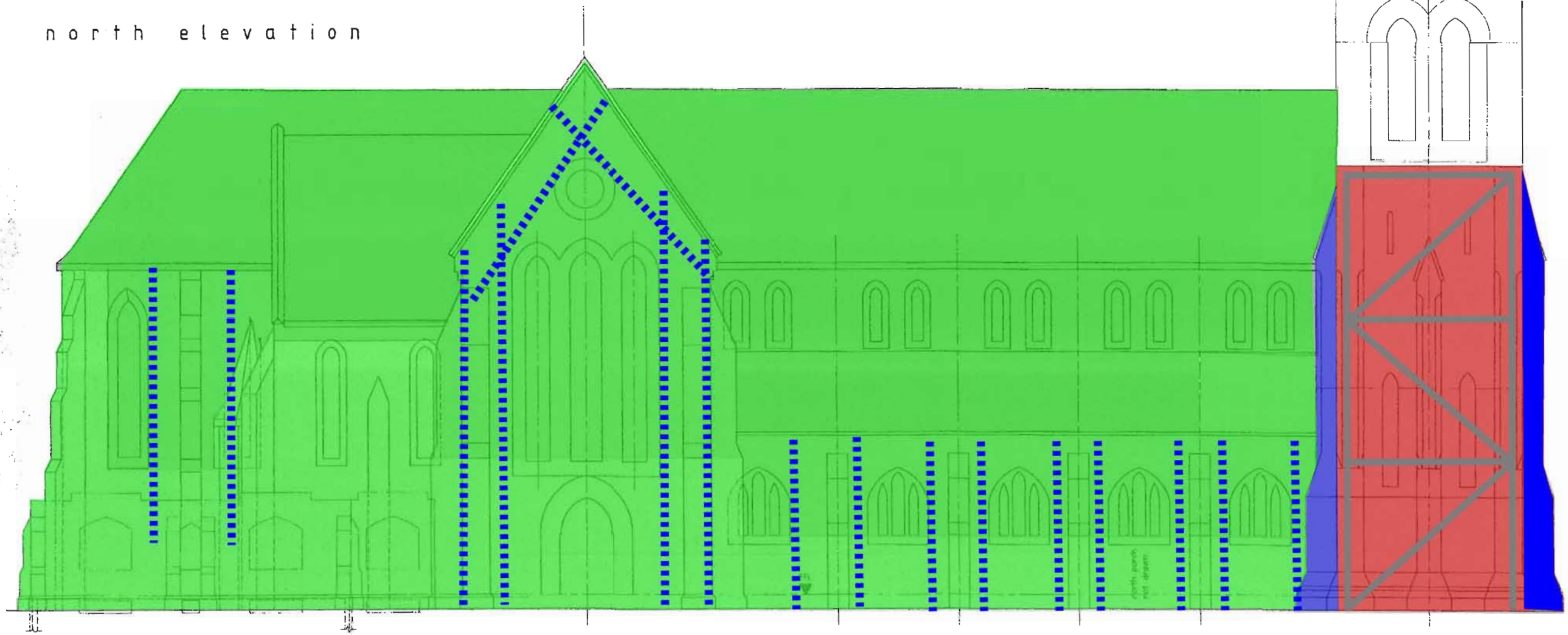
Project Name: *Christchurch Cathedral*

Date: 19 October 2011

Sketch Number: *020*

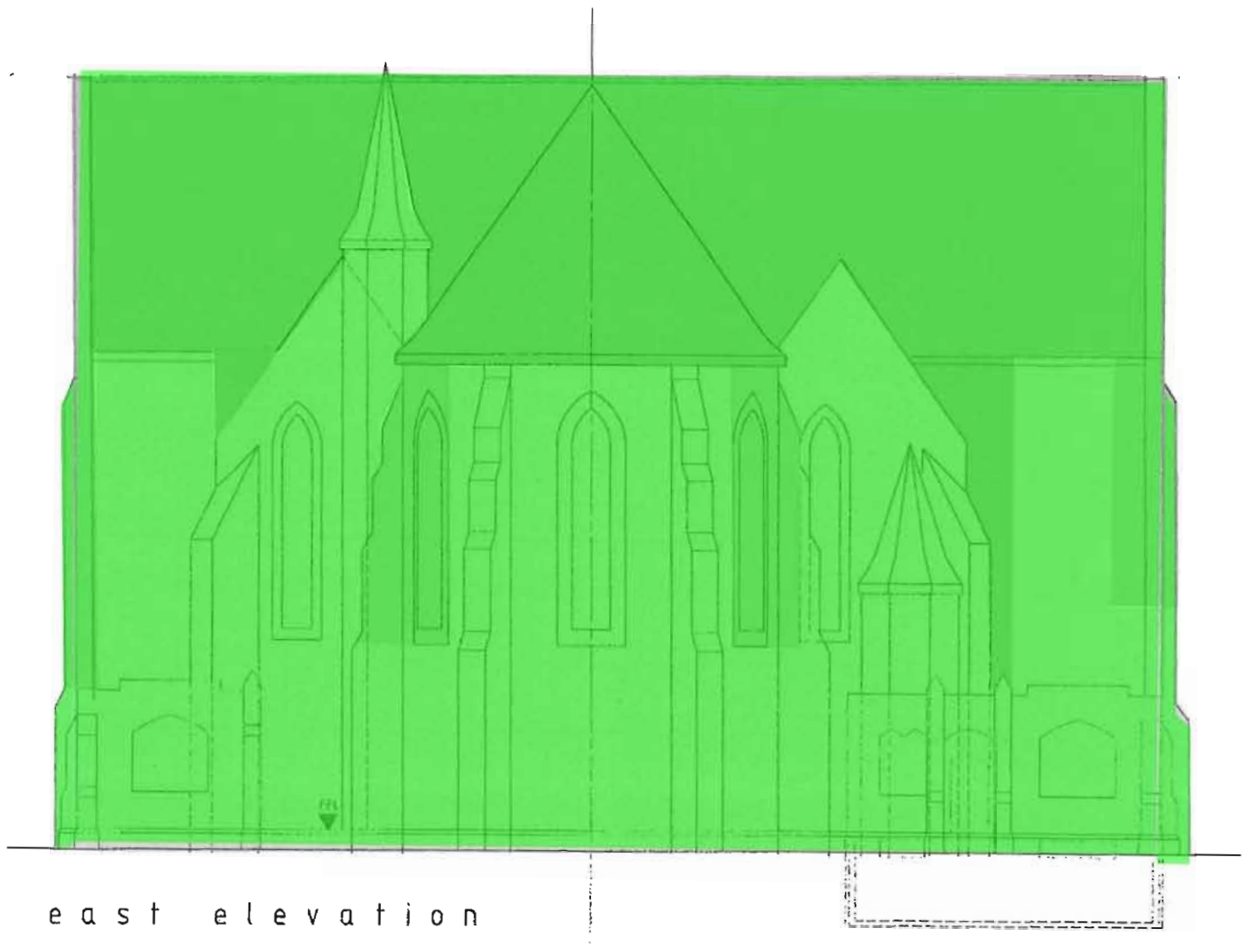


north elevation



LEGEND:

- Elements need to be deconstructed and reconstructed
- Elements can be repaired insitu but require propping
- Elements can be repaired insitu
- Centercore Installation Locations



east elevation

Project Name: *Christchurch Cathedral*

Date: 19 October 2011

Sketch Number: SK6

Appendix B – CPT Engineering Assessment (Holmes Consulting Group)

HolmesConsultingGroup

STRUCTURAL AND CIVIL ENGINEERS

CONSULTANT ADVICE

Project Name:	Christchurch Cathedral Reconstruction	CA HCG:	013
Project No:	106324	☐ Action:	
From:	Stuart Oliver	☑ Information	
Date:	20 October 2011	Pages:	1 of 3
Subject:	Concept Interim Make Safe Works		

To	cc			
☑	☐	Marcus Read	RCP	mread@rcp.co.nz
☑	☐	Kevin Long	RCP	klong@rcp.co.nz
☑	☐	Gavin Holley	CPT	operations@anglicanlife.org.nz
☑	☐	Liz Clarke	CPT	property@anglicanlife.org.nz
☐	☑	Bill Gregory	Warren & Mahoney	bill.gregory@wam.co.nz
☐	☑	David Doherr	Davis Langdon	ddoherr@davislangdon.co.nz
☐	☑	Jackie Gillies	Jackie Gillies & Ass	jackie@jackiegillies.co.nz
☐	☑	John Hare	Holmes Consulting Group	johnh@holmesgroup.com

Confirmation / Response to PC No.: N/A

As requested we have completed a preliminary assessment of the scope of make safe works that would be required to meet CERA requirements in terms of securing the site if the Christchurch Cathedral was to be left in an interim state for the medium term i.e. 1 – 5 years.

Two make concept safe options have been developed:

1. Maximum retention of heritage fabric
2. Minimum structural shoring option.

It is acknowledged that a range of interim make safe options exist between the two considered here.

Option 1 – Maximum Retention of Heritage Fabric

Please refer to SSK# 023 – 026 attached. Scope of proposed works includes:

(i) Braced structural steel shoring towers at the west end of the nave and central transept areas to provide additional global stability to the structure against

Christchurch

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Wellington

Queenstown

San Francisco

structural collapse. These will be connected to existing structural steel bracing elements where they occur.

(ii) Central portion of the western wall is to be demolished/deconstructed to gain construction access to the interior of the building. Other damaged wall elements (i.e. north and south isle walls) will generally be retained except that secondary high level falling hazards will need to be secured/removed.

(iii) Vertical steel mullions to provide out-of-plane stability to the north and south transept gables. These gables will be supported at the base by large concrete blocks and tied into the roof at existing roof tie locations.

(iv) Damaged roof bracing elements will be reinstated. Temporary weatherproofing to replace the area of roof that was damaged by tower debris will also need to be provided.

(v) Tower to be made safe by providing a new braced shoring frame at the north elevation to replace the lost section of wall. A new concrete 'roof' slab will be provided at the top of the remaining section of tower to maintain structural integrity and provide additional protection against future weathering.

(vi) Installation of the internal make safe works will require the use of 'safe havens' as detailed previously in HCG Consultants Advice No. 9 in order to minimize health and safe risks to construction personnel.

Option 2 – Minimum Shoring Option

Please refer to SSK# 027 – 026 attached. Scope of proposed works includes controlled demolition/deconstruction of most of the Cathedral (including removal of most of the roof) down to windowsill level. An exception to this is the east end of the Cathedral which, based on observations made to date, is in relatively good condition and could be made safe with minimal shoring/remedial works.

Consideration will need to be given to weather proofing those areas of the building that are exposed as a result of the make safe work.

Please note that the make safe options detailed in this Consultants Advice are at concept design level and a more detailed assessment of the building and the proposed make safe works will be required as part of any future design phases that might include full or partial reconstruction.

Regards,

Stuart Oliver
TECHNICAL DIRECTOR

106324CA0329.013

(N) BRACED SHORING @ NORTH FACE OF TOWER

tower

north porch

visitor's centre

remove existing stonework and pour new 450 thick insitu conc. skin wall against existing wall, with new stone veneer to match existing

north nave aisle

remove existing stonework and pour new 400 thick insitu conc. skin wall against existing wall, with new stone veneer to match existing (refer drawing S2-1 for elevation)

north transept

future 400 thick insitu conc. skin wall on existing wall (details similar to drawing S2-1)

DECONSTRUCT WEST WALL + PORCH

west porch

nave

(N) BRACED SHORING TOWER, TYP.

transepts

CONTRACTORS VEHICLE SPACE

remove existing stonework and pour new 450 thick insitu conc. skin wall against existing wall, with new stone veneer to match existing (refer drawing S2-1 for elevation)

south nave aisle

south transept

remove existing stonework and pour new 400 thick insitu conc. skin wall against existing wall, with new stone veneer to match existing

CONTRACTORS YARD AREA

future 400 thick insitu conc. skin wall on existing wall (details similar to drawing S2-1)

south porch

LEGEND:-

(N) NEW

(E) EXISTING.

ground floor plan 1:100

extent of Stage 1 & 2 work

(N) U.B. WALL MULLIONS TO STABILISE GABLE (TYP).

Title: CERA MAKE SAFE - PLAN

Job Name: CHCH CATHEDRAL

Job #: 106324 SSK#: 023

Date: 14/10/11 Rev: 1

nesConsultingGroup
TURAL AND CIVIL ENGINEERS
ge Terrace Telephone : 365-1366
Facsimile : 379-2169

Rev	Date	By	Revision
3	02:03:99	RIS	Tender
2	16:12:98	RIS	Building Consent
1	27:11:98	RIS	Preliminary

Drawn RIS Scale 1:100

Approved Acad Filename S1-1

CHRISTCHURCH CATHEDRAL STRENGTHENING

Sheet Title: ground floor plan

Job No	Sheet No	Rev
2948	S1-1	3

(N) BRACED SHORING @ NORTH FACE OF TOWER

(N) ROOF BRACING

(N) CONC SLAB @ TOP OF REMAINING TOWER SECTION PROVIDE FALLS FOR RUN-OFF

(N) ROOF STRUTS

DEMOLISH WEST WALL + PORCH.

tower

create access to existing roof space for Engineer to inspect roof/wall connections and upgrade as directed on site

new 'Rosehead' anchors similar to West gable wall

existing mezzanine floor to have new ties to existing walls (refer typical details)

new ms. angle tie bolted to face of existing wall at roof level, with anchor through existing wall into new concrete skin wall

Engineer to confirm on site the details at junctions between new tie beam and existing stair stair towers - allow to break out section of wall and carry new concrete tie beam through

existing 300 x 225 timber ceiling runner

new ms. angle tie across top of new conc. wall skins

new 200 UC 52 across face of existing wall at Aisle roof level

new 200/300 PFC braces to each side of existing stone pilasters

existing 150 x 150 timber ceiling runner with new steel bolted splice plates

existing 250 x 225 timber ceiling runner with new steel bolted splice plates

new 100 SHS 5 tie

new ms. angle tie bolted across face of wall at Aisle roof level

existing truss

existing 150 x 150 timber underpurlin with new steel bolted splice plates

future strengthening (details similar to this stage)

direction of these ceiling runners to be confirmed on site

refer drawing S2-1 for new 'Rosehead' anchors to gable wall

new diagonal SHS tie (refer detail 20/S3-6)

new ms. angle tie across top of new conc. wall skins

new Reidbar RB32 diameter cross bracing to Nave Aisle roof

details similar to north wall

diagonal hatching indicates new insitu concrete beams on top of existing masonry walls

create access to existing roof space for Engineer to inspect roof/wall connections and upgrade as directed on site

(N) BRACED SHORING TOWER, TYP.

(N) BRACED SHORING TOWER

(N) UB WALL MULLIONS TYP NORTH & SOUTH GABLES.

extent of Stage 1 & 2 work

roof plan 1:100

Title: CERA MAKE SAFE - ROOF PLAN

Job Name: CHCH CATHEDRAL

Job #: 106324 SSK#: 024

Date: 19/10/11 Rev: 1

HolmesConsultingGroup

Telephone : 366-3366
Facsimile : 379-2169

Rev	Date	By	Reason
3	02:03:99	RIS	Tender
2	16:12:98	RIS	Building Consent
1	27:11:98	RIS	Preliminary

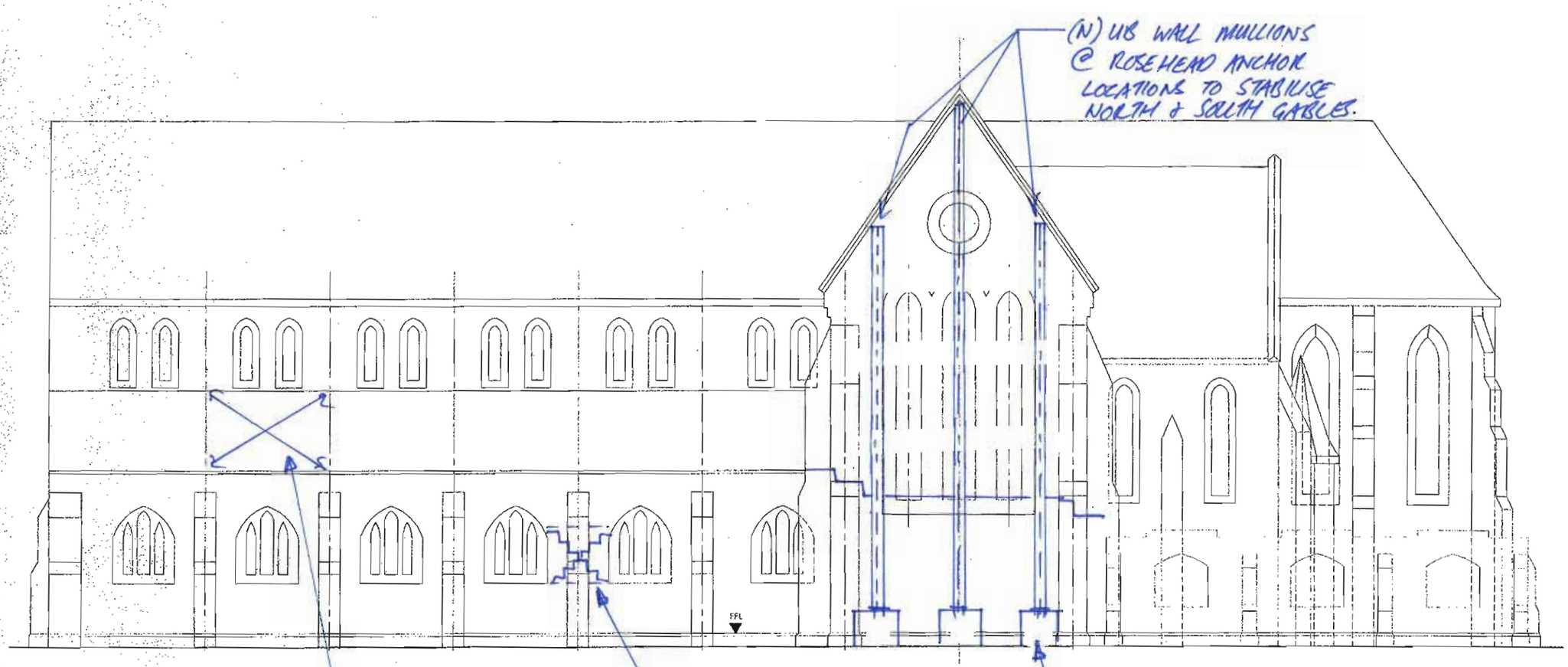
Drawn RIS Scale 1:100

Approved Acad Filename S1-2

CHRISTCHURCH CATHEDRAL STRENGTHENING

Sheet Title : roof plan

Job No	Sheet No	Rev
2948	S1-2	3



south elevation

(NORTH ELEVATION SIM.)

Title: CERA MAKE SAFE - SOUTH ELEV
Job Name: CHCH CATHEDRAL
Job #: 106324 SSK#: 025
Date: 14/10/11 Rev: 1

REV | DATE | BY | REASON

HOLMES CONSULTING GROUP
STRUCTURAL AND CIVIL ENGINEERS
Christchurch, Wellington, Rotorua, Tauranga, Auckland, Sydney

CHRISTCHURCH CATHEDRAL

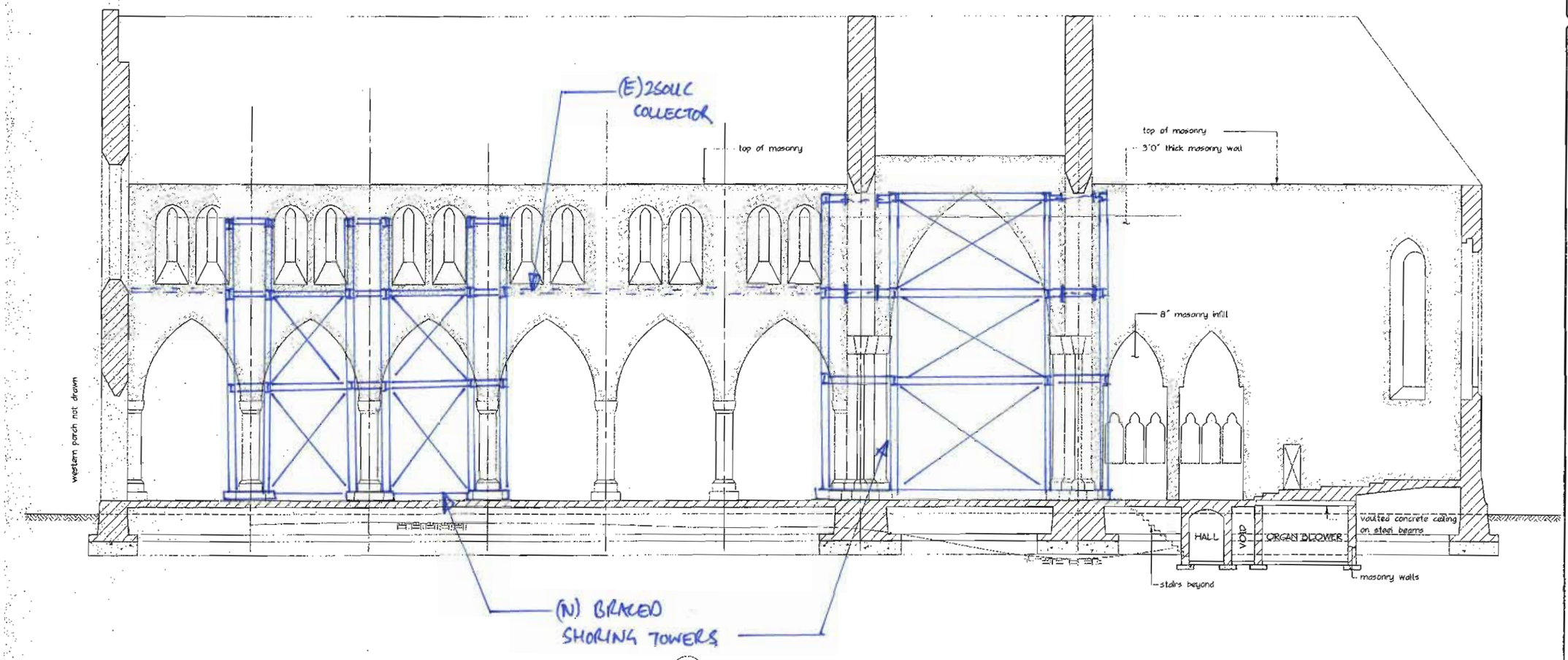
SEISMIC STRENGTHENING PROPOSALS

DRAWN: JCM SCALE: 1:100
APPROVED: ACAD FILENAME: CATHS1-2

SHEET TITLE:
ELEVATIONS

JOB No: 2948 SHEET No: S1-2 REV: REV

HolmesConsultingGroup



longitudinal section nave (3 / S1-1)

Title: CERA MAKE SAFE - LONG SECTION
Job Name: CHCH CATHEDRAL
Job #: 106324 SSK#: 026
Date: 19/10/11 Rev: 1

HolmesConsultingGroup

REV | DATE | BY | REASON

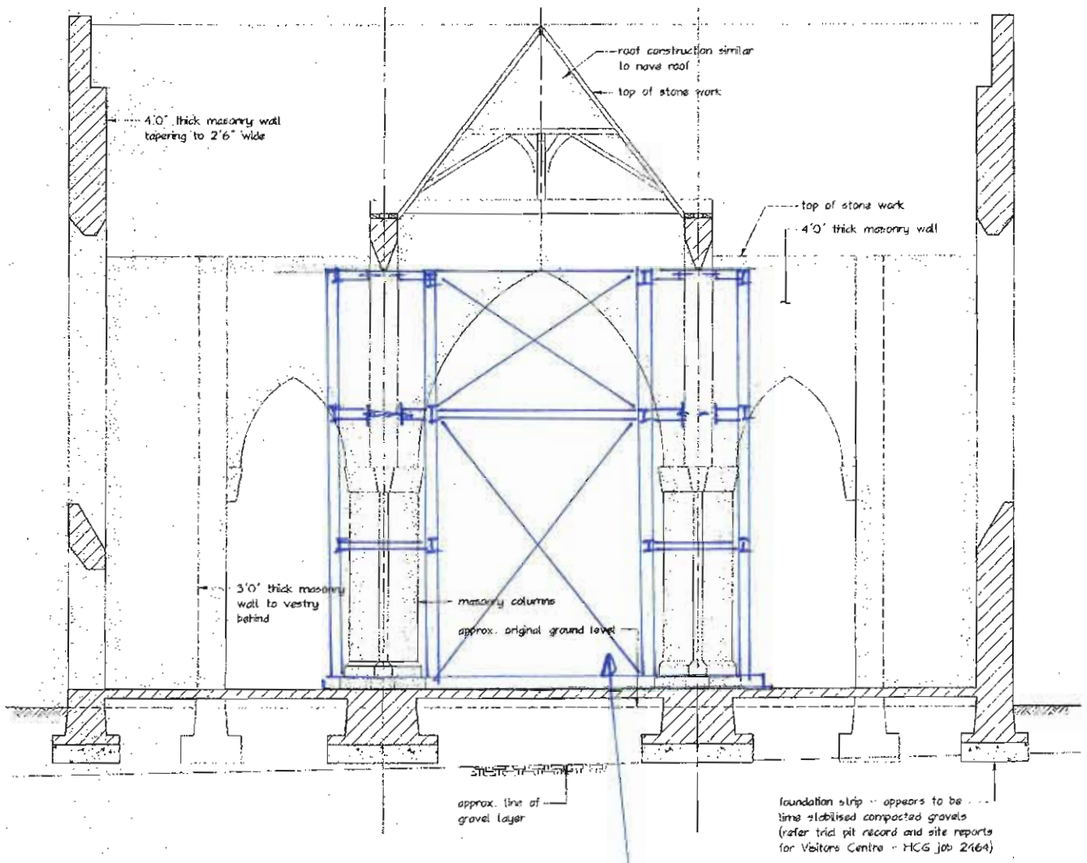
HOLMES CONSULTING GROUP
STRUCTURAL AND CIVIL ENGINEERS
Christchurch, Wellington, New Plymouth, Auckland, Sydney

CHRISTCHURCH
CATHEDRAL
SEISMIC STRENGTHENING PROPOSALS

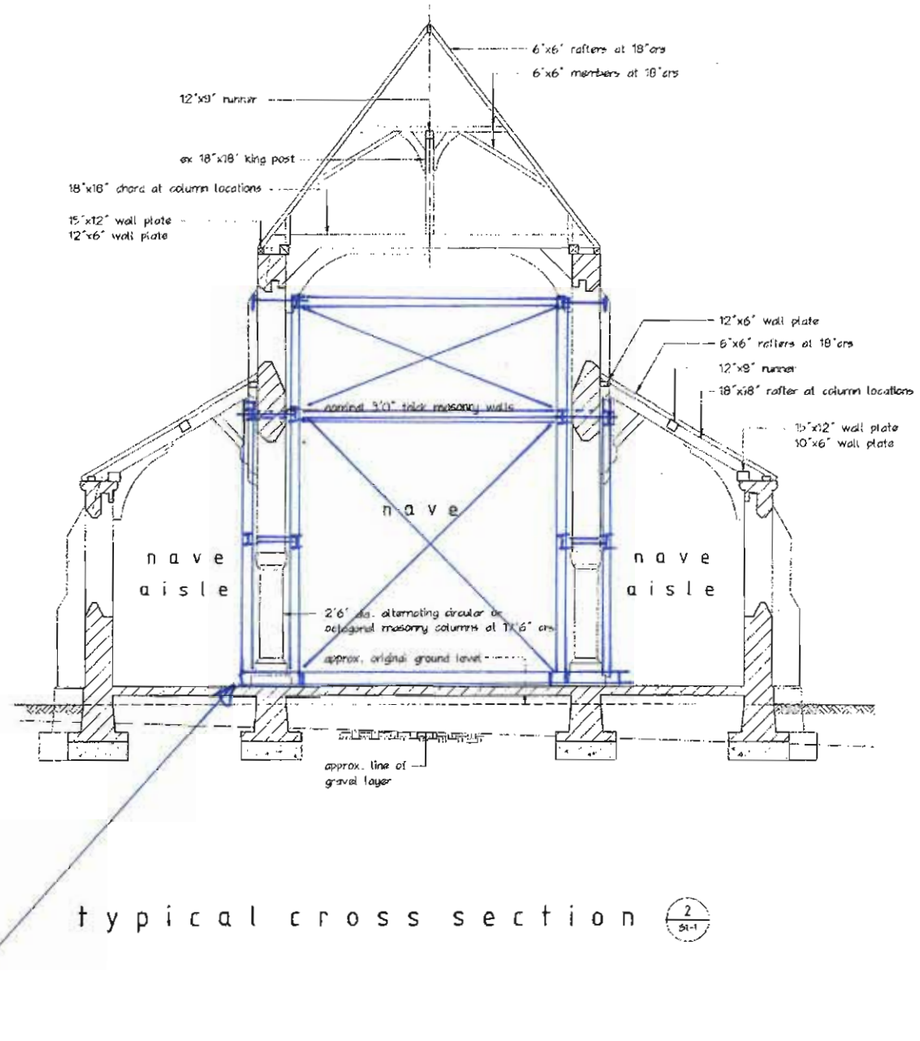
DRAWN: TDM SCALE: 1:100
APPROVED: ACAD FILENAME: CATHS1-6

SHEET TITLE:
SECTIONS

JOB No: 2948 SHEET No. S1-7 REV: REV



longitudinal section transepts (1 / S1-1)



typical cross section (2 / S1-1)

REV	DATE	BY	REASON

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

CHRISTCHURCH CATHEDRAL

SEISMIC STRENGTHENING PROPOSALS

DRAWN: IDM SCALE: 1:100
APPROVED: ACAD FILENAME: CATHS1-6

SHEET TITLE: SECTIONS

JOB No: 2948 SHEET No: S1-6 REV: REV

Title: CERA MAKE SAFE - SECTION
Job Name: CHCH CATHEDRAL
Job #: 106324 SSK#: 026
Date: 19/10/11 Rev: 1.

HolmesConsultingGroup
STRUCTURAL AND CIVIL ENGINEERS

Project Name: *Christchurch Cathedral*

Project Number: *106324*

Sketches By: *SXO*

Date: *20/10/2011*

Sketch Number: *027*

REV	DATE	BY	REASON

HOLMES CONSULTING GROUP
STRUCTURAL AND CIVIL ENGINEERS

CHRISTCHURCH
CATHEDRAL
SEISMIC STRENGTHENING
PROPOSALS

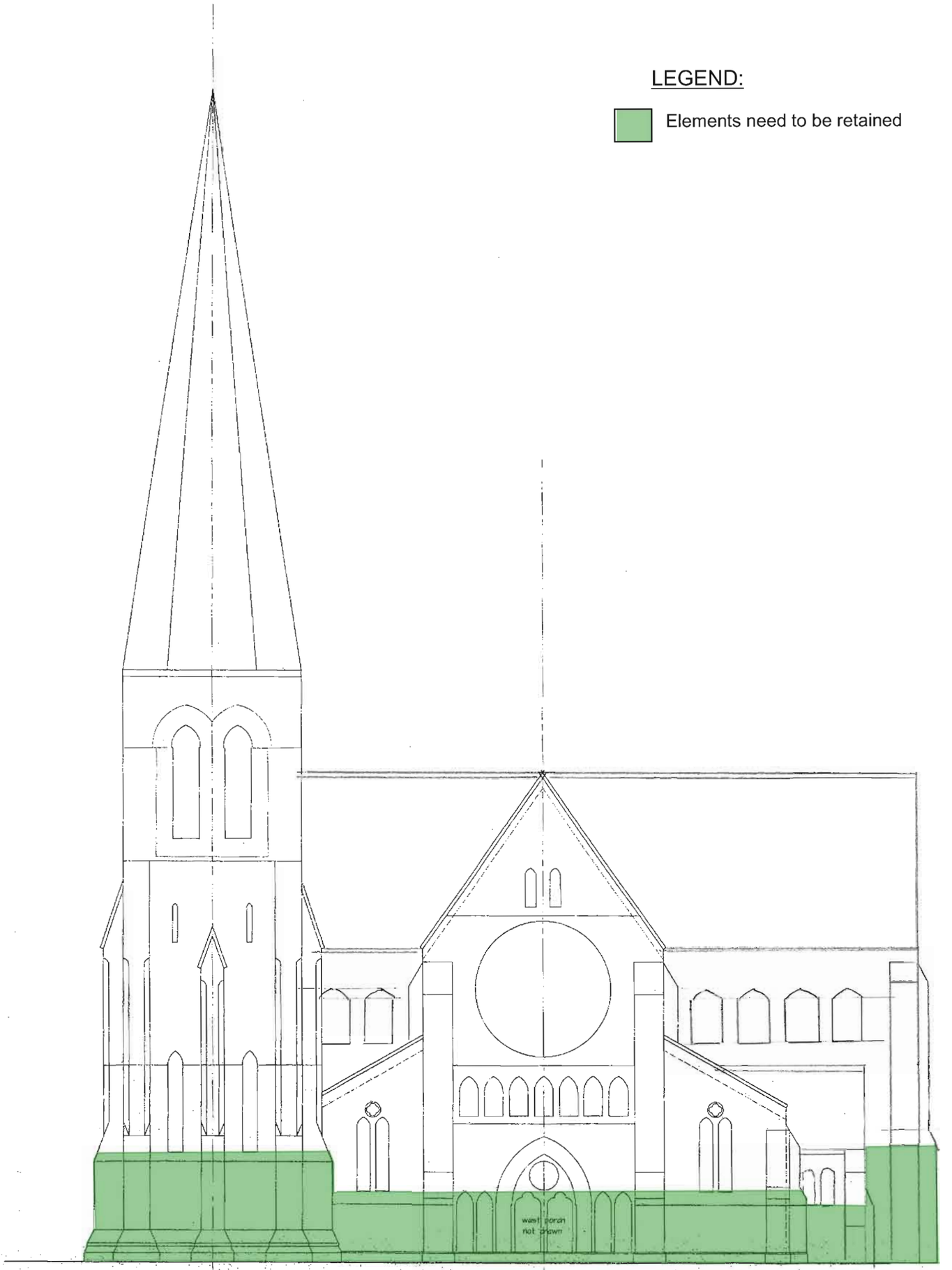
DRAWN: IDM SCALE: 1:100
APPROVED: ACAD FILENAME: CATHS1-5

SHEET TITLE:
ELEVATIONS

JOB No. 2948 SHEET No. S1-5 REV. REV

LEGEND:

Elements need to be retained



west elevation

LEGEND:

Elements to be retained

south elevation

REV | DATE | BY | REASON

HOLMES CONSULTING GROUP
STRUCTURAL AND CIVIL ENGINEERS

HolmesConsultingGroup
STRUCTURAL AND CIVIL ENGINEERS

Project Name:	*Christchurch Cathedral*
Project Number:	*106324*
Sketches By:	*SXO*
Date:	*20/10/2011*
Sketch Number:	*028*

LEGEND:

Elements to be retained

east elevation

REV	DATE	BY	REASON

HOLMES CONSULTING GROUP
STRUCTURAL AND CIVIL ENGINEERS

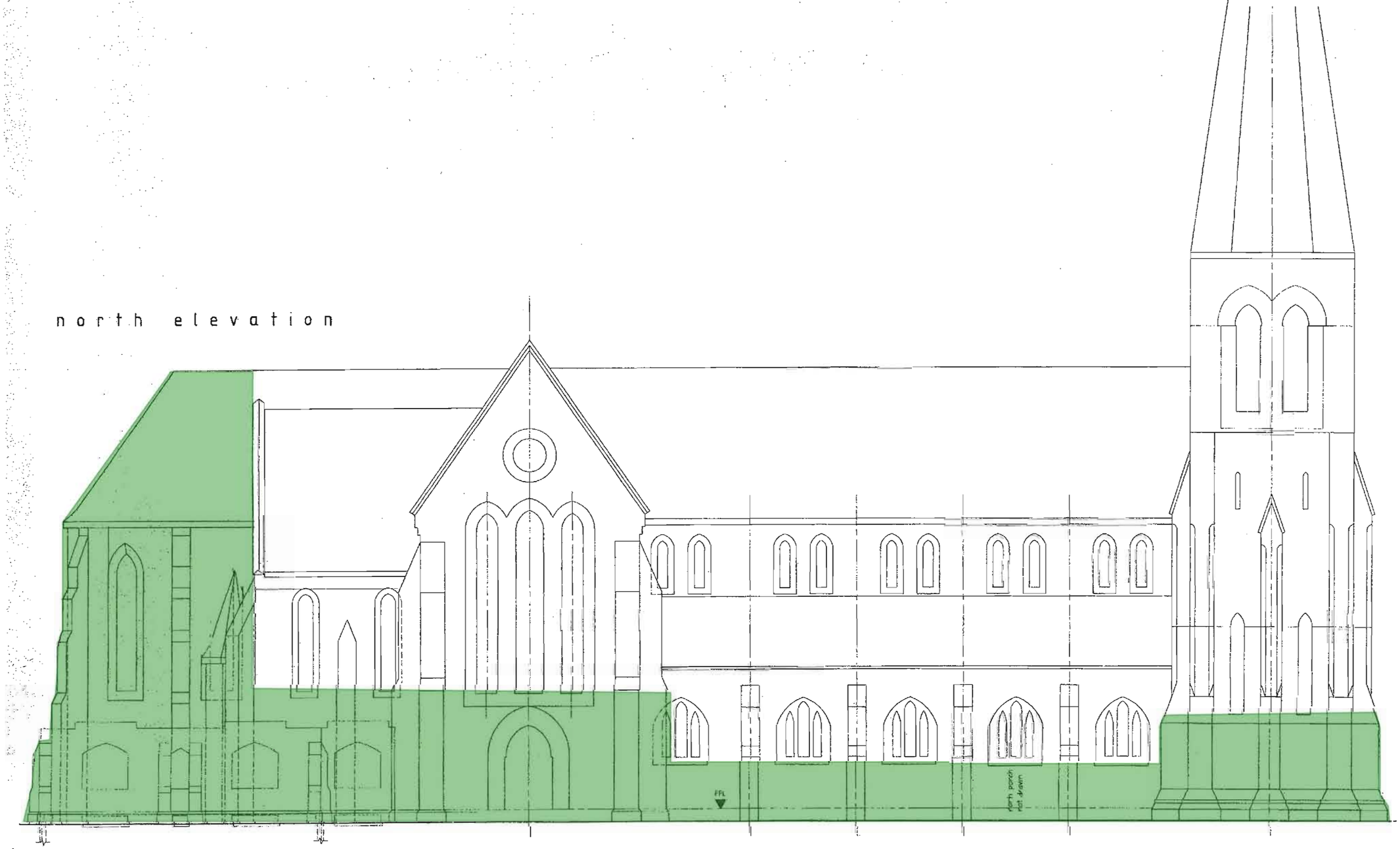
HolmesConsultingGroup
STRUCTURAL AND CIVIL ENGINEERS

Project Name:	*Christchurch Cathedral*
Project Number:	*106324*
Sketches By:	*SXO*
Date:	*20/10/2011*
Sketch Number:	*029*

LEGEND:

Elements to be retained

north elevation



HolmesConsultingGroup
STRUCTURAL AND CIVIL ENGINEERS

Project Name:	*Christchurch Cathedral*
Project Number:	*106324*
Sketches By:	*SXO*
Date:	*20/10/2011*
Sketch Number:	*030*

REV	DATE	BY	REASON

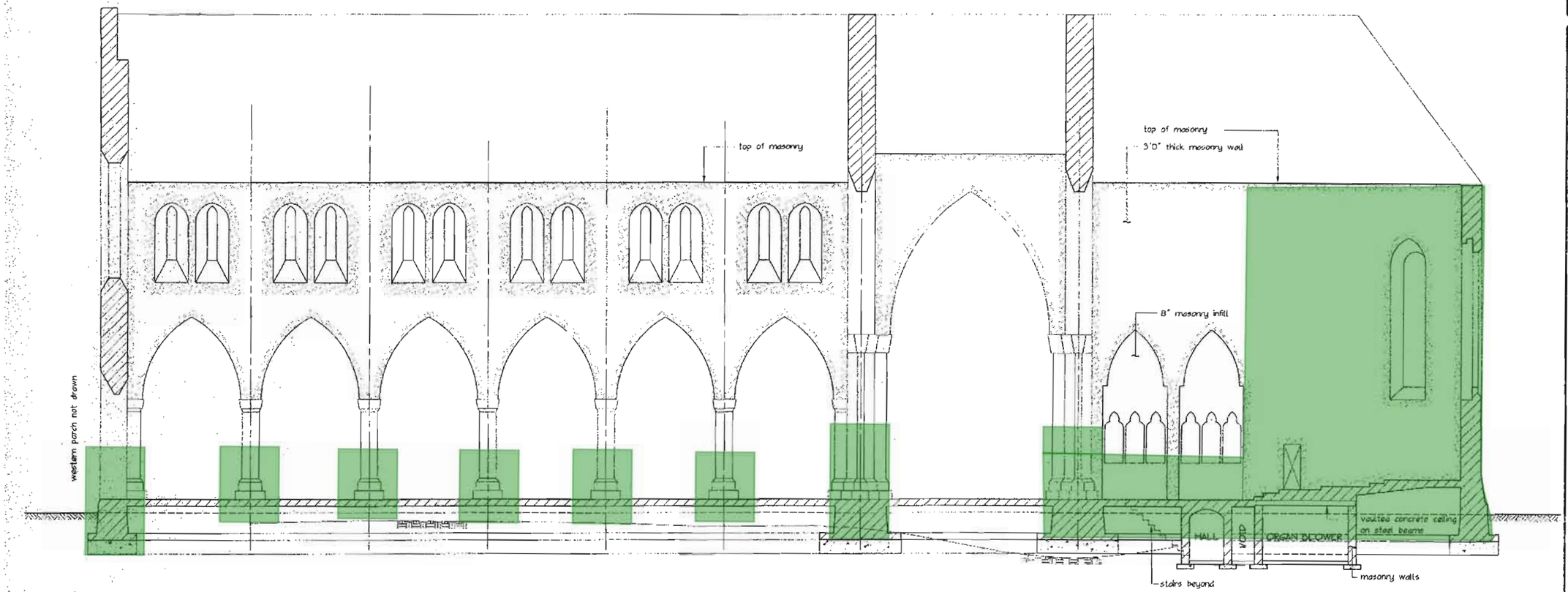
HOLMES CONSULTING GROUP
STRUCTURAL AND CIVIL ENGINEERS
Christchurch, Wellington, New Plymouth, Auckland, Sydney

CHRISTCHURCH
CATHEDRAL
SEISMIC STRENGTHENING PROPOSALS

DRAWN: IDM SCALE: 1:100
APPROVED: ACAD FILENAME: CATHS1-4

SHEET TITLE:
ELEVATIONS

JOB No: 2948 SHEET No: S1-4 REV: REV



longitudinal section nave (3 / S1-1)

LEGEND:

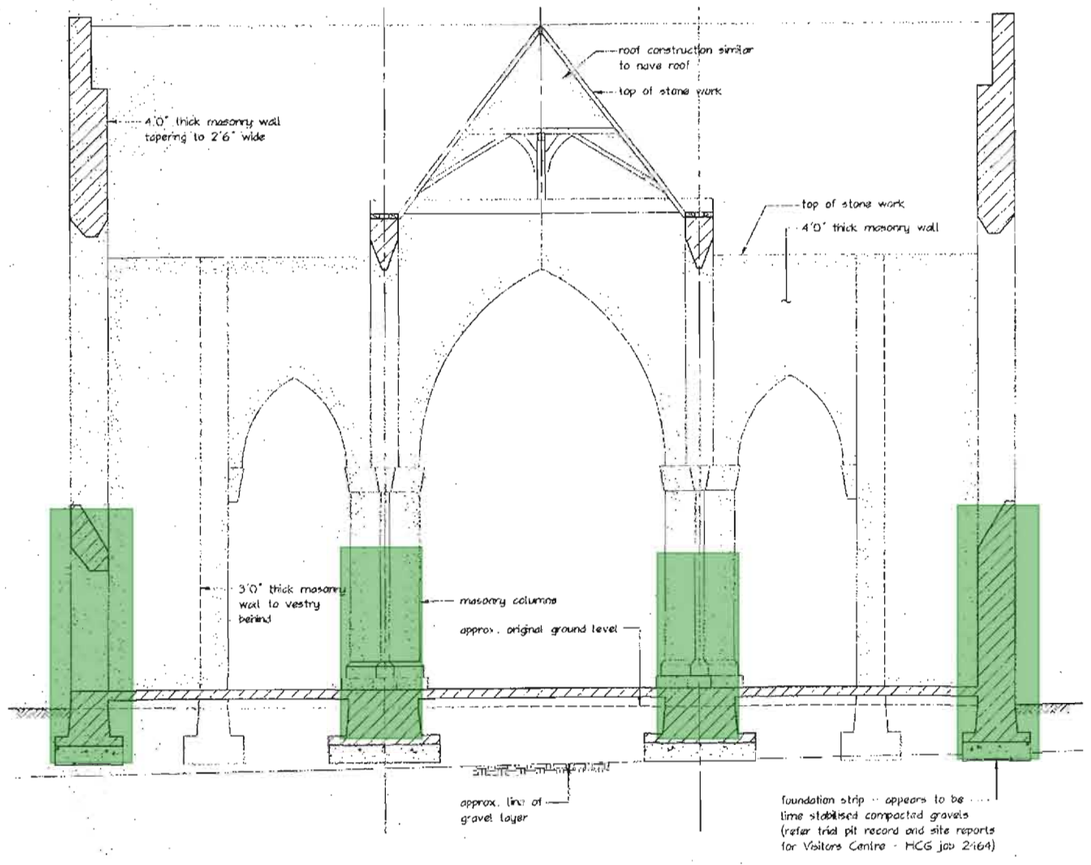
Elements to be retained

REV	DATE	BY	REASON

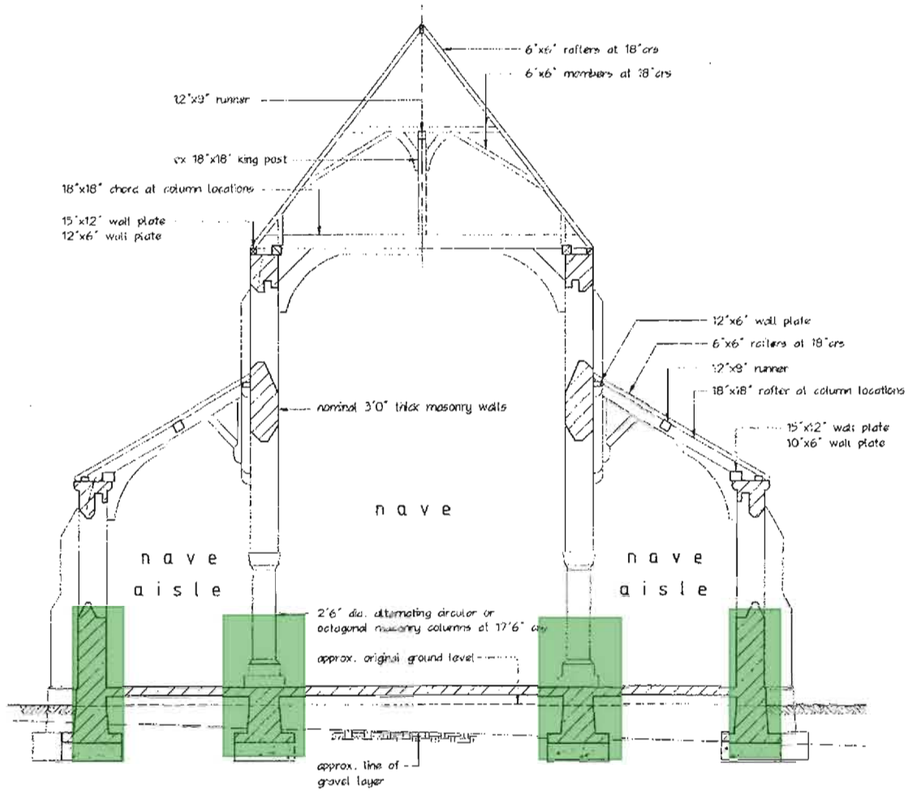
HOLMES CONSULTING GROUP
STRUCTURAL AND CIVIL ENGINEERS
Christchurch, Wellington, New Plymouth, Auckland, Sydney

HolmesConsultingGroup
STRUCTURAL AND CIVIL ENGINEERS

Project Name:	*Christchurch Cathedral*
Project Number:	*106324*
Sketches By:	*SXO*
Date:	*2010/2011*
Sketch Number:	*031*



longitudinal section transepts (1 / S1-1)



typical cross section (2 / S1-1)

LEGEND:

Elements to be retained

REV	DATE	BY	REASON

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

HolmesConsultingGroup
STRUCTURAL AND CIVIL ENGINEERS

Project Name:	*Christchurch Cathedral*
Project Number:	*106324*
Sketches By:	*SXO*
Date:	*20/10/2011*
Sketch Number:	*032*

Appendix C – CERA Engineering Memo # 1

MEMO

CERA

Canterbury Earthquake Recovery Authority

Attention	**Warwick Isaacs – General Manager Demolition**
From **Contact**	John O'Hagan, Structural Engineer, Significant Building Unit 0275 400 823
Reviewed	Chris Jaques, Structural Engineer, Significant Buildings Unit
Date	**Monday 12th September 2011**
Subject	**Christchurch Cathedral – Dangerous Building Status**
Number of Pages	4 pages

Warwick,

This memo has been prepared for and on the behalf of the Canterbury Earthquake Recovery Authority (CERA). The purpose of the memo is to comment on the current status of the Christchurch Cathedral.

Appended to this memo is a summary of the damage to the Cathedral which is based on the Holmes Consulting Group (Holmes) reports dated 24 March 2011 and 29 June 2011 and an external assessment by CERA Engineer John O'Hagan on 17 August 2011.

Building Description

In general terms the structure comprises slate tile roof cladding supported on timber framing (sarking, rafters and beams). The timber framing is supported by stone walls, strengthened with buttresses, which are likely founded on a stone wall foundation.

The stone walls typically comprise internal and external "facing" stonework with rubble infill. The rubble infill is typically poorly graded and weakly cemented.

The ability of the cathedral structure to resist lateral loads relies on the interconnection of the stone work and rubble infill. This interconnection was weak when constructed and has been further compromised as a result of the earthquake damage sustained.

Observed Damage

Christchurch Cathedral has been severely damaged. While the walls and roof of the cathedral itself remained mostly intact, the gable of the west front sustained significant damage in the February earthquake and in the June event most of the

west wall, including the Rose Window collapsed. The roof over the western section of the north aisle nearest the tower has collapsed. A significant portion of the tower has collapsed, and the northern and southern stone walls are badly cracked and have displaced laterally, compromising both the vertical and lateral load-carrying capacity of the structure. The roof has partially collapsed in a number of locations. Temporary shoring has been put in place to secure the West Wall and the South Turret has been removed. A detailed summary of the damage to the Cathedral is appended.

Cracks in the stone walls are getting wider as a result of the continuing aftershocks in the city, which further compromises the structural integrity of the Cathedral.

Additional propping and securing measures would be required if an internal inspection of the Cathedral is to be carried out. The building in its current condition would pose a high risk to tradesmen working in the building for a significant length of time as would be required to erect the propping and securing works.

Conclusion

In our opinion the building has suffered extensive and significant damage, is in poor structural condition, and is dangerous as defined in the Building Act 2004, as modified by the Canterbury Earthquake (Building Act) Order 2010. It is possible that in the event of a significant aftershock or less than moderate earthquake, the building, or parts of the building, could collapse or otherwise cause injury or death to any person in or around the building.

We believe that the building in its present condition would pose a high risk to tradesmen erecting temporary strengthening works within the building. We therefore conclude that it would not be possible to strengthen the building temporarily or otherwise in a safe manner without the risk of collapse of part or all of the building.

On the basis of this information and considered opinion, we recommend that you determine that the Christchurch Cathedral be deemed a dangerous building for the purpose of issuing a letter to the building owner under Section 38 of the C.E.R. Act, and that the building be demolished.

END

John O'Hagan
Structural Engineer for and on Behalf of CERA Significant Buildings Unit

Reviewed by

Chris Jaques
Structural Engineer for and on Behalf of CERA Significant Buildings Unit

Date:

Warwick Isaacs – General Manager Demolition

MEMO

Appendix - Summary of the damage to the Cathedral

This summary is based on the Holmes Consulting Group (Holmes) reports dated 24 March 2011 and 29 June 2011 and an external assessment by CERA Engineer John O'Hagan on 17 August 2011. Building damage and access limitations meant that the assessment was limited to the building exterior.

The scope of work for the Holmes report was:

- To complete a ground based survey of the building to identify the general form and location of earthquake damage.
- To provide a report that details the results of the structural survey.

The damage is summarised as follows:

- The west porch is permanently offset from the western wall by approximately 20 – 30 mm as a result of the February event and has displaced a further 10 mm in the June event. The additional deformation imposed on the west porch has caused the widths of the existing cracks to increase. There is moderate damage to the south and west walls, and significant damage to the north wall. The damage to north wall includes parapet collapse and significant spalling of the north western buttress. The north portion of roof has collapsed as a result of falling tower debris.

- The west wall sustained severe damage in February and significant additional damage in June. The north buttress and part of the adjoining section of the nave wall has collapsed. The south buttress has become separated from the west and south nave walls. A number of the capping stones have buckled but remain in place. The wall itself is significantly distorted.

  A significant portion of the west wall, including most of the Rose Window, has now collapsed with much of the debris landing on the roof of the west porch below. The remaining portions of the west wall are badly distorted and severely compromised.

- Complete collapse has occurred to the upper section of the tower. USAR demolished the central section of north wall down to approximately 4 m above ground level. The remaining buttress sections are reasonably stable but may require shoring to enable deconstruction. A large crack has developed to the inside and outside of the stair at the southeast corner, full height on south wall (30mm+). Most of the rubble has been stockpiled on site but is severely degraded.

- The north aisle has sustained significant damage at the western end due to falling tower debris. Portions of the north aisle roof sheathing, roof bracing and a rafter have also failed. The South aisle roof bracing has yielded and is visibly sagging.

- The severely damaged north and south walls sustained additional damage in the June event. The existing crack widths increased and new cracks were observed in both walls. Significant additional cracking and spalling was observed adjacent the south porch.

- The South wall piers and buttresses have sustained damaged similar to that observed in the north wall. The cracks are significantly wider (i.e. approx 10 –

30mm wide). Some glass damage has also occurred as a result of the structural deformations.

- High level walls in the north western corner of the Nave have an outward lean as a result of tower collapse. There is moderate cracking in other areas of the north wall. Columns and arches have sustained some damage to stone surfaces, some of this is severe.

- The west wall/buttresses of the north porch has sustained damage due to falling tower debris. Stone elements that make up the northern wall have also sustained surface damage. Falling tower debris has also caused much of the roof to collapse in the north porch.

- The south porch is generally in good condition except for severe damage to the stairwell wall that supported the South Turret. The South Turret has subsequently been removed.

- The North and South Transept walls have sustained significant cracking and damage. The upper regions have a permanent horizontal offset of approximately 10mm and 40mm for the north and south walls respectively. The North and South Transept wall gables have also sustained significant cracking. A number of capping stones on the north wall have shifted. Three capping stones at the apex of the south wall have also shifted. USAR have made temporary repairs to the Barker and Pilgrim columns that support the west Transept walls. The central Transept area appears to be in poor condition with significant cracking of the western arch keystone observed.

- The North and South Apse walls have sustained significant cracking (30 – 40 mm) and associated glass damage.

- The North and East walls, believed to be of reinforced concrete construction, of the 1960's Clergy Vestry are largely undamaged. The south wall, believed to be a plastered concrete block infill wall, has sustained some cracking. The original unreinforced masonry walls have sustained significant cracking.

- Damage to the Choir Vestry is similar to the Clergy Vestry. Stepped cracking has occurred to the east wall of the south transept above the Choir Vestery. Bed joint slide cracking in the original internal piers adjacent to the vestries increased in the June event. The extent and severity of the observed cracking is difficult to quantify due to the presence of wall linings.

- The Visitor Centre structure appears to be undamaged. Some damaged has occurred to non-structural elements.

Appendix D – CERA Engineering Memo # 2

memo

CERA
Canterbury Earthquake Recovery Authority

To: Warwick Isaacs – General Manager Demolition

From: Structural Engineer – Significant Buildings Unit

Reviewed: Structural Engineer – Significant Buildings Unit

Date: 28 October 2011

Subject: SB198 – Christchurch Anglican Cathedral

Warwick,

A Collaborative Working Group (CWG) was set up to help the Church Property Trust (CPT) find a way to make Christchurch Cathedral safe under CERA regulations and investigate the implications of the make safe options on the future scenarios for rebuilding. The development of specific rebuild concepts was excluded from this investigation. It was noted at the first CWG meeting on 29 September 2011 that the health and safety of the public was the priority of the Church Property Trust.

The CWG included the following:

- Church Property Trust
- CERA
- Christchurch City Council (Planning and Heritage)
- Historical Places Trust
- Holmes Consulting Group (Engineers for the Church Property Trust)
- Warren & Mahoney
- (Heritage Architect)
- RCP Project Managers
- Davis Langdon Quantity Surveyors

The CWG considered reports from Holmes Consulting Group and Miyamoto + Cardno (Engineers engaged by Christchurch City Council) detailing make safe options.

As highlighted in our memo dated 12th September 2011 the Christchurch Anglican Cathedral has been severely damaged and the extent of the damage was summarized in that memo. Since then, the city has experienced ongoing aftershocks, the largest being a 5.5 magnitude aftershock on 9 October 2011.

CERA Engineers have carried out further inspections, the most recent being on 26 October 2011. These inspections have revealed that there has been additional damage to the Cathedral since 12th September 2011, particularly to the west wall where there has been a further collapse of the wall around the rose window. In our

opinion the cracks in the stone walls are typically getting wider, longer and more numerous as a result of the continuing aftershocks in the city. This additional damage further compromises the structural integrity of the Cathedral.

CERA Engineers have reviewed and considered the options outlined in the reports by Holmes Consulting Group and Miyamoto + Cardno. It is the opinion of CERA engineers that the proposed make safe options, in their current form, do not reduce the risk of injury or death to tradesmen working in or around the building to an acceptable level. The preferred option will need to be further developed to ensure that safety issues are fully addressed.

CERA Engineers have considered full demolition versus partial demolition and in our opinion, the extent of stable structure left after demolition of those parts of the building that could collapse or otherwise cause injury or death to any person in or around the building would be minimal.

In our opinion the building has suffered extensive and significant damage, is in poor structural condition, and is sustaining more damage with the on-going seismic aftershocks. We still maintain that the Cathedral is dangerous as defined in the Building Act 2004 and as modified by the Canterbury Earthquake (Building Act) Order 2010. Given the continuing degradation of the structure it is our opinion that it is possible that in the event of a significant aftershock or less than moderate earthquake, the building, or parts of the building, could collapse or otherwise cause injury or death to any person in or around the building.

As previously reported we believe that the building in its present condition would pose a high risk to tradesmen erecting and carrying out the proposed temporary strengthening works within, or around, the building. We therefore conclude that it would not be practicable to strengthen the building temporarily or otherwise in a safe manner without the risk of collapse of part or all of the building.

On the basis of this information and our considered opinion, we recommend that you determine that the Christchurch Anglican Cathedral be deemed a dangerous building for the purpose of issuing a letter to the building owner under Section 38 of the C.E.R. Act, and that the building be demolished. The demolition must include all parts of the building that could collapse or otherwise cause injury or death to any person in or around the building.

END

Reviewed by

Structural Engineer
CERA Significant Buildings Unit

Noted + Agreed

Warwick Isaacs – General Manager Demolition

Structural Engineer
CERA Significant Buildings Unit

Date: 28/10/11. 1.30pm.

Appendix E – CCC Engineering Assessment of CERA Memo #2

Christchurch City Council

HERITAGE RESPONSE TEAM - HERITAGE BUILDING ENGINEERING ADVICE

Date ***4th November 2011***

Address ***Christ Church Cathedral, 100 Cathedral Square***

Following the receipt of a memo titled SB198 – Christchurch Anglican Cathedral from CERA , dated 28th October 2011, on 3rd November, I write to comment on the Structural Engineering content. The memo was signed by two Structural Engineers form CERA Significant Buildings Unit, whose names have been removed from the copy provided to us, and by Warwick Issacs – General Manager Demolition, we comment as follows;

The memo sets out the collaborative process set up to help the Church Property Trustees to try to find a way to make the cathedral safe. I have been involved with the process as part of the CCC Heritage response team. My involvement has been as a structural engineer experienced in Heritage inspecting the building, internally and externally on several occasions since the February EQ and helping prepare an earlier memo on the structural damage. I have not been involved in the Collaborative Working Group meetings. As part of the process I attended a meeting to brief Miyamoto Cardno on the level of advice they should be providing the CCC Heritage team as part of the process.

Two make safe proposals were provided by Holmes Consulting Group and Miyamoto Cardno, these were provided to the Collaborative Working Group to enable them to seek costings on the make safe and decide on the level of deconstruction to make the Cathedral safe. The two options were reviewed and considered as to how they related to the protection of the heritage fabric of the Cathedral in accordance with the principles of the ICOMOS charter 2011. In my opinion, the Cardno Miyamoto scheme offers a greater degree of protection to the heritage fabric of the building in a much as there is significantly less deconstruction involved. The CERA Engineers have commented on these carefully considered options, that they do not reduce the risk of injury or death to tradesmen working in or around the building to an acceptable level. In fact it appears that the CERA Engineers having no known experience in working on buildings of this nature have ignored the advice of local and International experts. I would have expected CERA to have had the proposals peer reviewed by an independent heritage Engineer given the group 1 listing under the CCC City Plan and category I status with New Zealand Historic Places Trust. In addition the Cathedral has significant status internationally and has a high social value to the Community.

The memo states that CERA Engineers have carried out further inspections and further damage has occurred since the 5.5 magnitude aftershock on 9th October 2011. They have noted further damage particularly to the west wall where there has been further collapse of the wall around the rose window. The cracks in the stone walls are alleged to be typically getting wider, longer and more numerous as a result of the continuing aftershocks in the city. I have compared the damage to the west wall between 22nd September and 3rd November and have seen only very minor changes as can be seen in the photos below:-

Civic Offices, 53 Hereford Street, Christchurch, 8011
PO Box 73010, Christchurch, 8154
Phone: 03 941 XXXX, Facsimile: 03 941 XXXX
Email: XXXX@ccc.govt.nz
www.ccc.govt.nz

West wall 22nd September

West wall 3rd November

Civic Offices, 53 Hereford Street, Christchurch, 8011
PO Box 73010, Christchurch, 8154
Phone: 03 941 XXXX, Facsimile: 03 941 XXXX
Email: XXXX@ccc.govt.nz
www.ccc.govt.nz

SW corner 22nd September

SW corner 3rd November

Civic Offices, 53 Hereford Street, Christchurch, 8011
PO Box 73010, Christchurch, 8154
Phone: 03 941 XXXX, Facsimile: 03 941 XXXX
Email: XXXX@ccc.govt.nz
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SW corner junction 22nd September

SW corner junction 3rd November

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Email: XXXX@ccc.govt.nz
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It is clear from the above photo's that the damage has not progressed over the six week period between photo's. In addition, I have liaised with stonemasons from Stoneworks who have been clearing the rubble from in front of the West wall. Under their health and safety assessments, they have monitored the works on a daily basis and have informed us that no movement has taken place. The West wall is the most damaged area of the Cathedral and is likely to be largely deconstructed so any movement of this wall is not considered to be a issue, given that there is a large steel frame protecting the public along with a safety fence some 30m away from the building.

The CERA Engineers show their lack of understanding of the repair techniques when they state that the proposed make safe options, in their current form, do not reduce the risk of injury or death to tradesmen working in or around the building to an acceptable level. It would appear that the CERA Engineers are unaware of the Council funded strengthening works that have been completed to the building. These included the installation of concrete shear walls to the West Aisle and crossing walls along with roof tying and bracing to the Nave. These interventions have led to a much stronger and safer structure than may be visible from an external inspection of the building as completed by CERA.

In my opinion, it is possible to make the Cathedral safe without putting tradesmen's lives at undue risk. This would have to be agreed by formulating a robust methodology with a suitably experienced Contractor along with the Church Property Trustees and their consultants who have all supported the make safe proposals.

I agree with the CERA memo that the building is a dangerous building at present, but firmly believe that it can be made safe, strengthened and conserved for the Church and Community for generations to come. In its present condition it is not considered a risk to the public or other property and I therefore believe that the process should be slowed down rather than being accelerated. This will allow best conservation practice to be followed on this iconic building.

Andrew Marriott **BE CPEng MIPENZ Int PE NZ M.ICOMOS**

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Christchurch City Council

HERITAGE RESPONSE TEAM - HERITAGE BUILDING ENGINEERING ADVICE

Date **18th October, 2011**

Address **Anglican Cathedral, Cathedral Square, Christchurch**

File Note

HCG have submitted a 'middle of the road" scheme for deconstruction required to make the Cathedral safe in the form of a series of elevations/section coloured accordingly.

It is accepted that this is a very broad brush approach, however there are significant concerns regarding the extent of the work suggested, and the likely extent, complexity (and cost) of temporary support required (which is not detailed in the documentation as it falls outside the brief of HCG).

It is important to note that our recent review of the CERA file (in conjunction with NZHPT) revealed that CERA Significant Buildings Unit Engineers have recommended demolition. This conclusion is, in my view, not based on sufficient information and inspections and should be challenged by Council. The document states "that it would not be possible to strengthen the building temporarily or otherwise in a safe manner".

The make safe work suggested by HCG would require significant work to the interior of the building to undertake temporary support work, and there is concern that CERA would not allow such work, based upon the stated conclusion of the Significant Buildings Unit engineers.

The extent of the deconstruction work identified by HCG is extensive, and limits the possibilities for future retention and insitu repair/strengthening with removal of significant areas of structure. In addition, it also suggests that the internal columns would require deconstruction to low level. These elements support significant structure over, and it is not clear how the columns could be removed and temporary support introduced. The need for column deconstruction is not identified, and the temporary support required to retain the roof and high level Nave walls would likely represent a significant investment which would not form part of a permanent repair.

Advice form Miyamoto Cardno (engaged by Council), who have considerable experience of this type of work internationally suggest that there are alternative techniques available for make safe works which could be incorporated into a final solution. This would also not limit future options for the building with much of the heritage fabric retained.

It is however quite clear from the process to date that there is as yet insufficient detailed advice in terms of engineering solutions for make safe and permanent works to be in a position to obtain robust pricing information in order to make an informed decision regarding the future of the Cathedral. Although HCG have considerable experience and have been involved in the Cathedral for a considerable period of time, the work undertaken to date on behalf of the Church Property Trust does not appear to include any analysis of the building, and is not backed by any calculation. It is therefore insufficient to gain robust pricing information, or to consider appropriate strategies for the future of the Cathedral to be developed.

It is also clear that the temporary make safe works (identified as the key driver and conclusion of the Collaborative Approach) is inextricably linked with the permanent solution and that it is inappropriate to look at these items in isolation for such an important building.

Due to the constraints identified by RCP at the start of the Collaborative Approach, there is insufficient time to undertake an appropriate amount of engineering analysis within the current process. We

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Christchurch City Council

would therefore conclude that the process is inappropriate and would therefore strongly recommend that additional time is allowed, together with sufficient funding to engage appropriately experienced expertise to enable sufficient robustness in the process, both engineering and financial, to enable an informed decision to be made.

Patrick S C Harvey **BEng (Hons) CEng (UK) MIStructE MIPENZ**

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Appendix F – CPT Geotechnical Preliminary Investigations (Tonkin and Taylor)

REPORT

Church Property Trustees

Christchurch Cathedral, The Square
Geotechnical Walkover Assessment

Report prepared for:

CHURCH PROPERTY TRUSTEES

Report prepared by:

Tonkin & Taylor Ltd

Distribution:

CHURCH PROPERTY TRUSTEES	1 copy
Tonkin & Taylor Ltd (FILE)	1 copy

September 2011

T&T Ref: 52161

Table of contents

Executive summary

Tonkin & Taylor Ltd (T&T) have undertaken a geotechnical walkover assessment of the Christchurch Anglican Cathedral building in The Square, Christchurch for Church Property Trustees. This assessment comprised a site walkover, review of existing relevant information for the site, a preliminary liquefaction assessment, a preliminary foundation assessment, and assessment of foundation options for reconstruction of the building or construction of a new building.

The existing building is a neo-gothic style cathedral constructed with dressed stone walls and columns, with timber vaulted ceiling and slate tile roof. The bell tower was also constructed of dressed stone, with a copper covered spire on timber rafters. The foundation system consists of shallow pile foundations beneath the interior columns. Exterior foundations consisted of strip foundations. It appears that both the exterior strip footings and shallow piles are founded on a shallow gravel layer at a depth of between 4' (1.2m) and 10' 3" (3.1m).

No settlement or differential settlement of the foundations was noted during the walkover assessment. No liquefaction or lateral spreading was noted in the immediate vicinity of the Cathedral.

The building is immediately underlain by overbank deposits of the Springston Formation, comprising sands, silts and gravels. Geotechnical investigations by others show that there is little present beneath the site that is potentially liquefiable. Fill, silty sand and sand may be present, with thicknesses of between 1.0 and 2.5m. Medium dense to dense sandy gravel is present, approximately 8.0m thick. Beneath this, medium dense to dense interbedded sand, silty sand and gravel of the Christchurch Formation are encountered at approximately 9.0 to 10.5m below ground level. Dense gravels of the Riccarton Formation are encountered at around 24.0 m below ground level. Ground water levels are expected to be between 1 and 3m below ground level and artesian pressures were encountered with drilling was undertaken in the Riccarton Gravel on nearby sites.

A preliminary liquefaction assessment indicates a low risk of liquefaction in a future ultimate limit state earthquake event. Free-field settlements of up to 20 mm are estimated for such an event, and similar settlements are estimated to have occurred for the 22 February 2011 M6.3 earthquake event.

Foundation performance of the existing building is considered to be adequate given the levels of shaking experienced during the 22 February 2011 event and taking into account the age of the building.

Depending upon the size and loads required to be carried by the foundation for a new building on the site, suitable foundation options could range from a raft foundation or waffle slab, possibly with a reinforced gravel raft, through to piles founding either within the upper gravel layer, or extending to the Riccarton Gravel, if heavily loaded piles are required. While ground improvement options are discussed, it is unlikely that this site will benefit from such works, as the thickness of potentially liquefiable material at the site appears to be small.

1 Introduction

1.1 General

This report summarises the preliminary results of a post earthquake geotechnical walkover assessment and desk study of the Christchurch Anglican Cathedral (Cathedral), The Square, Christchurch.

The work which is described in this document was commissioned by Church Property Trustees and has been completed in accordance with the terms and conditions which are outlined in Tonkin & Taylor's (T&T) letter of engagement dated 19 July 2011.

The following scope of work has been undertaken by T&T for the purpose of this report:

- A site walkover to assess any evidence of foundation distress and land damage such as settlement, differential settlement, liquefaction tilting or lateral spreading,
- A review of existing foundation details,
- A review of existing available geotechnical information for the site, followed by a preliminary liquefaction assessment based on this information, including classification of the soil type for seismic analysis purposes as per NZS 1170.5 and recent amendments,
- A preliminary assessment of survey information to assess building settlements and/or tilting,
- A preliminary assessment of options for new foundations, including pad and strip footings, bored cast in-situ piles, driven piles, screw piles or other ground improvement techniques that are considered feasible for the site and;
- Preparation of this report.

1.2 Existing structure

The Cathedral was constructed in five stages. The nave (and tower?) was constructed by 1881, and the west porch was added in 1894. The north transept, south chapel, choir, chancel, sanctuary, and vestries were completed by 1904. A crypt is located beneath part of the chancel. The two Pascoe additions were competed in 1960. The north addition includes a basement section underneath. The visitors centre was constructed in 1999 and included a tunnel to the basement under the north addition. The Cathedral is constructed on an east-west axis. A site plan is provided in Figure A1 (Appendix A).

Construction drawings for the older parts of the Cathedral, attached in Appendix A, have been provided to Tonkin and Taylor by Holmes Consulting Group (HCG). These drawings show that the building is generally supported by stone strip footings with deeper short piles beneath the internal columns within the nave. All of the strip footings except for the tower are shown to be 4' (1.2m) deep, sitting on 2' (0.6m) of hardfill or gravel. The base of the strip footings are shown to vary between 5' 6" (1.7m) and 7' 3" (2.2m) width and the top of the footings to vary between 2' 2½" (0.7m) and 4' 2½" (1.3m) width. The tower is shown to be supported on strip footings 5" (1.5m) deep, 9' 6" (2.9m) wide at the base and 5' 6" (1.7m) wide at the top of the footings, with 2' (0.6m) of hardfill or gravel at the base of the footings. The interior columns through the nave are shown to be supported on short piles extending into the upper gravel layer present beneath the site. The depth of the piles is shown to vary in depth approximately 4' 9" (1.5m) and 10' 3" (3.1m). The widths of the piles varied between approximately 2' (0.6m) and 3' 6" (1.1m) at the base of the piles. The piles are stepped, becoming narrower as they approach the ground surface.

1.3 Recent earthquakes

1.3.1 22 February 2011 earthquake

A magnitude 6.3 earthquake occurred near Lyttelton, approximately 8.0 km south-east of the site on 22 February 2011. This seismic event caused widespread damage in central Christchurch, and land damage due to liquefaction occurred in the vicinity of the site.

1.3.2 13 June 2011 earthquakes

Two earthquakes occurred on 13 June 2011 near Sumner, approximately 11 km south-east of the site. At approximately 1:00 pm a magnitude 5.7 earthquake occurred, followed by a magnitude 6.3 earthquake which occurred at approximately 2:20 pm. These seismic events caused further damage in Christchurch and localised areas outside the city.

2 Site walkover assessment

A site walkover was conducted on 12 September 2011 by T&T engineers, in conjunction with an engineer from HCG. The walkover inspection covered the exterior of the building, interior of the vestries and basement beneath the north vestry. Photographs are included in Appendix B.

The following main points were noted from our walkover:

- Any visible damage to the foundations appears to have been caused by shaking only,
- There is approximately 100mm of water in the tunnel connecting the north vestry with the visitor's centre,
- There were no signs of liquefaction or lateral spreading in the immediate vicinity of the Cathedral,
- There were no obvious signs of settlement or differential settlement of the foundations.

3 Subsurface conditions

3.1 Published geology

The published geological map titled "Geology of the Christchurch Urban Area"[1], shows that the area near the Cathedral is immediately underlain by alluvial sand and silt overbank deposits of the Springston Formation. The Springston Formation is made up of post-glacial fluvial channel and overbank sediments consisting of gravel, sand and silt.

Figure 1 shows an extract from the Geology of the Christchurch Urban Area map, which shows that the site is also near a terrace of the Avon River.

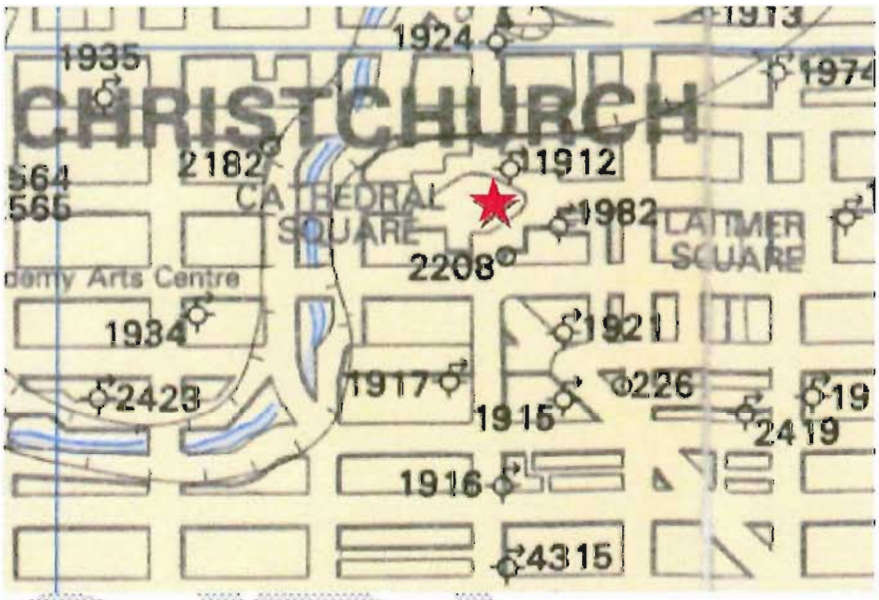

Figure 1 – Geological map of the Cathedral, The Square (marked with a red star) and surrounds (extract from Brown and Weeber, 1992)

3.2 Historical geotechnical information

3.2.1 Cathedral drawings

The package of historical drawings provided to T&T by HCG included cross sections of the soil profile along the interior column lines within the nave. These cross sections indicate that the soil profile beneath the site comprises:

- Approximately 2' (0.6m) fill, overlying,
- Between 2' 2' (0.7m) and 7' 7" (2.3m) of sand, overlying,
- Shingle (gravel with sand lenses) to an unknown depth.

The depth to ground water is shown as being approximately 11' 3" (3.4m) below ground level. A copy of the foundation plan and cross section is included in Appendix A.

[1] Brown, L.J.; Weeber, J.H. 1992: Geology of the Christchurch Urban Area. Scale 1:25 000. Institute of Geological and Nuclear Sciences geological map 1.

3.2.2 Environment Canterbury wells

A number of Environment Canterbury well bore logs are available in the vicinity of the site. These logs provide a limited interpretation of the soil types encountered in the well bores for the area. The well logs indicate that the subsurface profile consists of:

- 1.5 - 2.5 m of topsoil / fill/ organic silt, overlying ,
- 5 m of sandy gravel, overlying,
- 15 - 19 m interbedded silty sand, sand, silt and gravel, overlying,
- An unconfirmed thickness of gravel which extends from a depth of about 23m.

The gravels located at 23-25m below the ground surface are likely to be those known as Riccarton gravels or Riccarton Aquifer.

It should be noted that the wells were not drilled for geotechnical purposes and the soil interpretation may be unreliable.

3.2.3 Tonkin & Taylor geotechnical database

T&T have also undertaken investigations in the vicinity of the site. These investigations indicate that the subsurface profile in the general area comprises:

- 1.0m loose gravel (fill), overlying ,
- 8.0m of medium dense to dense sandy gravel with some sand, overlying,
- 9.5m medium dense sand, overlying,
- 2.0 – 2.5m very soft to soft silt, overlying,
- 3.0m interbedded stiff to very stiff silt, sandy silt and sand, overlying,
- An unconfirmed thickness of gravel which extends from a depth of about 24m.

During these investigations, artesian water pressure was encountered in the gravel from approximately 24m below ground level. The unconfined groundwater level was encountered at 2.90m bgl (approximately 12m RL).

3.3 Post earthquake geotechnical information

Since the 22 February 2011 earthquake, a number of investigations have been undertaken throughout the CBD. Information from our database suggests that, in the general vicinity of the site, interbedded layers of medium dense to dense sands and gravel are present between 1.2m and 8.2m depth. This material is likely to be non-liquefiable in a design ULS earthquake event. Medium dense to dense sands with traces of silt and peat of the Christchurch Formation are encountered between 8.2 and 19.5 m below ground level. This layer is also assessed as unlikely to liquefy in a design ULS earthquake event, although loose lenses of sand may liquefy. The effect of any liquefaction occurring within discrete lenses is likely to be small. Underlying this is a soft silt with some sand and peat layer. Dense gravels of the Riccarton Formation are encountered at approximately 23.5 m below ground level which are also unlikely to be liquefiable.

3.4 Generalised subsurface profile

Based on the existing information, the generalised subsurface profile is believed to be as per Table 1.

Table 1 Generalised subsurface profile

Layer description	Layer thickness	Depth below ground level of base of layer
Fill, silty sand and sand (Springston Formation, Yaldhurst Member)	1.0 – 2.5 m	1.0 – 2.5
Medium dense to dense sandy gravel (Springston Formation, Yaldhurst Member)	8.0 m	9.0 – 10.5 m
Interbedded silty sand, sand, silt and gravel, generally medium dense to dense (Springston Formation, Christchurch Formation)	9.0 m	18.0 – 19.5 m
Very soft to soft silt	2.0 m	20.0 – 21.5 m
Stiff to very stiff silt	3.0 m	23.0 – 24.5 m
Dense to very dense sandy gravel (Riccarton Gravels)	Unknown	Unknown

The ground water level is expected to be at a depth of 1 to 3m below the existing ground level. Artesian pressures were encountered when drilling was undertaken in the Riccarton Gravels on nearby sites.

4 Seismic assessment

4.1 Earthquake scenarios

Earthquake scenarios derived from "NZS1170 – Structural Design Actions" for the above sites are presented in Table 1. It has been assumed that the Cathedral is an Importance Level 3 structure with a 50 year design working life. Allowance has also been made for the recent changes to the Department of Building and Housing Compliance Document Clause B1 that were implemented on 19 May 2011 for Canterbury. The soil is assessed to be Class D (deep or soft soils) in terms of the NZS 1170.5 site subsoil class.

Table 1 Summary of the earthquake scenarios for liquefaction and lateral spreading assessment

	Serviceability Limit State earthquake (SLS)	Ultimate limit state earthquake (ULS)	22 February 2011 earthquake
Return period factor, R	0.33 (1)	1.3 (2)	Unconfirmed
Earthquake Magnitude, M	7.5	7.5	6.3
Peak ground acceleration, PGA	0.11 g	0.44 g	0.60 g (3)

(1) This corresponds to a return period of approximately 45 years, increased from 25 years (R = 0.25) in accordance with the changes to Clause B1 that took effect on 19 May 2011.

(2) This corresponds to a return period of 1000 years.

(3) Peak ground acceleration interpolated between records by GNS from the CHHC seismograph located approximately 1000m southwest of the site and the REHS seismograph located approximately 900m north of the site.

4.2 Preliminary liquefaction assessment

Liquefaction occurs when seismic shaking of loose, saturated (i.e., below the water table) sands and cohesionless silts results in a tendency for these materials to densify. This causes a build up of excess water pressure between the soil particles (pore water pressure) because the pore water cannot drain during seismic shaking. The pore water pressure can rise to a point where it overcomes the stress between the soil particles, resulting in a loss of friction. When this occurs, the soil has no strength and effectively behaves as a liquid.

Preliminary liquefaction analyses have been carried out based on the currently available information to determine if the founding soils are likely to be susceptible to liquefaction during future seismic events. The three earthquake scenarios listed in Table 2 were used in the analysis. It must be appreciated that the information used for the liquefaction analysis is not site specific, and therefore only gives a general indication of the ground conditions in the area.

Liquefaction assessments have conservatively assumed a ground water level at the ground surface at the time of the earthquake.

A preliminary assessment of the liquefaction risk at the Christchurch Cathedral site showed that during the design ULS earthquake, the site can be classified as Performance Level L1 to – "Mild" in the NZGS Guidelines for Geotechnical Earthquake Engineering Practice in New Zealand[2]. This

[2] New Zealand Geotechnical Society (2010) Geotechnical Earthquake Engineering Practice – Module 1 – Guideline for the identification, assessment and mitigation of liquefaction hazards, Rev 0, July 2010.

corresponds to limited excess pore pressures without complete liquefaction; relatively small deformation of the ground with relatively small settlements.

This risk is consistent with the observed damage following the 22 February 2011 earthquake. However, the performance level of the site in the 22 February 2011 event does not preclude the possibility of more severe liquefaction occurring at the site in a future severe earthquake.

The liquefaction assessment results from nearby sites are summarised in tables 3 and 4. The assessments predict that there is a low to moderate risk of liquefaction occurring at the site in a future ULS earthquake and a very low risk of liquefaction occurring in these layers in a future SLS earthquake.

Table 3: Summary of the liquefaction assessment results: Risk of liquefaction

Soil layer	Risk of liquefaction		
	SLS **M = 7.5** **PGA = 0.11 g**	**ULS** **M = 7.5** **PGA = 0.44 g**	**22 Feb 2011** **M = 6.3** **PGA = 0.60 g**
Fill, silty sand and sand (Springston Formation, Yaldhurst Member)	Very low	Low	Low
Medium dense to dense sandy gravel (Springston Formation, Yaldhurst Member)	Very low	Low	Low
Interbedded silty sand, sand, silt and gravel, (Springston Formation, Christchurch Formation)	Very low	Low to moderate	Low to moderate
Very soft to soft silt	Very low	Low	Low
Stiff to very stiff silt	Very low	Very low	Very low
Dense to very dense sandy gravel (Riccarton Gravels)	Very low	Very low	Very low

4.3 Settlements

Estimates of settlement induced by liquefaction of the subsurface materials are presented in Table 4. These settlement values are total, free field settlement estimations. This describes the settlement of ground not occupied by a building, occurring due to dissipation of excess pore water pressure generated during earthquake shaking. A component of building settlement may also occur due to yield of the liquefied founding soils. This component of settlement is very difficult to predict and depends on the interaction of the building and the soil it is founded on.

Table 4: Summary of the liquefaction assessment results: Effects of liquefaction

	SLS **M = 7.5** **PGA = 0.11 g**	**ULS** **M = 7.5** **PGA = 0.44 g**	**22 Feb 2011** **M = 6.3** **PGA = 0.60 g**
Cumulative thickness of liquefied layers	Approximately 0.0m thick	Approximately 0.1m thick	Approximately 0.1m thick
Estimated liquefaction induced *total* free field settlement	Negligible	<20 mm	<20 mm
Expected site Performance Level[1]	L1 "Mild"	L1 "Mild"	L1 "Mild"

1 New Zealand Geotechnical Society (2010) Geotechnical Earthquake Engineering Practice – Module 1 – Guideline for the identification, assessment and mitigation of liquefaction hazards, Rev 0, July 2010.

5 Assessment of existing buildings

5.1 Assessment of damage

A land and foundation damage assessment was completed by T&T using information from the following sources:

- A site walkover inspection by Geotechnical Engineers on 12 September 2011 to visually assess any evidence of liquefaction, lateral spreading and foundation damage;
- General observations from T&T staff immediately after the earthquakes; and,
- Land damage identified and mapped using aerial photographs.

The key findings of the foundation damage assessment are summarised in the following sub – sections.

5.1.1 Liquefaction

Aerial photographs do not indicate any evidence of significant liquefaction (i.e sand ejecta) in the immediate vicinity of the site. This is in general agreement with the results of the liquefaction analysis which is described in Section 4.2.

5.1.2 Lateral spreading

No evidence of lateral spreading has been observed at the site or in the immediate vicinity. However, the published geology (Figure 1) indicates the site is near an old terrace of the Avon River (the southern side of Gloucester Street). Therefore there is a risk of lateral spreading occurring in the vicinity of the site if substantial liquefaction were to occur in the vicinity of the site in a future severe earthquake.

5.1.3 Foundation damage

Little visible damage to the foundations was observed during the site walkover. The damage that was noted consisted of shaking damage. No obvious signs of differential settlement or tilting were evident. However, a level survey of the foundations would be needed to confirm the visual observations.

5.1.3.1 Structural damage

HCG have undertaken a structural assessment of the building and reported their findings separately. T&T have not undertaken a structural assessment of the building.

5.2 Post earthquake level survey

T&T are not aware of any level survey undertaken for this building.

5.3 Existing foundations

5.3.1 Assessment of foundation performance

Considering the age of the structure, the performance of the foundations during the 22 February earthquake appears to have been adequate, based on site observations, and our understanding of the subsurface conditions. There does not appear to have been any liquefaction induced settlement or differential settlement, nor does there appear to have been any bearing capacity failure.

6 Geotechnical issues

6.1 Introduction

The recommendations and opinions which are contained in this report are based upon data from the investigations undertaken on adjacent sites, and, observations of surface features. The nature and continuity of sub-surface conditions away from the investigation locations is inferred and it must be appreciated that the actual conditions may vary from the assumed model.

All of the recommendations and interpretations which are presented in this report should be reviewed and confirmed as part of the detailed design process for any future development, which would require a site-specific investigation programme (see Section 7).

The key geotechnical issues to be addressed at the site are:

- Potential for liquefaction in a future large seismic event, with resulting differential settlements of building foundation elements, and;
- Risk of lateral spreading (also related to liquefaction);
- Cyclic densification of upper materials.

However, based on the evidence available from investigation data from nearby sites and site observations, the risk of either liquefaction or lateral spreading occurring at this site are considered to be low.

6.2 Remedial options

Remedial options of the existing foundations have not been considered given the age and nature of the foundations and the level of structural damage the Cathedral sustained during the 22 February 2011 earthquake and 13 June 2011 earthquake.

6.3 Rebuild options

6.3.1 Overview

Given the fairly shallow depth to medium dense to dense gravel at this site, a number of foundation options can be considered for a new structure built on this site. This report presents a preliminary overview of foundation options, however, before one particular option is selected, a site specific geotechnical investigation would be required. This would most likely involve 4 to 6 machine drilled boreholes, and a number of cone penetration tests (CPTs), depending upon the scale of building intended for the site.

6.3.2 Shallow foundations

Depending upon the scale and structural design of a new building, shallow foundations in the form of a thickened reinforced concrete raft, or waffle slab may be an acceptable foundation option. The viability of this option will also be dependent upon the findings of site specific geotechnical investigations and analysis. However, if investigations indicate that the site is unsuitable for shallow foundations on their own, they may be able to be combined with other options such as constructing a reinforced gravel raft, or ground improvement works. The design of a raft foundation system is likely to be governed by settlement criteria rather than bearing capacity limits.

An alternative to locating shallow foundations at the ground surface could be to construct a basement beneath the new structure. If site specific investigations show that the gravel layer is

present at a high enough level over the site, then constructing a raft foundation without the need for additional ground treatment could also be an option. This could allow for the provision of parking, storage or other amenities within the new building. Construction challenges with this option include the presence of high groundwater. This introduces difficulties and expense in terms of excavating for and constructing the basement, as temporary support of the sides of the excavation and dewatering of the excavation would be required.

Individual pad foundations are not recommended, as they are more likely to settle differentially during a severe seismic event, which in turn can result in structural distress to the building.

6.3.3 Reinforced gravel raft

If site specific geotechnical investigations confirm that there are potentially liquefiable layers at a shallow depth, a reinforced gravel raft foundation system could be constructed to reduce the potential for differential settlements between heavily and lightly loaded areas of the foundations. A typical gravel raft is constructed from compacted angular gravel and reinforced with layers of geogrid material. As discussed in section 6.3.2 above, this option is combined with a thickened reinforced concrete raft or raft and ground beam foundation. This should enable the structure to tolerate a higher degree of settlement than would otherwise be designed for; however, depending upon the anticipated settlement, relevelling may be required following a severe earthquake.

The design of a raft foundation system is likely to be governed by settlement criteria rather than bearing capacity limits.

Again, construction challenges with this option include the presence of high groundwater. This introduces difficulties and expense in terms of excavating for and constructing the reinforced gravel raft, as temporary support of the sides of the excavation and dewatering of the excavation would be required.

6.3.4 Ground improvement

A number of methods are available to improve the resistance to liquefaction of the underlying soils in a future severe earthquake. While, based on the evidence available, it is unlikely that potentially liquefiable soils are present beneath the site to the extent that ground improvement would be considered as suitable treatment, the methods available are discussed below.

The ground improvement methods which are available include:

- **Dynamic Compaction**
  Dynamic compaction involves dropping a large weight onto the ground surface to densify the underlying soils. It can be highly effective where loose sands are predominant in the upper layers. However, the process involves considerable noise and vibrations that are unlikely to be appropriate at this site.
- **Stone Columns**
  Stone columns involve driving a vibrating probe into the soil to the required treatment depth, filling a tube attached to the probe with gravel via a hopper, and removing the probe while backfilling the hole with gravel. This forms a column of dense gravel within the ground, which stiffens the surrounding strata and will carry a greater portion of earthquake shaking induced stresses. Vibration of the probe can also densify the surrounding ground. The gravel columns create a preferential additional drainage path, allowing any excess pore pressures that develop during earthquake shaking to dissipate more quickly. The result of these effects is a strengthened block of soil with greatly increased resistance to liquefaction.

However, the construction process usually creates noise and vibrations. This may not be appropriate, given the location of the site within the CBD and the proximity of other surrounding buildings, and consideration to this matter would be required prior to the detailed design phase. In general, however, the noise and vibration issues which are associated with this option are expected to be less than dynamic compaction.

- **Continuous Flight Auger (CFA) Piles**
  CFA piles are a form of non-displacement pile, which involve creating a hole using an auger that is then filled with grout/concrete or similar material. The stiffness of the pile is higher than that of a stone column, resulting in the piles carrying a greater portion of earthquake shaking induced stresses; though unlike a displacement pile or stone column they do not provide any densification to the surrounding soil. CFA piles do have the advantage of being able to carry load through direct bearing, unlike other forms of ground improvement.

  CFA piles are less intrusive in terms of noise and vibration caused during construction. Should ground improvement prove to be required, they are expected to be the most appropriate form of ground improvement for this site.

6.3.5 Piled foundations

It would be possible to use driven, bored, or screw piles to found the building on dense, non liquefiable soil strata at greater depth than the options discussed above. Depending on the thickness and strength of the near surface gravel layer, the presence or otherwise of liquefiable material beneath the gravel and required load capacity, the piles may be able to be founded in this layer. It is likely that driven and screw piles would meet refusal in this upper gravel layer. However, depending upon actual site conditions and required loads, the piles may need to extend beneath this gravel layer, possibly to found within the Riccarton Gravel. Piles could be designed to essentially isolate the building from any upper loose sands/silts, reducing the impact of settlements arising from liquefaction in these layers.

The choice between driven, bored or screw piles would be determined by a number of factors. Excluding economic considerations from this discussion, the following factors would need to be considered when choosing an appropriate type of pile.

- The load capacity required. Generally, bored piles can be constructed to larger diameters than driven or screw piles and therefore, for a single pile, bored piles can be sized for larger load capacity.
- Lateral load capacity. Typically driven or bored piles can be designed to carry higher lateral loads than screw piles.
- Length of pile required and density of soil layers present above the pile founding layer. If the pile needs to extend through a dense layer to found within a lower dense layer, then bored piles will generally be more appropriate, as there is a risk that driven or screw piles would be unable to extend through the upper dense layer. At this site, this situation could arise if the upper gravel layer was of insufficient thickness and strength and piles had to be extended to say, the Riccarton Gravel.
- Installation noise and vibration. While no piling technique is noise or vibration free, generally driven piles will create the greatest noise and vibration while bored piles will create the least.

7 Geotechnical investigation recommendations

Prior to constructing a new building on the site, site specific geotechnical investigations will be required to enable further assessment and development of concept options and/or detailed design of foundations. These investigations should focus on:

- The nature and insitu strength of foundation materials around the perimeter of the site,
- Density of underlying materials,
- Groundwater levels, and
- Laboratory strength and classification properties.

The investigation is recommended to comprise a minimum of four machine drilled boreholes to 25 to 30 m depth, with installation of a piezometer, and, at least three cone penetrometers tests (CPTs). It is likely that the CPTs will need to be washed drilled through the upper gravel layer to allow for CPT testing to continue below this layer. Permission from Christchurch City Council and/or CERA is likely to be necessary to drill around the perimeter of the building in the public footpath and/or road reserve areas.

8 Conclusions

i. The site walkover did not reveal any foundation damage caused by liquefaction induced settlement or lateral spreading. There is no evidence that liquefaction occurred in the general vicinity of the Cathedral during the earthquakes and aftershocks which have occurred after 22 February 2011.

ii. The subsurface profile is expected to comprise of the following strata:

- Topsoil/fill, overlying
- Sands, and silty sands of between 1.0 m and 2.5 m thickness, of the Springston Formation, overlying
- Medium dense to dense sandy gravel of approximately 8.0m thickness, of the Springston Formation,
- Interbedded silty sand, sand, silt and gravel of approximately 9.0m thickness, of the Christchurch Formation, overlying
- Very soft to very stiff silt, up to 5.0m thickness, of the Christchurch Formation, overlying
- Dense gravels of the Riccarton Formation.

iii. The sands and silty sands of the Springston Formation may have liquefied during the 22 February 2011 earthquake, and, are assessed to have a low risk of liquefaction in a future ULS seismic event.

iv. Free-field settlements arising from liquefaction are expected to be minor over the site. Further site specific investigations are required to confirm more accurately assess this issue. Estimated free field settlements are in the order of less than 20mm in a ULS event.

v. The strength and bearing capacity of the soil underlying the site is expected to have returned to its pre earthquake level. Similar foundation performance to that which was observed in the 22 February 2011 earthquake is expected in a future ULS earthquake event.

vi. New foundation options include shallow raft or ground beam foundations, possibly constructed on a reinforced gravel raft. Ground improvement options such as dynamic compaction, stone columns or Continuous Flight Auger piles are unlikely to be required, unless site specific ground investigations indicate a greater thickness of liquefiable soil at the site than indicated by investigations undertaken at nearby sites. Alternatively, the building could be founded on a traditional driven or bored pile foundation system. The most appropriate type of pile would depend upon load capacity required.

vii. If a new building is to be constructed on the site, site specific geotechnical investigations will be required to confirm the subsurface conditions and provide geotechnical soil parameters for design.

9 Applicability

This report has been prepared for the benefit of Church Property Trustees with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Tonkin & Taylor LTD

Environmental and Engineering Consultants

Report prepared by:

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Anna Sleight

Senior Geotechnical Engineer

Report prepared by:

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Kirsti Murahidy

Geotechnical Engineer

Authorised for Tonkin & Taylor Ltd by:

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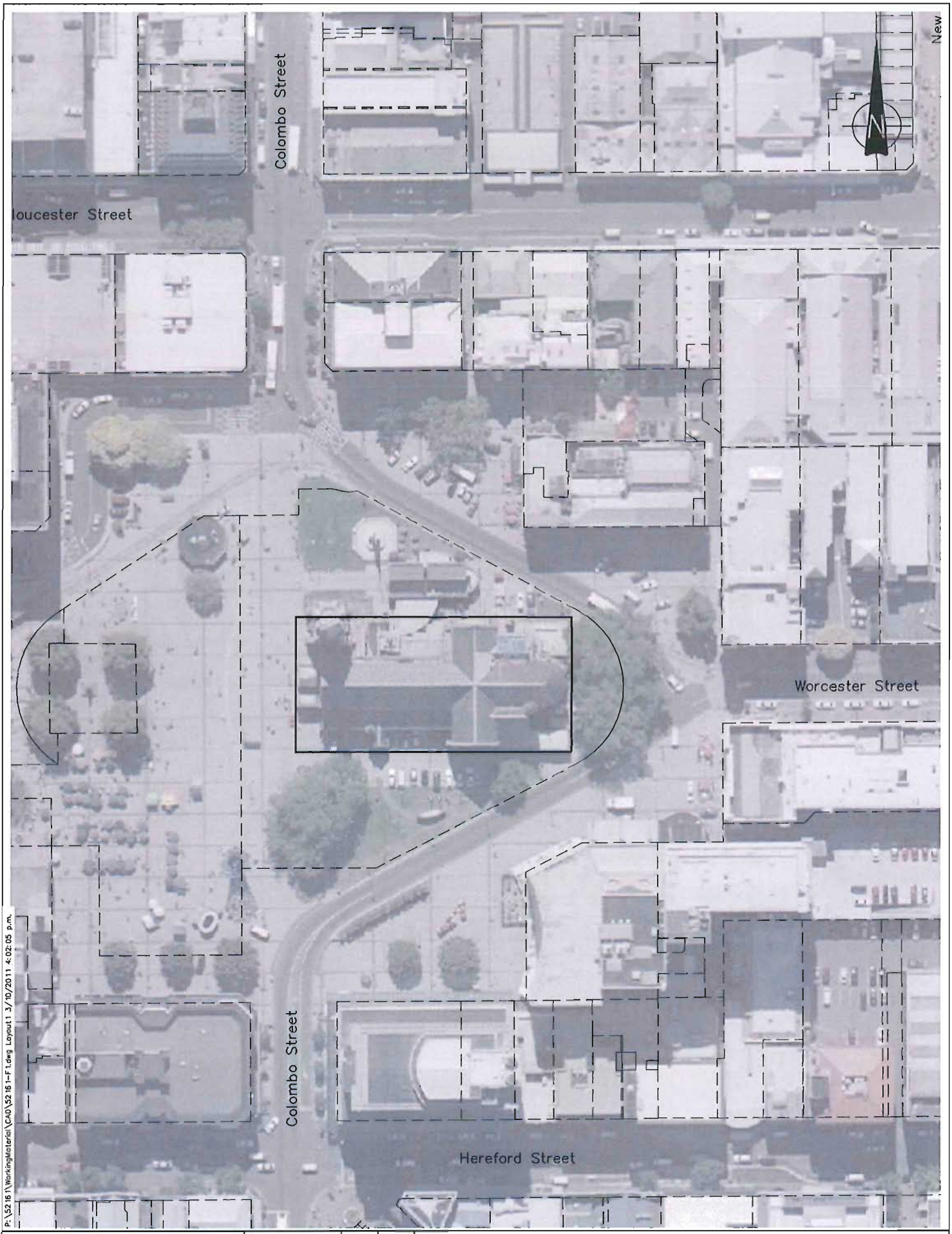
Anthony Fairclough

South Island Geotechnical Co- ordinator

Appendix A: Site plan and foundation plan



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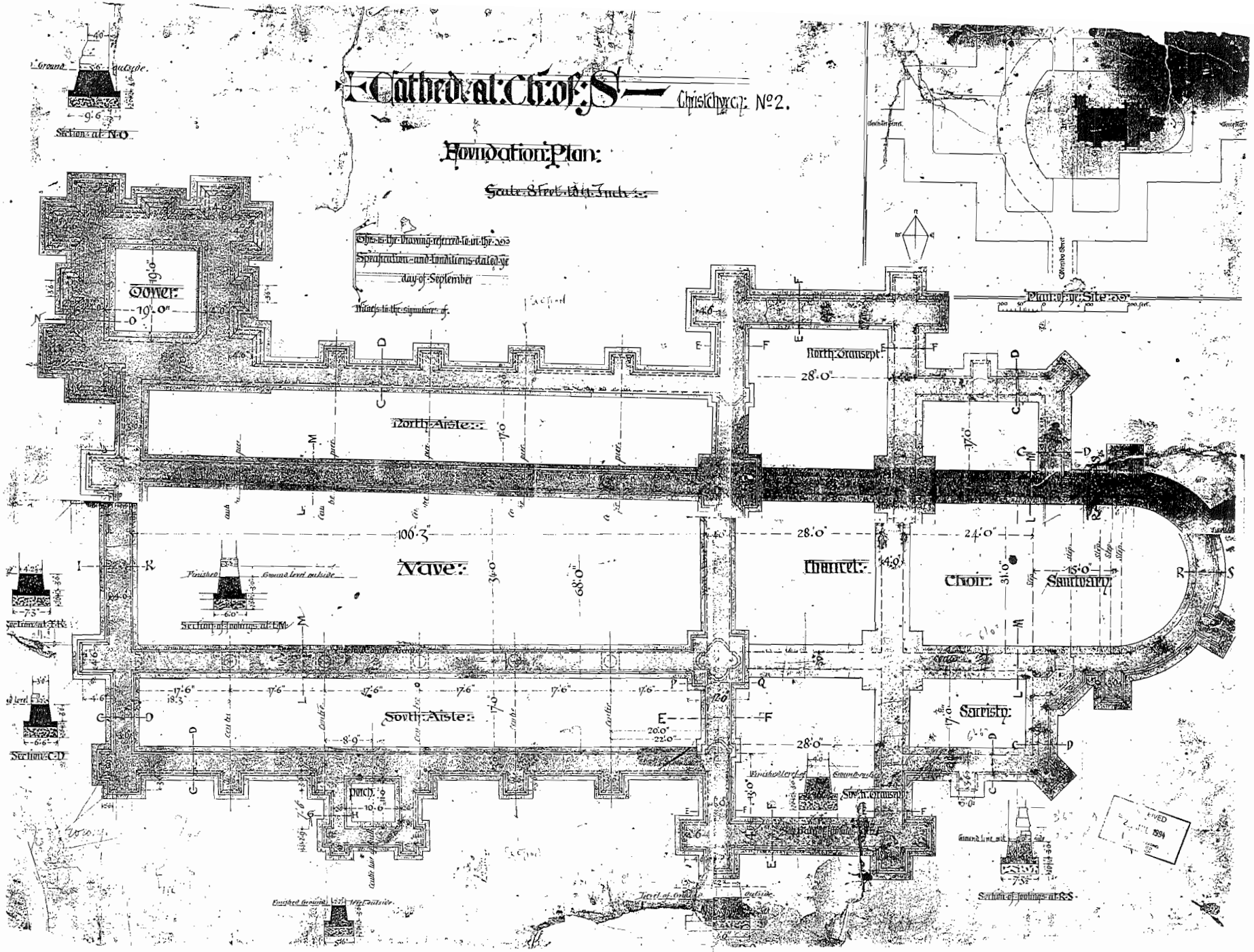
CHRISTCHURCH PROPERTY TRUSTEES

CHRISTCHURCH CATHEDRAL
CATHEDRAL SQUARE, CHRISTCHURCH

Site Plan

FIG. No. 52161-F1 REV. 0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Foundation Plan:
Scale 8 feet to 1 Inch
This is the Drawing referred to in the Specification and Conditions dated ye day of September
Witness to the signature of
Tower:
10'.0"
North Aisle:
106'.3"
Nave:
68'.0"
South Aisle:
17'.6"
Porch
10'.0"
North Transept
28'.0"
Chancel:
24'.0"
Choir:
15'.0"
Sanctuary
Sacristy:
South Transept
Plan of ye Site
Section at N.O
Section of footings at L.M
Section C.D
Section of footings at R.S
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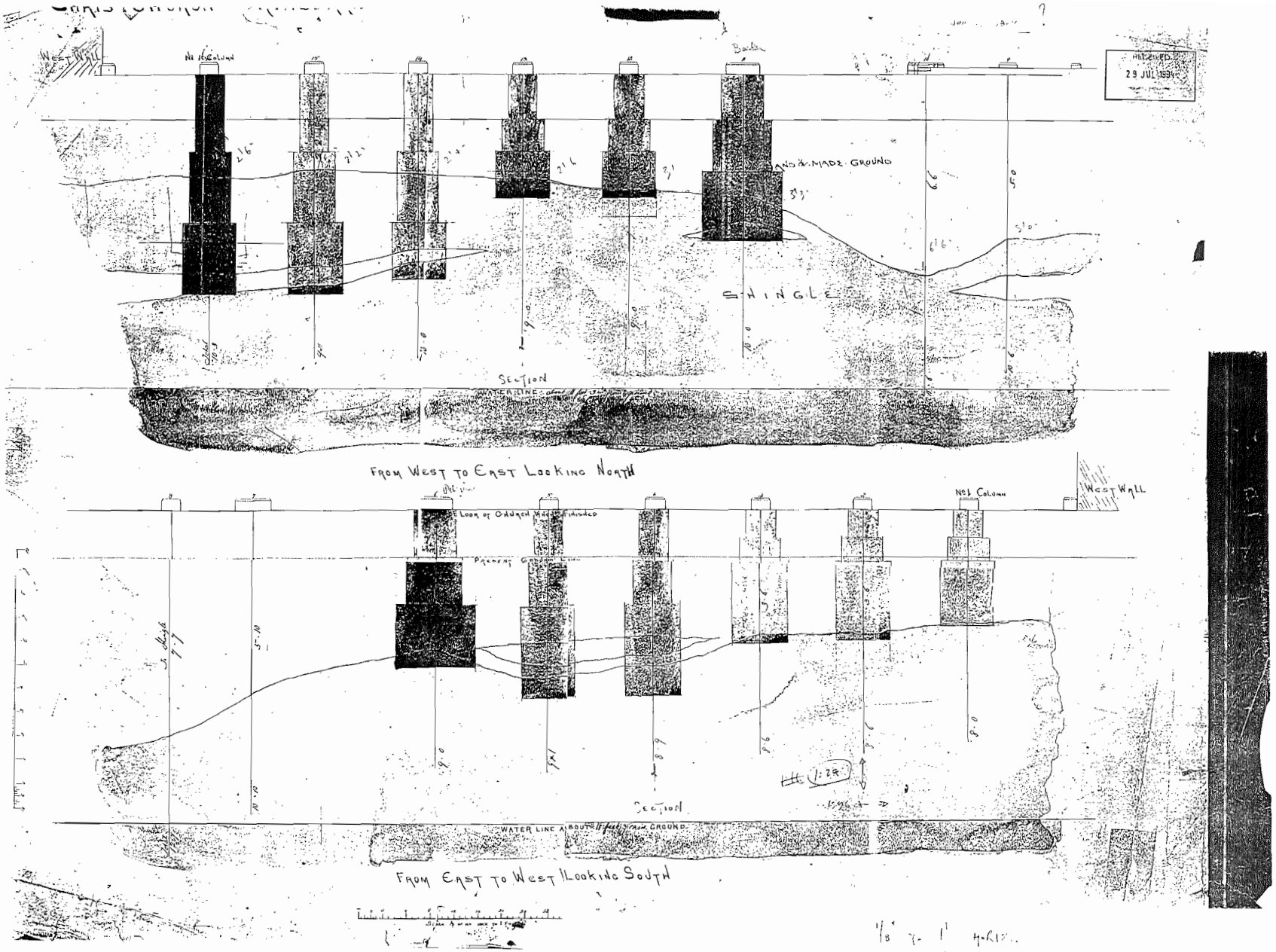

1/8" = 1' HORIZ.
1/2" = 1' VERT.

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Appendix B: Photographs from walkover assessment

Photograph A – interior view of south exterior foundation and south row of column foundations

Photograph B – Approximately 100mm depth of water in tunnel

Photograph C – Shaking damage to the top of the foundation at the south west corner of the building

Photograph D – General view of south side of Cathedral showing no liquefaction or ground settlement damage

Appendix G – CCC Heritage Assessment (Jeremy Salmond – Salmond Reed Architects and CCC)

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CHRIST CHURCH CATHEDRAL

OPTIONS FOR CONSERVATION, REPAIR and MAKING SAFE

Jeremy Salmond
3 November 2011

COMMENTARY ON REVIEW PROCESS AND CHOSEN OPTION

A series of meetings was held in Christchurch to consider options for Christ Church Cathedral. The context for these meetings was a requirement from CERA that a specific direction for the building had to be agreed before the end of October 2011, and that the direction chosen had to resolve the question of the safety of the building.

The key parties to these discussions were:

- The Church Property Trust
- Christchurch City Council
- New Zealand Historic Places Trust

The meetings were preceded by a joint site visit, and were attended by representatives of each group, including consultants appointed by the parties. Matters discussed included:

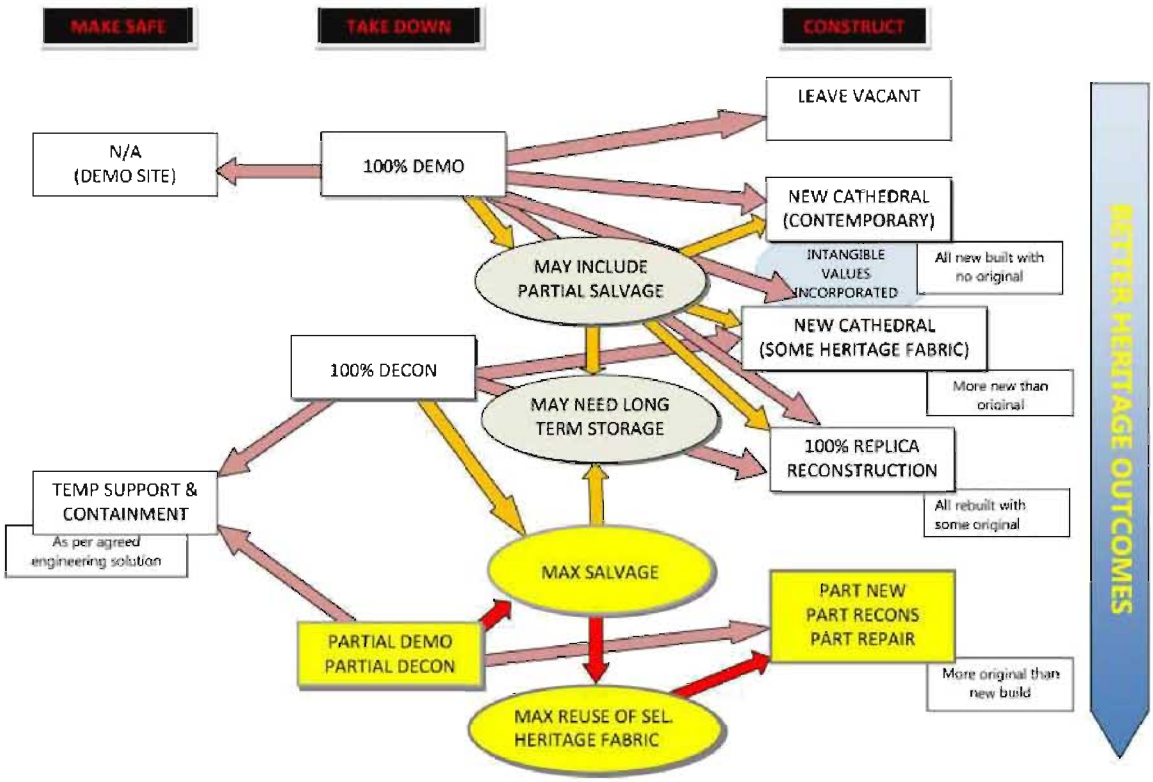
- The heritage significance of the cathedral,
- Conservation philosophy and practice,
- present condition,
- Public safety,
- Cost, and
- Options for the future of the building.

For the Church Property Trust, Jackie Gillies produced a document which reviewed the history of the building and summarised its heritage values against a range of values. I found this a bit muddled – both in thinking and layout. To my mind, the significance of the building is established, and it was not necessary to relitigate this for the purpose of establishing an appropriate repair strategy.

The report also rehearsed a wide range of philosophical positions for retention and repair of heritage, and this was the key heritage issue. The JG+A report did not in my view deal adequately with the present reality, and took a highly conservative conservation stance. For example, "full reconstruction" (Option D) was linked to "Make Safe option 2" which was defined as "100% deconstruction", but I do not see Option 2 as leading logically to Option D.

I think the various options were fair enough, but I question the relationships identified between each Make Safe option and each of the Rebuild options. In my view, the decision sequence for deconstruction and make safe is a separate process from that for rebuild.

I acknowledge that some deconstruction options inherently limit available rebuild options, but I think it too simplistic to identify direct links in the way this has been done. For instance, 100% demolition is a prerequisite for three of the four rebuild options. I have attempted to capture this in my diagram of the sequences (attached).



In the above analysis, I've identified three primary activities – **Make Safe**, **Take Down**, and **Construct**. The first two sequences are largely mechanical activities, but the methodologies used have consequences for eventual construction options. In my view, there are really only two make safe options – total demolition or some form of temporary support and containment of the site.

Similarly, there are only three Take Down options – total demolition (again), total deconstruction, or some blend of these techniques.

The consequences of the selected Take Down option are mediated in part by interim activities such as the extent of salvage, and by consideration of heritage outcomes. The construction sequence is, therefore, more complex, since it is qualified by these heritage considerations. There is a clear preferential hierarchy here, which has led to an agreed preferred rebuild option, this being some form of reconstruction, combined with repair of original fabric and some new construction.

In my diagram, I've identified (in yellow highlight) what I think is the achievable take down / rebuild sequence with the best prospects for heritage. Any outcome has to recognise the inevitability of significant fabric intervention in a manner never contemplated by SPAB or even the ICOMOS New Zealand Charter.

The key achievement will be to secure the opportunity to pursue this option, and within that option, to be able to negotiate the best set of outcomes for heritage in the process of recovering the building and rendering it safe.

Appendix H – CPT Heritage Assessment (Jackie Gillies - Jackie Gillies and Associates)

CHRISTCHURCH CATHEDRAL

MAKE-SAFE OPTIONS

INITIAL HERITAGE IMPACT ASSESSMENT

20th October 2011

Jackie Gillies + Associates
Architecture + Conservation + Archaeology
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CHRIST CHURCH CATHEDRAL

MAKE-SAFE HERITAGE IMPACT ASSESSMENT

INTRODUCTION

Jackie Gillies + Associates (JG+A) have been approached by RCP on behalf of the Cathedral Property Trust (CPT) to provide heritage conservation advice in the decision making process regarding the future of the ChristChurch Cathedral following the series of earthquakes in 2010 and 2011.

In order to make decisions regarding the future of the building, it is necessary to first understand the significance of the place before the earthquakes, its condition after the earthquakes and any changes to the significance as a result of these earthquakes. This assessment will be followed by an outline of the principles of the ICOMOS NZ Charter for the Conservation of Places of Cultural Heritage Significance (the ICOMOS NZ Charter) and a summary of the points which are of particular relevance to the Cathedral. From this, it would be possible to provide guidance to CPT regarding the various choices with which they are faced based on heritage best practice, the ICOMOS Charter and the identified significance of the Cathedral.

JG+A has been provided with copies of the following documents;

Salmond Reed Associates – Conservation Plan, 2006

Holmes Consulting Group:

- 1998-1999 – Christchurch Cathedral Strengthening dwgs;
- 20th March 2011 – Initial scope of work;
- 24th March 2011 – Preliminary damage report;
- 7th April 2011 – Building access plan;
- 19th April 2011 – Phase 1 report;
- 29th June 2011 – Damage reports parts 1 & 2;
- 30th June 2011 – Letter relating to above damage reports;
- 11th July 2011 – Reconstruction considerations;
- 14th July 2011 – Sample deconstruction methodology;
- 25th July 2011 – Draft property retrieval methodology;

- 10th October 2011 – Definitions; and
- 15th October 2011 – Scope of reconstruction & propping.
- 19th October 2011 – Minimum Propping Make Safe Option
- 20th October 2011 - Concept Interim Make Safe works

Tonkin & Taylor – Geotechnical Walkover Assessment, September 2011.

A structure for a collegial approach to the issues at hand comprising regular workshops with Christchurch City Council (CCC), NZ Historic Places Trust, Holmes Consulting Group (HCG), CPT and their representatives was proposed by RCP and the first workshop was held in Christchurch on Tuesday 4th October 2011. The bulk and detail of this report relates solely to the views of and research carried out by JG+A, but the Make Safe Options and the table showing Rebuild Options & Make Safe Analysis represent an agreed position of the collaborative working group established by RCP.

SITE VISIT

A site visit was arranged by RCP for the morning of the 4th October – Jackie Gillies and Robin Miller of Jackie Gillies + Associates attended. This included a brief visual inspection of the condition of the exterior and limited inspection of the interior of the building. Jackie Gillies had also visited the building exterior (only) on a number of occasions in the past prior to this commission.

PURPOSE OF THE REPORT

Following the devastating earthquakes in 2010 and 2011, the structural engineers reported that ChristChurch Cathedral had suffered considerable damage. This is most evident in the total collapse of the spire and the partial collapse of the tower. In the June event, the West wall suffered additional damage and is now in a precarious state. The rest of the Cathedral is still relatively intact, but nonetheless demonstrates widespread structural cracking and movement and some minor collapse.

RCP has advised that the Church property Trust (CPT) must find a way to make the building safe under the CERA regulations. One of the factors to be taken into account is the the implications of this make-safe work on the future scenarios for rebuilding.

CONTENT OF THIS REPORT

- Conservation approach - ICOMOS NZ and other documents & philosophies
- Review of Heritage Significance
- Brief outline of non-structural condition post earthquakes and consideration of protection measures
- Outline of possible scenarios for future rebuild of the Cathedral
- Impact on Heritage Significance per scenario
- Appropriate Make Safe options per scenario
- Conclusion and recommendations.

EXECUTIVE SUMMARY

This report is required to provide heritage advice to the Church Property Trust in their deliberations regarding appropriate ways that the Cathedral can be made safe as required by the Canterbury Earthquake Recovery Authority before decisions are made regarding the future of the cathedral.

Current best practice in terms of heritage evaluation is based on the ICOMOS NZ Charter for the Conservation of Places of Cultural Heritage Value. Amongst the most important matters identified in the Charter is the notion that all decisions relating to the future of heritage places should be based on an understanding of the heritage significance of the place. We have reviewed the various sources available and set these out in tabular form. The heritage significance of the Cathedral before the earthquakes was extremely high and has not been reduced. Its significance has actually been increased by the impact of the earthquakes - the Cathedral has become a symbol of the devastation caused by the events.

An important plank of all heritage and conservation principles in use in western societies today is the concept of authenticity – being true to the history of the place, its worn and aged materials, its original design and being honest in the carrying out of repairs and alterations so that it is clear what is a new intervention and what is original or old. Another common theme is the concept of guardianship of heritage places, whereby owners have an obligation beyond personal to look after the place for future generations to enjoy and appreciate due to the irreplaceable nature of the resource.

A range of possible future scenarios have been identified for the rebuilding of the Cathedral, from a wholly new building, through various degrees of part old part new to a wholly reconstructed facsimile of the original building. The impact on these scenarios on the identified

heritage values demonstrates that an approach which combines some new building with some areas of reconstruction and some elements retained in situ and repaired has the least impact on heritage significance.

A range of Make Safe Options has also been explored and then each future scenario was matched to the most appropriate method of making safe.

From this analysis is has been determined that the most appropriate Make Safe Option is described as Option 4 – Part controlled demolition, part deconstruction with maximum salvage and storage, and part repair in situ.

It is important to stress that this Heritage Impact Assessment has been prepared under a very short time frame and may therefore be limited in its scope and we would have wished to have the opportunity to have wider consultation.

CONSERVATION APPROACH

ICOMOS NZ Charter

Conservation and heritage management in New Zealand is guided by the ICOMOS NZ Charter for the Conservation of Places of Cultural Heritage Significance (the ICOMOS NZ Charter). This document was first drawn up in 1993 and was revised in 2010. It forms the basis of all statutory control of heritage matters such as the RMA and District Planning as well as providing the foundation for good practice with respect to conservation in New Zealand.

In order to provide guidance to the CPT it may be helpful to summarise some of the pertinent clauses of the Charter and describe how these might impact on the decisions relating to the future of the Cathedral. A full copy of the Charter is attached in the Appendix.

ICOMOS NZ Charter for the Conservation of Places of Cultural Heritage Significance.

ICOMOS NZ	IMPLICATIONS FOR THE CATHEDRAL
The Charter commences with a definition of the purpose of conservation – which is • "to care for places of cultural heritage significance..... • to retain and reveal those values ..... • and to support the ongoing meanings and functions of those places • for present and future generations." (Article 1). It continues with an outline of Conservation Principles. Those clauses which are applicable to the Cathedral project are summarised below • That conservation should be based on an understanding of the heritage values ot a place • That this includes both tangible, (eg fabric based), and intangible, (eg symbolic), values. • This understanding should be arrived at by research, investigation and recording, and that • Management of the place should be based on this understanding, (Article 2). • Conservation Plans should form the basis of all decisions affecting conservation work (Article 4)	**This means that there is a guardianship role required of all owners of cultural heritage buildings to keep and care for them and the heritage they represent for future generations.** **See JG+A Summary and review of Heritage Significance. This was collated from the Conservation Plan, the NZ HPT Register, CCC Statement of Significance and our own research.** **A Conservation Plan for the Cathedral was completed in 2006 by Salmond Reed and Associates.**
• All layers of history ot a building should be respected, (Article 5)	**It is not possible to say that the oldest and most original part of the Cathedral has the greatest degree of heritage significance. The recent earthquake events are another layer in the history of the Cathedral and should not be erased.**
• Only the least possible physical intervention should be considered, (Article 6)	**This may not be an option bearing in mind the extent of the damage to the Cathedral and the possible requirements of CERA. Even so, the least possible intervention or further damage to heritage fabric should be the preferred option.**

• All work on a heritage building should be subject to thorough documentation and detailed recording, (Article 12)	**Photographic recording of the building in its current condition should be carried out to the extent that it is safe to do so. Laser cloud survey would be extremely useful.** **Once work commences on the Make Safe or on permanent repair drawings and photographs of each stage of the works should be lodged in a suitable archive.**
• Fixtures and fittings that are integral to the heritage significance of a place should be left in situ and not removed to a remote location, (Article 13)	**For example, the stone memorial tablets of the founding families of the city would lose their relevance if relocated to a museum or to another church.**
The Charter then usefully defines appropriate Conservation Processes and Practice • Conservation Plans should form the basis of all decision-making regarding the future of a place, (Article 14)	**A Conservation Plan was completed before the earthquake. This report adds to the Plan.**
• All aspects of conservation should be carried out by people with appropriate skills and expertise, (Article 16)	**This applies to the various professionals involved, including heritage trained architects and building surveyors, engineers with heritage expertise, to stonemasons, stained glass restorers and other specialist trades.**
• Degrees of intervention in conservation projects include o Preservation and stabilisation o Restoration o Reconstruction and o Adaption o	**These are set out in order of least to most intervention on heritage values. Preservation and Stabilisation should be foremost in considering Make Safe Options.**
o (Recreation or replication is outside the scope of the ICOMOS NZ Charter) (Article 17)	**This is relevant to the Cathedral due to the total loss of the spire and part of the tower and west wall. It is fundamental to the Charter that recreation and replication is unacceptable.**
Preservation (Article 18) • Involves little intervention and may simply relate to stabilisation and slowing down of the natural processes of decay (eg ruins) • Regular maintenance • Programme of repairs in matching or similar materials.	**This option implies repair and conservation of remaining fabric as far as possible and is the preferred approach with respect heritage buildings.**

Restoration (Article 19) • May involve reassembly of original materials and reinstatement in their original position in order to • Reveal or restore the heritage significance of a place • It does not involve conjecture or creation of an imagined previous state.	**This may be possible in small areas, where the damage is extensive.**
Reconstruction (Article 20) • Includes new materials to replace what has been lost, • Only appropriate if the work is necessary to preserve o The function of a place o The integrity or understanding of a place and if o Sufficient evidence of its former state exists to avoid conjectural solutions. • Usually only applicable to parts of a building, not an entire building.	**This applies to areas which have been seriously damaged or which have to be modified in order to be strengthened.** **Only applies to parts of a building, not the entirety.**
Adaption (Article 21) Conservation is usually facilitated by continuing use of a building. Adaption of a building for a new use • Should be the minimum necessary and • Should not affect the heritage significance of a place, and • Complement the original form and fabric.	**n/a**
Non-Intervention (Article 22) There may be occasions where the most appropriate conservation approach is to do nothing. This may be when the intangible values, such as the spiritual associations of a place, have more significance than the tangible values, such as fabric and materials.	**n/a**
Interpretation (Article 23) Conservation is to a large extent the preservation of associations and stories relating to a place. Interpretation allows these stories to be presented to visitors and occupiers of a building alike and increase the understanding of its heritage significance.	**Whatever is decided there should be an element of Interpretation within or associated with the Cathedral, telling the story of the Cathedral from its birth right through to the effects of the earthquakes.**

Risk Mitigation (Article 24) Planning for risk mitigation with respect to flood, earthquake and other natural disasters shauld be carried out to protect the heritage values of a place.	**In order to mitigate the risk of future damage, the Cathedral must be brought up to full Earthquake Code standards. This may result in some unpalatable decisions relating to the structure of the exsiting building but this is acceptable provided it achieves the object of protecting the heritage values of the place and is the least possible.** **Regular review of risks and mitigation measures should be carried out a Risk Management Plan put in place for future events.**
The Charter concludes with glossary of definitions.	

OTHER DOCUMENTS & PHILOSOPHIES

The ICOMOS NZ Charter has developed from the conservation philosophies of Western Europe and has its roots in the Venice Charter (instigated following the wide-scale destruction of cultural heritage in World War Two) and the Athens Charter (following the First World War.) However all of these documents have themselves grown directly from the establishment of the Society for the Protection of Ancient Buildings (SPAB) in London by William Morris, the artist, and their Manifesto published in 1877. (A copy of the original Manifesto is attached together with a summary of the principles in use today).

The Society was formed in response to the trend at that time to carry out "repairs" to ancient buildings, often medieval churches, which went far beyond what we would understand today as "repair" and resulted in drastic changes to the appearance of these buildings. The changes were often made in order to "improve" a building beyond that which it ever was originally and was based on an imagined perfection of the past. The changes also often resulted in the loss of considerable authentic original material and details, from delicate Medieval wall paintings to coloured plaster and stone work or timber detailing.

The principles of the Society still form the fundamental basis of NZ's approach to conservation and good practice today and the most important aspect of this is a presumption that original fabric and an honest approach to repair will prevail. With respect to the Cathedral, and the decisions facing the Trustees, this means that a bias towards retaining as much of the original fabric and architectural spaces and features of the building and repairing or reconstructing them is recommended, rather than one which attempts to create a replica of the original. While a replica may appear to provide an overall satisfactory solution, the reality is that it cannot help but result in an imaginary recreation of a lost ideal, and runs the risk of falsifying history. Full replication would destroy the authenticity of the heritage building.

Authenticity	**SPAB places considerable emphasis on the authenticity of fabric and materials as well as design. It would not support the replacement of a place of heritage value with a replica or with a methodology of repair that resulted in extensive loss of authentic materials or features. The patina of wear and age would also be lost along with much of the skill of the original craftsmen.**
Minimum intervention	**This is not particularly applicable due to the extent of the damage sustained. Nonetheless, make-safe and rebuild options should aim to retain as much original fabric and architectural features and spaces as possible.**
Repair rather than replacement	**This relates back to the definition of "authenticity" above.**
Research	**No reconstruction or repair should be carried out without thorough research to avoid imagined or conjectural interventions. The Cathedral is relatively well recorded and documented due to its heritage significance and the existence of the Conservation Plan, and other technical and photographic records.**

In Scotland, the Stirling Charter - Conserving Scotland's Built Heritage, has a number of relevant and useful elements which discuss the importance of "heritage" in the broader sense, including both intangible and tangible values, rather than simply heritage fabric and its conservation. These include;

- **Conservation of Scotland's built heritage should be for the benefit of present and future generations**
- **Presumption in favour of preservation where at all possible.**
- **Scotland's built heritage is an irreplaceable resource.**
- **Measures should be taken to ensure that the heritage is enjoyed and understood by all people.**

However, ICOMOS, SPAB and its derivatives are still predominantly fabric or materials based. There are other philosophies which value the less obvious intangible significance of a place. These are more widely spread around the world, but do include some areas of Western Europe such as Berlin or Hungary, and are more common in oriental cultures.

In all of these philosophies values such as symbolic or spiritual, traditional or mythological and encasement of memory are more important than the "bricks and mortar" of a heritage place. UNESCO'S Nara Declaration in 1994 regarding intangible heritage and authenticity includes a statement as follows, (Article 13),

"*.....judgements may be linked [to].....form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, and other internal and external factors.*"

With respect to the future of the Cathedral, these intangible values are of considerable importance and the approach of these other charters or philosophies are useful to consider because even where the physical fabric of the Cathedral cannot be preserved and repaired an opportunity to allow a sense of continuity with the past can be realised by sensitive design that expresses some of these intangible values.

REVIEW OF HERITAGE SIGNIFICANCE

The following summary of heritage significance has been distilled from a more detailed review of significance prepared by JG+A and attached in the Appendix.

This review has collated descriptions of significance from the Salmond Reed Conservation Plan, dated 2006, the Christchurch City Council Statement of Significance for ChristChurch Cathedral and the NZ Historic Places Trust Registration document. JG +A have added to the descriptions with their own observations where they are not covered elsewhere.

These descriptions of significance have been grouped together under the following categories in order to unify the various sources. The categories are Historic and Social, Cultural and Spiritual, Architectural and Aesthetic, Technological and Craftsmanship, Contextual, and Archaeological significance.

Another approach to the review of significance for a building of this type is a more simple division of significance, namely ecclesiastical and secular.

CHRISTCHURCH CATHEDRAL - TABLE OF HERITAGE VALUES

Please refer to full Schedule of Heritage Values in the Appendix. The categories below are included as a guide only and other interpretations are possible.

CATEGORY	Tangible values	Intangible values	Combined tangible & intangible values		Ecclesiastical	Secular	Combined Ecclesiastical & Secular Values
S1. Historic & Social Significance	c)Heritage tourism site	b)Symbol of the foundation of the city	a)Associations with the founding of the city d)Chronicle of city's history e)First Anglican and oldest surviving cathedral		e)First Anglican and oldest surviving cathedral	b)Symbol of the foundation of the city c)Heritage tourism site d)Chronicle of city's history	a)Associations with the founding of the city
S2. Cultural and Spiritual Significance	c)Evidence of the founding ideals of the city fathers	a)Centre of Anglican Diocese in Canterbury c)Symbolises the founding ideals of the city fathers	b)Significant place of worship d)Part of the Cultural precinct of Christchurch, including the Museum, Arts Centre and the Provincial Chambers		a)Centre of Anglican Diocese in Canterbury b)Significant place of worship c)Symbolises the founding ideals of the city fathers	d)Part of the Cultural precinct of Christchurch, including the Museum, Arts Centre and the Provincial Chambers	
S3. Architectural & Aesthetic	a)Major work by noted English architect, Sir Giles Gilbert Scott	d)Association with Benjamin Mountford wha designed many of	b)Association with large number of Canterbury architects, craftsmen etc,			d)Association with Benjamin Mountford who designed many of the other major	a)Major work by noted English architect, Sir Giles Gilbert Scott b)Association with

CATEGORY	Tangible values	Intangible values	Combined tangible & intangible values		Ecclesiastical	Secular	Combined Ecclesiastical & Secular Values
	c)Largely unmodified and with a high degree of authenticity	the other major buildings in Christchurch including the Arts Centre and the Museum				buildings in Christchurch including the Arts Centre and the Museum	large number of Canterbury architects, craftsmen etc, c)Largely unmodified and with a high degree of authenticity
S4. Technological & Craftsmanship	a)High quality of construction and decoration, particularly stained glass, carved stone, ceramic tiles and timber.						a)High quality of construction and decoration, particularly stained glass, carved stone, ceramic tiles and timber.
S5. Contextual	b)Major landmark in the city c)Focal point of the Square.						b)Major landmark in the city c)Focal point of the Square.
S6. Values since the earthquakes	a)Evidence of earthquakes c)Rarity value following loss of majority of Christchurch's heritage buildings	b)Symbol of February earthquake around the world.				c)Rarity value following loss of majority of Christchurch's heritage buildings b)Symbol of February earthquake around the world.	a)Evidence of earthquakes

UPDATE OF HERITAGE SIGNIFICANCE POST EARTHQUAKES

The series of earthquakes in 2010 and 2011 resulted in catastrophic damage to a wide area around Canterbury and Christchurch. The Cathedral is one of many historic buildings which have suffered significant damage as a consequence of this seismic activity and the heritage landscape of the city has changed considerably. The identified heritage significance of the Cathedral before the earthquakes as summarised above remains unchanged, but these events have in themselves added to the significance of the building in several ways.

These might be summarised as follows;

S6. Post Earthquake Significance

a) Evidence of the earthquakes as part of the story of the Cathedral and the City.
b) The missing spire and damaged tower became a symbolic image of the earthquakes around the world.
c) The loss of so many other heritage buildings in Christchurch as a result of the earthquake has increased the value of the cathedral due to its increased rarity.

BRIEF CONDITION ASSESSMENT (NON STRUCTURAL)

A brief assessment of the condition of the readily accessible and visible non-structural elements was made at the time of our relatively cursory inspection on 4th October 2011. These elements are considered to be the roofing coverings, rainwater fittings, stained and plain glass windows, doors, ground floor tiles, internal decorative features, such as the inscribed stone panels, and linings.

It is important to appreciate that not only was the external inspection solely made from ground level around the building, but for reasons of safety it was necessary to keep well back from the external walls; hence non-structural fabric could only be seen at some distance. Within the interior of the building, it was only possible to assess the condition from the confines of the 'safe area', being the north vestry, north transept and aisle and a small area of the chancel. Much of the building was in darkness and many surfaces were covered with dust and rubble.

Roof coverings

The slate coverings to the main roof slopes have largely remained in place and appear to be generally in good condition. The principal areas of damage are where parts of the structure (such as the west gable and spire/tower) have moved or collapsed. There are some areas, for

example the curved roof of the apse, where raised lines in the slates indicate disturbance of the roof structure/sarking below. Generally, the main ridge cappings and valley gutters remain intact and functional.

Figure 1 General view of the north roof slopes.

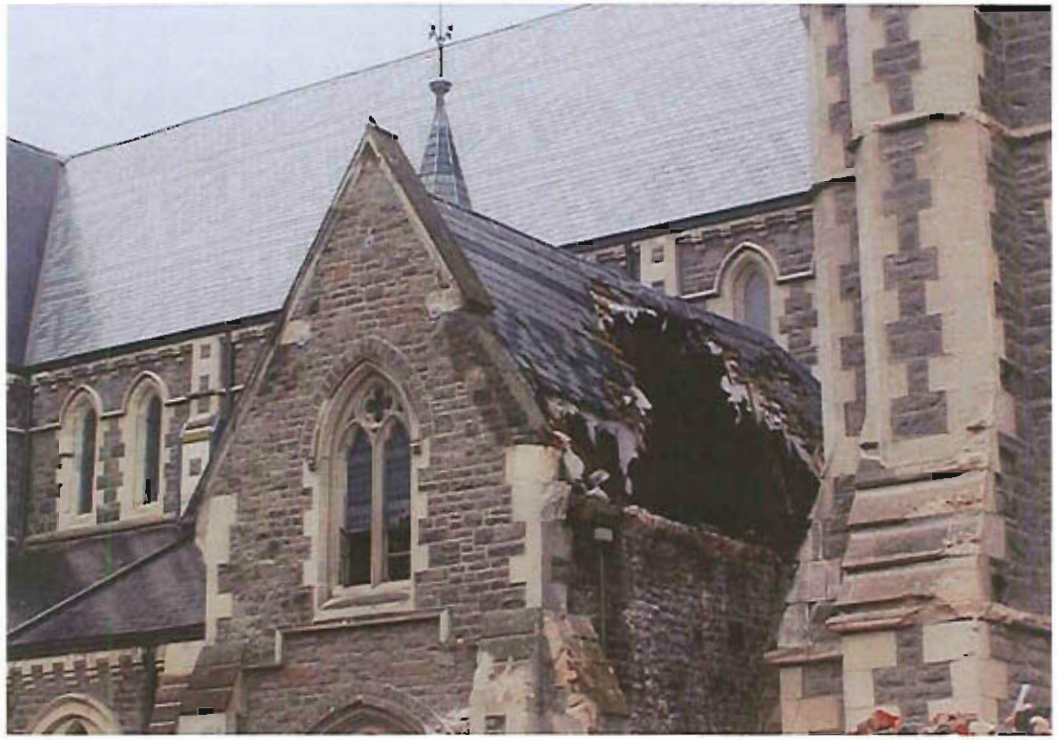


Figure 2 The north porch roof coverings – a principal area of damage to the roof slates.

There is the potential for localised water ingress where masonry adjoining the slate coverings has fallen or become displaced allowing water into the heads of the walls or to enter around flashings. Particularly vulnerable parts of the building are those where copings to the gables have been lost.

The general condition of the external claddings means that the interior of the building remains relatively dry, save for the obvious areas of roof damage at the western end of the cathedral and those parts that are particularly vulnerable as described above. Patching/temporary covering of these latter areas would enable the weathertightness of the main building to be secured in the short-term.

The vestry roofs are concealed behind parapets and could not be seen.

Rainwater fittings

The majority of the rainwater fittings remain in place and appear to function adequately. Some sections have been lost as a result of masonry failures and water staining on the external walls in the vicinity of some downpipes suggests they have fractured or become disconnected from the gutters. Accordingly localised repairs/renewals can be carried out relatively easily to allow rainwater to be discharged from the roof slopes in the manner that it was before the earthquakes. The proviso here is the potential for below ground drains to have been damaged by ground movement. It is known that the basement/crypt have flooded and, whilst this may be the result of leaking service pipes, there is the potential for the rainwater drains to also be a factor.

Figure 3 Guttering to the south aisle and porch with water saturation of the wall behind the downpipe indicating a blockage or disconnection.

As part of any future making safe and weathertight works, the drains will need to be investigated and allowance made for their repair or renewal in addition to localised rectification of the rainwater fittings themselves.

Windows and doors

In some instances, essentially to the west gable and parts of the tower, the windows have been destroyed. The majority do however remain, albeit with varying degrees of damage ranging from apparently little, or no, damage to partial buckling or loss. The large window to the south transept has been boarded up and it is understood that the leaded lights are in safe storage following repairs. The stained glass leaded lights to the large north transept window had been replaced before the February earthquake and appears to have survived with little damage, although there is no outer protective glazing now.

Figure 4 The large north transept window.

Examination of the windows to the south aisle and clerestory at distance indicates that the south aisle stained glass windows have suffered considerable buckling and the protective glazing has been lost, but the windows are capable of repair. The clerestory windows above have suffered far less damage with the protective glazing remaining intact and, as far as can be seen, the clear glazed leaded lights behind being in good condition.

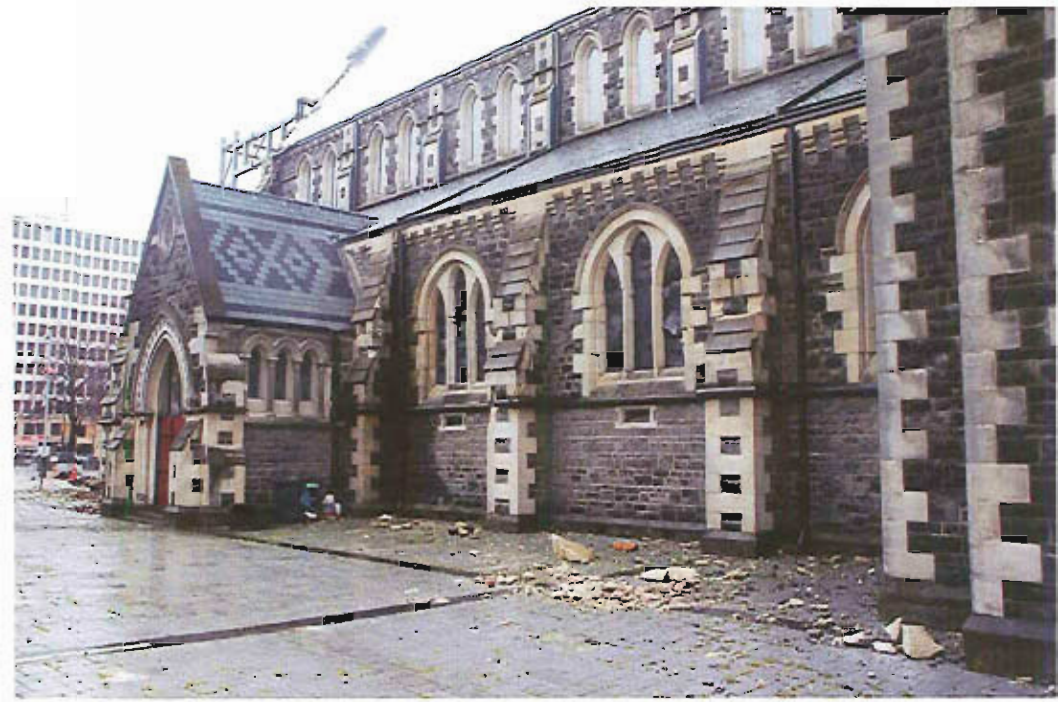


Figure 5 Buckling of the leaded lights to the south aisle windows has occurred, together with loss of the protective glazing, although these windows are capable of repair. Clerestory light above appear to be intact and to have suffered little or no damage.

Access is more limited to be north aisle and clerestory, but there seems to be a similar pattern here with the clerestory lights being in good condition and the aisle windows having buckled in places, but being relatively easily repaired.

Windows to the east end of the building, including the stained glass lancets to the apse and the clear glass casements to the vestries, all remain with little or no damage apparent. Some of the protective glazing needs to be replaced and it is possible close inspection will reveal broken panes or cames, but any such defects are readily repairable.

Examination of the various cathedral doors was very limited due to lack of access. Viewed at distance, the main entrance doors to the west porch and north and south transepts all remain intact. If found damaged upon close inspection, joinery repairs should not be problematical. The north porch door is boarded up and assumed therefore to have been damaged, although again repair is unlikely to be difficult. East end/vestry doors did not appear to be damaged.

Ground floors finishes within the main cathedral building

In accessible areas of the main building, the floor was covered with a thick layer of dust. Inspection was also impaired by rows of chairs and by some large piles of fallen masonry in the nave and towards the west end of the building. On the whole, however, there was no apparent sign of substantial movement or unevenness in the floors to suggest that large scale damage to the encaustic floor tile finishes has occurred.

Figure 6 A section of the floor in the south aisle showing the extent of dust and potential for scraps/scuffing of the tiles even where masonry has not fallen

Figure 7 A general view of the nave and crossing floor.

Although the ground movement of the earthquakes may not have caused substantial damage to the floor finishes, fallen masonry is likely to have smashed or cracked many of the floor tiles. Repairs and renewals will no doubt be necessary, but are unlikely to be particularly problematical.

Interior fittings/features

The condition of interior features with the west, north and south porches is unknown. Limited inspection from and within the chancel and eastern north aisle indicates that many of the internal fittings/features have survived with the principal damage being from fallen masonry in the vicinity of the west gable and tower. Examples of interior fittings that are damaged or that have survived well include:

- Geometric/mosaic dado tile panels along the external wall of the south aisle.
  A large panel between the doors to the north porch and tower has lost its centre. This can be reinstated either in new matching pieces of tile or by salvage of the fallen pieces (or most likely a combination of the two). Otherwise damage appears to be isolated or non-existent. Note: the section of exposed and white-washed stonework in the picture below is thought never to have been decorated.

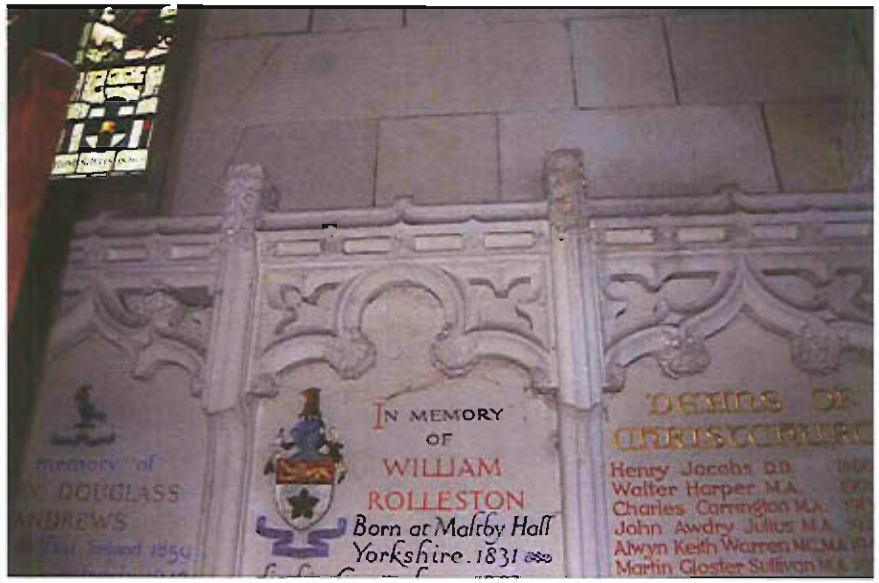
Figure 8 Damaged/fallen geometric mosaics to the south aisle.

- The altar
  The altar table itself has collapsed and a section of the timber panelling to the apse immediately to the south is displaced, although the remainder remains intact.

Figure 9 Collapse of the altar table

- Small columns to north and south walls of the chancel
  A number of these small circular columns have broken off or displaced and will need to be repaired.

- North and south aisle decorative stone panels
  The south aisle panels/memorials could only be seen at distance across the nave, but show little signs of damage, the principal fracturing being in the Oamaru stone between the aisle windows. The panels at the east end of the north aisle could be inspected at close hand and are in good condition with only one or two small fractures evident.



- Organ
  The organ seems to have survived intact, although it will no doubt be affected by dust and will require substantial maintenance and cleaning.

- Pulpit
  The pulpit remains standing, but was found to contain some debris and seems to have suffered damage to the steps up to it.

- Bishop Harper's tomb
  The tomb remains standing and, whilst much of it could not be seen due to a temporary protective covering, it appeared to be intact.

Conclusion

The structural engineers have reported upon the structure of the building and the damage that has occurred to it. Jackie Gillies + Associates' brief and limited inspection on the non-structural building fabric indicates that, whilst damage has occurred and whilst some elements have been lost, the majority of the non-structural fabric has survived reasonably well and is capable of repair. In the short term, much of this non-structural fabric will require either repair or, at very least, protection from further damage or from the weather as part of the 'make safe' options.

Protection

Holmes Consulting Group has offered two 'concept interim make save options' for the building (see their letter and drawings dated 16th October 2011). The first af these options (SK027 - 32) is described as "Essentially demolish/deconstruct down to window sill level without retention of the roof". This option requires the minimum shoring, but raises many questions (and potentially considerable cost) in the protection and management of the site and remaining structures in the interim whilst whatever rebuilding option takes place. Removal of the majority of the building envelop will result in a further challenge of how to protect, maintain and manage the remaining site and structures for a period of, say, up to 5 years. It is not possible at this stage to be definitive in any way as to what protection, maintenance and management will involve, but some initial reactions are set out below:

- Following salvage operations, removal of the structures above window sill heights and removal of all controlled demolition/deconstruction material from the site, the tops of the truncated walls, all the internal graund flaor finishes and remaining interior wall linings/finishes will be exposed to the elements and will require protection. It will be necessary to ensure that the walls, other areas of masonry/linings and floors are shielded from water penetration/saturation, kept dry and well ventilated.
- Frame-in and temporarily clad/sheath and weatherproof the remaining 'whole' section of the building at the east end of the cathedral.
- Capping of the wall heads is possible, but will not protect the floors or base af the walls. There are various optians for cappings, all of which will have different cost and maintenance implications. Protection of the floors could involve some form of covering with say geotextile membrane and soil/grass perhaps.
- Secure doors and windows where these remain (depending upon the height of deconstruction).
- Pump out and weather-proof the crypt.
- An alternative solution would be to cover the entire footprint of the building with a frame and 'low', temporary roof structure, preferably with rainwater fittings/disposal. This solution has its variations and cost/maintenance implications, including the potential for changes in roof levels depending upon the heights of ground floar sills.
- There is likely to be a requirement for substantial off-site storage.
- Maintenance of all security and protection measures on a periodic basis.

The second of the Holmes Consulting Group options is conceptually shown in SSK#023 – 026 and relates to the maximum retention of heritage fabric. It involves a system of shoring/bracing and, in addition to retaining the most heritage fabric, it makes use of the building itself to provide protection of the site. As above, it is not possible at this stage to assess exactly what would be required, but subject to more detailed assessment, initial thoughts on protection and non-structural works are set out below:

- Localised repairs to roof coverings and rainwater fittings, including repair of the damaged envelope to the north aisle/porch and making good of gables and copings around the building.
- Temporary boxing-in or soft protection of vulnerable historic building fabric whilst shoring/bracing takes place (some/all could stay in place for the foreseeable future until permanent repair of the building is achieved in order to help protect stonework and floors, etc).
- Frame-in and temporarily clad/sheath the west gable and west verge of the north aisle.
- Cap wall heads and protect floor to remaining tower structure.
- Remove damaged or valuable windows to glaziers' workshops or other secure storage and secure openings (security, weather, pigeons, etc).
- Secure windows and doors generally against intruders.
- Retention of the building may mean that off-site storage can be reduced.
- Maintenance of all security measures and external building fabric/protections on a periodic basis.

Both options require personnel protection during deconstruction/salvage or repairs/salvage and both options will also necessitate secure fencing off of the site in the interests of public safety and to avoid vandalism and theft in the interim until a permanent solution for the building is achieved.

POSSIBLE SCENARIOS FOR FUTURE CATHEDRAL

The primary purpose of this report is to provide guidance regarding the most appropriate approach for complying with the requirement of CERA to make the building safe in the short term. The Collaborative Working Group has prepared a summary of possible approaches for this work and each has a different impact on the heritage significance of the building. However, it has become clear that it is very difficult to make decisions relating to the most appropriate Make Safe measures, without first considering the range of options for the final solution. Some of these Make Safe options for instance would immediately rule out a later long term solution.

We have therefore attempted to draw these different themes together in the form of a table which assesses the impact on the identified heritage significance of each scenario. From this table it should be possible to identify the most appropriate Make Safe option for each scenario.

There are a number of possible scenarios which might be contemplated regarding the future of the Cathedral. In summary these include

SCENARIO – A New Cathedral with Intangible Heritage Values Incorporated.

SCENARIO – B New Cathedral with Intangible Heritage Values Incorporated and Selected Heritage Fabric.

SCENARIO – C Part New Cathedral, Part Reconstructed Replica, Part Original Repaired and Strengthened

SCENARIO – D Full Reconstruction.

These scenarios include a range of conservation and heritage-based approaches but are not necessarily set out in order from the best conservation approach to the least appropriate. This can be found in the conclusion of this report. There will be many potentially conflicting factors involved in the selection of the most appropriate scenario, but this report will only consider those that relate to heritage values.

SCENARIO – A New Cathedral with Intangible Heritage Values Incorporated.

This envisages a new building of contemporary design but with elements representing some of the intangible heritage values of the old. For example, the new building would inevitably retain its significance as a symbol of the Anglican Church in Christchurch simply in its role as the

Cathedral. More subtle intangible values could also be represented in the new design if for example, particular details representing each of the founding families whose names are associated with the current building are included in a similar way to how they are now in the old building.

SCENARIO – B **New Cathedral with Intangible Heritage Values Incorporated and Selected Heritage Fabric.**

This develops the previous approach, but would include the incorporation of a number of heritage elements or fabric recycled from the original. This might include individual elements such as the stained glass, carved features, window surrounds or the pulpit, etc. but it also might also include whole architectural elements, for example the nave, the crossing or the apse and incorporation of these into a new building, rather than individual pieces of building fabric.

SCENARIO – C **Part New Cathedral, Part Reconstructed, Part Original Repaired and Strengthened**

This acknowleges that some parts of the original cathedral building have been lost and would be recreated in new materials to a new design, some would have to be taken down and reconstructed and others are stable enough to remain in place and simply repaired and strengthened.

SCENARIO – D **Full Reconstruction.**

This would invalve the careful deconstruction of the Cathedral, storage of elements and materials for a number of years and then careful reconstruction (incorporating strengthening) as close as possible to the original. This would involve new structure and modern materials and some new materials to replace original fabric that is lost or damaged. However, it is inevitable that after deconstruction and a long period of storage much of the salvaged materials may not be of use.

In the following table **X** denotes an adverse effect on the heritage values, ✓ denotes no adverse effects and **X** ✓ denotes a mixed or unsatisfactory effect.

SCENARIO – A ..... New Cathedral incorporating intangible heritage values

	Impact on Identified Heritage Significance	COMMENTARY/ MITIGATION
S1. Historic & Social Significance	X	Interpretation of history of Cathedral and founding families recommended within Cathedral or Visitor's Centre. Some intangible values of the original cathedral could be expressed in the detailed design of the Cathedral, eg dedicated windows, specifically designed and dedicated pillars etc.
S2. Cultural and Spiritual Significance	X ✓	The new cathedral would remain as the centre of the Diocese and as a major place of worship but it would no longer form part of the heritage and cultural precinct
S3. Architectural & Aesthetic	X	If the new Cathedral was designed by a major firm of Canterbury architects then a new association with major architects would be forged, but all reference to past architects and tradesmen would be lost.
S4. Technological & Craftsmanship	X	All original high quality materials and craftsmanship would be lost, but an element of this could be retained if such high standards were continued in the new building.
S5. Contextual	✓	This is still possible depending on the new design.
S6. Post earthquake	X ✓	A new Cathedral would be a symbol of reconstruction after the earthquake, but would not have any references to the damage to the old Cathedral. This would have to be presented in some way by interpretation.

SCENARIO – B ..... New Cathedral incorporating intangible values and selected heritage fabric

	Impact on Identified Heritage Significance	COMMENTARY / MITIGATION
S1. Historic & Social Significance	X	Interpretation of history of Cathedral and founding families recommended within Cathedral or Visitor's Centre. Some intangible values of the original cathedral could be expressed in the detailed design of the Cathedral, eg dedicated windows, specifically designed and dedicated pillars etc. Selected elements of original fabric reinstated and therefore visible, but their relevance and authenticity may be compromised due to the loss of their original context.
S2. Cultural and Spiritual Significance	✓ X	The new cathedral would remain as the centre of the Diocese and as a major place of worship but its relevance to the ideals of the founding families and the cultural precinct are greatly reduced.
S3. Architectural & Aesthetic	X	If the new Cathedral was designed by a major firm of Canterbury architects then a new association with major architects would be forged, but all reference to past architects and tradesmen would be lost. There is a danger that the recycled fabric or heritage elements result in a "collage" of pieces rather than a cohesive whole.
S4. Technological & Craftsmanship	X	Most original high quality materials and craftsmanship would be lost, but an element of this could be retained if such high standards were continued in the new building. materials and architectural features, new stained glass windows for example.
S5. Contextual	✓	Still possible depending on new design.
S6. Post earthquake	✓ X	The new cathedral would express the spirit of rebuilding after the earthquakes, but retention of small pieces of salvaged fabric would only be a token nod towards the devastation caused. Retention of larger architectural spaces and elements would provide a better sense of continuity between the pre and post earthquake states.

SCENARIO - C ..... Part new Cathedral, part reconstructed, part original repaired & strengthened

	Impact on Identified Heritage Significance	COMMENTARY
S1. Historic & Social Significance	✓	Some loss would be experienced depending on the elements retained or removed, but some associations with founding families etc would be retained. The reconstructed Cathedral would remain as a symbol of the foundation of the city. Some interpretation will be required as to lost features.
S2. Cultural and Spiritual Significance	✓	All cultural and spiritual values would be retained.
S3. Architectural & Aesthetic	✓X	Scott's original design for the Cathedral along with Mountford's interiors would still be able to be appreciated and this could be combined with a new contribution from a major current architect.
S4. Technological & Craftsmanship	✓ X	The tradition of high quality building can be retained depending on selection of materials and architectural features in the new parts, while the retained and repaired sections retain their significance.
S5. Contextual	✓	Still possible depending on new design and elements retained.
S6. Post earthquake	✓	Design of new elements and retention of old would allow expression of devastation caused by the February earthquake but would also express the city's desire to rebuild and move on.

SCENARIO - D ..... Full reconstruction.

	Impact on Identified Heritage Significance	COMMENTARY / MITIGATION
S1. Historic & Social Significance	X ✓	Some loss would be experienced depending on the practicalities of deconstruction and long term storage, but most associations with founding families etc would be retained. However it would no longer be a genuine and authentic expression af Christchurch's founding history.
		Some loss would be experienced depending on the practicalities of deconstruction and long term storage, but most associations with founding families etc would be retained.
S2. Cultural and Spiritual Significance	✓	Cultural and spiritual values would be retained.
S3. Architectural & Aesthetic	X	It is possible that the architectural integrity of Scott's design and Mountford's interiors could be retained, but complete deconstruction and storage of materials for a period of time reduces their heritage values. There will be unavoidable loss too due to the requirements of strengthening scheme. It does not remove these values, however.
S4. Technological & Craftsmanship	X ✓	New materials to replace those lost must be of similar quality.
S5. Contextual	✓	No change, assuming the spire is reconstructed as its pre earthquake form.
S6. Post earthquake	X	Reconstruction of Cathedral as a facsimile would conceal the very important chapter of the Cathedral's history and that of the City.

This review has been subject to very rapid analysis and has not had the benefif of quiet reflection or wide consultation, but nonetheless it does help to highlight the impact on the heritage values of the various scenarios described.

It can be seen for example that A and B would result in a mixture of positive and negative effects on the heritage values, with some losses but both are still capable of retaining some of these values.

The analysis of C demonstrates that most of the identified heritage values would be unaffected with only minor adverse effects.

While scenario D might initially appear to provide for the best heritage outcome, careful analysis shows that in fact some very important values would be lost and others seriously compromised.

However, fhe purpose of this report is to provide guidance as to the most appropriate method of making the building safe while the crucial debate regarding the lang term future of the Cathedral is undertaken.

The following Make Safe Options have been developed from an initial proposal developed by the Heritage team of the City Council, and have been agreed by the Collaborative Working Group.

CHRISTCHURCH CATHEDRAL - MAKE SAFE OPTIONS

Make Safe 1 Complete demolition, no salvage.

Clear site.

Make Safe 2 Full deconstruction with maximum salvage and long term storage.

Clear site.

Make Safe 3 Part controlled demolition / Part deconstruction with selected salvage / Part temporary repair and protection of remaining fabric.

Secured site with building remaining.

Make Safe 4 Part controlled demolition / Part deconstruction with maximum salvage/ Part temporary repair and protection of remaining fabric.

Secured site with building remaining.

NOTE: All options envisage controlled rescue of selected objects as separate exercise.

Each of these options has implications on the future opportunities for rebuilding. For instance it is clear that Make Safe 1 would preclude any consideration of a repaired or reconstructed building, and similarly Make Safe 4 implies that the building will be reconstructed in some form.

In our opinion, the selection of the most appropriate Make Safe Option should be based on an understanding of the possible future rebuild scenarios, rather than the other way round, so that the Church Property Trustees have the greatest range opportunities available to them in the future for their deliberations.

For this reason the Collaborative Working Group has devised a table which shows the implications of each scenario on the most appropriate Make Safe Option and this follows overleaf. To this JG+A have added a rating of our preferred heritage approaches.

	REBUILD OPTIONS		REBUILD OPTIONS		REBUILD OPTIONS		REBUILD OPTIONS
A	New cathedral incorporating intangible values (See full definition above)	B	New cathedral incorporating intangible values and selected heritage fabric (See full definition above)	C	Part new cathedral Part reconstructed Part repair (See full definition above)	D	Full reconstruction to pre-earthquake form. (See full definition above)
	All new built with no original materials		More new than original		More original than new build.		All rebuilt with some original materials
	HERITAGE PREFERENCE		**HERITAGE REFERENCE**		**HERITAGE PREFERENCE**		**HERITAGE PREFERENCE**
	3rd		**2nd**		**1st**		**4th**
							
	MAKE SAFE OPTIONS		**MAKE SAFE OPTIONS**		**MAKE SAFE OPTIONS**		**MAKE SAFE OPTIONS**
1	100% demolition no salvage	3	Part controlled demolition Part deconstructed with selected salvage with storage Part repair	4	Part controlled demolition Part deconstructed with maximum salvage with storage Part repair	2	100% deconstruction maximum salvage long term storage

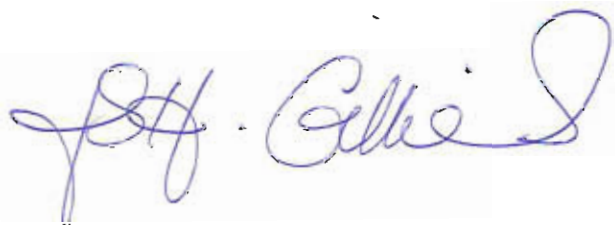
CONCLUSIONS & RECOMMENDATIONS

This report has described the foundation of good conservation practice as espoused by the ICOMOS NZ Charter and other current conservation philosophies and highlighted the importance of basing all decision-making regarding heritage matters being based on identified heritage significance.

We have also reviewed possible scenarios that are open to the CPT with respect to future rebuilding and assessed these against the impact on the identified heritage significance. This analysis has demonstrated that the future rebuild scenario which would have the least impact on identified heritage values is "C – Part new Cathedral, part reconstructed and part repaired".

The range of possible Make Safe Options has also explored and from a comparison of these with the possible future scenarios the most appropriate Make Safe Option has been identified as "Make Safe Option 4 – Part controlled demolition, part deconstructed with maximum salvage and storage and part temporary repair".

This report is based solely on our interpretation of the heritage implications of the various proposals and it is acknowledged that there are other equally important factors to be balanced by the Trustees in formulating their final decision.



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CHRISTCHURCH CATHEDRAL

MAKE-SAFE OPTIONS

HERITAGE IMPACT ASSESSMENT

20th October 2011

APPENDIX

Includes JGA Heritage Assessment – Conservation Approach dated 26th September 2011; ICOMOS NZ Charter 2010; SPAB Manifesto and Principles; & JGA Review of Heritage Significance for the Cathedral

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26th September 2011

CHRIST CHURCH CATHEDRAL
HERITAGE ASSESSMENT - CONSERVATION APPROACH

PRELIMINARY OBSERVATIONS

The Cathedral has suffered incremental damage at each of the main earthquakes and major aftershocks. The condition of the cathedral has been monitored and recorded by Holmes Consulting Group (HCG) throughout this time. It is clear that major intervention will be required to make the building safe and to reconstruct the new Cathedral. However, it is less clear what form that reconstruction should take and two main drivers of these decisions will be structural issues and heritage values. We would like to propose the following approach regarding assessing and safeguarding these heritage values.

1. Heritage Significance Pre-earthquake
   In order to identify the remaining heritage values of the Cathedral we believe it is necessary to understand those values before the earthquake. To achieve this we propose the following;
   - Review Conservation Plan and in particular Identified Heritage Significance, Fabric and Taonga.
   - Consult with Cathedral Chapter and others with specialist knowledge of the Cathedral such as Jenny May (currently on leave in the UK until 20 October).

2. Outline Condition Report Post Earthquake
   It is also necessary to understand as far as possible the condition of the cathedral since the earthquakes occurred. This might be achieved in the following way;
   - Review HCG Structural Reports
   - Carry out ground based external outline condition assessment of external non-structural elements (eg, glass, slates, carved stone, rainwatergoods, etc)
   - Prepare internal condition assessment of non-structural elements based on photographs and first hand reports from previous visits, including floor tiles, wall tiles, carved stone, carved timber, roof members, metalwork, etc. Make limited internal inspection from identified sate areas under the supervision of the engineers.
   - Liaise with other specialists to prepare outline condition assessment of taonga based on photographs and first hand reports from previous visits, including the organ, memorials, flags/tapestries, etc.
   - Summarise post earthquake condition.

3. Review Heritage Significance, Fabric & Taonga Post-earthquake
   Once this background research is complete it will be possible to prepare a summary of the remaining or changed heritage values. This would include;
   - Any changes to the identified significance in the Conservation Plan

- Carry out and summarise perceived heritage significance post-earthquake in the community
- Consider intangible heritage values
- Consider significance of the earthquake itself as a crucial part of the Cathedral's history.

4. Conservation Approach
   Once the current, post-earthquake heritage significance has been identified (as indicated above), the range of possible conservation philosophies or approaches can be explored. This would be based on national and international Charters, in particular ICOMOSNZ, and international best practice regarding catastrophic loss of heritage buildings.

   This would include a review of the various philosophies with commentary on how each might impact on or contribute to the resolution of the cathedral reconstruction. For example, the western conservation philosophy is still very focussed on historic fabric and material values, whereas there are others where the meaning of a place and the memories that it holds are more important.

   The different approaches would involve varying degrees of replication, authenticity, loss or retention of heritage values and would be balanced against the reality of the findings of the Structural Reports and the Outline Condition Report.

   Whatever philosophy is agreed, it will provide the foundation of all future decisions relating to the repair or reconstruction of the Cathedral. It is very important that this issue is explored fully and in a wide forum to ensure that the approach decided upon is absolutely sound and has the greatest possible support within the church and also within the community.

We believe that the Heritage Assessment must be as wide and as extensive as indicated above so that it can form a solid basis for all future decisions and which can stand up to rigourous debate and close examination by local, national and international experts. The rebuilding of Christ Church Cathedral should provide a world class example of recovery from traumatic heritage loss.

Jackie Gillies
Jackie Gillies + Associates

ICOMOS New Zealand Charter

for the Conservation of Places of Cultural Heritage Value

Revised 2010

Preamble

New Zealand retains a unique assemblage of **places** of **cultural heritage value** relating to its indigenous and more recent peoples. These areas, **cultural landscapes** and features, buildings and **structures**, gardens, archaeological sites, traditional sites, monuments, and sacred **places** are treasures of distinctive value that have accrued meanings over time. New Zealand shares a general responsibility with the rest of humanity to safeguard its cultural heritage **places** for present and future generations. More specifically, the people of New Zealand have particular ways of perceiving, relating to, and conserving their cultural heritage **places**.

Following the spirit of the International Charter for the Conservation and Restoration of Monuments and Sites (the Venice Charter - 1964), this charter sets out principles to guide the **conservation** of **places** of **cultural heritage value** in New Zealand. It is a statement of professional principles for members of ICOMOS New Zealand.

This charter is also intended to guide all those involved in the various aspects of **conservation** work, including owners, guardians, managers, developers, planners, architects, engineers, craftspeople and those in the construction trades, heritage practitioners and advisors, and local and central government authorities. It offers guidance for communities, organisations, and individuals involved with the **conservation** and management of cultural heritage **places**.

This charter should be made an integral part of statutory or regulatory heritage management policies or plans, and should provide support for decision makers in statutory or regulatory processes.

Each article of this charter must be read in the light of all the others. Words in bold in the text are defined in the definitions section of this charter.

This revised charter was adopted by the New Zealand National Committee of the International Council on Monuments and Sites at its meeting on 4 September 2010.

Purpose of conservation

1. The purpose of conservation

The purpose of **conservation** is to care for **places** of **cultural heritage value**.

In general, such **places**:

(i) have lasting values and can be appreciated in their own right;
(ii) inform us about the past and the cultures of those who came before us;
(iii) provide tangible evidence of the continuity between past, present, and future;
(iv) underpin and reinforce community identity and relationships to ancestors and the land; and
(v) provide a measure against which the achievements of the present can be compared.

It is the purpose of **conservation** to retain and reveal such values, and to support the ongoing meanings and functions of **places** of **cultural heritage value**, in the interests of present and future generations.

Conservation principles

2. Understanding cultural heritage value

Conservation of a **place** should be based on an understanding and appreciation of all aspects of its **cultural heritage value**, both **tangible** and **intangible**. All available forms of knowledge and evidence provide the means of understanding a **place** and its **cultural heritage value** and cultural **heritage significance**. **Cultural heritage value** should be understood through consultation with **connected people**, systematic documentary and oral research, physical investigation and **recording** of the **place**, and other relevant methods.

All relevant **cultural heritage values** should be recognised, respected, and, where appropriate, revealed, including values which differ, conflict, or compete.

The policy for managing all aspects of a **place**, including its **conservation** and its **use**, and the implementation of the policy, must be based on an understanding of its **cultural heritage value**.

3. Indigenous cultural heritage

The indigenous cultural heritage of **tangata whenua** relates to **whanau**, **hapu**, and **iwi** groups. It shapes identity and enhances well-being, and it has particular cultural meanings and values for the present, and associations with those who have gone before. Indigenous cultural heritage brings with it responsibilities of guardianship and the practical application and passing on of associated knowledge, traditional skills, and practices.

The Treaty of Waitangi is the founding document of our nation. Article 2 of the Treaty recognises and guarantees the protection of **tino rangatiratanga**, and so empowers **kaitiakitanga** as customary trusteeship to be exercised by **tangata whenua**. This customary trusteeship is exercised over their **taonga**, such as sacred and traditional **places**, built heritage, traditional practices, and other cultural heritage resources. This obligation extends beyond current legal ownership wherever such cultural heritage exists.

Particular **matauranga**, or knowledge of cultural heritage meaning, value, and practice, is associated with **places**. **Matauranga** is sustained and transmitted through oral, written, and physical forms determined by **tangata whenua**. The **conservation** of such **places** is therefore conditional on decisions made in associated **tangata whenua** communities, and should proceed only in this context. In particular, protocols of access, authority, ritual, and practice are determined at a local level and should be respected.

4. Planning for conservation

Conservation should be subject to prior documented assessment and planning.

All **conservation** work should be based on a **conservation plan** which identifies the **cultural heritage value** and **cultural heritage significance** of the **place**, the **conservation** policies, and the extent of the recommended works.

The **conservation plan** should give the highest priority to the **authenticity** and **integrity** of the **place**.

Other guiding documents such as, but not limited to, management plans, cyclical **maintenance** plans, specifications for **conservation** work, interpretation plans, risk mitigation plans, or emergency plans should be guided by a **conservation plan**.

5. Respect for surviving evidence and knowledge

Conservation maintains and reveals the **authenticity** and **integrity** of a **place**, and involves the least possible loss of **fabric** or evidence of **cultural heritage value**. Respect for all forms of knowledge and existing evidence, of both **tangible** and **intangible values**, is essential to the **authenticity** and **integrity** of the **place**.

Conservation recognises the evidence of time and the contributions of all periods. The **conservation** of a **place** should identify and respect all aspects of its **cultural heritage value** without unwarranted emphasis on any one value at the expense of others.

The removal or obscuring of any physical evidence of any period or activity should be minimised, and should be explicitly justified where it does occur. The **fabric** of a particular period or activity may be obscured or removed if assessment shows that its removal would not diminish the **cultural heritage value** of the **place**.

In **conservation**, evidence of the functions and intangible meanings of **places** of **cultural heritage value** should be respected.

6. Minimum intervention

Work undertaken at a **place** of **cultural heritage value** should involve the least degree of **intervention** consistent with **conservation** and the principles of this charter.

Intervention should be the minimum necessary to ensure the retention of **tangible** and **intangible values** and the continuation of **uses** integral to those values. The removal of **fabric** or the alteration of features and spaces that have **cultural heritage value** should be avoided.

7. Physical investigation

Physical investigation of a **place** provides primary evidence that cannot be gained from any other source. Physical investigation should be carried out according to currently accepted professional standards, and should be documented through systematic **recording**.

Invasive investigation of **fabric** of any period should be carried out only where knowledge may be significantly extended, or where it is necessary to establish the existence of **fabric** of **cultural heritage value**, or where it is necessary for **conservation** work, or where such **fabric** is about to be damaged or destroyed or made inaccessible. The extent of invasive investigation should minimise the disturbance of significant **fabric**.

8. Use

The **conservation** of a **place** of **cultural heritage value** is usually facilitated by the **place** serving a useful purpose.

Where the **use** of a **place** is integral to its **cultural heritage value**, that **use** should be retained.

Where a change of **use** is proposed, the new **use** should be compatible with the **cultural heritage value** of the **place**, and should have little or no adverse effect on the **cultural heritage value**.

9. Setting

Where the **setting** of a **place** is integral to its **cultural heritage value**, that **setting** should be conserved with the **place** itself. If the **setting** no longer contributes to the **cultural heritage value** of the **place**, and if **reconstruction** of the **setting** can be justified, any **reconstruction** of the **setting** should be based on an understanding of all aspects of the **cultural heritage value** of the **place**.

10. Relocation

The on-going association of a **structure** or feature of **cultural heritage value** with its location, site, curtilage, and **setting** is essential to its **authenticity** and **integrity**. Therefore, a **structure** or feature of **cultural heritage value** should remain on its original site.

Relocation of a **structure** or feature of **cultural heritage value**, where its removal is required in order to clear its site for a different purpose or construction, or where its removal is required to enable its **use** on a different site, is not a desirable outcome and is not a **conservation** process.

In exceptional circumstances, a **structure** of **cultural heritage value** may be relocated if its current site is in imminent danger, and if all other means of retaining the **structure** in its current location have been exhausted. In this event, the new location should provide a **setting** compatible with the **cultural heritage value** of the **structure**.

11. Documentation and archiving

The **cultural heritage value** and **cultural heritage significance** of a **place**, and all aspects of its **conservation**, should be fully documented to ensure that this information is available to present and future generations.

Documentation includes information about all changes to the **place** and any decisions made during the **conservation** process.

Documentation should be carried out to archival standards to maximise the longevity of the record, and should be placed in an appropriate archival repository.

Documentation should be made available to **connected people** and other interested parties. Where reasons for confidentiality exist, such as security, privacy, or cultural appropriateness, some information may not always be publicly accessible.

12. Recording

Evidence provided by the **fabric** of a **place** should be identified and understood through systematic research, **recording**, and analysis.

Recording is an essential part of the physical investigation of a **place**. It informs and guides the **conservation** process and its planning. Systematic **recording** should occur prior to, during, and following any **intervention**. It should include the **recording** of new evidence revealed, and any **fabric** obscured or removed.

Recording of the changes to a **place** should continue throughout its life.

13. Fixtures, fittings, and contents

Fixtures, fittings, and **contents** that are integral to the **cultural heritage value** of a **place** should be retained and conserved with the **place**. Such fixtures, fittings, and **contents** may include carving, painting, weaving, stained glass, wallpaper, surface decoration, works of art, equipment and machinery, furniture, and personal belongings.

Conservation of any such material should involve specialist **conservation** expertise appropriate to the material. Where it is necessary to remove any such material, it should be recorded, retained, and protected, until such time as it can be reinstated.

Conservation processes and practice

14. Conservation plans

A **conservation plan**, based on the principles of this charter, should:

(i) be based on a comprehensive understanding of the **cultural heritage value** of the **place** and assessment of its **cultural heritage significance**;

(ii) include an assessment of the **fabric** of the **place**, and its condition;

(iii) give the highest priority to the **authenticity** and **integrity** of the **place**;

(iv) include the entirety of the **place**, including the **setting**;

(v) be prepared by objective professionals in appropriate disciplines;

(vi) consider the needs, abilities, and resources of **connected people**;

(vii) not be influenced by prior expectations of change or development;

(viii) specify **conservation** policies to guide decision making and to guide any work to be undertaken;

(ix) make recommendations for the **conservation** of the **place**; and

(x) be regularly revised and kept up to date.

15. Conservation projects

Conservation projects should include the following:

(i) consultation with interested parties and **connected people**, continuing throughout the project;

(ii) opportunities for interested parties and **connected people** to contribute to and participate in the project;

(iii) research into documentary and oral history, using all relevant sources and repositories of knowledge;

(iv) physical investigation of the **place** as appropriate;

(v) use of all appropriate methods of **recording**, such as written, drawn, and photographic;

(vi) the preparation of a **conservation plan** which meets the principles of this charter;

(vii) guidance on appropriate **use** of the **place**;

(viii) the implementation of any planned **conservation** work;

(ix) the **documentation** of the **conservation** work as it proceeds; and

(x) where appropriate, the deposit of all records in an archival repository.

A **conservation** project must not be commenced until any required statutory authorisation has been granted.

16. Professional, trade, and craft skills

All aspects of **conservation** work should be planned, directed, supervised, and undertaken by people with appropriate **conservation** training and experience directly relevant to the project.

All **conservation** disciplines, arts, crafts, trades, and traditional skills and practices that are relevant to the project should be applied and promoted.

17. Degrees of intervention for conservation purposes

Following research, **recording**, assessment, and planning, **intervention** for **conservation** purposes may include, in increasing degrees of **intervention**:

(i) **preservation**, through **stabilisation, maintenance**, or **repair**;
(ii) **restoration**, through **reassembly, reinstatement**, or removal;
(iii) **reconstruction**; and
(iv) **adaptation.**

In many **conservation** projects a range of processes may be utilised. Where appropriate, **conservation** processes may be applied to individual parts or components of a **place** of **cultural heritage value**.

The extent of any **intervention** for **conservation** purposes should be guided by the **cultural heritage value** of a **place** and the policies for its management as identified in a **conservation plan**. Any **intervention** which would reduce or compromise **cultural heritage value** is undesirable and should not occur.

Preference should be given to the least degree of **intervention**, consistent with this charter.

Re-creation, meaning the conjectural **reconstruction** of a **structure** or **place**; replication, meaning to make a copy of an existing or former **structure** or **place**; or the construction of generalised representations of typical features or **structures**, are not **conservation** processes and are outside the scope of this charter.

18. Preservation

Preservation of a **place** involves as little **intervention** as possible, to ensure its long-term survival and the continuation of its **cultural heritage value**.

Preservation processes should not obscure or remove the patina of age, particularly where it contributes to the **authenticity** and **integrity** of the **place**, or where it contributes to the structural stability of materials.

i. Stabilisation

Processes of decay should be slowed by providing treatment or support.

ii. Maintenance

A **place** of **cultural heritage value** should be maintained regularly. **Maintenance** should be carried out according to a plan or work programme.

iii. Repair

Repair of a **place** of **cultural heritage value** should utilise matching or similar materials. Where it is necessary to employ new materials, they should be distinguishable by experts, and should be documented.

Traditional methods and materials should be given preference in **conservation** work.

Repair of a technically higher standard than that achieved with the existing materials or construction practices may be justified only where the stability or life expectancy of the site or material is increased, where the new material is compatible with the old, and where the **cultural heritage value** is not diminished.

19. Restoration

The process of **restoration** typically involves **reassembly** and **reinstatement**, and may involve the removal of accretions that detract from the **cultural heritage value** of a **place**.

Restoration is based on respect for existing **fabric**, and on the identification and analysis of all available evidence, so that the **cultural heritage value** of a **place** is recovered or revealed. **Restoration** should be carried out only if the **cultural heritage value** of the **place** is recovered or revealed by the process.

Restoration does not involve conjecture.

I. Reassembly and reinstatement

Reassembly uses existing material and, through the process of **reinstatement**, returns it to its former position. **Reassembly** is more likely to involve work on part of a **place** rather than the whole **place**.

II. Removal

Occasionally, existing **fabric** may need to be permanently removed from a **place**. This may be for reasons of advanced decay, or loss of structural **integrity**, or because particular **fabric** has been identified in a **conservation plan** as detracting from the **cultural heritage value** of the **place**.

The **fabric** removed should be systematically **recorded** before and during its removal. In some cases it may be appropriate to store, on a long-term basis, material of evidential value that has been removed.

20. Reconstruction

Reconstruction is distinguished from **restoration** by the introduction of new material to replace material that has been lost.

Reconstruction is appropriate if it is essential to the function, **integrity**, **intangible value**, or understanding of a **place**, if sufficient physical and documentary evidence exists to minimise conjecture, and if surviving **cultural heritage value** is preserved.

Reconstructed elements should not usually constitute the majority of a **place** or **structure**.

21. Adaptation

The **conservation** of a **place** of **cultural heritage value** is usually facilitated by the **place** serving a useful purpose. Proposals for **adaptation** of a **place** may arise from maintaining its continuing **use**, or from a proposed change of **use**.

Alterations and additions may be acceptable where they are necessary for a **compatible use** of the **place**. Any change should be the minimum necessary, should be substantially reversible, and should have little or no adverse effect on the **cultural heritage value** of the **place**.

Any alterations or additions should be compatible with the original form and **fabric** of the **place**, and should avoid inappropriate or incompatible contrasts of form, scale, mass, colour, and material. **Adaptation** should not dominate or substantially obscure the original form and **fabric**, and should not adversely affect the **setting** of a **place** of **cultural heritage value**. New work should complement the original form and **fabric**.

22. Non-intervention

In some circumstances, assessment of the **cultural heritage value** of a **place** may show that it is not desirable to undertake any **conservation intervention** at that time. This approach may be appropriate where undisturbed constancy of **intangible values**, such as the spiritual associations of a sacred **place**, may be more important than its physical attributes.

23. Interpretation

Interpretation actively enhances public understanding of all aspects of **places** of **cultural heritage value** and their **conservation**. Relevant cultural protocols are integral to that understanding, and should be identified and observed.

Where appropriate, interpretation should assist the understanding of **tangible** and **intangible values** of a **place** which may not be readily perceived, such as the sequence of construction and change, and the meanings and associations of the **place** for **connected people**.

Any interpretation should respect the **cultural heritage value** of a **place**. Interpretation methods should be appropriate to the **place**. Physical **interventions** for interpretation purposes should not detract from the experience of the **place**, and should not have an adverse effect on its **tangible** or **intangible values**.

24. Risk mitigation

Places of **cultural heritage value** may be vulnerable to natural disasters such as flood, storm, or earthquake; or to humanly induced threats and risks such as those arising from earthworks, subdivision and development, buildings works, or wilful damage or neglect. In order to safeguard **cultural heritage value**, planning for risk mitigation and emergency management is necessary.

Potential risks to any **place** of **cultural heritage value** should be assessed. Where appropriate, a risk mitigation plan, an emergency plan, and/or a protection plan should be prepared, and implemented as far as possible, with reference to a conservation plan.

Definitions

For the purposes of this charter:

Adaptation means the process(es) of modifying a **place** for a **compatible use** while retaining its **cultural heritage value. Adaptation** processes include alteration and addition.

Authenticity means the credibility or truthfulness of the surviving evidence and knowledge of the **cultural heritage value** of a **place.** Relevant evidence includes form and design, substance and **fabric**, technology and craftsmanship, location and surroundings, context and **setting**, **use** and function, traditions, spiritual essence, and sense of place, and includes **tangible** and **intangible values.** Assessment of **authenticity** is based on identification and analysis of relevant evidence and knowledge, and respect for its cultural context.

Compatible use means a **use** which is consistent with the **cultural heritage value** of a **place,** and which has little or no adverse impact on its **authenticity** and **integrity.**

Connected people means any groups, organisations, or individuals having a sense of association with or responsibility for a **place** of **cultural heritage value.**

Conservation means all the processes of understanding and caring for a **place** so as to safeguard its **cultural heritage value. Conservation** is based on respect for the existing **fabric**, associations, meanings, and **use** of the **place.** It requires a cautious approach of doing as much work as necessary but as little as possible, and retaining **authenticity** and **integrity**, to ensure that the **place** and its values are passed on to future generations.

Conservation plan means an objective report which documents the history, **fabric,** and **cultural heritage value** of a **place**, assesses its **cultural heritage significance,** describes the condition of the **place**, outlines **conservation** policies for managing the **place**, and makes recommendations for the **conservation** of the **place**.

Contents means moveable objects, collections, chattels, documents, works of art, and ephemera that are not fixed or fitted to a **place,** and which have been assessed as being integral to its **cultural heritage value.**

Cultural heritage significance means the **cultural heritage value** of a **place** relative to other similar or comparable **places**, recognising the particular cultural context of the **place.**

Cultural heritage value/s means possessing aesthetic, archaeological, architectural, commemorative, functional, historical, landscape, monumental, scientific, social, spiritual, symbolic, technological, traditional, or other **tangible** or **intangible values,** associated with human activity.

Cultural landscapes means an area possessing **cultural heritage value** arising from the relationships between people and the environment. **Cultural landscapes** may have been designed, such as gardens, or may have evolved from human settlement and land use over time, resulting in a diversity of distinctive landscapes in different areas. Associative **cultural landscapes**, such as sacred mountains, may lack **tangible** cultural elements but may have strong **intangible** cultural or spiritual associations.

Documentation means collecting, **recording**, keeping, and managing information about a **place** and its **cultural heritage value**, including information about its history, **fabric,** and meaning; information about decisions taken; and information about physical changes and **interventions** made to the **place.**

Fabric means all the physical material of a **place**, including subsurface material, **structures**, and interior and exterior surfaces including the patina of age; and including fixtures and fittings, and gardens and plantings.

Hapu means a section of a large tribe of the **tangata whenua**.

Intangible value means the abstract **cultural heritage value** of the meanings or associations of a **place**, including commemorative, historical, social, spiritual, symbolic, or traditional values.

Integrity means the wholeness or intactness of a **place**, including its meaning and sense of **place**, and all the **tangible** and **intangible** attributes and elements necessary to express its **cultural heritage value**.

Intervention means any activity that causes disturbance of or alteration to a **place** or its **fabric**. **Intervention** includes archaeological excavation, invasive investigation of built **structures**, and any **intervention** for **conservation** purposes.

Iwi means a tribe of the **tangata whenua**.

Kaitiakitanga means the duty of customary trusteeship, stewardship, guardianship, and protection of land, resources, or **taonga**.

Maintenance means regular and on-going protective care of a **place** to prevent deterioration and to retain its **cultural heritage value**.

Matauranga means traditional or cultural knowledge of the **tangata whenua**.

Non-intervention means to choose not to undertake any activity that causes disturbance of or alteration to a **place** or its **fabric**.

Place means any land having **cultural heritage value** in New Zealand, including areas; **cultural landscapes**; buildings, **structures**, and monuments; groups of buildings, **structures**, or monuments; gardens and plantings; archaeological sites and features; traditional sites; sacred **places**; townscapes and streetscapes; and settlements. **Place** may also include land covered by water, and any body of water. **Place** includes the **setting** of any such **place**.

Preservation means to maintain a **place** with as little change as possible.

Reassembly means to put existing but disarticulated parts of a **structure** back together.

Reconstruction means to build again as closely as possible to a documented earlier form, using new materials.

Recording means the process of capturing information and creating an archival record of the **fabric** and **setting** of a **place**, including its configuration, condition, **use**, and change over time.

Reinstatement means to put material components of a **place**, including the products of **reassembly**, back in position.

Repair means to make good decayed or damaged **fabric** using identical, closely similar, or otherwise appropriate material.

Restoration means to return a **place** to a known earlier form, by **reassembly** and **reinstatement**, and/or by removal of elements that detract from its **cultural heritage value**.

Setting means the area around and/or adjacent to a **place** of **cultural heritage value** that is integral to its function, meaning, and relationships. **Setting** includes the **structures**, outbuildings, features, gardens, curtilage, airspace, and accessways forming the spatial context of the **place** or used

in association with the **place**. **Setting** also includes **cultural landscapes**, townscapes, and streetscapes; perspectives, views, and viewshafts to and from a **place**; and relationships with other **places** which contribute to the **cultural heritage value** of the **place**. **Setting** may extend beyond the area defined by legal title, and may include a buffer zone necessary for the long-term protection of the **cultural heritage value** of the **place**.

Stabilisation means the arrest or slowing of the processes of decay.

Structure means any building, standing remains, equipment, device, or other facility made by people and which is fixed to the land.

Tangata whenua means generally the original indigenous inhabitants of the land; and means specifically the people exercising **kaitiakitanga** over particular land, resources, or **taonga**.

Tangible value means the physically observable **cultural heritage value** of a **place**, including archaeological, architectural, landscape, monumental, scientific, or technological values.

Taonga means anything highly prized for its cultural, economic, historical, spiritual, or traditional value, including land and natural and cultural resources.

Tino rangatiratanga means the exercise of full chieftainship, authority, and responsibility.

Use means the functions of a **place**, and the activities and practices that may occur at the **place**. The functions, activities, and practices may in themselves be of **cultural heritage value**.

Whanau means an extended family which is part of a **hapu** or **iwi**.

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English language text first published 1993
Bilingual text first published 1995

This revised text replaces the 1993 and 1995 versions and should be referenced as the *ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value* (ICOMOS New Zealand Charter 2010).

This revision incorporates changes in conservation philosophy and best practice since 1993 and is the only version of the ICOMOS New Zealand Charter approved by ICOMOS New Zealand (Inc.) for use.

Copies of this charter may be obtained from
ICOMOS NZ (Inc.)
P O Box 90 851
Victoria Street West,
Auckland 1142,
New Zealand.

SPAB Manifesto

The manifesto of the SPAB was written by William Morris and other founder members and issued in 1877. Although produced in response to the conservation problems of the 19th century, the manifesto extends protection to "all times and styles" and remains to this day the philosophical basis for the Society's work.

"A society coming before the public with such a name as that above written must needs explain how, and why, it proposes to protect those ancient buildings which, to most people doubtless, seem to have so many and such excellent protectors. This, then, is the explanation we offer.

No doubt within the last fifty years a new interest, almost like another sense, has arisen in these ancient monuments of art; and they have become the subject of one of the most interesting of studies, and of an enthusiasm, religious, historical, artistic, which is one of the undoubted gains of our time; yet we think that if the present treatment of them be continued, our descendants will find them useless for study and chilling to enthusiasm. We think that those last fifty years of knowledge and attention have done more for their destruction than all the foregoing centuries of revolution, violence and contempt.

For Architecture, long decaying, died out, as a popular art at least, just as the knowledge of mediaeval art was born. So that the civilised world of the nineteenth century has no style of its own amidst its wide knowledge of the styles of other centuries. From this lack and this gain arose in men's minds the strange idea of the Restoration of ancient buildings; and a strange and most fatal idea, which by its very name implies that it is possible to strip from a building this, that, and the other part of its history - of its life that is - and then to stay the hand at some arbitrary point, and leave it still historical, living, and even as it once was.

In early times this kind of forgery was impossible, because knowledge failed the builders, or perhaps because instinct held them back. If repairs were needed, if ambition or piety pricked on to change, that change was of necessity wrought in the unmistakable fashion of the time; a church of the eleventh century might be added to or altered in the twelfth, thirteenth, fourteenth, fifteenth, sixteenth, or even the seventeenth or eighteenth centuries; but every change, whatever history it destroyed, left history in the gap, and was alive with the spirit of the deeds done midst its fashioning. The result of all this was often a building in which the many changes, though harsh and visible enough, were, by their very contrast, interesting and instructive and could by no possibility mislead. But those who make the changes wrought in our day under the name of Restoration, while professing to bring back a building to the best time of its history, have no guide but each his own individual whim to point out to them what is admirable and what contemptible; while the very nature of their task compels them to destroy something and to supply the gap by imagining what the earlier builders should or might have done. Moreover, in the course of this double process of destruction and addition, the whole surface of the building is necessarily tampered with; so that the appearance of antiquity is taken away from such old parts of the fabric as are left, and there is no laying to rest in the spectator the suspicion of what may have been lost; and in short, a feeble and lifeless forgery is the final result of all the wasted labour. It is sad to say, that in this manner most of the bigger Minsters, and a vast number of more humble

buildings, both in England and on the Continent, have been dealt with by men of talent often, and worthy of better employment, but deaf to the claims of poetry and history in the highest sense of the words.

For what is left we plead before our architects themselves, before the official guardians of buildings, and before the public generally, and we pray them to remember how much is gone of the religion, thought and manners of time past, never by almost universal consent, to be Restored; and to consider whether it be possible to Restore those buildings, the living spirit of which, it cannot be too often repeated, was an inseparable part of that religion and thought, and those past manners. For our part we assure them fearlessly, that of all the Restorations yet undertaken, the worst have meant the reckless stripping a building of some of its most interesting material features; whilst the best have their exact analogy in the Restoration of an old picture, where the partly-perished work of the ancient craftsmaster has been made neat and smooth by the tricky hand of some unoriginal and thoughtless hack of today. If, for the rest, it be asked us to specify what kind of amount of art, style, or other interest in a building makes it worth protecting, we answer, anything which can be looked on as artistic, picturesque, historical, antique, or substantial: any work, in short, over which educated, artistic people would think it worth while to argue at all.

It is for all these buildings, therefore, of all times and styles, that we plead, and call upon those who have to deal with them, to put Protection in the place of Restoration, to stave off decay by daily care, to prop a perilous wall or mend a leaky roof by such means as are obviously meant for support or covering, and show no pretence of other art, and otherwise to resist all tampering with either the fabric or ornament of the building as it stands; if it has become inconvenient for its present use, to raise another building rather than alter or enlarge the old one; in fine to treat our ancient buildings as monuments of a bygone art, created by bygone manners, that modern art cannot meddle with without destroying.

Thus, and thus only, shall we escape the reproach of our learning being turned into a snare to us; thus, and thus only can we protect our ancient buildings, and hand them down instructive and venerable to those that come after us."

Historic building/heritage principles of The Society for the Protection of Ancient Buildings (abridged)

"Old buildings cannot be preserved by making them new."

William Morris founded the SPAB in 1877 to defend old buildings from destructive 'restoration'. He saw that the most vulnerable buildings were those of most eloquent craftsmanship, survivors from a time before mass-production took hold.

The Society is guided by these principles:

1. Complement not parody

New work should express modern needs in a modern language. These are the only terms in which new can relate to old in a way which is positive and responsive at the same time. If an addition proves essential, it should not be made to out-do or out-last the original.

2. Fit new to old

When repairs are made, new material should always be fitted to the old and not the old adapted to accept the new. In this way more ancient fabric will survive.

3. Integrity

As good buildings age, the bond with their sites strengthens. A beautiful, interesting or simply ancient building still belongs where it stands however corrupted that place may have become. Use and adaptation of buildings leave their marks and these, in time, we also see as aspects of the building's integrity.

4. Workmanship

Why try to hide good repairs? Careful, considered workmanship does justice to fine buildings, leaving the most durable and useful record of what has been done. On the other hand, work concealed deliberately or artificially aged, even with the best intentions, is bound to mislead.

5. Materials

The use of architectural features from elsewhere confuses the understanding and appreciation of a building, even making the untouched parts seem spurious. Trade in salvaged building materials encourages the destruction of old buildings, whereas demand for the same materials new helps keep them in production. The use of different but compatible materials can be an honest alternative.

6. Respect for age

Bulging, bowing, sagging and leaning are signs of age which deserve respect. Good repair will not officiously iron them out, smarten them or hide the imperfections. Age can confer a beauty of its own. These are qualities to care for, not blemishes to be eradicated.

7. Repair not "restore"

Although no building can withstand decay, neglect and depredation entirely, neither can aesthetic judgement, nor archaeological proof, justify the reproduction of worn or missing parts. Only as a practical expedient on a small scale can a case for restoration be argued.

8. The need for responsible methods of repair

A repair done today should not preclude treatment tomorrow, nor should it result in further loss of fabric.

9. Regular maintenance

This is the most practical and economic form of preservation.

10. Information

To repair old buildings well, they must be understood. Appreciation of a building's particular architectural qualities and a study of its construction, use and social development are all enlightening. These factors also help us to see why decay sets in and how it may be put right.

11. Essential work

The only work which is unquestionably necessary (whether it be repair, renewal or addition) is that essential to a building's survival.

ChristChurch Cathedral

Review of significance – Pre Earthquakes

Key: Green text indicates an assessment of significance derived from Salmond Reed's conservation plan

Blue text relates to the assessment in the CCC statement of significance

Purple text relates to statements in the NZHPT listing

Italics indicate additional information from Jackie Gillies + Associates.

Note: In the SR conservation plan, the statement of significance is not divided into categories of significance i.e. historical and social. This is what has been done by CCC in their statement and is a recognised approach to an assessment. Typical categories of heritage values are as follows:

Historic and social significance;
Values associated with a particular person, group, event, phase or activity. These may be, for instance, social, historical, economic or political.

Cultural and spiritual significance;
Values associated with a distinctive way of life, philosophy, tradition, religion or belief.

Architectural and aesthetic significance;
Values associated with a particular style, design, period, form, scale or colour.

Technological and craftsmanship significance;
Values associated with materials, traditional/innovative/unusual building techniques and construction methods or those that are particularly notable for their time or quality.

Contextual significance;
Values associated with the setting of a building or site in terms of landscape or townscape and its relation to the environment. These values may include those relating to the grouping of buildings together in a particular place or environment.

Archaeological significance.
Values associated with our understanding of past events, activities, people or patterns by the appreciation of archaeological information that can be gained from a building or site.

Review of current heritage listings

1. Christchurch City Council City Plan

Cathedral:

100
Cathedral Square
1864-1904 Christ Church Cathedral
Group 1
Lot 1 DP39475 SO10333

Cathedral Square:

Cathedral Square
1867
Godley Statue
Group 1
Pt RS 1 SO 6659

Cathedral Square
c1850
Cathedral Square including Godley Plot
Group 1
Lot 2 DP 39745 Pt R1 TS1193

War Memorial:

Cathedral Square
1937
Citizens War Memorial
Group 1
Lot 1 DP39475 SO 10333

Group 1 buildings have had their overall significance ranked as '**International or national significance**'.

2. New Zealand Historic Places Trust

Register no. 46
Category 1
Lot DP 39475 (CT CB18K/1392), Canterbury Land District

Category I status is given to places of 'special or outstanding historical or cultural heritage significance or value'; Category II status to places of 'historical or cultural heritage significance or value'.

The review of significance on the basis of widely accepted categories of significance is as follows:

Historic and social significance

ChristChurch Cathedral is a place of considerable significance in Christchurch and in New Zealand for the following reasons:

- The association of the need for a Cathedral with the foundation of Christchurch City.
- As a building viewed by many as symbolising the city and as reflecting the ideals of the city's founders.
- The building is a major historic place and as such is a major tourist attraction.
- The developed Cathedral complex represents the work of a number of architects, builders and craftspeople, including George Gilbert Scott, Robert Speechley, James Tait, Benjamin Mountfort, W Stocks & Co, John Roddis, RL Clark, Cyril Mountfort, RSD Harman, Frederick Gurnsey, Jake Vivian, Paul Pascoe, Giles Scott, and most recently Don Donnithorne, Sir Miles Warren, Larson Architects, Alun Wilkie, Holmes Consulting and CS Luney Ltd.
- The Cathedral forms a chronicle of city history through an accretion of memorial windows, tablets, monuments and plaques within and around the building/ChristChurch Cathedral has historical and social significance as the church built to symbolise the Anglican settlement of Christchurch (CCC statement continues with a brief history)/The multitude of memorial windows, tablets and so forth, within and around the cathedral, create a living history of Canterbury's past and its people.

Cultural and spiritual significance

ChristChurch Cathedral is a place of considerable significance in Christchurch and in New Zealand for the following reasons:

- As the centre of the Anglican diocese in Canterbury/It is the centre of the Anglican diocese; it is still used for worship as well as for concerts, and is a major tourist attraction.
- As a cultural and symbolic centrepiece for the only fully implemented planned city in New Zealand/It is seen by many as symbolising the city as well as reflecting the ideals of its Pakeha founders.
- ChristChurch Cathedral has cultural and spiritual significance as the central church of the Anglican Church in Christchurch. Since 1881, Anglican worship has been conducted in this building. The many memorial tablets, windows, monuments and plaques give this building particular commemorative significance. The cathedral is a symbol for the city and has been the venue for many important commemorative services including the funerals of many well-known Canterbury citizens.

- *The Cathedral is New Zealand's first Anglican cathedral and the oldest surviving cathedral in the country.*

- *The Cathedral has significance as part of the cultural precinct of Christchurch along with associated buildings, such as The Arts Centre and Canterbury Museum.*

Architectural and aesthetic significance

ChristChurch Cathedral is a place of considerable significance in Christchurch and in New Zealand for the following reasons:

- It is a major work of ecclesiastical architecture in New Zealand by the noted English architect, Sir George Gilbert Scott, and the sole example of his work in this country. As one of several Cathedrals and churches he designed for various colonies of the British Empire, it stands as a memorial to the Empire's expansion and the spread of the Anglican faith around the world.

- The present configuration of the building reflects a pattern of incremental change for continuous use for over 120 years, yet it remains largely original in appearance. *This means that the Cathedral has a high degree of authenticity.*

- ChristChurch Cathedral has architectural and aesthetic significance as it was designed to plans sent over from England by leading British Gothic Revival architect Sir George Gilbert Scott (1811-1878). (Statement continues with a history of the construction and supervising architects).

- It is the only Scott-designed church in New Zealand. As one of several churches he designed for various colonies of the British Empire, it stands as a memorial to the empire's expansion and the spread of the Anglican church around the world. Although Mountfort did not design the cathedral, he had a significant influence on the final look, resulting in greater High Victorian emphasis than the original 1864 design.

Technological and craftsmanship significance

- The ChristChurch Cathedral has considerable technological and craftsmanship significance due to the high level of constructional and applied decoration. The ornate interior scheme, which included stained glass windows and decorative tiles, was designed by Benjamin Mountfort.

Contextual significance

ChristChurch Cathedral is a place of considerable significance in Christchurch and in New Zealand for the following reasons:

- As a major landmark and a visual high point located at the heart of the city; it combines with its surroundings and its context within the city to be a significant marker and icon for the Christchurch City.

- The ChristChurch Cathedral has contextual significance due to its location in Cathedral Square. The setting consists of the whole of Cathedral Square. The building is positioned to the east of the open space overlooking the majority of the square itself. The Cathedral has several prominent listed buildings within the immediate environs including the former Government Buildings, the Press building, Warners and the former Lyttelton Times building. The cathedral faces the Canterbury Museum, designed by Mountfort, at the west end of the Worcester Boulevard, the promenade which connects the two buildings. The Boulevard is the city's premier heritage precinct with several key listed buildings including the former Municipal Chambers, the Canterbury Club and the Arts Centre, positioned between the Cathedral and the museum. The cathedral is a major landmark in the centre of the city.

- The ChristChurch Cathedral is a major landmark located at the heart of the city.

Archaeological significance

- The ChristChurch Cathedral is of archaeological significance because it has the potential to provide archaeological evidence relating to past building construction methods and materials, and human activity on the site, possibly including that which occurred prior to 1900.

Another approach to the review of significance for a building of this type is a more simple division of significance, namely ecclesiastical and secular.

Ecclesiastical significance

- The association of the need for a Cathedral with the foundation of Christchurch City.

- The present configuration of the building reflects a pattern of incremental change for continuous use for over 120 years, yet it remains largely original in appearance. *This means that the Cathedral has a high degree of authenticity.*

- It is a major work of ecclesiastical architecture in New Zealand by the noted English architect, Sir George Gilbert Scott, and the sole example of his work in this country. As one of several Cathedrals and churches he designed for various colonies of the British Empire, it stands as a memorial to the Empire's expansion and the spread of the Anglican faith around the world.

Secular significance

- As a building viewed by many as symbolising the city and as reflecting the ideals of the city's founders.

- The building is a major historic place and as such is a major tourist attraction.

- The present configuration of the building reflects a pattern of incremental change for continuous use for over 120 years, yet it remains largely original in appearonce. *This means that the Cathedral has a high degree of authenticity.*

- The developed Cathedral complex represents the work of a number of architects, builders and craftspeople, including George Gilbert Scott, Robert Speechley, James Tait, Benjamin Mountfort, W Stocks & Co, John Roddis, RL Clark, Cyril Mountfort, RSD Harman, Frederick Gurnsey, Jake Vivian, Paul Pascoe, Giles Scott, and most recently Don Donnithorne, Sir Miles Warren, Larson Architects, Alun Wilkie, Holmes Consulting and CS Luney Ltd.

- The Cathedral forms a chronicle of city history through an accretion of memorial windows, tablets, monuments and plaques within and around the building.

- The ChristChurch Cathedral has historical and social significance as the church built to symbolise the Anglican settlement of Christchurch (CCC statement continues with a brief history).

- As a cultural and symbolic centrepiece for the only fully implemented planned city in New Zealand/It is seen by many as symbolising the city as well as reflecting the ideals of its Pakeha founders.

- *The Cathedral has significance as part of the cultural precinct of Christchurch along with associated buildings, such as The Arts Centre and Canterbury Museum.*

- The ChristChurch Cathedral has contextual significance due to its location in Cathedral Square. The setting consists of the whole of Cathedral Square. The building is positioned to the east of the open space overlooking the majority of the square itself. The Cathedral has several prominent listed buildings within the immediate environs including the former Government Buildings, the Press building, Warners and the former Lyttelton Times building. The cathedral faces the Canterbury Museum, designed by Mountfort, at the west end of the Worcester Boulevard, the promenade which connects the two buildings. The Boulevard is the city's premier heritage precinct with several key listed buildings including the former Municipal Chambers, the Canterbury Club and the Arts Centre, positioned between the Cathedral and the museum. The cathedral is a major landmark in the centre of the city.

- The ChristChurch Cathedral is a major landmark located at the heart of the city/As a major landmark and a visual high point located at the heart of the city; it combines

with its surroundings and its context within the city to be a significant marker and icon for the Christchurch City.

- The ChristChurch Cathedral is of archaeological significance because it has the potential to provide archaeological evidence relating to past building construction methods and materials, and human activity on the site, possibly including that which occurred prior to 1900.

Review of significance – Post Earthquakes

Changes to Identified Significance

The series of earthquakes in 2010 and 2011 resulted in catastrophic damage to a wide area around Canterbury and Christchurch. The Cathedral is one of many historic buildings which have suffered significant damage as a consequence of this seismic activity and the heritage landscape of the city has changed considerably. The identified heritage significance of the Cathedral before the earthquakes as summarised above remains unchanged, but the events have in themselves added to the description of significance in several ways, including

- *It has been strongly emphasised in the pre-earthquakes assessment of significance that the Cathedral formed a chronicle of the city's history. The earthquakes and their effect on the building are a continuation of this chronicle and are an addition to the social and historical values of the Cathedral – to reiterate , these are values associated with a particular person, group, event, phase or activity. It is the accretion of these occurrences and the development of social and historical values that often add depth of meaning to our cultural heritage.*

- *The video footage of Cathedral Square immediately following the earthquake with the tower collapsed and crowds of people in shock around the rubble, was viewed by people all around the world and became an international symbol of the February 22nd earthquake. Again this has added to the historical/social and cultural/spiritual significance of the Cathedral.*

- *As a result of the damage sustained to so many heritage buildings in Christchurch and the eradication of so many of these buildings, the cathedral has additional significance for its relative rarity.*

Appendix I: Glossary of Terminology

HolmesConsultingGroup

MEMORANDUM

STRUCTURAL AND CIVIL ENGINEERS

To: Marcus Read

Company: Resource Co-ordination Partnership Ltd.

From: Stuart Oliver

Project No: 106324 Date: 10 October 2011

Subject: Christchurch Cathedral - Definitions

For the purpose of this project the following definitions apply:

Make safe

Any work the ensures the building is made safer for further investigative work; or is work that will ensure the building is propped, secured, protected and made watertight until permanent repairs can be made i.e. work that protects the fabric and the form.

Deconstruction

Taking the building or sections of the building carefully apart in order that all elements can be crated, logged etc to allow for a faithful reconstruction.

Controlled demolition

The demolition of the building in a manner that allows for the careful removal of some elements that can be crated, logged etc and stored for either future incorporation in a new building, part of a latter interpretation program or stored for possible recycling in other conservation projects.

Demolition

Conventional demolition of the building without consideration for removal of elements or contents.

Christchurch

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Best Regards,

Stuart Oliver
TECHNICAL DIRECTOR

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