Christchurch City Council

Burnside RFC & Toilets PRK 0275 BLDG 007

Detailed Engineering Evaluation

Quantitative Assessment Report

Christchurch City Council

Burnside RFC & Toilets Quantitative Assessment Report

Memorial Ave & Roydvale Ave, Burnside

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Date: May 2013
Reference: 6-QUCC1.63
Status: Final

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Summary

Burnside RFC & Toilets
PRK 0275 BLDG 007

Detailed Engineering Evaluation
Quantitative Report - Summary
Final

Background

This is a summary of the quantitative report for the building structure, and is based on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011, visual inspections on 21 and 25 March, and available drawings.

Key Damage Observed

Minor damage has been observed to wall linings and minor cracking to masonry walls.

Critical Structural Weaknesses

No critical structural weaknesses have been identified in the Burnside RFC buildings.

Indicative Building Strength

The building seismic capacity was found to be 31% of the new building standard, and is therefore an earthquake prone building in accordance with the NZSEE classification system. The building's seismic capacity is limited by the welded column to rafter joint of the upper level portal frames of the 1981 extension and the cross bracing in the walls of the original building.

Recommendations

We make the following recommendations:

a) Undertake an intrusive investigation to determine the details, if any, of the roof bracing provided in the original building, and analyse its strength. The roof bracing is expected to be in the roof plane of the wall-braced bay between grids 11 and 12.

b) Strengthening designs should be developed to increase the seismic capacity of the building to at least 67%NBS.

c) Undertake repairs to the corroded portal frame baseplates and holding down bolts.

d) Undertake repairs to damaged wall cladding around the entrance stairwell, and repair block wall cracks.

Contents

1 Introduction

Opus International Consultants Limited has been engaged by Christchurch City Council to undertake a detailed seismic assessment of the Burnside RFC & Toilets building, located at Memorial and Roydvale Avenues, Burnside, Christchurch following the Canterbury Earthquake Sequence since September 2010.

The purpose of the assessment is to determine if the building is classed as being earthquake prone in accordance with the Building Act 2004.

The seismic assessment and reporting have been undertaken based on the qualitative and quantitative procedures detailed in the Detailed Engineering Evaluation Procedure (DEEP) document (draft) issued by the Structural Engineering Society (SESOC) [3] [4].

2 Compliance

This section contains a brief summary of the requirements of the various statutes and authorities that control activities in relation to buildings in Christchurch at present.

2.1 Canterbury Earthquake Recovery Authority (CERA)

CERA was established on 28 March 2011 to take control of the recovery of Christchurch using powers established by the Canterbury Earthquake Recovery Act enacted on 18 April 2011. This act gives the Chief Executive Officer of CERA wide powers in relation to building safety, demolition and repair. Two relevant sections are:

Section 38 – Works

This section outlines a process in which the chief executive can give notice that a building is to be demolished and if the owner does not carry out the demolition, the chief executive can commission the demolition and recover the costs from the owner or by placing a charge on the owners' land.

Section 51 – Requiring Structural Survey

This section enables the chief executive to require a building owner, insurer or mortgagee to carry out a full structural survey before the building is re-occupied.

We understand that CERA require a detailed engineering evaluation to be carried out for all buildings (other than those exempt from the Earthquake Prone Building definition in the Building Act). CERA have adopted the Detailed Engineering Evaluation Procedure (DEEP) document (draft) issued by the Structural Engineering Society (SESOC) on 19 July 2011. This document sets out a methodology for both initial qualitative and detailed quantitative assessments.

It is anticipated that a number of factors, including the following, will determine the extent of evaluation and strengthening level required:

1. The importance level and occupancy of the building.
2. The placard status and amount of damage.
3. The age and structural type of the building.
4. Consideration of any critical structural weaknesses.

Christchurch City Council requires any building with a capacity of less than 34% of New Building Standard (including consideration of critical structural weaknesses) to be strengthened to a target of 67% as required under the CCC Earthquake Prone Building Policy.

2.2 Building Act

Several sections of the Building Act are relevant when considering structural requirements:

Section 112 - Alterations

This section requires that an existing building complies with the relevant sections of the Building Code to at least the extent that it did prior to the alteration. This effectively means that a building cannot be weakened as a result of an alteration (including partial demolition).

The Earthquake Prone Building policy for the territorial authority shall apply as outlined in Section 2.3 of this report.

Section 115 – Change of Use

This section requires that the territorial authority is satisfied that the building with a new use complies with the relevant sections of the Building Code 'as near as is reasonably practicable'.

This is typically interpreted by territorial authorities as being 67% of the strength of an equivalent new building or as near as practicable. This is also the minimum level recommended by the New Zealand Society for Earthquake Engineering (NZSEE).

Section 121 – Dangerous Buildings

This section was extended by the Canterbury Earthquake (Building Act) Order 2010, and defines a building as dangerous if:

1. In the ordinary course of events (excluding the occurrence of an earthquake), the building is likely to cause injury or death or damage to other property; or
2. In the event of fire, injury or death to any persons in the building or on other property is likely because of fire hazard or the occupancy of the building; or
3. There is a risk that the building could collapse or otherwise cause injury or death as a result of earthquake shaking that is less than a 'moderate earthquake' (refer to Section 122 below); or

4. There is a risk that other property could collapse or otherwise cause injury or death; or
5. A territorial authority has not been able to undertake an inspection to determine whether the building is dangerous.

Section 122 – Earthquake Prone Buildings

This section defines a building as earthquake prone (EPB) if its ultimate capacity would be exceeded in a 'moderate earthquake' and it would be likely to collapse causing injury or death, or damage to other property.

A moderate earthquake is defined by the building regulations as one that would generate loads 33% of those used to design an equivalent new building.

Section 124 – Powers of Territorial Authorities

This section gives the territorial authority the power to require strengthening work within specified timeframes or to close and prevent occupancy to any building defined as dangerous or earthquake prone.

Section 131 – Earthquake Prone Building Policy

This section requires the territorial authority to adopt a specific policy for earthquake prone, dangerous and insanitary buildings.

2.3 Christchurch City Council Policy

Christchurch City Council adopted their Earthquake Prone, Dangerous and Insanitary Building Policy in 2006. This policy was amended immediately following the Darfield Earthquake on 4 September 2010.

The 2010 amendment includes the following:

1. A process for identifying, categorising and prioritising Earthquake Prone Buildings, commencing on 1 July 2012;
2. A strengthening target level of 67% of a new building for buildings that are Earthquake Prone;
3. A timeframe of 15-30 years for Earthquake Prone Buildings to be strengthened; and,
4. Repair works for buildings damaged by earthquakes will be required to comply with the above.

The council has stated their willingness to consider retrofit proposals on a case by case basis, considering the economic impact of such a retrofit.

If strengthening works are undertaken, a building consent will be required. A requirement of the consent will require upgrade of the building to comply 'as near as is reasonably practicable' with:

- The accessibility requirements of the Building Code.
- The fire requirements of the Building Code. This is likely to require a fire report to be submitted with the building consent application.

Where an application for a change of use of a building is made to Council, the building will be required to be strengthened to 67% of New Building Standard or as near as is reasonably practicable.

2.4 Building Code

The Building Code outlines performance standards for buildings and the Building Act requires that all new buildings comply with this code. Compliance Documents published by The Department of Building and Housing can be used to demonstrate compliance with the Building Code.

On 19 May 2011, Compliance Document B1: Structure was amended to include increased seismic design requirements for Canterbury as follows:

- increase in the basic seismic design load for the Canterbury earthquake region (Z factor increased to 0.3 equating to an increase of 36 – 47% depending on location within the region);
- Increased serviceability requirements.

2.5 Institution of Professional Engineers New Zealand (IPENZ) Code of Ethics

One of the core ethical values of professional engineers in New Zealand is the protection of life and safeguarding of people. The IPENZ Code of Ethics requires that:

Members shall recognise the need to protect life and to safeguard people, and in their engineering activities shall act to address this need.

1.1 Giving Priority to the safety and well-being of the community and having regard to this principle in assessing obligations to clients, employers and colleagues.

1.2 Ensuring that responsible steps are taken to minimise the risk of loss of life, injury or suffering which may result from your engineering activities, either directly or indirectly.

All recommendations on building occupancy and access must be made with these fundamental obligations in mind.

3 Earthquake Resistance Standards

For this assessment, the building's earthquake resistance is compared with the current New Zealand Building Code requirements for a new building constructed on the site. This is expressed as a percentage of new building standard (%NBS). The loadings are in accordance with the current earthquake loading standard NZS1170.5 [1].

A generally accepted classification of earthquake risk for existing buildings in terms of %NBS that has been proposed by the NZSEE 2006 [2] is presented in Figure 1 below.

Description	Grade	Risk	%NBS	Existing Building Structural Performance	Improvement of Structural Performance	
					Legal Requirement	NZSEE Recommendation
Low Risk Building	A or B	Low	Above 67	Acceptable (improvement may be desirable)	The Building Act sets no required level of structural improvement (unless change in use) This is for each TA to decide. Improvement is not limited to 34%NBS.	100%NBS desirable. Improvement should achieve at least 67%NBS
Moderate Risk Building	B or C	Moderate	34 to 66	Acceptable legally. Improvement recommended		Not recommended. Acceptable only in exceptional circumstances
High Risk Building	D or E	High	33 or lower	Unacceptable (Improvement required under Act)	Unacceptable	Unacceptable

Figure 1: NZSEE Risk Classifications Extracted from table 2.2 of the NZSEE 2006 AISPBE Guidelines

Table 1 below compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% risk of exceedance in 50 years (i.e. 0.2% in the next year).

Table 1: %NBS compared to relative risk of failure

Percentage of New Building Standard (%NBS)	Relative Risk (Approximate)
>100	<1 time
80-100	1-2 times
67-80	2-5 times
33-67	5-10 times
20-33	10-25 times
<20	>25 times

3.1 Minimum and Recommended Standards

Based on governing policy and recent observations, Opus makes the following general recommendations:

3.1.1 Occupancy

The Canterbury Earthquake Order[1] in Council 16 September 2010, modified the meaning of "dangerous building" to include buildings that were identified as being EPB's. As a result of this, we would expect such a building would be issued with a Section 124 notice, by the Territorial Authority, or CERA acting on their behalf, once they are made aware of our assessment. Based on information received from CERA to date and from the DBH guidance document dated 12 June 2012 [6], this notice is likely to prohibit occupancy of the building (or parts thereof), until its seismic capacity is improved to the point that it is no longer considered an EPB.

3.1.2 Cordoning

Where there is an overhead falling hazard, or potential collapse hazard of the building, the areas of concern should be cordoned off in accordance with current CERA/territorial authority guidelines.

3.1.3 Strengthening

Industry guidelines (NZSEE 2006 [2]) strongly recommend that every effort be made to achieve improvement to at least 67%NBS. A strengthening solution to anything less than 67%NBS would not provide an adequate reduction to the level of risk.

It should be noted that full compliance with the current building code requires building strength of 100%NBS.

3.1.4 Our Ethical Obligation

In accordance with the IPENZ code of ethics, we have a duty of care to the public. This obligation requires us to identify and inform CERA of potentially dangerous buildings; this would include earthquake prone buildings.

[1] This Order only applies to buildings within the Christchurch City, Selwyn District and Waimakariri District Councils authority

4 Background Information

4.1 Building Description

The two storey building comprises four parts built in phases over a period exceeding 20 years. These phases are described as the original building, a 1981 extension, a 1990 extension, and the 2002 addition.

Table 2: Description of Building Construction Phases

Construction Phase	Structure
Original Structure	A two storey building approximately 27.2m long and 13.8m wide. The roof structure is constructed of steel portal frames that span over the top of the first floor and is supported at ground level. Ground level comprises a slab-on-grade, with concrete masonry walls supporting 1st floor timber floor and walls.
1981 Extension	A major two storey extension to the original structure approximately 17.4m long and 15.1m wide. The upper level roof is supported on steel portal frames supported off the ground floor reinforced concrete masonry walls at 1st floor level. The 1st floor is approximately 3.32m above ground floor level, while the apex of roof is approximately 7.8m above ground floor. Ground level comprises a slab-on-grade with concrete masonry walls supporting 1st floor timber floor and walls.
1990 Extension	This two storey extension is to the north-eastern face, approximately 5.8m wide x 22.4m long. The outside wall of the structure has been moved outwards with a glass curtain wall. The roof is supported by steel rafters and 1st floor is a reinforced concrete slab supported by concrete masonry walls.
2002 Addition	A small single storey structure measuring 7.2m x 9.6m on plan constructed of reinforced concrete masonry walls and a lightweight timber roof. Minor modifications were undertaken to the main clubhouse buildings.

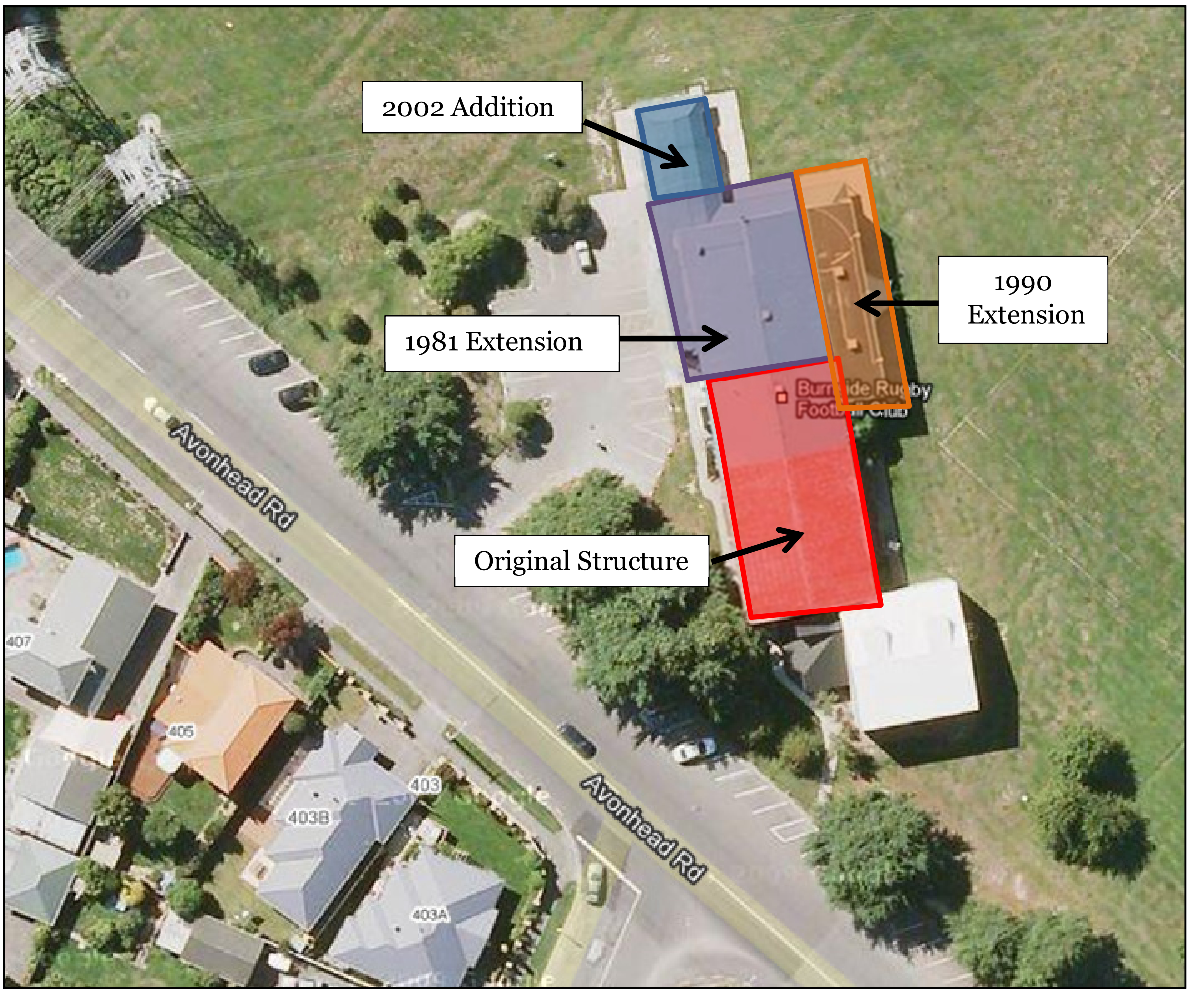


Figure 2: Burnside Rugby Football Club Location and Building Construction Phases

4.2 Survey

4.2.1 Post 22 February 2011 Rapid Assessment

No Level 2 seismic assessment placard was posted on the building but it is our understanding that a post-earthquake assessment was done and that the building "passed", according to a Burnside RFC official. An external inspection of the building was undertaken by an Opus Senior Structural Engineer on 9th June 2012.

4.2.2 Further Inspections

A further inspection was undertaken by Opus on 11 September 2012, to measure and document the structural systems and the extent of internal damage.

4.3 Original Documentation

Copies of the following construction drawings were provided by CCC:

- Architectural drawings by Stewart Ross Designs, titled "Extensions & Alterations to Burnside Rugby Club" dated December 1980, and structural drawings by Endell Lust, Registered Civil Engineer, dated 16/7/1981.
- Architectural Drawings (sheets 1 to 9) by GM Design titled "Burnside Rugby Club" undated but stamped by CCC 24 May 1990, and structural drawings (sheets 1 to 6) by Harding Consulting Engineers Ltd dated Oct 89
- Architectural drawings (sheets 0 to 8) by Colin Stokes titled "Renovations and Additions for Burnside Rugby Football Club", dated Feb 2002.

The drawings have been used to confirm the structural systems, investigate potential critical structural weaknesses (CSW) and identify details which required particular attention.

Copies of design calculations were not provided.

5 Structural Damage

No significant structural damage has been observed following visual inspections undertaken following the 22 February earthquake. There is cracking to plasterboard wall lining, mainly around the upper level walls to the entrance stairs, and also minor block wall cracks, indicating that large displacements have occurred during seismic activity.

We note here that there is significant corrosion to the original building portal frame baseplates and holding down bolts. This is not seismic damage, but repairs should be undertaken to rectify this.

5.1 Surrounding Buildings

The only nearby building is the immediately adjacent squash club building. An external survey of this building did not reveal any significant damage. An internal survey was not undertaken.

5.2 Residual Displacements

No residual displacements of the buildings were identified.

5.3 Foundations

Liquefaction was not evident at the site. No foundation displacements or failure were identified.

5.4 Primary Gravity Structure

Both the original building and the 1981 extension rely on upper level portal frames to provide support to the roof, and lower level concrete masonry load bearing walls support the timber floors. The gravity load bearing structure for the 1990 extension relies on steel roof beams, steel columns to 1st floor level and precast flat slab floors on masonry walls at ground floor.

6 Detailed Seismic Assessment

The detailed seismic assessment has been based on the NZSEE 2006 [2] guidelines for the "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes" together with the "Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury, Part 2 Evaluation Procedure" [3] draft document prepared by the Engineering Advisory Group on 19 July 2011, and the SESOC guidelines "Practice Note – Design of Conventional Structural Systems Following Canterbury Earthquakes" [5] issued on 21 December 2011.

6.1 Critical Structural Weaknesses

The term Critical Structural Weakness (CSW) refers to a component of a building that could contribute to increased levels of damage or cause premature collapse of a building. No critical structural weaknesses have been identified in the Burnside RFC building, extensions and additions.

6.2 Quantitative Assessment Methodology

The method of assessment is an evaluation using seismic loads derived from an equivalent static analysis. Seismic load distribution has been based on considering the upper floor as a single storey structure. Justification of this is based on the very high stiffness of the ground floor masonry walls that would not result in amplification of the earthquake response into the lightweight upper floors and roof.

6.3 Limitations and Assumptions in Results

This analysis is based on an assessment of the building in its undamaged state.

The results have been reported as a %NBS and the stated value is that obtained from our analysis. Despite the use of best national and international practice in this analysis and assessment, this value contains uncertainty due to the many assumptions and simplifications which are made during the assessment. These include:

a. Simplifications made in the analysis, including boundary conditions such as foundation fixity.
b. Assessments of material strengths based on limited drawings, specifications and site inspections. Drawings of the extensions and additions were available but no drawings of the original building were located.
c. The normal variation in material properties which change from batch to batch.
d. Approximations made in the assessment of the capacity of each element, especially when considering the post-yield behaviour.

6.4 Assessment

A summary of the structural performance of the building is shown in the following table. Note that the values given represent the worst performing elements in the building, as these effectively define the building's capacity. Other elements within the building may have significantly greater capacity when compared with the governing elements. This should be considered further when developing the strengthening options, if required.

Table 3: Summary of Seismic Performance

Structural Element/System	Failure Mode	% NBS based on calculated capacity
	Original Building	
Portal frames	Column flexure	**90** (μ=1.25)
	Rafter flexure	**>100** (μ=1.25)
Diagonal cross bracing	Brace tension	**48** (μ=1.0)
	Bolted end connections	**40** (μ=1.0)
Masonry walls	In-plane shear and flexure	**>100** (μ=1.25)
	1981 Extension	
Steel flat roof bracing	Brace tension	**>100** (μ=1.0)
Steel Portal frames	Flexure	**>100** (μ=1.25)
Steel Portal frames Column-rafter welded connection	Web compression / welds	**31** (μ=1.0)
Steel Portal frames Column hold-down bolts	Tension & shear	**>100** (μ=1.0)
Ply wall bracing 1st floor - Across	Web Shear	**61** (μ=3)
Ply wall bracing 1st floor - Along	Web Shear	**50** (μ=3)
Masonry walls ground floor	In-plane shear and flexure	**>100** (μ=1.25)

	1990 Extension	
Ply diaphragm roof bracing	Web shear	**95** (μ=3)
Masonry Walls - Across	In-plane shear and flexure	**>100** (μ=1.25)
Masonry Walls - Along	In-plane shear In-plane flexure	**94** **49%** (μ=1.25)
	2002 Addition	
Masonry walls	Out-of-plane shear Out-of-plane flexure	**70** **100** (μ=1.25)

7 Geotechnical Appraisal

No specific geotechnical assessment has been undertaken. The seismic site parameter used for the structural analysis was Type D, based on geotechnical advice from Opus.

8 Conclusions

a) The original part of the two storey building in its post-earthquake state has a seismic capacity of 40% NBS as limited by the wall cross-bracing. The 1981 extension has a seismic capacity of 31%NBS as limited by the portal frame beam-column joints. The building is therefore classed as earthquake prone.
b) The stand-alone scrum room and stores building (2002 Addition) has a seismic capacity of 70% and is therefore not classed as an earthquake prone building.
c) Strengthening work will be required to the two-storey clubrooms to upgrade the seismic capacity to 67% or more.

9 Recommendations

We make the following recommendations:

a) Undertake an intrusive investigation to determine the details, if any, of the roof bracing provided in the original building, and analyse its strength. The roof bracing is expected to be in the roof plane of the wall-braced bay between grids 11 and 12.

b) Strengthening designs should be developed to increase the seismic capacity of the building to at least 67%NBS.

c) Undertake repairs to the corroded portal frame baseplates and holding down bolts.

d) Undertake repairs to damaged wall cladding around the entrance stairwell, and repair block wall cracks.

10 Limitations

a) This report is based on an inspection of the structures with a focus on the damage sustained from the 22 February 2011 Canterbury Earthquake and aftershocks only.

b) Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at the time.

c) This report is prepared for the CCC to assist with assessing remedial works required for council buildings and facilities. It is not intended for any other party or purpose.

11 References

[1] NZS 1170.5: 2004, Structural design actions, Part 5 Earthquake actions, Standards New Zealand.

[2] NZSEE (2006), Assessment and improvement of the structural performance of buildings in earthquakes, New Zealand Society for Earthquake Engineering.

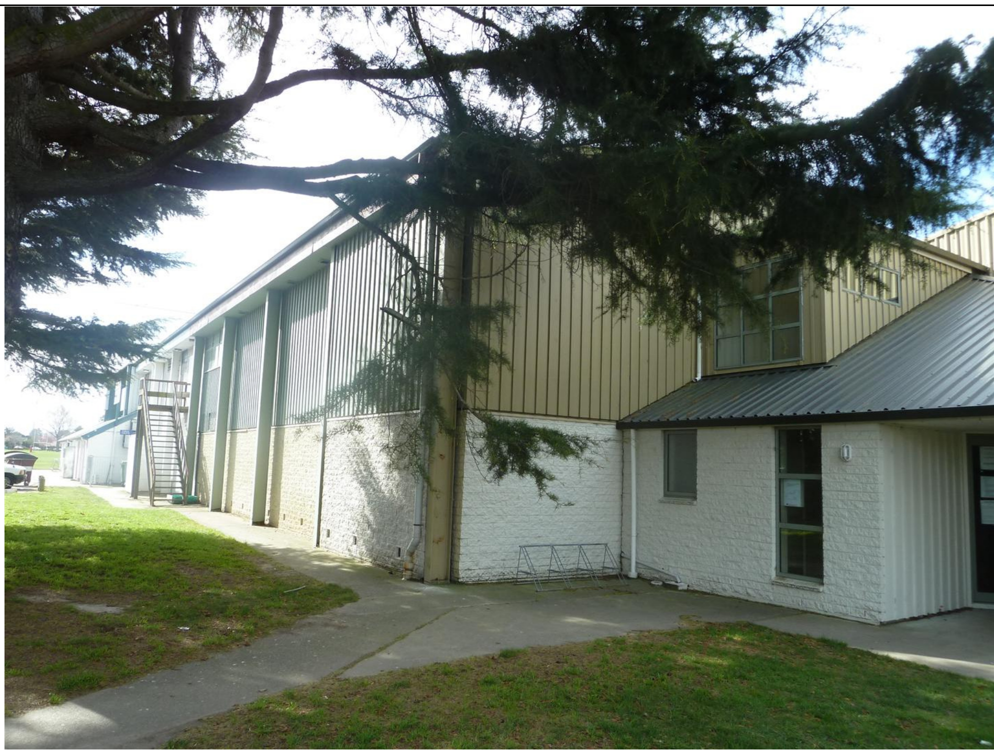
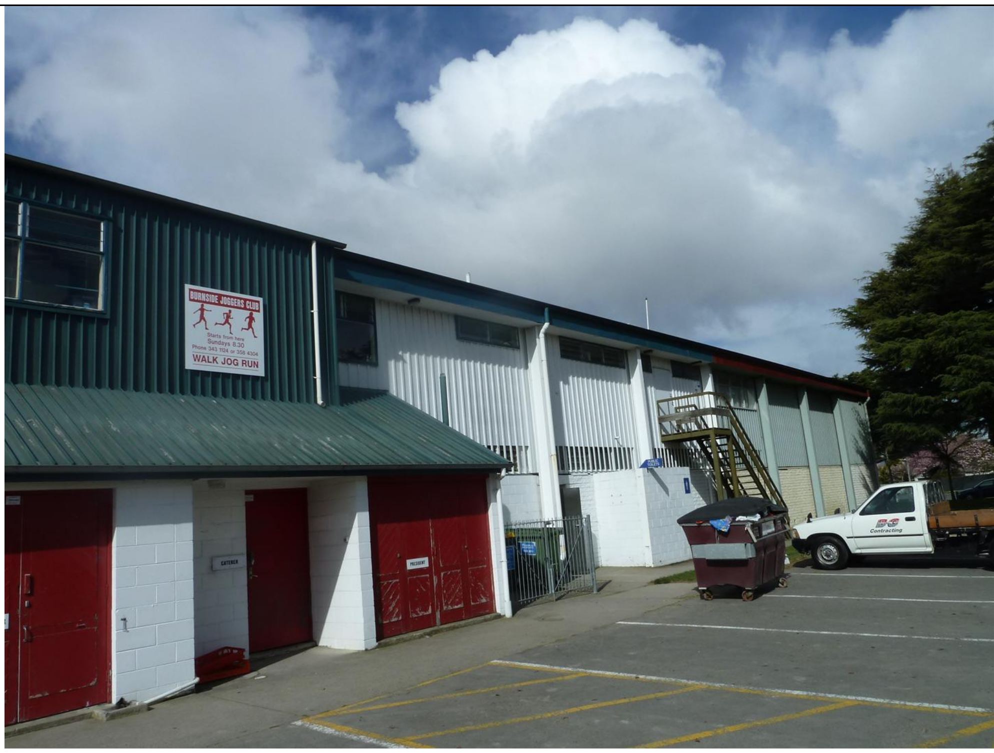
[3] Engineering Advisory Group, Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury, Part 2 Evaluation Procedure, Draft Prepared by the Engineering Advisory Group, Revision 5, 19 July 2011.

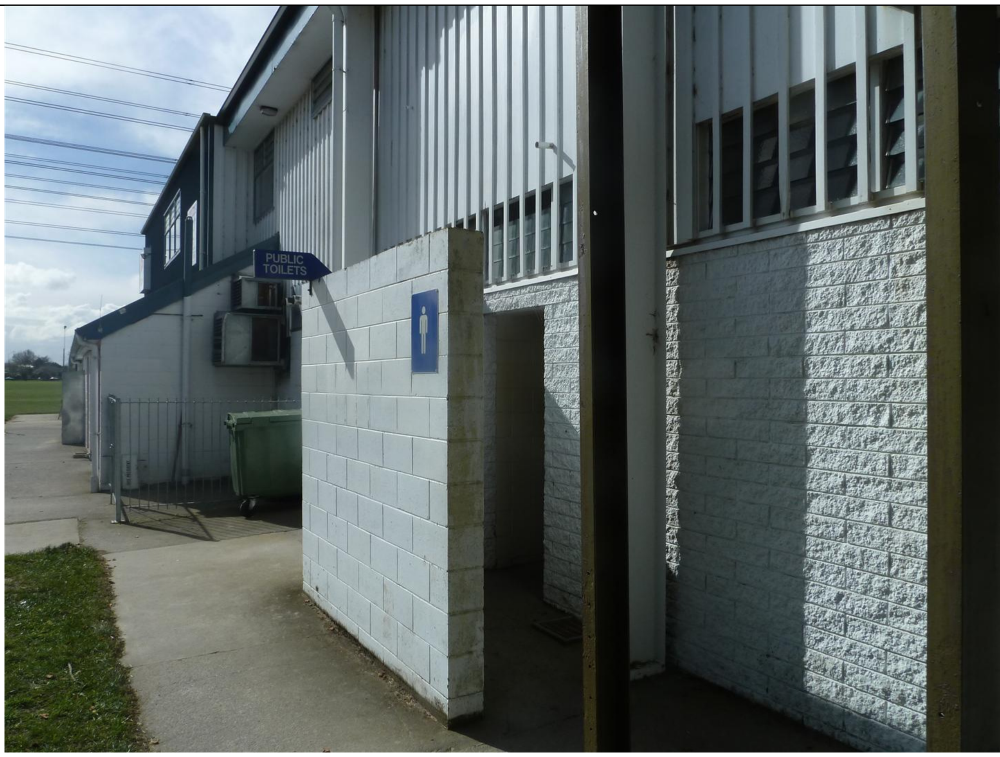
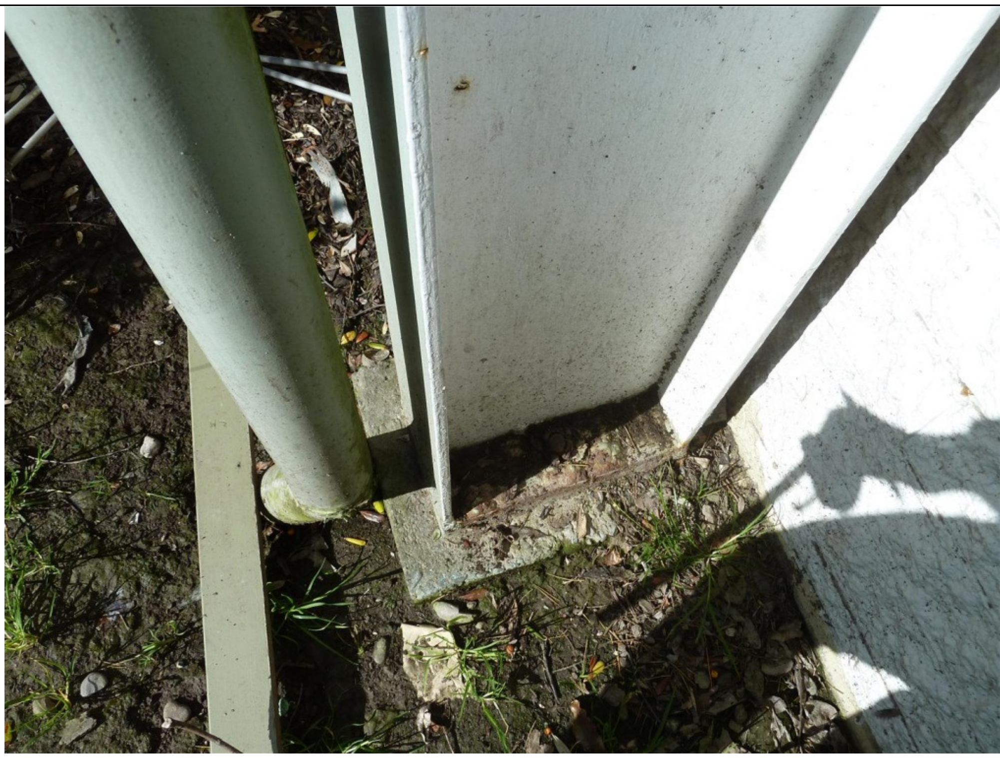
[4] Engineering Advisory Group, *Guidance on Detailed Engineering Evaluation of Non-residential buildings, Part 3 Technical Guidance*, Draft Prepared by the Engineering Advisory Group, 13 December 2011.

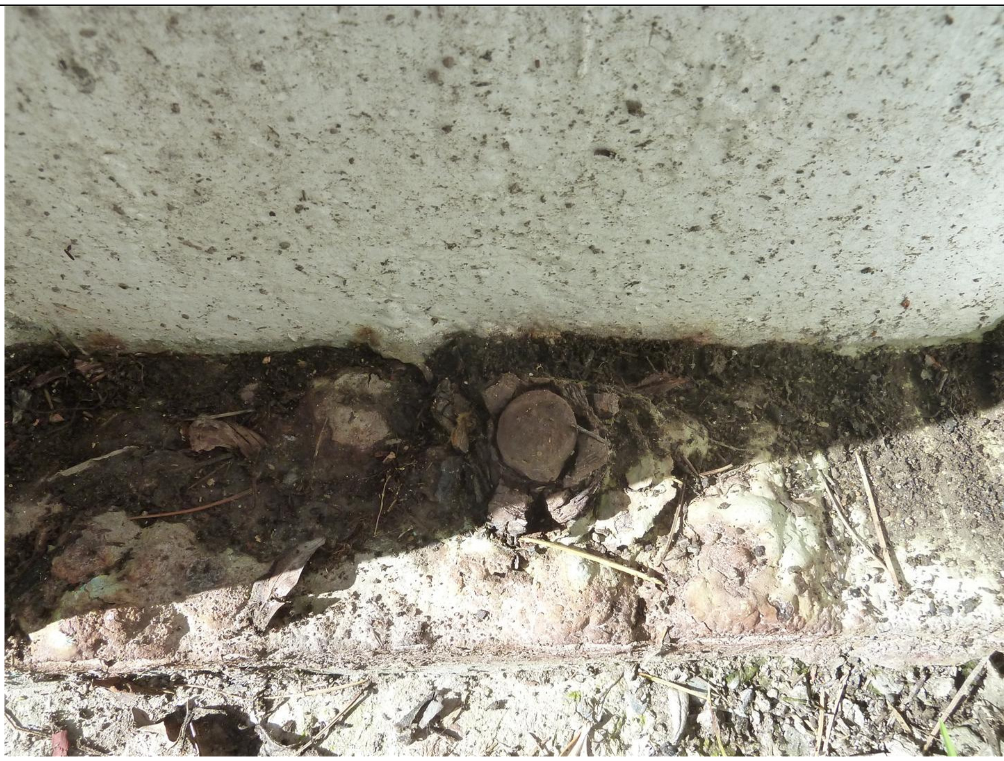
[5] SESOC (2011), Practice Note – Design of Conventional Structural Systems Following Canterbury Earthquakes, Structural Engineering Society of New Zealand, 21 December 2011.

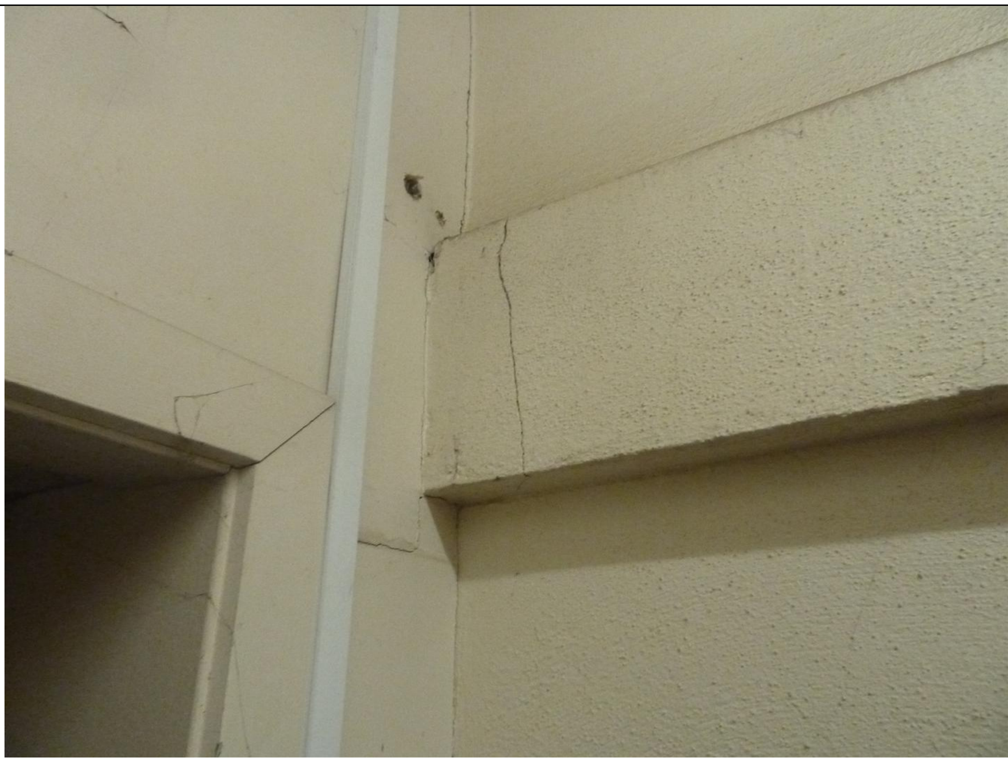
[6] DBH (2012), Guidance for engineers assessing the seismic performance of non-residential and multi-unit residential buildings in greater Christchurch, Department of Building and Housing, June 2012.

Appendix 1 - Photographs

Original Building		
No.	Description	Photo
1.	Southern corner	
2.	SW elevation of Original building with 1981 extension in foreground	

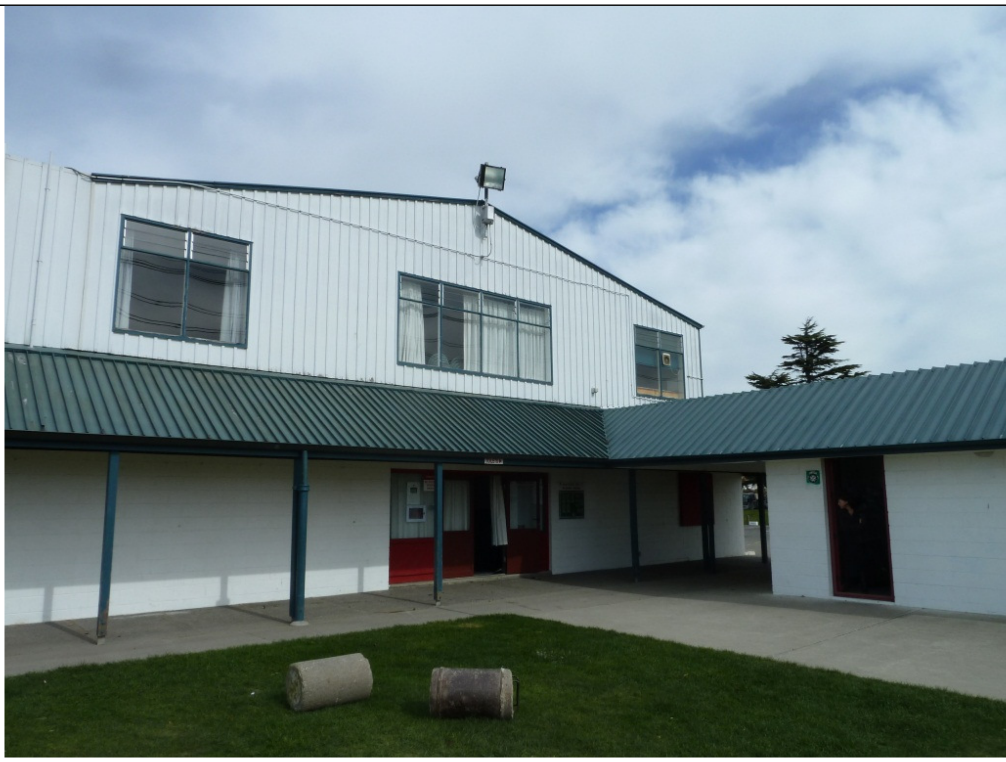
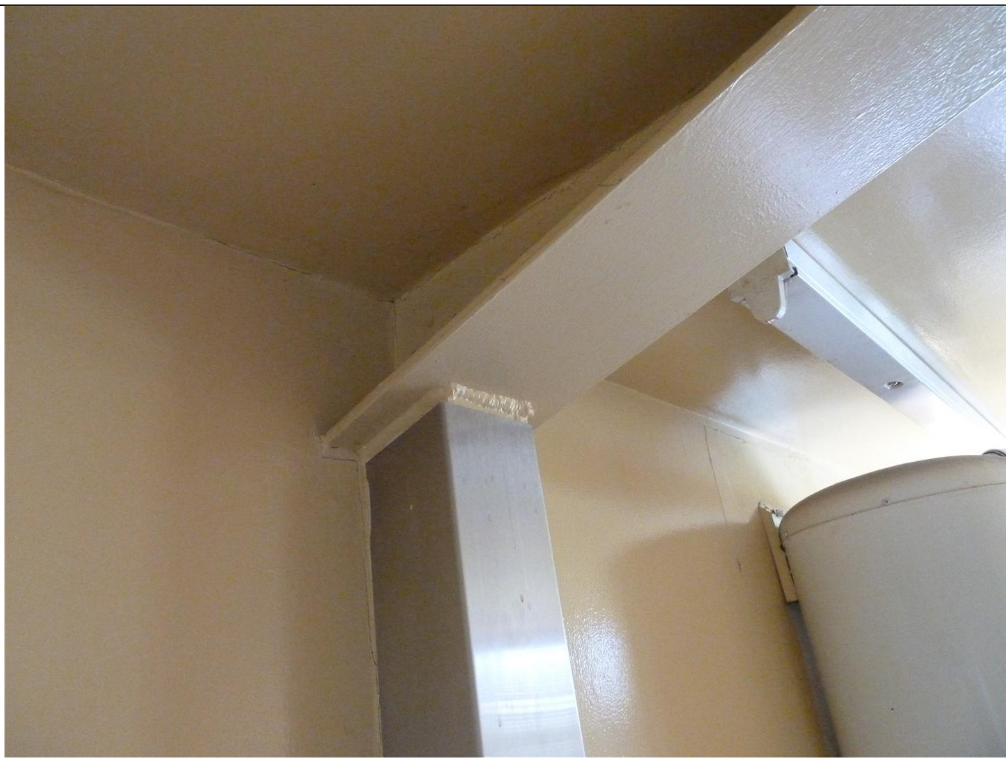
3.	Public Toilets – part of the Original building on the SW	
4.	Portal column view of corroded baseplate	

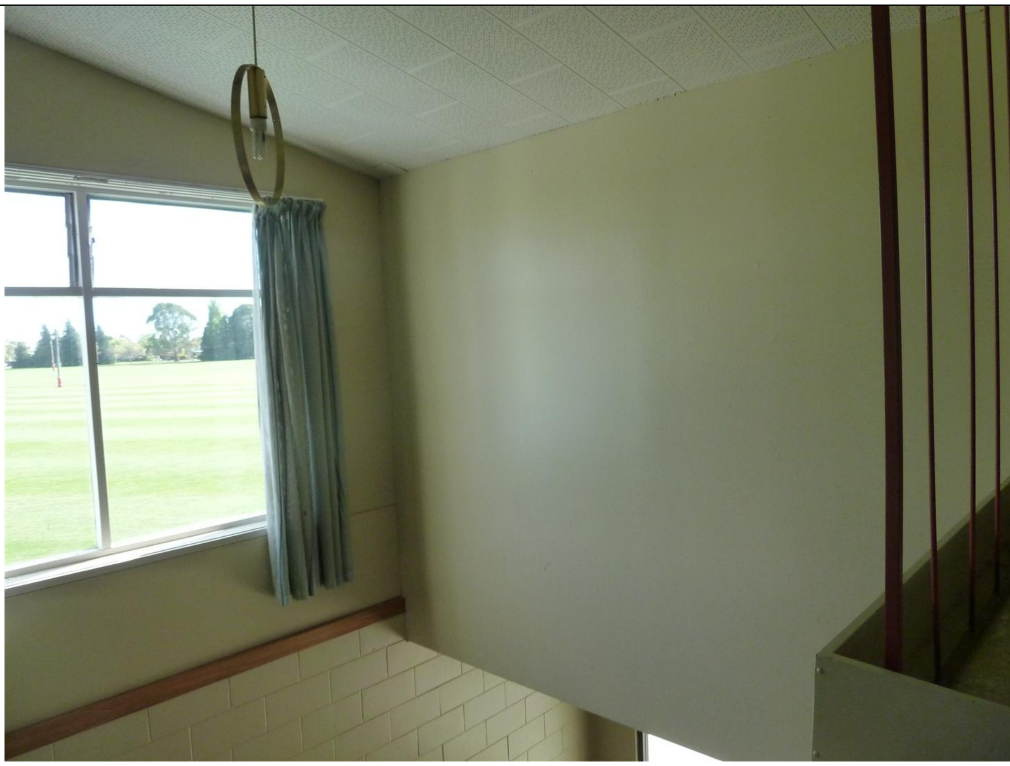
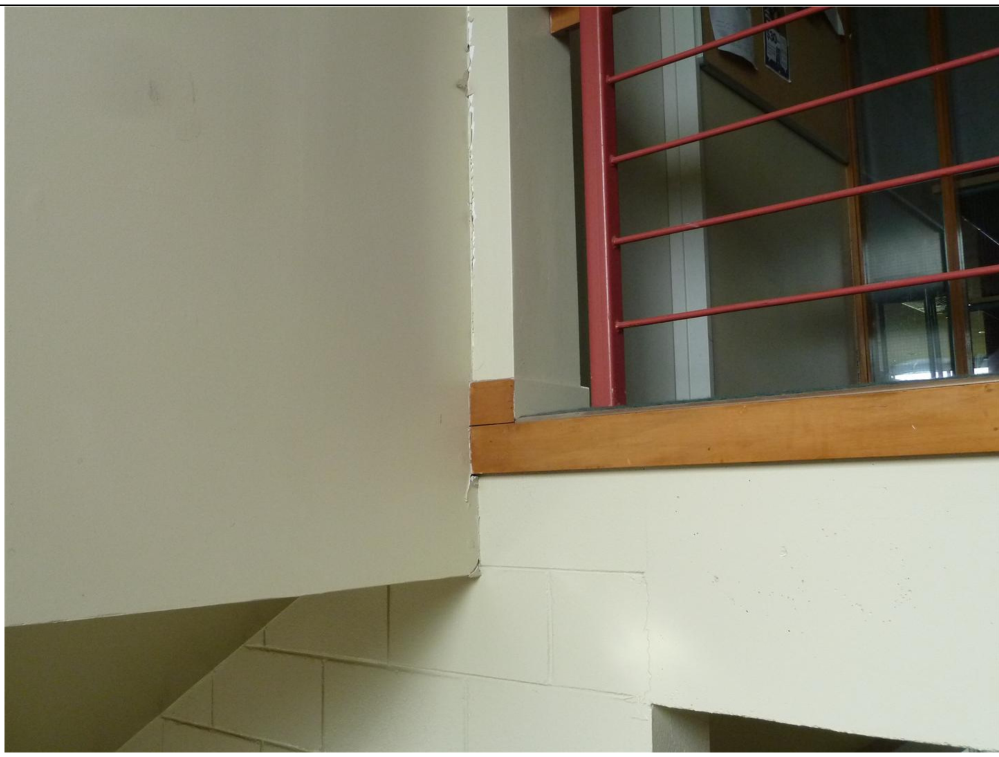
5.	Close-up view of column base showing corroded holding-down nut	
6.	Steel Bracing connection to portal base	

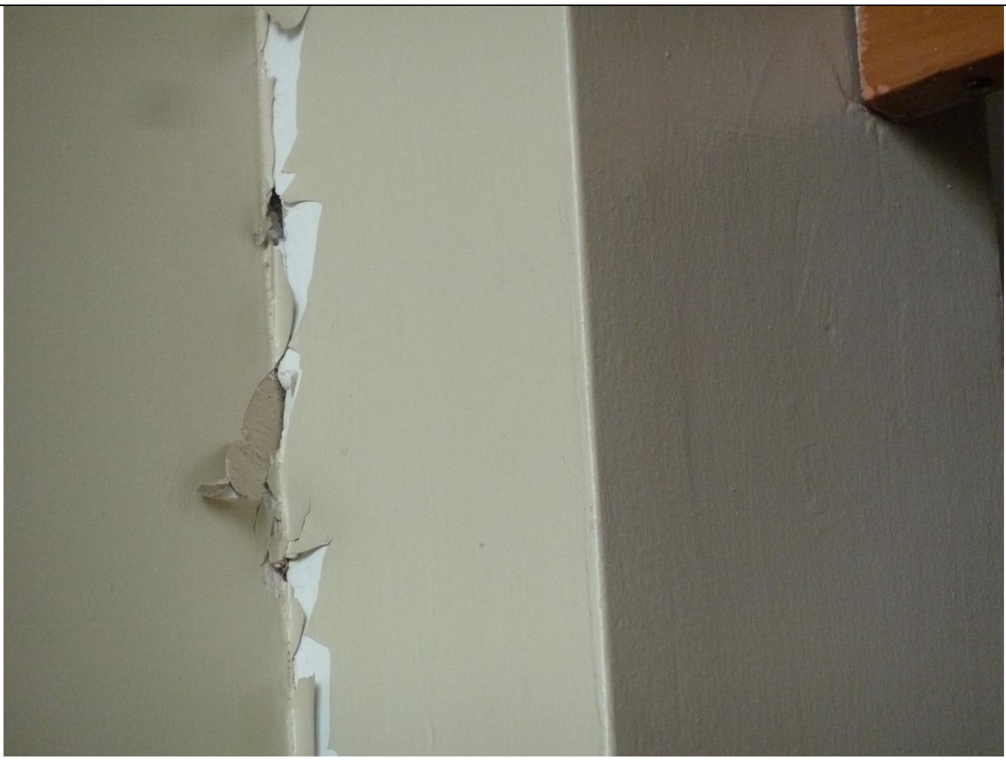
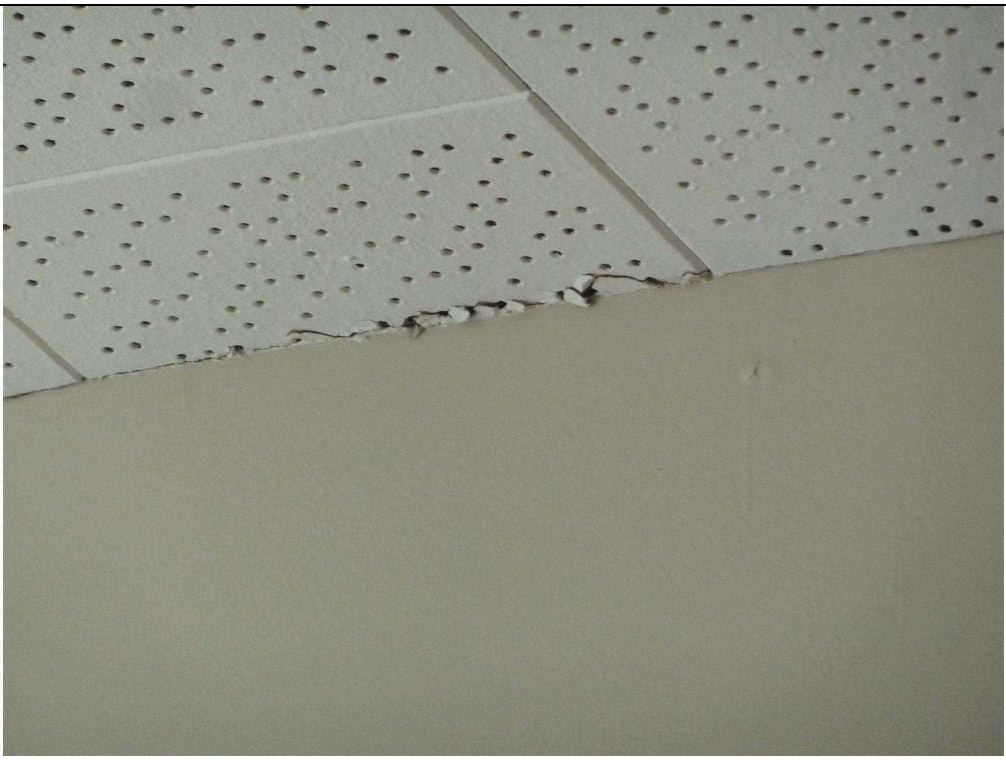
7.	Crack in internal wall bond beam	

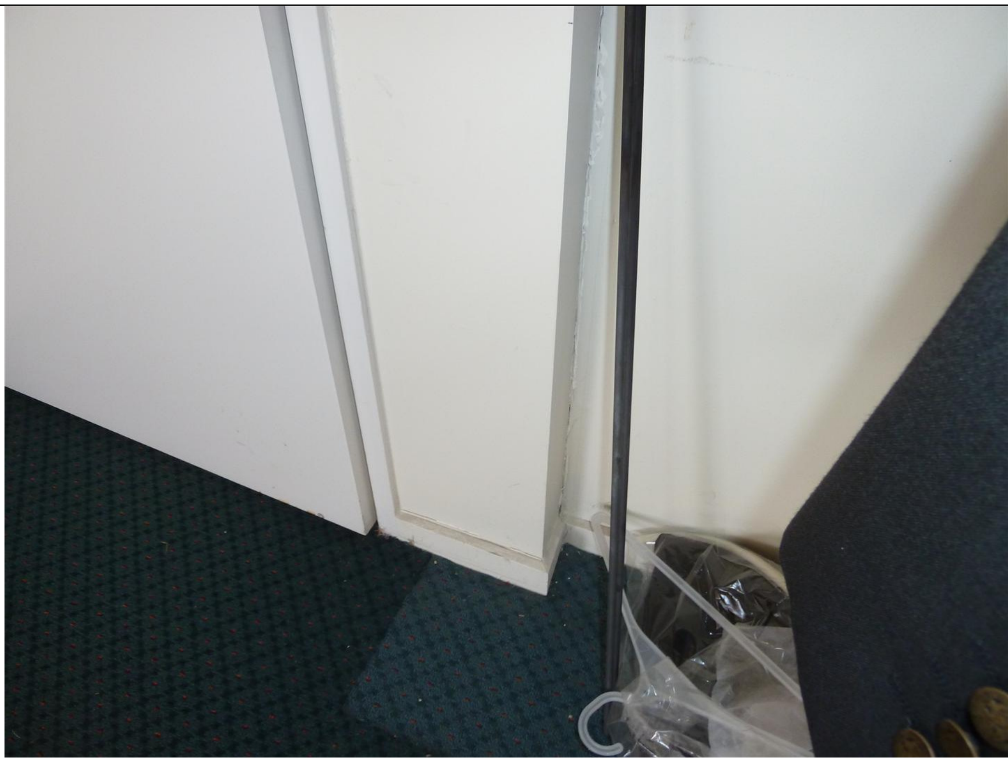
1981 Extension

No.	Description	Photo
8.	SW elevation showing original building in distance	

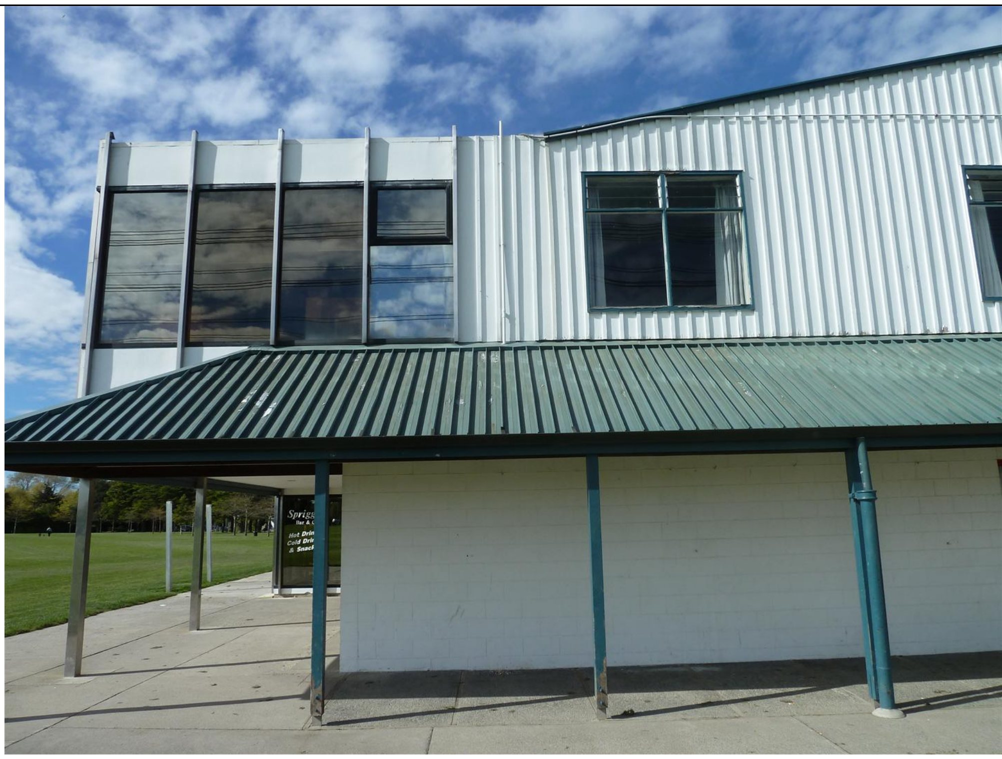
9.	NW elevation	
10.	Portal frame - welded column to rafter joint	

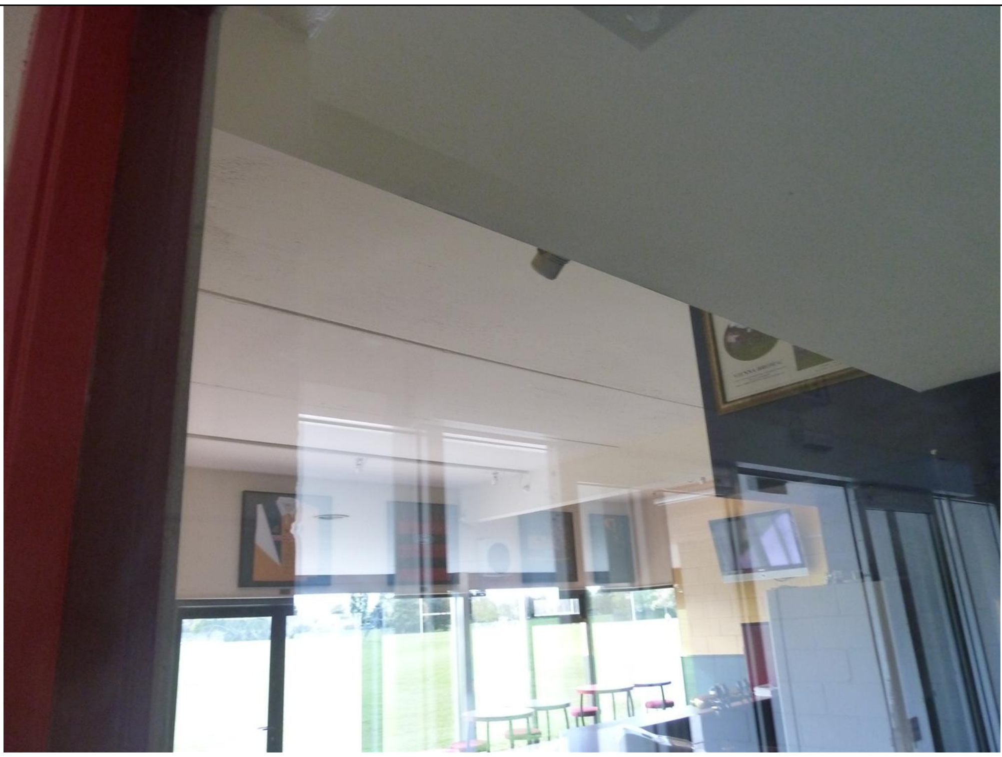
11.	Ply bracing wall over foyer entry stairs	
12.	Cracking at edge of ply bracing wall over foyer entry stairs	

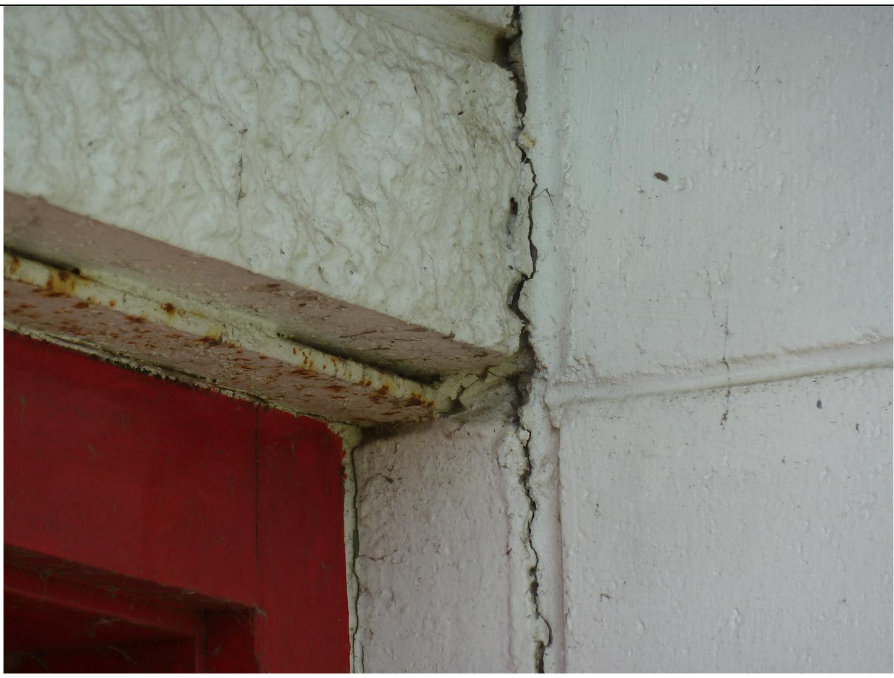
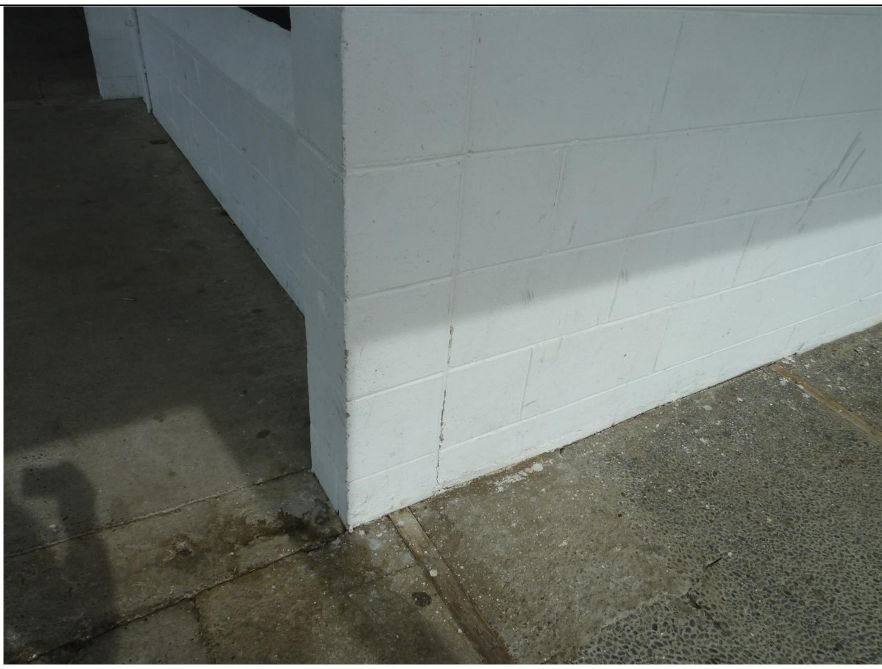
13.	Close up view of ply wall brace cracking	
14.	Wall ceiling cracking to ply bracing wall at foyer entry stairs	

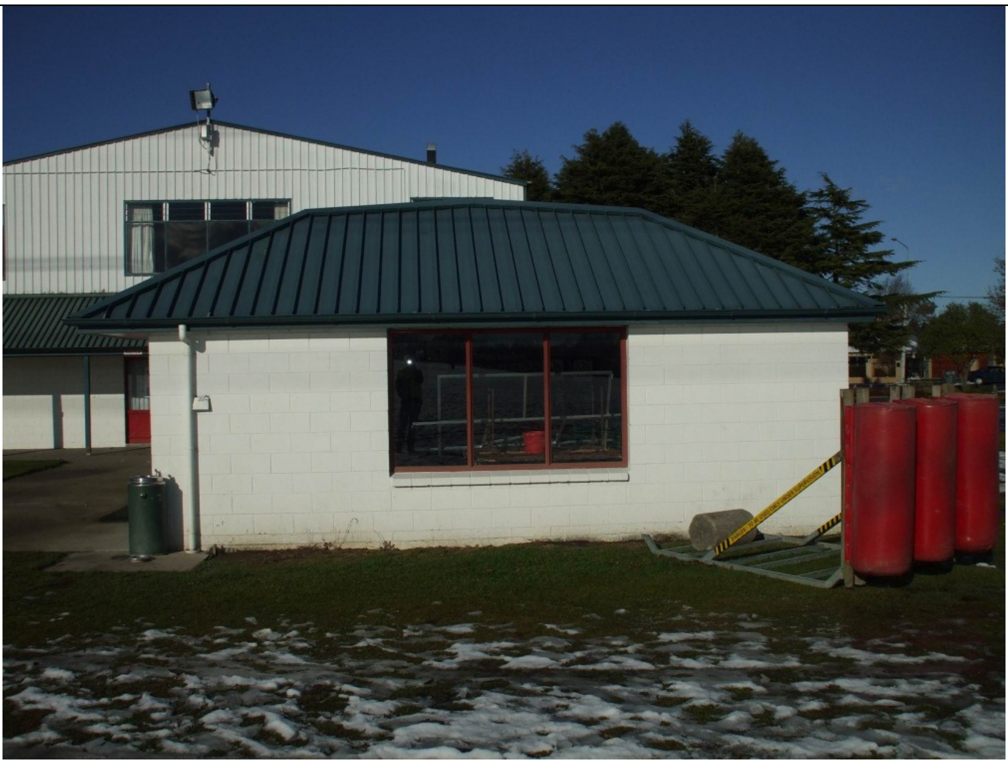
15.	Wall joint cracking to 1st floor office	

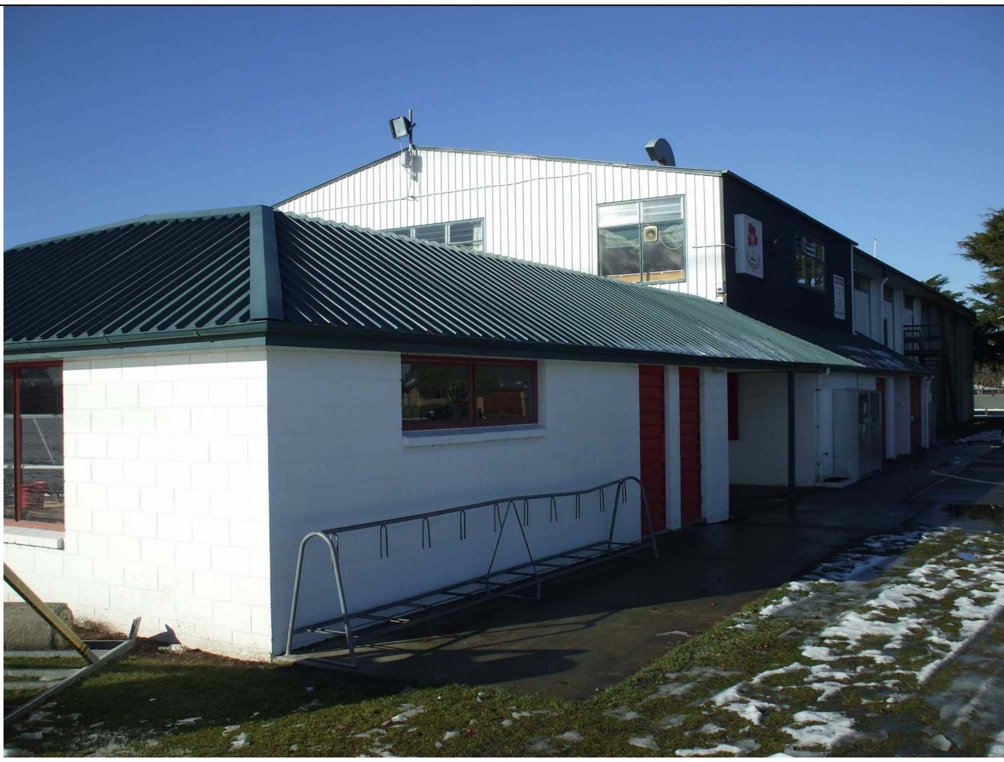
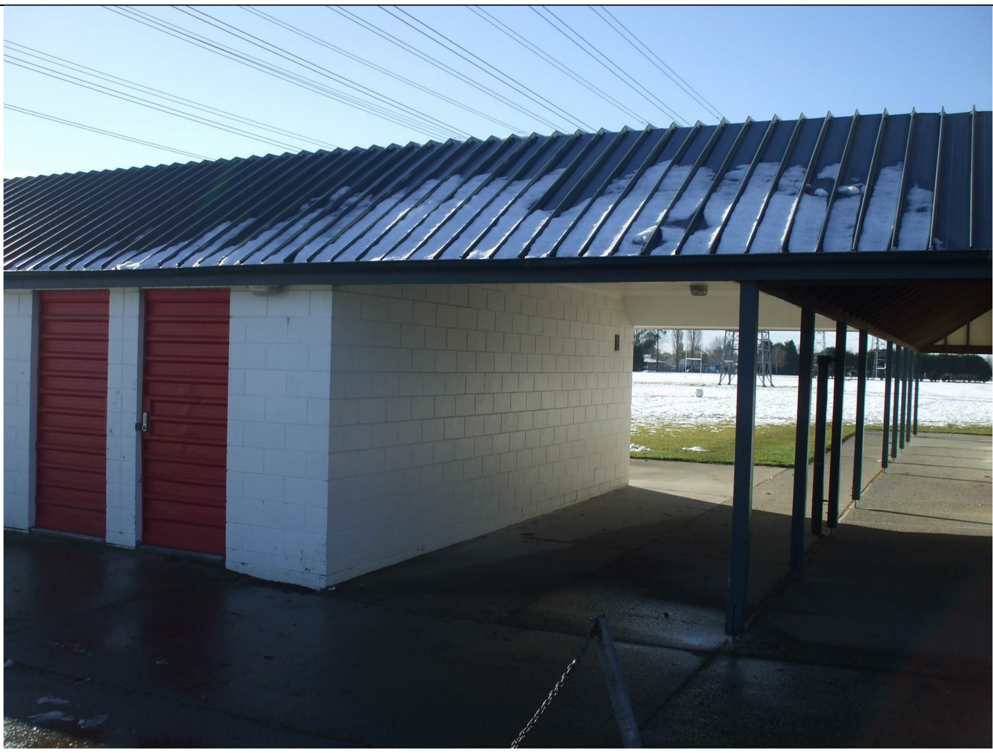
1990 Extension		
No.	Description	Photo
16.	NE Elevation	

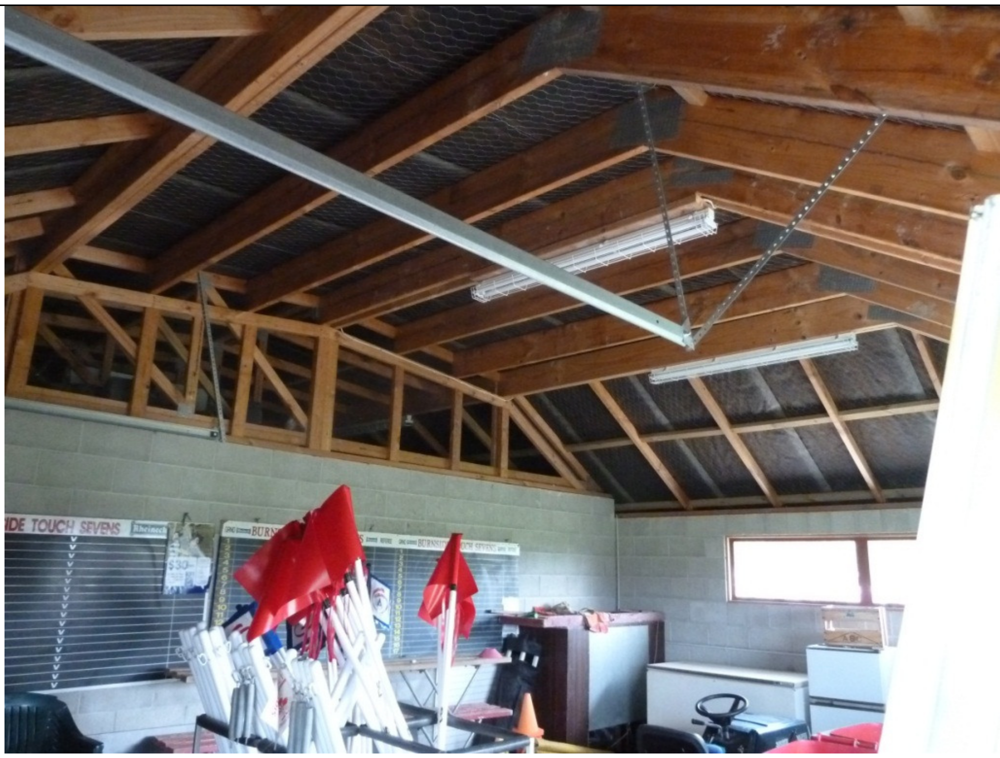
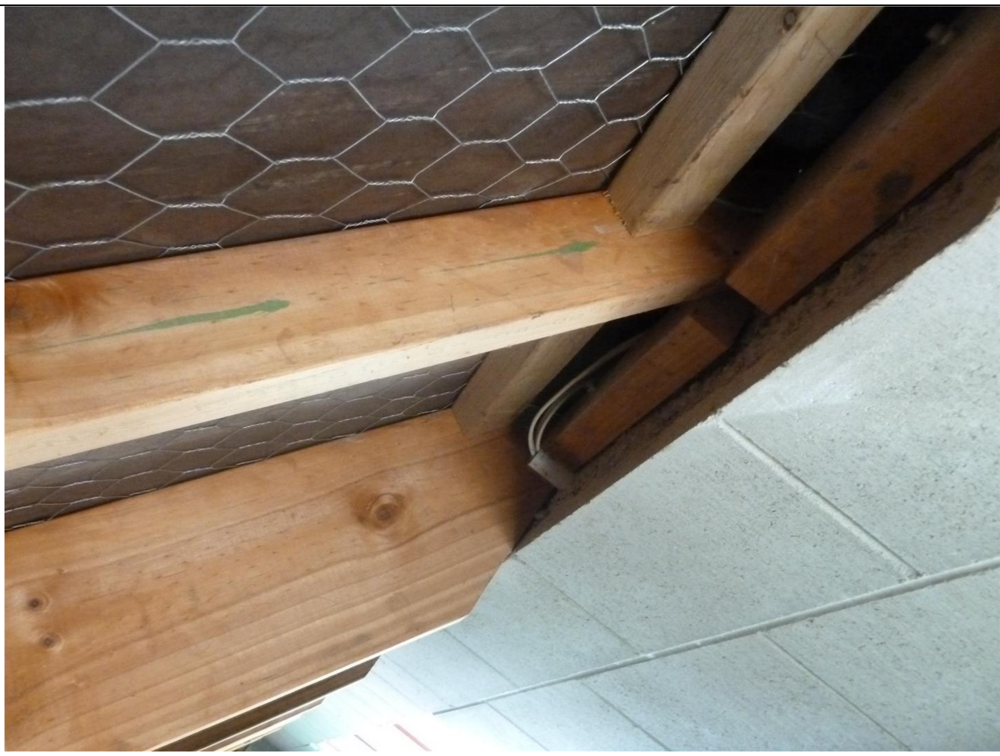
17.	Northern corner	
18.	NW elevation	

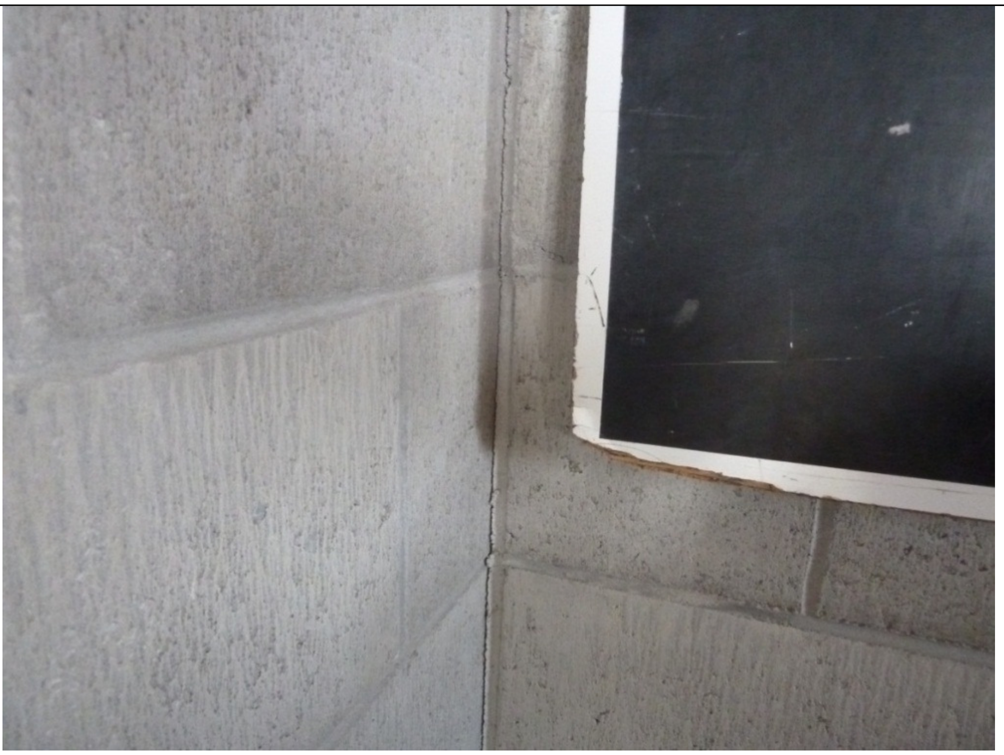
19.	View of underside of precast concrete floor from office	
20.	Block wall interface with original building	

21.	Cracking at joint interface with original building	
22.	Crack in blockwork at interface with 1981 extension	

2002 Addition – Scrum Room & Stores		
No.	Description	Photo
23.	NE Elevation	
24.	NW Elevation	

25.	Western corner	
26.	Southern corner	

27.	Interior showing Roof structure	
28.	Rafter and top plate to masonry wall	

29.	Crack to block wall joint in scrum room	

Appendix 2 – CERA DEE Spreadsheet

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Burnside Rugby Football Club & Toilets	Reviewer:	Jan Stanway
	Unit / No: / Street	CPEng No:	22291
Building Address:	Memorial and Roydvale Avenues	Company:	Opus International Consultants
Legal Description:		Company project number:	6-QUCC1.63
		Company phone number:	03 363 5400
	Degrees / Min / Sec		
GPS south:	43 / 30 / 11.85	Date of submission:	14-May-13
GPS east:	172 / 33 / 37.57	Inspection Date:	6-Jun-12
		Revision:	Final
Building Unique Identifier (CCC):	PRK 0275 BLDG 007	Is there a full report with this summary?	yes

Site

Site slope:	flat	Max retaining height (m):	
Soil type:		Soil Profile (if available):	
Site Class (to NZS1170.5):	D		
Proximity to waterway (m, if <100m):		If Ground improvement on site, describe:	
Proximity to clifftop (m, if < 100m):			
Proximity to cliff base (m,if <100m):		Approx site elevation (m):	

Building

No. of storeys above ground:	2	single storey = 1	Ground floor elevation (Absolute) (m):
Ground floor split?	no	Ground floor elevation above ground (m):	3.30
Storeys below ground	0		
Foundation type:	strip footings	if Foundation type is other, describe:	
Building height (m):	5.70	height from ground to level of uppermost seismic mass (for IEP only) (m):	
Floor footprint area (approx):	835		
Age of Building (years):	40	Date of design:	1976-1992
Strengthening present?	no	If so, when (year)?	
		And what load level (%g)?	
Use (ground floor):	other (specify)	Brief strengthening description:	
Use (upper floors):	other (specify)		
Use notes (if required):	Rugby and squash club		
Importance level (to NZS1170.5):	IL2		

Gravity Structure

Gravity System:	frame system		
Roof:	steel framed	rafter type, purlin type and cladding	310UB portal, 225x50 purlins
Floors:	timber	joist depth and spacing (mm)	250x50 @ 450
Beams:	steel non-composite	beam and connector type	
Columns:	load bearing walls	typical dimensions (mm x mm)	ground floor masonry walls
Walls:	fully filled concrete masonry	#N/A	

Lateral load resisting structure

Lateral system along:	fully filled CMU	**Note: Define along and across in detailed report!**	
Ductility assumed, μ:	1.25	note total length of wall at ground (m):	
Period along:	0.20	##### enter height above at H31 / estimate or calculation?	estimated
Total deflection (ULS) (mm):	1	estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	1	estimate or calculation?	estimated
Lateral system across:	fully filled CMU		
Ductility assumed, μ:	1.25	note total length of wall at ground (m):	
Period across:	0.20	##### enter height above at H31 / estimate or calculation?	estimated
Total deflection (ULS) (mm):	1	estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	1	estimate or calculation?	estimated

Separations:

north (mm):		leave blank if not relevant
east (mm):		
south (mm):		
west (mm):		

Non-structural elements

Stairs:	timber	describe supports	timber stringers & timber posts
Wall cladding:	profiled metal	describe	galv corrugated iron
Roof Cladding:	Metal	describe	300 series trough section
Glazing:	timber frames		
Ceilings:	plaster, fixed		
Services(list):			

Available documentation

Architectural	partial	original designer name/date	various - refer full report
Structural	partial	original designer name/date	various - refer full report
Mechanical		original designer name/date	
Electrical		original designer name/date	
Geotech report		original designer name/date	

Damage

Site: (refer DEE Table 4-2)

Site performance:	very good	Describe damage:	
Settlement:	none observed	notes (if applicable):	
Differential settlement:	none observed	notes (if applicable):	
Liquefaction:	none apparent	notes (if applicable):	
Lateral Spread:	none apparent	notes (if applicable):	
Differential lateral spread:	none apparent	notes (if applicable):	
Ground cracks:	none apparent	notes (if applicable):	
Damage to area:	none apparent	notes (if applicable):	

Building:

	Current Placard Status:			
Along	Damage ratio:	0%	Describe how damage ratio arrived at:	
	Describe (summary):			
Across	Damage ratio:	0%		
	Describe (summary):			
Diaphragms	Damage?:	no	Describe:	
CSWs:	Damage?:	no	Describe:	
Pounding:	Damage?:	no	Describe:	
Non-structural:	Damage?:	no	Describe:	

$$Damage\_Ratio = \frac{(\%NBS\,(before) - \%NBS\,(after))}{\%NBS\,(before)}$$

Recommendations

	Level of repair/strengthening required:	minor structural	Describe:	portal connections, upper level bracing
	Building Consent required:	no	Describe:	
	Interim occupancy recommendations:	full occupancy	Describe:	refer full report
Along	Assessed %NBS before e'quakes:	40%	##### %NBS from IEP below / If IEP not used, please detail assessment methodology:	Quantitative
	Assessed %NBS after e'quakes:	40%		
Across	Assessed %NBS before e'quakes:	31%	##### %NBS from IEP below	
	Assessed %NBS after e'quakes:	31%		

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