Christchurch City Council

Akaroa Weighbridge
PRK 3650 BLDG 002

Detailed Engineering Evaluation

Quantitative Assessment Report

Christchurch City Council

Akaroa Weighbridge

Quantitative Assessment Report

Beach Road, Akaroa

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Akaroa Weighbridge
PRK 3650 BLDG 002

Detailed Engineering Evaluation
Quantitative Report - SUMMARY
Final

Beach Road, Akaroa

Background

This is a summary of the quantitative report for the Akaroa Weighbridge located at Beach Road, Akaroa, and is based on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011, visual inspections on 9 August 2011 and 26 March 2012. No structural or architectural drawings were available.

Key Damage Observed

- Minor transverse cracking of up to 3mm wide to the front porch ground bearing slab;
- Minor separation of approximately 5mm at corner of porch slab;
- Moderate cracking and peeling of pebbledash finish near window opening at the north elevation;
- Minor buckling and cracking to the horizontal fascia board near the base of the north elevation wall ; and
- Minor rotation to the west elevation vertical fascia board adjoining the canopy.

Critical Structural Weaknesses

No critical structural weakness is noted for this building.

Indicative Building Strength

The overall %NBS for this building is 68%.

Strengthening Concepts

In order to achieve 100% NBS, any of the following options can be implemented depending on the respective component's heritage importance:

Option 1 – Replace External Wall Cladding

Remove the entire external pebbledash finish and the timber lath. Install with a single layer of 7mm of plywood using Ecoply bracing details. Apply a new pebbledash finish to the plywood.

Option 2 – Replace Internal Wall Lining

Remove the entire internal timber match lining finishes of the four external walls. Install a single layer of 7mm plywood using Ecoply bracing details. Attach the match lining to the plywood.

Option 3 – Reduce Building Seismic Weight

Replace the existing heavy clay tile roofing with lightweight metal roof cladding.

Recommendations

It is recommended that:

a) The cracking to the external pebbledash finish be repaired as soon as possible and weather-proofed to prevent long term seepage of moisture which could lead to degrading of timber members.

b) The external wall base connection is checked by an engineer when the temporary cladding is removed for permanent repair, to confirm that the bottom timber plate is connected to the foundation. If the building is found to not be well connected to the foundation, we would recommend that this connection be added.

Contents

Figure 1: Akaroa Weighbridge Building

1 Introduction

Opus International Consultants Limited (Opus) has been engaged by Christchurch City Council (CCC) to undertake a detailed seismic assessment of the Akaroa Weighbridge, located at Beach Road, Akaroa (43° 48’ 45.47”S, 172° 57’ 26.00” E) following the M6.3 Christchurch earthquake on 22 February 2011.

The report is a quantitative assessment of the building structure incorporating the key aspects of a qualitative assessment. The methodology is based on the qualitative and quantitative procedures detailed in the Detailed Engineering Evaluation Procedure (DEEP) document (draft) issued by the Structural Engineering Society (SESOC) on 19 July 2011. By inspection of the initial survey, it was apparent that a quantitative assessment would be more appropriate.

This assessment involves a desktop review of existing structural and geotechnical information, including existing drawings and calculations (if available) and undertaking some non-intrusive and intrusive site investigation as necessary. The purpose of the assessment is to:

- determine the likely building performance and damage patterns;
- identify any potential critical structural weaknesses or collapse hazards;
- undertake an analysis of seismic capacity of the bracing systems for seismic loads in the transverse and longitudinal directions to determine the likely building strength in terms of percentage of new building standard (% NBS); and
- Provide recommendations and/or strengthening concepts for the structure if it is found to be less than 33% or 67% NBS.

At the time of this report, no intrusive site investigation of the building structure has been carried out. Such investigation was not needed to reach the conclusions of this report.

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.

Any building with a capacity of less than 33% of new building standard (including consideration of critical structural weaknesses) will need to be strengthened to a target of 67% as required by 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).

Section 115 – Change of Use

This section requires that the territorial authority (in this case) 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 CCC as being 67% of the strength of an equivalent new building. 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.

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:

- 36% increase in the basic seismic design load for Christchurch (Z factor increased from 0.22 to 0.3);
- 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 AS/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 2 below.

Description	Grade	Risk	%NBS	Existing Building Structural Performance
Low Risk Building	A or B	Low	Above 67	Acceptable (improvement may be desirable)
Moderate Risk Building	B or C	Moderate	34 to 66	Acceptable legally. Improvement recommended
High Risk Building	D or E	High	33 or lower	Unacceptable (Improvement required under Act)

Improvement of Structural Performance	
Legal Requirement	NZSEE Recommendation
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
	Not recommended. Acceptable only in exceptional circumstances
Unacceptable	Unacceptable

Figure 2: 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). It is noted that the current seismic risk in Christchurch results in a 6% risk of exceedance 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, 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/Christchurch City Council 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 Akaroa Weighbridge building is a simple rectangular timber framed building with tiled hipped roof and a corrugated iron canopy over the front porch area. The external finish is pebbledash plaster except for the east elevation which appears to be weatherboard panel. The interior walls and ceiling have a timber match lining finish. It is built circa 1910 based on the inscription in front of the building.

The building has an open plan layout with a small partition for toilet facilities at the south east corner of the building. It is currently being used as a tourist souvenir shop.

Figure 3: Building Location (source: Google Earth)

The building is predominately south facing and is approximately 4 m wide by 6.5m long, excluding the veranda. The building footprint is approximately 26 m^2. For the purpose of this report, we refer east to west as the longitudinal direction and north-south as the transverse direction.

4.2 Gravity Load Resisting System

The clay tiled roof is supported on timber battens on timber rafter framing that spans transversely across the building. The rafters are approximately 450mm apart with a bottom chord across. The framing is supported directly on the perimeter timber framed wall.

4.3 Lateral Load Resisting System

The lateral load resisting system is the perimeter timber wall acting primarily as shear wall. The wall is assumed to be constructed with continuous let-in diagonal timber brace, which is typical timber construction practice at the time.

4.4 Foundation

Structural drawings were not available and no exploratory excavations were undertaken. It is likely that the timber floor joists and external walls are founded on perimeter shallow strip footing with the possibility of an internal row of timber piles.

4.5 Survey

4.5.1 Post 22 February 2011 Rapid Assessment

An engineer from Structex undertook structural (Level 2) assessment of the building on 20 January 2012. No significant damage was reported apart from the cracking to north and west external walls.

The building was posted with a Green (G1) placard, indicating that the building access is not restricted.

4.5.2 Further Inspections

On 12 April 2012, an engineer from Opus re-inspected the site for the purpose of a detailed engineering evaluation. The inspection included external and internal visual inspections of all structural elements above foundation level, and areas of damage to structural and non-structural elements. No linings were removed and no physical invasive investigation took place.

4.6 Original Documentation

A basic layout plan and elevation drawing (reference no. CP501638 Sheet 1 of 1) was provided by CCC. The drawing shows some basic plan dimensions and elevation views of the building. See Appendix 3.

5 Damage Assessment

The following damage has been noted:

5.1 Foundation

a) The building's foundation appears to have performed satisfactorily with no observed damage due to the Canterbury earthquake.

b) We were not able to confirm that the building is well connected to the foundation. It is assumed that the building is connected, but we recommend that an engineer is present on site when the temporary wall repairs are undertaken, to inspect the building's foundation connection.

5.2 Floor Slab

a) A transverse cracking of up to 3mm wide is observed to the front porch on ground slab. See Photo 1.

b) Minor separation of approximately 5mm at the west corner of the slab at the porch. See Photo 2.

5.3 Perimeter Wall

a) Moderate cracking and peeling to the north elevation pebbledash finish. However, it is not certain how much of the finish peeling is due to earthquake shaking and how much is due to subsequent vandalism. See Photo 3, 4 and 5.

b) Minor buckling and cracking to the fascia board at the base of the wall. See Photo 3.

c) Minor rotation to the west elevation vertical fascia board adjoining the canopy. This is likely to be caused by the different responses of the roof and the canopy during earthquake shaking, and hence, leaving a permanent residual gap of 20mm at the top of the fascia board. See Photo 6.

6 General Observations

The building has sustained minor damage which is consistent with the expected building performance. This is expected to be cost effective to repair.

7 Critical Structural Weaknesses

As outlined in the Critical Structural Weakness and Collapse Hazards draft briefing document issued by the Structural Engineering Society (SESOC) on 19 July 2011, the term 'Critical Structural Weakness' (CSW) refers to a component/s or structural feature/s of a building that could contribute to increased levels of damage or cause premature collapse of a building.

We have identified no CSW's for this building.

8 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.

This quantitative assessment is intended to initially assess the residual capacity of the building in its undamaged state and then to assess the efficacy of repairs and strengthening as necessary.

8.1 Seismic coefficient parameters

The seismic design parameters based on current design requirements from NZS1170:2002 and the NZBC clause B1 for this building are:

- Site soil class C, clause 3.1.3 NZS 1170:2002
- Site hazard factor, Z=0.3, B1/VM1 clause 2.2.14B
- Return period factor Ru = 1.0 from table 3.5, NZS 1170.5:2004 [1], for an Importance Level 2 structure with a 50 year design life.

Based on these parameters, an equivalent static analysis was carried out to establish the actions on the structural elements.

8.2 Expected ductility factor

Based on our assessment of the building structural layout and using guidance from the timber structures standard NZS3603:1993 and NZS3604:2011, our estimates for the expected maximum structural ductility factor for the primary seismic resisting systems are as follows:

Table 2: Ductility factors

Direction	Element	μ_{max}
Transverse	Perimeter timber framed wall	2.0
Longitudinal	Perimeter timber framed wall	2.0

8.3 Limitations and Assumptions in Results

The results have been reported as a %NBS and the stated value is that obtained from our analysis and assessment. 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:

- Simplifications made in the analysis, including boundary conditions such as foundation fixity;
- Assessments of material strengths based on limited drawings, specifications and site inspections;
- The normal variation in material properties which change from batch to batch; and
- Approximations made in the assessment of the capacity of each element.

8.4 Analysis Methodology

The seismic force arising from the roof mass is distributed to the perimeter timber wall frame. There is no evidence of any cross bracing within the roof framing, but there is a timber match lining ceiling. Because of this, and the small size of the building we assumed that the roof framing has sufficient rigidity to distribute seismic forces to the perimeter framing.

Key Components Analysed

Since the building size is small and the plan is regular, the seismic force in both orthogonal directions is checked against the respective in-plane capacities of the perimeter walls that are parallel to the direction of the seismic force.

8.5 Results of Analysis

The results of the analysis are reported in the following table as %NBS, where for the component:

$$\% NBS = \frac{\text{Reliable Strength}}{\text{New Building Standard force}}$$

Table 3: Summary of Seismic Performance

Component	Seismic Rating %NBS
Transverse direction • East and west elevation perimeter timber wall	83% NBS
Longitudinal direction • North and south elevation perimeter timber wall	68% NBS

Hence, the overall %NBS for this building is 68%.

8.6 Evaluation of Results

The overall result is generally consistent with the damage sustained by the building.

9 Geotechnical Assessment

9.1 Regional Geology

The published geological map of the area, (Geology of the Christchurch Area 1:250,000, Forsyth, Barrell and Jongens, 2008) indicates the site is located on grey river alluvium comprising gravel, sand and silt in active floodplains.

9.2 Peak Ground Acceleration

Interpolation of United States Geological Survey (USGS) Shakemap: South Island of New Zealand (22 Feb, 2011) indicates that this location has likely experienced a Horizontal Peak Ground Acceleration (PGA) of approximately 0.05g to 0.1 g during the 22nd February 2011 Earthquake. Estimated PGA's have been cross checked with Geonets' Modified Mercalli intensity scale observations.

9.3 Expected Ground Conditions

No relevant site investigation data is available from Environment Canterbury database in the vicinity of this building.

9.4 Site Observations

The building was inspected by an Opus Structural Engineer on the 12th April 2012. The following observations were made from photographs taken during the site visit.

- The Weighbridge building is located on a flat site, approximately 35m east of the Akaroa Wharf.
- The north-west corner of the building is located within 1.5m of the crest of the seawall. The Weighbridge building is likely to be founded on fill material, underlain by alluvial deposits.
- The building appears to be founded on a concrete perimeter strip footing (unknown dimensions).
- A 3mm wide crack in the concrete slab extends from the door to the edge of the concrete pad on the south elevation of the building (Photo 1).
- The concrete pad at the south east corner of the building appears to have moved laterally by 10mm (Photo 2).
- Lateral movement appears to have occurred at the foundation/super-structure interface in the centre of the north elevation of the building.
- The pavement surrounding the building does not appear to have been affected by the recent seismic events.

9.5 Conclusions and Discussion

The existing foundations of the Akaroa Weighbridge building appear to have performed satisfactorily in the recent seismic events. No liquefaction has been observed in the vicinity of the site. Minor cracking and lateral movement of up to 10mm has been observed. The minor cracking and movement of the concrete pad along the south of the building appears to have been caused by ground shaking.

The building is likely to be founded on fill material, the source and liquefaction potential of the fill is currently unknown. The performance of the Weighbridge Building in future seismic events will be strongly influenced by the stability of the existing sea wall. Further damage is anticipated in a design level earthquake. If CCC wish to quantify the liquefaction hazard for this building, site investigations and a detailed stability assessment of the seawall would be required. Based on observations and the performance of the site, further geotechnical investigation and assessment are currently not recommended at this stage.

10 Strengthening Concepts

If it is desired to strengthen the building to achieve a capacity of 100% NBS, any of the following options can be implemented depending on the respective component's heritage importance:

Option 1 – Replace External Wall Cladding

- On both the east and west elevations, remove the entire external pebbledash finish and the timber lath. Install with a single layer of 7mm of plywood using Ecoply bracing details. Apply a new pebbledash finish to the plywood. Although only a minimum length of 1.5 m per wall is required to achieve the bracing capacity, a full replacement is proposed for practical and cost effectiveness purposes; and
- Similar as above, remove the entire external pebbledash finish and the timber lath. Install with a single layer of 7mm of plywood using Ecoply bracing details. As a minimum, at least 3.8m of the north wall and the entire south wall need to be replaced.

Option 2 – Replace Internal Wall Lining

- Remove the entire internal timber match lining finishes of the four external walls. Install a single layer of 7mm plywood using Ecoply bracing details. Attach the match lining to the plywood.

Option 3 – Reduce Building Seismic Weight

- Replace the existing heavy clay tile roofing with lightweight metal roof cladding.

11 Conclusion & Recommendation

a) The overall %NBS for this building is 68%, and therefore no strengthening work is required.

b) It is recommended that:

- The cracking to the external pebbledash finish be repaired as soon as possible and weather-proofed to prevent long term seepage of moisture which could lead to degrading of timber members.
- The external wall base connection is checked by an engineer when the temporary cladding is removed for permanent repair, to confirm that the bottom timber plate is connected to the foundation. If the building is found to not be well connected to the foundation, we would recommend that this connection be added.

12 Limitations

a) This report is based on an inspection of the structure of the building and focuses on the structural damage resulting from the 22 February Canterbury Earthquake and aftershocks only. Some non-structural damage is described but this is not intended to be a complete list of damage to non-structural items.

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 this time.

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

13 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, *Practice Note – Design of Conventional Structural Systems Following Canterbury Earthquakes*, Structural Engineering Society of New Zealand, 21 December 2011.

Appendix 1

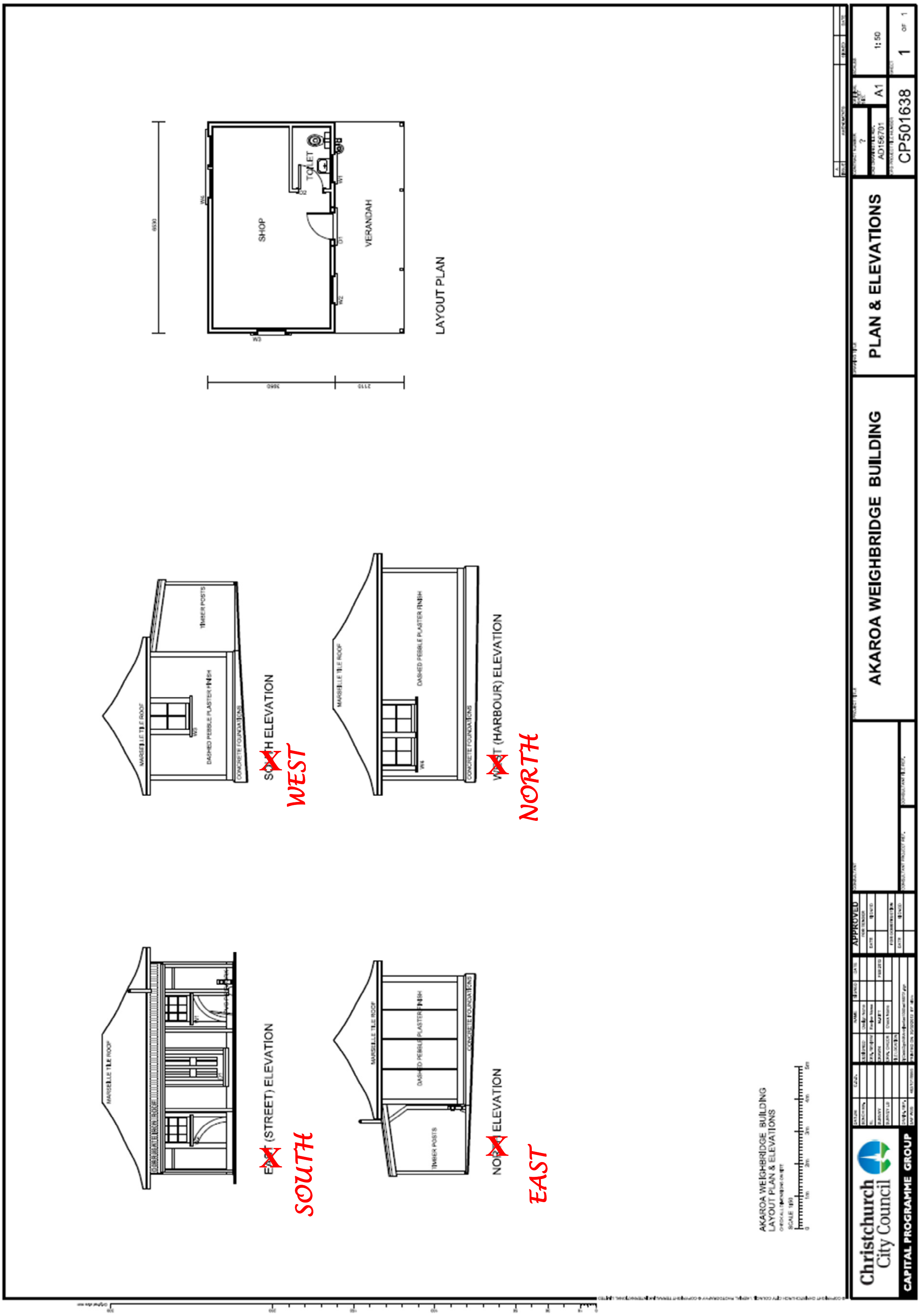
PHOTOGRAPHS

No.	Item description	Photo
1.	Cracking to ground bearing slab at several locations	
2.	Minor separation at the west corner of slab at porch.	
3.	Moderate peeling to north elevation pebbledash finish (prior to temporary repair) and minor buckling to base fascia board	

4.	Cracking to north elevation pebbledash finish	
5.	Existing temporary repair to the north elevation wall	
6.	Rotation to the top of the front canopy at the west corner. Gap at top measured approximately 20 mm.	

Appendix 2

DRAWING


LAYOUT PLAN
SHOP
TOILET
VERANDAH
SOUTH ELEVATION
WEST
WEST (HARBOUR) ELEVATION
NORTH
EAST (STREET) ELEVATION
SOUTH
NORTH ELEVATION
EAST
MARSEILLE TILE ROOF
DASHED PEBBLE PLASTER FINISH
CONCRETE FOUNDATIONS
TIMBER POSTS
AKAROA WEIGHBRIDGE BUILDING
PLAN & ELEVATIONS
APPROVED
A1
1:50
CP501638
1
Christchurch City Council
CAPITAL PROGRAMME GROUP

Appendix 3

DEE SPREADSHEET

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Akaroa Weighbridge
Building Address: (Unit / No: / Street)	Beach Road, Akaroa
Legal Description:	
GPS south: (Degrees / Min / Sec)	
GPS east:	
Building Unique Identifier (CCC):	PRK 3650 BLDG 002
Reviewer:	Jan Stanway
CPEng No:	222291
Company:	OPUS International Consultants Ltd
Company project number:	6-QUCCC.79
Company phone number:	3635400
Date of submission:	26-Sep-13
Inspection Date:	12-Apr-12
Revision:	Final
Is there a full report with this summary?	yes

Site

Site slope:	flat
Soil type:	silty sand
Site Class (to NZS1170.5):	C
Proximity to waterway (m, if <100m):	10
Proximity to clifftop (m, if < 100m):	
Proximity to cliff base (m,if <100m):	
Max retaining height (m):	
Soil Profile (if available):	
If Ground improvement on site, describe:	
Approx site elevation (m):	0.00

Building

No. of storeys above ground:	1 (single storey = 1)
Ground floor split?	no
Storeys below ground	0
Foundation type:	strip footings
Building height (m):	4.30
Floor footprint area (approx):	26
Age of Building (years):	102
Ground floor elevation (Absolute) (m):	2.50
Ground floor elevation above ground (m):	0.10
if Foundation type is other, describe:	
height from ground to level of uppermost seismic mass (for IEP only) (m):	3
Date of design:	Pre 1935
Strengthening present?	no
If so, when (year)?	
And what load level (%g)?	
Brief strengthening description:	
Use (ground floor):	retail
Use (upper floors):	
Use notes (if required):	
Importance level (to NZS1170.5):	IL2

Gravity Structure

Gravity System:	load bearing walls
Roof:	timber framed
Floors:	timber
Beams:	
Columns:	
Walls:	
rafter type, purlin type and cladding	190x45 / clay tile
joist depth and spacing (mm)	not visible

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along:	lightweight timber framed walls
Ductility assumed, μ:	2.00
Period along:	0.25 (0.00)
Total deflection (ULS) (mm):	
maximum interstorey deflection (ULS) (mm):	
note typical wall length (m)	3.8
estimate or calculation?	estimated
estimate or calculation?	
estimate or calculation?	
Lateral system across:	lightweight timber framed walls
Ductility assumed, μ:	2.00
Period across:	0.25 (0.00)
Total deflection (ULS) (mm):	
maximum interstorey deflection (ULS) (mm):	
note typical wall length (m)	3.95
estimate or calculation?	estimated
estimate or calculation?	
estimate or calculation?	

Separations:

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

Non-structural elements

		Describe
Stairs:		
Wall cladding:	plaster system	pebbledash
Roof Cladding:	Heavy tiles	clay tiles
Glazing:	timber frames	
Ceilings:	strapped or direct fixed	timber match lining
Services(list):	none	

Available documentation

		original designer name/date
Architectural	partial	basic layout
Structural	none	
Mechanical	none	
Electrical	none	
Geotech report	none	

Damage

Site: (refer DEE Table 4-2)

		notes (if applicable)
Site performance:		Describe damage:
Settlement:	none observed	
Differential settlement:	none observed	
Liquefaction:	none apparent	
Lateral Spread:	0-50mm	<5mm (possibly historical)
Differential lateral spread:	none apparent	
Ground cracks:	none apparent	
Damage to area:	slight	

Building:

Current Placard Status:	green
Along — Damage ratio:	0%
Along — Describe (summary):	
Across — Damage ratio:	0%
Across — Describe (summary):	
Describe how damage ratio arrived at:	

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

	Damage?	Describe
Diaphragms	no	
CSWs:	no	
Pounding:	no	
Non-structural:	yes	Cracking to external cladding

Recommendations

		Describe
Level of repair/strengthening required:	minor structural	
Building Consent required:		
Interim occupancy recommendations:	full occupancy	

Along	Assessed %NBS before:	68%	##### %NBS from IEP below
	Assessed %NBS after:	68%	
Across	Assessed %NBS before:	83%	##### %NBS from IEP below
	Assessed %NBS after:	83%	