Lysaght & Associates

SEISMIC ASSESSMENT REPORT -RAKAIA COMMUNITY POOL CHANGING SHEDS & OFFICE -69 CRIDLAND ST - - RAKAIA-

Report prepared by:
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SEISMIC ASSESSMENT REPORT OF RAKAIA COMMUNITY POOL CHANGING SHEDS & OFFICE, 69 CRIDLAND ST,RAKAIA.

INTRODUCTION

Colin Wendleborn of the Ashburton District Council Property Department has engaged me to undertake a seismic assessment of the Rakaia Community Pool Changing Sheds and Office at 69 Cridland St, Rakaia.

I would estimate the changing rooms and office to be at least 50 years old from their type of construction and maybe even older.

The buildings have been assessed against the strength requirements for importance level 2 buildings; this is based on the building area being less than 1000m² and occupancy less than 300 people.

A structural calculation check on the building foundations has not been carried out as part of this assessment due to no geotechnical information on the founding soil being found in the ADC Property file for this address. My visual inspection of the internal and external load-bearing walls has however found possible settlement of the eastern end of the female changing shed which appears to have been a later extension to the original changing shed.

I carried out my visual inspection of the exterior and interior of the building on 6th October2021, when the weather was fine and dry.

The inspection cannot comment with certainty on any aspect of the building that was covered over or not visible at the time of inspection.

METHOD OF ASSESSMENT UNDERTAKEN

From my external and internal inspection of the changing shed building it is potentially earthquake prone due to the absence of any roof and sidewall bracing down to the masonry bloackwalls and the absence of vertical reinforcement in some walls. In this case an IEP (Initial Evaluation Procedure) approach would not give an accurate rating due to the absence of these critical lateral stability mechanisms.

Therefore, I have decided to use the Comprehensive Initial Seismic Assessment (ISA) procedure detailed in the NZSEE Technical Guidelines for Seismic Assessments July 2017, Part B – Initial Seismic Assessment. Figure B1 in this document outlines the procedure to be carried out. My comprehensive ISA includes supplementary calculations and the identification of any potential structural weaknesses.

BUILDING DESCRIPTION

The building description has been taken from my visual inspection on 6th October 2021.

The primary structural systems are as follows for each part of the building:

CHANGING ROOMS:

Gravity System: Exposed timber purlins and rafters with corrugated steel roofing above, are supported on raised external timber top plates propped off masonry blockwork walls and internal timber beams that are propped off masonry blockwork walls below with timber jack studs.

Lateral System: – There is no roof-plane bracing present. The west, east and south jack stud walls of 400mm height have no diagonal bracing in them. The north elevation jack stud wall has two diagonal timber braces in it. Below the jack stud walls there are external and internal masonry blockwork walls that act as shear walls in both directions to provide lateral stability.

OFFICE:

Gravity System: timber rafters with purlins supporting corrugated steel roofing span the short direction onto a concrete bond beam supported on 90mm hollow block walls below.

Lateral System: The masonry hollow block walls act as shear walls in both directions to provide lateral stability.

STRUCTURAL CONDITION INSPECTION OF THE BUILDING

EXTERNAL

Changing Rooms

On the west elevation adjacent the south corner there is a stepped crack visible from high level down to floor level symptomatic of past earthquake damage that has been filled externally. The 2-3mm wide crack is visible internally. It goes around to the southern flank wall where the 3 blocks above the crack have moved inwards by 20mm. On the west elevation the 400mm high timber jack studs supporting the roof above the masonry are all visibly leaning by about 20-30mm, again symptomatic of past significant lateral forces. There is one wire dog and nails connecting the base of the jack stud to the bottom plate.

On the south elevation, where the apparent eastern addition connects to the original structure there is a vertical separation of the 190mm thick blockwalls that starts at hairline width at the floor level and increases to a 35mm open gap at the top of the blockwall. Therefore, it is a rotational movement of the wall and foundation. Along the eastern blockwall elevation there is surface water ponding on the external concrete slab adjacent the base of the wall. The slab is also significantly

cracked and appears out of level across the crack pointing to settlement having occurred. The edge of the crack has been ground to a chamfer in the past to prevent a trip hazard, indicating vertical movement has occurred in the past. On the north elevation where the eastern addition blockwall joins the original, the same rotational movement found on the south elevation is repeated with a 35mm wide gap open to the inside was measured at the top of the wall. Wire ties between the joints was found.

Office

The External elevations of the office are 90mm hollow masonry blockwork with a concrete bond beam around the perimeter and a timber roof above. No visible defects were observed.

INTERNAL

Changing Rooms

In the male changing room on the west side the sawtooth cracking at the south corner is right through the mortar joints. On the north wall there is also evidence of saw-tooth cracking from the toilet cubicle down to the base of the corner that has been filled and painted over.

I used my Zircon metal detector scanner to check for the presence of reinforcing steel in the grouted 190mm masonry blockwork walls. In the west external wall there is a horizontal bar in the top course, but no vertical bars were detected. In the south external wall there was a horizontal bar in the 10th course and no verticals detected. The top 2 courses of the wall are un-filled.

The internal 190mm masonry wall running north-south between the male & female rooms has a top horizontal bar and verticals at approx. 1.2m centres. There are 140mm thick flanking walls 1.25m long to this wall that are hollow masonry blocks.

Within the female changing room the western most room with the toilet cubicle there are 3 number 1.2m long 140mm hollow concrete block flanking walls. The westernmost short wall has a 10mm gap at the top where it meets the north-south 190mm thick blockwall. 3 courses down from the top there is sign of horizontal movement of the top of the wall along a sawtooth pattern in a joint. The joint has been re-pointed at some time in the past. The 190mm thick eastern blockwall 2m high, dividing the female changing room was scanned and only a top horizontal rebar was detected.

In the easternmost room of the female changing shed where the internal north-south wall meets the north and south external walls the open joint at the top of the wall of 35mm at both ends is visible to the outside and is a source of rainwater ingress to the internal.

The north wall was scanned and only a horizontal top bar was detected. The east wall showed a horizontal top bar and vertical bars at 1.2m centres. The south wall showed a horizontal bar at the ninth course and vertical bars at 800mm crs. The top two courses of the wall of 2.2m height were unfilled hollow blockwork.

Office

The office has 90mm hollow blockwalls visible and a lined ceiling internally. There is a concrete bond beam/lintel of minimum depth 200mm around the perimeter of the walls. I scanned the bond beam and detected a horizontal steel bar, but no verticals in the blockwork walls.

CONCLUSIONS FROM THE STRUCTURAL INSPECTION

Changing Sheds

There is evidence of past earthquake damage to the west and and south external concrete blockwalls that has just had superficial filling of the mortar joints. These walls have no detectable vertical reinforcement in them. There is evidence of past settlement of the foundations of the eastern external wall where it has rotated and pulled away from the original part of the changing room leaving 35mm open gaps at the top of the north and south side walls to the outside leading to rainwater ingress internally.

Office

The small office structure appears to be in a satisfactory condition.

ASSESSED SEISMIC RISK

The results of the Comprehensive ISA carried out indicate the changing room building's seismic rating to be **10% NBS (IL2)** assessed in accordance with the New Zealand Society of Earthquake Engineering (NZSEE) EPB methodology. The seismic rating assumes an Importance level 2 (IL2), in accordance with the joint Australian/New Zealand Standard – Structural Design Actions Part 0, AS/NZS 1170.0:2002, is appropriate. Therefore, this is a **Grade E** building following the NZSEE grading scheme. Grade E buildings represent a risk to occupants of approximately 25 times greater than that expected for a new building of 100 % NBS, indicating a **Very High Risk exposure**.

As detailed below, the lowest % NBS score of **10% NBS** is the absence of roof plane bracing and bracing of the short timber frame jack walls down to the tops of the blockwalls.

The small Office has a lowest % NBS score of 75% NBS and is therefore a **Grade B** building, indicating a medium – low risk exposure.

A building with a seismic rating less than 34%NBS is considered to be an Earthquake –Prone Building (EPB) in terms of the Building Act and a building less than 67%NBS as an Earthquake Risk Building (ERB) by the New Zealand Society of Earthquake Engineering.

Therefore under the Building Act, the Changing Room building would be classified as **Earthquake Prone.** The Office building does not fall into either of the earthquake risk classifications.

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The supplementary calculations identified the following structural weakness's in the Changing Shed building:

- The absence of any roof in-plane bracing and diagonal bracing down to the top of the loadbearing blockwall walls means it must be rated at **10% NBS.**
- The out-of-plane flexural resistance of the load bearing grouted blockwalls without any vertical steel, but a top horizontal bar has an assessed capacity of **15 % NBS.**
- Secondary Structural & Non-Structural items (SSNS identified) such as the short un-grouted internal blockwork walls 2m high, forming cubicle partition walls and partition walls were assessed and found to have an out-of plane capacity of **13% NBS.**

I also identified the following structural weakness's in the Office building:

- The flexural capacity of the top of blockwork wall bond beam is **75% NBS**

No Severe Structural Weaknesses (SSW's) were identified in the assessment.

BASIS FOR THIS ASSESSMENT

The following information is made available/discovered as part of the initial seismic assessment (ISA):

My onsite inspection and measurements carried out on 06/11/2021.

RECOMMENDATIONS FROM THE ASSESSMENT

As the changing rooms possess significant areas of grouted concrete block walls sparsely reinforced or with no vertical steel reinforcing in them as well as unreinforced blockwork partition and cubicle walls with %NBS ratings of 13-15%NBS they pose critical life safety risks in an earthquake as this masonry with a weight greater than 25 kg/m² can fall just over 2m in height. There is what appears to be past earthquake damage to areas of blockwall that has had superficial filling of cracked mortar joints in the past.
My recommendation is the Changing rooms can no longer be used safely and should be off-limits to the public.
The timber roof and walls can be easily braced, but stabilising the heavy masonry blockwalls would be expensive and problematic, requiring quite an amount of steel restraint bracing to be added.
There is also the issue of the settlement of the foundations to the eastern side of the building. It would be an expensive exercise to under-pin and remediate the damage caused. Due to the age and condition of the building it may be more prudent to demolish and re-build the changing room to meet the current building code and standards of hygiene.
The small office building is adjudged to not be an earthquake risk building and so can still be used.

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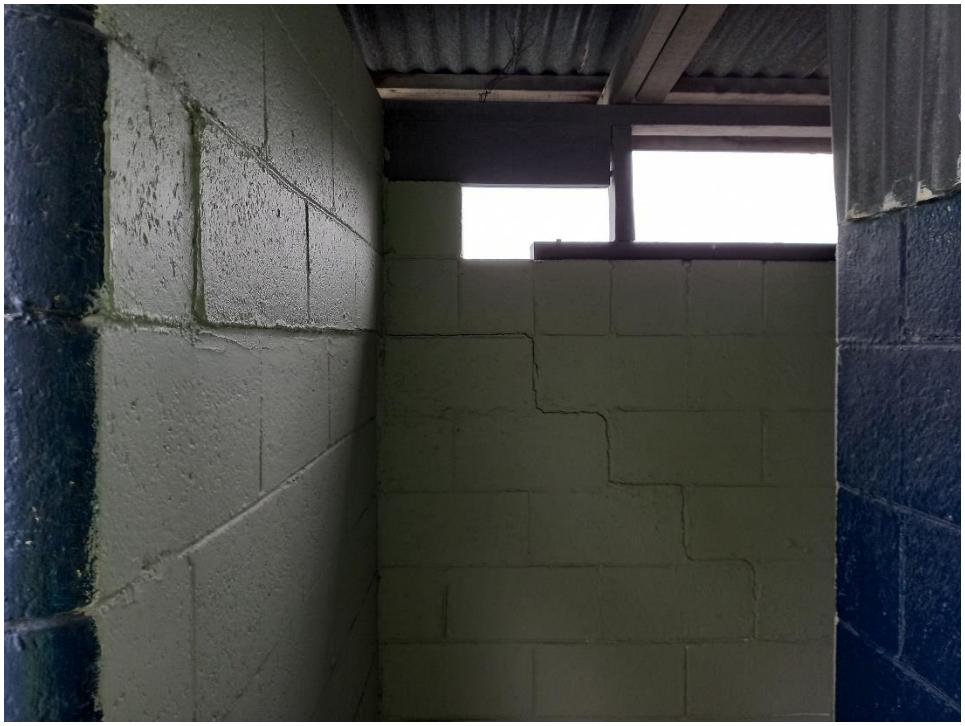
PHOTOS OF STRUCTURAL ISSUES FOUND DURING THE INSPECTION

West Elevation showing filled saw-tooth cracking at south end and short timber jack studs leaning noticeably to the south.



Internal view in Mens changing room of west elevation wall cracking and south wall corner wall above the crack projecting 20mm inward.

Internal of Male changing room showing sawtooth crack filled on north wall and short internal hollow block partition walls.

Internal of female changing rooms showing hollow block partition walls. Note right hand wall shows signs of past lateral and horizontal movement.

View of south external wall internally within female changing room showing 35mm open gap at top of wall where the eastern elevation wall foundation has appeared to have settled causing the connected south wall to rotate.

View within the same female changing room looking toward the northern external wall showing the same 35mm open gap at the top where it joins the original structure to the left.

View of south-east corner of building, surface water ponding and external slab cracked with level differences across the crack, all evidence of past settlement of the foundation.

View of small office structure.

AERIAL PHOTO OF COMMUNITY POOL SITE

Rakaia Community Pool
Cridland St, Rakaia

Canterbury Maps

N

0 0 0.01 0.01 0.02 Kilometres

Scale: 1:300 @A4

Map Created by Canterbury Maps on 17/11/2021 at 8:48 AM