

**SEISMIC ASSESSMENT REPORT
-HINDS COMMUNITY POOL
CHANGING SHED
-ISLEWORTH RD -
- HINDS-**



**Report prepared by:
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November 2021.

SEISMIC ASSESSMENT REPORT OF HINDS COMMUNITY POOL CHANGING SHED, ISLEWORTH RD, HINDS.

INTRODUCTION

Colin Wendleborn of the Ashburton District Council Property Department has engaged me to undertake a seismic assessment of the Hinds Community Pool Changing Shed at Isleworth Rd, Hinds.

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

The building has 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 not found any visible evidence of problems with the existing foundations.

I carried out my visual inspection of the exterior and interior of the building on the 20th October 2021, 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 hollow unreinforced masonry blockwalls and the poor quality of the bond-beam concrete. There is also significant rot to timber wallplates and ends of rafters and purlins in places. In this case an IEP (Initial Evaluation Procedure) approach would not give an accurate rating.

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 20th 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 a reinforced concrete bond-beam sitting on 90mm hollow unreinforced concrete block walls.

Lateral System: – There is no roof-plane bracing present, so the reinforced concrete perimeter bond beam is expected to span between hollow blockwalls that act as shear-walls to resist lateral loading in both directions.

STRUCTURAL CONDITION INSPECTION OF THE BUILDING

EXTERNAL

The original concrete to the bond beam was not compacted fully and there are areas where the aggregate has lumped together with little cement and sand between meaning a more porous concrete. As a result, on the south elevation there are areas where the bottom layer of bond beam reinforcement has been exposed due to the steel rusting, expanding and the concrete being spalled off. This has weakened the bond beam structure. Along the same southern elevation the timber barge board is badly rotten and in one place there is a 400mm width section completely rotted away allowing rainwater ingress into the building through the male toilets. There is a 2-3mm wide sawtooth crack leading from the bottom east corner of the male toilet window down to floor level that is symptomatic of past earthquake movement. On the south elevation externally between the two toilet windows there is a PE water supply pipe above ground that has a significant leak at an elbow joint above ground that needs fixing. It is spraying water over the adjacent Plunkett room access pathway.

On the east end of the building the timber barge board is totally rotten along its length together with the timber wall plate. There are open holes through to the inside.

INTERNAL

Within the male changing room, adjacent the door into the toilet cubicle the end of a rafter has completely rotted away and the rafter end is suspended in air and appears to have moved up 50mm under wind suction. The timber wall plate below is wet and rotten and has borer damage as well. The next rafter along is also showing early signs of rot damage. The timber wall plate has rot damage extending at least 3m in length. To the bottom eastern edge of the mens WC window there is 2mm

sawtooth cracking through the blockwork joints that is reflected into the inside of the wall. There is also a crack leading from the opposite lower corner that sawtooth's in the opposite direction through the joints. This cracking pattern is symptomatic of past earthquake movement. There are significant open gaps under the window frame to the blockwork, further reducing the weathertightness of the building. There is a large area of past cracks in the concrete floor slab to both the men's and woman's changing room that appear to have been filled in the past.

Within the female changing room there are two 390x190mm blockwork piers on the northern elevation walls. There appears to be minimal tying of the piers to the 90mm external blockwall as there are vertical gaps of up to 5mm between the two. The segregation of the original concrete in the bond-beam is repeated on the inside of the female changing room. At the eastern end wall two 10 mm diameter steel bars are exposed to the inside. On the northern external wall adjacent the door there is a 3mm wide vertical crack from the bond beam to the block course below that then runs in the horizontal mortar joint, symptomatic of past seismic movement.

Above the eastern end wall blockwork the timber top plate is water stained and borer infested. The end rafter is rotted right through in places and water stained. The ends of purlins landing on this rafter are water stained and showing signs of rot. There is daylight visible under the end rafter. At the north-east corner there is significant white rot fungus to the end rafter, wall plate and end of purlin. There is also daylight visible under the wall plate at this corner.

Adjacent the external wall of the woman's toilet cubicle there was a significant amount of water on the floor slab which has appeared to have come through the eaves and the chicken wire covered windows during recent rainfall.

CONCLUSIONS FROM THE STRUCTURAL INSPECTION

There is evidence of past earthquake damage to the south external concrete blockwall and some cracking to the north external wall and separation of the blockwork piers within the female changing room. There is also evidence of cracking having occurred to the floor slab in the past that has been filled. The original concrete in the perimeter bond-beam is of poor quality and has led to rusted reinforcement and concrete spalling to the south elevation. There is significant water and rot damage to the south elevation timber wall plate and ends of rafters and to the full width of the eastern end wall barge board, end rafter, ends of purlins and wall plate. Notwithstanding the unreinforced blockwall's low seismic strength, the timber roof along these elevations sitting on them are at significant risk of collapse in the future due to their deteriorating strength from decay.

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 lateral capacity of the 90mm hollow blockwall wingwalls at the entrance to both changing rooms and of the timber roof structure along the south and east walls due to their rotten condition.

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

- Secondary Structural & Non-Structural items (SSNS identified) such as the short un-grouted 90mm blockwork walls 1.9m high, forming the entrance wingwalls to each changing room were assessed and found to have an out-of plane capacity of **10% NBS**.
- Due to the rotten condition of the wall plates and ends of rafters and purlins along the south and east elevations I would have to rate these elements as being **10% NBS** as well. Although they do not provide lateral resistance to the building, they are in danger of failing and leading to a localised collapse of the roof under a moderate seismic event due to the decay present.
- The out-of-plane flexural resistance of the load bearing hollow blockwalls confined by the reinforced concrete bond beam have an assessed capacity of **20 % NBS**, taking into account the poor quality of the concrete.

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 20/10/2021.

RECOMMENDATIONS FROM THE ASSESSMENT

As the changing rooms possess significant areas of 90mm thick hollow unreinforced concrete block walls and entrance wingwalls with %NBS ratings of **10%-20%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 external concrete blockwall and the concrete floor-slab. The significant rot damage to the south and east elevation eaves timber roof and top plate members leaves these parts of the roof at high risk of future collapse from even moderate environmental loads.

My recommendation is the Changing rooms can no longer be used safely and should be off-limits to the public.

Due to the age and poor condition of significant parts 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 water leak to the water supply pipe at the southern elevation should also be repaired asap to conserve water.

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PHOTOS OF STRUCTURAL ISSUES FOUND DURING THE INSPECTION



South Elevation concrete bond-beam showing poor original concrete compaction and low cover leading to reinforcement corrosion and spalling of concrete.



South Elevation above toilet windows showing rotten fascia board open to rain ingress and cracks below the left hand window in the joints.



East End view of roof barge board totally rotten through with holes to the inside.



View internally of south wall in the male changing room showing end of one rafter missing and rotten and borer damage top plate.



View of Male Toilet cubicle south wall and cracking to the hollow blockwall joints, symptomatic of past seismic movement.



View of male changing room floor slab showing past floor slab cracking that has been filled in the past.



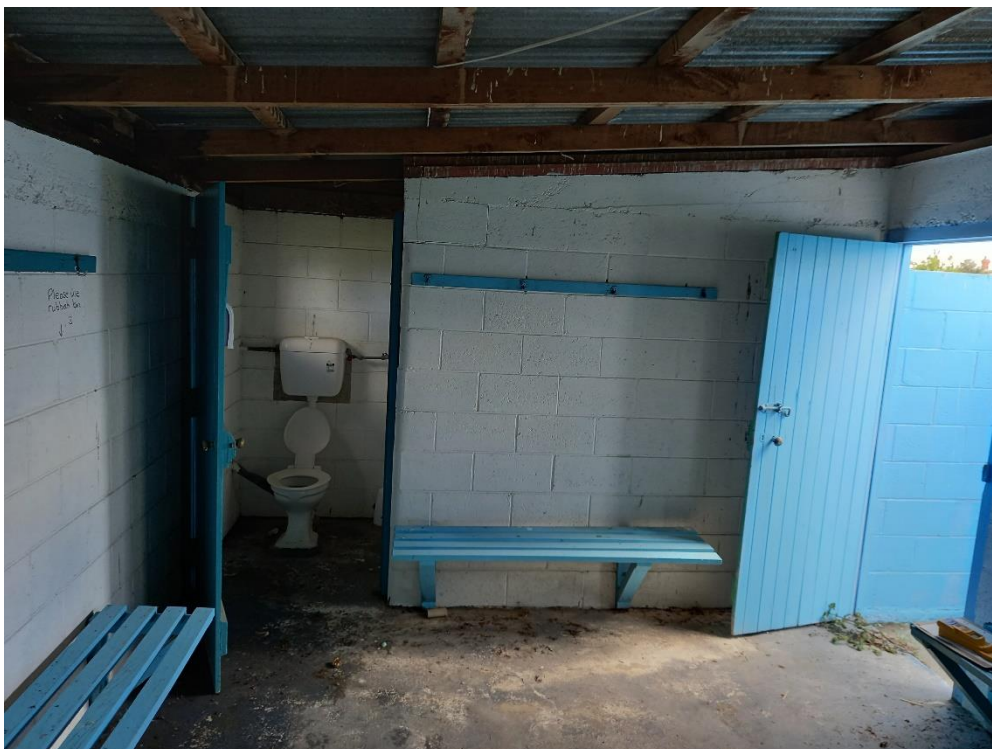
View within the female changing room showing water damage and rot along the south elevation eaves.



View of the east end of the female changing room barge, showing rot of end rafter, wall plate & ends of purlins.



View of the south-east corner of the female changing room showing white fungus rot to all timber members and daylight under bottom plate.



View of female toilet cubicle showing recent rainwater ingress on the floor slab adjacent the south wall and also a crack in the masonry blockwork under the bond-beam in centre of photo.



View of detachment of female changing room blockwork pier from north external wall, most likely during past seismic event.



View of detachment of another block pier from the blockwall within the female changing room on the north wall.



Lysaght & Associates

AERIAL PHOTO OF COMMUNITY POOL SITE

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Scale: 1:250 @A4

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Changing Shed