Lysaght & Associates

SEISMIC ASSESSMENT REPORT
-TINWALD DOMAIN POOL CHANGING SHEDS
-MARONAN RD -
- TINWALD-



Report prepared by:
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November 2021.

SEISMIC ASSESSMENT REPORT OF TINWALD DOMAIN POOL OFFICE, CHANGING ROOM & PLANT ROOM, MARONAN RD,TINWALD.

INTRODUCTION

Colin Wendleborn of the Ashburton District Council Property Department has engaged me to undertake a seismic assessment of the Tinwald Domain Pool Buildings in the Tinwald Domain off Maronan Rd, Tinwald.

I would estimate the building to be at least 50 years old from the type of construction and maybe even older. There has been some more recent internal concrete blockwalls added in the past.

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 27th 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 unreinforced masonry brick walls and visible cracks in the plant room brick walls. 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 27th 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 the single wythe clay brick walls that have a sand-cement external render finish. There is a mixture of brick internal cross walls, concrete block walls and a timber framed cross wall.

Lateral System: – There is no roof-plane bracing present, so the reinforced concrete perimeter bond beams are expected to span between brick cross walls with brick piers, concrete block and a timber framed wall that act as shear-walls to resist lateral loading in both directions .

STRUCTURAL CONDITION INSPECTION OF THE BUILDING

EXTERNAL

The western elevation of the building is brickwork that has a painted sand-cement render finishing over it. At the southern end of this elevation at the plant-room there is a horizontal crack leading horizontally from the bottom corner of the window that then goes on a diagonal orientation to the top of the wall at the south-west corner of about7 -8mm width. There is also a diagonal crack in the render from the opposite corner of the plant room window leading towards floor level of about 5mm width. This pattern of cracking appears to be symptomatic of seismic movement in the past.

On the rest of the wall elevations no visible damage, externally was seen.

INTERNAL

Internally in the office/shop and male and female changing rooms, no visible damage or defects were observed. I used my Zircon metal detector scanner to confirm the presence of horizontal steel reinforcing in the concrete bond-beam above the east and west external brick walls. In the plantroom at the far southern end of the building it was observed that the reinforced concrete bond-beams to the east and west external walls stop where they meet the south end wall. The south end wall is of single brick construction with a brick pier in the centre.

Internally, viewing the western external wall the sawtooth diagonal and horizontal cracking viewed on the external wall side is visible and the width of cracking is about 10mm and daylight through is visible. The south end brick gable wall also appears to have moved 10mm southward at its top as there is a 10mm gap from the end of the concrete bond-beam and between the end rafter and the brick wall. This is symptomatic of past seismic movement. The horizontal crack from the northern side of the window corner also goes through an adjacent brick pier of about 5mm width.

On the east elevation wall above the door there is about 1mm width diagonal cracking in the brick joints from the corner of the door head leading back to the south-western corner where the concrete bond-beam stops. There is also a gap from the end of the bond-beam similar to the west side of at least 5mm.

NORTHERN BOUNDARY WALL FENCE

The northern boundary wall fence to the pool area is approximately 1.8m high within the pool area and is up to 2.4m high from the external ground level. I scanned the 190mm thick grouted concrete block wall and detected a top horizontal steel bar and vertical steel bars at approximately 800mm centres.

Looking from the western corner of the wall east there is a noticeable horizontal bow in the top of the wall. There is also up to a 10mm lateral displacement outwards of the wall along a sawtooth crack through mortar joints. I also found further sawtooth cracks running through the wall almost vertically along its length.

At a vertical construction joint in the wall near the western end there is an approximately 50mm horizontal offset between both walls at the top reducing in width toward the ground. At the next construction joint the horizontal displacement between the two sides of the wall is about 60mm at the top reducing to zero at ground level. There looks to have been joint damage in the blockwork in the past that has been re-pointed.

The foundations to the eastern end of the wall appear to be about 100-150mm thickness of concrete and there are some gaps underneath it to ground level. The concrete foundation does not appear to be founded into the ground by very much at all.

CONCLUSIONS FROM THE STRUCTURAL INSPECTION

There is evidence of past earthquake movement and damage to the east, west and south elevation brick walls of the plantroom. The office/shop , male and female changing room parts of the building appear to be in a satisfactory structural condition, with no visible signs of damage from past seismic events.

The Northern boundary blockwork wall fence is of some concern due to the excessive lateral displacement at the top of the wall over a significant proportion of its length, in my opinion caused by rotation of the base of the wall due to either poor or insufficient foundations. The wall in my opinion poses a high life safety risk considering it borders a children’s playground.

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 unreinforced masonry southern end wall to the Plantroom.

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:

- The lateral out-of -plane capacity of the unreinforced brickwork South End elevation wall is **10% NBS.**
- The lateral out-of-plane capacity of the North, East and West elevation unreinforced brick walls are **40% NBS.**
- The flexural capacity of reinforced concrete bond-beams on North, East and West wall elevations is **75% NBS.**

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 27/10/2021.

RECOMMENDATIONS FROM THE ASSESSMENT

Due to the lack of a reinforced concrete bond beam to the south elevation adjacent the pool plant room the building has to be currently rated at 10% NBS.

As the office and changing rooms have a rating of 40%NBS, being above 34% NBS they are not deemed earthquake prone and could be used by members of the public in my opinion.

My recommendation is that the Office and Changing rooms could be used safely, but that the southern end of the plantroom be avoided. Most of the southern end wall is external to the pool area, being fenced off from within the pool area, so this is achievable as there are no reasons for the public to be in front of this wall outside the pool area. The top of the southern brickwall could be tied back into the end of the concrete bond-beams to the east and west external walls with the addition of a steel beam with anchor bolts epoxied into the face of the bond beams and into the brick end wall. Repair and weathertightness of the brickwork joints could also be done at the same time. Lysaght & Associates could design this strengthening solution for Council.

I am concerned about the stability of the northern boundary fence wall of the pool area, which also retains about 600mm of ground level difference. The 60mm displacement of the top of the wall at the two construction joints is excessive, which I believe is due to the construction of or lack of suitable foundations to the wall, considering I have confirmed it has sufficient vertical steel reinforcing in it to safely with-stand the design imposed lateral loads.
Until stabilising work is done on the wall, I would recommend a safety fence be erected at least 3.5m from the face of the wall in the children's play area, which is 1.5 times the height of the wall.
I would consider reinforced concrete blockwork buttress walls on reinforced concrete foundations at regular centres along the length of the wall would be the most economical way to stabilise the wall.
Lysaght & Associates would be happy to design a solution in partnership with Council to stabilise this wall to remove its risk to life safety to users of the playground.

Report prepared by:
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November 2021.

PHOTOS OF STRUCTURAL ISSUES FOUND DURING THE INSPECTION



West elevation wall of plantroom showing significant diagonal cracking through the render finish to the brickwork, symptomatic of past seismic movement.



View internally in the plant room of the west elevation wall with approx. 10mm wide cracking through joints and note the 10mm gap from end of bond-beam to the south end wall brickwork.



View of the west elevation wall toward the plant room window showing cracking of joints to window and through the adjacent brick pier.



View of the east elevation wall of the plantroom showing cracking of the brickwork joints and gap at the end of the concrete bond-beam after the south end wall movement under seismic force.



Excessive lateral displacement of top of northern boundary wall at a construction joint toward the western end of the wall.



View of northern wall from west to east showing bowing out of top of wall and joint displacement.



View of wall towards its eastern end showing 60mm lateral displacement at its top at a construction joint.



View of eastern end of northern wall showing the poor depth and standard of concrete foundation to the wall.

AERIAL PHOTO OF TINWALD DOMAIN POOL SITE

TINWALD DOMAIN POOL
MARONAN RD, TINWALD

Canterbury Maps

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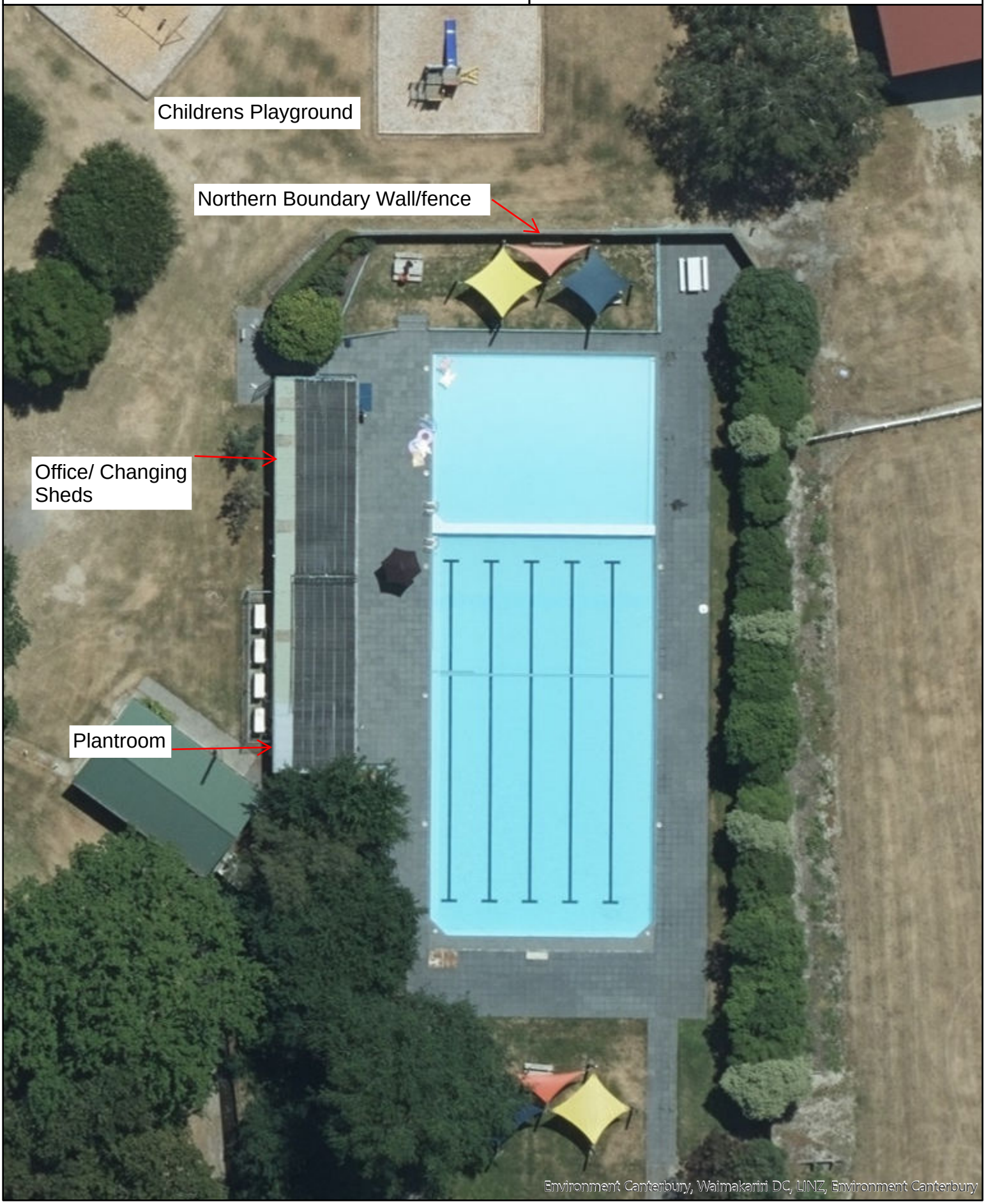
Information from this map may not be used for the purposes of any legal disputes. The user should independently verify the accuracy of any information before taking any action in reliance upon it.

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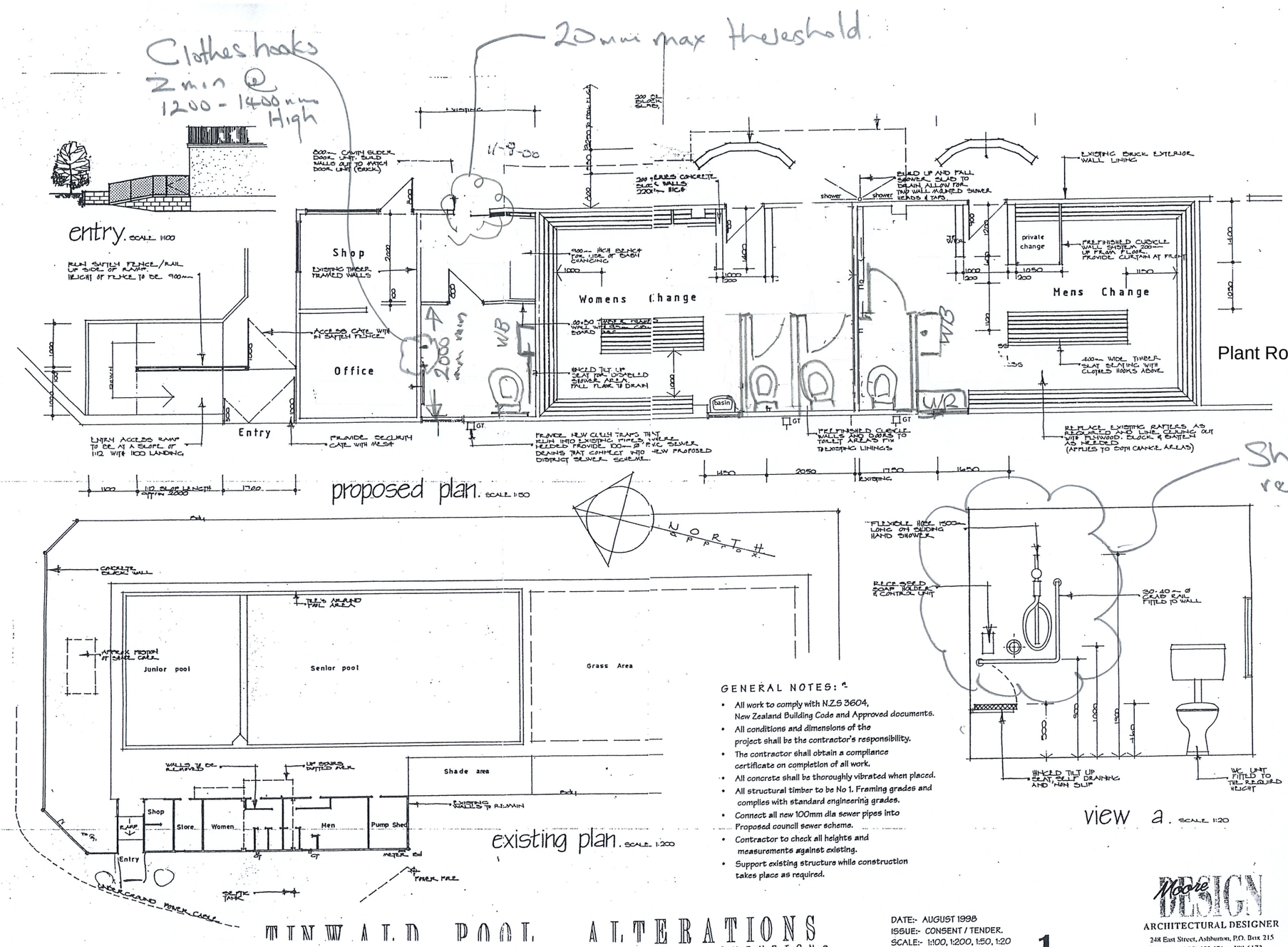
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Scale: 1:300 @A4

Map Created by Canterbury Maps on 19/11/2021 at 2:17 PM



Drawings of Building Consent for a 2018 Internal Alteration



GENERAL NOTES:

- All work to comply with N.Z.S 3604, New Zealand Building Code and Approved documents.
- All conditions and dimensions of the project shall be the contractor's responsibility.
- The contractor shall obtain a compliance certificate on completion of all work.
- All concrete shall be thoroughly vibrated when placed.
- All structural timber to be No 1. Framing grades and complies with standard engineering grades.
- Connect all new 100mm dia sewer pipes into Proposed council sewer schema.
- Contractor to check all heights and measurements against existing.
- Support existing structure while construction takes place as required.

TINWALD POOL ALTERATIONS

A.D. ASHBURTON

COMMENCEMENT OF ANY WORK ON SITE

DATE:- AUGUST 1998
ISSUE:- CONSENT / TENDER.
SCALE:- 1:100, 1:200, 1:50, 1:20
JOB NO:- 3124

1 OF. 1

Moore DESIGN
ARCHITECTURAL DESIGNER
248 East Street, Ashburton, P.O. Box 215
Phone (025) 332 371 or 308-6173

Ashburton District Council
00696
Approved Building
BC Consents Documents

MIKE FARRELL
Building Inspector
Ashburton District Council

Variation

RECEIVED
- 9 NOV 2018
BY:

23 NOV 2018