HAIGH WORKMAN
Civil & Structural Engineers

16 Oct 2014 HW: ref 14 175

FNDC
Attn: Mark Osborne

RE: Structural Investigation – Oruru Hall

1.0 Introduction

Haigh Workman was engaged by FNDC to complete a structural inspection and report of the Oruru Hall.

A comprehensive site inspection was completed on October 8, 2014 to determine the current condition of the hall.

The hall has had little maintenance work done over the years and consequently appears to be in very poor condition. The result of our inspection indicates there is significant deterioration which will require considerable maintenance with some areas more urgent than others.

The hall however, in our opinion, could be brought back to a condition to continue its useful service life to the community.

2.0 Objective & Scope

The structural inspection was a visual non-destructive investigation of the entire building including the roof structure, walls (where access was available), the subfloor, services and a general ground stability appraisal.

This investigation does not replace previous inspections of the hall completed by other consultants but is a review of these reports, includes an up to date structural appraisal to add to the volume of consultant's work already on file.
Two other reports that are closely aligned with this report are Fraser Thomas report completed in 2009 and Frank Burton and Associates report completed in August 2014.

We have not been engaged to do any structural design checks other than to identify design work that may result from this inspection.

The scope of our services include:

- General site walkover by a senior structural engineer
- Detailed visual inspection of the structure
- Property file review
- Recommendations
- Preparation of this report

3.0 Site Description

Site Address:	692 Oruru Road, Taipa
Legal Description:	FNDC District Facilities
Area:	approx. 1000m^2

The property is immediately adjacent to the main Oruru Road about 7km from Taipa. This is a rural site, is flat, drains to the road and has a small swale drain on the southern boundary. The building has two levels including a mezzanine floor at the eastern end of the building which covers approximately ¼ of the floor plan area while the other ¾ is an open plan hall.
The hall is about 100 years old with c.g.i roof, a mix of fibrolite, weatherboard and board & batten (b&b) cladding on timber frames. The subfloor structure is timber flooring on timber joists and bearers supported on concrete piles. The two level area is on a concrete foundation and slab.

4.0 Property File

We completed a property file review of the information relevant to this inspection.
The two most important documents aligned with this report are cited in section 2.0.
This report should be read as an up to date structural addendum in conjunction with these two reports.

5.0 Published Geology

The NZMS 290 geology and maps show the site being predominantly overlain with Mangikahia silt loam. These are flood plain soils and are classified as moderately drained.
We were not engaged to complete a soils investigation and this information is included to provide general information on the site soils and potential for drainage.

6.0 Site Stability

There are no visual signs of any deep-seated instability of the building footprint. We did not shoot any levels whilst on site, however, by the general look of the building it would be unlikely that it is true to line and level.

The ground appeared to be fairly well drained for this time of the year. In and around the open swale drain on the southern boundary the soils were very boggy. The swale is not well maintained and water would not easily escape to the road.

7.0 Foundations and Floor

The main hall foundations are concrete piles supporting timber bearers, joists and tongue and groove floor boards. The building appears to have been re-piled at some stage as some of the original timber piles are still in place. Accessibility was limited however external observations from the sides of the building indicate that the timbers, which appear to be all the original native species, are generally in pretty good condition with no obvious signs of any serious deterioration.
We did not shoot levels on the floor however to the naked eye the hall floor appears to be reasonably level.

Around the perimeter plate line of the building there is more serious deterioration particularly on the north and west sides of the building where rainwater has penetrated. The bearers have rotted completely and will need replacing.

The outer row of concrete piles on the northern side also appear to be out of level and should be repaired. In this location the ground level has been lowered forming a drain possibly to pull the soils away from the building line or improve ventilation but storm water in this drain cannot escape. Saturated clay soils loose approximately 50% of their strength and this is a likely cause for this problem.

A similar problem as above exists on the southern side of the subfloor structure but much less severe and localized to an area where the down pipe is.

The road front mezzanine section of the building is constructed of concrete footings and slab. This area was a more recent alteration to the original building whereby a part of the building was lifted to create the mezzanine.
Again no levels were taken but there are no obvious signs of failure of the concrete foundation structure.
There is very little separation of the floor level from ground level to this section of the building and water penetration has significantly damaged the timber at the bottom plate line and requires repair maintenance work.

8.0 Cladding and Framing

The hall has a mixture of cladding systems. The mezzanine area is predominantly board and batten with fibrolite on the upper level façade facing the road.
Due to poor ground separation water has rotted the cladding, bottom plate and more than likely the bottom section of the wall framing. All should be repaired.
It may be easier to remove and replace with new treated board and battens.
The extent of the wall framing damage will not be evident until the cladding is removed however we did observe in one location on the southern elevation of the hall, where we could get access, that the bottom 500mm (approx.) had significant decay. It may work out cheaper to prop the upper level and renew the entire external wall below the mezzanine floor.

The upper level board and batten and the fibrolite appear to be in better condition and would only require localized repair.

The main hall section has weatherboard cladding everywhere except the western end wall which is fibrolite. The weatherboards have had numerous repairs completed over the years and are generally in reasonable condition but require a closer inspection for rotting timbers as general maintenance dictates.

The gable wall at the intersection between the hall and mezzanine has seen recent repair work and water ingress around this area is obvious inside the building. This area requires more detailed investigation and repair as there is still damage and deterioration to the cladding.
There is an obvious sag in the roof around this area which also requires more investigating and is mentioned later in this report.

The fibrolite western end wall appears to have been repaired possibly due to damage and/or water ingress. This area is damp due to overgrown vegetation on the boundary. There could be internal water damage in this area due to poor flashings and cladding joins. A closer investigation to this area would be timely with the option to replace this with b&b at the same time as the mezzanine area.

The baseboards around the hall should be repaired particularly on the north and west elevations to provide protection from the weather but allowing good ventilation of the subfloor space.

The roof has been more recently re-clad with c.g.i. and appears to be in very good condition.

9.0 Storm Water

The collection and discharge storm water systems are very poor. Most of the down pipes discharge storm water directly to the ground adjacent to the building and the only down pipe that doesn't is blocked. This down pipe drains into the small swale drain on the southern boundary which doesn't appear to be free draining and requires maintenance. The soils on this site are not free draining and this simply exacerbates the problem of getting rid of excess storm water.

All the roof storm water should be collected and piped to the road drainage system. The existing sump on the road appears to be blocked and needs cleaning out and regularly maintained.

There is no separation between the concrete floor and the natural ground level. The Building Code requires a minimum separation for timber cladding of 150mm to a concrete path or 225mm to bare ground.
Frank Burton and Associates report have suggested re-contouring to provide this separation.

10.0 Structure

There are several structural issues that require some urgency. The building as it exists today would not pass any rigorous structural assessment. Fraser Thomas provided a very brief structural appraisal in 2009 for the lateral stability of the hall.

1. The lateral stability looks at forces of nature i.e. wind and seismic forces that would ultimately load the building causing it to collapse. This was preliminary work and provided information for pricing purposes only. The conclusions they came to would be no different if Haigh Workman were to do a similar analysis today therefore what they have indicated in their report still holds true. Basically the Hall being a large open structure requires portal frames and wall bracing as indicated in their report as the hall does not have any sound engineering systems to support lateral loads. Without going into any structural detail, the systems providing lateral support at the moment are most likely the c,g.i. roof cladding and a lot of nails holding hands.

2. Further to this, some of the original support structures i.e. the roof trusses have been seriously compromised by removing very important structural elements, the bottom chord. Whilst we were on site it was mentioned that the raised roof to allow installation of the movie screen, could be removed if necessary. We recommend this and replace the bottom chord of the truss, with engineering advice. The Fraser Thomas report also suggests removing the raised roof to simplify their structural bracing ideas.

3. As mentioned above in section 8.0 there is a sag in the roof at the intersection of the hall and the raised mezzanine area. We suspect the reason for this is that the original roof structure would have had a full structural truss at this location. The bottom chord was removed to allow for the movie theatre to have an unobstructed view of the newly installed screen. We don't know whether or not any strengthening was installed to replace the structural truss as it is framed and lined now but this would be reasonable conjecture at what is causing the roof sag.
A portal frame should be erected in this location to support the roof. One of the options in the Fraser Thomas report was to place a portal frame in this location but for other reasons, lateral stability.

4. At the opposite end of the hall where the stage is, we think this was a gable end wall at the front of the stage and the hip end of the building was added to create the stage. To support this idea, the existing ceiling diagonal braces terminate on this line which would normally be an external wall. There is no structural truss over the front of the stage, it appears to be a gable end truss which has no gravity load capability i.e. cannot support roof loads. It is difficult to see what structure is supporting this area of roof except, again, roof iron and nails holding hands.

A portal frame should be erected in this location to support the roof. Again one of Fraser Thomas' options was to place a portal here also for different reasons as mentioned above.

11.0 Miscellaneous

The front canopy has deteriorated significantly and more than likely will need to be replaced.
The fire safety including the steel fire escape stairs is covered in the Frank Burton and Associates report.
The sanitary system including the on-site disposal field was not investigated and is not covered by this report. Notwithstanding this, the toilets are rather shabby and could be upgraded.

If the intention is to continue using the theatre, then a structural engineering assessment of the floor support structure should be undertaken as the code requirement for a theatre floor live load is 4kPa which is rather heavy.

12.0 Recommendations

The Oruru Hall has some significant structural and general maintenance problems that must be addressed in the very near future in order to keep the hall operational.

With poor maintenance over the years, the weather has penetrated the cladding system and rotted some of the native timbers including the bearers, bottom plates, subfloor, framing and the cladding itself, details of these are all clearly outlined in this report.

The structural problems listed in section 10.0 are more serious and should be addressed with some urgency as there is no sound structural mechanism in place to support the hall against serious wind and seismic forces of nature and the structure has been compromised by the removal of critical structural elements in the trusses.

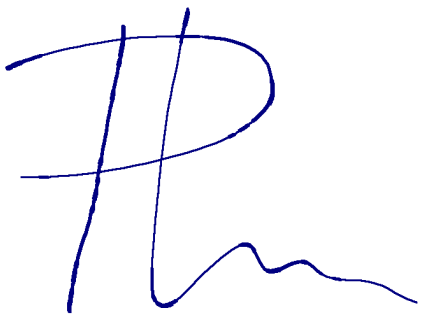
The hall is a great asset to the community and the cost to replace it would exceed the repair costs. In general the native timbers in this building are in reasonable condition and with some maintenance and structural upgrading the hall's useful life could be extended by 20+ years.

13.0 Applicability

This report has been prepared for the FNDC with respect to the brief and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement. The contents of this report are the opinions of HW.

There is some structural engineering work required in the recommendations of this report. We would be pleased to provide this engineering service to you and believe you would benefit from this continuity.

Yours faithfully,



Phillip Workman

Addendum: Engineer's Cost Estimates.

Mezzanine Area:

Jack and support building to complete works	$6000
External wall repair materials (framing, gib, ply, miscellaneous items)	$3000
Labour (incl. re-wire $1000, plumbing $1000)	$10,000

Steel Portal Frames: (3 of)

Scaffolding	$4000
Fabrication ($8000/ton fabricated and painted)	$8000
Deliver to site	$1000
Installation	$9000
Footings – 6 of (dig and tie steel)	$5000
Materials 4m cube conc.	$2000

Hall End and Side Wall:

Replace bottom plate, repair framing, jack studs and piles, ply cladding (Mostly labour costs)	$20,000

Reinstating claddings and wall coverings to effect the above works:	$20,000

Storm Water:

Repair/replace/reinstate to council drainage system	$5000

Contingency:

For unforeseen rotten and defective structure uncovered during the course of the works	$20,000

Exclusions:

Non-structural costs including but not limited to:
Building Consent fees, Engineering design fees, Architectural Draughting fees, Resource consent fees.

Additional costs for face-lift if desired i.e. internal and external painting, additional re-cladding for water tightness etc.

Upgrading the toilet facilities.

All costs associated with Fire Safety detailed in Frank Burton and Associates report.