Shelly Bay
Slipway Building

Building Condition Report

Wellington City Council

Shelly Bay - Slipway Building Condition Report

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Contents

Executive Summary

Opus International Consultants Ltd has been commissioned by the Wellington City Council to undertake a condition assessment report on the Slipway Building at Shelly Bay, Wellington.

As part of the condition assessment, Opus undertook a site inspection of the building. Following this it has been deemed that all services are considered in-operable and require removal and replacement. This includes switchboards, wiring, sockets, sprinklers and treated water supply.

The stability of the structure is also questionable due to a number of key structural items missing and considered non-functional. The building is considered earthquake prone as per section 122 of the New Zealand Building Act as the structure has insufficient bracing in the longitudinal direction.

The risk of fire is high which has the potential to cause harm to persons on the neighbouring property and, given the building is able to be accessed, may cause harm to unknown personnel 'squatting' on the premise. There is also a high risk to persons due to falling debris caused by connection and member failures and the sagging mezzanine floor. Consequently under section 121 of the New Zealand Building Act, in its current condition, the building is considered dangerous as it is likely to cause injury to persons in the property or on adjacent properties.

The building is in a state of disrepair and there is a large amount of moisture ingress due to the deficiencies in the external claddings. Should the building be occupied in its current state then under section 123 of the New Zealand Building Act it would be considered that the building is insanitary as it is 'likely to be injurious to health because it is in a state of disrepair and has insufficient of defective provisions against moisture penetration as to cause dampness in the building.'

Further design and investigation would be required to accurately cost remedial solutions; however given the poor state of the building it is likely it will be uneconomical to repair and demolition should be considered.

It is important however to not ignore the value of the building to the character of the surrounding area. It is encouraged that if new development does occur within the area the design aligns with the principles outlined in the Shelly Bay Design Guide and respects the distinctive environmental qualities of the area.

Due to the value of the building to the character of the surrounding area photograph survey to record the building may be considered prior to demolition, some native timber structural elements are also recoverable and could be utilised in the future development of the site and surrounding areas.

1 Introduction

1.1 General Description

The Slipway building was built alongside the Shipwrights building and was intended for the repair of vessels undercover. Storage of machinery and parts occupied the building for a large portion of its life.

Figure 1: Internal view of building

The large rectangular native timber building sits parallel to Shelly Bay and has been unoccupied for over 10 years. New Zealand hardwood timber trusses are supported by double timber columns and a concrete floor slab. The roof is sarking supported by timber purlins and trusses and the roofing is corrugated asbestos cement fibreboard (Super-Six). Weatherboards protect the 42x7.5x8 meter exterior walls.

The building has weathered over 70 years of northerly and westerly winds, sea water and corrosive salts which is a testament to World War II construction workers who considered fundamentally building elements in 1941.

The Shelly Bay design Guide references new development around Shelly Bay and that any new design must accompany the existing character of Shelly Bay.

*Bounded by the existing road to the east and the water's edge to the west, the wharf area is an almost separate entity. The main focal point of the wharf area is the two storey saw-toothed Workshop and Stores building, adjacent to the linear volume of the low shipwright's building to the south. Both buildings are strongly related to the military history of Shelly Bay. The foreground position of the Workshop and Stores building, its relative height and characteristic roof form make it a recognisable landmark feature of Shelly Bay (*Shelly Bay Design Guide Wharf Area Page 5).

1.2 Purpose

The purpose of the report is to provide insight into the overall building condition. Safety and structural stability of the building is important to ensure neighbouring site assets are not affected.

It is important to acknowledge that whatever the end outcome for the building there is an immediate requirement to address the additional high risk elements identified in the report to make the building safe.

1.3 Scope

For the Slipway building at Shelly Bay a condition report will be produced which will include a Detailed Engineering Evaluation as well as an assessment of the gravity and wind loading capacity of the structure and comment on the general condition of the building. The assessment will include;

- Structural Analysis
- Building Condition Assessment
- Conclusions and Recommendations

2 High Impact Risks

Due to the buildings location within such an exposed environment and the lack of regular maintenance, a number of Health and Safety concerns have been identified as high risk elements and require consideration when providing insight into the overall building condition. The risk of these elements has therefore been linked to the definitions within the New Zealand Building Act 2004 as to what is considered to be a dangerous, earthquake prone or insanitary building.

2.1 Building Stability

The current structural condition and deterioration of primary elements within the building has made inspections of the building a risk. Prior to the inspection of the Slipway building a detailed Health and Safety plan was prepared to ensure appropriate processes and safety measures were known by all personnel visiting the site. Time inside the building was kept to a minimum and movements within the building were planned. Falling debris was identified as a high risk and the southern end of the building was completely avoided due the deterioration and risk of the mezzanine floor collapsing.

Although the building has been fenced off and a majority of windows and access doors are boarded there is still a risk to public safety and this was reinforced by the evidence of vandalism that has occurred within the building confirming entry into the building has occurred despite the current measures to restrict entry.

2.2 Fire Safety Precaution Systems

An assessment of the fire safety precautions within the Slipway building concluded that there were no operational fire systems. This was expected as the building has not been tenanted in approximately 10 years. There is evidence that an existing sprinkler system was installed within the building however the services are now inoperative and considered beyond repair. Given the building is constructed entirely of timber, without appropriate fire systems it has been determined that fire is a high risk. Should the building catch alight the asbestos within the roof and guttering will create hazardous ash and smoke which will affect neighbouring properties.

Figure 2: Timber framed external wall

Figure 3: Timber portal column base

3 Structural Elements

3.1 General Structure

The Slip Way building is a timber framed building constructed in the early 1940's, with timber detailing typical of Military buildings of its era. The building is rectangular with the long length orientated in the north-south direction. The main area of the building is double height single storey and there is a small mezzanine floor located at the southern end of the building.

The structure consists of double timber columns supporting double timber trusses. Asbestos cement roofing sits on timber sarking supported on purlins which span between the timber trusses. The roof slopes down from east to west, with the high side supported by a timber truss which runs the length of the eastern wall. The building has a concrete slab which is on-ground at the northern end and rises on infill to maintain level as the ground slopes towards the sea.

3.2 Gravity Load Elements

The main gravity load carrying elements in the structure are the timber portal frames which carry the weight of the roof. The timber framed walls support their self-weight only. The mezzanine floor is supported on timber which spans between the western and eastern walls and is supported off the portal frames.

The portal frames are in a reasonable condition considering their exposure to the elements; there are no signs of significant sagging in any members from gravity loading. However, the mezzanine has a large sag in the centre of the span. The un-supported timber span is approximately 7.5m, the sag has potentially been caused by water ingress into the timber on the floor above adding additional weight, the removal of a ground floor supporting wall, or poor original design. The stairs up to the mezzanine floor are damaged to a point where they are un-safe to be used.

3.3 Lateral Load Resisting Elements

3.3.1 Longitudinal Direction (north-south)

In the longitudinal direction the building has two long timbers walls which run the length of the building. Both walls have windows and doors spaced along there length. These walls are not connected to the roof and only support their own self-weight. The walls have no internal lining to provide bracing to them (i.e. GIB or plasterboard) and have only one diagonal brace in the northern end of the building. The walls rely on the timber framing and the external weatherboards to provide resistance to lateral loads. Given the condition of both the framing and the weather boards and the lack of any bracing members the performance of the walls is compromised, there is a high risk of their failure in an extreme wind event or a seismic event.

Seismic and wind loading generated from the roof is transferred into the timber portal frames via the purlins supporting the timber sarking. The timber portals are required to act out-of-plane to provide resistance to the induced lateral loading as there is no cross-

bracing between the frames. Some of the frames are connected to the adjacent walls however the connections are small nailed on timber members which are not likely to be strong or stiff enough to transfer significant force from the frames into the walls. As previously discussed given the condition of the walls they are unlikely to provide any additional bracing to the timber portal frames, even if they were appropriately connected.

The condition of the timber truss supporting the eastern (high) side of the roof is extremely poor. The original cladding adjacent to the truss has been either purposefully removed or has been dislodged by the elements. This exposure has resulted in the bolted truss showing significant signs of rot and rust. As seen in the photos below, this means in places the top chord of the truss is missing and the bolted connections are so badly rotted and rusted they are only just holding together. This deterioration means the roof is unstable in high winds or in a seismic event inducing loads in the longitudinal direction as the fixity of the roof to the structure is compromised.

Figure 4: Deteriorated Connection

Figure 5: Truss missing top chord members

3.3.2 Transverse Direction (east-west)

The lateral load resistance in the transverse direction is provided by the timber portal frames. The frames support their self-weight, the weight of the roof and the weight of the truss which runs the length of the east wall. The timber frames are bolted onto timber plinths which transfer the lateral loads from the structure into the foundations.

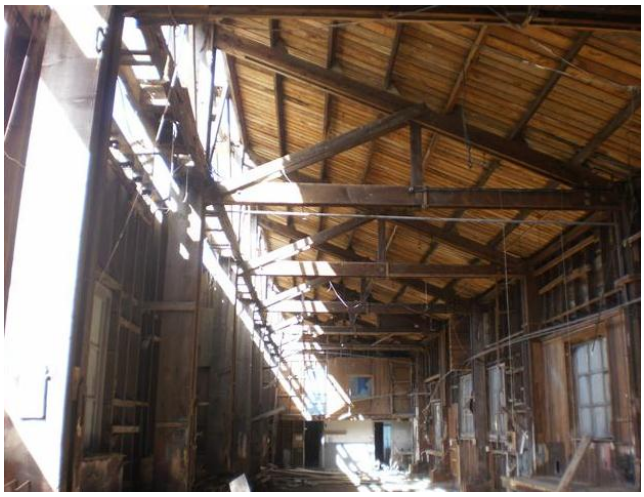

Figure 6: Timber frames with half truss

Figure 7: Timber frame base detail

The timber portal frames are largely intact despite their exposure to the weather. However, given the deterioration in the external cladding which has occurred the frames could be expected to deteriorate quickly in a similar manner to the east wall truss. Already there are early signs of rot in the timber members and rust in the bolted connections which will affect their ability to resist lateral loads.

3.4 Summary of Performance

The structure is in such poor condition it is not possible to calculate reliable strengths for the building. In the longitudinal direction the structure is relying primarily on the external cladding and timber frames for strength. Weatherboard provides insignificant bracing capacity and the timber framing relies on the bracing from the linings for lateral stability. The seismic strength in the longitudinal direction is likely to be less than 10% (NBS) of new building standard. In the transverse direction the timber portal frames provide the lateral load resistance. The frames are exposed to the elements and the condition of the bolted connections and the timber members is beginning to deteriorate. The frames are double timber and are not resisting a significant load. It is likely the building is greater than 33% NBS in the transverse direction.

The deterioration of the structure has severely compromised the structures ability to carry gravity loads and resist lateral loading. The light weight nature of the structure and lack of any live loading has meant the structure has been able to maintain its integrity to date under wind loading, albeit with significant failures in the cladding elements occurring. Should a design level earthquake occur, failures around the connections and in the rotted timber members would be expected, which is likely to lead to a failure in the buildings ability to carry gravity loads.

4 Secondary Elements

4.1 Exterior Cladding

The original exterior cladding is timber weatherboard and is current. In the January 2008 Building Condition Assessment there was evidence of rotting and missing areas of weatherboard. Remedial works were proposed but have not been undertaken and subsequently rotting has increased along with sun exposure and the thin layer of paint that remained has peeled off in many areas providing no protection to the exposed weatherboard. Many weatherboards have also started to bow and split with small signs of borer starting on internal studs.

An estimated 20% of the weatherboards are missing along with 30% non-repairable; therefore approximately 50% of the weatherboard are condemned and require removal and replacement.

Figure 8: Weatherboard cladding

4.2 Windows

85% of exterior windows are boarded up and frameless to provide additional security. Interior windows down the southern end of the building are broken. The remaining windows are in a poor condition with rusty fixings and rotting timber. Nearly all windows would need to be completely replaced to ensure the water tightness of the building should it be refurbished.

4.3 Access

The eastern roller door has been removed and been framed out to half height with a door for access as shown on the left of Figure 9. The northern doors shown below in Figure 9 below are functional however the larger original door has been removed and it has been retrofitted with a smaller door, approximately half the height of the original. This prevents large machinery/items being stored in the building. External doors on the remaining facades are boarded up to provide additional security.

Figure 9: External view of former roller door

4.4 Roofing

The original roofing material (corrugated asbestos cement super-six) is currently on the structure and has been for over 50 years. Portions of the roofing membrane are missing and have holes in them. The New Zealand ultra violet levels are strong and due to the length of time it has been in place the roofing material must be considered brittle and unsafe. Together with the asbestos content, the roofing material is considered hazardous.

Upon our site visit there were signs of leaking throughout the roof structure and in severe weather conditions this would be significant.

The roof requires significant repair and given it is asbestos this would be impractical. The only feasible option is to remove the roof and replace with corrugated iron, or similar modern roofing material. A large portion of the supporting purlins are missing and/or not adequate which will also require replacing.

4.5 Services

The state of services is beyond repair, removal and replacement is the sole option.

4.5.1 Water Supply

The water supply to the Slipway building has been disconnected; taps, basins and pipework are inoperative and considered to be beyond repair. The storm-water drainage is asbestos cement channel guttering and downpipe and it is recommended that if restoration of the building occurs that the asbestos is removed. Additional expense should be allowed for as Health and Safety planning will be required and a pre-approved dumpsite will need to be determined.

The building is currently un-occupied and measures have been taken to restrict access to the public. However, should the building be occupied in its current state the New Zealand Building Act Section 123 Meaning of insanitary building provides the following definition;

A building is **insanitary** *for the purposes of this Act if the building—*

(a) is offensive or likely to be injurious to health because—

(i) of how it is situated or constructed; or

(ii) it is in a state of disrepair; or

(b) has insufficient or defective provisions against moisture penetration so as to cause dampness in the building or in any adjoining building; or

(c) does not have a supply of potable water that is adequate for its intended use; or

(d) does not have sanitary facilities that are adequate for its intended use

From the definition it is considered that if the building was occupied it would be considered insanitary as it is 'likely to be injurious to health because it is in a state of disrepair and has insufficient of defective provisions against moisture penetration as to cause dampness in the building.'

Figure 10: Moisture damage to internal timbers

4.5.2 Electrical Services

Opus understands the electrical services are currently disconnected and advice not reconnecting until a detailed electrical analysis is completed by a suitably qualified person and the outdated and damaged electric services are replaced.

Exposed wiring is damaged by rats and water along with switchboards. Scorch marks on a number of power points and the main switchboards is evidence of unstable loads which indicate probable failure in wiring and and/or tripping of the switchboards.

The main switchboard is in poor condition with a number of fuses and wire missing.

Removal of wiring and associated electrical fittings is the sole option for the supply and distribution of safe electricity within the Slipway.

Figure 11: Switchboard

5 Condition Summary

The building in its current condition is a risk to occupant's health and safety. . In terms of the Building Act 2004 the building is classified as;

- Dangerous as it is likely to cause injury to persons in the property or on adjacent properties due to the high fire risk, the risk of falling debris due to the failure of connections in the structural elements and the risk of failure of the sagging mezzanine floor.

- Is earthquake prone as the buildings capacity is less than 10% of new building standard (%NBS), which is below the 33% NBS threshold. This is due to the lack of bracing capacity in the longitudinal direction, which is primarily relying on the weatherboard cladding and timber framing to resist lateral loadings.

Rats, weather and vandalism have resulted in the building services being damaged beyond repair and would require complete re-fit in order to be operable. The power supply to the building has been switched off, however given there are no fire protection systems and the buildings constructed almost entirely from timber the fire risk is very high.

The building's very poor condition means there are feasibly three options;

- Demolition and salvaging of native timbers for re-use
- Demolition and salvaging of native timbers for re-use and construction of a new building in its place
- Refurbishment and reinstatement of the existing structure

Regardless of the option chosen for the future use of the building immediate securing works are required to ensure that un-authorised persons can't entire the building and to slow the degradation of the building.

6 Options for Site

6.1 Demolition and salvage of timbers

Demolition of the Slipway building is the cheapest option for the site. The timbers in the building, which include native New Zealand hardwoods, could be salvaged and re-used for decorative purposes in other building works or as furniture. It could be used within the Shelly Bay environment as a way of maintaining the historical link with the area.

The demolition will require specialist contractors to deal with the asbestos elements, and will require additional considerations for the disposal of the material. This will require additional health and safety requirements and cost over what would be expected if the building did not contain asbestos. The site could then be left for future development once funds become available.

6.2 Demolition and salvage of timbers and subsequent new build

As with above the structure could be demolished and the timbers salvaged. The salvaged materials could be used as architectural features in the new build to provide a connection with the Slipway building.

The condition of the wharf the existing Slipway building is founded on would need to be further examined to determine whether any work is needed to strengthen it to allow the construction of a new building on the old foot print. Any new building would need to fit within the parameters set-out in the Shelly Bay Design Guide.

6.3 Refurbishment and strengthening of existing building

Refurbishment of the existing building will require an almost complete replacement and repair of the existing structure. Before commencing a detailed inspection of the timber portal frames would need to be undertaken to check the condition of the connections and to check for rot in the timber. Should this come back favourable then these elements can form the basis of the refurbishment.

To reinstate the building to a form similar to its previous use refurbishment will require as a minimum;

- Removal of the asbestos roof and erection of a new roof constructed from modern materials. Missing and damaged purlins will also need to be reinstated.
- Replacement of missing and damaged weatherboards.
- Replacement of damaged and removed window frames and glazing.
- Replacement of damaged and removed doors, including roller doors, and associated framing
- Painting of entire building exterior
- Replacement of the timber truss supporting the eastern side of the roof
- Removal of asbestos guttering and downpipes and replacement with modern materials
- Seismic strengthening of building using braces in both directions, to a minimum of 33% NBS to remove earthquake prone status

- Strengthening of mezzanine floor at southern end of structure, will likely require full removal and replacement
- Removal and reinstatement of moisture damaged timbers
- Re-wiring of electrical services
- Reconnection of sanitary services and potable water supply
- Improvements to fire detection, prevention and fighting measures together with upgrades and sign posting of fire escapes

The above is not an exhaustive list of what will be needed but is an indication of the scope of work required. The cost of undertaking this work is likely to be close to, if not more expensive than undertaking a new build and relies on the main structural connections and elements being in a reasonable condition.

7 Recommendations

A report completed by Opus International Consultants in January 2008 reinforced the need for immediate remedial works to occur to the Slipway building to ensure restoration of key structural elements and deteriorated building elements.

Since January 2008 the severe environmental conditions experienced by the Slipway building within Shelly Bay have exponentially deteriorated key building elements potentially beyond economic repair. All services have been determined to be condemned and require replacement posing a significant financial association. The remedial works or recommended care was not undertaken at the time and significant degradation has since occurred.

As a consequence of the buildings current condition a number of Health and Safety issues have been identified as a risk to public safety and to neighbouring properties.

It is therefore our recommendation that the Slipway building is demolished as the financial implications associated with the restoration of the building are high. Further design and investigation would be required to accurately cost remedial solutions; however given the poor state of the structure it is likely much of the building is beyond saving.

It is important however to not ignore the value of the building to the surrounding area and it is encouraged that, if new development does occur within the area, the design aligns with the principles outlined in the Shelly Bay Design Guide and respects the distinctive environmental qualities of the area.

Due to the value of the building to the character of the surrounding area a photographic survey to document the building before demolition should be considered. Opus International Consultants sees value in retaining some of the native timber used within the structure of the Slipway building and utilising these elements in either future design or along the marine drive to enhance the levels at which Shelly Bay is experienced and include references to the area's history.

Regardless of the long term option chosen by the Wellington City Council, immediate securing measures should be undertaken to eliminate the health and safety risk to people entering the building un-lawfully and to slow the degradation of the building by the elements.

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