



Image: DPA Architects

ROTORUA BATH HOUSE HERITAGE IMPACT ASSESSMENT

FOR REVIEW

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1 INFORMATION

1.1 Introduction

This report concerns the former Bath House in Rotorua, now also known as the Rotorua Museum Te Whare Taonga o Te Arawa.

Initially conceived as a spa resort and sanatorium by the newly established Department of Tourist and Health Resorts, the earliest part of the building was completed in 1908. Additions were constructed in 1911, 1983, 2008 and 2011. In 1966 the building ceased to function as a bath house and in 1969 was repurposed as the Rotorua Museum. The museum holds collections related to the Rotorua region, but also features exhibits relating the history of the building itself.

A seismic report made in 2016 found the majority of the building to meet 15% of the New Building Standard (NBS). Consequently, the museum was closed to the public. Rotorua Lakes Council engaged DPA Architects in 2018 as project architects for the seismic strengthening and redevelopment of the building. DIZHUR Consulting have since been appointed to provide the structural strengthening scheme.

In conjunction with the structural upgrade, the roof of the central portion of the building will be replaced to resolve recurring water ingress problems. Interior alterations will be made to provide accessible access to at least 90% of public spaces and comply with fire regulations. A new café, conference room, storage rooms, toilets and infant change room will also be provided.

The report is in the form of a heritage impact assessment. It includes a brief account of the history of the building and its setting, then outlines the historic heritage values of the place. The proposed works are then detailed and their impacts on the heritage values of the place are assessed.

1.2 Heritage Protection

The former Bath House was listed as a Category 1 historic place by Heritage New Zealand Pouhere Taonga in April 1985 under the list number 141. The building is also listed as a historic structure within the operative *Rotorua District Plan* in *Sched 2 – Historic Structures Schedule* (ID H1.1).

The site is considered an archaeological site, with recorded archaeological deposits linked to the development of the Government Gardens established during the 1880s. The site will be afforded protection under the *Heritage New Zealand Pouhere Taonga Act 2014* which defines an archaeological site as “a place associated with pre-1900 human activity, where there may be evidence relating to the history of New Zealand.”

1.3 Commission and Authorship

The report was commissioned by the Rotorua Lakes Council and written by DPA Architects.

1.4 Information Sources

Information has been drawn from a conservation plan for the former Bath House written by DPA Architects in 2018. The historic account in that document was prepared by historian Philip Andrews.

All other sources of information, including historic photographs, are referenced throughout the document.

2 HISTORICAL BACKGROUND¹

“The new bath building, while not completing the original scheme, should yet be one which for architectural beauty and for completeness of internal fittings would do credit to the most famous spas of Europe, while for excellence and variety of mineral waters supplied, it need fear no comparison with any bathing establishment in the world.”

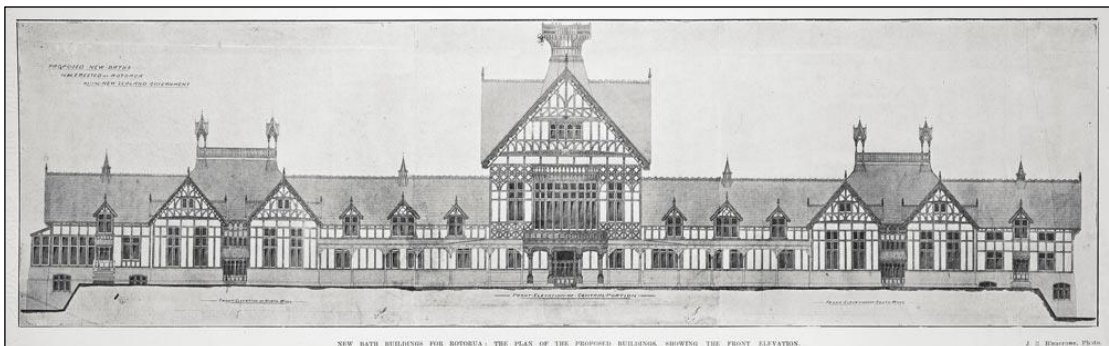
-Arthur Stanley Wohlmann

In August 1902 T. E. Donne, Superintendent of the Department of Tourist and Health Resorts, informed his minister that the new Government Balneologist, Dr. Arthur Stanley Wohlmann, was anxious to “proceed with the inauguration of a new era of things at Rotorua, and proposes that immediate steps be taken to construct a new bath house.”

Before the end of September that year Wohlmann had sent a revision of his original plan to Wellington. Wohlmann provided initial drawings and was to oversee the planning and construction of the building. Government architect B. S. Corlett prepared detailed plans and specifications, possibly with the help of the department’s draughtsman W. J. Trigg. The plaque prepared for the official opening names Corlett and Trigg as joint architects.



Bath House original concept. A “homely timbered building.” Source: Rotorua Museum Te Whare Taonga o Te Arawa.



Original drawing for the front elevation of the Bath House Source: Auckland Libraries Heritage Collections.

¹ DPA Architects, *Rotorua Bath House (Former) Conservation Plan*, 2019.

The building was to overlook the sanatorium grounds, facing west. The floor to ceiling height would be twenty feet, with concrete foundations rising to six feet and six inches above ground level to allow ample room within the basement for piping, drying and storage rooms, water storage cylinders and compressed air machinery for pumping. The high foundation was also intended to eliminate “any squat appearance... affording a fine view over the lake from the verandahs.”

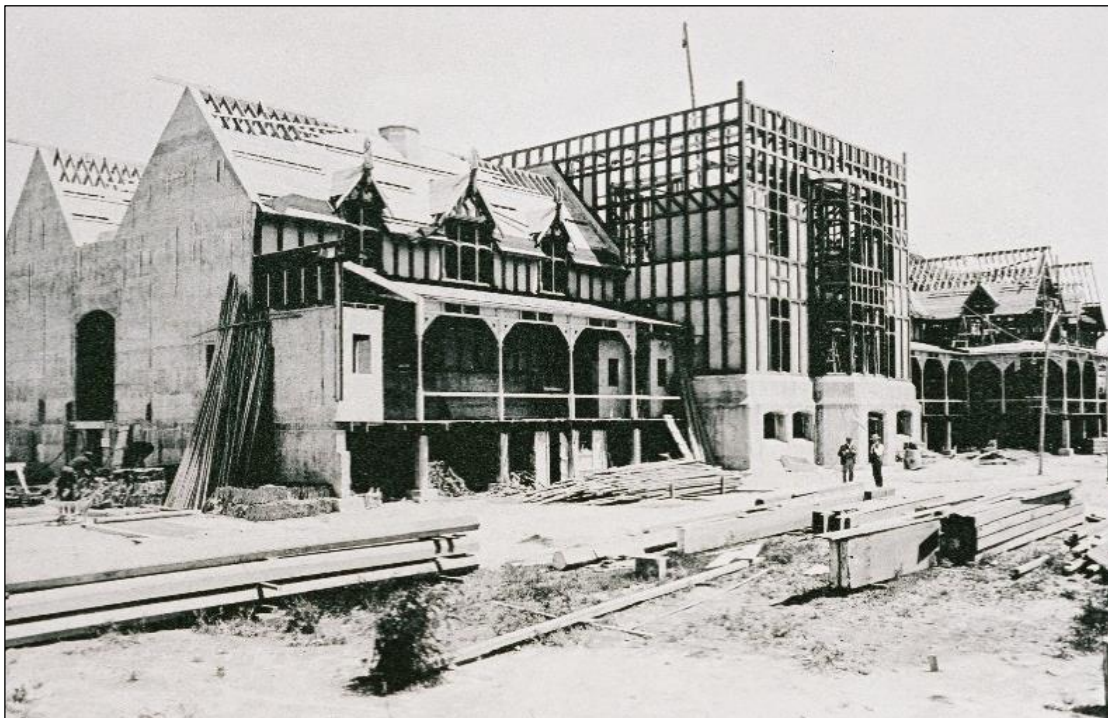
Twelve-foot wide verandahs were regarded by Wohlmann as a special feature, providing summer shade and winter shelter. Corlett opposed the verandahs, believing them incongruous with what he called an ‘old English style’ timber-framed building. As a compromise, Wohlmann omitted that part of the verandah where exposure to sun was poor.

The initial plan included eight deep baths, twelve mud baths and forty-two shallow baths, large massage and Turkish baths, two electrical bathrooms and four vapour and hot air rooms.

On 31 May 1908 the building contract was completed, and in August the building officially opened to the public. Large numbers of visitors were treated for a range of complaints during what was to be almost sixty years of operation as a spa. During the First World War hundreds of wounded soldiers were admitted for treatment. Throughout this period, hydrogen sulphide gas, acidic water and steam created building maintenance problems which were never entirely resolved.

Reflecting the declining popularity of hydrotherapy, the Bath House closed in 1966, at which time much of its equipment was removed. Following an interlude as a restaurant and dance hall, the building was adapted and reopened as the Rotorua Museum Te Whare Taonga o Te Arawa in 1969.

In 1985 the building was recognised as a heritage building by Heritage New Zealand Pouhere Taonga.



The Bath House under construction – rear elevation. Source: Rotorua Museum Te Whare Taonga o Te Arawa.



The central hall prior to the opening of the Bath House in 1908. Source: Auckland Libraries Heritage Collections NZG-19080708-18-3.



View along corridor towards central hall, 1960. Source: Alexander Turnbull Library.

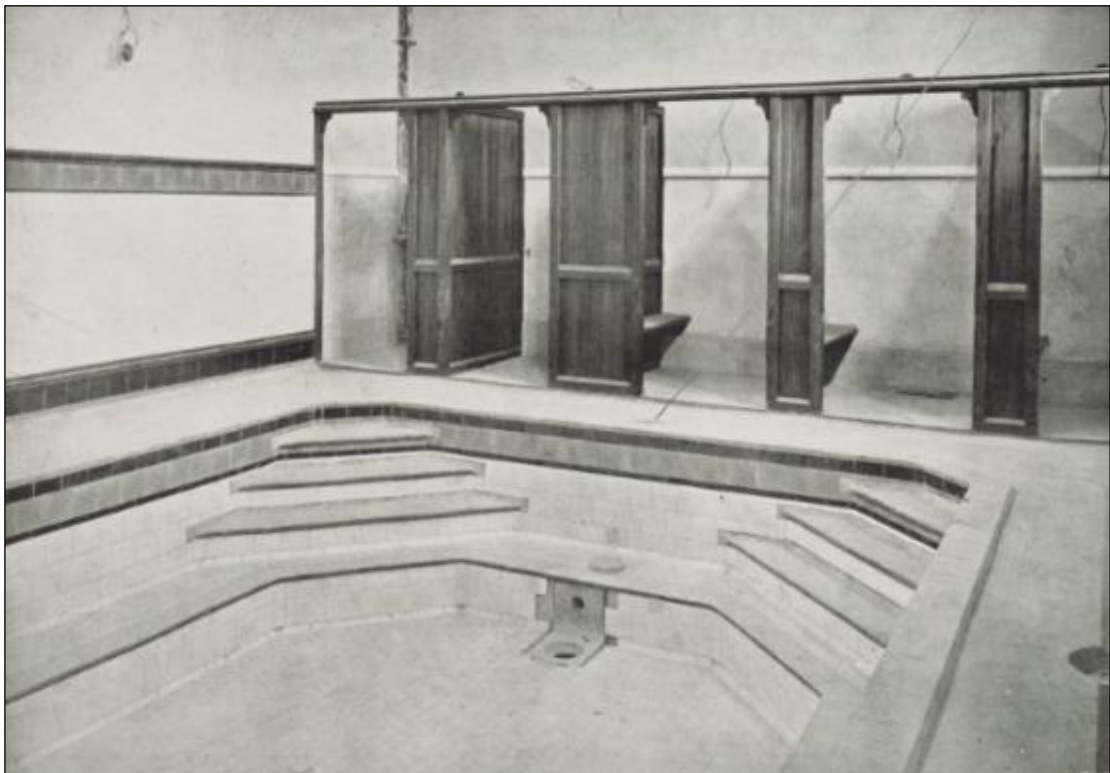
Equipment

Wohlmann was responsible for selecting the baths, equipment and furnishings. He experimented with different bath designs, chose tiles and colour schemes and kept up to date with hydrotherapy products available internationally. The equipment he purchased was varied and modern.

Treatments included a 'Turkish bath' (a steam bath followed by a shower and massage) and a 'Russian bath' (a hot air bath). Both baths were heated by a fifty horse-power boiler which also warmed the building. The inhalation baths were supplied by steam from the artificial Malfroy Geyser. The Rachel Bath - the largest in the building - was designed to promote relaxation.



Left and right: various treatments available at the Rotorua Bath House in the 1920s. Source: Alexander Turnbull Library.



The most substantial bath in the Bath House: The Rachel Bath nearing completion in 1908. Source: Auckland Libraries Heritage Collections.

3 PHYSICAL DESCRIPTION

3.1 Location and Setting

Located within the Government Gardens and near the shore of Lake Rotorua / Te Rotorua Nui ā Kahumatamomoe, the Bath House has been a focal point of the settlement of Rotorua since its construction.

The Rotorua Government Gardens are listed by Heritage New Zealand Pouhere Taonga as an historic area. The site is known to tangata whenua in part as Paepaehakumanu and in part as Motutara, and is a wāhi tapu (sacred place) for Ngāti Whakaue.² Within the historic area are buried archaeological deposits, geothermal features, historic plantings and structures including the Blue Baths, Rotunda, Gardener's Cottage, Prince's Arch and Tea Pavilion.³

Other listed buildings in the vicinity include the Civic Theatre, the former Post Office and the Prince's Gate Hotel.

The former Bath House remains prominently visible from Hinemaru Street. At the rear of the building is the Southern Trust Sportsdrome and Energy Events Centre.



The Bath House set within the Government Gardens, sometime after the 1911 extension. Source: Rotorua Museum Te Whare Taonga o Te Arawa GP-600.

² Heritage New Zealand Pouhere Taonga, 'Rotorua Government Gardens Historic Area,' accessed July 2022, <https://www.heritage.org.nz/the-list/details/7015>

³ Ibid.



The Rotorua Bath House situated within Government Gardens showing surrounding listed heritage buildings (blue) and unlisted (red). Source: DPA Architects.

3.2 Architectural Description

Roughly symmetrical about the two-storey central hall, the former Bath House building is oriented along a north-south axis, its primary façade facing west. The central hall is set beneath a gabled roof, which is intersected by a smaller gable. A tower rises from the intersection of these two gables.

A balcony supported by timber columns and a faceted bay window are positioned above the main entrance at the centre of the west elevation. Northern and southern wings extend from the central section, each set beneath a separate gable roof.

Pumice concrete perimeter walls rise to the foot of the windows, above which the walls are of half-timbered construction. The exposed Elizabethan-style tōtara framing comprises studs and nogs fixed with pūriri pegs.

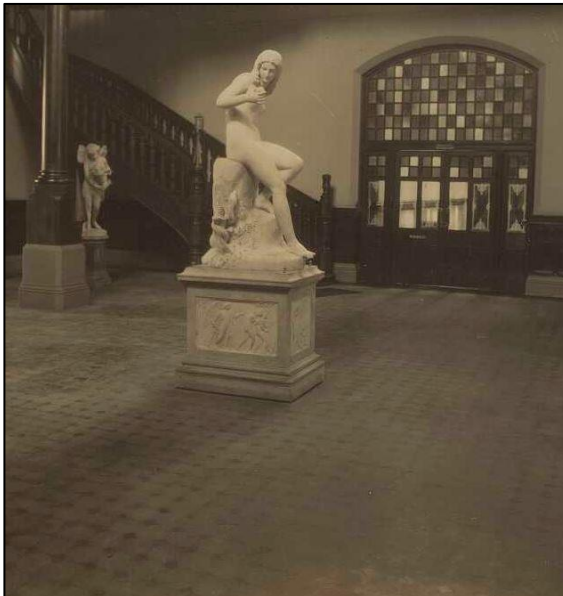
Traditionally, infill panels between the timber framing of buildings of this style would have been wattle and daub, lath and plaster or brick. Cognisant of the poor bearing characteristics of the ground at the Bath House site, however, an innovative solution was reached: light-weight pumice concrete panels were fabricated, cast in newspaper-lined moulds. The resulting panels, only fifteen millimetres thick, were fitted into rebates in the framing and secured with timber battens. Although some cracks have occurred, the panels have proved exceptionally durable. At various locations, decorative framing or 'strapwork' was also fixed over the panels.

Additions made to the building in 1983 adapted this construction methodology, using tanalised pine framing infilled with fibre cement boards, with battens fixed over the joints. The resulting structure has been prone to leak. A reaction between hydrogen sulphide and salts within the tanalised timber has also produced black staining.

The original roof structure comprised timber trusses and rafters, over which timber sarking was laid. The main structural members are thought to be tōtara, with kauri used elsewhere.

According to the specification - and from original tiles found in the basement - the roof was originally clad with a more ornate and darker coloured no.4 Bridgewater 'well burnt' tile, sourced from Colthurst and Symons in England. These tiles can be seen in photographs of the building up until around 1950. Architect Corlett thought the Bridgewater tile preferable to the Marseille tile, believing it to be more harmonious with the style of the building and 'homemade' – 'home' being England. The present Marseille roof tiles on the central sections of the building date to c.1952.

Light-coloured tiles were originally laid within the central hall but have been replaced at some point with the existing darker terracotta tiles. Elsewhere on the ground floor, concrete floors were ornamented with tile borders. The original tongue and groove timber floor of the level one gallery of the central hall survives and is believed to be mataī.



Detail of a 1908 photograph showing the original lighter coloured floor tiles in the central hall. Source: National Library.



An original 'well burnt' Bridgewater roof tile from the Bath House. Source: Rotorua Museum Te Whare Taonga o Te Arawa.

3.3 Modifications

The Bath House was originally planned as a symmetrical building centred on a large foyer, comprising the main entrance. The foyer was planned as a double height space with a central light well in the upper floor illuminating the lower level. A fountain was proposed within the foyer but was never realised. The central section also contained ticket offices and the balneologist's consulting room.

Single-storey wings extending to the north and south of the foyer originally served as separate areas for male and female patrons. Only a small section of the southern female wing was initially built, with extensions made in 1911. Each wing was divided into small rooms of different sizes, some containing baths and others waiting and cooling rooms.

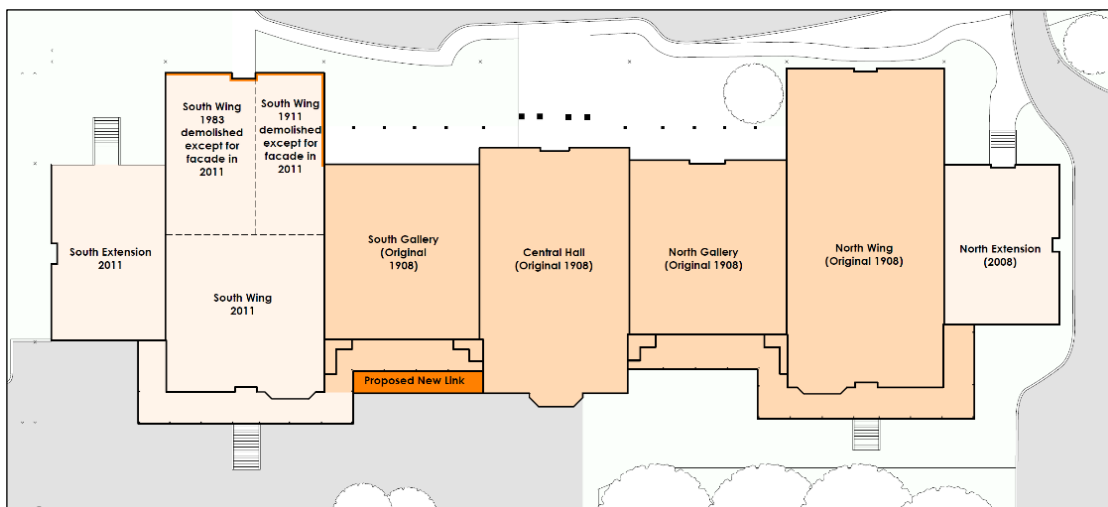
Until the 1960s, alterations and additions had been related to the changing requirements of hydrotherapy and allied treatments. During the 1960s the building began to be adapted for new uses – such as a restaurant and dance hall - requiring the removal of some interior walls, partitions, tiled dados and most of the baths. In 1964 the original kauri columns in the foyer were re-erected at the entrance to the north wing gallery; however, during restoration work in the late 1990s they were returned to the main foyer. The same year, the Sportsdrome was erected at the rear of the Bath House and the two buildings were connected by a covered walkway.

Anticipating the building's centenary, it was proposed to fulfil the original design of the building as conceived by Wohlmann. During the original construction period, budget restrictions had led to the omission of the northern-most section of the north wing and most of the southern wing. One more gable was added to the south wing in 1911, and a second gable added alongside this in 1983. Extensions to the north wing were completed in 2008; those to the south wing were finished in 2011. These latest additions provided additional gallery space for the Rotorua Museum and completed the symmetry of the front elevation.

As part of the 2008-11 works, turrets and railing around the promenade roof (which may have been removed as a safety measure after the 1931 Napier Earthquake) were reinstated.



Diagram showing chronological realisation of the Bath House building. Source: DPA Architects.



Plan of the Bath House building with date of construction indicated within each section. Source: DPA Architects.

4 ASSESSMENT OF SIGNIFICANCE

The *Rotorua District Plan* contains no specific criteria for evaluating historic heritage. In lieu of this, the criteria used to assess significance in this heritage impact assessment are those used by Heritage New Zealand Pouhere Taonga in the document *Sustainable Management of Historic Heritage Guidance – Assessment Criteria to Assist in the Identification and Assessment of Historic Heritage Values*.⁴

These values are as follows:

Physical Values

- *Archaeological Information*
- *Architecture*
- *Technology and Engineering*
- *Scientific*
- *Rarity*
- *Representativeness*
- *Integrity*
- *Vulnerability*
- *Context or Group*

Historic Values

- *People*
- *Events*
- *Patterns*

Cultural Values

- *Identity*
- *Public Esteem*
- *Commemorative*
- *Education*
- *Tangata whenua*
- *Statutory recognition*

An assessment of the former Bath House, according to these criteria, is made below.

Physical Values

Archaeological information

The site may hold pre-1900 archaeological significance for Ngāti Whakaue as it appears it was a place of human activity before it was gifted 'hei oranga mo ngā iwi katoa o te Ao' ('for the benefit of the people of the world') in 1880. Buried archaeological deposits associated with the development of the Government Gardens at the site are also recorded.

Architecture

The former Bath House has architectural significance as a purpose-built antipodean spa designed in an Elizabethan revival style. The building is of half-timbered construction and features an elaborate roofline of towers and gables, a grand entrance foyer and large glazed areas. The verandah represents an adaptation of the style to New Zealand conditions.

Technology and Engineering

The former Bath House has significance under this criterion as a technically accomplished and innovative structure. The use of reinforced concrete, fire-proof slab walls and electricity in the original building were advanced technologies for the time. The half-timbered construction method was adapted to the site, incorporating precast pumice concrete infill panels and native timber framing. Although precast panels became common later, particularly in the 1960s, this was the first recorded use of such a technique.

⁴ Available online at Heritage New Zealand Pouhere Taonga, <https://www.heritage.org.nz/resources/sustainable-management-guides>

Scientific

The former Bath House has scientific significance for its association with early twentieth century medical experimentation and observation in the field of hydrotherapy.

Rarity

The building is a rare example of an Edwardian period Elizabethan revival style building in a New Zealand context. The application of this style for a bath house is unique in the southern hemisphere.

Representativeness

The 1908 portion of the building is an exceptional and unique example of a half-timbered Elizabethan revival building in New Zealand.

Integrity

Although many of the original internal spaces were rebuilt during the 1960s and 70s, some original interior fabric survives including floor surfaces, baths, ceilings, staircases and other decorative features. The exterior of the 1908 and 1911 portions of the building is largely intact, although the original roof tiles have been replaced. The extensions made to the north and south were completed in the style of the original building.

Vulnerability

In 2016 the building was closed when a seismic report found the majority of the building to be rated at 15% of the New Building Standard (NBS). Other factors which contribute to the building's vulnerability include the risk of fire and general weathering.

Context or Group

The former Bath House is the best-known building in Rotorua and is an important landmark in the area. The building is located in close proximity to other heritage buildings including the Blue Baths (1933) and Princes Gate Hotel (1897, transferred to Rotorua from Waihi in 1917) and forms part of a group of local heritage buildings associated with tourism and leisure activities. The setting of the Bath House within the Government Gardens (previously known as the Sanatorium Gardens) also contributes to the contextual value of the building.

Historic Values

People

The former Bath House is associated with several notable people, contributing to its heritage significance. These include the Government Balneologist Dr. Wohlmann who conceived the initial designs of the building and Messrs Corlett and Trigg who realised Wohlmann's ideas with assistance from Government Architect J. Campbell. The building was opened by Rear-Admiral Sperry of the United States Navy along with 200 of his officers and New Zealand Prime Minister Sir Joseph Ward. The Australian sculptor Charles F. Summers designed twelve statues that originally graced the foyer.

Events

The opening event of the 1908 building is of historic significance. The event included a welcome by Te Arawa in the Sanatorium Reserve and was attended by Rear-Admiral Sperry and 200 naval officers. Prime Minister Sir Joseph Ward officially opened the building and addressed the gathering from the first-floor balcony, making tributes to Balneologist Arthur Wohlmann, Department of Tourist and Health Resorts Superintendent T. E. Donne, the architects Benjamin Stott Corlett and W. J. Trigg, resident engineer Lawrence Birks and the builder Hutchison.

Patterns

The former Bath House represents the New Zealand Government's first major commitment to the tourist industry, commencing a pattern of Government-driven development in the tourism sector. Rotorua was both the first and last full-scale attempt to create a spa town in the southern hemisphere with the hope of attracting northern hemisphere visitors. Tourism continues to be an important source of revenue for the city.

Cultural Values

Identity

The Bath House was conceived as a social centre for the Edwardian township of Rotorua, as well as an exotic leisure centre for the visitors it hoped to attract from overseas. This emphasis on tourism - and the building's function as a focal point of local community life - helped establish the identity of the place.

Public esteem

The former Bath House is held in high public esteem for its rich history, aesthetic qualities and connection to the development of Rotorua. The strength of community appreciation for the building was evidenced by the support of residents for the adaptation of the building into a museum and community facility following the cessation of bathing facilities in 1966.

Commemorative

The former Bath House has commemorative value as a place of special interest, character and visual appeal. The building has been frequented by the community for more than a century and serves as a symbol of the history and settlement of Rotorua.

Education

The building contributes to people's awareness and appreciation of New Zealand history through public education programmes run by the Rotorua Museum. The museum not only celebrates the history of Rotorua and its people but also the history of the Bath House building.

Tangata whenua

The former Bath House is located on a site known to tangata whenua in part as Paepaehakumanu and in part as Motutara. Heritage New Zealand Pouhere Taonga describes the site as being a wāhi tapu (sacred/spiritual place), of ongoing significance to Ngāti Whakaue. The significance of the former Bath House building in particular under this criterion has not been assessed.

Statutory recognition

The former Bath House is listed as a Category 1 historic place by Heritage New Zealand Pouhere Taonga (List Number 141). The building is also listed as a historic structure within the operative *Rotorua District Plan* in *Sched 2 – Historic Structures Schedule* (ID H1.1).

5 PROPOSED WORKS

Rotorua Lakes Council now wishes to undertake a range of works to the former Bath House to enable its continued use as a museum. The building will be structurally strengthened, brought up to compliance with current fire regulations and its services will be consolidated and renewed. Access within the building for people with disabilities will be improved. A new café and toilets will be installed, along with other minor architectural works. A new lighting scheme will be provided for the interior and exterior of the building.

In preparation for the proposed works, Manawatu Museum Services Limited were engaged to remove all existing heritage fixtures from the basement. The document *Protection & Removal Methodology Heritage Fixtures: Basement, Bathhouse – Rotorua Museum*⁵ documents the heritage fixtures which have now been removed. These items will be reinstated after structural and architectural works in the basement are complete.

A set of floor plans is included in the Appendix. These are denoted with zones, room codes and gridlines for reference.

5.1 Seismic Strengthening Works

The proposal for the former Bath House building includes improving the ground conditions and foundations to meet or exceed 70% NBS. The superstructure will be strengthened so that all areas of the building above ground will meet or exceed 80% NBS.

Tonkin + Taylor have provided specific geotechnical advice regarding the strengthening of the foundations. DIZHUR Consulting were commissioned to prepare the strengthening scheme for the superstructure. Both schemes have been prepared in consultation with DPA Architects to minimise the impact on heritage fabric and spaces.

Geotechnical Works

The existing foundations of the former Bath House building are shallow concrete footings, said to be reinforced with railway iron and steel.⁶

According to the Tonkin + Taylor *Geotechnical Report for Underpinning Concept*,⁷ the building is subject to long-term static settlement. Tonkin + Taylor and DIZHUR Consulting have identified support of the heavy gable walls along gridlines A4 and A5 as being critical to minimising further differential settlement of the structure. The report noted that minor support may also be required to foundations in other areas of the building.

To reduce the static settlement of the structure four options were considered.⁸ These were:

- Option 1A: Jet grout columns under Zone 3 gable walls + extensive network of tie beams
- Option 1B: Jet grout columns under Zone 3 gable walls only
- Option 2A: Extensive network of tie beams only
- Option 2B: No tie beams, no jet grout columns

⁵ Detlef Klein and Marco Buerger, *Protection & Removal Methodology Heritage Fixtures: Basement, Bathhouse – Rotorua Museum*, 2020.

⁶ 'The New Bath House,' *Auckland Star*, 2 August 1908, 3.

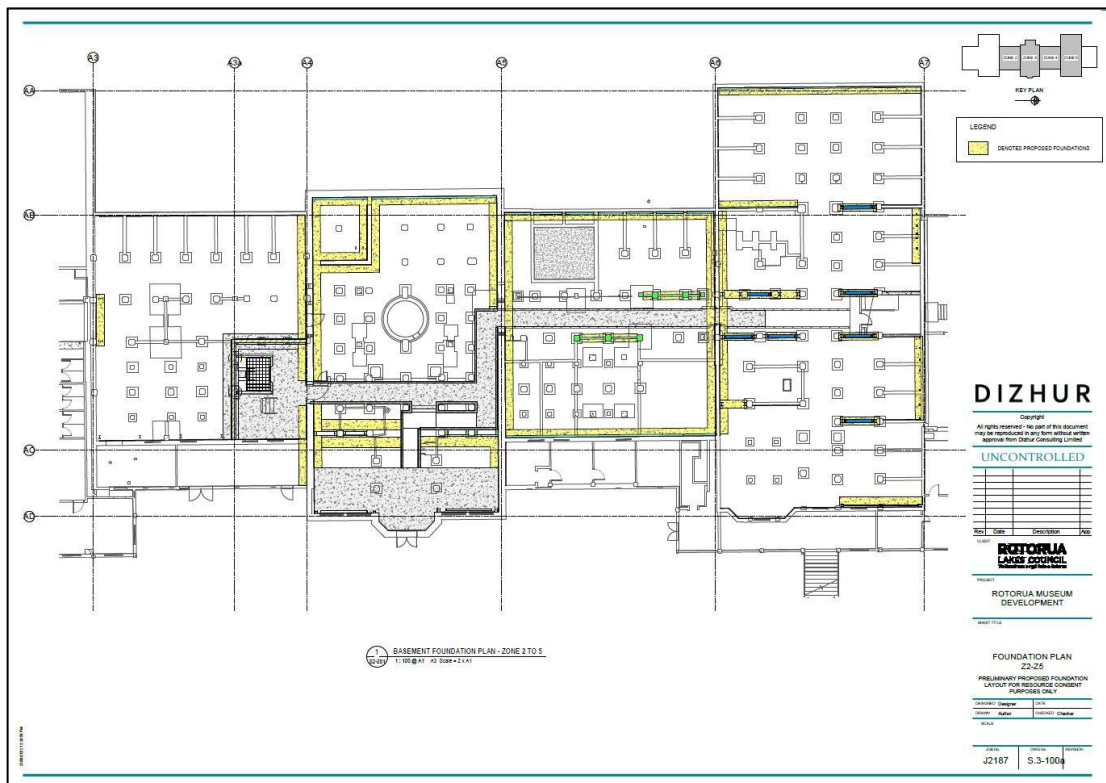
⁷ Tonkin + Taylor Limited, *Geotechnical Report for Underpinning Concept*, June 2022.

⁸ Tonkin + Taylor Limited, *Geotechnical Assessment Report for Potential Building Underpinning Solution*, October 2022.

Rotorua Lakes Council has selected Option 2B as the preferred option. This will entail a series of reinforced concrete footings being installed in zones 2-5. Beneath the gable walls along gridlines A4, A5 and A6 footings will be provided on either side of the existing footings, tied together with reinforcing bars. Where the new footings intersect with the proposed basement walkway, the footings will be stepped beneath the walkway.

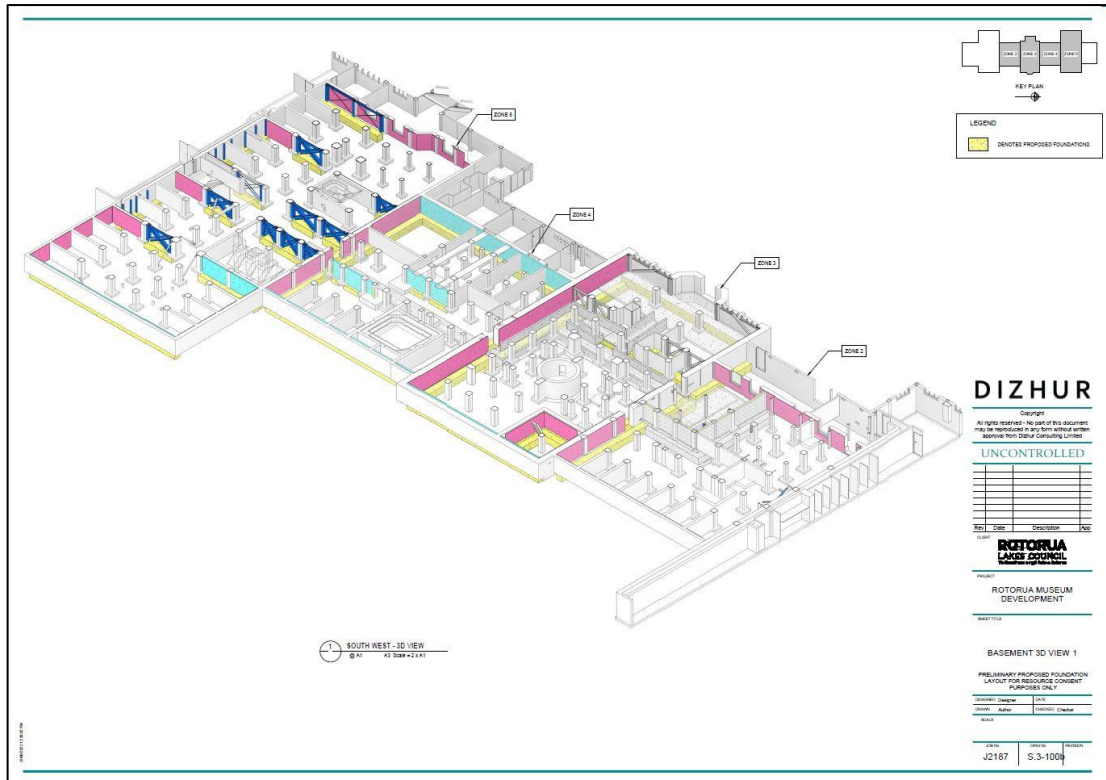
Option 2B represents a comparatively simple, low-cost solution, for which the future uncertainties for the structure are comparatively high.⁹ To mitigate the risk of ongoing static settlement, it was recommended that long-term monitoring of the building movement be carried out, in conjunction with long-term monitoring of the site's groundwater. This information will be useful to develop a maintenance management plan.

The position of the proposed new reinforced concrete footings is shown on the plans below.



Proposed foundation plan. Source: DIZHUR.

⁹ Tonkin + Taylor Limited, *Geotechnical Assessment Report for Potential Building Underpinning Solution*, October 2022.



Basement 3D view, with proposed foundations shown in yellow. Source: DIZHUR.

Structural Works

The unique structure and materiality of the former Bath House contributes strongly to the heritage values of the building. Due to its age and composition, the building contains undulating surfaces and few orthogonal lines in either plan or elevation. The proposed structural strengthening scheme makes minimal use of exposed steel framing, which is not only visually intrusive, but incompatible with the irregular forms and surfaces of the building.

The proposed scheme is tailored to the existing structure, ‘touching many surfaces lightly’ by integrating strengthening treatments directly into walls, floors and ceilings. In this way, the appearance of the building’s significant internal spaces will be altered as little as possible.

The structural scheme has been conceived with the following characteristics:

- Visually discreet. Where possible, strengthening elements will be integrated into existing wall, floor, ceiling and roof surfaces. Concealment of original fabric will be restricted, where possible, to areas of the building which are less visually prominent or not accessible to visitors.
- Versatile and buildable. Although steel has been proposed in some locations, timber and plaster-based reinforcing materials will be widely used. These materials can be applied to areas of the building with limited accessibility, may be easily tailored on site, and can be applied to the undulating and irregular surfaces found throughout the building.

- Sensitive to fabric of historic heritage significance.¹⁰ Where strengthening is proposed for areas containing significant fabric, detailed consideration has been given to the retention and protection of these elements. This includes plans for the removal and reinstatement of features such as architraves, skirtings and dadoes. In some instances, features will be retained in place throughout the strengthening works, such as the cornices and skirtings in the central hall.

The review of the impact of the structural works on the heritage values of the building will only address the seismic-related structural interventions. Structural works associated with new work to the museum will be instead assessed under the architectural works section.

The proposed structural strengthening scheme employs a range of techniques throughout the building. These techniques are described below.

Fibre Reinforced Cementitious Matrix (FRCM)

FRCM will be used to strengthen many of the original pumice concrete walls found throughout the building. The FRCM will add thickness of between 25 mm and 40 mm to the walls, with mechanical fixings at 600 mm centres.

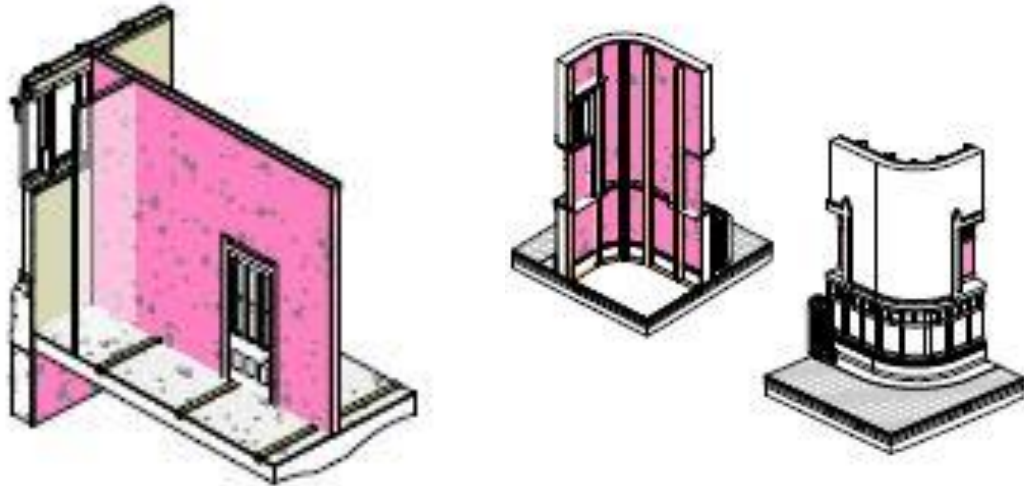
FRCM offers several advantages. It can be applied over walls with irregular surfaces and forms; it can be applied to surfaces which are difficult to access; and the additional thickness of the walls will be discreet. Disadvantages include the masking of original wall finishes and the loss of some original interior elements too fragile to survive removal and reinstatement, such as plaster cornices and skirtings.

To apply FRCM to the north and south walls within the central hall, the original timber dadoes will be carefully removed and reinstated, while the plaster cornices and skirtings will remain in place.

In other areas, FRCM will be applied to walls which are concealed behind museum walls, areas not accessible to the public and walls visible only from a distance.

Where the impact on heritage fabric will be minimal, FRCM will often be applied to both sides of the pumice concrete walls. Exceptions include the curved partition walls within the central hall, which feature ornate curved dados, skirtings and cornices. For these walls, FRCM will be applied only to the rear surfaces, leaving the more prominent surfaces intact.

¹⁰ Spaces and fabric of heritage significance have been identified in Section 6.4 of DPA Architects, *Rotorua Bath House (Former) Conservation Plan*, 2019.



FRCM applied to both sides of internal wall.

FRCM applied to one side only of curved internal walls within the central hall, with timber framing also applied.

Carbon Fibre Reinforced Polymer (CFRP) Strips

This technique involves near-surface-mounted strips of carbon fibre reinforced polymer cast into the original pumice concrete walls at 1.6 m centres. CFRP strips will be used in the north walls of B 2F and G 2B within the new circulation space.

FRCM will be significantly more discreet than FRCM and has been selected to preserve as much as possible of the original wall finishes in these locations.

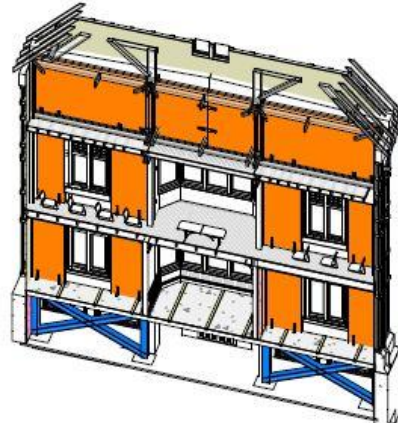
Cross-Laminated Timber (CLT) Panels

CLT panels will reinforce the original timber-framed walls at the east and west of zones 3 and 4. The panels provide a practical solution to reinforcing the gable end walls which contain large glazed areas.

The panels will be 90 mm thick and will likely be strapped and lined, adding additional depth. This will impact skirtings, dados, cornices and window openings. The panels will be detailed to allow a small space around the window openings, with chamfered reveals.



CLT panels (shaded orange) in Zone 4.

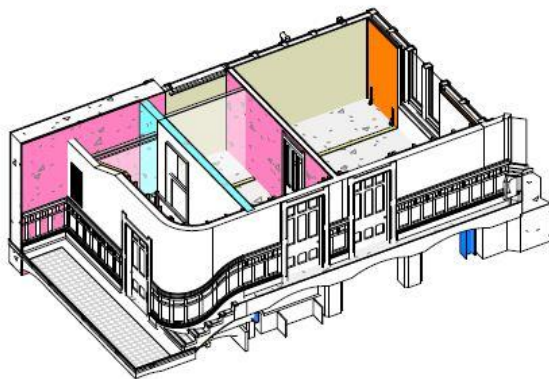


CLT panels (shaded orange) lining the interior of the east and west walls of central hall in Zone 3, from ground floor through the first-floor gallery and into the plant room above.

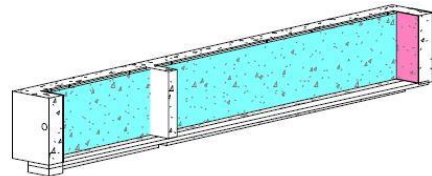
Reinforced Concrete Shear Walls

Reinforced concrete shear walls will be poured on site as a skin over several of the original pumice concrete walls. These skin walls are located at basement level within zones 3, 4 and 5. Each of the skin walls will be 150 mm thick and will conceal original pumice concrete surfaces. These walls will only be visible to visitors at a distance from the proposed basement walkway.

A free-standing concrete shear wall to be constructed at the ground floor of Zone 3 between spaces G 3N and G 3I will replace a former pumice concrete wall in that location. Two new reinforced concrete shear walls will also be constructed between columns within the Zone 4 basement.



Reinforced concrete shear wall between G 3N and G 3I.



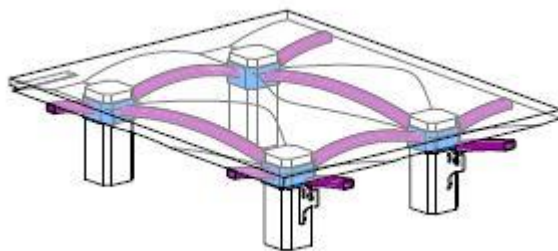
Reinforced concrete skin wall in basement of Zone 3.

Steel Framing

The proposed scheme makes minimal use of steel framing. In general, new steel work is located within the basement or concealed within existing cavities or behind existing false walls.

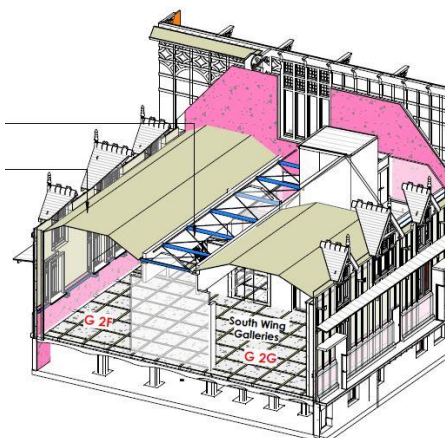
Within the basement of Zone 3, steel cross-braced frames will be installed between existing concrete columns in four locations along gridlines AC and AD, which will require the removal of the eastern wall of the former mud pit. Within the basement of Zone 5 ten steel cross-braced frames will be installed throughout the space between existing columns.

Also within the basement of Zone 5, part of the vaulted concrete ceiling will be strengthened by fitting curved RHS steel beams to existing columns with steel collars. This will enable the eastern side of the ground floor of Zone 5 to be strengthened from below, preserving the original floor finishes in that area.

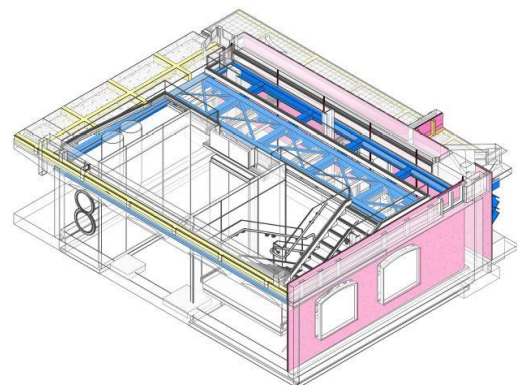


Curved RHS steel beams fitted to existing columns with steel collars in the basement of Zone 5.

In two instances – above the central corridor in Zone 2 and within the new circulation space in Zone 2A - new steel trusses will be prominent, one in the ceiling and one in the floor. The horizontal truss proposed for the void within the new circulation space will be set off the walls allowing light and air to penetrate the basement level of the circulation space.



Steel truss (shaded blue) above the corridor in Zone 2.



Bridge walkway framing within new circulation space in Zone 2A.

New steel framing will also be visible at the eastern gable end wall of Zone 5 along gridline AD. A specific steel structure has been designed for this wall, with three legs protruding from the basement in G 5H and G 5K to form a frame with a horizontal member at gutter-level extending above the corridor and into the ceiling of G 5A. The frame will be clearly visible in G 5H and G 5K but not in the corridor or G 5A. The horizontal steel member above the cooling room G 5A will be concealed in the ceiling.



Steel frame applied to eastern gable end wall of Zone 5.

New steel strong backs will be installed against the northern walls of G5P and G5N along gridline A7. To preserve the existing cornices in these areas the steel elements will be spaced off the wall. In G5P timber framed gallery walls will conceal all but the uppermost portion of these elements. In G5N the strong backs will be exposed and will penetrate the original tiled floor and ceiling.

Four final steel framing solutions will be entirely concealed behind linings. These include:

- New steel bracing applied to an existing vertical truss within the cavity between the stair wall and the museum false wall on gridline A3.
- PFC steel frame positioned at the inside face of the nib walls along gridlines AB and AC within the ground floor of Zone 2. This frame will be concealed within the cavity between the original wall and the new museum walls.
- Central flight of stairs at ground floor in Zone 3 to be strengthened with HD12 reinforcing bars, drilled and epoxied into the fabric of the stairway.
- Existing steel frames at either side of the ground floor corridor within Zone 4 will be replaced with new steel frames, which will be concealed behind new wall linings.

Plywood Sheathing

Plywood is used in throughout the building to strengthen floors, walls, ceilings and the roof plane.

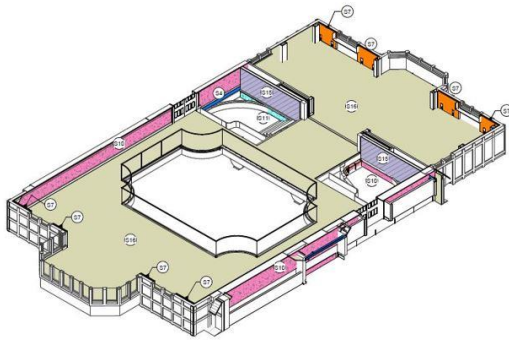
Floors: Within the first-floor gallery of Zone 3 and the mezzanine in Zone 4, plywood will be laid over existing floor joists and concealed beneath new floor linings.

Walls: In three instances, plywood linings will be applied to existing timber framed walls (the eastern end of the wall along gridline A5 in the ground floor of zone 3; in various locations at the ground floor of Zone 5; and between the CLT panels on the western wall of Zone 4).

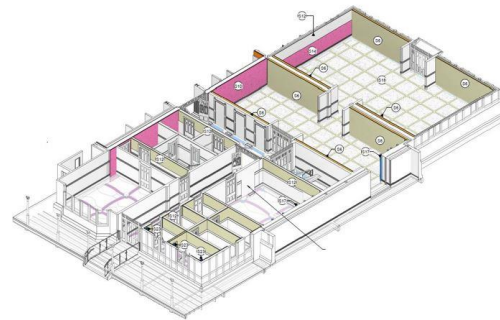
Ceilings: Throughout zones 2-5, plywood ceiling diaphragms will be installed. In zones 2, 4 and 5 this involves fixing 21 mm plywood to the existing ceiling joists, to which plasterboard linings

will be added. To preserve the tongue-and-groove timber ceiling above the roof trusses in Zone 3, the plywood diaphragm will be fixed to the top side of the ceiling joists within the roof space.

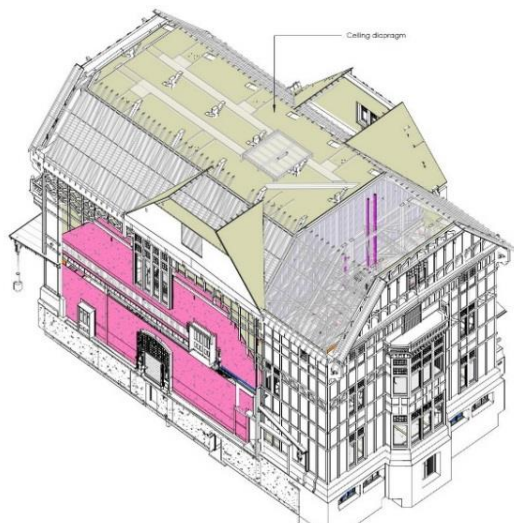
Roof: Plywood will also be used in zones 2-5 to provide roof plane bracing. A plywood skin will be laid over the existing sarking and rafters, onto which counter battens and underlay will be fixed before the roof is re-clad with new tiles.



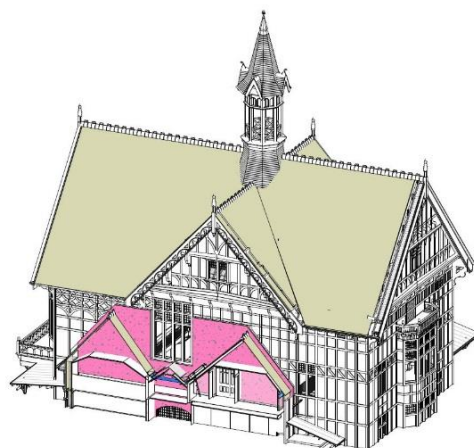
Plywood floor lining (shaded tan) in Zone 3 mezzanine.



Plywood sheathing (shaded tan) to existing timber framed walls at ground floor of Zone 5.



Plywood ceiling diaphragm (shaded tan) in Zone 3.



Plywood roof plane bracing (shaded tan) in Zone 3.

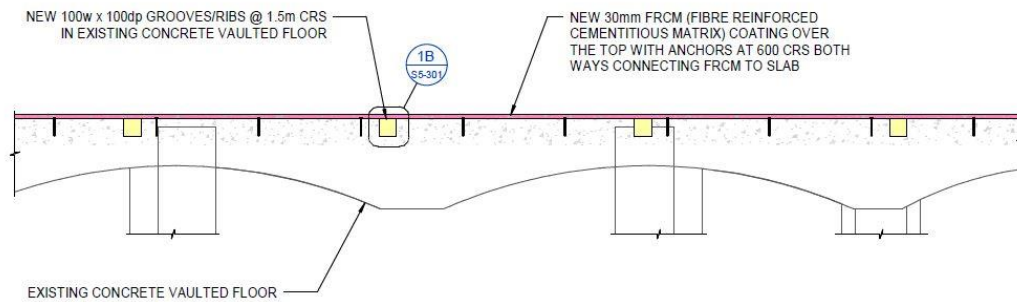
Concrete Lattice Floor Strengthening

Floor finishes in the building at ground floor level have been altered during previous works - with the exception of the eastern side of Zone 5 which is largely intact.

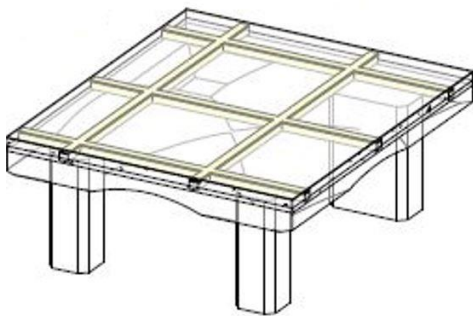
To strengthen the floors throughout the ground floor of zones 2-4 it is proposed to incise the existing concrete floor slabs in a grid formation and insert reinforced concrete beams, forming a latticework structure 100 mm deep by 100 mm wide. FRCM will then be applied to the surface with mechanical fixings at 600 mm centres. This method will conceal the reinforcing structure

within the existing depth of the floor, offer good accessibility for builders and preserve the vaulted concrete ceiling of the basement.

Within Zone 5, the floor to the west of the central corridor will be strengthened with concrete lattice strengthening inserted from above, however the floor to the east side of the corridor will be strengthened from below to preserve the existing floor finishes, with curved steel beams as described above.



Section of concrete lattice (yellow) and FRCM (pink) applied to vaulted concrete floor.



Detail of concrete lattice within floor plane.

Timber Shear Wall

The existing partition wall in the first floor of Zone 3, between F3B and F3A, will be replaced with a new timber shear wall.

New timber shear walls will be erected in place of existing steel framed gallery walls in G 5P and G 5Q Along grids AA and AB. These will be made up of 140mm timber framing and lined both sides with plywood sheeting.

Strengthening of Concrete Columns

Pumice concrete columns at basement level between which new shear walls are proposed will require strengthening. A skin - of FRCM, or a similar treatment - will be applied to these columns.

5.2 Architectural Works

New Finishes as a Result of Strengthening

To minimise the impact of structural strengthening works on the heritage values of the building, a variety of techniques will be employed.

Original elements such as dadoes, skirtings and cornices will be carefully removed and reinstated on top of new linings wherever possible. Where the original lath and plaster linings will be removed, new plasterboard linings will be provided.

Within the central hall, a layer of the pumice concrete side walls will be removed prior to installation of the new FRCM coating, to accommodate the thickness of the new material. Gypsum will then be applied over the FRCM as it was originally applied to the pumice concrete walls to achieve a paint finish.

Walls to which CLT panels will be fitted will be lined with plasterboard. Within the Zone 3 gallery area and the western wall of Zone 4, new CLT panels finished with plasterboard will add substantial thickness to walls with original window joinery. To preserve these features, the CLT panels will recede around the windows and be detailed with chamfers.

A variety of floor finishes are proposed. Where original floor finishes survive in fair condition, as in Zone 5, these will be retained. Where the original flooring is significantly damaged or removed, new floor linings have been proposed. Within the central hall, the existing non-original tiles will be replaced with new tiles laid to match the original design. New tiles will be laid in the toilets in Zone 4 and carpet tiles in G 4K and F 4A. New timber slat flooring be laid over the existing concrete floor in G 4M. In the G 4L corridor, new coloured concrete screed will be laid with a border of new tiles, replicating the original layout.

On the gallery level of Zone 3 the original timber floor will be removed. The boards will be machined to reduce their thickness, then re-laid in restricted areas over the new plywood diaphragm. The remainder of the floor will be carpeted.

Other finishes such as skirtings, dadoes, architraves and cornices will be removed and reinstated where possible. Some original finishes will be re-constructed – for instance, where plaster skirting will be removed to install new wall linings, replica plaster skirting will be constructed. New timber dadoes will be installed on the eastern walls of G 3C and G 3A to match the existing dadoes.

Within the corridor in Zone 5, two new doorways into G 5E and G 5S will be reinstated to the original layout. The reinstated doors and architraves have been removed from F 3A. These items are not original but are replicas of originals found within the building.

Roof Work

Water ingress is a recurring problem. The proposed roof works will ensure water-tightness, protecting the building fabric and museum exhibits.

Proposed roof works include:

- Replace Marseille roof tiles with new terracotta Marseille tiles in zones 2, 2A, 3, 4 and 5, and also to entry roofs above entry to G 5Q, inserting underlay and counter battens on top of new structural plywood layer. All terracotta ridge tiles will be removed and reinstated (all ridge tiles were new in 2008 and/ or 2010).
- Replace flat terracotta tiles to main tower with new terracotta Marseille tiles.

- Remove and re-lay existing flat tiles to platform towers of the northern viewing deck to accommodate slightly raised roof level due to new structural plywood layer and new counter battens.
- Remove and re-lay existing flat tiles to ventilator towers within zones 2-5 (ten out of the sixteen towers).
- Install new flashings to zones 2, 2A, 3, 4 and 5, including valley flashings, abutment flashings, finial flashings, apron flashings to platform towers of northern viewing deck and to ventilation towers within zones 2-5, dormer cheek flashings within zones 2-5 and apron flashings on western verandah roof to north and south of central hall.
- Replace all membrane roofing, located within all internal roof/gutter spaces.
- Replace corrugate metal roofing with membrane roofing within internal roof/gutter spaces.
- Replace fibreglass gutters in central roof of south wing with new membrane gutters.
- Replace sheet metal internal gutters in various locations with new membrane gutters.
- Replace membrane to deck and stair cover of northern viewing platform.
- Remediate all timberwork of balustrade and towers of viewing (north) and plant (south) platforms to ensure no water ingress.
- Assess water-tightness of lead roof over main building entry, replacing if required.
- Replace lead deck to main tower.
- Replace Rain Water Head and introduce overflow to lead roof over bay window at eastern side of central hall.
- Replace existing standing seam metal roofing of western verandah roof with new corrugated roof metal.
- Timber finials in areas where roof will be replaced to be repaired and repainted and their lead flashings replaced.
- Replace all spouting, external downpipes and internal downpipes in areas where roof will be replaced.
- Repair and refurbish platform towers and ventilator towers.

Other External Work

- New fresh air intake grilles to be installed beneath each of the two external staircases on the west elevation. Two new timber exhaust grilles to be fitted into basement perimeter wall at eastern elevation and one existing exhaust grill on east elevation to be replaced.
- New access door to be provided at underside of stair void on external stair at west wall of Zone 1.
- Safety glass barriers to be installed to balustrades on both sets of external stairs on east elevation. These barriers will also prevent public access to the non-compliant balustrades along the verandahs.
- Replace timber decking of north-eastern verandah stair.
- Remediate and repair decking to eastern verandahs.

Internal Work

- New basement accessway to be created between the circulation space in Zone 2A and the stairway at the northern end of Zone 5. This includes removing six original pumice concrete columns within Zone 2A, creating a new doorway in original pumice concrete wall along gridline A4, creating a recessed concrete pathway within Zone 3 with ramp leading to mud bath display area in B 3A and pouring a new architectural concrete slab in B 3A. An existing timber walkway through zones 4 and 5 will be replaced with a new recessed concrete walkway in the same location.

- New circulation space to be created within Zone 2A, providing elevator and accessible stair access between basement and first floor levels (gallery). Circulation space to include new concrete bridge in G 2B, glass balustrades and new partition walls.
- New store rooms to be created in G 2H and F 2D.
- Sprinkler valve room to be relocated from G 3L to G 2I.
- Ticket window within central hall (within south-western curved wall) to be reconstructed to match that in the north-western wall.
- New kitchen fitout to be installed in G 3L.
- Café to be remodelled within G 4M. The Rachel Bath will be exposed as a sub-floor exhibit, beneath new laminated safety glazing. The café counter will be cantilevered over the bath. A glazed partition wall installed between G 4M and the corridor.
- Install new storeroom, cleaning cupboard and service shaft at northern end of new café space in G 4M.
- New mezzanine space provided within café (F 4C) with glass balustrade. This will double as a fire egress route from the Zone 5 roof space.
- Install new accessible plywood staircase in zones 4 and 5 leading from café space in G 4M, to new mezzanine F 4C, to the attic space of F 5A and rooftop viewing platform in Zone 5. Will serve as a fire egress route from the Zone 5 roof space.
- New toilets to be constructed in Zone 4 with male, female, unisex and accessible toilets and infant change room.
- Remove suspended ceiling to expose original ceiling layout inclusive of skylights above G 4L corridor.
- Bathhouse exhibit space at eastern end of Zone 5 to be returned to original layout and refurbished: Recovered replica doors to be reinstated in G 5F to give access to G 5E and G 5S. Original half height wall to be reinstated to form new switchboard room in G 5E, glass floor and balustrade to be installed over part of bath in G 5C, display alcove to be removed from between areas G 5E and G 5S and wall, plaster dado rail and skirting to be reinstated.
- Conference room to be created within F 3A with carpet tiles laid over new structural plywood floor diaphragm, new timber slat dado installed and blackout system provided to windows.
- New timber cavity sliding doors to be installed at entrance to new conference room in F 3A.
- New glass balustrade to be provided around void in Zone 3 first floor gallery.
- New store rooms and kitchenette to be provided along the north wall of office space F 4A.
- New glass doors to be installed in multiple locations throughout building, including within main entranceway G3M, between G1G and G1A and between G2A and the south wing galleries.

Accessibility

To increase the areas of the building that are accessible to persons with limited mobility the following lifts will be installed:

- Two new platform lifts will be installed between G 3N and G 3I, and in F 4A.
- One new elevator to be installed in the new Zone 2 circulation space, giving access to basement, ground floor and first floor.

One of the project drivers, aims, aspirations are to create a more accessible building to be enjoyed by all. Some of the interventions which have resulted in the loss of heritage fabric have been for circulation. Although not the only driver or outcome accessibility has been an important aspect of the new design process.

Services

Services have accumulated throughout the building. Many are now outdated or superfluous. All services will be reviewed and rationalised. Reticulation will be carefully considered for its impact on visitor experience, particularly in the basement and northern roof space.

Mechanical

To protect the building fabric, museum collections and equipment and to provide suitable ventilation to the café, toilets and office spaces, the following works are proposed:

- New mechanical fresh air intakes and exhausts incorporated into roof ventilation towers.
- New timber grilles and fresh air ducts installed to provide ventilation to basement.
- Zone 3 to be ventilated with 75% scrubbed air.
- Museum and gallery spaces to be ventilated with 100% scrubbed air.
- Wall linings and cavities to be ventilated where possible and practical, with a combination of passive ventilation and mechanical ventilation. Passive ventilation will be achieved by vertical packing of new linings against existing studs. Mechanical ventilation is proposed within the new wall cavities at the western perimeter wall of Zone 5.

Electrical

The following electrical works are proposed:

- Switchboards to be replaced.
- New switch room to be installed in G 5E.
- General reticulation.
- New security systems to be installed.

Fire

All proposed works will comply with the new fire report throughout the building. The changes are listed below

- Four sets of double doors will be reactivated as emergency exists. Includes installation of panic bars and manual call points. Internal linings blocking double doors leading into G 5Q and G 1G to be removed.
- New fire egress to be provided from Zone 5 attic space.
- Fire sprinkler system riser and valve set to be relocated to G 2I.
- The fire sprinklers to be rerouted to accommodate the new proposed architectural layout.
- The new basement sprinkler design to include separate zone shut-off valves to enable areas of the building to be isolated.

Lighting

- New emergency lighting to be installed.
- New heritage lighting scheme to be installed, including custom-made lights within the central hall.
- Contemporary lighting will be installed in new areas.
- Exterior lighting to be provided to the western elevation.

6 HERITAGE IMPACT ASSESSMENT

The impact of the proposed works on the heritage values of the building is assessed below.

Structural Strengthening Works

Proposed Work	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Install 800x800mm reinforced concrete footings in selected locations at basement level of zones 2-5.	Existing concrete footings are original fabric. No removal of heritage fabric required, other than where reinforcing bars are inserted through existing footings to connect to new footings alongside.	-	The new footings will be set slightly below ground level and will not be visible. There will be no impact on heritage values.
FIBRE REINFORCED CEMENTITIOUS MATRIX (FRCM)	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Apply fibre reinforced cementitious matrix (FRCM) to pumice concrete walls in the following locations:	FRCM will conceal original pumice concrete walls dating to the 1908 structure. A layer of pumice concrete will be removed from the side walls in Zone 3 to accommodate the thickness of the FRCM layer.		
Zone 2 Basement - both sides wall along western end of gridline A4 - one side of walls along gridlines AB and AC		Zone 2 Basement -	Zone 2 Basement Walls in this area will not be accessible to the public. No impact on heritage values.
Zone 2 Ground Floor - both sides of wall at western end of gridline A4 - both sides of concrete nib walls on grids AB and AC		Zone 2 Ground Floor -	Zone 2 Ground Floor FRCM on the A4 wall will be discreetly located within new sprinkler pump room (G 2I) and storage room (G 2H). There will be a minor loss of heritage values associated with the loss of original finishes to the interior surfaces. FRCM to both sides of the nib walls will be concealed behind gallery walls except for the eastern wall of Zone 2a where the FRCM will be finished and painted as per the

			original wall. The painted wall will appear as it did so there will be no impact on heritage values.
Zone 3 Basement both sides of walls along gridlines A4 and A5		Zone 3 Basement FRCM will be finished to resemble, as closely as possible, the finish of the original concrete walls.	Zone 3 Basement Walls in this area will be visible to visitors only at distance from the central walkway. The concealment of original wall surfaces will have a minor negative impact on heritage values.
Zone 3 Ground Floor - FRCM + timber strongbacks provided to inner surfaces only of each of the four curved partition walls - both sides of walls along north and south of Central Hall (gridlines A4 and A5)		Zone 3 Ground Floor Skirtings, cornices and door architraves on the inner surfaces of the curved walls will be removed and reinstated. To reduce the thickness of the finished walls along gridlines A4 and A5 within the Central Hall, a layer of pumice concrete will be removed prior to the application of FRCM. Gypsum will then be applied over the FRCM to approximate the original pumice concrete finish. Existing plaster skirtings will be demolished and reconstructed. The dado will be removed and reinstated, which may involve some damage or loss of fabric. The cornice will be retained in place.	Zone 3 Ground Floor Application of FRCM to the interior surfaces of the curved partition walls will enable the outer surfaces, which are prominently visible and feature detailed heritage fabric, to remain intact. There will be a minor loss of heritage values associated with the loss of original finishes to the interior surfaces. The application of FRCM to the side walls will have a minor negative effect, associated with the loss of the original skirtings and original wall surfaces.
Zone 3 Level 1 Gallery both sides of walls at north and south of space along gridlines A4 and A5		Zone 3 Level 1 Gallery To reduce the thickness of the finished walls along gridlines A4 and A5 a gypsum hardwall plaster will be applied over the FRCM to allow a paint finish over. Existing skirtings, dado and architraves will be removed and reinstated.	Zone 3 Level 1 Gallery The application of FRCM to the walls will have a minor negative effect, associated with the loss of the original skirtings and original wall surfaces.

Zone 4 Basement both sides of walls along gridlines A5 and A6		Zone 4 Basement FRCM will be finished to resemble, as closely as possible, the finish of the original concrete walls.	Zone 4 Basement Walls in this area will be visible to visitors only at distance from the central walkway. The concealment of original wall surfaces will have a minor negative impact on heritage values.
Zone 4 Ground Floor both sides of walls along gridlines A5 and A6		Zone 4 Ground Floor -	Zone 4 Ground Floor All FRCM coated walls within this area will be concealed behind timber framed walls associated with new uses for the spaces. Concealment of original walls in this area will have a minor impact on heritage values.
Zone 4 Mezzanine both sides of walls along gridlines A5 and A6		Zone 4 Mezzanine -	Zone 4 Mezzanine All FRCM coated walls within this area will be concealed behind timber framed walls associated with new uses for the spaces. No impact on heritage values.
Zone 5 Basement - various locations - wall along gridline A6 and the two nib walls on grids A6 and A7 between grids AA and AB		Zone 5 Basement FRCM will be finished to resemble, as closely as possible, the finish of the original concrete walls.	Zone 5 Basement Walls in this area will be visible to visitors only at distance from the central walkway. The concealment of original wall surfaces will have a minor negative impact on heritage values.
CARBON FIBRE REINFORCED POLYMER (CFRP)	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Apply carbon fibre reinforced polymer (CFRP) strips to pumice concrete walls in two areas: - north wall of B 2F - north wall of G 2B	Pumice concrete walls in these locations date to the original 1908 structure. A small amount of fabric will be removed to insert the CFRP strips.	CFRP will be used in these locations to avoid the use of FRCM, to minimise the loss of visible heritage fabric. Vertical cuts made to the pumice concrete walls will be finished with a set back and/ or differential colour to read as strengthening interventions which	Walls in these locations are readily accessible to the public and the repaired incisions will be apparent. Minor negative impact on heritage values.

		will allow the remaining original wall fabric to be viewed	
CROSS-LAMINATED TIMBER (CLT)	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Fix cross-laminated timber (CLT) panels to walls in the following locations: - east and west end walls of Zone 3 - east and west end walls of Zone 4 Walls will then be strapped and lined with plasterboard.	Timber-framed walls in these locations date to the original 1908 structure. Original lath and plaster linings will be removed.	Panels have been modelled to provide a small space around existing windows so that existing architraves can remain and will be detailed with chamfered edges. Skirtings, dados and cornices will be removed and reinstated. Some adaptation of the dado will be required to adapt to the increased wall thickness.	The thickness of the end walls will be increased by more than 90 mm, changing the original wall line and impacting original skirtings, dados, cornices and window openings. The roof truss in the Zone 3 first floor gallery will be partially embedded in the new wall thickness, as it is currently. Original lath and plaster wall linings will also be lost. Overall, there will be a moderate negative effect on heritage values.
REINFORCED CONCRETE SHEAR WALLS	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Install reinforced concrete shear walls in the following locations:	With the exception of the new shear wall in the ground floor of Zone 3, skin walls will be applied to original pumice concrete walls dating to the 1908 structure. Original fabric will be concealed but not removed.	-	The proposed shear walls will add approximately 150 mm thickness to original pumice concrete walls and will conceal the original surfaces; however, the increased thickness will be discreet and likely imperceptible when viewed at distance. The impact on heritage values will be minor.
Zone 3 Basement new skin wall along interior face of western wall		Zone 3 Basement Concrete surface will be finished to resemble, as closely as possible, the finish of the original concrete walls.	Zone 3 Basement The affected wall in this area will be visible to visitors only at distance from the new walkway. The concealment of original wall surfaces will have a minor negative impact on heritage values.

Zone 3 Ground Floor new shear wall between spaces G 3N and G 3I		Zone 3 Ground Floor The concrete shear wall will be strapped and lined with plasterboard.	Zone 3 Ground Floor The ground floor portion of an original pumice concrete wall between G 3N and G 3I was removed in the past and a concrete shear wall will now be constructed in the same position. No impact on heritage values.
Zone 4 Basement - two shear walls to be constructed between seven columns - new skin walls to be applied to eastern and western perimeter walls along gridlines AB and AC		Zone 4 Basement Concrete surface will be finished to resemble, as closely as possible, the finish of the original concrete walls.	Zone 4 Basement The perimeter walls in this area will only be visible at a distance from the new walkway. The concrete walls constructed between existing columns in the middle of the space will have more visual impact. There will be a moderate negative impact on heritage values.
Zone 5 Basement new skin wall to be applied to western perimeter wall on gridline AA		Zones 5 Basement Concrete surface will be finished to resemble, as closely as possible, the finish of the original concrete walls.	Zone 5 Basement The affected wall in this area will be visible to visitors only at distance from the new walkway. The concealment of original wall surfaces will have a minor negative impact on heritage values.
STRUCTURAL STEEL FRAMING	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Install steel framing in the following locations:	In general, steel structure will not require the removal of significant quantities of heritage fabric, although in some locations will penetrate original floor, wall and ceiling linings and finishes. In G 5N the proposed steel strong backs will penetrate original tiled floors. One of the proposed steel cross-braced frames within the basement of Zone 3 will require the removal of	-	In general, steel framing will be employed only where necessary and has been carefully considered to be as visually discreet as possible and to preserve the integrity of spaces. Some elements, such as the arched braces and collars to be fitted in the basement of Zone 5, may be of interest to visitors as an innovative structural engineering solution to a heritage structure.
Zone 2 Basement 100SHS bracing to existing vertical truss		Zone 2 Basement -	
Zone 2 Ground Floor - steel framing with cross bracing to form bridge walkway in floor void in Zone 2A 100SHS bracing to existing vertical truss concealed		Zone 2 Ground Floor The horizontal steel truss will be visible and will be detailed to compliment an existing truss above.	

within cavity along gridline A3 150PFC to existing nib wall and existing steel columns along gridline AB and AC concealed behind exhibition walls - horizontal steel truss to be installed above central corridor at gutter line - PFC steel frame to be positioned along nib walls on gridlines AB and AC. Frames will be concealed behind false walls, except for a small section on the east wall of Zone 2A	one side wall of the original mud pit (alongside gridline AC).		In most instances, steel work will be entirely concealed by wall linings or within existing cavities. In these cases, there will be no impact on heritage values. The use of steel framing within the basement will more successfully retain the openness of those spaces than additional concrete shear walls, which were considered as an alternative. Where new steel work is required to penetrate original tile floors, there will be an inevitable impact on heritage values. Such instances have been avoided where possible, however, the frame to be installed against the eastern gable end wall of Zone 5 will be prominently visible in an area of the building that contains a significant amount of original fabric, including wall and floor tiles and other finishes. The frame will be visible in both G 5H and G 5K, with upright members spanning floor to ceiling within these spaces and cross braces positioned in front of the windows. It is noted, however, that these rooms have already been modified, including the addition of a steel representation of an original partition wall and the removal of an original bath tub. The impact of the new steel frame in this area will be moderate.
Zone 3 Basement steel cross-braced frame with reinforced concrete foundation beams along gridlines AC and AD		Zone 3 Basement -	
Zone 3 Ground Floor HD12 reinforcing bars to be inserted beneath central stairs. Entry and exit points for drill holes to be concealed beneath new floor tiles.		Zone 3 Ground Floor -	
Zone 3 Level 1 Gallery - steel plates installed at each of the two stair openings - steel strapping to gallery floor		Zone 3 Level 1 Gallery -	
Zone 4 Ground Floor steel frames inserted on either side of corridor,		Zone 4 Ground Floor -	

concealed by new wall linings			
Zone 5 Basement - ten steel cross-braced frames installed between existing columns - column collars and steel arch braces installed on eastern side of basement - two braced frames to be installed along eastern perimeter wall		Zone 5 Basement -	
Zone 5 Ground Floor - steel hollow section strong backs installed on wall along gridline A7 in G 5P and G 5N - steel frame on eastern gable wall along gridline AD to the north of fire egress doors, which will be visible in spaces G 5H and G 5K		Zone 5 Ground Floor The unreinforced pumice concrete wall along gridline A7 in Zone 5 will be strengthened with square hollow section steel strong backs. In both G 5P and G 5N, the steel work will be spaced away from the wall to preserve the cornices. In G 5P the strong backs will then be largely be concealed behind the timber framed gallery walls, and only be visible where they protrude above. In G 5N, the steel work will also be spaced off the wall to clear the cornice but will remain visible. The customised steel structure designed to support the eastern gable end wall in Zone 5 will stand off the wall to allow the wall tiles, skirtings and dado to remain intact.	
PLYWOOD SHEATHING	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Zones 2-5 Roof Plywood roof plane bracing to be applied to zones 2-5.	Zones 2-5 Roof The roof structure is original however the Marseille tiles in zones	Zones 2-5 Roof -	In general, the use of structural plywood sheathing offers a discreet method for strengthening the

	2-5 date to 1952. No loss of heritage fabric.		building. Where it is applied to floor, wall ceiling and roof surfaces it will be all but imperceptible, and there will be only minor loss of heritage values associated with the removal of original linings in these areas.
Zones 2, 4 and 5 Ceilings Plywood ceiling diaphragms to be installed to underside of ceiling joists in zones 2-5.	Zones 2,4 and 5 Ceilings Ceiling linings in zones 2,4 and 5 are a mix of lath and plaster, fibrous plaster and plasterboard. These will be removed. Some loss of heritage fabric.	Zones 2,4 and 5 Ceilings Ceilings will be re-lined with plasterboard, laid over new plywood diaphragms. The finish will appear very similar to the original lath and plaster linings.	The loss of the majority of the original timber floor in the Zone 3 first floor gallery will have a negative impact on heritage values which will be partly mitigated the re-laying of some of the original floorboards.
Zone 3 Ceiling Plywood to be fixed to upper side of ceiling joists.	Zone 3 Ceiling No impact.	Zone 3 Ceiling In Zone 3, the plywood ceiling diaphragm will be fixed to the upper side of the ceiling joists to preserve original ceilings in this area.	
Zone 3 Level 1 Gallery Plywood to be laid over floor joists in first floor gallery of zone 3 with new floor linings applied on top.	Zone 3 Level 1 Gallery The floor of level 1 gallery in zone 3 is original and comprises thick tongue-and-groove timber believed to be matai. There will be some loss of heritage fabric as all of the timber will be removed and only some will be re-laid.	Zone 3 Level 1 Gallery The existing original timber floor will be removed, machined to reduce its thickness, and re-laid in restricted areas over the new diaphragm plywood floor lining – the remainder of which will be lined with carpet.	
Zone 4 Mezzanine Plywood to be laid over floor joists in mezzanine of zone 4 with new floor linings applied on top.	Zone 4 Mezzanine The mezzanine floor of Zone 4 is T&G and is later fabric as there was no floor in the original construction. No loss of heritage fabric.	Zone 4 Mezzanine -	
Various locations Plywood linings to be fixed to existing timber framed walls in various locations.	Various locations Concealment of original wall surfaces.	Various locations Walls will be re-lined with plasterboard. The finish will appear very similar to the original lath and plaster linings.	
CONCRETE FLOOR STRENGTHENING	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Apply concrete lattice floor strengthening and topping layer to top side of vaulted concrete floors in	The concrete floors in zones 2-5 date to the original 1908 structure, however the original floor finishes in	The lattice will be embedded within the existing floor fabric, so that the thickness of the resulting floor will be	The concrete lattice will be concealed within the fabric of the existing concrete floors. Where

zones 2-4 and at the western side of Zone 5.	these areas – coloured concrete and tiles – are now significantly damaged or missing. The existing tiles in Zone 3 ground floor are not original. There will be some loss of heritage fabric associated with the incisions cut in the concrete floor to lay the concrete lattice beams.	only slightly increased, by the depth of the topping layer. By strengthening the top side of the floor the basement vaulted ceiling remains untouched.	original floor linings are intact, as in the eastern side of Zone 5, an alternative floor strengthening technique has been employed. The basement ceiling will remain unchanged. There will be no impact on heritage values.
TIMBER SHEAR WALLS	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Zone 3 Level 1 Gallery Replace an existing partition wall in the first-floor gallery of Zone 3 between F3B and F3A with a new timber shear wall.	The existing partition wall is not original and does not contain heritage fabric. This will be removed. The ornate posts and beam surrounding the large opening in this wall are original and will be retained.	Ornate posts and beam will be retained.	The new wall will be slightly thicker than the existing wall, but the additional thickness will be absorbed into F 3A. No impact on heritage values.
Zone 5 Ground Floor Replace existing non-structural gallery walls with timber framed, plywood lined shear walls.	The existing inner gallery walls are later fabric and will be replaced with new timber walls. There will be no loss of original fabric.	-	No impact on heritage values.
COLUMN STRENGTHENING	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Strengthen selected concrete columns within basement, between which new shear walls are proposed. A skin will be applied, possibly FRCM or a similar treatment.	Pumice concrete columns in zones 2-5 date to the original 1908 structure.		The skin will conceal the original fabric of the columns. Other original pumice concrete columns will remain visible within the basement. The impact on heritage values will be minor.

Architectural Works

Roof Work

Proposed Work	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Replace Marseille roof tiles with new terracotta Marseille tiles in zones 2, 2A, 3, 4 and 5, including inserting underlay and counter battens on top of new structural plywood layer.	Remove and reinstate all terracotta ridge tiles (all ridge tiles were new in 2008 or 2010). No heritage fabric present.	To replace existing terracotta tiles with new matching terracotta tiles.	The new tiles will be the same as those removed. They will match those in place on zones 1 and 6. There will be no impact on heritage values.
Replace flat terracotta tiles to main tower with new flat terracotta tiles.	Tiles are not original.	To replace existing terracotta tiles with new matching terracotta tiles.	No impact.
Remove and re-lay existing flat tiles to platform towers of the northern viewing deck to accommodate slightly raised roof level due to new structural plywood layer and new counter battens.	Tiles are not original.	To replace existing terracotta tiles with new matching terracotta tiles.	The additional thickness of the decks will be almost imperceptible. No impact on heritage values.
Remove and re-lay existing flat tiles to ventilator towers within zones 2-5 (ten out of the sixteen towers).	Tiles are not original.	To replace existing terracotta tiles with new matching terracotta tiles.	No impact.
New flashings to be installed to zones 2, 2A, 3, 4 and 5, including valley flashings, abutment flashings, finial flashings, apron flashings to platform towers of northern viewing deck and to ventilation towers within zones 2-5, dormer cheek flashings within zones 2-5 and apron flashings on western verandah roof to north and south of central hall.	Flashings are not original.	Replace flashings in a traditional manor, with traditional materials in their original locations	No impact.

Replace all membrane roofing, located within all internal roof/gutter spaces.	Membrane roofing is not original.	The membrane will be a darker neutral colour and is not visible from anywhere but the northern viewing deck.	Little or no impact.
Replace corrugate metal roofing with membrane roofing within internal roof/gutter spaces.	Corrugate metal roofing is not original.	The simplifying of materials will provide better longevity and less risk of water ingress to the building.	Little or no impact.
Replace fibreglass gutters in central roof of south wing with new membrane gutters.	Fibreglass gutters are not original.	The simplifying of materials will provide better longevity and less risk of water ingress to the building.	No impact.
Replace sheet metal internal gutters in various locations with new membrane gutters.	Sheet metal internal gutters are not original.	The simplifying of materials will provide better longevity and less risk of water ingress to the building.	No impact.
Replace membrane to deck and stair cover of northern viewing platform.	Membrane to deck and stair is not original.	-	No impact.
lead roof over main building entry, replacing if required.	Lead roof is unlikely to be original.	If replacement is required then lead would be laid.	No impact.
Replace lead deck to main tower.	Lead roof is unlikely to be original.	Lead to be laid as the replacement material.	No impact.
Assess water tightness of lead roof over bay window at eastern side of Central Hall.	Lead roof is unlikely to be original.	If replacement is required then lead would be laid.	No impact.
Replace existing standing seam metal roofing of western verandah roof with new corrugated roof metal.	The standing-seam roofing is not original.	Returning the roof to its earlier form.	The original roof in this area was corrugated metal. Impact on heritage values will be positive.
Timber finials in areas where roof will be replaced to be repaired and repainted and their lead flashings replaced.	Finials are original fabric believed to be Totara. Flashings are not likely to be original. No loss of original fabric.	Repair and retention of original fabric	No impact.
Replace all spouting, external downpipes and internal downpipes in areas where roof will be replaced.	All but one single item of the rainwater goods are not original fabric.	The single piece of spouting believed to be original shall be restored and reinstated.	The new spouting will be modelled off the original section so the Impact on heritage values will be positive.
Repair and refurbish platform towers and ventilator towers.	Platform towers are not original.	-	No impact.

Other External Work

Proposed Work	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
New fresh air intake grilles to be installed beneath each of the two external staircases on the west elevation. Two new timber exhaust grilles to be fitted into basement perimeter wall of verandah at eastern elevation, and one existing exhaust grill on east elevation to be replaced	Both staircases were added in 2008 and 2010. The wall under the verandah at the eastern elevation was also added at a later date so there will be no loss of heritage fabric associated with creating new openings to install the grilles.	Grills to the west will be discreetly positioned at the sides of the staircases to minimise their visual impact. They will sit perpendicular to the main view of the building. The eastern verandah wall has various service doors and grilles and is considered a back of house.	The stair grilles will not be prominently visible and will be detailed in timber as a more appropriate material. The grilles purpose is to ventilate the basement which will enhance the air quality. These grilles will have less than minor impact on heritage values. The eastern grilles, both new and replacement will also be detailed in timber and are expected to have a minor impact on heritage values.
Provide new access door to stair void on external stair at west wall of Zone 1.	The stair was constructed in 2010 so there is no impact on heritage fabric.	Door will be discreetly positioned at the side of the staircase to minimise visual impact.	Less than minor impact on heritage values.
Install safety glass barriers to balustrades on both sets of external stairs on east elevation. These barriers will also prevent public access to the verandahs which have non-compliant balustrades.	Staircase at south is not original fabric and therefore no impact. Staircase at north is original fabric but is in poor condition and will likely need reconstruction. Minor impact on heritage fabric associated with fixing of glass to balustrades.	Frameless glass will be visually discreet.	Frameless glass will be used throughout the building where required to control visitor circulation. While the glass will be visually discreet, the verandahs were originally intended for the benefit of visitors to the building and loss of public accessibility to these areas will have a negative effect on heritage values.
Isolated and specific replacement of timber decking of eastern verandahs.	Removal of later decking - not original fabric. No impact on heritage values	Decking will be replaced "like for like".	No impact on heritage values.

Internal Work

Proposed Work	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
Create new basement accessway between circulation space in Zone 2A and Zone 5. This includes removing six original pumice concrete columns within Zone 2A, creating a new doorway in original pumice concrete wall along gridline A4, creating a recessed concrete pathway within Zone 3 with ramp leading to bath display area in B 3A and pouring a new architectural concrete slab in B 3A. An existing timber walkway in zones 4 and 5 will be replaced with a recessed concrete walkway in the same location.	Areas of earth floor and later concrete will be removed to create new accessible concrete ramp and passageways. Passageways will be slightly recessed into the ground to provide additional head room. This will involve the excavation of some earth.	-	The basement was originally conceived as an accessible space for mud baths, piping, drying and storage rooms, water storage cylinders and compressed air machinery for pumping. Original tongue and groove panelling and mud baths will be reinstated into the mud bath exhibition area in B 3A and made accessible via the new accessway. The works will enhance public access and understanding of the original use of the building and will have a positive impact on heritage values.
New circulation space to be created within Zone 2A, providing elevator and stair access between basement and first floor levels. Circulation space to include new concrete bridge in G 2B, glass balustrades and new partition walls.	The circulation space will require the removal of a section of original pumice concrete floor at ground level and columns at basement level. There will be some alteration to the original roof framing for the lift over-run.	The proposed circulation space will require the removal of some original fabric but will provide accessible lift and stair access to the basement, ground and first floor levels of the building.	The circulation structure will be clearly recognisable as new fabric, of glass and steel construction. These materials will be repeated throughout the building where new elements are required, providing consistency and clear contemporary contrast with heritage fabric. While the loss of heritage fabric will have a negative impact on heritage values, this is considered to be outweighed by the benefits of providing accessible access to all levels of the building.
Provide new store rooms in G 2H and F 2D.	No impact on heritage fabric.	-	No impact on heritage values.

Sprinkler valve room to be relocated from G 3L to G 2I.	An access hole must be cut from the original pumice concrete plinth wall to house the sprinkler inlet pipe.	The relocation of the valve set will provide room for the café kitchen and is essential for the ongoing protection of the building from fire.	Relocating the sprinkler valve room will provide additional amenity space for the café kitchen. Minor impact on heritage values.
Ticket window within central hall (within south-western curved wall) to be rebuilt to match that existing in the north-western wall.	An original ticket window existed in this location and has since been infilled and modified. Fabric to be removed to create new opening will be later fabric.	-	Reinstating the ticket window will restore a feature of the original design. Impact on heritage values will be positive.
New kitchen fitout to be installed in G 3L.	G 3L contains original windows and architraves, and a ceiling rose. These will be retained in the new fitout behind the kitchen hygiene walls. No other impact on heritage fabric.	Heritage features to remain behind new walls and linings.	The new kitchen fit-out will not require the removal of heritage fabric and will not be accessible to visitors. There will be no impact on heritage values.
Café to be remodelled within G 4M, including new counter and new glazed partition wall between G 4M and the corridor. Alterations to the floor linings in this area are assessed below.	This area has been heavily modified. Fabric to be removed – include ceiling linings which is later fabric. Original windows and architraves are present and will be retained.	-	The café is considered to be an appropriate use of this space, compatible with the heritage values of the building. The new glazed partition wall will be of a simple design and offer a clear contrast with heritage fabric. There will be no impact on heritage values.
New storeroom, cleaning cupboard and service shaft to be installed at northern end of new café space in G 4M.	No impact on heritage fabric.	-	No fabric of significance exists in this area and the new amenity spaces will be of simple design, positioned discreetly below the new cafe mezzanine. There will be no impact on heritage values.
New mezzanine to be provided above café (F 4C) with glass balustrade. This forms part of the new fire egress route from the Zone 5 roof space.	New fabric to be installed with only a single point of contact with heritage wall fabric along gridline AB.	Mezzanine will be constructed of steel with glass balustrade and timber soffit, in keeping with the material palette for new fabric used throughout the building.	The mezzanine will be clearly distinguishable as new fabric and will not obscure elements or fabric of significance. There will be no impact on heritage values.
New accessible staircase installed in zones 4 and 5, leading from the attic space of F 5A and rooftop viewing	A new opening will be cut into the original pumice concrete wall along gridline A6 in the roof space.	-	The accessway will connect the new mezzanine with an existing platform within the roof space of Zone 5 (F

platform in Zone 5 to new mezzanine F 4C, and down to café space in G 4M. Will serve as a fire egress route from the Zone 5 roof space.			5A). It will enable the northern roof platform to remain accessible to visitors, through the provision of a second compliant fire egress. The new structure will be of glass, plywood and steel and will be distinguishable as new fabric. The overall effect on heritage values will be minor.
Construct new toilet area in Zone 4 with male, female, unisex and accessible toilets and infant change room.	This area has been heavily modified. It contains original windows but no other significant fabric.	-	The new ablutions area will not obscure fabric of significance. There will be no impact on heritage values.
Remove suspended ceiling to expose original ceiling layout and skylights above G 4L corridor.	Suspended ceiling is later fabric. There will be no loss of heritage fabric	-	The original design of this area introduced natural light into bathing rooms via the central glazed roof and high-level windows within the corridor walls. Revealing the original glazed corridor roof will have a positive impact on heritage values.
Bathroom exhibit space at eastern end of Zone 5 to be altered and refurbished: original half height wall to be reinstated to form new switchboard room in G 5E, glass floor and balustrade to be installed over part of bath in G 5C, display alcove to be removed from between areas G 5E and G 5S and wall, plaster dado rail and skirting to be reinstated.	This area contains original tile and coloured cement floors, tile dados, baths and fixtures, plaster ceiling ornamentation and cornices. These will be retained and repaired where possible and necessary. The deep bath in G 5C is highly intact and will be retained and exposed for visitors to view. The non-original display case in this area is considered to be intrusive and will be removed.	-	The proposal involves the removal of later, intrusive fabric, and reinstates an original wall. The new glazed floor and balustrade will enable visitors to view, but not enter, the deep bath. The effect on heritage values will be positive.
Two new doorways to be installed in the corridor in Zone 5, giving access to G 5E and G 5S. Doors and architraves will be reused from F 3A,	Door openings originally existed in the location of the proposed doorways into G 5E and G 5S. No original fabric will be removed.	-	The doors and architraves to be reused are not original but are good quality replicas of original items found elsewhere in the building. The reinstatement of doors to their

where they will no longer be required.			original locations will have a positive effect on heritage values.
Conference room to be created within F 3A with carpet tiles laid over new structural plywood floor diaphragm, new timber slat dado installed, and blackout system provided to windows.	This area has been heavily modified. There will be no removal of heritage fabric.	-	A conference room is considered to be suitable use for this area, that will not adversely impact the heritage values of the building. The blackout system will be reversible and will not have any permanent impact on heritage values.
New timber sliding doors to be installed at entrance to new conference room in F 3A.	No doors currently exist in this location. The ornate timber post and beam surrounding the large opening are original and will be retained?	-	The timber doors will be a new element and have no impact on heritage values.
New glass balustrade to be provided around void in Zone 3 first-floor gallery as the existing is not a compliant barrier.	The floors will be modified for the structural diaphragm so no heritage fabric removed for the barrier installation.	The glass system will sit out from the existing balustrade and not fix to it. The existing balustrade will be interpreted through the glass barrier.	A similar technique will be used throughout the building, where balustrades are non-compliant with current building standards. The glass will be discreet and be distinguishable as new fabric. The impact on heritage values will be minor.
New store rooms and kitchenette to be provided along the north wall of office space F 4A.	No impact on heritage fabric.	-	This area contains no significant heritage fabric. There will be no impact on heritage values.
New glass doors to be installed in multiple locations throughout building, including within main entranceway G3M, between G1G and G1A, and between G2A and the south wing galleries.	No impact on heritage fabric.	New glass doors will be frameless and visually unobtrusive.	The new glass doors will allow regulation of the flow of air and visitors within the museum. The doors will be of a consistent design throughout and distinguishable as new fabric. The impact on heritage values will be minor.
New Floor Finishes			
New floor finishes to be provided to ground floor concrete floors once concrete lattice strengthening has been installed. In particular:			

Zone 2 Ground Floor Existing false floor to be removed and reinstated	Zone 2 Ground Floor A later concrete topping and false floor have been installed in this area. The false floor will be removed and reinstated. Some removal of heritage fabric to insert the structural floor lattice beams. Minor impact on heritage fabric.	-	Zone 2 Ground Floor Reinstating the existing false floor will have no impact on heritage values.
Zone 3 Ground Floor New tiles to be laid	Zone 3 Ground Floor The existing tiles in Zone 3 ground floor will be removed. The tiles are not original and are darker than those that appear in early photographs. The conservation plan assessed their significance to be 'none.' Some removal of heritage fabric to insert the structural floor lattice beams. Minor impact on heritage fabric.	-	Zone 3 Ground Floor The existing floor tiles within the ground floor of Zone 3 were assessed as having no heritage significance in the Conservation Plan. They will be replaced with new lighter-coloured tiles which resemble those visible in early photographs of the space. This will have a positive impact on heritage values.
Zone 4 Ground Floor - Eastern side: new floor tiles to be laid in toilet area and new carpet tiles in G 4K - Corridor: new concrete screed to be applied and new tiles laid according to original layout Western side: Timber strip flooring will be laid over the new concrete screed with glass laid over Rachel Bath for public viewing	Zone 4 Ground Floor Eastern side: no remnants of original floor finishes. Corridor: original border tiles and coloured concrete floor are present, although concrete is cracked and has had repairs. This original fabric will be removed to insert new structural floor lattice beams and concrete screed. There will be loss of heritage fabric. Minor impact on heritage fabric. Western side: some original tiles exist in north western corner but are badly damaged. These will be removed to insert new structural floor lattice beams and concrete screed. Due to the condition of the tiles there will be a minor impact on heritage fabric.	Zone 4 Ground Floor The loss of heritage finishes will partly be mitigated by replicating the original tile arrangement.	Zone 4 Eastern side: new tiles and carpet in this area will be suitable for the new functions of this space as toilets and a flexible room for museum use. No impact on heritage values. Corridor: removal of the original floor finish will have a negative impact on heritage values, which will be partly mitigated by the new concrete screed and tiles which will replicate the original layout. Western side: the new glazed floor over the Rachel Bath will provide a focal point within the new café and reveal the original use of the space. The effect on heritage values will be positive.

Zone 5 Ground Floor • Eastern side: original floor linings to remain • Western side: new timber strip flooring to match existing to be provided within gallery space	Zone 5 Ground Floor Eastern side: original floor tiles to remain. No impact of heritage fabric. Western Side: The timber flooring is later fabric. Some removal of heritage fabric to insert the structural floor lattice beams. Minor impact on heritage fabric.	-	Zone 5 Eastern side: Aside from the steel floor penetrations outlined in the structural section the floors will remain intact. Western Side: No impact on heritage values.
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Services

Proposed Work	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
All services will be rationalised and updated where required throughout the building. Some disused heritage ducts and services have been removed in anticipation of the forthcoming works and to facilitate other works.	There are instances when services must run through walls and floors. These locations have been selected to be practical and discreet. There will be some minor specific loss of fabric to facilitate the service penetrations.	Service runs location and appearance have been considered for the least impact on the building and visitor experience.	Existing services are haphazardly installed. The new services will simplify the basement space and allow heritage features to be more easily viewed. The effect on heritage values will be positive.

Lighting

Proposed Work	Impact on Heritage Fabric	Mitigation	Impact on Heritage Values
New emergency lighting to be installed.			
New heritage lighting scheme to be installed, including custom lights within central hall.	Existing lights are all non-original and will be removed. Installation of new light fittings will involve fixing to some original fabric such as newel posts.	-	The scheme has been based on surviving original lighting plans, which indicate the position of original light fixtures, and photographic records. The impact on heritage values will be positive.
Contemporary lighting will be installed in new areas.	No impact on heritage fabric.	-	No impact on heritage values

Exterior lighting is currently fixed to the exterior of the building, predominantly on the roof. This will be removed for a new scheme which will light the building from existing light poles along the western elevation.	Positive impact on heritage fabric as we are removing light fittings from the existing fabric.	-	Removal of the light fittings to a remote location will have a positive impact on heritage values.
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7 CONCLUSION

The former Bath House is of outstanding historical and cultural significance to both Rotorua and New Zealand. The proposed works are intended to support the ongoing use of the site as the Rotorua Museum, under which the rich history of the building will continue to be made available and appreciated.

The building will be upgraded to meet current seismic performance requirements and fire safety standards. Accessibility for people with disabilities will be improved. In addition, several internal alterations will be made to allow the building to function as a modern museum, including the provision of a new café and kitchen fitout, toilets and infant change room, storage areas and conference room.

Inevitably, the structural strengthening of the building will involve the loss of some original fabric and have some visual impact. The structural scheme provided by DIZHUR Consultants employs innovative techniques, many of which involve the application of strengthening materials directly into or onto the building's surfaces. The scheme is tailored to the idiosyncrasies and form of the existing structure and will generally have only minor visual impact on the building's significant interior spaces. The most significant impact will occur in the original bathing rooms in Zone 5, where a steel frame strengthening the eastern gable end wall will be prominently visible.

To minimise the impact of the structural works, original dadoes, cornices and skirtings will be removed and reinstated where possible, or reconstructed if necessary. The original timber floor in the gallery of Zone 3 will be partially re-laid, while in the corridor of Zone 4 a new concrete and tile floor will be laid over the original, replicating the initial layout.

In general, new elements to be installed throughout the building – such as the café fitout, glass doors, circulation space and basement walkway - have been designed to have minimal impact on heritage fabric and use a limited material palette. Interventions are concentrated in spaces which have the least surviving original fabric and heritage value.

The construction of a new circulation space connecting the basement, ground floor and first floor will require the removal of some original fabric, however the negative impacts of this are considered to be outweighed by the improved access gained to all three levels of the building.

Aspects of the proposal that will enhance the heritage values of the building include the refurbishment and repair of original fabric within the bathhouse exhibition area in Zone 5, the construction of a new walkway at basement level which will allow the basement to be viewed by visitors, the revealing of the Rachel Bath, the recovery of the original glazed roof above the corridor in Zone 4 and the installation of a heritage lighting scheme. The new stairway to be constructed between the café and northern rooftop viewing platform will enable this unique feature to remain accessible to visitors.

Overall, it is considered that the proposal is sensitively tailored to protect and enhance the heritage values of the former Bath House, while achieving the project aims of allowing the building to continue to operate as the Rotorua Museum.

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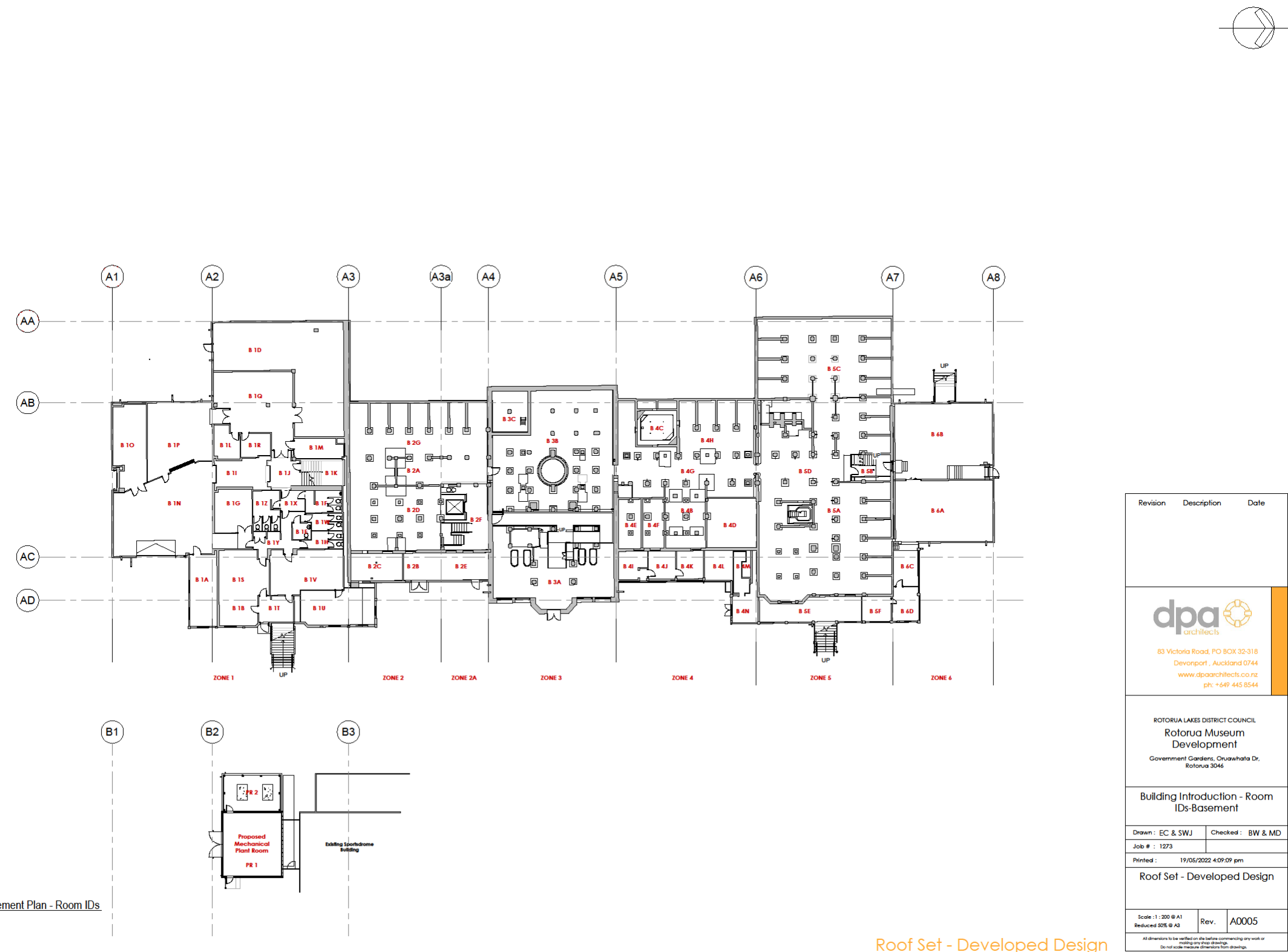
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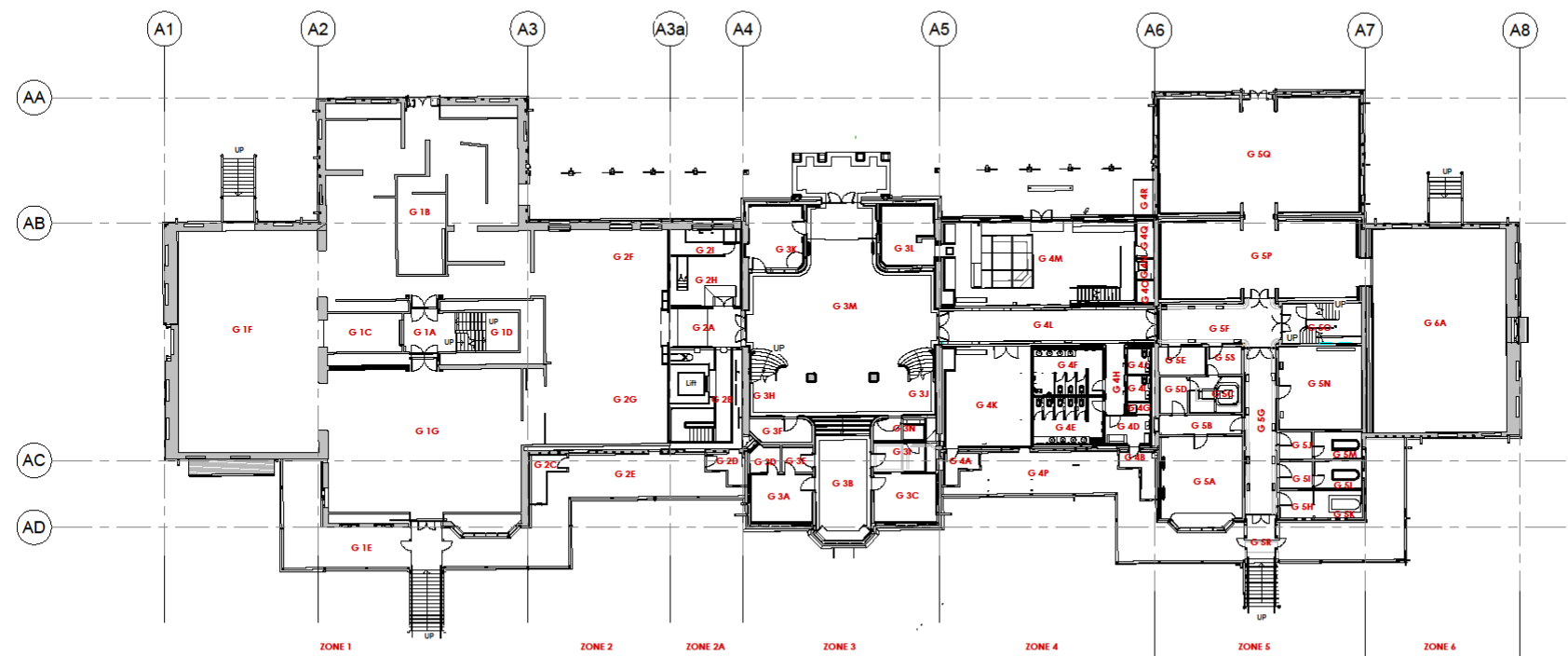
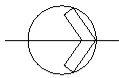
Archives

Alexander Turnbull Library
Auckland Libraries Heritage Collections
National Library
Rotorua Museum Te Whare Taonga o Te Arawa

9 APPENDIX

The following drawings identify building zones, gridlines and room codes to which reference has been made throughout this report.

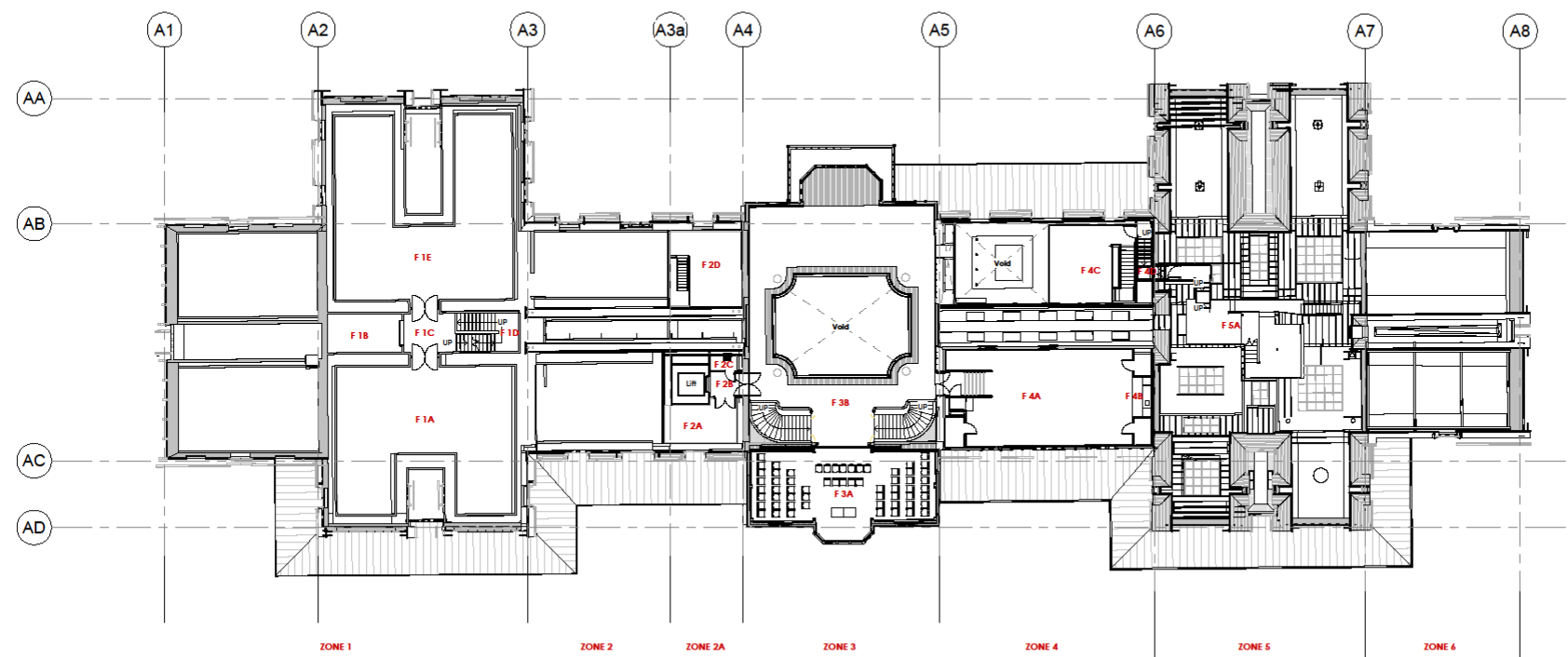
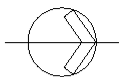




Revision	Description	Date
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ROTORUA LAKES DISTRICT COUNCIL Rotorua Museum Development Government Gardens, Oruwhata Dr, Rotorua 3046		
Building Introduction - Room IDs_Ground Floor		
Drawn : EC & SWJ	Checked : BW & MD	
Job # : 1273		
Printed : 19/05/2022 4:09:33 pm		
Roof Set - Developed Design		
Scale : 1 : 200 @ A1 Reduced 50% @ A3	Rev. A0006	
All dimensions to be verified on site before commencing any work or installing any final fittings. Do not scale measure dimensions from drawings.		

1 Proposed Ground Floor Plan - Room IDs
A3.0 (RC) SCALE: 1:200

Roof Set - Developed Design



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ROTORUA LAKES DISTRICT COUNCIL Rotorua Museum Development Government Gardens, Oruawhata Dr, Rotorua 3046		
Building Introduction - Room IDs_First Floor		
Drawn : EC & SWJ	Checked : BW & MD	
Job # : 1273		
Printed : 19/05/2022 4:09:59 pm		
Roof Set - Developed Design		
Scale : 1 : 200 @ A1 Reduced 50% @ A3	Rev. A0007	
All dimensions to be verified on site before commencing any work or making any shop drawings. Do not scale measure dimensions from drawings.		

1 Proposed First Floor Plan - Room IDs
A205 (S6) SCALE: 1:200

Roof Set - Developed Design