conservation studio

Heritage Impact Statement

Cairo Flats – Garden Wall Remediation

98 Nicholson Street, Fitzroy 3000

Prepared for:

Cairo Flats
98 Nicholson Street, Fitzroy
Owners Corporation

Date: 29/01/2021

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-	29/01/2021	Client review and comment
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1. Project overview

1.1 Introduction

This Heritage Impact Statement (HIS) has been prepared on behalf of the Owners Corporation – Cairo Flats H1005 and outlines the heritage impacts of the proposed works to dismantle and reconstruct the Hanover St boundary wall, including removal of existing decayed trees, replacement planting and garden maintenance, and upgrade of the existing stormwater system on the northern side of the site.

Documents for approval

The following documents are attached to this Heritage Impact Statement detailing the investigation works and recommendations outlined herein and proposed by the HIS:

- Memorandum of advice prepared by Conservation Studio and dated 13/05/2020 including advice from Quatrefoil Consulting and Hard Rock Geotechnical Engineers.
- Cairo Landscape Masterplan prepared by John Patrick Landscape Architects.

1.2 The site

The site is Cairo Flats located at 98 Nicholson Street, Fitzroy comprising three two-storey clinker brick apartment buildings in a U shape formation connected by cantilevering concrete walkways.

The site is bound to the North by Hanover St, Nicholson St to the West as the front of the site, a laneway along the eastern boundary where the garages are located and abuts the Academy of Mary Immaculate (H0507) on the South.

For the purposes of this HIS, the works are limited to the northern boundary wall along Hanover Street and extending into the site to include the first approximately 2 metres towards the outer northern elevation of the flats.

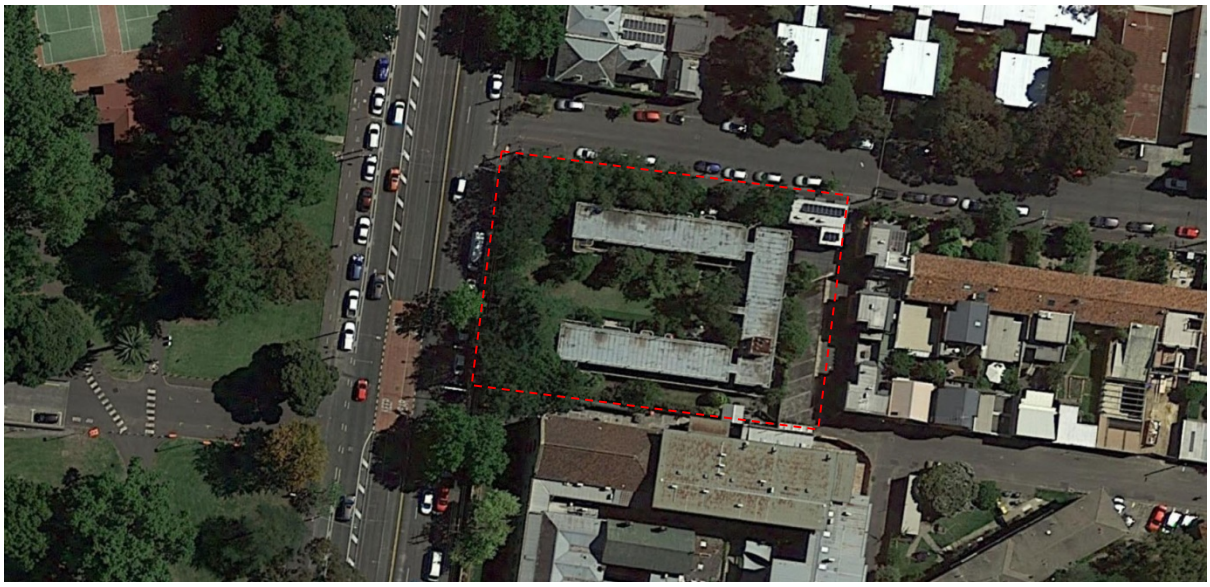


Figure 1 Aerial image of the site indicating the location of Cairo within the greater site context.
Source: Google Maps edited by Conservation Studio.

Description

As outlined above the site is limited to the boundary wall along Hanover St. The northern boundary wall along with the plinth along Nicholson St are the only nineteenth century remnant of the former Uxbridge House that occupied the site until the 1930s.

The wall is constructed of hawthorn bricks in Flemish bond with a cream brick capping of profiled header bricks and spans the length of the northern boundary of the site, terminating to the west with a truncated brick pier. The eastern end of the wall terminates against the former milkbar / dinning room now a residence located at 14 Hanover St.

The wall maintains a uniform height datum of 1800-1900mm above the footpath. Within the site, the ground level gradually increases away from Nicholson St. the ground has built up over time and is between 300-1000mm above the outside level (Hanover Street). As such the wall is acting as a retaining wall although not designed for this structural action.

The wall has extensive rotation in two locations, in the centre adjacent to a larger peppercorn tree and at the eastern end near a large elm. The wall has previously rotated in two other locations and was dismantled and reconstructed. The reconstruction has utilised the original bricks where possible, but the overall treatment is unsympathetic and not in keeping with the remaining sections of the wall.

The space behind the wall extends 6m back to the north face of Cairo Flats. The gardens were subdivided into seven yards and common space in the early 2000s as part of the sale of the property. The trees along the boundary wall appear to date from before the construction of Cairo and comprise varieties of Dutch Elms and a peppercorn tree along with other more recent plantings. The low-level gardens vary from lot to lot.

Overall, the upper canopy is in poor condition. The Elms have reached the end of their life and host weeds growing from their hollow trunks. The peppercorn remains in good health, but its root stock is contributing to the rotation of the wall. John Patrick Landscape Architects describe the planting along the north boundary wall as likely to be weeds and possibly incidental in nature:

> *In my opinion, the Peppercorns to this boundary alignment are likely to be weeds that have become established and are now so much a part of the Cairo landscape that they are identified as having historic value and a right to be there. The Elms may also be weeds, though the presence of Elms along the Nicholson Street frontage where they may have been planted makes this far from certain. Sweet Pittosporum along this alignment are certainly interlopers and should be removed.*

The garden is generally overgrown and has become host to many invasive weeds. The overall structure of the garden retains very little of the nineteenth century plantings of Uxbridge or the early twentieth century planting established at the time of construction of Cairo, comprising Silver Birch planted between the balconies, drystone dwarf walls with low level shrubs. Notable remnants of the twentieth century plantings are two Silver Birch near the off-form concrete stair, the large Cedar in the front yard and the drystone walls, which appear to retain some shrub like-plantings.

Over time the garden has become established more organically without intentional formal design or planting; however, the resultant “secluded garden” is attractive to the owners.

Existing conditions images

We have included the following existing conditions images of the site, fence and vegetation.

Figure 2 Views of Cairo front yard with low level plantings to the perimeter of the courtyard. Images taken soon after construction c1940.

Figure 3 Views of Cairo yards. Left: view looking east down the north side of the property from Nicholson St, note the established peppercorn tree and elm along the fence line. Top Right: View of the front yard from Nicholson St indicating no low-level shrubs, along with a series of established Elms, Moreton Bay Fig (since removed) and Jacaranda (since removed). Bottom Right: View from inside the milkbar looking west along the northern edge of the site depicting Birch planted between the balconies and remaining established trees along the northern fence line.

Figure 4 Hanover St garden wall. Left: Western end of the wall at the corner of Nicholson St. This section of wall was reconstructed in 2007. Right: Midway section of the wall indicating a junction between the existing and a section of reconstruction, note the difference in pointing and the colour of the bricks.

Figure 5 Former Uxbridge House (Demolished 1926), view from over the Hanover St garden wall c1890. Source: Yarra Libraries.

Figure 6 Left: Views of the inside of the wall indicating the build-up of ground level compared to the street view of the wall. Note irregularly occurring engaged piers in the rear of the wall and the close proximity of plantings to the wall. Right: Street views of the wall indicating the outward bowing and capping details.

1.3 Project background

The brickwork wall along the northern boundary of the Cario Flats site dates from the later part of the nineteenth century and is related to the earlier residence Uxbridge House.

In 2007 a package of works was undertaken to stabilise two areas of the wall, at the western end and a central section. These works included dismantling and rebuilding the two sections of wall on new concrete footings and truncating the base of the wall. As a result of these works, details such as the engaged piers were lost and the use of highly cementitious mortar with a crude struck finish resulted in a varied visual outcome. These works were undertaken by way of a Permit Exemption P11643.

In recent years the wall has continued to bulge and exhibit outward and inward rotation in two main locations that were not previously addressed and appear to be the result of impact from tree roots.

The owners corporation at Cairo Flats have received correspondence AR19/00317 from the City of Yarra's Building Officer, dated 25 September 2019 identifying the wall as:

> *During our inspection, we observed the masonry (brick) fence exhibits various cracking, it is out of plumb and longitudinal bowing is occurring.*

And states that it is their view that the wall does not present an immediate danger of collapse at the present time and recommends the owners corporation seek guidance from a registered Structural Engineer on the integrity and long-term soundness of the wall. A copy of this letter is included in the submission for your reference.

Tree assessment and condition

As outlined above, a conditions assessment of the trees was undertaken by ArborCo in 2007 and updated recently in 2018. The conditions assessment identifies a number of existing elm trees as being in poor – very poor condition and identifies that the trees have a reasonable potential of failure or of dropping limbs.

The report details the condition of the trees, specifically those along the Hanover Street boundary as:

> *Eleven Elm trees, no's U1-04, U2-02, U1-06, U3-03, OC-03, 0C-06, OC-08, OC-09, OC-14, OC-17, and OC-21, were maturing specimens likely part of the original Cairo Flats development landscape; the remaining six elms included a maturing specimen, no. OC-24, and, four semi-mature specimens no's OC-28, U3-01, U3-02, and U5-01, all most likely developed from sucker (root sprouts). Mature trees growing along the Hanover Street frontage, no's U1-04, U2-02, U1-06, U3-03 had been subjected to level changes, with the soil level raised an estimated 600mm around the base of the trees, evidenced by the lack of buttress root growth around the base; examination of several hollow stem found to extend beneath the current ground level by up to 600m.*
>
> *All maturing elms located on the Hanover and Nicholson Street property boundaries have been subjected to a regime of pollarding1 in the past. The pollarding regime has lapsed with more recent pruning involving the reduction pruning of the lapsed pollard regrowth. Pollarding has had the effect of deteriorating the primary structure of these trees, with decay and cavity development in the primary branches, in some instances extending into the upper trunks.*

2. Heritage considerations

2.1 Victorian Heritage Register (VHR)

Cairo Flats is included on the Victorian Heritage Register (VHR) as H1005 to the extent of the Cairo building and the land. The extent of registration identifies the *perimeter wall* as being excluded and describes the extent of registration as follows:

> *1. All of the building known as Cairo Flats, 98 Nicholson Street, Fitzroy, including the former dining room (now milk bar) and the garages, being the building marked B-1, B-2 and B-3 on Plan 6012828(A), endorsed by the Chairperson, Historic Buildings Council and held by the Director, Historic Buildings Council, but excluding the perimeter wall.*
>
> *2. All of the land described in Memorial No. 965 Book 551 and Memorial No. 836 Book 551, being portion of suburban Section Number 70, in the Parish of Jika Jika, marked L-1 on Plan 6012828(B), endorsed by the Chairperson, Historic Buildings Council and held by the Director, Historic Buildings Council.*

Permit exemption and exemption policy

The VHR citation for the site includes a permit exemption policy that identifies the inclusion of the site in the World Heritage Environs Area for the Royal Exhibition Buildings and Carlton Gardens, and expresses that works must consider the effect works may have on the World Heritage Site. Clarified by the following permit emption policy:

> *The registered place is located within the declared World Heritage Environs Area for the Royal Exhibition Building and Carlton Gardens. In accordance with the permit considerations set out in the Heritage Act 1995, proposed works to the registered place must consider:*
>
> *- the effect of the works on the World Heritage values of the Royal Exhibition Building and Carlton Gardens; and*
>
> *- the approved "World Heritage Environs Area Strategy Plan: Royal Exhibition Building and Carlton Gardens" (Department of Planning and Community Development, 2009).*
>
> *The Commonwealth's Environment Protection and Biodiversity Conservation Act 1999 and Environment Protection and Biodiversity Conservation Regulations 2000, as they relate to actions that may impact on World Heritage values, must also be considered.*

Statement of Significance

The Statement of Significance focuses on the Cairo Flats for its architectural importance to the changes in contemporary inter-war living and is the reason the site is included on the VHR.

The Statement of Significance does not identify the nineteenth century remnants that remain on the site including the boundary wall and a number of substantial plantings that were established prior to the construction of Cairo.

In summarizing the heritage values, these are also founded in the 1936 Overend's design for its association with changes to the inter-war living through innovative and labour-saving design mechanisms.

The following Statement of Significance does not identify the boundary wall or landscaping as elements that contribute to the understanding of the place.

> *Cairo Flats, built in 1936 and designed by the architect Acheson Best Overend, is a two-storey, U-shaped building, comprising 28 bachelor flats. The flats were constructed of blue clinker brick with projecting, curved balconies and were designed to provide maximum amenity in minimum space for minimum rent. The flats were complemented by a communal dining room, an in-house meal and laundry service, central heating, garages at the rear and a communal flat roof space.*
>
> *Cairo Flats is of architectural and historical significance to the State of Victoria.*
>
> *Cairo Flats is of architectural significance as an early example of the minimal flat type in Victoria. The building is an important example of the International Modern style and established a major break with conventional maisonette flat design. Cairo Flats is significant for Overend's daring use of concrete, especially in the unusual cantilevered stairs. The flats retain their original layout and feature original polished floorboards, timber front doors with small edged portal windows and the original 'D' shaped aluminum internal door handles, possibly the first use of such handles in Australia.*
>
> *Cairo Flats is of historical significance for the insight it provides into changing lifestyles for single people in inter-war Melbourne. At the time of its construction it provided an uncommon type of accommodation in Melbourne, and was important in the development of flats in Victoria. Best Overend's vision for a 'minimal flat with maximum comfort' was manifested in the innovative use of labour-saving devices such as service hatchways, dustbin hatchways, service telephones and the provision of a dining room (now milk bar) and meal service.*

Conservation Management Plan

The Conservation Management Plan (CMP), prepared by Bryce Raworth, dated 2001 touches on the earlier occupation of the site by Uxbridge noting its demolition in 1936 to make way for Cairo, the main focus of the CMP. Whilst providing some conservation management policies, the CMP is generally void of any mention of the boundary wall and details regarding the gardens and landscape. It does, however, identify the Hanover Street boundary brick wall as being of Primary Significance to the site and states that elements of primary significance should be conserved and maintained.

Under the section – 5.4 General conservation policies of the CMP, it states that the garden has become overgrown and unkept and is not significant in a historical or botanical sense. It incorrectly identifies that all of the trees date from a period after construction of the flats, further stating that none are remaining from the earlier mansion grounds.

> *The grounds of the place have been allowed to become overgrown and unkept in recent years. While the foliage contributes to the verdant and secluded character of the place, it is not significant in an historical or botanical sense. The individual trees all date from the period after construction of the flats, which none remaining from the earlier mansion grounds. Their size and outgrown presentation does not reflect the design intent of the original garden or the 1930s gardens generally, as shown in contemporary Australian Home Beautiful article. Many of the trees are self-seeded. Ivy is rampant through many of the tree canopies. The open courtyard, the principal characteristic of the buildings' setting, should remain unobstructed.*

We are able to identify through historical images that many of the plantings were established prior to and at the time of construction. This is discussed in further detail within this HIS.

2.2 Victorian Heritage Inventory (VHI)

Cairo Flats is not included in the Victorian Heritage Inventory or identified as having archeological potential to the State of Victoria.

2.3 World Heritage Environs Area

Cairo Flats is included in the World Heritage Environs Area for the Royal Exhibition Building and Carlton Gardens as enshrined on the UNESCO World Heritage List and as such works may be subject to approvals under the Commonwealth's Environment Protection and Biodiversity Conservation (EPBC) Act 1999.

2.4 Heritage Overlay Yarra Planning Scheme

Cairo Flats is individually identified in the Schedule to the Heritage Overlay of the Yarra Planning Scheme at HO185.

The provisions of Clause 43.01 – Heritage Overlay in the Yarra Planning Scheme is superseded by the inclusion of the Heritage Place on the Victorian Heritage Register under the *Heritage Act 2017* in accordance with Clause 43.01-2 of the Planning Scheme. The Executive Director, Heritage Victoria may refer the application to the City of Yarra as the responsible municipality.

2.5 National Trust of Australia

Cairo Flats is classified on the National Trust of Australia (Victoria), classified 18/11/1992, Place ID: 67147. Listings classified by the National Trust of Australia impart no statutory obligation.

Figure 7 Left: Victorian Heritage Register extent of registration for Cairo Flats indicating the registered buildings and land. Right: Yarra Planning Scheme Heritage Overlay mapping indicating the Cairo Flats site as individually listed HO185 within the greater precinct context of Fitzroy. Bottom Left: Royal Exhibition Building and Carlton Gardens World Heritage Environs Area indicating the location of the Cairo Flats site within the Environs Area.

3. Proposed works

3.1 Summary of proposed works

In summary the works will comprise:

- Record of the existing brickwork wall through images, drawings, sketches and the like.
- Careful dismantling of the brickwork wall and the bricks cleaned and set aside for re-instatement. Note some bricks that are soft and highly eroded or cracked may be lost in the dismantling process.
- Remove vegetation and trees in a zone 1m back from the rear of the wall.
- Batter back the soil in 1:1 ratio
- Excavate down approximately 1m to lay new strip footing on weathered rock.
- Reconstruct the wall using existing bricks with a lime putty mortar to closely match original composition.
- Construct a new brick retaining wall at rear of reconstructed heritage wall and tank with a new membrane.
- Install an agricultural drain to remove ground water and prevent it coming in contact with the reconstructed wall.
- Install a new PVC stormwater system adjacent to agricultural drain and connect to four existing stormwater pipes running from the building to the wall. Install stormwater pits at each end of the pipe run and at each junction (five in total) and connect to the legal point of discharge in Nicholson St.
- Reline with a flexible liner the existing four pipe runs from the building to the new stormwater pits.
- Back fill the soil to cover pits, pipes and retaining wall and undertake landscaping works.
- Application of a nano technology anti-graffiti coating system to the brickwork wall.

We have considered the impact of all three options outlined in Section 1.3 Project background. The space at the rear of the wall have been subdivided into rear yards for the ground floor apartments and as such have been individually landscaped including paving, decking and new plantings. Along with the existing trees, which are in most cases hard up against the wall, there are several challenges with completing options 1 and 2, which involve all works being undertaken from within the site where the ground levels are 1m higher than the street. Option 1 and 2 require significant excavation back as far as the external wall and balconies of the flats.

All options consider the removal of the existing trees for various reasons. The elm trees along the back of the wall were investigated by ArborCo in 2007 and again in 2018 and found to be in poor condition. The trees are described as being loose in the soil, hollow and generally described as being in poor condition.

Investigations

We have investigated the condition of the wall with input from Quatrefoil Structural Engineers and HardRock geotechnical Engineers. The wall is found to be acting as a retaining wall, retaining between 100mm – 1000mm of soil and tree root mass. The wall has been found to have rotated 55mm out of vertical alignment in two locations along the length of the wall. One location aligning with a mature peppercorn tree *(Schinus molle) and* the other location aligning with a mature Dutch Elm *(three varieties present: Dutch Elm, Wych Elm and Huntingdon Elm).*

The investigations confirmed the previous advice provided in ArborCo's 2018 *Tree Assessment 98 Nicholson Street Fitzroy* that the tree root zone has been covered over by 500mm of soil. It also found that the tree roots are hard up against the wall and are likely to be the cause of the rotation. It is understood that this was also found to be the reason for the need to reconstruct the wall in part in 2007 and at that time a large peppercorn tree was removed from the north western corner of the site along with the removal of a mature Elm tree along the north boundary.

The investigations recommend that the wall should be underpinned to a depth of 1m on the street side of the wall to be founded on weathered rock.

We have investigated three options for the stabilisation of the wall and have found that option 3 outlined below is preferred. The reasons for selecting option 3 are discussed in the next section.

Option 1 – Install an independent retaining wall at the rear of the existing masonry wall to remove the loads imposed by the soil and trees with bored piers and a pad foundation and back props to the 13m extent of wall required to be stabilised.

Option 2 – Underpin the wall with larger foundations and install an independent retaining wall at the rear of the existing masonry wall to remove the loads imposed by the soil and trees with back props to the 13m extent of wall required to be stabilised.

Option 3 – Dismantle the length of wall and install new foundation, reconstruct the wall. This option is likely to need additional rear supports in the wall or significant reinforcing to result in the cantilever action to enable the wall to act as a retaining wall. Alternatively, the wall below ground level can be truncated to create ballast in the base of the wall, but this would be a significant thickening.

Alternative proposals

The following section makes assessment of the proposed works against Section 101 (2) (a),(b),(d) and (f) and Section 101 (3) of the heritage Act 2017 - alternative proposals that were considered and reasons why these were dismissed.

As detailed above, as part of the investigations into the remediation of the wall we have investigated alternative options for the remediation of the wall. Each option would impact the existing trees and require their removal in order to construct the works. The key difference in considering alternative options would be avoiding the dismantling and reconstruction of the wall by back propping and underpinning the wall.

Option 1 and 2 detailed above have been dismissed on the basis of complex buildability issues associated with underpinning, deep excavation on the inside of the wall (1.6m deep) and the network of existing services inground and above the wall which pose potential latent conditions and extensive costs required to move, isolate and avoid clashes with the services.

Given the previous approach to dismantling and reconstruction of parts of the wall, we have considered that Option 3 provides the opportunity to remediate the wall restoring it to a homogenous architectural aesthetic and restore correct details such as the original lime putty mortar and details such as the struck finish of the pointing, of which small remnants remain below the capping course. Thus, eliminating the previous patchy approach to repairs.

Conservation approach

As a part of the dismantling and reconstruction of the wall, the approach will focus on accurate reconstruction using a lime putty based mortar that is similar to the mortar used in the original parts of the wall that remain and reversing the 2007 reconstruction works that utilized a cement rich mortar without a tooled finish on the joints.

Where possible all existing bricks will be salvaged and reused in the works. It is noted that some bricks are cracked and are highly friable, these are likely to be lost in the dismantling and reclaimed bricks of a similar age and colour will be integrated into the works. Where possible, bricks that do not match in colour will be used below the interior surface level where they will have no visual impact.

In summary, the proposed conservation works will include the following:

- Carefully record the existing details of the wall, including height, setout, location and detail of engaged piers, capping, plinth and other relevant details to enable reconstruction.
- Carefully washdown the wall to remove all organic growth and debris using hot pressure water 1200 psi and approved biocide.
- Carefully dismantle the wall by hand removing bricks from top down. Clean, sort and pallet bricks so that the face bricks and profiles bricks are separate from inner skins.
- Following completion of the inground structural works, commence reconstruction of the wall, setting out the bricks with correct bond ensuring face bricks are utilized in the outer facing skin using lime putty mortar of 1:4 slaked lime and sand ratio with brick dust pozzolan.
- Strike all joints with a tolled finish to match original with raked lines in the mortar to emphasise the joints.
- Wash down the wall at completion of works to remove excess lime and bloom.
- Apply a nano technology anti-graffiti coating system to the brickwork wall.

Landscaping works

John Patrick Landscape Architects have been engaged to prepare a general site landscaping masterplan that looks at the whole of the Cairo site developing an approach to the garden common space gardens. They have prepared a specific study of the northern edge of the site that we have attached to this HIS in support of the application.

The masterplan provides recommended plantings to replace the Dutch Elms and peppercorn trees that will provide a similar canopy form, are deciduous and will create a similar back drop to the World Heritage Environs Area as the existing trees provide.

The removal of the Peppercorns and Elms from this frontage gives the opportunity to review planting to this boundary alignment and to consider the appropriateness of alternative choices. With the wall being re-engineered to withstand the load of the soil to their rear and the action and load of roots, the opportunity for tree selection is not limited by this aspect of the site.

The constraints in re-planting lie in the location of overhead cables above the Hanover Street footpath close to and parallel with the site, the need for light access to the north facing flats, the need for privacy, resilience to pests, and the need for selected trees to be able to tolerate northern exposure at a time of global warming. Of course, tolerance to hot dry conditions may bring with it

an increased risk of a tree becoming a weed. Additionally, there is a need for selected trees to be historically appropriate, not for Cairo but for the wall they supplement.

Overhead cables are likely to lead ultimately to the pruning of most trees grown in this location. Some trees tolerate pruning better than others. Elms, for example, tend to produce extensive epicormic growth, and this can rapidly grow back to close to its original size with poorly attached branches that need some arboricultural work to achieve appropriate structure and form. Their wounds frequently become subject to rot leading to cavities and structural weakness, as is the case currently. Other trees, Peppercorn is one species, can tolerate pruning and produce much less re-growth as a response as well as maintaining better structural integrity. Any tree selected should not have a shape that depends for its effect on a well formed, symmetrical canopy; the pruning clearance for cables will appear particularly inappropriate on such species

Replanting Elm species in a like for like sense has been considered and it is widely understood that the existing Elms on site suffer damage from Elm Leaf Beetle, suffer rot as a result of pruning associated with the overhead cables and with the City of Melbourne's predicted future temperature increase of at least 0.8 degrees centigrade and possible change in rainfall volume and timing, conditions will become increasingly demanding for successful tree growth. This location is not well suited to establishing healthy Elm varieties.

The recommended replacement plantings are based on the recommendations of the City of Melbourne's *Future Urban Forest* (2016) and comprise the following varieties. The Owners Corporation have not settled on a selection from the following varieties, as such we ask that the selection be considered for this permit application and that a permit condition be included in the permit that the final selection taken from the following varieties and their location for planting be submitted for approval prior to the completion of the works and prior to commencement of the replacement landscaping. We request the following condition be included in the permit:

> *Prior to the completion of the works and prior to the commencement of any replacement landscaping works submit the chosen replacement plantings for the northern boundary of the site to be taken from the varieties recommended by John Patrick Landscape Architects and included in the Heritage Impact Statement and the proposed location of each planting to the Executive Director, Heritage Victoria for approval.*

Proposed replacement plantings for northern boundary:

- Diamond -leaf Pittosporum
- Ivory Curl Tree
- Blueberry Ash
- White Yiel Yiel / White Silky Oak
- Jacaranda
- Golden Rain Tree
- Macadamia
- Persian Ironwood
- Chinese Pistachio
- Japanese Elm

In addition to the proposed replacement planting along the northern boundary, it is also proposed to undertake some general garden maintenance to remove the ivy that is rampant throughout the garden and growing on the walls of Cairo. Ivy can cause detrimental impacts on historic structures, particularly where it can block, damage or dislodge downpipes, and sucker into cracks in the mortar and masonry. The removal of the ivy should be supported as a good conservation action. Other less invasive varieties of Ivy (Boston Ivy and other varieties) are present on the rear (south

east corner) of the building. These are considered to be less of a problem, their maintenance through regular cutting back is recommended, their removal is not recommended.

In summary, the landscaping works will comprise the following:

- Removal of the existing peppercorn trees along the northern boundary fence.
- Removal of the existing elm trees along the northern boundary fence.
- Removal of overgrown ivy generally from the building, downpipes and garden.
- Removal of other trees and plantings along the northern boundary.
- Planting new trees from the selection included above along the northern boundary at the completion of the remediation works.

3.2 Assessment of impacts

Impacts on cultural heritage significance

The following Section makes assessment of the proposed works against Section 101 (2) (a) of the Heritage Act 2017 - the extent to which the application affects the cultural heritage significance of the place or object.

In summary the cultural heritage values of Cairo Flats lie in its architectural and heritage significance, which are embodied in the heritage fabric of the Flats, the garages and the associated former milkbar and dining room.

- It is of architectural significance as an early example of the minimal flat type in Victoria;
- As an example of the International Modern style and established a major break with conventional maisonette flat design;
- For use of unique details, such as the concrete cantilevering staircase and D pull handles; and
- It is of historical significance for the insight it provides into changing lifestyles for single people in inter-war Melbourne. Including the use of labour-saving devices.

The property is included on the Victorian Heritage Register for Best Overend's minimalist international modern style dwellings and not for its association with the earlier nineteenth century Uxbridge House or for its landscaping qualities, which are not considered to contribute to the understanding of the place.

On this basis the proposed works have no impact on the cultural heritage significance of the place. However, it should be considered that the remaining nineteenth century elements, being the boundary walls along with the established plantings providing a backdrop to the wall are considered to be significant at a local level and are identified in the inclusion of the property in the Yarra Heritage Overlay.

It is important that the local cultural heritage values are not diminished by these works. The retention through reconstruction of the wall utilising the existing bricks with the reintroduction of original details such as lime putty mortar and the original struck pointing details will enhance the current architectural and heritage values of the wall. It could be considered that the repair works undertaken in 2007 resulted in a diminished architectural and heritage value of the wall in the patchy approach to its repair. These values will be restored by a more sympathetic approach to the repairs proposed by this HIS.

World Heritage Environs Area

The World Heritage Environs Area (WHEA) established a curtilage surrounding the World Heritage site of the Royal Exhibition Building and Carlton Gardens and was declared and gazetted in 2007.

The purpose of the WHEA was to establish a buffering zone for effective protection of the nominated property, By establishing a buffer zone as an area surrounding the nominated property which has complementary legal and/or customary restrictions placed on its use and development to give an added layer of protection to the World Heritage site.

The buffer zone includes the immediate setting of the Carlton Gardens, important views and other areas or attributes that are functionally important as support and protection for the Royal Exhibition Building and Carlton Gardens.

The key consideration in determining the buffer zone established what actions and activities in the WHEA could impact on and/or erode the World Heritage values and were established in reference to the 'EPBC Act Policy Statement 1.1 Significant Impact Guidelines' May 2006, which identifies the following:

- Involve construction of buildings or other structures within, adjacent to, or within important sight lines of, a World Heritage property which are inconsistent with relevant values; and
- Alter the setting of a World Heritage property in a manner which is inconsistent with relevant values.

The universal values of the Royal Exhibition Building and Carlton Gardens are founded in two key events:

1. The world exhibitions of the late nineteenth century and as a surviving industrial palace associated with the exhibitions; and
2. The opening of the Commonwealth of Australia's first parliament.

The WHEA study identifies a series of key views into the Royal Exhibition Building and Carlton Gardens from the surrounding street scape, with particular emphasis on the visibility of the Royal Exhibition Building and its dome.

The result of this is the establishment of two hierarchies of areas, being of greater sensitivity, and identifying key elements in the character of the area and specifically identifying key nineteenth century buildings within the area, based around views and an axis with the dome of the Royal Exhibition Building.

Cairo is not specifically identified as a key element but is set in one of the areas of greater sensitivity facing the Carlton Gardens. The study also identifies areas of lesser sensitivity being the northern fringe of the CBD where substantial development has already occurred.

In identifying streetscape characters that contribute to the WHEA, the study identifies the immediate Nicholson Street plantings (specifically Plane Trees) and features. It identifies setbacks of nineteenth century buildings and elements of front planting facing key streetscapes of Nicholson, Rathdowne and Gertrude Streets and Victoria Parade.

The formal planting of the Carlton Gardens, particularly the North Garden, (the simple pattern of tree-lined diagonal paths separating garden spaces) which reflect traditional European principles and elements of nineteenth century international garden style are supported by the large scale street trees (London Plane Trees) lining Nicholson St, which contribute to the nineteenth century aesthetic of the precinct as a whole in the sense of an immediate backdrop. Other prominent trees

contribute to this, such as the large Cedar in the front of Cairo. The plantings on the northern boundary of the site provide a tertiary level of streetscape and backdrop to the precinct.

The proposed works outlined in this HIS are located in secondary streetscapes and will minimal impact the Nicholson Street frontage of the property, where the existing line of Elm Trees are proposed to be retained, despite their condition being marginally better than those on the northern boundary of the site.

The works do not contemplate construction of new forms but seeks to reconstruct the fence accurately as existing with minor alterations to the inside face of the wall, which cannot be identified in the WHEA context or understood though important sightlines. The works do not seek to alter the setting of the World Heritage property. The conservation and remediation actions proposed by these works would enhance the nineteenth century character of the wall and would not alter vista or view in to or out of the World Heritage site.

3.3 Relevant guidelines

The Executive Director has adopted a number of policy guidelines and principles that may be considered under Section 101(3) (b) of the Heritage Act 2017. The proposed relocation works have been assessed against these guidelines and policies:

Guiding principles for changes proposed to places on the Victorian Heritage Register

The Executive Director made and published a set of guiding principles under s19(1)(f) of the Heritage Act 2017 in July 2019 to inform statutory decision-making under s.101 of the act. The proposed works are addressed under each principle.

Principle 1. Understand why the place is significant

The proposal to dismantle and reconstruct the garden wall along with replacement of established planting along the northern boundary will have no impact on the significance of the place.

The significance of Cairo as a place is embodied in the 1936 apartment block and the associated international style complex of bachelor dwellings, garages and dining room. It is significant for the architectural aesthetic that the apartment blocks, garages and dining room impart on the site, and is of heritage significance for the changes in lifestyle associated with the architectural typology. The changes proposed by this HIS will not impact on these values.

Principle 2. Changes to a place should be sympathetic to its significance

The end result of the proposed works will result in a change in the overall mass of tree canopy along the northern boundary of the site in a temporary sense until trees become established and mature.

This change will impart the light and special qualities along the northern edge of the site that existed at the time of construction of Cairo. The northern boundary of the site was less shaded and contained far less of an overgrown appearance than the current space allowing natural light into the apartments and balconies. The early images (Figure 8) of the site show a visual permeability into the site that provided an open-air characteristic inevitably lost to the matured and overgrown nature of the garden. It can be reasonably considered that these works are sympathetic to re-establishing the light, open-air and special qualities that once existed on the site.

The works associated with reconstruction of the wall will, for the most part, be largely undiscernible and as such can be considered sympathetic to maintaining the current north elevation of the site.

Figure 8 Views of Cairo yards. Left: view looking east down the north side of the property from Nicholson St, note the established peppercorn tree and elm along the fence line. Top Right: View of the front yard from Nicholson St indicating no low-level shrubs, along with a series of established Elms, Moten Bay Fig (since removed) and Jacaranda (since removed). Bottom Right: View from inside the milkbar looking west along the northern edge of the site depicting Birch planted between the balconies and remaining established trees along the northern fence line.

Principle 3. Protect significant settings and views

Given the landscaping and the garden wall are not considered to be significant to the site and do not support the original design intent, their views and settings from within the site are considered to contribute little or no significance to the place.

Views from the surrounding streetscape and from the Royal Exhibition Buildings and Carlton Gardens back to the site are included in and significant to the in the WHEA. In order to demonstrate the setting and view of the wall and mature trees along the northern edge of the site, we have prepared the following study of views from within the WHEA. The location from where each image has been taken is identified on an aerial image of the precinct.

On the basis that the wall will be reconstructed in a like for like state albeit repaired, it will have no impact on the WHEA and will remain visually prominent in the streetscape and general setting. The more established trees with larger canopies, such as the peppercorns, provide a tertiary level backdrop that is prominent within the Nicholson and Hanover streetscapes and from a subsidiary backdrop to the Carlton Gardens when viewed from the eastern edge perimeter of the WHEA, but is far less prominent in the streetscape than the Cedar or the London Plane Trees along Nicholson Street, which form the main backdrop to the curtilage.

a.

b.

c.

d.

e.

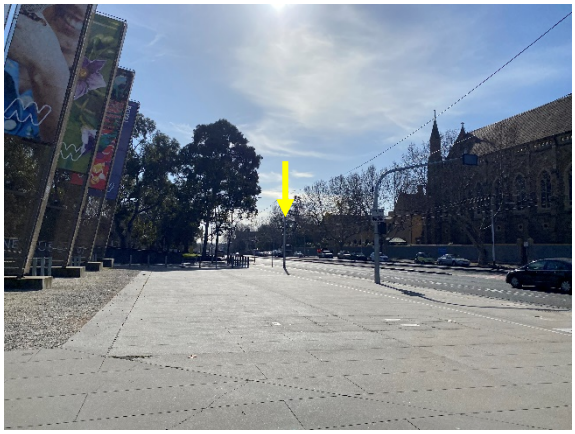
f.

Figure 9 Views of Cairo from within the WHEA. A-D views from Hanover St, E-F views from Nicholson St

g.

h.

i.



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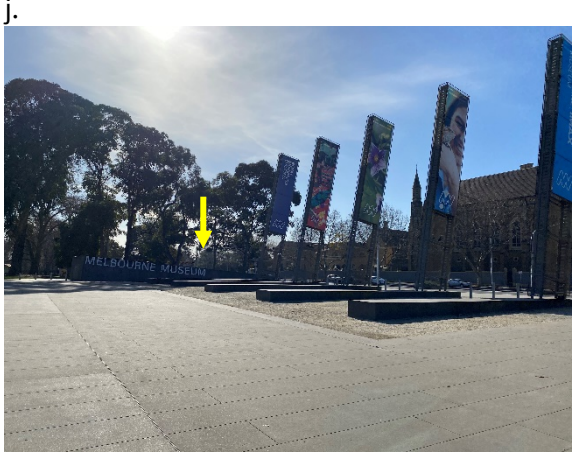


l.

Figure 10 Views of Cairo from within the WHEA. G-L views from Carlton Gardens

The proposed works do not impact or diminish the universal values or the overall setting of the Royal Exhibition Building and Carlton Gardens. The retention and remediation of the wall will enhance the nineteenth century aesthetic and architectural values of the Environs and therefore contribute to the precinct as a whole. The removal of the established planting will alter the backdrop of the Environs in the short-term whilst the plantings re-establish into mature trees.

The selection proposed, being a combination of various forms of deciduous trees will mimic the existing dappled canopy of the peppercorns and the contrasting stark and full canopies of the Elms and provide the seasonal differences that are experienced in nineteenth century formal gardens, complimenting and reinforcing the formal structure of the Carlton Gardens.

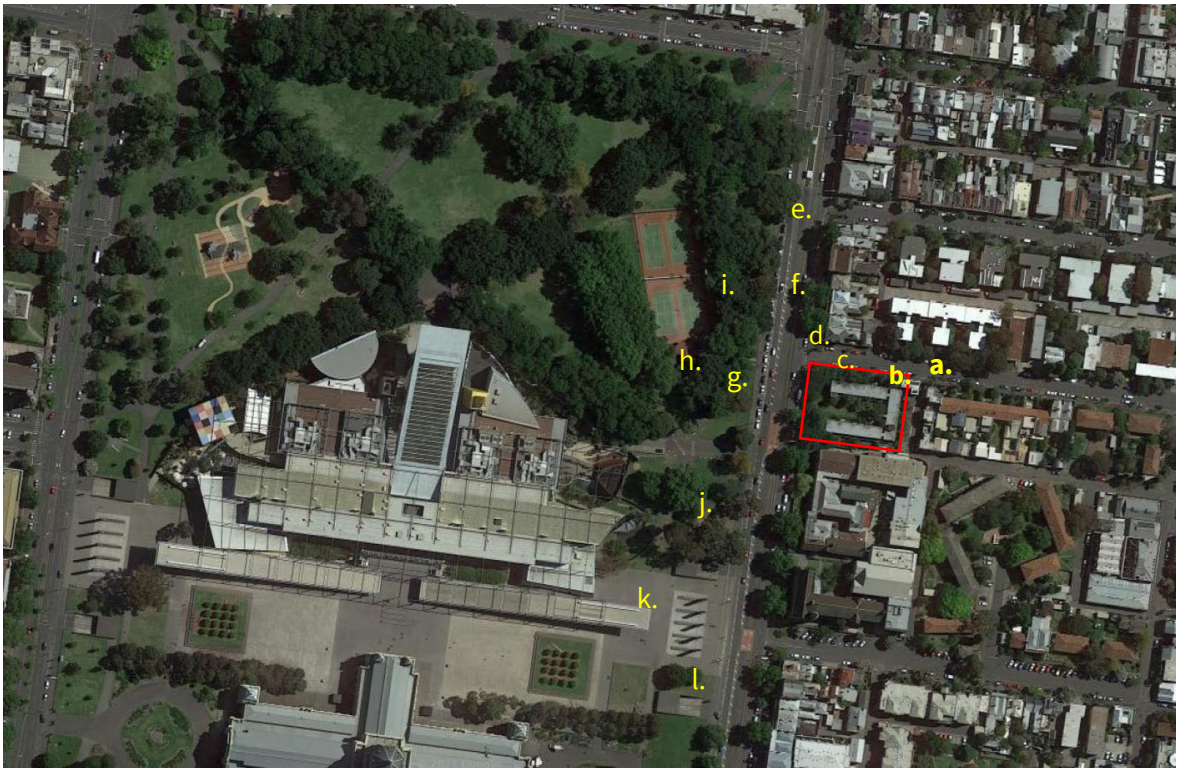


Figure 11 Aerial view of the WHEA indicating the location from where images of views in Figures 9 and 10 were taken. Subject site indicated in red box.

Principle 4. Provide for upkeep

The proposed works facilitate upkeep through a comprehensive package of restoration works to the wall and through the much-needed replacement of the stormwater system. The replacement of the stormwater system will protect the significant fabric of Cairo in the long-term. The system is currently in poor condition and does not adequately remove water from the site.

4. Conclusion

4.1 Conclusion

In conclusion, the works relating to the remediation of the wall are generally of a conservation nature and seek to conserve the place by providing structural and conservation to the existing fabric, including repairs to the stormwater system and drainage.

The proposed works only affect the nineteenth century remnants of the former Uxbridge House. The potential heritage values of the remnant nineteenth century fabric, which is not identified in the Statement of Significance of Cairo but is identified in at a local level in the extent of the municipal listing under the Heritage Overlay of the Yarra Planning Scheme and in the contribution the streetscape makes the Royal Exhibition Building and Carlton gardens World Heritage Environs.

The proposed works to remove the dilapidated Elm trees and the mature peppercorn tree are consequential to the remediation of the wall. Whilst the landscaping is not identified in the Statement of Significance of Cairo, it is contributory to the significance of the nineteenth century streetscape and backdrop established by the World Heritage Environs for the Royal Exhibition Buildings and Carton Gardens.

This impact of the removal of establish, but delipidated trees will be managed by planting of a selection of sympathetic replacement trees that provide a similar mass and canopy form and are similarly deciduous and will provide the characteristic of seasonal changes that from part of the overall landscaping backdrop.

The proposed works include the conservation and remediation of the garden wall, which should be supported. As such we consider the proposed works to have no impact on the cultural heritage significance or understanding of the heritage values associated with Cairo as a refined example of residential architecture in the international style modernism.

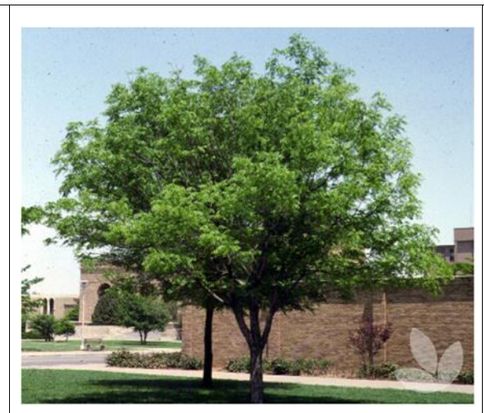
We consider that the replacement of the trees on the northern boundary of Cairo will have no impact on the cultural heritage significance of Cairo and whilst some degree of change will occur within the World Heritage Environs area, it is considered that the existing trees exist as a backdrop to the streetscape of the area and will be replaced with new trees that will over time will re-establish a similar canopy of form within the streetscape. On this basis the replacement of the tree will not adversely impact the Universal Values of the Royal Exhibition Building and Carlton Gardens as the place of the opening of the first federal Australian parliament and as a surviving example of the nineteenth century palace for the industrial exhibition movement.

Appendix A - Cairo Flats, 98 Nicholson Street, Fitzroy Landscape Masterplan

Cairo Flats, 98 Nicholson Street, Fitzroy Landscape Masterplan - Appendix B: Appropriate trees for Northern Boundary planting prepared by John Patrick Landscape Architects

Appendix B: Appropriate trees for Northern Boundary planting

				
Diamond-leaf Pittosporum *Auranticarpa rhombifolia* (formerly *Pittosporum rhombifolium*	Ivory Curl Tree *Buckinghamia celsissima*	Blueberry Ash *Elaeocarpus reticulatis*	White Yiel Yiel/White Silky Oak/Grey Oak *Grevillea hilliana*	Jacaranda *Jacaranda mimosifolia*
An attractive, native, narrow-canopied evergreen tree 10-15m H with ascending branches. Interesting foliage, leaves shiny dark green above. Creamy white flowers in clusters.	A spectacular flowering evergreen large shrub or small tree. Dark green, glossy foliage. Approx. 8m H x 2m W. Prolific white-cream long flowerheads. Australian native.	A hardy Australian native evergreen tree of conical form. 8-10m H x 3-5mW. Dainty white or pale pink bell-shaped flowers October-January.	A round-canopied, small, evergreen native tree with impressive, fragrant white flower spikes. 8-12m H x 5-6m W. Bushy habit and rounded canopy.	A deciduous tree 10m H x 7m W with delicate foliage which allows filtered light penetration. Interesting branch tracery and stunning purple flowers in summer

				
Golden Rain Tree *Koelreuteria paniculata*	Macadamia *Macadamia integrifolia*	Persian Ironwood *Parrotia persica*	Chinese Pistachio *Pistachia chinensis*	Japanese Zelkova/Japanese Elm *Zelkova serrata*
A slow-growing, small deciduous tree (6m x 4m) with branches which droop at the ends creating a slight weeping effect. Rounded form with flat canopy and gnarled appearance at maturity. Yellow flowers in summer.	Small to medium native evergreen tree with dark green glossy leaves and dense canopy. Approx. 8-10mH in Melbourne.	Deciduous, broad-domed tree to 10 x 6m. Yellow to burgundy autumn foliage.	Small (8 x 6m) deciduous tree, moderate growth rate, impressive yellow/orange/red autumn colour.	Spreading deciduous tree, green leaves turning coppery red in autumn.

Appendix B - Cairo, 98 Nicholson Street Garden Wall

Cairo Flats, 98 Nicholson Street Garden Wall memorandum of advice prepared by Conservation Studio, Quatrefoil Consulting and Hardrock Geotechnical Engineers

conservation studio

MEMORANDUM:

To:	Owners Corporation PS 448738U	**Job No#:**	19-005
From:	Dan Blake	**Date:**	13/05/2020
			7/06/2020 Rev

Re: Cairo, 98 Nicholson St Garden wall

Following the initial issue of this memorandum in May, we have sought advice on constructability of each option and have revised the below memorandum to reflect the advice provided. In discussions with Techniblock Underpinning we have considered the following:

Option 1 would be possible to install leaving some tree in situ and by hand digging the bored piers. We note that the tree roots are part of the cause of the rotation in the fence and that in order to trench out the rear of the wall 300mm wide we would have to cut the tree roots back, which could cause the trees to die.

Options 1 and 2 would impact yards and result in the general disturbance of gardens, smaller plants can be removed and reinstated, but some larger trees will need to be removed.

Machine boring for Option 1 would be possible but is likely to result in substantial removal of back yards to get down the length of fence.

In considering the above points, and whilst it is our preference as conservation architects to retain and remediate original fabric. In this instance Option 3 – to dismantle and reconstruct the wall is likely to be the most feasible option and mean that the installation of a root barrier, agricultural drain and new stormwater line would be feasible.

This option would still result in the removal of some trees, particularly the large peppercorn in front of Unit 2 causing the accentuated bulging in the masonry. The wall can not be reconstructed in correct alignment if this tree remains in location.

We note that the Heritage Victoria extent of registration comments that the Boundary Wall is excluded from the extent of registration but notes that all of the land within the title boundary is included within the extent of the registration.

On this basis the works to the rear of the wall, inground and the trees will require Heritage Victoria approval. The dismantling and rebuilding of the wall should not be subject to Heritage Victoria approval. However, this may therefore mean that the wall is still subject to the provisions of the Heritage Overlay to the Yarra Planning Scheme, and a separate town planning application may need to be made on this basis.

Please find attached the report from Quatrefoil Consulting Engineers with an attachment of the Geotechnical Report by HardRock outlining options for the remediation of the Hanover Street Wall at 98 Nicholson Street, Fitzroy.

Summary

In summary the findings indicate that the wall has a significant outward rotation over a section of the wall approximately 13m long in front of Unit 2 spaning into the adjacent yards of Units 1 and 3. This rotation generally appears to be in excess of 50mm out of alignment and is therefore considered too greater degree of rotation to be left without remediation works.

The advice outlined in the Quatrefoil report considers that the wall is acting as a retaining wall holding the mass of 900mm deep soil and root bowl of large sized mature trees. It also considers the depth and width of the foundation to be inadequate to perform as a retain wall.

Options

The following three options appear to be available:

Option 1 – Install an independent retaining wall at the rear of the existing masonry wall to remove the loads imposed by the soil and trees with bored piers and a pad foundation and back props to the 13m extent of wall required to be stabilised.

Option 2 – Underpin the wall with larger foundations and install a install an independent retaining wall at the rear of the existing masonry wall to remove the loads imposed by the soil and trees with back props to the 13m extent of wall required to be stabilised.

Option 3 – dismantle the length of wall and install new foundation, reconstruct the wall. This option is likely to need additional rear supports in the wall or significant reinforcing to result in the cantilever action to enable the wall to act as a retaining wall. Alternatively, the wall below ground level can be truncated to create ballast on the base of the wall, but this would be a significant thickening.

Considerations

We consider the following points:

1. Each option will impact the garden and existing mature trees and in some cases, trees may need to be removed where they are hard up against the wall and contribute to its deformation.
2. The sections of wall that have been reconstructed do not appear to be reinforced or truncated that they may long-term act as a retaining wall and may in the future crack and begin to fail in a similar manner, but are not of an immediate concern.
3. The sections of rebuilt wall appear to contain a harder more tensile cement-based mortar. This will make is difficult to dismantle these sections of wall without damage to the bricks.
4. The original sections of wall contain a lime putty mortar and this should be replicated should the wall be dismantled and rebuild.
5. Should the wall remain and be remediated. The wall should be substantially repointed with lime putty mortar.
6. The installation of an independent retaining wall provides opportunity to address some drainage issued that impact on the condition of the lower section of the wall and consideration should be given to the installation of agi drains.

7. Consideration should be given to ensuring that the wall as a whole is founded to a common depth to avoid possible differential movement throughout the length of the wall. This means that if part of the wall is underpinned than all of the wall should be underpinned to the same depth.
8. Consideration to undertaking the underpinning from outside the property is conceivable and would minimise the depth of excavation needed. It should be considered that there are numerous services within the pavement and that management of these services can incur cost and cause difficulty. But may result in less excavation within the property.
9. Option 1 where bores piers are used, would have lesser impact on the garden areas if the bored piers can be installed with the driver located in Hanover street and undertaken over the wall. This requires further investigation as to weather is can be achieved.
10. At this stage we anticipate that Option 3 is likely to be the most cost effective of the three options, but note that should complex works such as propping trees or the confirmation of the need to reinforce the wall arise than this would affect the cost of works.
11. From a heritage approval perspective, we know of cases where all three options have been approved by Heritage Victoria. In our view retention and repair of original should take preference over removal and reconstruction but understand this is not always achievable.

Recommendation

Based on our further investigation into constructability, we recommend that in this instance Option 3 would be best suited to the particular site circumstances.

We would be happy to meet and discuss the findings and recommendations.

Appendix A – Engineer's Report

MEMORANDUM 02

Project: Cario Flats, 98 Nicholson St Fitzroy – Boundary Wall

Date: 11.05.20

Pages: 6+ 3 + 10 = 19

Our ref: 7669m02 200511 remediation review and options summary.docx

Distribution	To: ➔	Copy:✓	Attention	Email
✓	**Quatrefoil Consulting**		File	
➔	**Conservation Studio**		Dan Blake	dan@conservationstudio.com.au

RE: EXISTING BOUNDARY WALL
STABILITY REVIEW AND REMEDIATION OPTIONS

1.0 INTRODUCTION:

At the request of the Owners Corporation for Cairo Flats, via Conservation Studio, Quatrefoil Consulting has reviewed the stability of the existing brickwork northern boundary wall facing Hanover St, Fitzroy.

The wall pre-dates the existing Cairo Flats buildings in that it was a boundary fence for the previous building on the site. It currently retains soil up to approximately 900mm above the external footpath level. Several trees are planted in close proximity to the wall along most of its length, some of which are exerting direct pressure against the wall.

Outward leans to the wall have developed over a long period of time. The degree of lean varies from low to significant. Sections of the wall rebuilt on new footings in 2007 remain reasonably plumb and are not of current concern. A review of the wall was made by others last year, with the recommendation that the remnant original sections of wall be demolished and rebuilt. This investigation is aimed at:

- Reviewing the structural stability and strength of the wall with the current leans.
- Determining what extent of additional support to the wall itself is required for the original fabric of the wall to be able to be retained.
- Reviewing available options for foundation strengthening and removing lateral loading from the rear face of the wall.

2.0 VERTICALITY SUMMARY:

Detailed verticality measurements have been taken by Conservation Studio and provided on their documentation. This is generally summarised on the attached SK01, ie:

- The eastern end of the wall, east of Unit 6, is not leaning significantly.
- The section of wall in front of Units 4 to 6 that was rebuilt in 2007 is not leaning significantly and does not require attention at present.
- The Section of wall in front of Units 1 to 3 is leaning significantly and the base of the wall appears to have shifted laterally. This section requires remediation.

Consulting Civil & Structural Engineers
Heritage Engineers
Forensic Engineers
Building Evaluation
Expert Witness

DIRECTOR:
David Hogg

CONSULT AUSTRALIA
Member Firm

- The western half of the original section of wall is currently leaning, but not to an extent that is of structural concern. Subject to attention to the main causes of the movement, remedial works for this section are less critical compared to the section in front of Units 1 to 3.
- The western corner section was rebuilt in 2007 and does not require attention at present.
- Retained soil height above the external footpath level varies between approximately 700mm and 900mm, reducing slightly toward the western end.

3.0 GEOTECHNICAL & FOOTING INVESTIGATION:

The original wall footings were exposed in two locations to confirm existing subsurface conditions, footing construction, footing geometry, founding depth and founding material. The report from this investigation is provided in Appendix A. Based on the report, a typical section through the fence is therefore as shown in Figure 01.

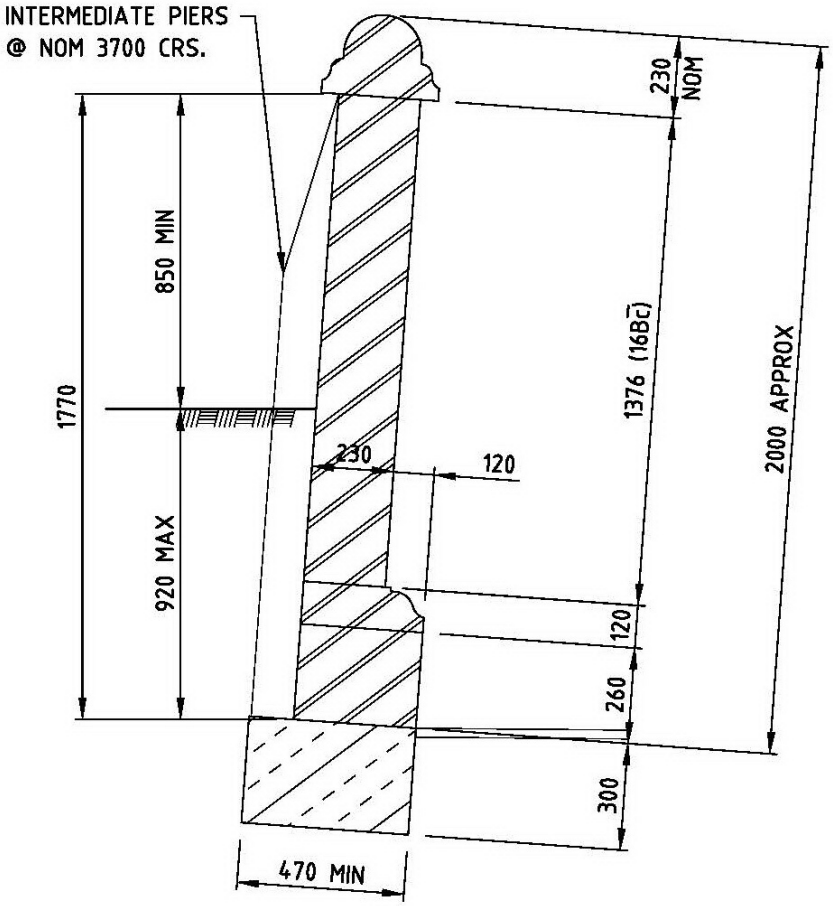


Figure 01: Typical existing wall section and footing

Summary findings from the footing investigation are as follows:

- The site is classified as a Problem Site, Class P, due to trees and presence of deep fill behind the wall.
- The underlying foundation soils are Silurian Age siltstone rock and clays derived from the weathering of this material. Clays were found at depths of between 800 and 1000mm below the garden level, which puts it at about the same level as the footpath or just below it.
- Footings to the original fence section are bluestone and founded at shallow depth of only 300mm or so below the external footpath level.

- Footings are founded both just on top of the natural silty clay layer and slightly into it.
- The footings are relatively small in size and depth and it is clear that they cannot be justified to current standards for lateral earth loading from the retained soil. It seems probable that the wall was never intended to be a retaining wall.
- Extremely weathered rock was encountered at 1.8-2.0m depth, noting that boreholes were hand augured due to access issues. This equates to approximately 0.9 to 1.0m below footpath level.

The report notes that if underpinning is pursued then it should found into the distinctly weathered siltstone rock. No depth is provided, but it is likely to be somewhat deeper than hand auger refusal on extremely weather rock. Excavations made from the garden side would be over 2.0m deep.

The report notes that "*a medium to large sized conventional hydraulic excavator could penetrate through the filling, natural soils and extremely weathered siltstone rock".* This would be problematic given the difficult site access and excavations are therefore better kept within the natural clays if possible.

4.0 STABILITY REVIEW COMMENTS

General check calculations were made with respect to the stability of the wall with the current measured outward leans and <u>without additional loading from retained soils</u>. These checks suggested that:

- The maximum lean that can be accommodated without soil loading is approximately 50mm of lateral lean over the height of the wall.
- The wall cannot be justified for the current retained soil height. Soil therefore needs to be removed from behind the wall generally, or the wall strengthened to accommodate the lateral loading.
- The wall also cannot be justified for current wall leans for much of the height of the wall and, for the more significantly leaning areas in front of Units 1 to 3 as shown on SK01, additional strengthening the existing masonry must be provided *<u>in addition to the removal of the soil behind the wall</u>.*

5.0 TREES:

The general check calculations ignore the effect of the trees in close proximity to the wall. Additional to the general findings of the check calculations, it is clear that the trees are having a significant effect on the wall and, quite apart from the inadequacy of the wall to act as a retaining wall, the trees are probably the most significant cause of leans due to direct pressure of the root ball against the fence or of soil between the tree and the fence.

The trees are often in poor condition and their retention will continue to adversely affect the wall. Some at least will need to be removed in order to allow recommended repairs to be carried out. In general:

- Any tree that is currently touching or where the existing trunk and root ball is within 300-400mm of the rear face of the wall should be removed.
- For the wall to be protected, where root mass runs along the wall or is between the trunk and the wall, it will generally need to be removed. This will affect both the stability and health of the tree and will need to be assessed individually by an arborist.
- Even where a tree in close proximity can be retained, modifications to remedial works details and measures to protect from future direct pressure loading will be required. This latter requirement will need consistent monitoring into the future.

6.0 REMEDIAL WORKS OPTIONS

This memo is aimed at retention of the wall and what is required to allow it to be safely retained into the future. Essentially, in many cases a decision will need to be made about the importance of a tree against the desire to repair and retain the original wall rather than demolish it and rebuild it on a new footing as has been done in the past. A detailed mapping of existing significant trees that cannot be removed will need to be completed, along with their major root runs as this will affect the remedial works and how they can be configured and carried out.

On the assumption that the trees against the wall are removed or their effects can be mitigated and controlled, the aim of remediation is to either:

- Remove lateral load from the wall and strengthen as required, or
- Strengthen the existing wall and footing to allow it to carry the applied loads

Removal of lateral loading will require construction of a separate retaining wall behind the existing for the full extent of the original section of the wall. So as not to load the wall in future, the gap between the new retaining wall should be filled with a compressible material or regularly cleaned out.

In addition, where the wall leans exceed 50mm over the height of the wall, additional strengthening by provision of steel soldiers fixed to the face of the wall will be required.

The attached SK02 & SK03 show a schematic system of constructing a new timber sleeper wall or similar set back from the internal face of the wall sufficiently to pass the existing piers. Integral with this are T-Section stiffeners fixed to the internal face of the wall and extending approximately 700mm above the internal soil level.

The difference between SK02 and SK03 is in the footing systems. SK02 shows a bored pier option while SK03 shows a pad footing option. The bored pier option is much less invasive into the space but will require machinery to construct and the ability to do this within the confines of the site needs to be confirmed.
The pad footing option is more likely to be able to be constructed within the site but is significantly larger in plan size.

Modifications to both of these schematic options will be required where existing trees in the area are retained, but the general concept would be to provide two strengthening lines per bay between piers, or at approximately 1850mm centres.

6.1 REBUILD OPTION:

If it is decided to rebuild the wall rather than try to remediate it, details would likely be similar to those use in the 2007 reconstruction, noting that further checks would be required to confirm whether piers or wall reinforcement is required for lower strength mortars that would be recommended rather than the contemporary mortars that may have been used in the 2007 rebuild.

Some additional practical considerations would be:

- Excavation to install the new footings would likely require the soil to be battered back to both build the wall and footing and to install recommended drainage and porous backfill.
- This would in turn require trees within the batter to be either propped in some fashion or removed if too close to the wall.
- The effects on the trees of this disturbance would still need to be assessed by an arborist and the same decisions regarding the retention of the trees would still need to be made.

- Access would be available from the street side to make carrying out the work less invasive, however it is likely that similar disturbance would result within each unit courtyard.

7.0 SUMMARY:

To retain the existing boundary wall rather than rebuild it will require the existing soil loading to be removed from the rear face of the wall and a separate retention system provided set back from the face of the wall. Where existing wall leans exceed 50mm over the height of the wall, strengthening will be required even with removal of the soil.

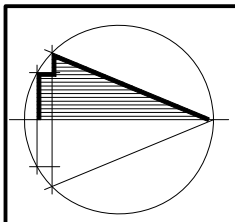
The existing trees are very problematic and many will not be able to be retained if the wall is to be repaired rather than rebuilt. Schematic typical details are provided that cater for the above. Modifications will need to be made to the proposal to cater for trees where they are retained and where they clash with the necessary structure.

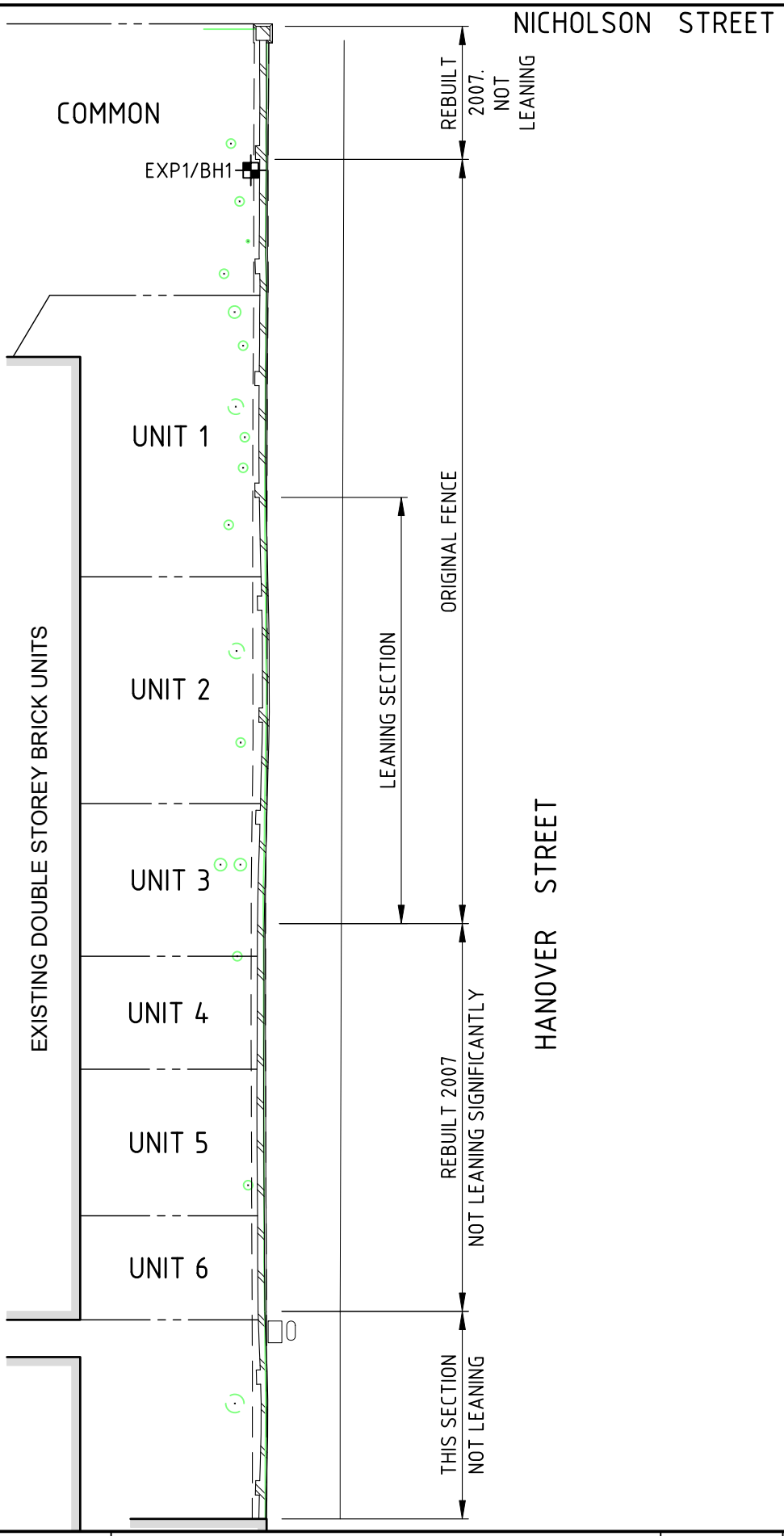
If the wall is rebuilt rather than remediated, construction would be simpler due to access availability from the street side, however disturbance within the sites would likely be similar.

Please call if you have any queries.

Yours faithfully

DAVID HOGG
On behalf of Quatrefoil Consulting Pty Ltd





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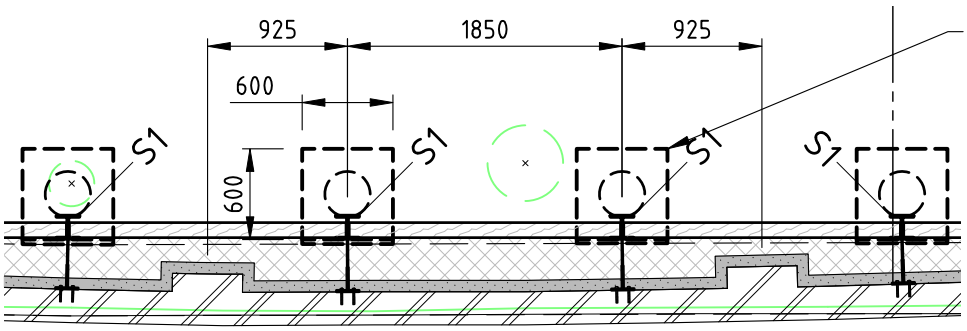
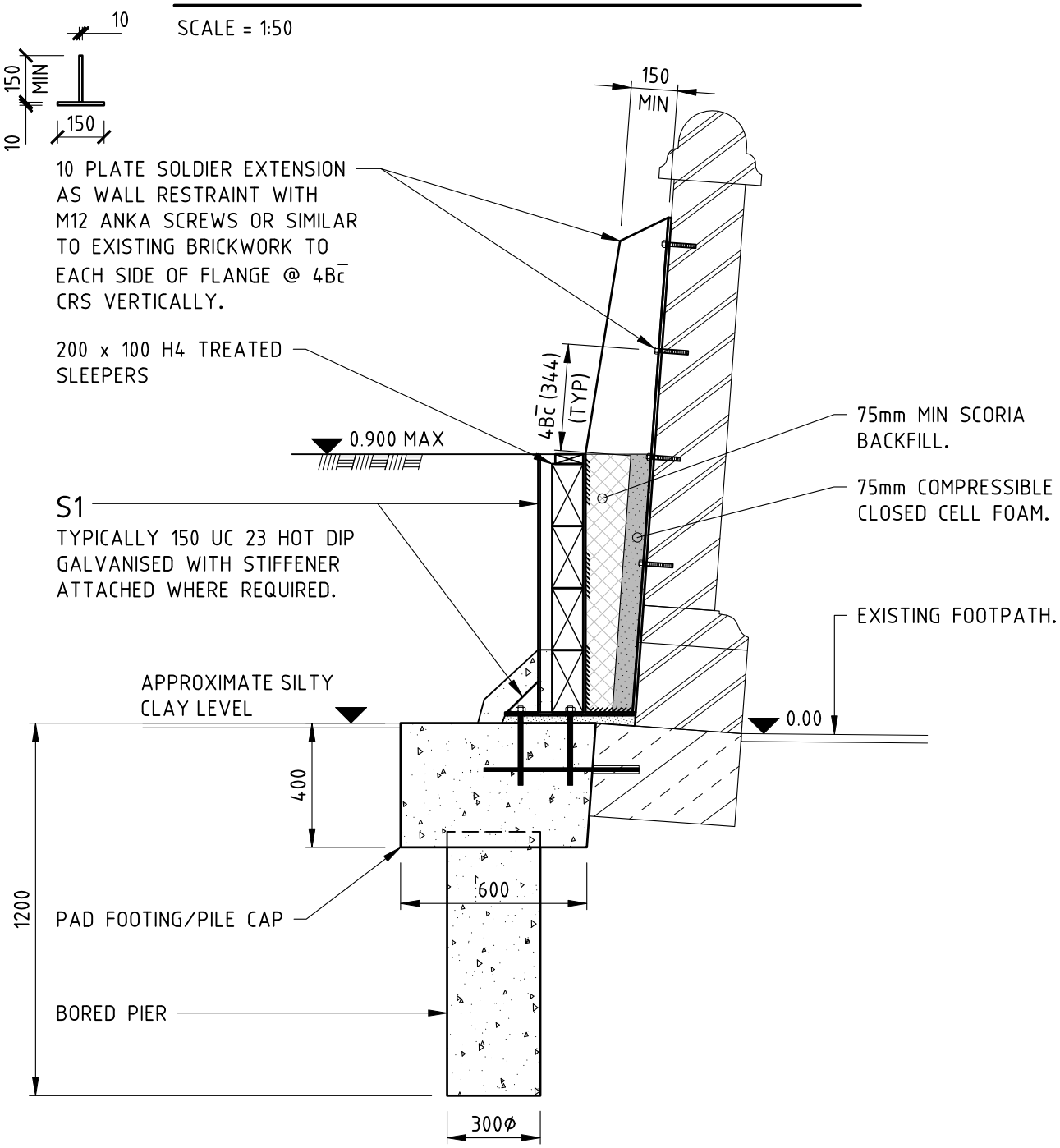
Job	CAIRO FLATS BOUNDARY WALL 98 NICHOLSON STREET FITZROY STRUCTURAL REVIEW	Date MAY 20	Scale 1:200
		Surveyed D.H	Drawn W.H
Title	EXISTING CONDITIONS SUMMARY	Job No 7669	Sheet No SK01



PAD FOOTING/PILE CAP WITH BORED PIER ALTERNATIVE.
NOTE: BORED PIER WILL REDUCE PAD/PILE CAP SIZE BUT WILL BE DIFFICULT TO INSTALL WITH EXISTING SITE CONSTRAINTS.

OPTION 1 PART PLAN - TYPICAL BAY

SCALE = 1:50



TYPICAL SECTION

SCALE = 1:20

QUATREFOIL CONSULTING PTY. LTD.
CONSULTING STRUCTURAL & CIVIL ENGINEERS
PO BOX 36, CAULFIELD SOUTH, VIC, 3162
TELEPHONE 0415 539 577
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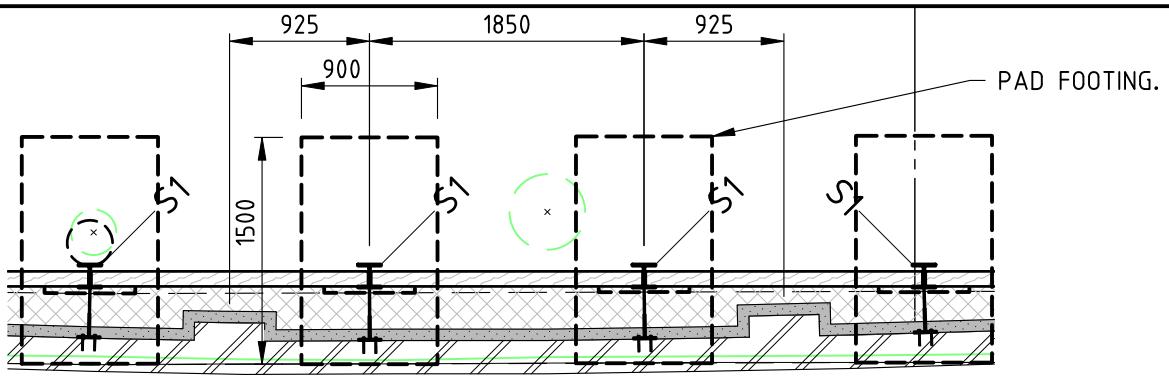
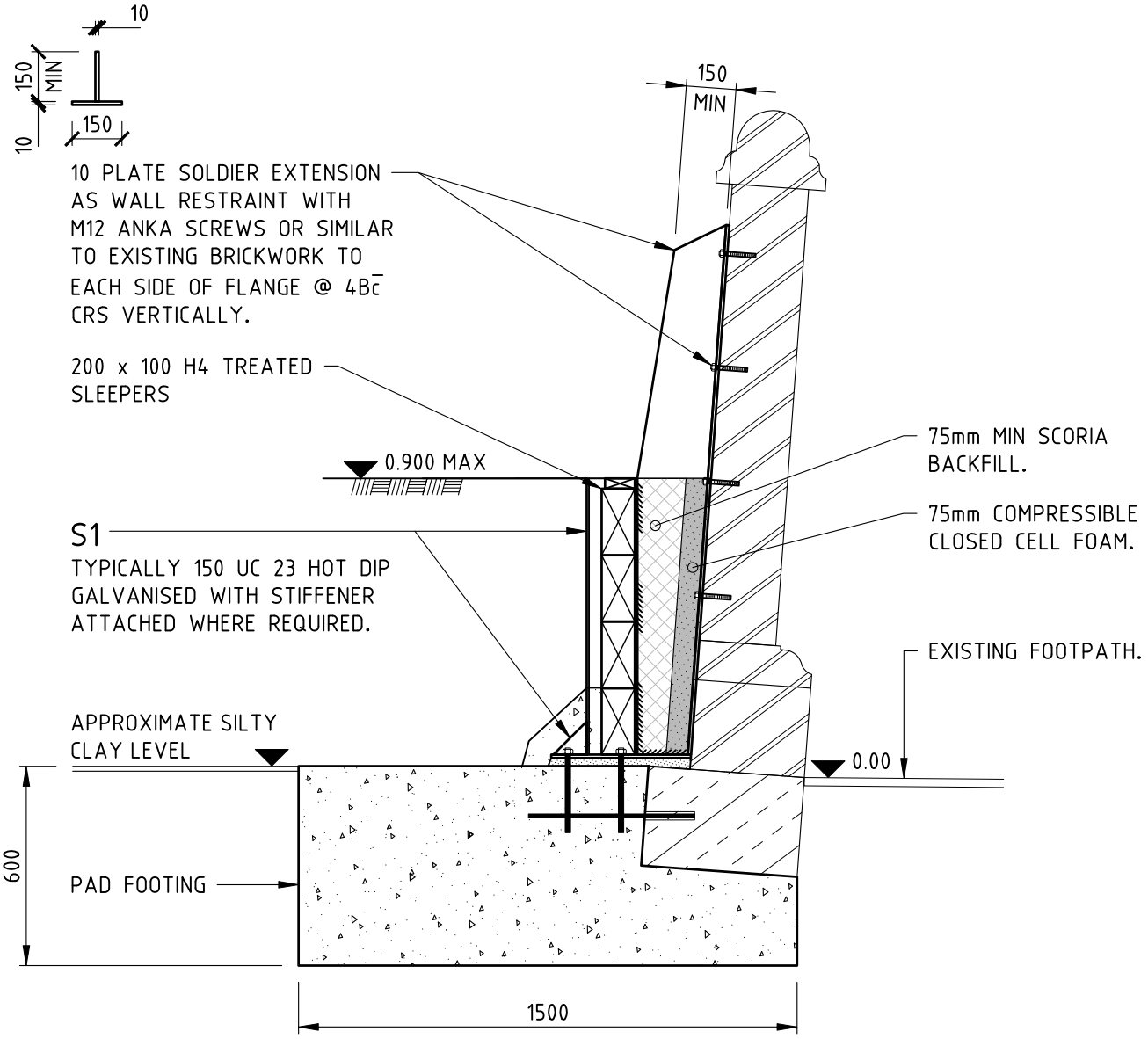
Job	CAIRO FLATS BOUNDARY WALL 98 NICHOLSON STREET FITZROY STRUCTURAL REVIEW	Date MAY 20	Scale AS NOTED
		Surveyed D.H	Drawn W.H
Title	WALL STIFFENING & RETAINED SOIL SEPARATION OPTION 1	Job No 7669	Sheet No SK02



OPTION 2 PART PLAN - TYPICAL BAY

SCALE = 1:50



TYPICAL SECTION

SCALE = 1:20

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Job	CAIRO FLATS BOUNDARY WALL 98 NICHOLSON STREET FITZROY STRUCTURAL REVIEW	Date MAY 20	Scale AS NOTED
		Surveyed D.H	Drawn W.H
Title	WALL STIFFENING & RETAINED WALL SEPARATION OPTION 2	Job No 7669	Sheet No SK03

APPENDIX A

FOOTING AND GEOTECHNICAL INVESTIGATION BY HARDROCK GEOTECHNICAL PTY LTD

HARDROCK GEOTECHNICAL
CONSULTING GEOTECHNICAL ENGINEERS

File Number:	200256
Date:	25 March 2020
Client:	Mayfield Body Corporate Manager C/- Conservation Studio 98 Nicholson Street FITZROY VIC 3065
Distribution:	- Conservation Studio - Quatrefoil Pty Ltd

RE: Site Investigation at 98 Nicholson Street, Fitzroy

A site investigation was conducted by an experienced geotechnical engineer on 18 March 2020. The purpose of the investigation was to provide:

⇒ Brief comment of possible causes of movement to the existing north boundary fence; and
⇒ Remedial options where necessary.

This report is not intended for use in litigation. There is a high degree of uncertainty of the possible cause(s) of building distress. The limited nature of the investigation and complex mechanisms associated with building distress make it impossible to accurately allocate responsibility for a building exceeding acceptable building tolerances.

There can be a number of different and equally valid explanations for unsatisfactory performance. Often the cause(s) of movement may never be fully known, or may only become clear during rectification work when a more thorough and extensive examination of the subsurface profile is possible.

Scope of the Investigation

The site investigation involved the drilling of two boreholes and the exposure of the existing foundation in two locations. The subsurface profile was logged and bulk sampled for visual identification. Borehole logs and locations are shown on pages 8 and 9 of this report.

Site Description

The site is occupied by a double storey brick apartment building. The existing masonry fence on the north boundary is retaining approximately 700mm and has experienced some outward rotation. There are some small to large size trees in close proximity to the existing fence. Elsewhere, the surrounding area has a ground cover of pavements and garden beds. The site falls to the north west and has poor surface drainage.

Subsurface Conditions

Regional geology

The site is identified on the 'Geological Survey of Victoria' Melbourne Sheet (1:63,360) as being within the Silurian "Dargile" formation and associated residual soils.

Subsurface profile

See borehole log page 8.

The borehole intersected FILLING to depths of between 0.70m and 1.00m, underlain by natural clayey SILT top soils (borehole 1 only) to a depth of 0.80m, underlain by moderately reactive stiff silty CLAY.

Refusal was met on the underlying siltstone ROCK in both boreholes at depths of between 1.80m and 2.00m, noting the boreholes were hand augured.

Soil moisture and groundwater

Borehole 2 intersected wet fill above the clay contact. This groundwater forms a shallow perched water table within the material immediately above the clay interface. This water table is not permanent and will be variable in depth depending on the intensity and duration of recharge. The natural clay intersected was in a moist condition.

Site Classification

The site is classified as **CLASS P** in accordance with AS2870-2011, due to the depth of filling intersected and development of 'abnormal' soil moisture conditions associated with the significant trees in proximity to the building envelope.

The underlying soil profile is moderately reactive (CLASS M).

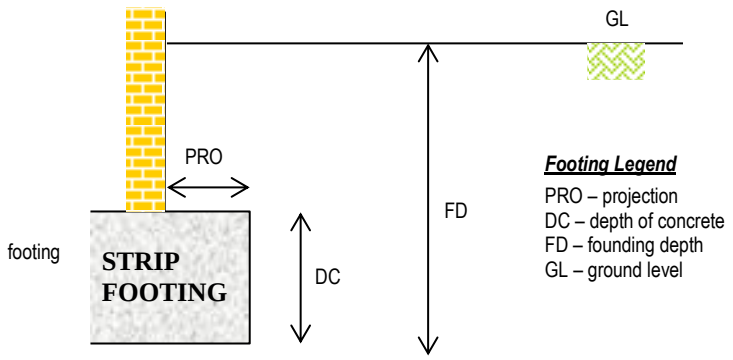
Sub-Soil Classification

With reference to AS1170.4-2007, Section 2.4, a site sub-soil class of **CLASS B_e – Rock Site** is appropriate.

Details of existing footing

The existing footings were exposed at boreholes 1 and 2 (see figure 1). Dimensions and founding material are shown below; depths are relative to the existing surface levels at the time of the investigation.

Location	**Borehole 1**	**Borehole 2**
	North boundary	**North boundary**
Type	Bluestone strip	Bluestone strip
Founding Depth	1000mm	1000mm
Depth of Footing	300mm	330mm
Projection	120mm	120mm
Founding Material	silty CLAY	silty CLAY



Borehole 1

Borehole 2

Discussion

Outward rotation has occurred within the existing masonry fence on the north boundary.

The cause of movement is likely to be associated with a number of mechanisms, including (but not limited to) the following:

⇒ Bulk root mass exerting lateral pressure on the wall, noting both boreholes encountered dense roots within the upper material.

⇒ Soil mass exerting lateral pressure on the wall noting the wall and footing do not appear to have been designed as a retaining wall

⇒ Possible moisture variations and subsequent volumetric movements within the reactive silty clay founding material

It is understood the fence is to be retained. At the discretion of the Structural Engineer, we recommend stabilisation of the wall comprises a combination or all of the following:

1. The existing trees within close proximity the wall should be removed. Trees have deleterious effects on the retaining walls from the penetration of root systems, these may include increased loading on the structure and penetration of roots into joints or drainage systems. BS 8002 (1994) recommends that trees should not be permitted within a distance from the retaining wall equal to half the mature height of the mature height of the tree.

2. A retaining wall be installed between the high level soils and fence. The retaining wall may comprise a bored pier and concrete sleeper wall or similar.

3. Underpinning of the fence. Consideration should be given to differential movements between underpinned and non-underpinned sections of the fence in the design. The risks of partial underpinning are discussed below and should be understood by the owners.

The degree of remedial works to be conducted reflects the necessity of achieving a balance between cost, safety and serviceability. This will be a matter for the proponent to decide based on the required level of serviceability and desired performance criteria, and cost.

Maintenance

Some foundation maintenance criteria are stated below under construction and maintenance. In addition we recommend that:

- All services should be pressure checked and tested for leaks, and if found leaking be replaced with PVC if possible away from the existing footings.
- All services must be maintained in an excellent condition at all times and do not deliver, or drain, liquid to the soil in the vicinity of the foundations.
- Guttering should be kept clean at all times and downpipes discharge all roof water into the storm water system.
- Monitoring of surface drainage paths should be conducted and any areas where ponding or pooling of water occurs the surface should be regraded to direct water away from the residence or to storm water discharge points.
- Surface sealing of the ground directly adjacent to the walls should be conducted, as per the drainage requirements C5.2 AS2870 2011. Sealing should extend to a width of 1m. This can be achieved preferably by the installation of concrete pathway. The pathway should be graded away from the building and run off should be collected and channelled into stormwater discharges.
- Watering of garden beds adjacent to the buildings should be avoided.
- Any trees within close proximity to the structure be removed. It is recommended to prohibit trees within a distance equal to ¾ the mature height of the tree for class M site classifications. There generally has to be a compromise between the presence of trees and cracks. It should be noted that tree roots are attracted to moist ground conditions. If a relatively low and constant ground moisture condition can be maintained in the vicinity of the foundations, tree roots, which may cause shrinkage in later dry periods, will be attracted to other areas.

Once this is conducted, long term drying of the foundations soils will commence. This will induce further foundation movement until a new soil equilibrium has been achieved.

Underpinning Recommendations

Differential movement

Differential movement will occur between underpinned areas of the building and non-underpinned areas. It would be normal to install a brick control joint to isolate the underpinned areas from the non-underpinned areas. This would allow movement to occur within the control joint. Brick control joints must be installed in brick veneer structures. The location of these joints should be discussed with this office or the structural engineers, refer to “The Cement and Concrete Association of Australia” Technical Note TN61

In solid brick structures, installation of the brick control joint is very difficult as it requires major works involving brick laying, plastering, painting, etc. Partial underpinning of solid brick structures therefore does not generally involve the installation of brick control joints.

The aim of the underpinning is to stop areas of the structure which are affected by foundation movement and thus, hopefully, differential movement between the underpinned and non-underpinned areas should be minimal. However, if the brick control joints are not installed and cracking of the walls does result between

underpinned and non-underpinned areas, a brick control joint may then need to be installed or further underpinning may need to be conducted.

The owners should discuss this matter carefully with the contractor such that they understand the inherent risks of partial underpinning.

Underpinning

Underpin pads should penetrate a minimum of 100mm into the distinctly weathered siltstone ROCK. No minimum founding depth applies.

Depth to rock may be estimated from the borehole logs attached, and are relative to surface levels at the time of the site investigation.

An allowable bearing pressure of 400kPa may be adopted beneath underpins founding in the distinctly weathered siltstone ROCK. This pressure may be reviewed once design loads have been determined.

Excavation Potential

It is expected that a medium to large sized conventional hydraulic excavator could excavate through the filling, natural soils and extremely weathered siltstone rock. Some difficulty may be encountered within the distinctly weathered siltstone rock due to the interbedded nature of the rock with softer and harder layers encountered.

The siltstone rock will increase in strength with depth. It is expected that rock breaking equipment and pre-loosening will be required within the distinctly weathered siltstone rock. The excavation potential of the rock will be dependent on the size of the excavator, the degree of weathering and jointing (orientation and condition). The excavation contractor will be more familiar with the capacity of their machine and local areas, and their advice should be sought as to the excavation potential of the site, and/or a trial pit conducted before large-scale cutting is proposed.

Piles/Piers

Where required, we recommend the use of bored piers or equivalent.

All piles should penetrate through any filling and upper soils and be founded a minimum of 300mm into the underlying distinctly weathered rock. No minimum founding depths apply. Depth to rock can be estimated from the borehole logs.

Piles should be proportioned for an allowable end bearing pressure of 700kPa.

Alternatively, rock socketed bored piers founding a minimum of **three pile diameters within the distinctly weathered siltstone rock** can adopt a maximum allowable end bearing pressure of 1000kPa.

A skin friction of 50kPa can be adopted where within the distinctly weathered siltstone rock. No skin friction can be within the fill material or natural soils.

Bored piers must be clean of any fallen debris and saturated material. The piling contractor must provide means to ensure that a clean base to the pile is maintained.

Significant collapse of open bored piers may occur should the fill material and natural topsoils be saturated at the time of installation.

Cantilevered soldier design

The piles should be designed for a triangular earth pressure distribution using the design parameters provide in Appendix A.

- K_0 parameters should be adopted where abutting or within a very close proximity to adjacent buildings, with suitable surcharge loads added accordingly;
- K_a parameters should be adopted elsewhere.

The embedment depth of bored piles for the support of a solider pile retaining wall will be dependent on the ultimate lateral resistance of the pile.

The lateral load capacity of the pile may be limited in three ways the shear capacity of the soil and structural capacity of the pile section and excessive deformation of the pile. Methods of calculating the ultimate lateral soil resistance include Brinch Hansen (1961) and Broms (1964) (simplification of the Broms method in AS 2159 – 1978).

Using one of the above mentioned methods the ultimate lateral capacity of the piles can be determined for differing embedment depths.

This office can be contacted where embedment depths appear excessive.

Construction and Maintenance

Site conditions

Excavation within the upper fill material may experience short term instability (particularly if undertaken during the wetter months) and shoring and/or over excavation should be anticipated.

The presence of a perched water table at the time of construction may make the foundation excavations very problematic. It is suggested that the contractor conduct a test pit prior to construction to ensure open excavations will be viable. Continual collapse and running sand conditions may necessitate the use of piles (e.g. screw piles), and this office should then be contacted for further advice.

Service trenches/easements

The presence of service trenches and easements is a common cause of unsatisfactory performance of foundations through either direct undermining or through the introduction of undesirable levels of soil moisture.

For this reason, we recommend where underpins/piles are located in close proximity or adjacent to a backfilled service trench or easements, the underpins/piles must be deepened and founded at a depth at or below the level of plane of inclination of 45° above horizontal extending outwards from the base of the trench or filling (as illustrated by figure C6.1 AS 2870 2011). This includes service trenches which may be present on adjacent sites or on site prior to the current development (such as abandoned storm water and sewer trenches).

Construction

All contractors must be well **briefed** as to the requirements and specifications in this report. To minimise the likelihood of misinterpretation, this report must not be reproduced unless in full and contractors given ready access to the complete report.

This report is based on the assumptions that conditions revealed through selective sampling are indicative of the actual conditions throughout the site, i.e. correlation between boreholes. Variations between boreholes may exist due to previous land use or natural geologic processes. Additional deepening of the foundations,

deeper than the minimum specified founding depths in this report, may be required. The actual subsurface conditions can be discerned only during earthworks when the subsurface profile can be directly observed.

For further information regarding geotechnical site investigation reports, refer to reference (4) below.

Inspection of all foundation excavations, site works and compaction must be conducted by a suitably qualified, experienced engineer, engineering geologist, building surveyor or similar to ensure that the founding material and site works are in accordance with this report. Should there be any doubt, this office should be immediately contacted.

Maintenance

The underpins and/or piles will not be subject to maintenance requirements.

Further advice with regard to an alternative foundation design may be obtained from this office, if required

Yours faithfully,
Hard Rock Geotechnical Pty Ltd

Harold McIntosh. B.E. (Civil)
(Geotechnical Engineer)

References

(1) AS2870-2011. "Residential slabs and footings"
(2) "The Cement and Concrete Association of Australia", Technical note TN61.
(3) "Guide to home owners on foundation maintenance and footing performance", CSIRO sheet No. 10-91, April l995.
(4) "Guidelines for the Provision of Geotechnical Information in Construction Contracts", published by the Institution of Engineers, Australia, 1987.
(5) AS2017-2017 "Geotechnical Site Investigations".

Hard Rock Geotechnical Pty Ltd

Consulting Geotechnical Engineers

Borehole Logs

File: 200256
Date: 18/03/2020
Supervisor: HM/FM

Client: Mayfield Body Corporate Manager

Project: 98 Nicolson Street, Fitzroy

Borehole No. 1 **Drilling Method**: HA **Location:** see Figure 1

Depth (m)	Structure	Description	Cohesion/ density	Soil moisture/ groundwater	Testing:
	Fill	dense roots/ clayey SILT/ gravel/ rubble	L	M	
0.70					
	SP	clayey SILT (ML), low plasticity, brown/grey some gravel	L	M	
0.80					
		silty CLAY (CL), medium plasticity, orange/brown/ grey	ST	M	
2.00					
		Refusal at 2.00m on siltstone ROCK			

Borehole No. 2 **Drilling Method**: HA **Location:** see Figure 1

Depth (m)	Structure	Description	Cohesion/ density	Soil moisture/ groundwater	Testing:
	Fill	dense roots/ clayey SILT/ gravel/ rubble	L L	M W	
1.00					
	SP	silty CLAY (CL), medium plasticity, orange/brown/ grey	ST	M	
1.80					
		Refusal at 1.80m on siltstone ROCK			

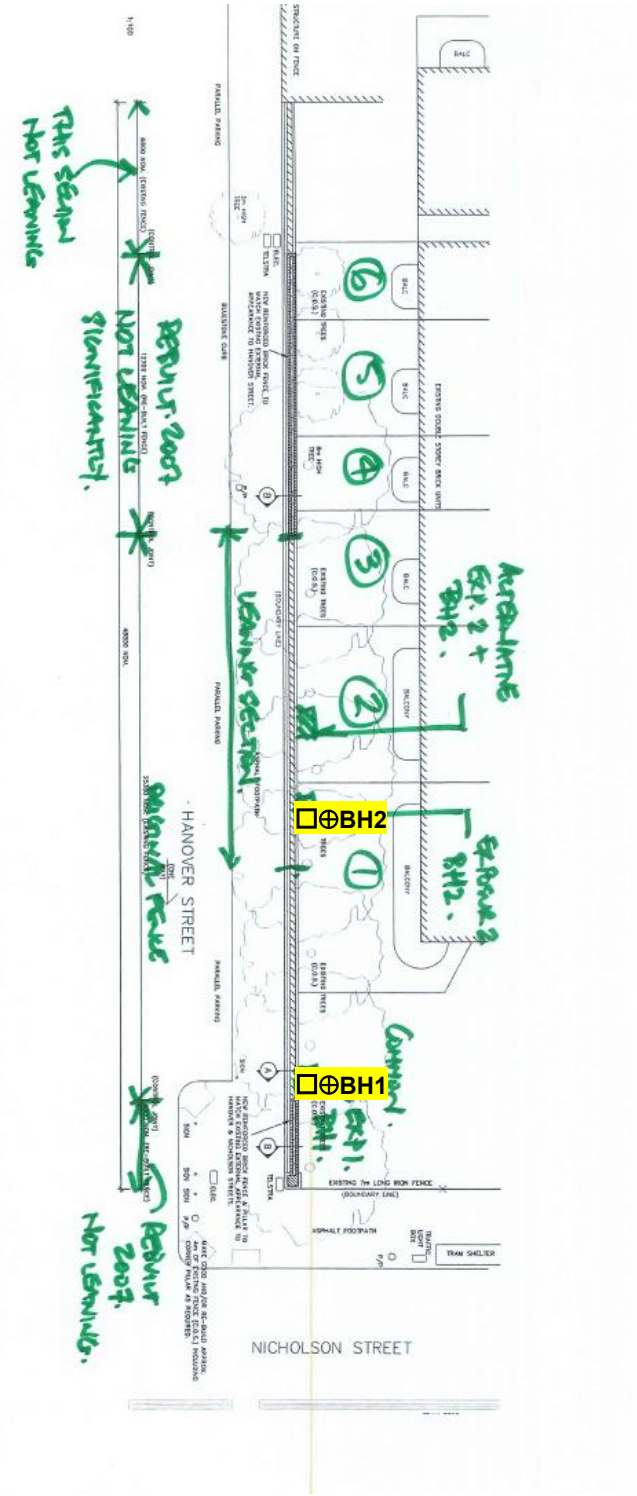
Legend:	**Density**	**Cohesion**	**Moisture**	**HA -** Hand Auger **A -** Flight Auger Drill Rig
	VL - Very Loose	S - Soft	W - Wet	Unified Soil Classification Symbols: CL, SM, SW
	L - Loose	F- Firm	M - Moist	SP - Soil Profile
	MD - Medium Density	ST - Stiff	D - Dry	Some< 15%
	D - Dense	VST- Very Stiff		Trace< 5%

HARD ROCK GEOTECHNICAL PTY LTD
Consulting Geotechnical Engineers

File: 200256
Date: 18/03/2020

LOCATION PLAN

Figure 1



Project:
No. 98 Nicholson Street, Fitzroy.
Scale:
Not to Scale (sketch for borehole locations)

Legend:
⊕ Borehole
☐ Footing inspection

Appendix A – 98 Nicholson Street, Fitzroy

Material	Design Parameters						Poisson's Ratio	Drained Young's Modulus E´ (MPa)	K_0	K_p	K_a
	Drained		Undrained		Moist bulk weight γ (kN/m^3)	Saturated bulk weight γ_{sat} (kN/m^3)			$(1 - \sin\phi')$	$\frac{(1 + \sin\phi')}{(1 - \sin\phi')}$	$\frac{(1 - \sin\phi')}{(1 + \sin\phi')}$
	c´ (kPa)	ϕ´ (°)	C_u (kPa)	ϕ (°)							
FILL (loose)	0	28	0	28	17	20	0.1-0.2	1-5	0.53	2.76	0.36
clayey SILT (loose)	0	28	0	28	17	20	0.1-0.2	1-5	0.53	2.76	0.36
silty CLAY (stiff) including extremely weathered siltstone ROCK	3	25	100	0	19	19	0.2- 0.4	8-15	0.58	2.46	0.41
Distinctly weathered siltstone ROCK (high to moderately weathered)	3 (joint strength)	25 (joint strength)	0	37	24	24	0.2-0.3	150-500	0.58	4.11	0.41

Please note these parameters are difficult to measure and exhibit large natural variations. Sound engineering judgement is recommended in their use.