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Unlocking Highgate Cemetery project, Highgate, London

Structural Appraisal Report

Ref: 240323/S Wilkinson
Approved By: K Clark
Date: 22 May 2024
Status: For Information
Version: 1

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1.0 INTRODUCTION

1.1 Conisbee has been appointed by the Friends of Highgate Cemetery Trust to undertake a visual inspection of historic areas and selected mausolea, as proposed by West Scott Architects and to provide a written report with general recommendations, including high level advice on strategy, repair types and scale/extent of works.

1.2 Our inspections were undertaken by Simon Wilkinson and Holly Morgan on Thursday 9th and Thursday 16th May 2024. The inspection included the Terrace Catacombs, Cedar Circle, Egyptian Avenue, Cuttings Catacombs and individual mausolea identified on plan drawings by West Scott Architects.

1.3 The inspection was visual only and no opening-up or intrusive investigations were carried out at this stage. Attempts were made to open vault doors where keys were available. Due to the poor condition of many of the doors and difficulties with re-closing them, direct access was not feasible in many instances and a borescope camera was inserted through ventilation apertures (where present) to view the interiors remotely. This exercise was largely successful and most vaults were at least partially viewed. A number of defects were identified using this method and direct access will certainly be required to these vaults in the future to confirm the condition of currently uninspected areas and the repair approach required.

1.4 We also recommend that direct access is gained to all vaults with openable doors for future inspections and to fully confirm whether any remedial action is needed. For those vaults which are sealed using masonry materials, assessment as to whether access is needed will need to be made on an individual basis, as noted in the report sections below.

1.5 A selection of photographs taken during our inspection is reproduced herein for illustrative purposes. Other photographs were also taken during the site visits and can be made available on request.

1.6 Whilst our investigation and assessment has been taken far enough to satisfy the requirements of our brief it has, of necessity, not been exhaustive. The findings cannot therefore be warranted to apply to areas not inspected or investigated.

1.7 This report is intended for the use of our client, the Friends of Highgate Cemetery Trust, and no liability can be accepted for its use by any third party.

2.0 TERRACE CATACOMBS

2.1 Observations & Discussion

2.1.1 A plan showing areas inspected and accompanying notes is included at Appendix A.

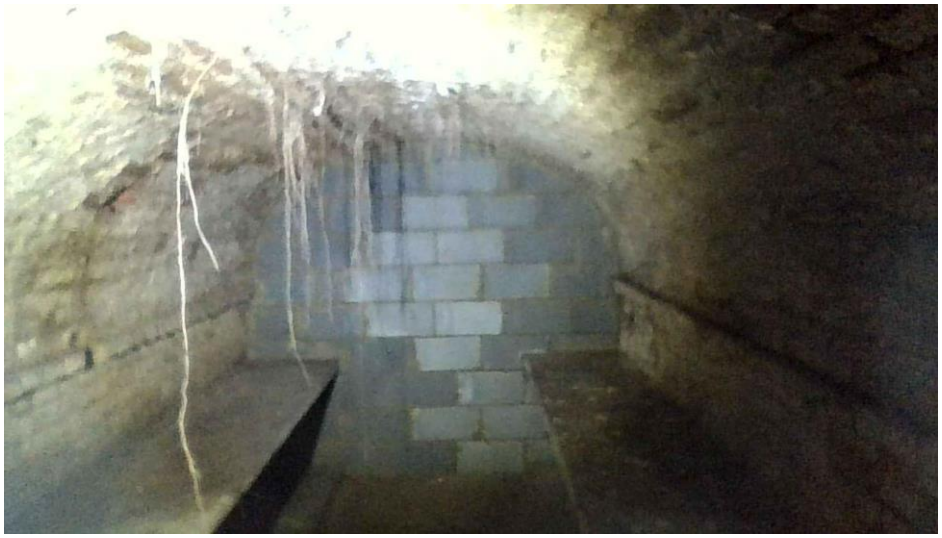
2.1.2 The vaulted brickwork structure of the Terrace Catacombs remains in good overall condition where visible. No structural cracking or movement was visible to the groined vaults in the aisles, or to the barrel vaults over the side chambers and their separating walls. The intradoses of the vaults are only partially visible due to the stone coffin shelves and dividers but we note there was no sign of flattening or distortion and no evidence of cracking or crushing to the brick or stone work, which may be indicative of general structural movement. Similarly, the dividing walls to the rows of chambers to the north and south of the aisles were not showing any signs of any structurally significant cracking or movement.

Photograph 1: Terrace Catacombs – typical view of groined vault brickwork in the central aisle.

2.1.3 The Catacombs form a retaining structure close to the site boundary with substantial buildings (St Michael's Church) to the north along part of their length. There was noted to be a gap between the structures and narrow vegetated border between the presumed rear wall of the catacombs and the site boundary wall line. It is presumed that St Michael's Church is founded at a similar level to the Catacombs and there is no surcharge loading applied from church onto the lower catacomb structure. The brickwork walling which closes off the chambers to the north is only visible in a very few locations where coffin shelves are empty but again there is no sign of cracking, movement or separation.

2.1.4 The primary retaining structure comprises the buttressing dividing walls, with the arch infill brickwork locally retaining smaller quantities of material. Light was visible through a ventilation aperture in this rear wall in one location and it is presumed that this passes through the catacomb rear wall, traverses through further retained earth and then the boundary wall into an adjoining garden.

2.1.5 The south elevation contains three access doorways and several individual vaults, some of which could be opened and some viewable by remote camera. Few defects were identified and there is no sign of separation between the façade and vault walls, however direct access will still be required to fully confirm condition. The most significant issue seen was root penetration and probable cracking to the unnamed empty vault adjacent to the Simpson vault at the east side. The blockwork walling pictured to the rear of the vault conceals skeletal human remains disinterred from elsewhere in the Cemetery.



Photograph 2: Unnamed vault at eastern end – root penetration and probable cracking to the vault intrados.

2.1.6 The terrace surface is in poor condition and drainage provisions appear to be inadequate. Water ingress through the tarmacadam into the vault brickwork is an ongoing issue and has resulted in some leaching of lime from the mortar, with deposition evident at the soffits. Whilst undesirable, losses seem to be moderate (based on the visible depositions) and have probably not led to structurally concerning voiding on a wide scale. We also note that assuming the vaults remain in compression, the sharp sand aggregate in the mortar will continue to maintain the arching action. As it is proposed to renew the surface materials and improve drainage, the opportunity can be taken at that point to investigate voiding in the seemingly worst affected areas and apply lime grout if/where needed.

2.1.7 We agree that the proposed renewal of surface finishes and drainage improvements will be of significant benefit to long-term structural stability and durability, and we have provided proposed locations for trial pit investigations to confirm the sub-base type and depth in the first instance. The drainage arrangements are not fully confirmed and additional excavations to facilitate CCTV survey of individual pipe drops and horizontal runs may be needed – lack of inspection chambers and multiple 90 degree bends have currently precluded full inspection.

2.1.8 The steps to the south-west side over the two common vaults are in poor condition and will require reconstruction, potentially on new sleeper walls or other supporting structure built off the vault extradoses. The two common vaults are filled with multiple coffins which partially obscure the brickwork but direct access will still be beneficial to confirm their condition.

2.1.9 The retaining wall at the west side which continues from the steps in a south-easterly direction has been affected by a semi-mature yew tree at the topside. This has resulted in the stuccoed brickwork leaning and bulging outwards. We understand that the yew trees are considered to be a significant feature, so a solution to conserve the fabric and the tree will be needed. We anticipate that ground anchors could be viable option here in the short to medium term but also note that the tree will continue to grow and exert further lateral pressure in the long-term.

Photograph 3: Failing retaining wall at western end of the Terrace Catacombs.

2.2 Recommendations

2.2.1 The following further investigations are recommended:

- Trial pit investigations to the terrace area (refer to Appendix A)
- Further drainage CCTV surveys – excavations and cutting into pipework may be needed
- Investigate possible brickwork voiding (to be undertaken from topside)
- Gain direct access to all vaults at the south-side.

2.2.2 The following outline remedial works are currently recommended (further items may be added following intrusive investigations and full direct inspection):

- Repair/reconstruction of the west side access steps
- Stabilisation of retaining wall at the west side
- Repair of probable cracking to unnamed vault to east side

3.0 CIRCLE OF LEBANON

3.1 Observations & Discussion

3.1.1 A plan showing areas inspected and accompanying notes is included at Appendix A.

3.1.2 The majority of the individual vaults to the inner and outer circle were inaccessible as doors were either rusted shut or at risk of non-closure once opened. Most vaults were therefore inspected using a borescope camera inserted through ventilation holes in the doors.

3.1.3 Relatively few significant defects were visible in the individual vaults, certainly in the outer circle. Several inner circle vaults exhibited longitudinal cracking to the barrel vault brickwork and more limited diagonal cracking. This may be related to the large cedar tree formerly present in the centre of the circle and merits direct access and further investigation before any remedial works can be recommended. Due to the fact that the vaults are arranged in circular pattern, there is fairly limited potential for lateral movement and flattening or hinging of the vault brickwork, although there may be a degree of unresolved lateral load at the outer perimeter. Nevertheless, we will still need to review the extent of any movement and potential mortar loss.

Photograph 4: Inner Circle Vault 1: Typical example of longitudinal cracking at the vault intrados and more isolated example of cracking to the rear wall.

3.1.4 Some dampness to the vaults is evident and is unsurprising as the roofs on the outer circle were reportedly defective for long periods; there is also reportedly no waterproofing layer over the inner circle vaults and all have earth retaining brickwork rear walls. Additionally, the original provision for cross ventilation via door and roof vents is now absent or only partially operational. No resulting structural defects seem to have arisen at present but reducing dampness will help the general durability of the structural elements.

Photograph 5: Outer Circle Vault 13 (Brett) – typical dampness at vault intrados

3.1.5 Drainage arrangements for the topside of the inner circle seem to be poor and the façade is saturated in some areas. This has not resulted in any clear structural problems but there is extensive local washout of lime mortar evident at cornice/parapet level, which will require remedial work.

Photograph 6: Inner Circle – example of mortar washout at parapet level and dampness at low level due to drainage issues.

3.1.6 No separation between the vaults and the facades was evident on the either the inner or outer circles. The facades are mainly stuccoed brickwork and may well be bonded into the vault cross walls. The inner circle walls are reclining inwards which also provides a degree of increased resistance.

3.2 Recommendations

3.2.1 The following further investigations are recommended:

- Open all vault doors to allow direct access for inspection
- Excavate trial pits at the top side of the inner circle above vaults with cracked arches
- Review historic and remaining cross ventilation provision
- Investigation mortar loss around areas of external calcium deposition.

3.2.2 Structural remedial works will be confirmed following further investigation but grouting and stitching of cracked brickwork arches should be provisionally allowed for.

4.0 EGYPTIAN AVENUE

4.1 Observations & Discussion

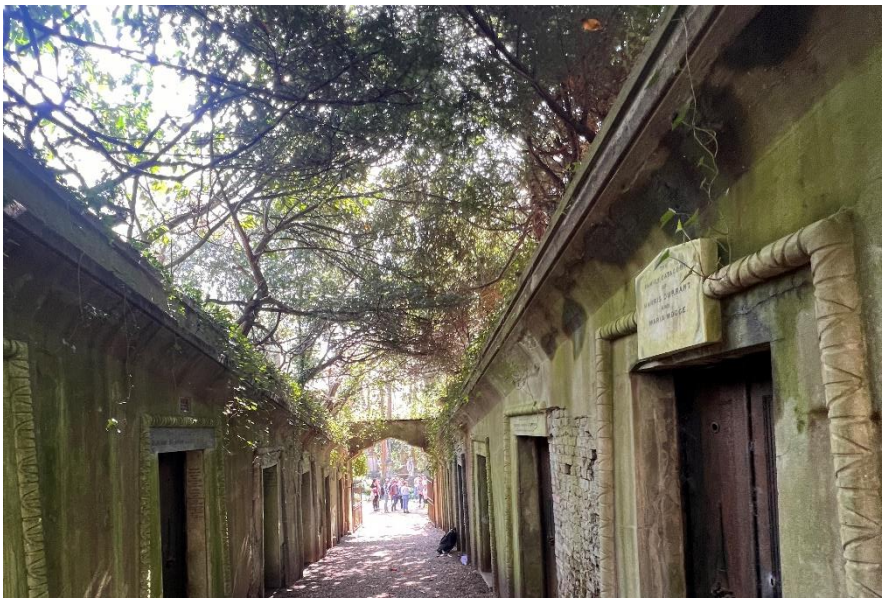
4.1.1 All vaults were inspected, the majority again using a borescope camera. Future direct access to all vaults is required.

4.1.2 The vault structures appear to remain in good condition. No significant structural cracking was seen. Some minimal root penetration was evident along with some inevitable dampness.

Photograph 7: Egyptian Avenue – typical view of brick vault intrados showing some dampness and limited fine root penetration.

4.1.3 Despite substantial vegetation growth above the vaults and behind the façade parapets, there was no real evidence of any current or continuing separation between the two. Proposed repair/rebuilding works to the parapets to improve drainage will help to confirm and address any problems present. Some substantial but localised repairs were undertaken in the 1990s with parts of the façade wall rebuilt and/or stabilised where bulging outwards and these have seemingly been successful.

4.1.4 We did note that some patches of stucco were debonded and hollow. Whilst the brickwork substrate is probably not defective, review will be needed at the point when these are removed. Full hammer tap testing is recommended to identify other detached areas. The upper parts of the façade are noticeably damp due to water penetrating through the earth retaining parapet and such areas may be more prone to debonding as a result.



Photograph 8: Egyptian Avenue – general view showing dampness to upper parts of the facades.

4.2 Recommendations

4.2.1 The following further investigations are recommended:

- Open all vault doors for direct inspection access
- Review condition of brickwork behind debonded stucco

4.2.2 At the current time, no structural remedial works are anticipated but review will be required following completion of investigations.

5.0 CUTTINGS CATACOMBS

5.1 Observations & Discussion

5.1.1 These catacombs are comprised of a row of individual vaults stepping down the slope and abutting a brickwork retaining wall supporting a very substantial earthen bank.

5.1.2 Most of the vaults are fully independent structures however two smaller ones at the south end seem to be constructed as infills and the roofs likely derive support from the adjoining structures. There are two further gaps where infill vaults may have stood as there are remnant parts of stone roof slabs embedded in the side walls. It is not clear why these were removed but substantial brickwork buttressing has been added to the Hawes mausoleum in one gap, presumably to address a real or perceived issue of lateral stability on the sloping site.

5.1.3 There is no evidence of any current lateral movement but we also note that the duo-pitched roofs are formed from stone slabs which abut at the apex without any ridge beam or supplementary support. Some fairly unsympathetic steel work supports have been added inside the externally buttressed Hawes vault, presumably to address possible loss of contact and collapse of the slabs.

Photograph 9: Hawes vault – previous supplementary supports to roof slabs

Photograph 10: External buttressing to the Hawes vault with saturated brickwork to the visible retaining wall on the right.

5.1.4 The roofs are somewhat vegetated generally and further inspection is recommended to confirm that all slabs are still in contact and all mortar joints filled.

Photograph 11: General view of roof slabs at the north end of the row.

5.1.5 Access to the vault interiors is difficult in many cases without potentially destructive work but equally this is probably not needed in the absence of any significant structural problems externally.

5.1.6 Although the retaining wall is extremely wet where visible in the gaps, it does not seem to have failed and there is no sign that excessive surcharge loading is being applied to the rear of the vaults. Cracking or movement was not evident. It is not currently clear whether water is penetrating into the vaults, however the fact that water is flowing onto the ground in the gaps and is not visibly running out from under doors or grilles, suggests it is not.

Photograph 11: Water draining out through existing weep holes and brickwork joints and ponding on the ground under.

5.1.7 Ground anchors and wire netting have previously been installed to stabilise the slope behind the retaining wall, and seem to be generally successful. Further vegetation management is also needed to remove self-seeded trees and laurels on the slope. The steepness and height of the ground above the mausolea, combined with burials at the slope top, precludes excavation to retrofit drainage and waterproofing to the rear of the retaining wall. Drainage options will need to be considered in detail but seem likely limited to provision of a French drain at the wall top and additional weep holes at the base, combined with new gullies to avoid water flowing and ponding on the ground.

5.2 Recommendations

5.2.1 The following further investigations are recommended:

- Open vaults for direct inspection where possible without damage to stone or ironwork
- Assess condition of roof slabs

5.2.2 The following remedial works should be considered probable at the current time:

- Formation of new weep holes and local adaptations to below ground drainage
- Some repairs to roof slabs

6.0 MAUSOLEA

6.1 Cheylesmore

6.1.1 This monument remains in good overall structural condition externally. No works are anticipated.

6.1.2 The door to the interior could not be opened at the time of inspection and the roof was not visible due to its height. Direct inspection access to both is needed to confirm recommendations.

6.2 Beer

6.2.1 The Beer monument superstructure is in good condition and no structural repairs are anticipated currently.

6.2.2 The rear wall of the vault is very damp. This may be partially related to defective drainage pipework from the Terrace Catacombs and resolved as part of those works. It is not currently structurally significant.

6.3 Cory-Wright

6.3.1 This monument remains in good overall condition and no structural repairs are anticipated.

6.4 Strathcona

6.4.1 This monument remains in good overall condition and no structural repairs are anticipated.

6.4.2 Some leaching of calcium salts was evident to masonry joints in the upper part. This is likely to be due to a roof defect but is not of structural concern currently.

Photograph 12: Strathcona vault interior – mortar leaching is visible

6.5 Pocklington

6.5.1 This monument remains in good overall condition and no structural repairs are anticipated.

6.6 Dalziel

6.6.1 This monument remains in good overall condition and no structural repairs are anticipated.

6.7 Kelman

6.7.1 The external elevations are somewhat dilapidated but there was no visible evidence of any structurally significant issues.

6.7.2 Access to the interior was not feasible but will be needed for future inspections. Limited borescope camera viewing was possible and showed the roof structure to be a clay block arch supporting the external dual pitch structure/finish. This appeared to be damp at the soffit and needs further inspection.

6.7.3 No structural repairs are anticipated at present but review will be needed once access to the interior has been obtained.

6.8 Rosa

6.8.1 The external elevations are somewhat dilapidated but without apparent structural defects.

6.8.2 The interior was not accessible as the doorway is sealed with slate/masonry. Limited borescope camera access did not show any defects of structural concern.

Photograph 13: Rosa – partial view of vault interior (rotated)

6.9 Hartley

6.9.1 This monument remains in good structural condition externally. The only visible defect of note is that the granite cladding has moved at the east side base, exposing the brickwork under. No defects to the brickwork were apparent but due to the size of the superstructure, it is presumed that this is a vault side wall. If re-fixing is included in an architectural repair package, we suggest further limited inspection of the brickwork at that point.

6.9.2 The interior of the vault was not accessible. The entrance is permanently sealed.

6.10 Otway

6.10.1 The Otway mausoleum structure comprises a stone or concrete slab roof supported by steel beams spanning between concrete or brickwork masonry retaining walls.

6.10.2 The structural steelwork is corroding and structurally significant section loss appears to have occurred in some locations, particularly around the entrance area. The beams have been previously overpainted but perhaps not well prepared, with the result that the finish is now failing. At least two different beam sizes have been used and there is some indication that supplementary beams were added at a later stage. Detailed measurements of section sizes will help confirm and approximately date any such intervention.

Photograph 14: Otway vault interior – entrance area

Photograph 15: Otway vault entrance area

6.10.3 Spalling was not evident at the slab soffit. This would be consistent with stone slab construction. If concrete, it is either unreinforced (this is possible due to the close spacing of the beams) or the cover to the reinforcement is substantial and significant expansive corrosion has not occurred.

6.10.4 The vault is generally damp with beading water evident on concrete and steel surfaces at the time of inspection. Patterns of staining to surfaces indicates that some leakage is occurring, particularly around the roof lights and some beam bearings. Surface corrosion in more distant areas may then be related to generally damp conditions and poor ventilation, causing condensation.

Photograph 16: Otway Vault – example of water ingress at steel beam bearing

6.10.5 There was no visible evidence of cracking or failure of the vault walls.

6.10.6 Intrusive investigations will be needed to open-up selected beam bearings and connections and clean back corrosion product to be able to assess the extent of section loss. Our initial view is that full replacement of some steel elements will be needed. Other beams with less extensive losses will need thorough cleaning and treatment. Cross ventilation provision should also be reviewed. Full prevention of water ingress is unlikely, so interventions should be focussed on addressing structural defects and increasing durability of vulnerable fabric.

6.11 Guerrier

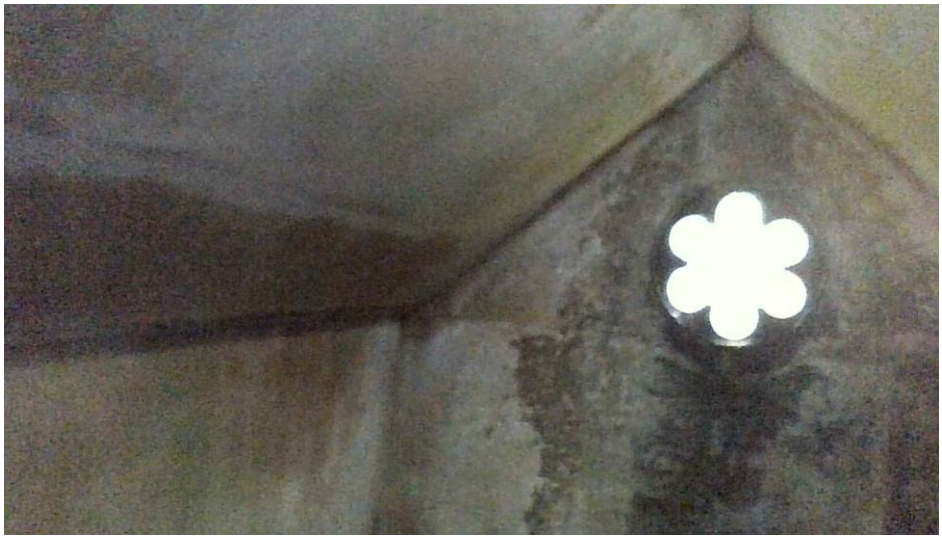
6.11.1 No structural defects are visible to the external elevations. The vault door could not be opened and borescope inspection was not possible. Direct inspection access is recommended.

6.12 Foster

6.12.1 No structural defects are visible to the external elevations although the upper part of the north elevation close to the parapet appeared to be very damp. The vault door could not be opened and a partial inspection of the interior was undertaken by borescope.

Photograph 17: Foster mausoleum – north elevation

6.12.2 The interior also appeared to be quite damp and some damage to coffins was evident, however no structural defects were visible. Direct inspection to confirm is still recommended once the vault door has been opened.



Photograph 18: Foster mausoleum – partial interior view looking west.

6.13 Jankovich

6.13.1 No structural defects were visible to the external elevations and the interior was in clean and dry condition. No structural repairs are anticipated.

6.14 Morgan

6.14.1 This monument requires conservation repairs to the external elevations but no structurally significant defects were apparent.

6.14.2 The door could not be opened and limited borescope inspection did not reveal any obvious structural defects internally. Some root penetration to the interior has occurred and direct inspection access is recommend to confirm initial conclusions.

Photograph 19: Morgan – partial view of vault interior

6.15 Da Silva

6.15.1 This monument is in poor overall condition. Direct access to the interior is not currently possible as the entrance doorway is bricked up.

6.15.2 The monument seems to have suffered from structural movement which has led to a degree of roof spread, causing a gap to open between the slabs at the apex. The cornice units at the eaves and the pilaster at the south-east corner have also moved. The rear pediment is currently at risk of falling away.

Photograph 20: Da Silva - rotational movement at the south east corner pilaster

Photograph 21: Da Silva - movement at the cornice units and rear pediment

6.15.3 Partial inspection of the interior was possible by borescope. This revealed a gap at the roof apex and extensive damage to the coffins and shelves.

Photograph 22: Da Silva - roof structure

Photograph 23: Da Silva – partial view of interior looking towards the south-east

6.15.4 Photograph 22 seems to show that the east roof pitch slab slipped, which would also be consistent with the external movement at the pilaster. It is less clear in Photograph 23 whether the external movement in the pilaster is reflected internally and direct inspection will be required to confirm.

6.16 Further investigations will be needed to confirm the full scope of works to this monument but dismantling and reconstruction of the roof structure should be anticipated. Once deloaded, it may be feasible to rotate the pilaster back into position, but the precise construction details will need to be confirmed first.

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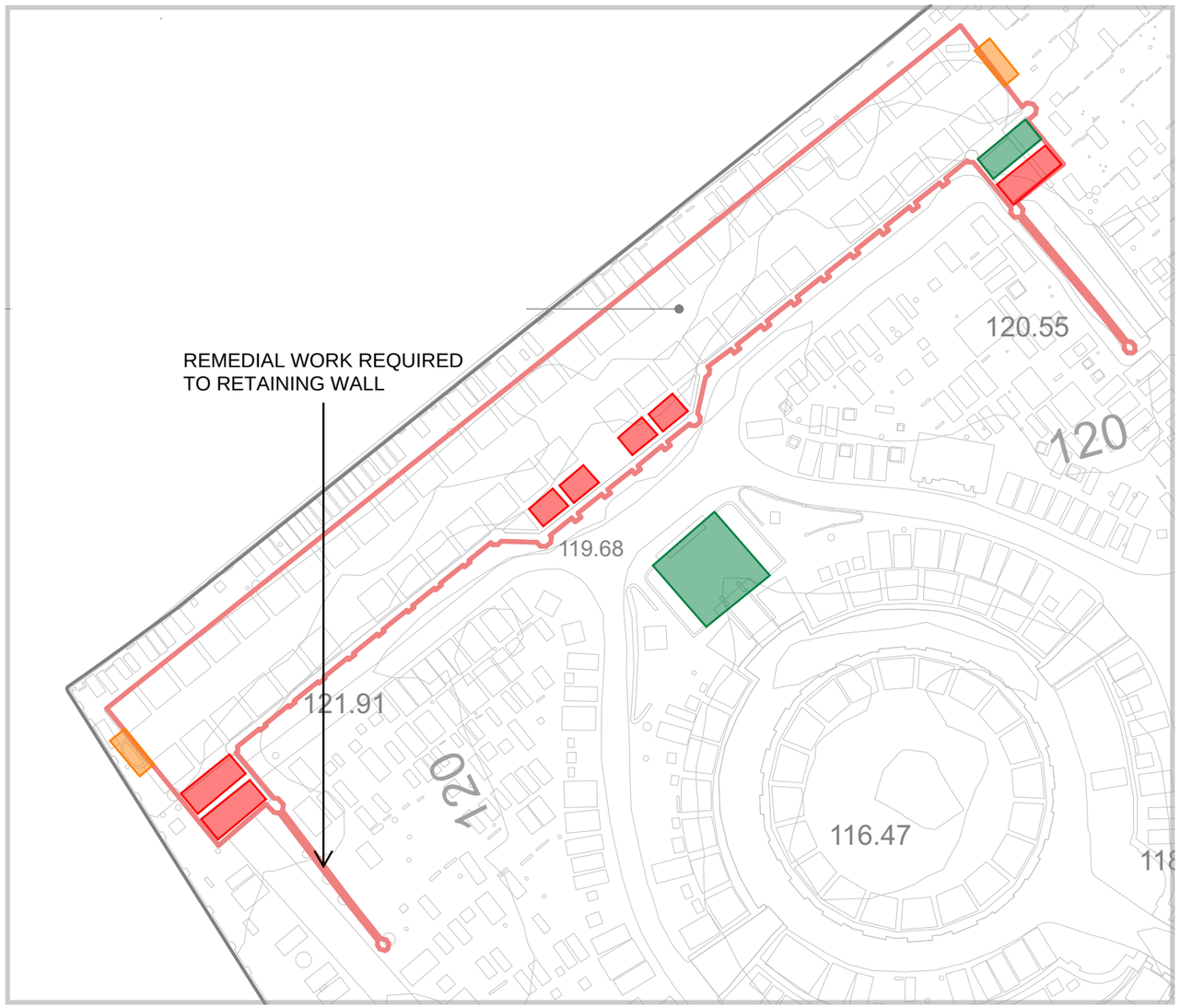
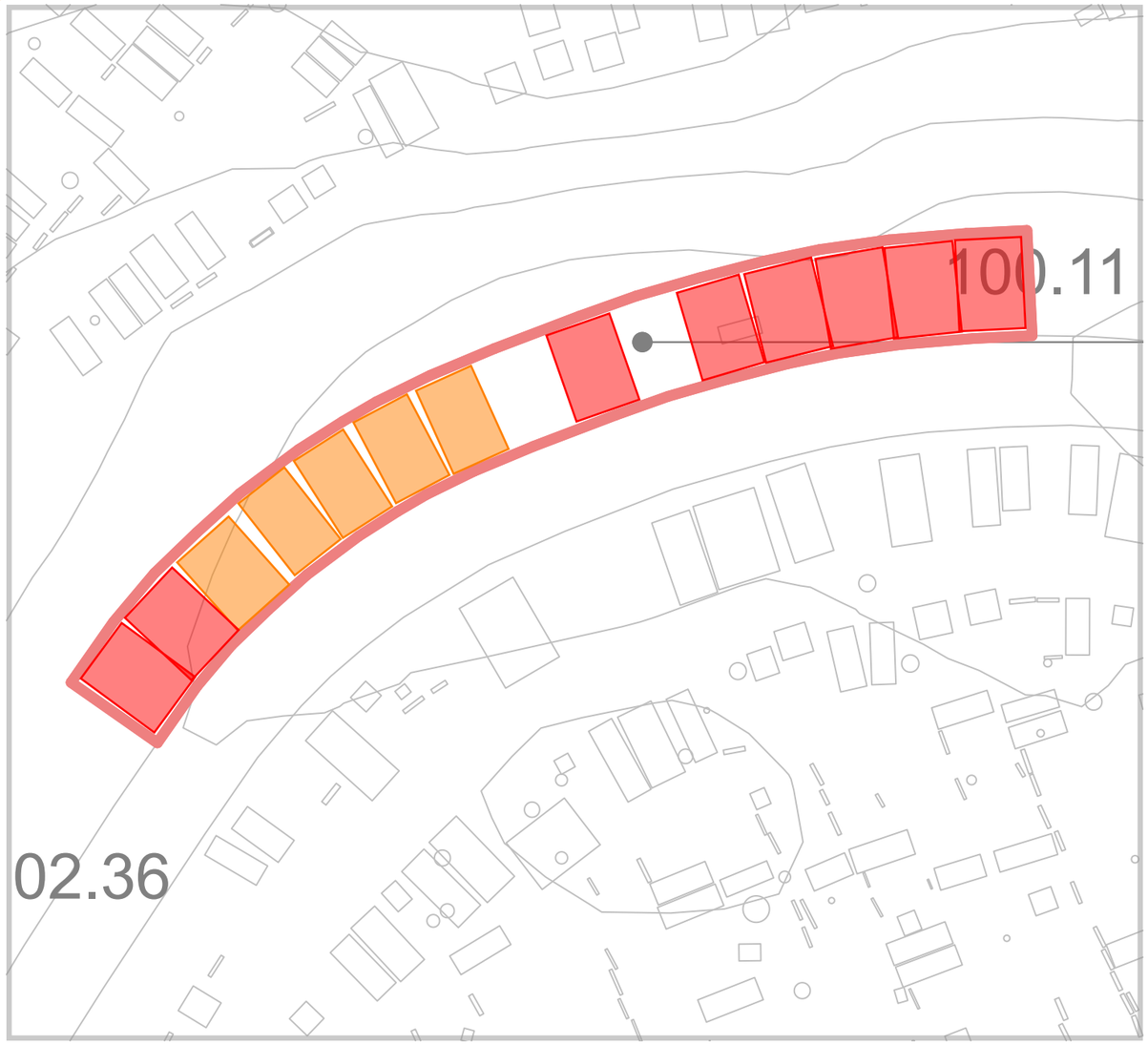
7.0 APPENDIX A: CONISBEE ANNOTATED PLANS



Terrace Catacombs (WSA Ref. No. 8)
N.T.S



Cuttings Catacombs (WSA Ref. No. 5)
N.T.S

KEY

DENOTES DEFECT NOTED AND/OR FURTHER INVESTIGATION REQUIRED DUE TO NO ACCESS

DENOTES CATACOMB WHERE BORESCOPE INSPECTION WAS CARRIED OUT HOWEVER FURTHER INSPECTION WHEN DOORS ARE OPENED IS REQUIRED

DENOTES FULL INSPECTION POSSIBLE, IN GOOD CONDITION WITH NO FURTHER INSPECTION REQUIRED

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL OTHER RELEVANT DRAWINGS. DO NOT SCALE FROM THIS DRAWING

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Project
UNLOCKING HIGHGATE CEMETERY

Title
PART PLAN TERRACE & CUTTINGS CATACOMBS

Rev	Date	Description		
S2	22.05.24	INFORMATION	HM	SW

Scale	Drawn	Engineer	Date
NTS	HM	HM	MAY 2024

Drawing Status	Project No	Revision
FOR INFORMATION	240323	S2

Drawing No
CON-SK-S-003

KEY

DENOTES DEFECT NOTED AND/OR FURTHER INVESTIGATION REQUIRED DUE TO NO ACCESS

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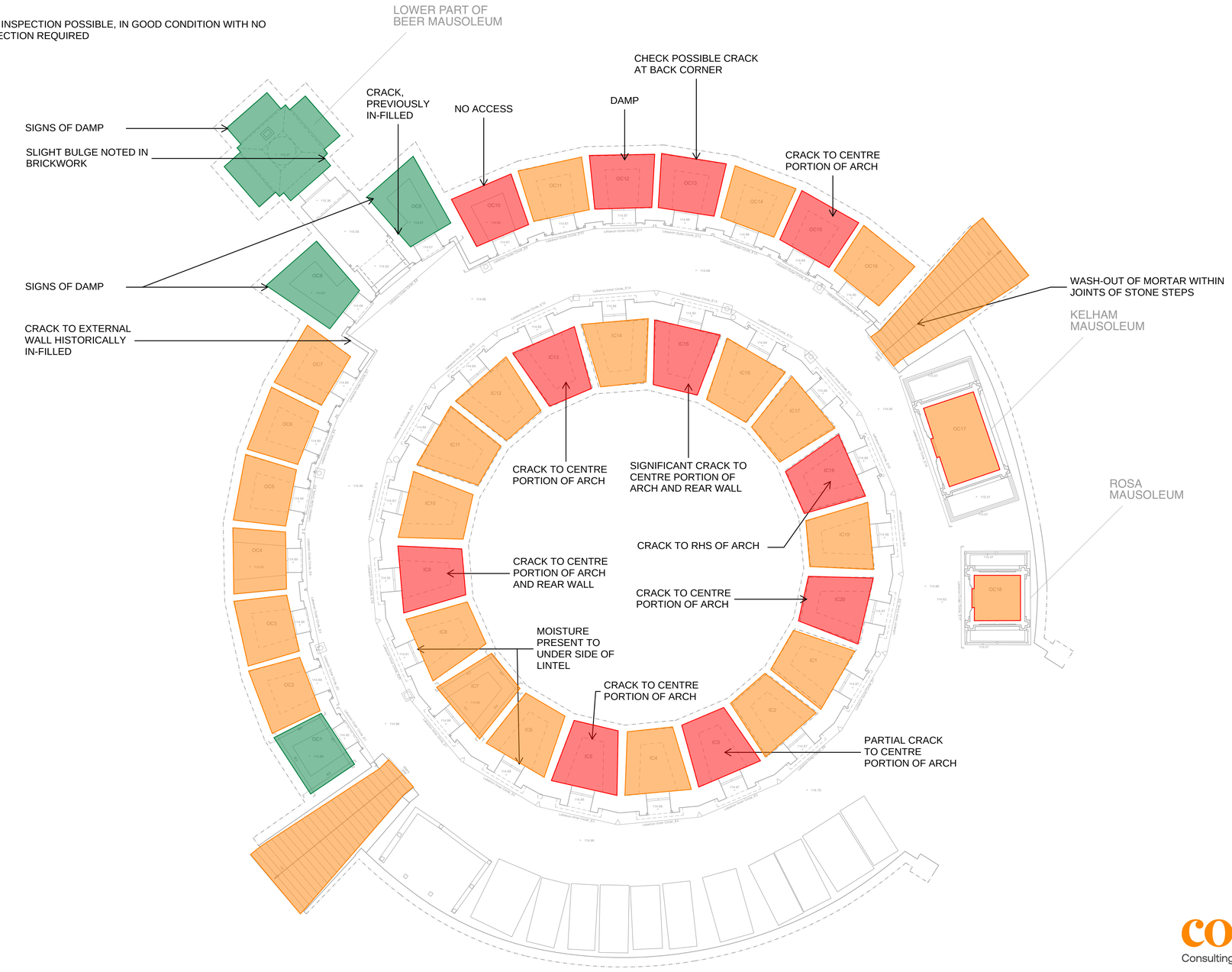

GROUND FLOOR PLAN

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N

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Project: UNLOCKING HIGHGATE CEMETERY	Status: S2
	Job No: 240323
Title: CIRCLE OF LEBANON GROUND FLOOR PLAN, INITIAL INSPECTION FINDINGS	Scale: N.T.S
	Date: 22.05.24
	Drawn: HM
Drg No. CON-SK-S-002	Checked: SW

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Notes

Revisions

P1	30.05.23	First Issue
P2	16.06.23	Drawing page scale annotation corrected

Drawing Number 1066-3.2-7-10-P2

Content
Circle of Lebanon
GF Plan Existing

Scale 1:100 AT A1 Date MAY 2023

HIGHGATE CEMETERY
CAPITAL PROJECT

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Key

Drawing Number 1066-3.2-7-10-P2

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DENOTES FULL INSPECTION POSSIBLE, IN GOOD CONDITION WITH NO FURTHER INSPECTION REQUIRED

GROUND FLOOR PLAN

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Consulting Structural and Civil Engineers

Project: UNLOCKING HIGHGATE CEMETERY	Status: S2
	Job No: 240323
Title: EGYPTIAN AVENUE GROUND FLOOR PLAN, INITIAL INSPECTION FINDINGS	Scale: N.T.S
	Date: 22.05.24
	Drawn: HM
Drg No. CON-SK-S-001	Checked: SW

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All critical dimensions not noted are to be measured on site or referred to architect.

Notes

Revisions

P1	30.05.23	First Issue
P2	16.06.23	Drawing page scale annotation corrected

Drawing Number 1066-3.2-6-10-P2

Content
Egyptian Avenue
GF Plan Existing

Scale 1:50 AT A1 Date MAY 2023

HIGHGATE CEMETERY
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Key

Drawing Number 1066-3.2-6-10-P2

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8.0 APPENDIX B: PROPOSED VAULT OPENING PRIORITY

8.1 Terrace Catacombs

Vault Number	Priority 1	Priority 2	Priority 3
WV1	No access		
WV2	No access		
WV3	No direct access		
WV4	No direct access		
EV1	No access		
EV2	No access		
EV3			Accessible
EV4	Cracking		

8.2 Circle of Lebanon

Vault Number	Priority 1	Priority 2	Priority 3
OC1			Accessible
OC2		No direct access	
OC3		No direct access	
OC4		No direct access	
OC5		No direct access	
OC6		No direct access	
OC7		No direct access	
OC8			Accessible
OC9			Accessible
OC10	No access		
OC11		No direct access	
OC12	No direct access - damp		
OC13	Possible Cracking		

OC14		No direct access	
OC15	Cracking		
OC16		No direct access	
OC17 (Kelham)		No direct access	
OC18 (Rosa)		No direct access	
IC1		No direct access	
IC2		No direct access	
IC3	Cracking		
IC4		No direct access	
IC5	Cracking		
IC6		No direct access	
IC7		No direct access	
IC8		No direct access	
IC9	Cracking		
IC10		No direct access	
IC11		No direct access	
IC12		No direct access	
IC13	Cracking		
IC14		No direct access	
IC15	Cracking		
IC16		No direct access	
IC17		No direct access	
IC18	Cracking		
IC19		No direct access	
IC20	Cracking		

8.3 Egyptian Avenue

Vault Number	Priority 1	Priority 2	Priority 3
EA1			Accessible
EA2		No direct access	
EA3			Accessible
EA4		No direct access	
EA5		No direct access	
EA6		No direct access	
EA7		No direct access	
EA8		No direct access	
EA9		No direct access	
EA10		No direct access	
EA11		No direct access	
EA12		No direct access	
EA13		No direct access	
EA14		No direct access	
EA15		No direct access	
EA16			Accessible

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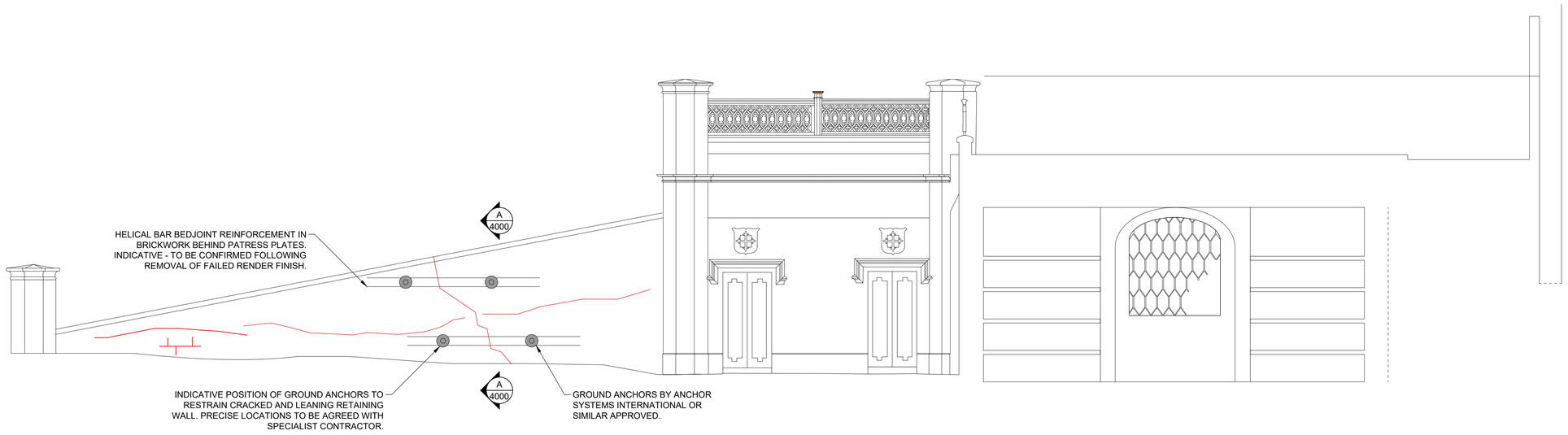
8.4 Cuttings Catacombs

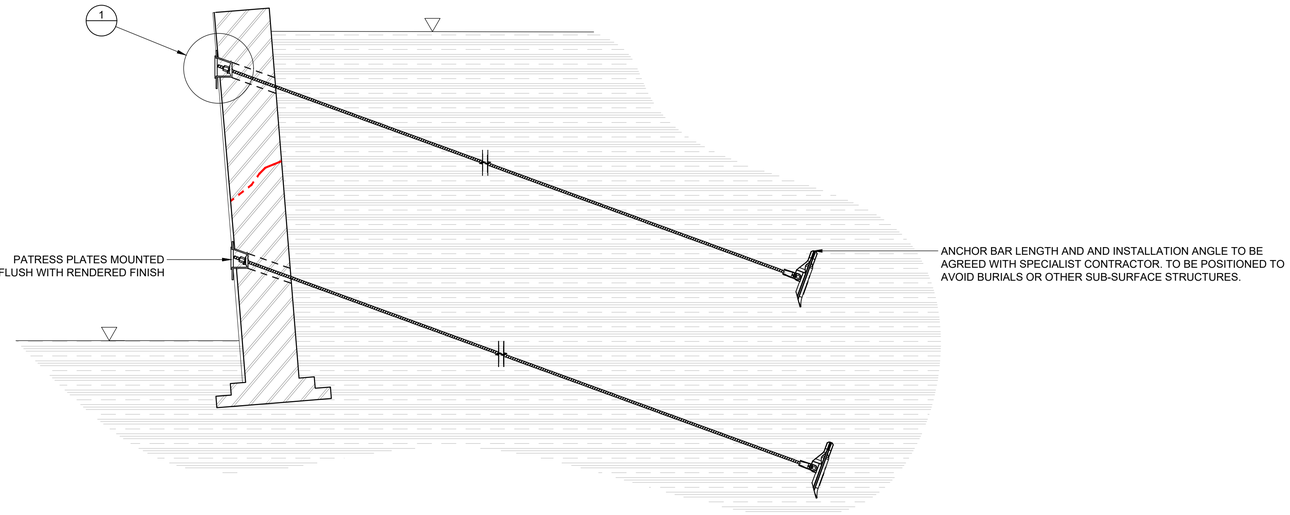
Vault Number	Priority 1	Priority 2	Priority 3
CC1	No access		
CC2	No access		
CC3		No direct access	
CC4		No direct access	
CC5		No direct access	
CC6		No direct access	
CC7		No direct access	
CC8 (gap)			
CC9	No access		
CC10 (gap)			
CC11	No access		
CC12	No access		
CC13	No access		
CC14	No access		
CC15	No access		

8.5 Mausolea

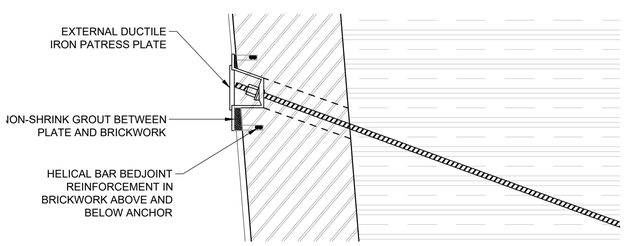
Mausoleum	Priority 1	Priority 2	Priority 3
Cheylesmore		No direct access	
Beer			Accessible
Cory-Wright			Accessible
Strathcona			Accessible
Pocklington			Accessible
Dalziel			Accessible
Kelham		No direct access	
Rosa		No direct access	
Hartley			Sealed
Otway			Accessible
Guerrier	No access		
Forster		No direct access	
Jankovich			Accessible
Morgan		No direct access	
Da Silva		No direct access	



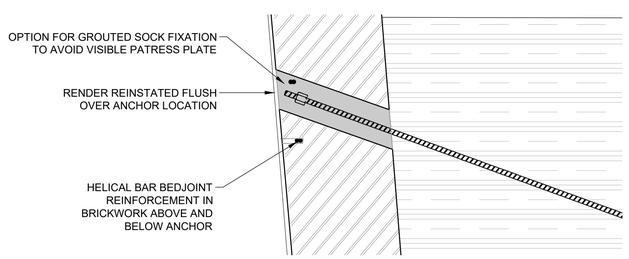
GROUND ANCHORS TO FAILING RETAINING WALL - INDICATIVE ELEVATION
scale 1:50@A1



SECTION A-A: TYPICAL ANCHOR ARRANGEMENT
scale 1:20@A1



DETAIL 1: TYPICAL SECTION THROUGH PATRESS PLATE
scale 1:20@A1



DETAIL 1 (OPTION): CONCEALED FIXING WITH GROUTED SOCK
scale 1:20@A1

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS
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STRUCTURAL CONSERVATION REPAIR NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF TEMPORARY WORKS. THEIR PROPOSALS MUST BE SUBMITTED TO THE STRUCTURAL ENGINEER SUFFICIENTLY IN ADVANCE OF THE WORKS STARTING TO PERMIT COMMENT. UNDER NO CIRCUMSTANCES SHOULD ANY STRUCTURAL ALTERATIONS BE CARRIED OUT PRIOR TO THE STRUCTURAL ENGINEER COMMENTING ON THE CONTRACTORS TEMPORARY WORKS PROPOSALS.
2. FINAL POSITION AND CONFIGURATION OF ANCHORS TO BE AGREED FOLLOWING SITE TESTING OF GROUND BY SPECIALIST CONTRACTOR.
3. ANCHORS TO BE SET OUT TO AVOID ANY INTERACTION WITH BURIALS OR SUBSURFACE STRUCTURES.
4. BARS AND ANCHORS TO BE GRADE 316 STAINLESS STEEL TO ACHIEVE 120+ YEAR LIFE SPAN.
5. PATRESS PLATES TO BE INSTALLED AS FLUSH AS POSSIBLE TO WALL FACE AND ANY REMAINING GAPS INFILLED WITH NON-SHRINK GROUT TO MAINTAIN FULL CONTACT.
6. (IF USED) ANCHOR RODS WITH GROUTED SOCK FIXING TO BE CUT RECESSED BELOW WALL SURFACE TO ALLOW RENDER TO BE REINSTATED FLUSH.
7. 2no. 8mm DIA. HELICAL BARS TO BE INSTALLED ABOVE AND BELOW ANCHORS. BARS TO BE CHASED INTO BRICKWORK MORTAR JOINTS AND SET IN PROPRIETARY GROUT.

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Rev	Date	Description	Drawn	Check
P1	30.08.24	PRELIMINARY ISSUE	SW	SW

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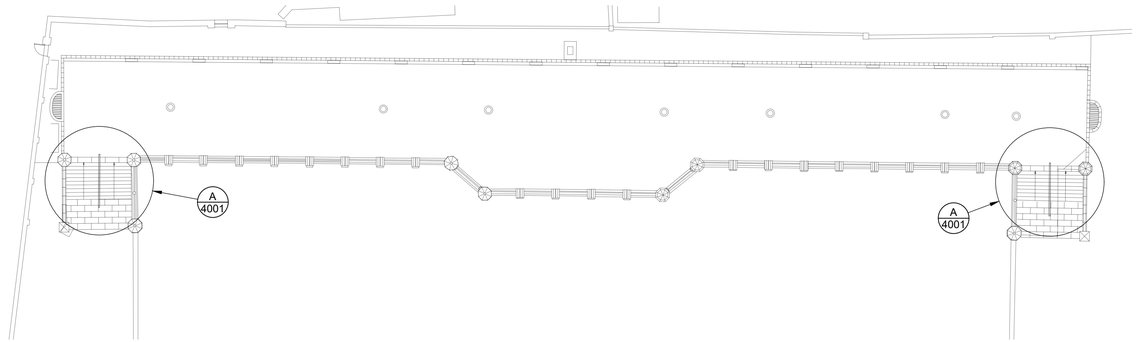
Drawing Status
PRELIMINARY

Project
UNLOCKING HIGHGATE CEMETERY

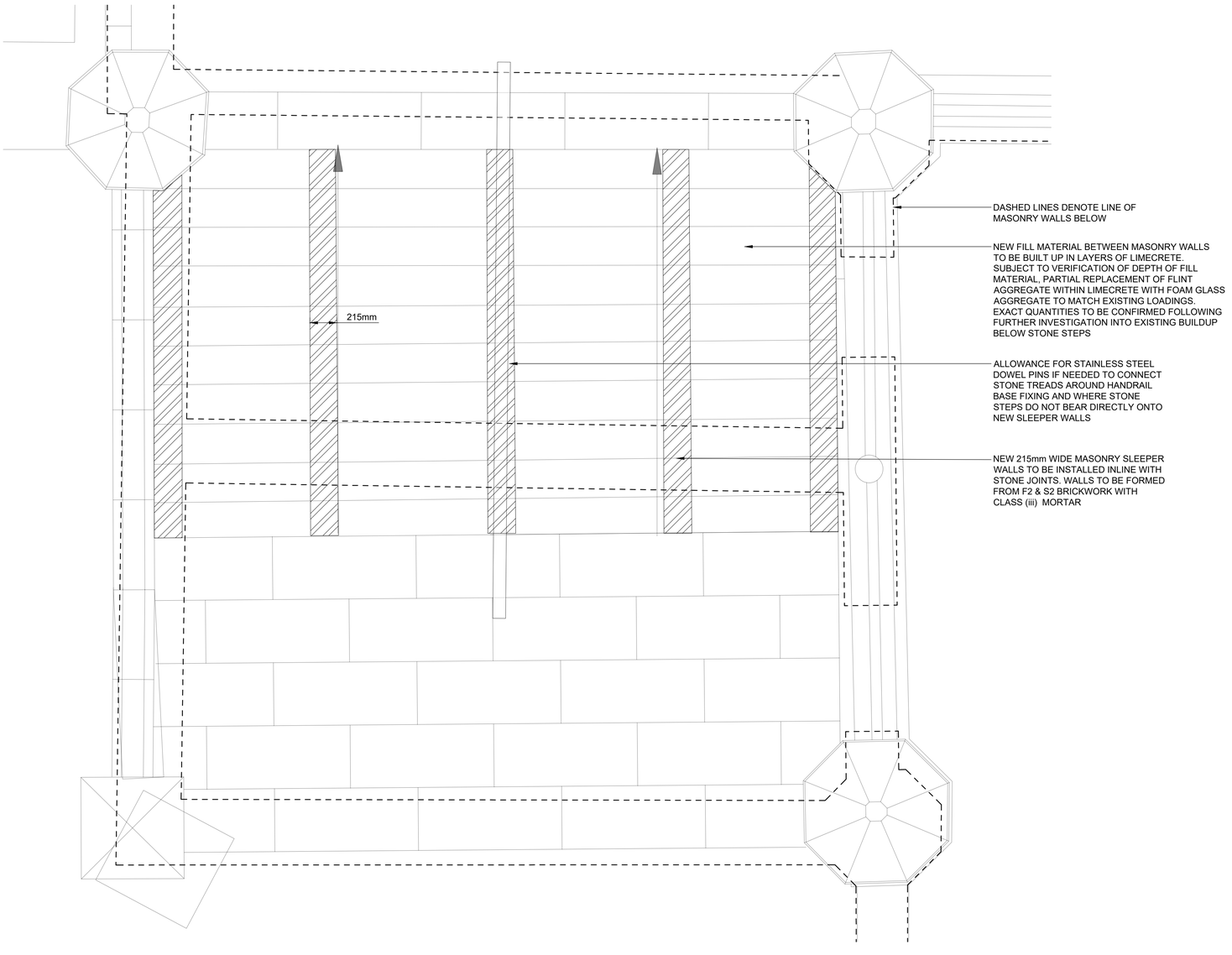
Title
TERRACE CATACOMB STEPS (W)
PROPOSED GROUND ANCHORS

Drawing No
240323-XX-SK-S-4000

Date AUG 2024
Scale VARIES
Drawn SW
Engineer SW
Project No **240323**
Revision **P1**



KEY PLAN SHOWING EAST AND WEST STEPS TO BE REBUILT - CATACOMBS TERRACE
scale 1:250@A1



PART PLAN A - TERRACE CATACOMB - REBUILDING STEPS
scale 1:20@A1

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS
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STRUCTURAL CONSERVATION REPAIR NOTES

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2. CONTRACTOR TO PROVIDE PROPOSED SEQUENCE OF WORKS FOR COMMENT BEFORE COMMENCEMENT OF WORK ON SITE
3. CONSTRUCTION SEQUENCE TO BE CAREFULLY CONSIDERED. MASONRY VAULTS TO BE LOADED EVENLY NO ECCENTRIC/HIGH POINT LOADS TO BE ADDED. NO STORAGE OF MATERIALS ON TOP OF MASONRY VAULTS.
4. FINAL NUMBER OF MASONRY SLEEPER WALLS TO BE CONFIRMED FOLLOWING INVESTIGATION ON SITE.
5. DOWELS TO BE GRADE 316 STAINLESS STEEL TO ACHIEVE 120+ YEAR LIFE SPAN.
6. ALL MASONRY TO BE FROST RESISTANT BELOW DPM
7. LIMECRETE TO BE NHL5 AND GRADED AGGREGATES

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Rev	Date	Description	Drawn	Check
P1	30.08.24	PRELIMINARY ISSUE	HM	HM

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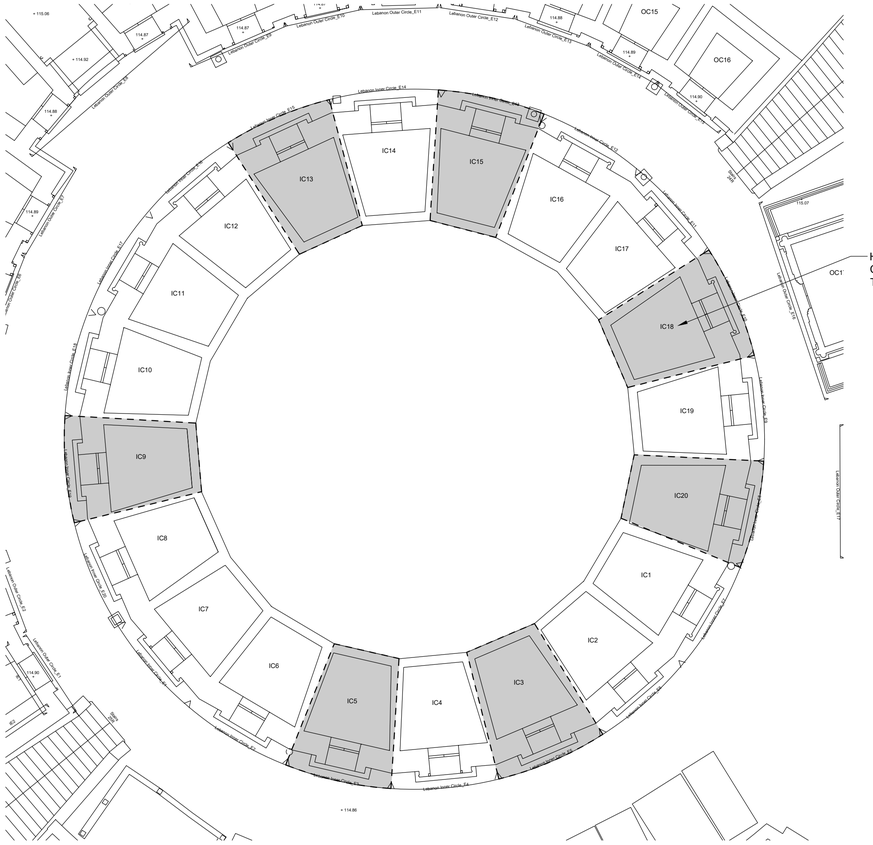
Drawing Status
PRELIMINARY

Project
UNLOCKING HIGHGATE CEMETERY

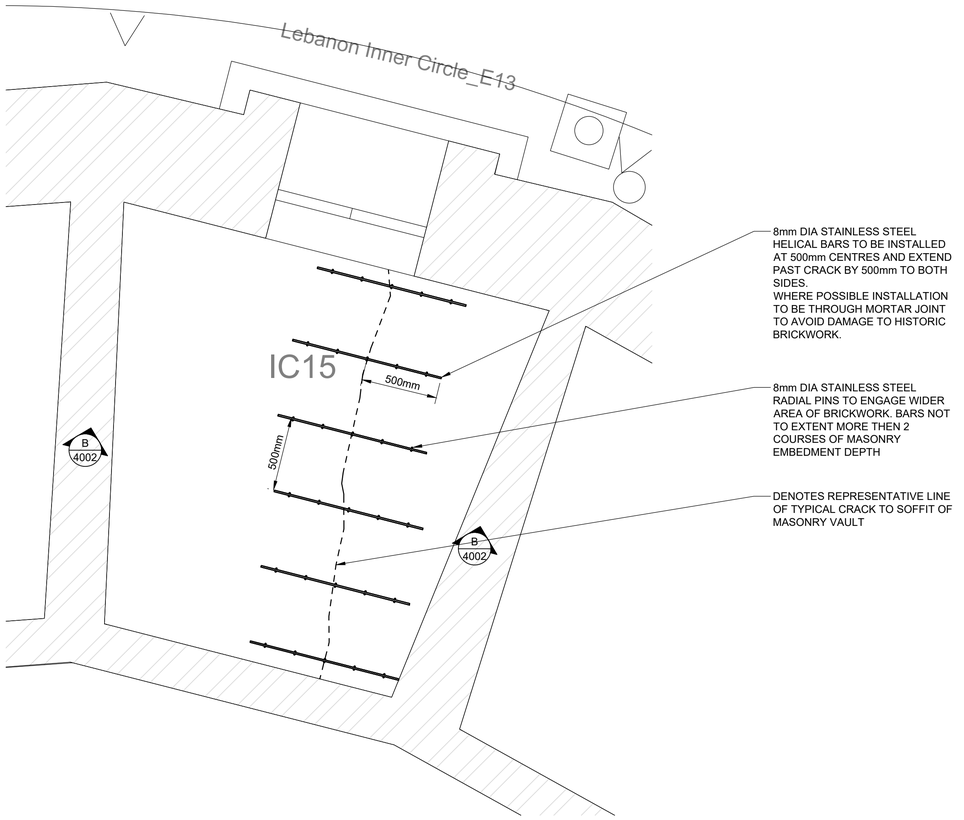
Title
TERRACE CATACOMB STEPS (E&W) REBUILD

Drawing No
240323-XX-SK-S-4001

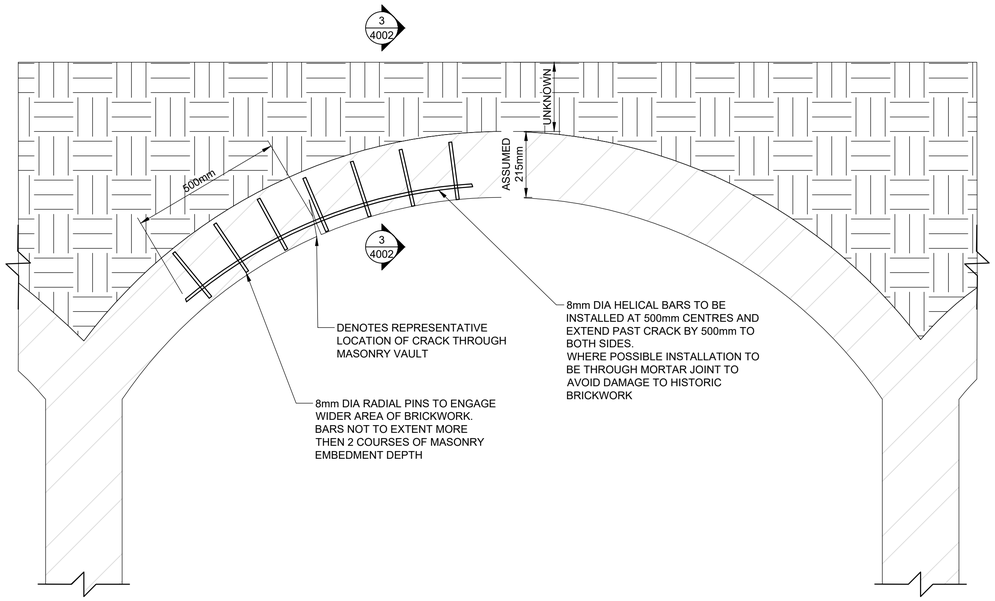
Date AUG 2024
Scale VARIES
Drawn HM
Engineer HM
Project No **240323**
Revision **P1**



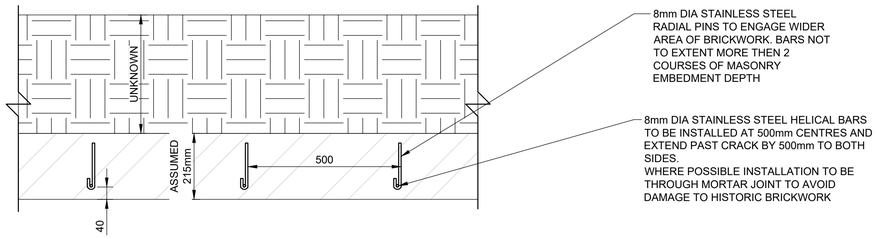
KEY PLAN HIGHLIGHTING LOCATIONS FOR INNER CIRCLE OF LEBANON CRACK STITCHING REPAIRS
scale 1:100@A1



TYPICAL INNER CIRCLE OF LEBANON PLAN SHOWING CRACK STITCHING REPAIR
scale 1:20@A1



SECTION B - INNER CIRCLE OF LEBANON - CRACK STITCHING TO MASONRY VAULTS
scale 1:10@A1



DETAIL 3 - INNER CIRCLE OF LEBANON - CRACK STITCHING TO MASONRY VAULTS
scale 1:10@A1

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STRUCTURAL CONSERVATION REPAIR NOTES

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2. BARS TO BE GRADE 316 STAINLESS STEEL TO ACHIEVE 120+ YEAR LIFE SPAN.
3. 8mm DIA. STAINLESS STEEL HELICAL BARS TO BE INSTALLED ABOVE AND BELOW ANCHORS. BARS TO BE CHASED INTO BRICKWORK MORTAR JOINTS AND SET IN PROPRIETARY GROUT.

SEQUENCE FOR INSTALLATION OF HELIBAR REPAIR

1. CUT SLOTS INTO THE HORIZONTAL MORTAR JOINTS (WHERE POSSIBLE) TO 40mm DEEP. BARS TO BE INSTALLED AT 500mm CENTRES ALONG LINE OF CRACKING.
2. REMOVE ALL DUST AND MORTAR FROM SLOTS AND THOROUGHLY FLUSH WITH WATER.
3. DRILL 16mm DIA. VERTICAL HOLES ALONG LINE OF HORIZONTAL CHASE AT 250mm CENTRES IN PREPARATION FOR INSTALLING RADIAL PINS. MASONRY VAULT IS ASSUMED TO BE AT LEAST 2 COURSES THICK (200mm). RADIAL PINS NOT TO EXCEED THIS DEPTH.
4. INJECT A BEAD OF HELIBOND GROUT APPROXIMATELY 15mm DEEP INTO THE BACK OF THE HORIZONTAL SLOT.
5. PUSH THE 8mm DIA. STAINLESS STEEL HELICAL BAR INTO THE GROUND TO OBTAIN GOOD COVERAGE.
6. INJECT HELIBOND GROUT INTO VERTICAL RADIAL PIN PILOT HOLES, INSERT 8mm DIA. STAINLESS STEEL RADIAL PINS HOOKED AROUND THE HORIZONTAL BAR.
7. INJECT SECOND RUN OF HELIBOND GROUT OVER REMAINING EXPOSED HELICAL BAR AND COMPACT INTO MORTAR JOINT. LEAVE 10-15mm FOR NEW POINTING AND COLOUR MATCHED MORTAR REPAIR.
8. BARS TO BE GRADE 316 STAINLESS STEEL TO ACHIEVE 120+ YEAR LIFE SPAN.

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Rev	Date	Description	Drawn	Check
P1	30.08.24	PRELIMINARY ISSUE	HM	HM

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Drawing Status
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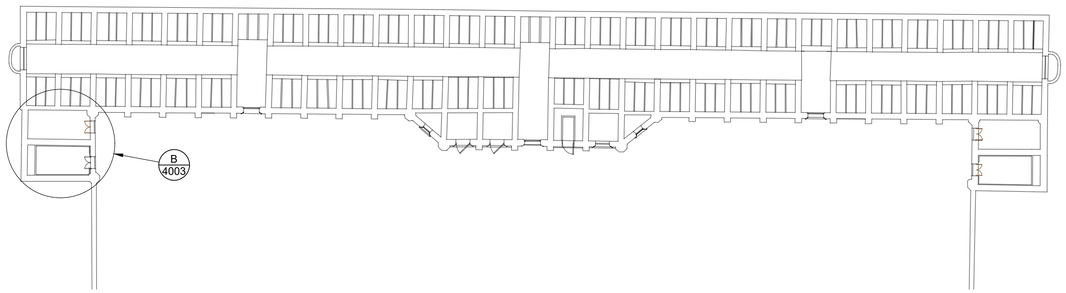
Project
UNLOCKING HIGHGATE CEMETERY

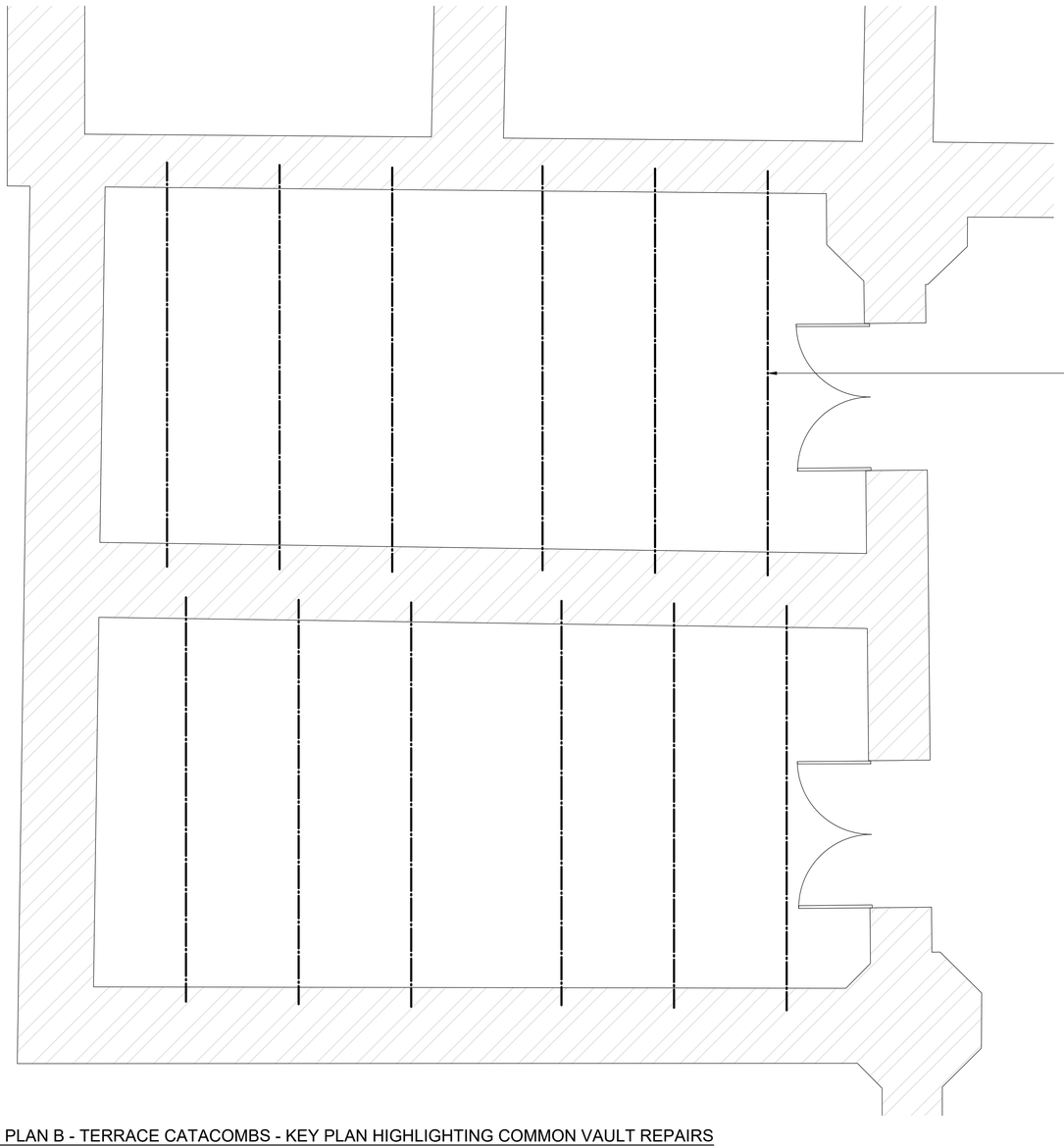
Title
CIRCLE OF LEBANON CRACK STITCHING REPAIRS

Drawing No
240323-XX-SK-S-4002

Date AUG 2024
Scale VARIES
Drawn HM
Engineer HM
Project No **240323**
Revision **P1**



KEY PLAN SHOWING COMMON VAULT LOCATION - CATACOMBS TERRACE
scale 1:250@A1



PART PLAN B - TERRACE CATACOMBS - KEY PLAN HIGHLIGHTING COMMON VAULT REPAIRS
scale 1:20@A1

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2. FINAL CONFIGURATION AND EXTENT OF REPAIRS TO EXISTING T-BEAMS TO BE AGREED RELOCATION OF THE COFFINS TO FACILITATE FULL ACCESS FOR THE CONDITION INSPECTION.
3. AT REPAIR LOCATIONS ALL EXISTING STEELWORK TO BE THOROUGHLY CLEANED AND PREPARED TO ST2 GRADE PRIOR TO PRIMING OR INSTALLATION OF NEW STEEL.
4. NEW STEELWORK TO BE GRADE 316 STAINLESS STEEL TO ACHIEVE 120+ YEAR LIFE SPAN.
5. INFILL ANY GAPS AROUND NEW BEAMS USING EITHER NON- SHRINK MORTAR (FOSROC CONBEXTRA GP OR SIMILAR) OR SAND:CEMENT DRY PACK.
6. ALL AFFECTED AREAS TO BE PAINTED WITH TWO COATS OF M902 EPOXY PRIMER BY SHERWIN WILLIAMS (APPLIED IN FULL ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS). COLOUR TO MATCH EXISTING FINISHES IF REQUESTED BY THE CLIENT/LBC.
7. DRAWINGS TO BE READ IN CONJUNCTION WITH ALL OTHER CONISBEE REPAIR DRAWINGS.

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Project
UNLOCKING HIGHGATE CEMETERY

Title
TERRACE CATACOMB COMMON VAULT REPAIRS

Drawing No
240323-XX-SK-S-4003

Date	AUG 2024
Scale	VARIES
Drawn	HM
Engineer	HM
Project No	**240323**
Revision	**P1**