Structural Report

Sheldon Manor retaining wall

For

Seed Environmental Ltd

Unit 3

Lanwades Business Park

Kentford

CB8 7PN

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Job Ref. C4874

Issue: 1.0

Date: 10 October 2023

Issue

Issue	Reason for Issue	Date
1.0	First Issue	10 October 2023

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1.0 Introduction

Michael Aubrey Partnership (MAP) are a practice of consulting engineers instructed to provide structural advice for the remediation works at the addressed property.

Prior to the survey visit, the client advised that a fuel spill has contaminated soil in front of, and under the foundations of a garden retaining wall. MAP's brief was to:

- Attend site to inspect opening up works carried out by the client and to collect structural information on the affected areas.
- Provide a report covering the following:
    - Underpinning layout to allow contaminated soils under the wall foundation to be removed.
    - Excavation layout in consideration of the temporary stability of the wall and foundation structure.
    - Method Statement for the remediation works.

Andrew Wiggett undertook a visual inspection at the property on 06 October 2023.

It should be noted that this report is for the sole use of the named client and is confidential to them and their professional advisors. Any other persons rely on the report at their own risk.

2.0 Observations

2.1 Property Description

Building Type:	Retaining wall
Age:	Unknown
Superstructure Construction:	Part concrete blocks, part fake drystone walling (with hidden mortar)
Topography:	Retained height approx. 1300mm
Soil Conditions:	Thick clay found in trail pits in front of and under the wall's footings. Trapped/retained ground water.
Extent of Contamination:	Contaminated soil to 600mm depth in front of wall, and underneath the footings.

3.0 Discussion

3.1 Design Philosophy

Excavation is required beneath and in front of the retaining wall to replace contaminated soil. The soil will need to be replaced with concrete. The work will need to be done in stages as the wall is not only holding its own weight against gravity but resisting the lateral load against lateral sliding.

3.2 Excavation Works and Underpinning

1. The existing wall foundations are shallowly founded (about 200mm estimated) and will be undermined by the proposed excavation. It is recommended that sequential underpinning is carried out using traditional mass concrete in 0.75m bays over 4 phases.

2. To avoid the need for dry packing and accelerate the programme, as well as minimising the time the wall is partly unsupported, it is recommended that the concreting is carried out at least 200mm above existing founding level (just below ground level) and compacted with a vibrating poker. This ensures the concrete pour encapsulates the existing footing.

3. As the wall must resist sliding, and there is currently the thin unreinforced floor slab providing lateral resistance, this is to be replaced by increasing the volume (weight) of concrete in the new bases. As the new concrete will be applying lateral pressure on the adjacent soil, this soil must be original virgin soil. Applying lateral pressure to newly laid hardcore backfill will not have the same resistance, so all excavation should be infilled with concrete.

4. The separate underpins should be linked together with dowel bars, excavations are to be limited to the base level of the new underpinning. Any sumps needed in the excavation should be away from the wall, and also filled with concrete.

5. No additional weight should be placed above the wall during the works.

4.0 Conclusion and Recommendations

Wall to be underpinned in 4 phases, creating a new base under the wall and in front of the wall, which will prevent lateral movement of the wall.

Phase plan in corner designed to provide maximum possible working room.

Adjoining bays to be doweled together, and any sumps required due to high ground water to be on the far side of the excavation from the wall.

Entire excavation is to be infilled in concrete, as hardcore/MOT1 would not provide the same lateral resistance as virgin soils.

The excavation is sufficiently far from the house that the excavation will not affect its footings.

Signed: .....

Andrew J Wiggett MA MEng CEng MIStructE

For and on behalf of Michael Aubrey Partnership Ltd

Signed: .....

John M Staves BSc(Hons) CEng FIStructE

Date: 10 October 2023

5.0 Method Statement

During works, do not park vehicles or store materials at the retained side of the retaining wall. Keep 2m clear from the wall to avoid any surcharge load.

Underpinning

1. Underpinning in bays marked A is to be carefully excavated below the wall, depth 600mm, width 750mm.
2. 4No. 600lg H16 bars to be positioned within the soil, each side, with min. 300mm embedment.
3. GEN 3/C20 concrete footing to be poured. Concreting to encapsulate the existing footing to avoid dry packing. Concrete to be well compacted with vibrating poker. Top of concrete level to be at or as close as possible to ground level, to maximise hydrostatic head on the footing.
4. Allow minimum 2-days cure.
5. Underpinning in bays marked B to be excavated
6. Repeat items 2 to 4 in the “B” bays, allowing 2 days to cure.
7. Underpinning in bays marked C to be excavated
8. Repeat items 2 to 4 in the “C” bays, allowing 2 days to cure.
9. Underpinning in bays marked C to be excavated
10. Repeat items 2 to 4 in the “C” bays, allowing 2 days to cure.
11. Reinstate finishes, gravel etc.

6.0 Appendix A – Remediation Layouts

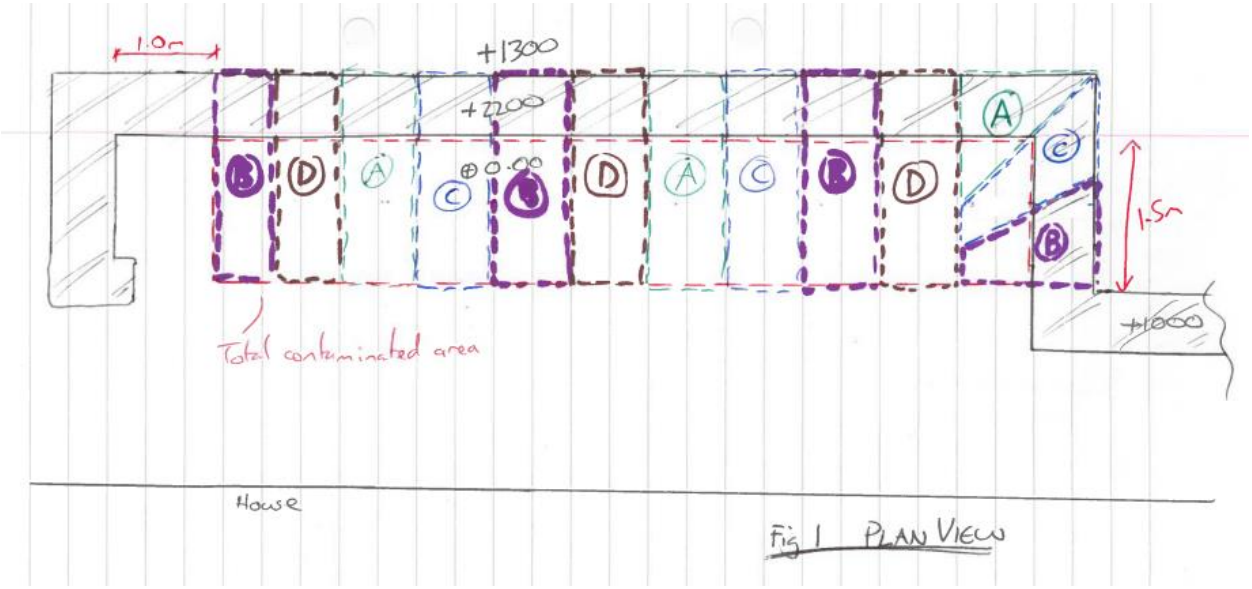


Figure 1 – Excavation and Underpinning Layout

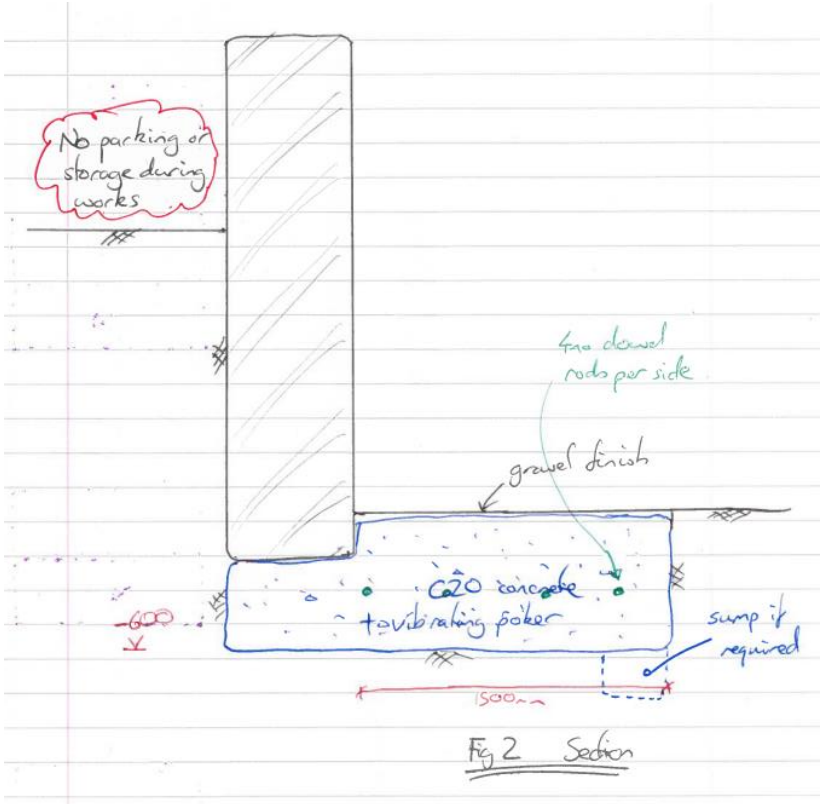


Figure 2 – Section showing underpinning dimensions

7.0 Appendix B – Photographs



Photograph A – General Affected Area Overview



Photograph B – General Affected Area Overview from upper level.



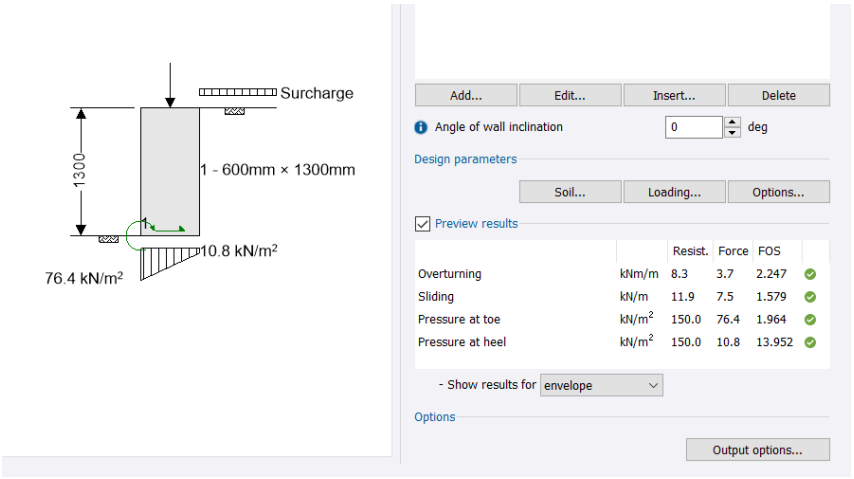
Photograph C – End view of wall – it is assumed that the blockwork may only a single block – 100mm thick throughout, and the remainder of the wall is stone. However below the level of the upper ground, the wall cannot be observed.

8.0 Appendix C – Calculations

Retaining wall in complete state – neglecting the below ground part of the wall, applying a dead load to the top of the wall to represent the weight of the wall above retained soil level. A surcharge of 2.5kN/m2 is also applied to the retained soil.

The wall is adequate under its own self weight. The wall does not rely on the wall's lateral strength, or the plan arrangement with return walls for its stability.

Calculation screenshots from Tedds v2.0.03, retaining wall design to BS EN 1997



Removing the surcharge, the factor of safety on resistance to sliding increases by roughly 25%. Approximately, a 4 phase underpin with no surcharge load will be no more onerous that the current arrangement.

