

WALLED GARDEN, TOTTENHAM HOUSE, WILTSHIRE

Structural Engineer's Statement – Use and removal of Foamed Concrete

RIBA Stage 4

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1.0 INTRODUCTION

This report presents Michael Barclay Projects Ltd.'s proposals, as Structural Engineer, for the infill material to the buried chamber to the head of the historic well located adjacent to North West corner of Building 14 of the Walled Garden within the Tottenham House Estate:

1.1 THE BRIEF

Our proposal is based on the planning drawings prepared by BLDA architects, the Client's brief and design discussions with the project team.

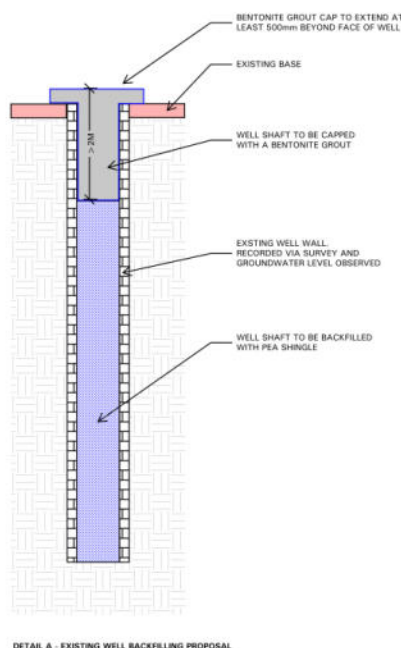
2.0 EXISTING STRUCTURES

The historic well is located adjacent to the North East corner of Building 14. The existing structure consists of a vertical masonry lined shaft, that sits beneath a vaulted masonry structure embedded into the landscape of the walled gardens. There is also an additional buried chamber adjacent to Building 16 which appears to be a more modern construction.

3.0 PROPOSED BACKFILLING

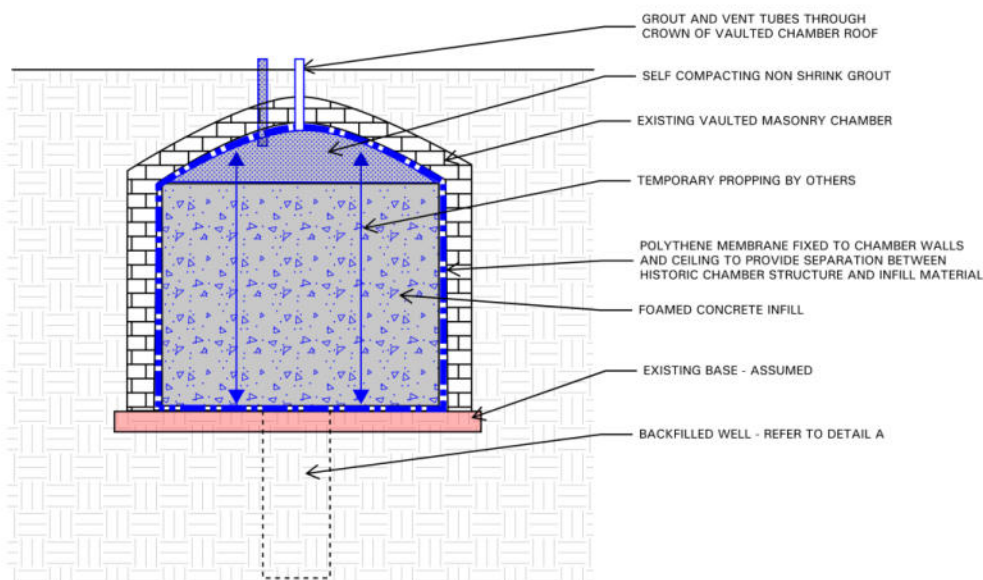
The well and chamber are proposed to be backfilled to secure the structure, eliminating the falling hazard whilst preserving the historic fabric for future. All proposed materials used for the backfilling are reversible and removable.

The well is to be infilled with pea shingle and capped with a bentonite plug to seal the well and prevent water ingress.



The vaulted masonry chamber is proposed to be filled with a lightweight foamed concrete, to ensure that the vaulted masonry roof is fully supported and can safely support vertical loads

applied above at ground level. The walls and ceiling of the chamber are to be lined with a polythene membrane to provide a separation layer between the foamed concrete fill and the historic fabric.



DETAIL B - EXISTING BELOW GROUND CHAMBER BACKFILLING PROPOSAL

The buried chamber adjacent to Building 16 does not have a well at its base. The chamber is to be lined and filled with foamed concrete following the same principles as described above for the well and chamber adjacent to Building 14.

Further details can be found in the below drawing.

10443-MBP-XX-XX-SK-S-0302-Well and Chamber Backfilling Proposals

4.0 FOAMED CONCRETE

Foamed concrete is a lightweight cellular concrete product with a relatively low strength that is commonly used as a void filling material and is well suited for filling underground tanks, chambers, culverts and voids. Foamed concretes are typically produced with at least 50% by volume air entrainment, upto approximately 80%. It is also commonly used in temporary works as it can be relatively easily broken out once it has served its temporary purpose.

A low strength foamed concrete would have a typical compressive strength of 0.5N/mm² at 28 days. To loosely relate this to soil mechanics it would be classed as hard/solid and would likely require pickaxe or pneumatic hammer/chisel to remove. Our proposals stipulate that all the existing historic surfaces would have a Polythene membrane fixed to them to provide a physical separation between the retained structure and the infill material, such that the air entrained concrete can be removed without causing damage to the historic fabric.



Foamed concrete is typically placed in layers upto 1 metre in thickness to ensure the air void structure is maintained. It could be possible to introduce additional separating membranes and or bursting tubes to assist with the future removal.

There is already a precedent for its use on The Tottenham House Estate where a basement void was infilled on the main house. More information can be found at the below link.

<https://www.cemex.co.uk/w/foam-concrete-used-in-tottenham-house-to-support-restoration>

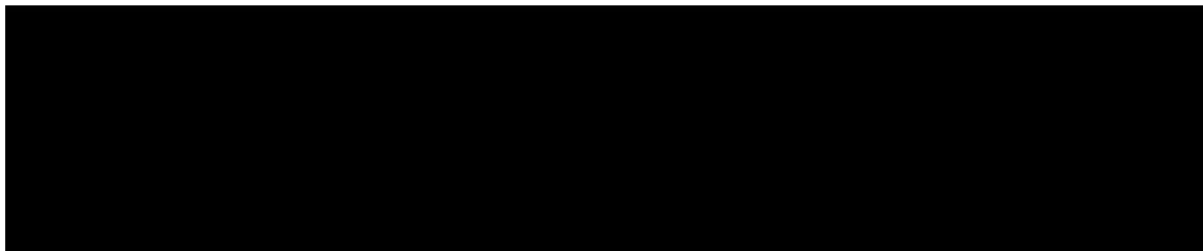


4.0 SUMMARY

Foamed concrete has already been utilised successfully elsewhere on the project in proximity to historic fabric. The material is regularly used in the construction industry for temporarily filling voids that require to be easily removed later in the construction sequence. By selecting a product with a very low design strength and the use of separating membranes to the historic fabric, it will be feasible to remove the foamed concrete from the chamber in future should it be necessary, whilst providing a sound support to and preserving the vaulted structure for the foreseeable future.

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For MBP Ltd
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