Project Name: Flat 1, 15 Wedderburn Road, London, NW5

CONSTRUCTION METHOD STATEMENT

This report contains the specific details of the excavation, temporary works and construction techniques to be employed

Ref No: **23569 Rev B**

Date: March 2014

FLUID.STRUCTURES ENGINEERS AND TECHNICAL DESIGNERS

Quality Management

Job No	23569
Client	Mr Dabiel Wagner
Location	15 Wedderburn Road
Title	Specific Details of Excavation, Temp Works & Construction Techniques
Document Status	Issue
Date	March 2014
Prepared By	DC
Checked By	JG

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Revision Status/ History

Rev	Date	Issue/ Purpose/ Comment	Prepared	Checked	Authorised
A	31/10/2013	Architectural Request	KM	DC	DC
B	21/03/2014	Plans Updated	KM	DC	DC

CONTENTS

1.0 INTRODUCTION

Fluid Structures have been commissioned by Mr. Dan Wagner to act as structural engineers for the proposed work at Flat 1, 15 Wedderburn Road, London, NW3 5QS.

The proposal includes the following structural alterations.

- Alterations at ground floor level internally to remove walls
- Removal of existing garage and conservatory to facilitate constructing a car park ramp to lower ground level.
- Alterations at the existing lower ground level to change the internal layouts and extend the space at the front to provide car parking.
- Construction of a new basement level incorporating a swimming pool and Cinema.

The work is to be carried out without any alterations at first and second floor level which are outside our client's demise and are occupied by different owners.

1.1 PURPOSE

The purpose of this report is to document the specific details of the excavation, temporary works and construction techniques to be employed in the excavation of the basement. This report must be read in conjunction with all relevant Architectural drawings (existing and proposed) by Clive Sall Architecture and the site investigation report by Geotechnical and Environmental Associates. The relevant report is "Site Investigation and Basement Impact Assessment Report" (J13235) October 2013.

This report responds to the requirements of the Royal Borough of Kensington and Chelsea Subterranean Development SPD (2009) in relation to Chapter 6 which sets out the requirements for construction method statements.

1.2 EXECUTIVE SUMMARY

This report highlights the outline structural philosophy for the refurbishment works at Flat 1, 15 Wedderburn Road, London, NW5.

The proposed work includes alterations at ground level, extension at lower ground level and construction of a new basement.

The anticipated ground conditions are predominantly Made Ground on the claygate member overlying London Clay. Groundwater was measured at a depth of 3 to 4 meters in the claygate member but the absence of significant sand bod horizons would suggest that the probability will be relatively low.

It is proposed that the basement is formed with a perimeter of non-displacement type piling, which would be installed prior to excavations commencing. A secant type wall is likely to be required to retain the perimeter materials and inhibit inflows of ground water into the basement. Excavations for the proposed basement structure will require support to maintain stability of the excavations and surrounding structures at all times.

The superstructure of the property is to be substantially retained during construction, including the existing masonry facades during the construction of the subterranean works. The refurbishment of the superstructure is therefore not anticipated to present any unusual challenges or risks other than ensuring that temporary support to it is maintained throughout the substructure works.

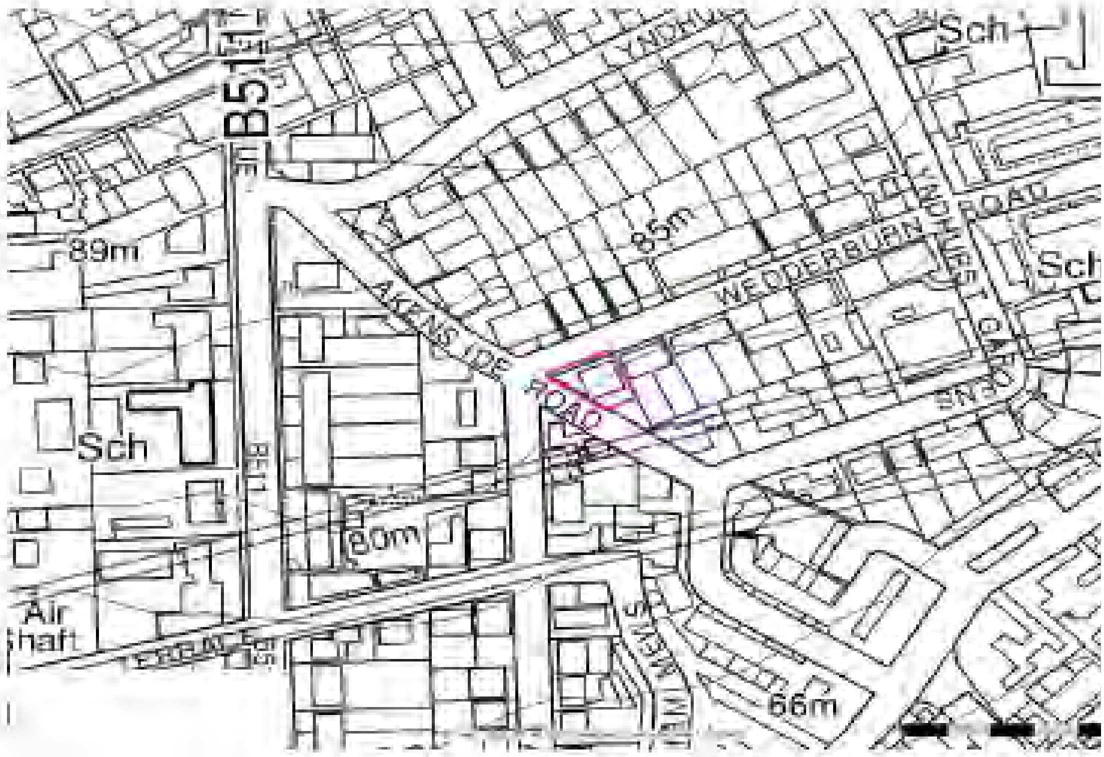
2.0 THE EXISTING SITE

The site is located in a residential area of the London Borough of Camden to the south of Hampstead Village. It is bounded to the east by No13 Wedderburn Road and to the south by a single storey building treading onto Akenside Road.

The existing house appears to date to the early part of the twentieth century and is predominantly built of load bearing masonry with timber floors. In some areas there is steel framing to facilitate the spatial arrangements and open up the living spaces. At ground level it appears that the house is built on corbelled brick footing on the naturally occurring brick earth material.

Our client's property comprises Flat No 1, which occupies the entire ground floor and lower ground floor of the building, together with the garden area and an adjoining single storey garage to the north west of the site.

Existing West Elevation



Site Location Map

View of Property from Wedderburn Road

View from Rear Garden Area

Single Storey Garage to North West of Site

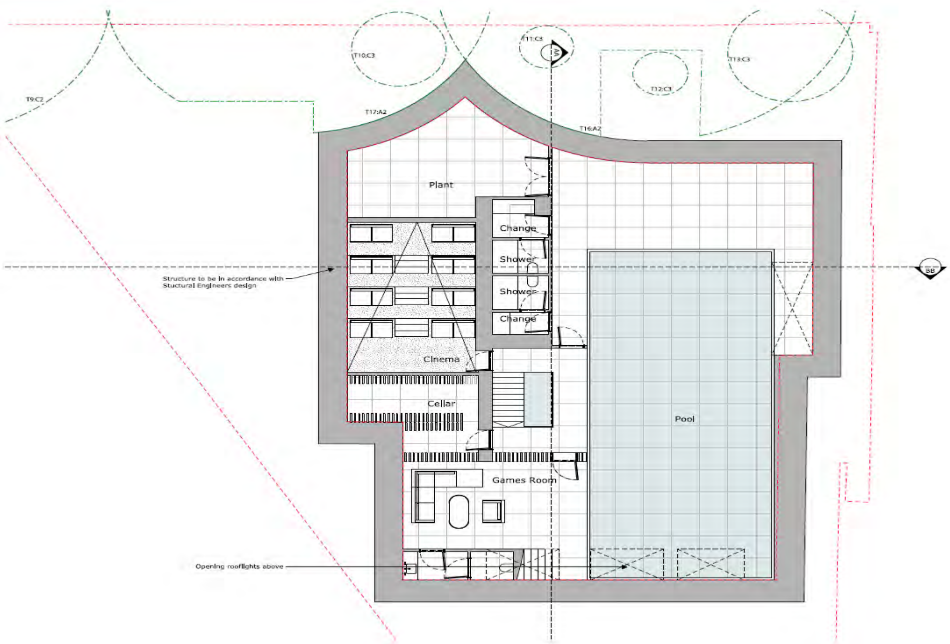
3.0 THE PROPOSED REDEVELOPMENT

The proposed redevelopment will involve alterations to the building at ground level and lower ground level with a new basement being constructed beneath the lower ground floor. At ground level, the garage and conservatory on the North West side of the property will be demolished to make way for an access ramp which will lead down to the lower ground floor car park.

The existing front areas of the ground floor level will be altered and the current study, store and bedroom areas will be replaced by a new kitchen and a void over the lower ground level. Towards the rear of the property new walk on glass roof lights will be introduced above the ground level to maximise the natural light.

At lower ground a significant car parking space will be excavated at the front of the property accessed by the ramp previously described. The old swimming pool space and adjoining facilities will be completely reconfigured to provide a new central staircase and three new bedrooms with bathroom and dressing room provision.

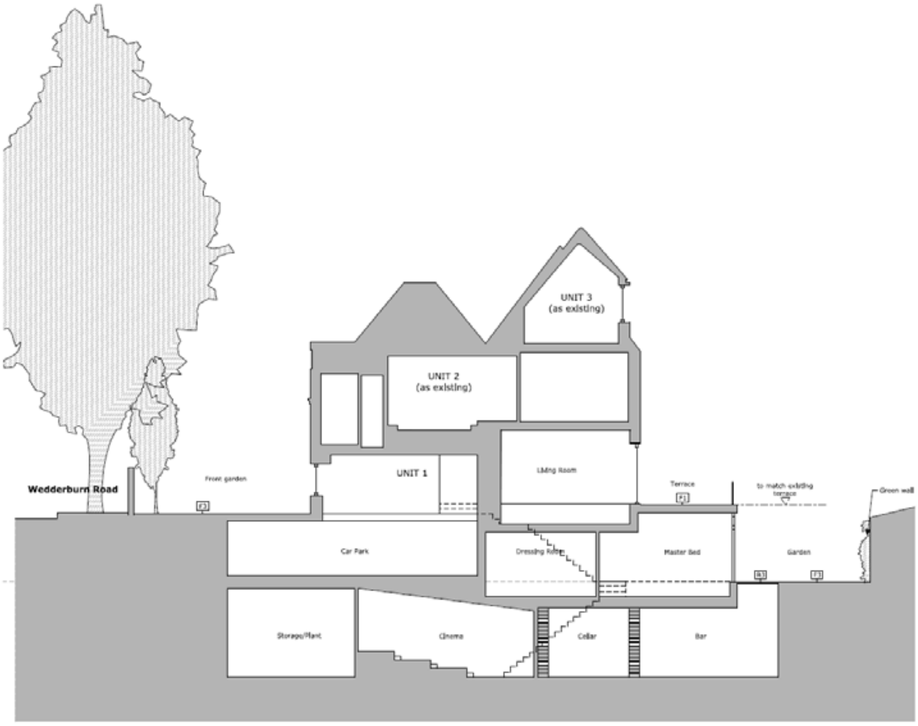
Beneath the lower ground area a new basement space is to be excavated which will provide pool, cinema and games room as well as a cellar and changing facilities.



Proposed Basement Plan

Proposed Lower Ground Floor Plan

Proposed Ground Floor Plan



Proposed Section AA

The sequencing of the work will be very important to maintain the stability of the house at all times and to ensure that the work is carried out safely without any impediment of the surrounding areas or the occupants at first and second floor level.

The following sequence describes the approach that will be taken in the execution of the work. It explores the excavation methodology and the temporary works that will be installed to safeguard the existing building and its neighbours. It also highlights the construction techniques such as secant piling and top down construction.

Stage 1 Internal Back Propping of House

In the first stage the house will be back propped from the underside of the first floor down to the existing lower ground level. This propping will provide additional redundancy in the house, increase its stability and robustness during the construction work.

Stage 2 Demolition of Garage and Conservatory

The existing garage and conservatory will be taken down to make space for piling to be commenced in the vicinity at a later stage.

Stage 3 Removal of Existing Obstructions Internally

Alterations will be carried out within the lower ground level space to remove walls which will obstruct the progress of the piling rig at a later stage. Where walls are load bearing they will be replaced with steel box frames to ensure that the load paths are maintained.

Stage 4 Internal Piling

Piling will be carried out in some areas within the existing house to form the external perimeter of the new basement level swimming pool. The piling will be secant type 450mm diameter carried out by a low head room rig with a mast height not exceeding 3.5 metres. In the existing swimming pool area of the house at lower ground level this will be fine as the headroom is in excess of 3.5 metres. In other areas, parts of the ground floor may need to be locally removed to accommodate the rig. It should be noted that the special access rig will be taken apart and lowered by crane into position and then reassembled. A suitable rig is shown in Figure 1 of the appendix.

Stage 5 External Piling

Once all the internal piling has been completed the external piling will commence. This piling is generally at the rear of the property and at the front plus around the new access ramp to the car parking.

Stage 6 Construction of Capping Beam

When piling has been completed, it will be necessary to tie the pile together at head level with a capping beam to provide a full continuous permanent tie.

Stage 7 Insertion of New Ground Floor Beams

On completion of piling and casting of the capping beam work can commence to insert beams to the underside of the ground floor and support the load bearing masonry. These new beams will be supported by spanning them between the newly inserted piles. The beams as likely to be steel sections which will need to be spliced together to facilitate access and their insertion. In addition it may be necessary to preload the beams by the use of harjaks or similar to ensure that the beams have picked up the load, thus minimising the likely hood of any settlement cracking above.

Stage 8   Insertion of Ground Floor Slab

After beams have been installed to support the load bearing elements, then new sections of the ground floor can be cast which are suspended and suit the new architectural arrangement.

Stage 9   Excavation of Lower Ground

Once the ground floor has been completed, excavation can commence beneath the floor to remove material and open up the new space for the car parking. The excavated material will need to be removed from site and it would be sensible to set up a modular belt run so that the material can be removed easily to skips for disposal. At this time the dig for the vehicle access ramp can also be carried out.

Stage 10   New Lower Ground Level Slab

On completion of the excavation for the lower ground level. It will be necessary to cast the new lower ground floor slab. This slab will be in reinforced concrete spanning between primary reinforced concrete beams which are in turn supported on the new piled perimeter walls or internal piled walls. The central staircase void will be maintained as this will provide access for the later removal of materials from the basement space beneath. The new lower ground floor slab will be tied to the piles by use of resin anchors and it will provide suitable propping to the piles by means of its diaphragm action.

Stage 11   Excavation of Basement Void and Construction of Basement Level Slab

Work commences on the removal of material beneath the new lower ground slab to form the new swimming pool basement space. The material is excavated to the new formation and a new basement slab is cast on compressible material such as Cellcore to take account of likely heave. The slab is anchored around the perimeter and also internally to piles to provide restraint against the buoyancy force associated with ground water.

As part of this work the new swimming pool is also constructed most likely from reinforced concrete with hydrophobic additives.

Stage 12   Gunnite to Walls

Once the basement slab has been cast, then work can commence to line the secant piled wall with a 150mm of gunite concrete which will be sprayed on to a pinned up mesh on the pile faces. This gunite will provide a smooth face for further finishing and will also provide additional resistance against the ingress of ground water.

4.0 CONCLUSION

The investigations by Fluid Structures and GEA show that the existing building can be refurbished and extended without adversely affecting or impacting on the surrounding areas or property.

It is also concluded that the proposed basement will not result in a significant change to the ground water flows regime in the vicinity of the proposal or on the amount of annual recharge into the Claygate Member.

The basement will need to be excavated in a carefully considered manner and it is likely that it will be necessary to carry out a secant type piling operation to retain the surrounding material and prevent water ingress.

5.0 FLUID STRUCTURES AND NEW BUILD RESIDENTIAL PROJECTS

Fluid Structures is one of the UK's leading design oriented structural engineering practices. The firm was established in 1999 and has gained an exemplary reputation for the quality of its engineering design. Fluid has been commissioned to work at the Science Museum (twice), and the Royal Festival Hall, and has acted as a consultant to the BBC. The sectors in which the company works regularly include education, retail, residential and commercial. Projects to date have ranged in value from £500,000 to in excess of £100 million.

Fluid's approach is characterised by a desire to develop an engineering solution that complements the architectural aspiration whilst also responding to the client's core requirements and maintaining a sensitivity to the priorities of other stakeholders, such as Planning Authorities; Conservation Officers; the Public and the End User.

The practice considers itself to be a technical design house and offers a number of areas of expertise that include:

- The appraisal and refurbishment of existing buildings and structures
- The design of complex basements and substructures
- Design of façade engineering including double façades and solar shading
- Value engineering reports on potential developments
- An in depth knowledge of construction materials including steel, concrete, timber, masonry, glass, aluminium and fabric
- Sustainable design solutions: working within the constraints of individual projects to minimise the carbon footprint of buildings and maximise their positive impact in relation to the environment, the economy and society at large
- The use of 'low tech' vernacular materials such as brickwork and structural timber and as an alternative to steel frames on insitu concrete
- Expert knowledge on the application of best practice in low energy building design to meet the requirements of BREEAM and the Code for Sustainable Homes.

Fluid's experience demonstrates the practice's ability to deliver a project such as;

Clarendon Close

Project cost £ confidential; Architect: Andy Martin Associates

This project involved the construction of a rear extension to a 3 storey residential building in West London. The roof of the extension consists of toughened glass barrel vaults which are supported on steel valley beams. The system is tied against lateral movement by means of metal frames which are manufactured to a profile to suit the new glass doors.

El Ray, Dungeness

Project cost £ 200,000; Architect: Simon Conder Associates

The beach house comprised a timber superstructure supported on a ground-bearing reinforced concrete raft. The timber roof and walls comprised plywood decking and sheathing fixed to STEICO timber I joists and I studs. The glazed elevation facing the beach was formed with two, parallel, 8m span KERTO timber portal frames to allow the sliding/folding glazed doors to open full width. The internal wall and ceiling surfaces were clad with birch plywood and the external wall and roof surfaces were clad with Itaube planks.

Huttons Farm

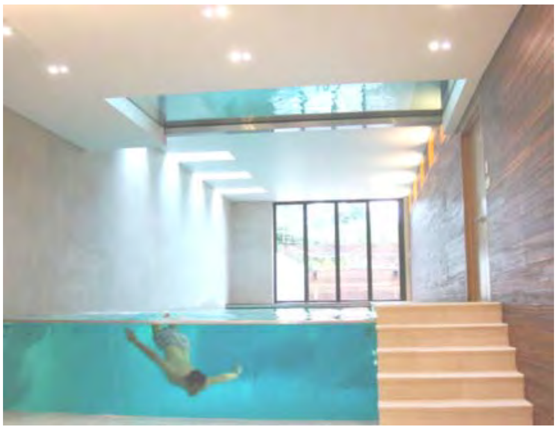
Project cost £ 18.0 million; Architect: Giles Quarme and Associates

Huttons Farm is a traditional Chiltern's Farm complex consisting of a number of early Nineteenth Century timber barns surrounding a brick and flint farmhouse. It is located in an Area of Outstanding Natural Beauty. The development includes an underground art gallery and has an estimated contract value of £18 million.

Castelnau Pool

Project cost £ 3-4 million; Architect: Brybuild Ltd

The work involved the refurbishment of an existing detached property in South West London. A new extension and basement were added to provide swimming pool leisure facilities. The shell of the pool enclosure and basement were formed using reinforced water-proof concrete. The external roof of the pool extension superstructure has a grass roof with strategically located roof lights. The pool has a glass wall end designed to cater for the water pressure and the dynamic loadings exerted by swimmer kicking off the wall.



Eastcliff Two Cottage

Project cost £ 1.0 million; Architect: Simon Conder Architects

This project sees the construction of two small houses overlooking the sea in Porthtowan, Cornwall. Whilst the primary structure of the buildings comprises of dense masonry and concrete perimeter walls and floors, to achieve thermal mass; the super-insulated facades is clad in timber, possibly harnessing the striking burnt-timber visual effect of 'Thermowood'. A narrow terrace to the front of each house utilises slatted timber floors, supported off an exposed timber frame. This two-storey frame is constructed in a durable hardwood, generating an elegant and uncluttered front elevation

CIVIC TRUST AWARDS

Fife Road

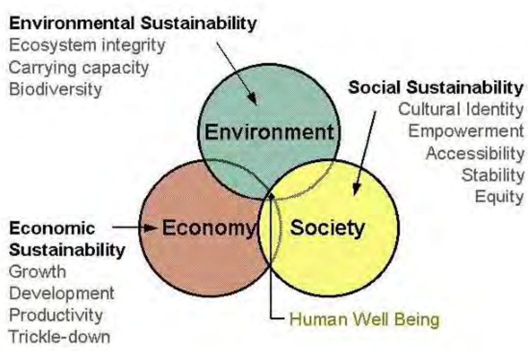
Project cost £ circa £800,000; Thompson and Baroni Architects

This project consisted of the refurbishment of an existing detached villa overlooking Richmond Park. In addition, the work involved the construction of a new family room at the rear of the property engaging the garden space. The single-storey structure was detailed very carefully both structurally and architecturally to maximise the garden views and simplify the sliding glass walls.

6.0 SUSTAINABILITY

Recent years have seen a much more widespread appreciation by the public and government of the importance of environmental issues. Similarly, in the building profession, the significance of good building design as a way to achieve sustainable living and working has become universally acknowledged.

In the UK the construction and, more importantly, the use of buildings represents a major proportion of national energy consumption, almost all of which is fossil fuel derived. This is not meeting our needs without compromising the ability of future generations to meet theirs. The knowledge and technologies exist however to enable very low or even zero carbon operation of buildings, whilst the energy embodied in building fabric can also be dramatically reduced by careful design and specification by the design team. Indeed the issue of embodied energy can be addressed in part by good spatial planning and structural design to ensure flexibility to suit future re-use of the building and its fabric.



There are other design issues which can play a key role in passively reducing the energy demands of a building. Locating elements with high thermal mass and large surface area, such as heavy walls or slabs, inside the thermal envelop so that their high specific heat capacity moderates diurnal temperature fluctuations. This can be particularly effective in moderating summer overheating, thereby avoiding the need for air conditioning, itself four times more energy demanding per kW than space heating. Fluid Structures appreciate that often the solution with the lowest life cycle carbon footprint is not necessarily that with the lowest embodied energy.

Fluid Structures have an established record in the innovative use of materials and constantly seek to explore new engineering applications of established materials. Innovative use of materials is a key area for addressing the challenges presented by low energy building design. For instance large areas of glazing can - when correctly located, shaded, and specified, - provide significant winter solar gains, year round natural lighting, but still have gains which are moderated against summer heating. Fluid has extensive expertise in the use of structural or large area glazing in buildings, including an Institution of Structural Engineers Special Award.

When all the passive measures possible have been taken to reduce the demands of the building on the external environment there are various sustainable technologies now available to support the use of the building. Projects underway include closed loop ground source heat pumps, evacuated tube solar thermal arrays, vertical axis wind turbines, and photo voltaic (PV) arrays. The latter point is an area where technology is developing fast, with building integrated PV systems now available including PV louvers, thin film PV sheet roofing, PV roof tiles, and photovoltaic cells integrated into double glazed units.

APPENDIX A

Details of Piling Rig

- Figure 1 – Details of Piling Rig proposed for secant piling

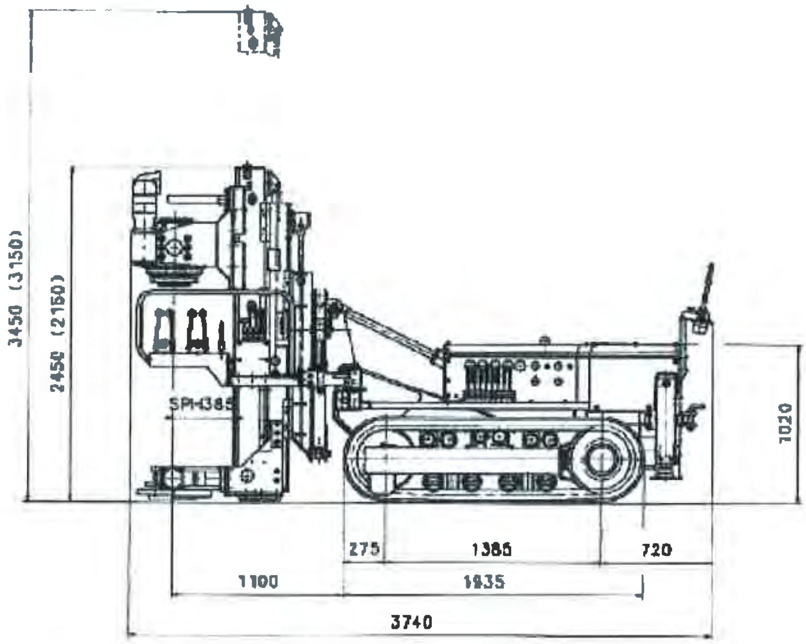
Structural Drawings

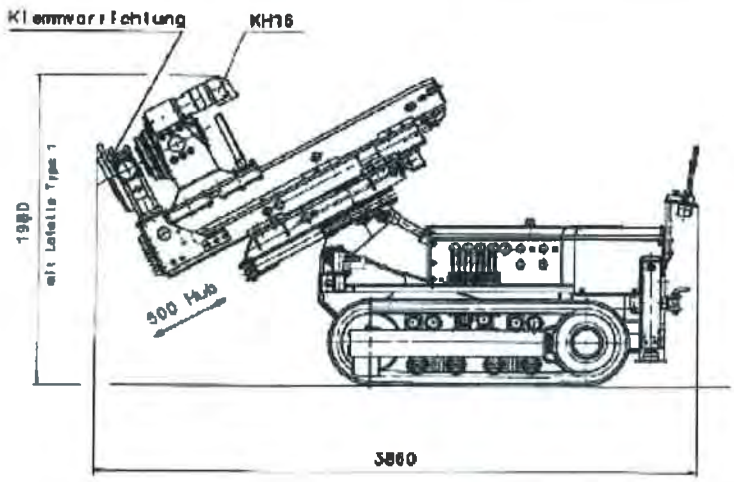
- SK/10 STAGE 1 – Back Prop House
- SK/11 STAGE 2 – Existing Garage & Conservatory
- SK12 STAGE 3 – Internal Alterations to Facilitate Piling Rig
- SK13 STAGE 4 – Internal Piles Pre Installed
- SK14 STAGE 5 – External Piling Carried Out
- SK15 STAGE 6 & 7 – Capping Beam Constructed & New Ground Floor Beams Inserted
- SK 16 STAGES 8 & 9 – Ground Floor Slab Constructed and Excavation of Lower Ground
- SK17 STAGE 10 – Cast Lower Ground Slab
- SK18 STAGE 11 &12 – Basement Excavated / Basement Slab Cast Gunnite Applied to Walls

Proposed Floor Plans

- SK/100 Proposed Ground Floor
- SK/101 Proposed Lower Ground Floor
- SK/102 Proposed Basement Level

KLEMM 702





*Technical specifications are subject to modifications without prior notice and incurring responsibility for machines previously sold. The shown machines may have optional equipment. Error and misprints reserved.

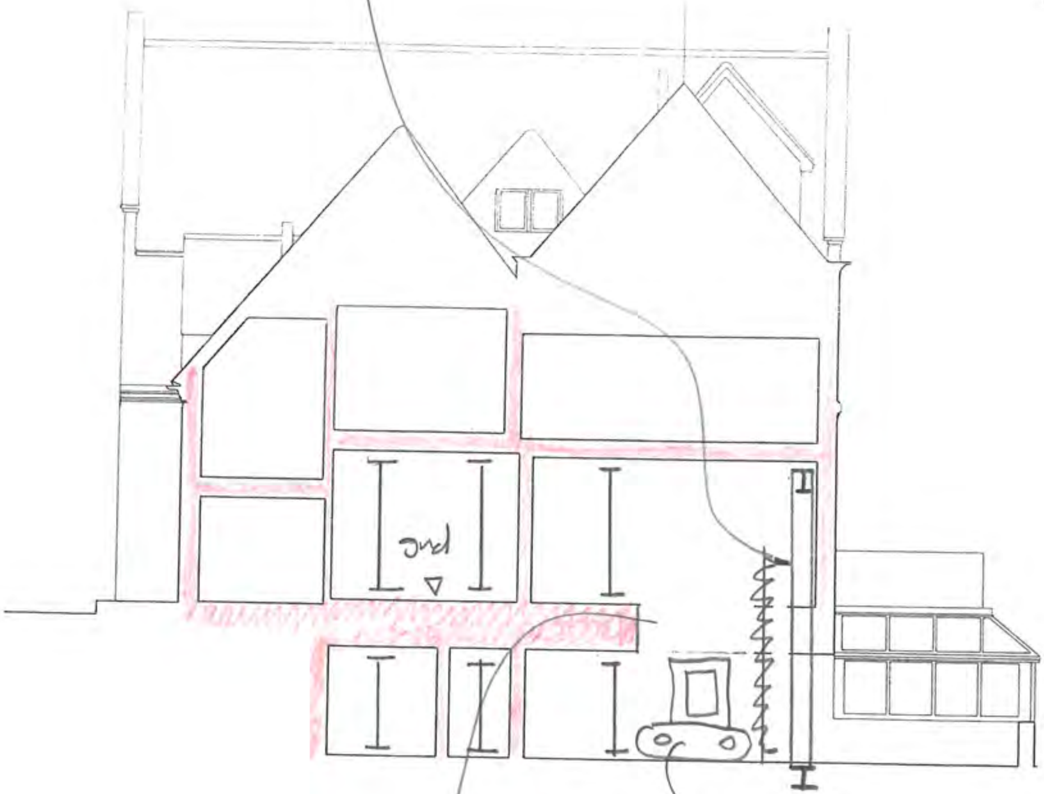
STAGE L
BACK PROP HOUSE

Existing Garage &
Conservatory on
Western side of house
to be carefully taken down
(Note – not shown on this section)

STAGE 2
EXISTING GARAGE
& CONSERVATORY REMOVED

SK/11

Box frames Inserted as necessary to allow for removal of any ground floor load bearing structure obstructing the rig.

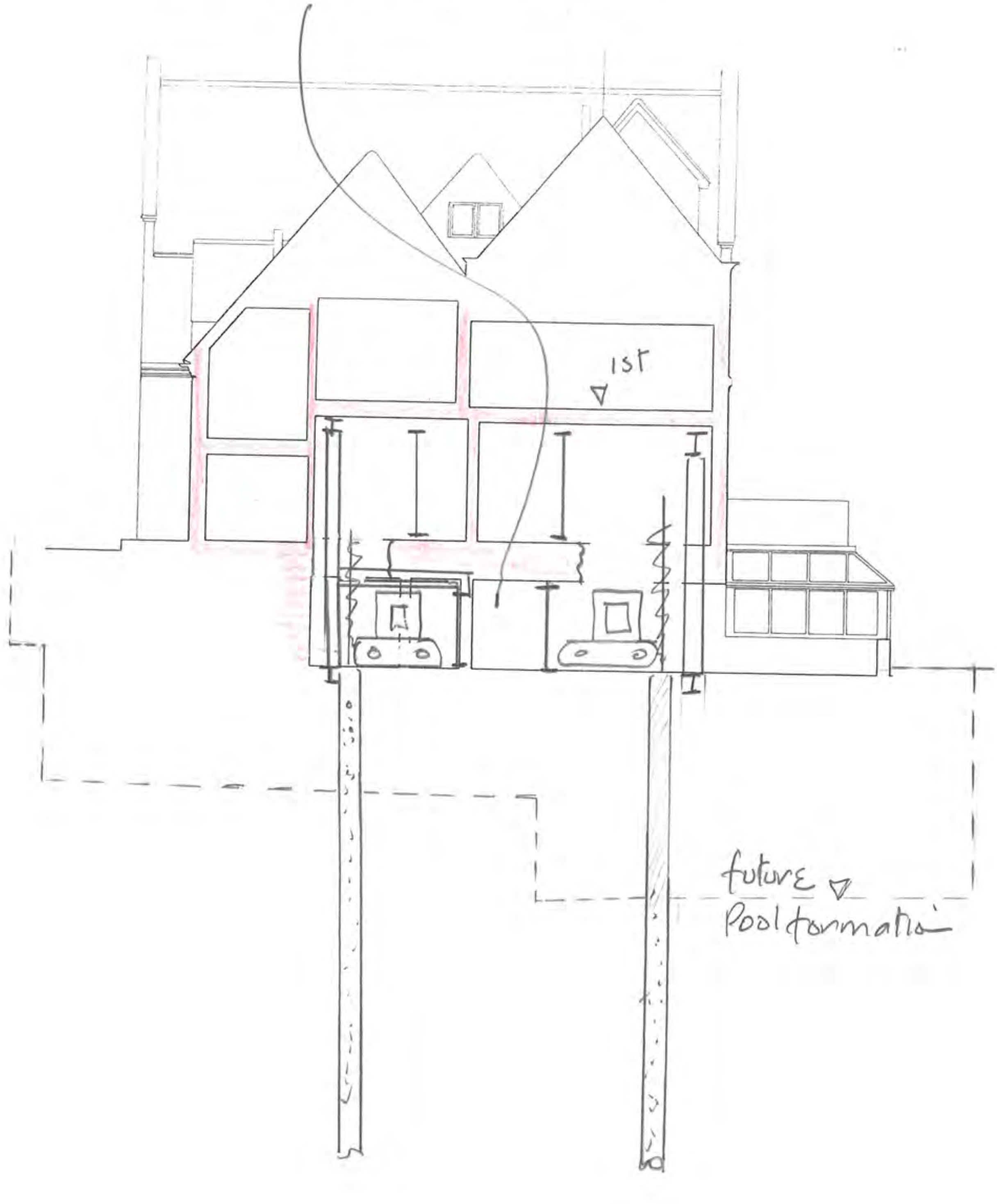


Piling Rig

ground floor locally removed to facilitate the rig.

STAGE 3
INTERNAL ALTERATIONS TO FACILITATE PILING RIG

Piles are installed within house by Rig operating from lower ground level. Some piles may be dry cast to get down to appropriate level, ie tension piles to swim pool.

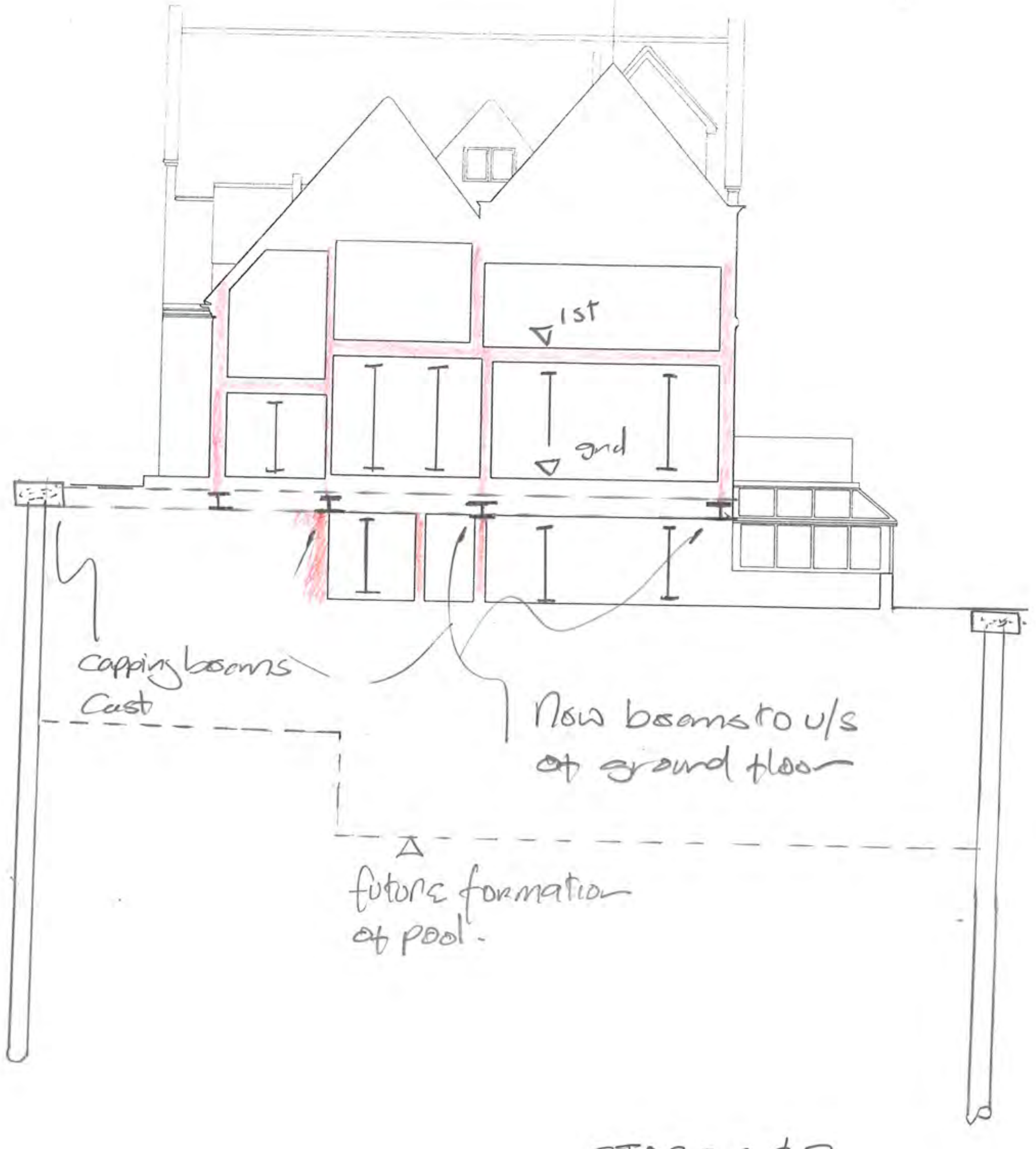


STAGE 4
INTERNAL PILES ARE INSTALLED

SK/13

STAGES

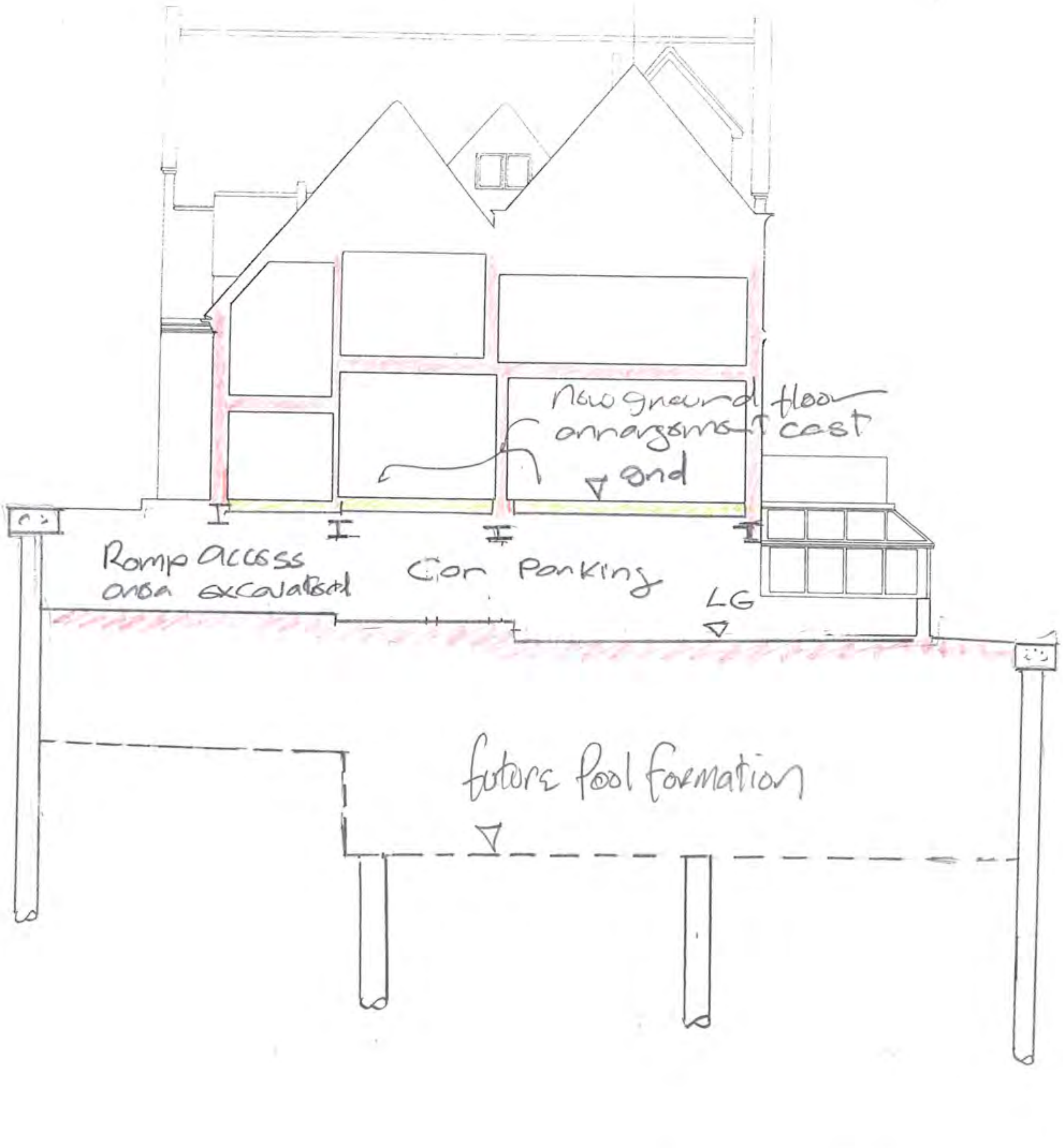
EXTERNAL PILING CARRIED OUT



STAGE 6 & 7

CAPPING BEAM
CONSTRUCTED &
NEW GROUND FLOOR
BEAMS INSERTED

SK/15



STAGES 8 & 9

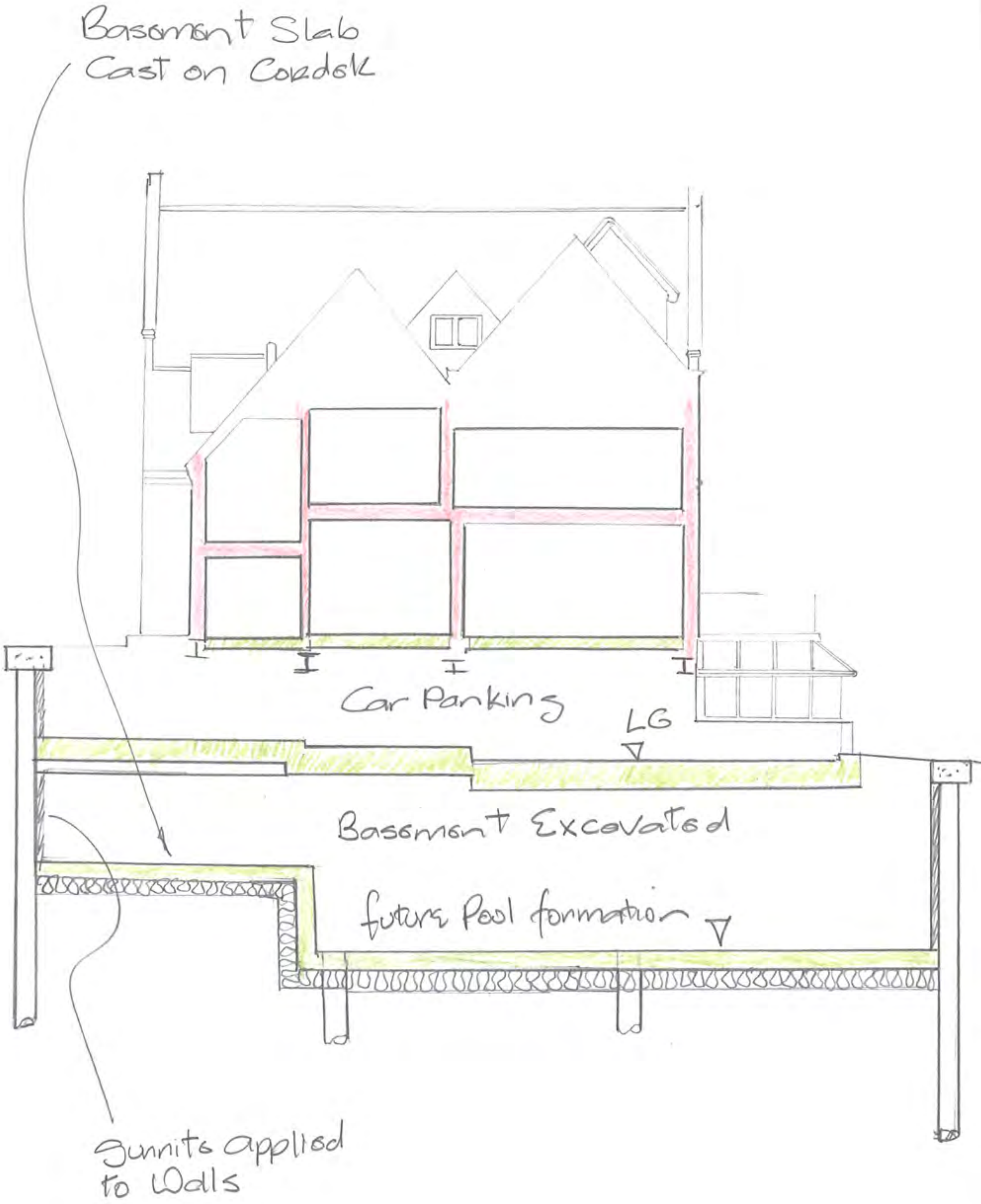
GROUND FLOOR SLAB CONSTRUCTED AND EXCAVATION OF LOWER GROUND

SK/16

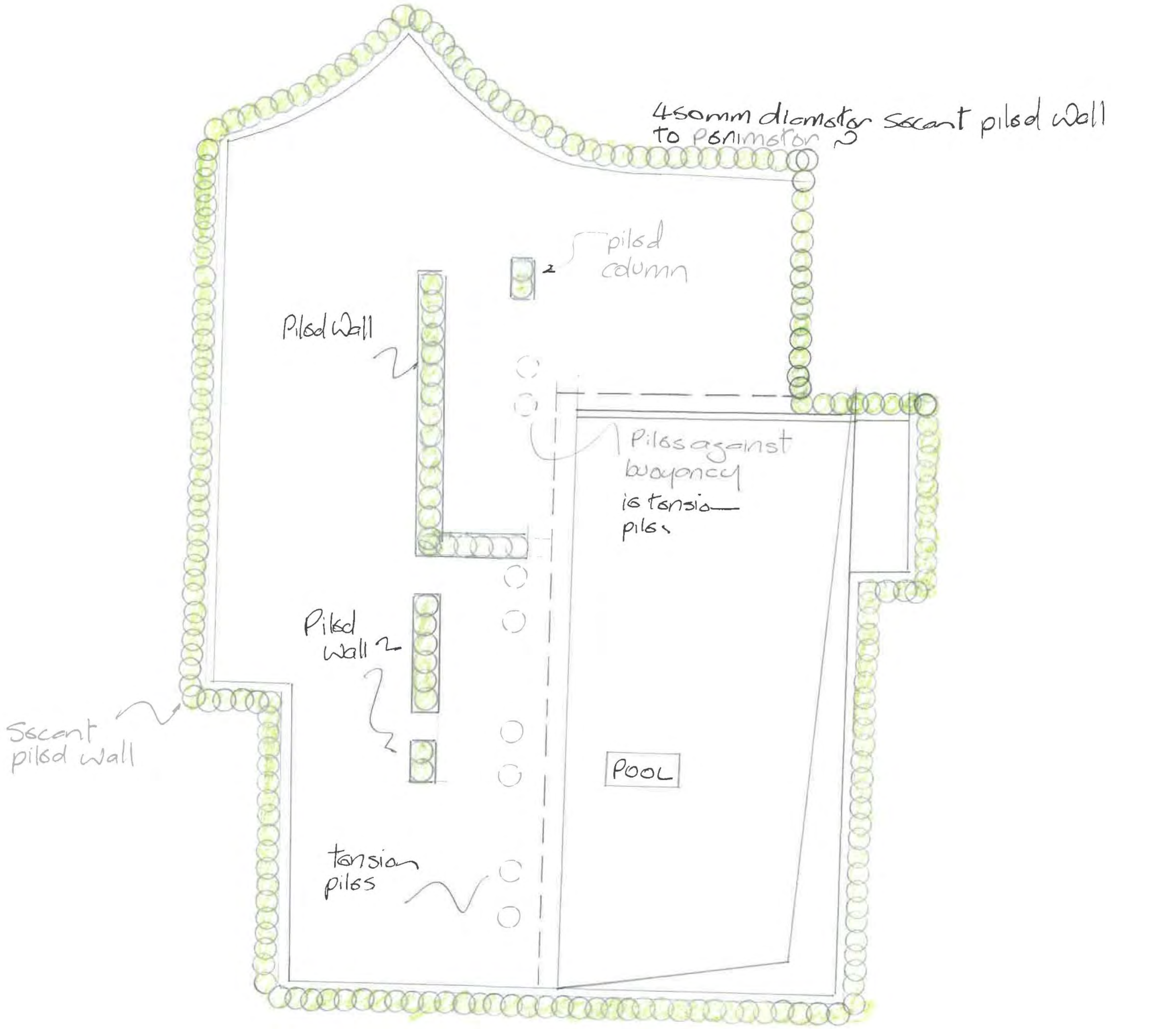
lower ground level
slab is cast

STAGE 10
CAST LOWER
GROUND SLAB

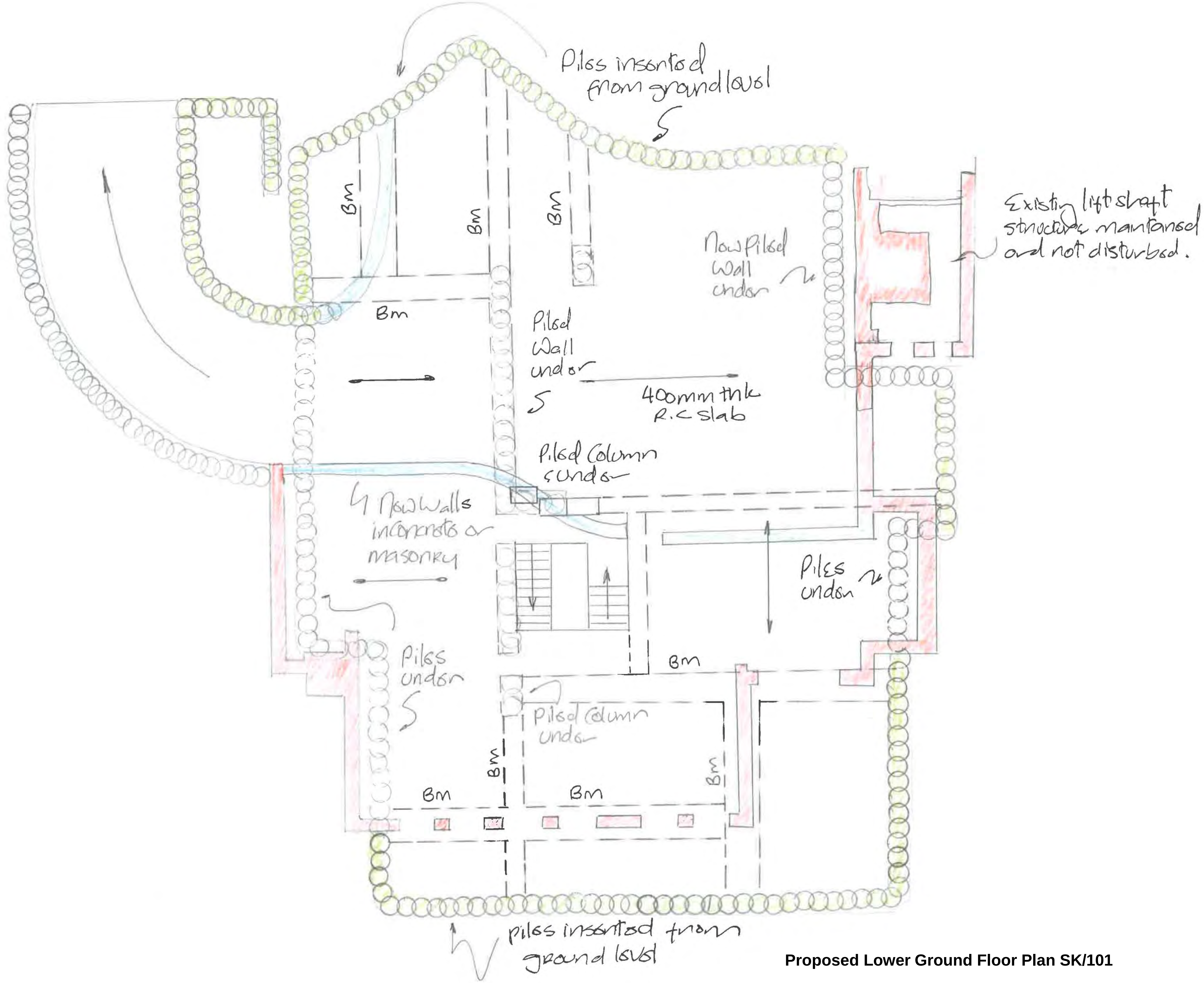
SK/17



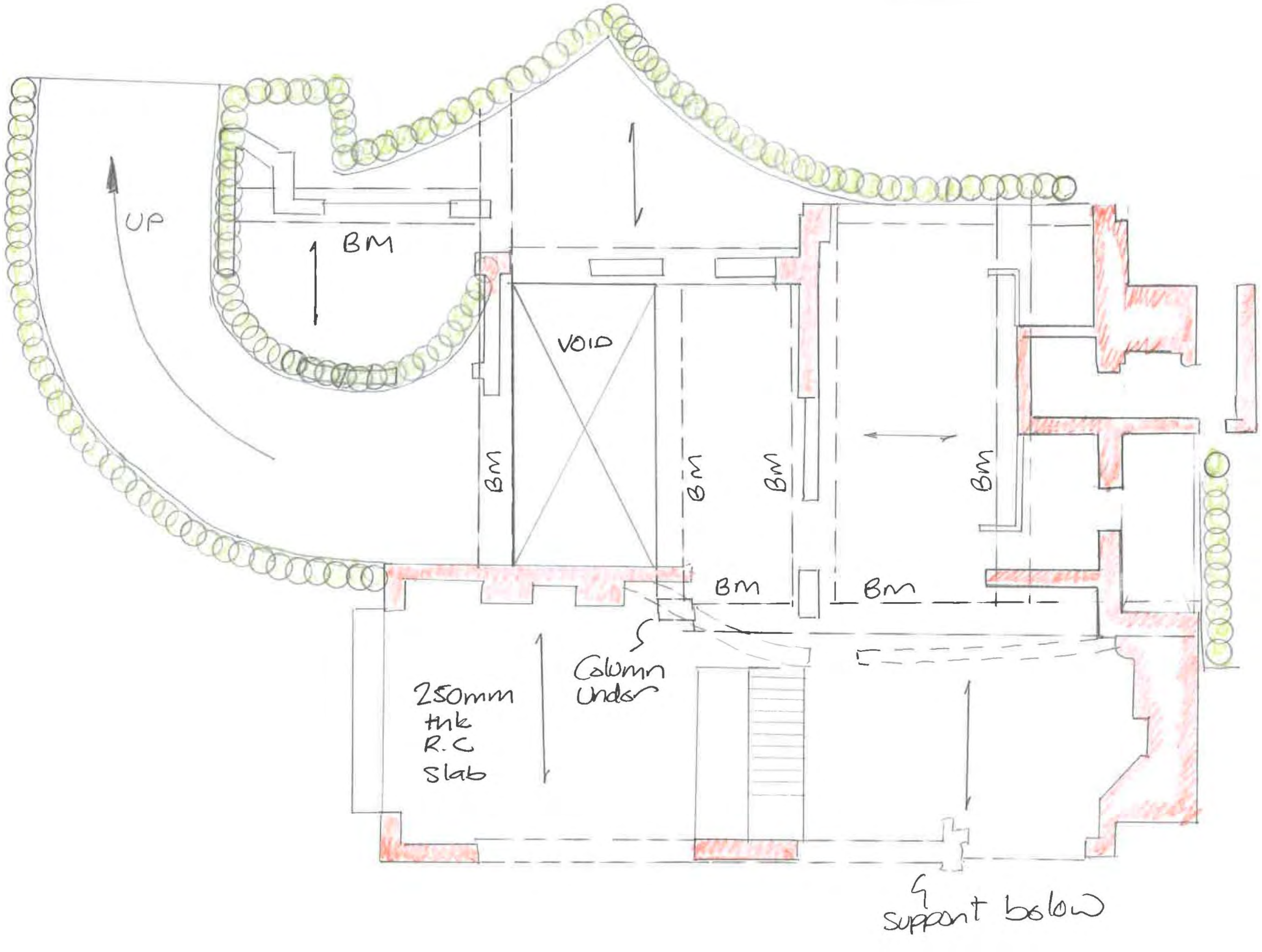
STAGE 11 & 12
BASEMENT EXCAVATED
BASEMENT SLAB CAST
GUNNITE APPLIED
TO WALLS
SK/18



Proposed Basement Plan SK/100



Proposed Lower Ground Floor Plan SK/101



Proposed Ground Floor Plan SK/102