Project No. 1582	Revision [A]: November 2017

93 Redington Road Structural Method Statement to accompany BIA

constructure

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1. INTRODUCTION

Constructure Ltd were appointed in March 2017 for structural advice on the proposed refurbishment and basement extension of 93 Redington Road. This Construction Method Statement report has been produced to accompany the Planning Application submission by Formation architects, describing the scope and nature of the structural works. It details the outline approach that will be taken to safeguard the integrity of adjacent buildings, highways and services, in particular with the construction of the proposed lower ground floor structures. In conjunction with this, a BIA and GMA has been carried out by Chelmers Ground Investigation Ltd.

Local ground conditions have been assessed with targeted site investigations, scoped to ensure site conditions are known. This assists to reliably inform the structural design and construction sequence. This has been conducted to support the assessment of the proposed basement extension works.

Please refer to the appendix for a list of structural engineering drawings which support this report and show the shell and core basement works in detail.

1.1 THE EXISTING PROPERTY

Situated within the residential area of West Hampstead, the property is of 19th century origin, a detached house used as a single dwelling unit. The house is set across 3 levels, with a small cellar area to the north side of the rear, adjoining the large garden. To the front of the property is a large sweeping driveway, with gated access from Redington Road.

Constructure have conducted a site walkover during the early scheme development stages, with the SI works carried out on the 24th May, during which an additional walkover was carried out.

1.2 THE PROPOSED WORKS

It is proposed to construct an extension to the existing cellar, which will extend around 4m into the garden area.

The existing cellar is also to be excavated to improve the headroom and comfort for the occupiers. This will result in a general reduction in lower ground floor level of some 800mm.

To the upper levels, a number of layouts alterations are to be made, but these are not considered relevant for the purposes of this report.

2. DESK STUDY

2.1 SITE HISTORY

Along with conducting a site walk-over to inspect the general site conditions and setting, a historic site usage search has been conducted.

[FIGURE 1] HISTORIC MAPS SHOWING POSITION OF SITE UPON UNDEVELOPED LAND IN 1920, AND DEVELOPED REGION IN 1934

The OS map from 1920 [upper map, Figure 1] shows the west side of Redington Road largely undeveloped, with the east side already fully populated with new residential buildings. These do not appear on the 1896 map, but are all present on the 1915 map, suggesting construction around the turn of the century.

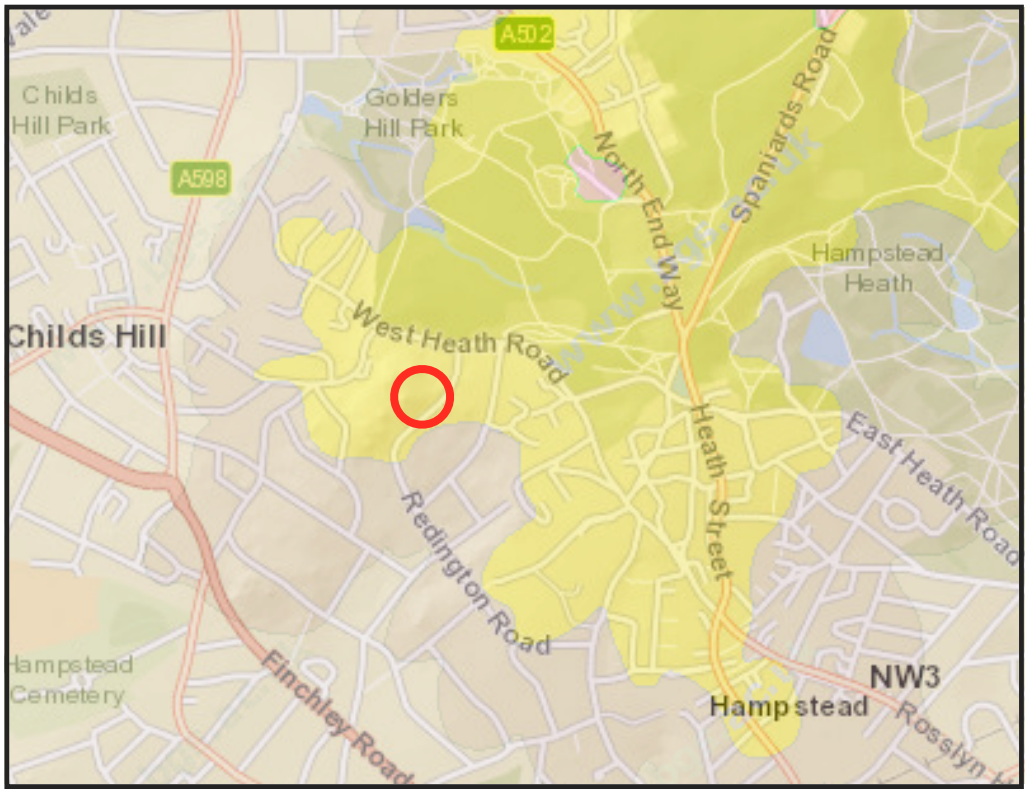
The lower map of Figure 1, published in 1934-1936, shows this open land to have been partially developed as a row of detached houses. At this time there were still undeveloped plots of land to the west side of Redington Road, with a small woodland area to the east of Phyllis Court.

It is therefore apparent that the land upon which 93 Redington Road was constructed between 1915-1934 was undeveloped until that time, and considered therefore that the historic land use presents no concerns of great contamination risk.

The historical maps as far back as 1864 show no indications of any watercourses local to the site, only a small footpath leading to a presumed farmstead to the west of West Heath.

2.2 LOCAL GEOLOGY AND HYDROLOGY

From geological maps for the area [Figure 2], the ground conditions (which have been confirmed through targeted site investigations in the form of trial pits & a single borehol) are known to comprise a layer of Made Ground of around nominal thickness onto Bagshot Sands, which in turn overly the London Clay.

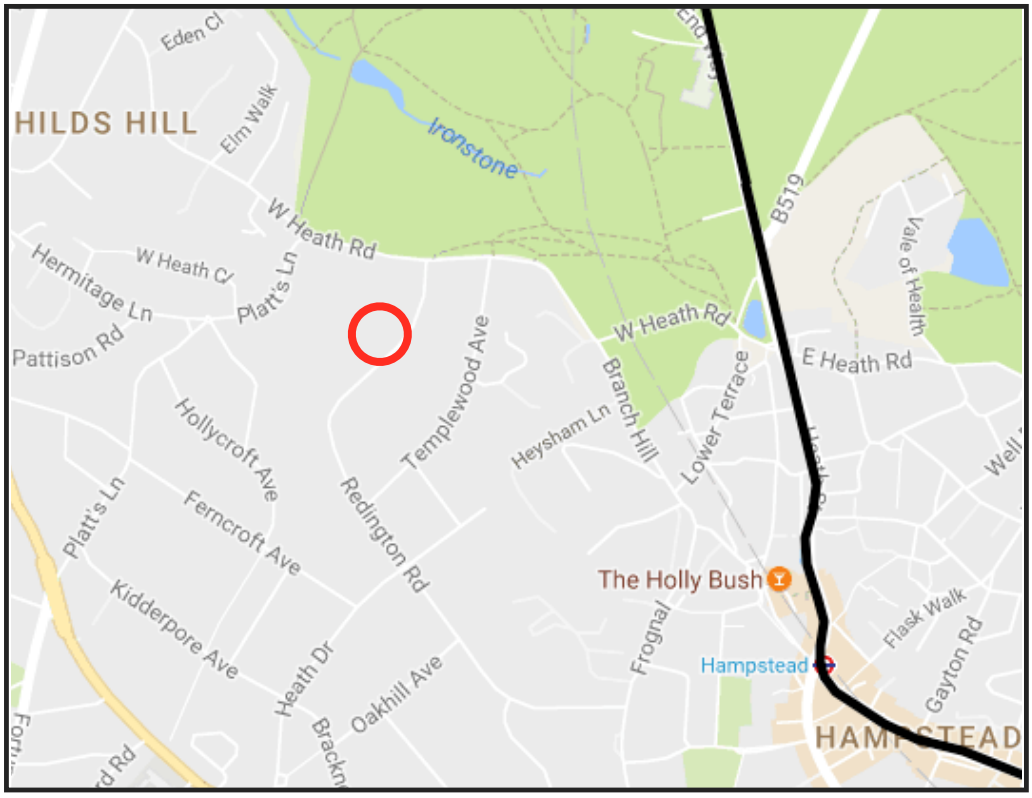


[FIGURE 2] LOCAL GEOLOGICAL MAP

2.3 LONDON UNDERGROUND AND RAILWAY LINES

From the map with underground lines overlaid [Figure 3] it can be seen that the site is sufficiently far from London Underground infrastructure, with the closest line being

over 500m away from the site boundary to the east. Therefore no consultation with the London Underground or TfL Asset Protection team is considered to be necessary.



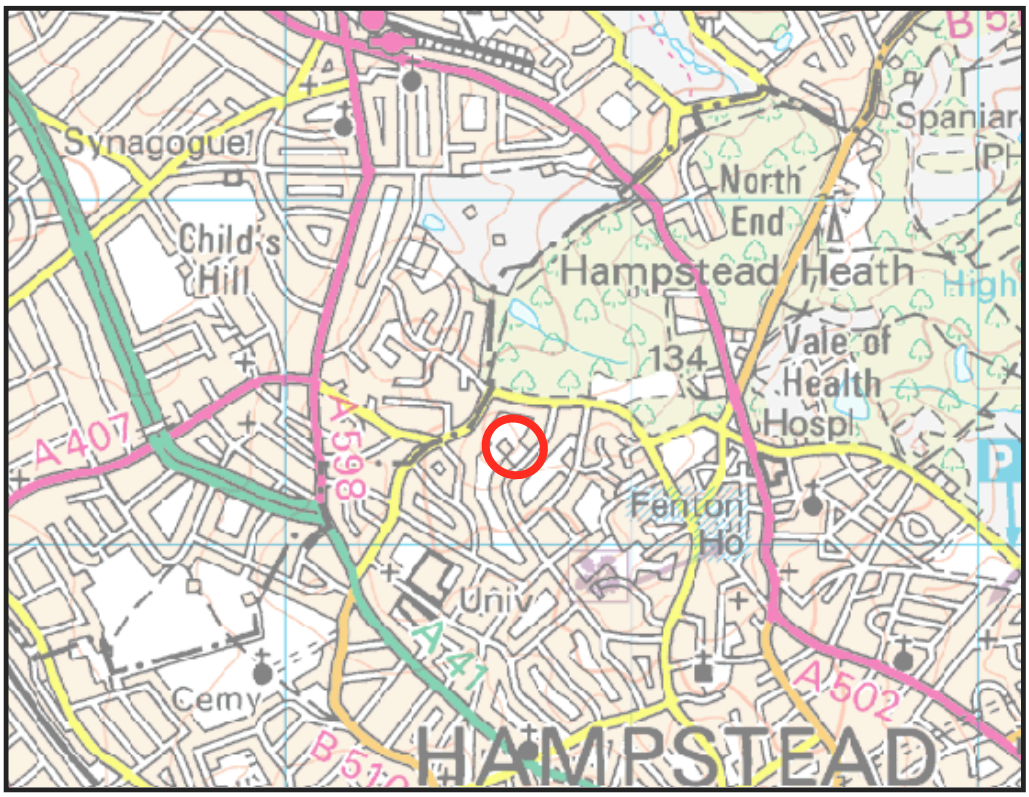
[FIGURE 3] LOCAL TRANSPORT TUNNELS

2.4 FLOOD RISK

With reference to the Environment Agency's Flood Risk map, it can be seen that the site lies outside any flood risk zones. The site is on higher ground than the areas that historically experienced flooding most recently in 1975. As such, a Flood Risk Assessment is not deemed required. Refer to section 5.1.

2.5 EXISTING UTILITIES AND UNDERGROUND SERVICES

Existing services including sewers and drainage runs will be identified prior to commencing the works. The proposed new drainage is anticipated to be connectable to the existing outfalls to the public system.



[FIGURE 4] EA FLOOD RISK MAP

3. STAGES 1 & 2: SCREENING AND SCOPING ASSESSMENTS

Camden Planning Guidance CPG4 sets out the assessment requirements, the initial stages being a screening and scoping assessment, the checklists for which are addressed below. These inform the further desk study in subsequent sections.

3.1 STAGE 1: SCREENING

SCREENING CHECKLIST: SUBTERRANEAN GROUNDWATER FLOW			
CONSIDERATION		RESPONSE	JUSTIFICATION
1A	Is the site located directly above an aquifer?	NO	BGS records indicate Bagshot sands/gravels overlying clay
1B	Will the proposed basement extend beneath the water table surface?	NO	Whilst the overlying ground is permeable, the site lies atop a steep hill, and there is therefore a very low risk of water issues in the ground. This has been confirmed with standpipes and monitoring
2	Is the site within 100m of a watercourse, well (disused/ used), or potential spring line?	YES	The lost rivers of London maps indicated there may be the beginnings of a watercourse nearby, but this has been shown not to lie within the site of the proposed basement
3	Is the site within the catchment of the pond chains on Hampstead Heath?	NO	The property is located topographically down-stream of the pond chain
4	Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	NO	There will be a small increase in hardstanding, of around 15m2
5	As part of the site drainage, will more surface water (eg rainwater and run-off) than at present be discharged to the ground (eg via soakaways and/or SUDS)?	NO	As per the above, no material additional hard paved areas are proposed. The site underlain with London Clay means that the drainage required to continue to be connected to the public sewer system

6	Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to or lower than the main water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?	NO	The excavations proposed are less than a metre lower than the existing lower ground floor level, and will be similar therefore to original floor levels to the adjacent property. No groundwater has been encountered in the trial pits or borehole

SCREENING CHECKLIST: SLOPE STABILITY			
CONSIDERATION		RESPONSE	JUSTIFICATION
1	Does the existing site include slopes, natural or man-made, greater than 7°, or 1 in 8?	NO	Longitudinal fall (front to rear) is around 2.5m over 50m (1 in 20) Transversely this is seen to be <0.5m over >10m (<1 in 20)
2	Will the proposed re-profiling of the landscaping at site change slopes at the boundary to more than 7°, or 1 in 8?	NO	There are no proposed changes to the landscaping levels
3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°, or 1 in 8?	NO	The neighbouring land across the boundary follows the natural topography of between 0° and 7° (where Q2 does not apply)
4	Is the site within a wider hillside setting in which the slope is greater than 7°, or 1 in 8?	NO	Natural slope is seen to be between 0 and 7° in accordance with slope angle map
5	Is the london clay the shallowest stratum at the site?	NO	Sandy clay proven in both trial pits within the existing cellar
6	Will any trees be felled as part of the proposed development, and/or any works proposed within tree protection zones where trees are to be retained?	NO	
7	Is there a history of seasonal shrink/swell subsidence in the local area, and/or evidence of such effects at the site?	NO	Not apparent to existing and neighbouring properties. The soil is a sandy clay meaning typically less susceptible to seasonal movements

8	Is the site within 100m of a watercourse?	YES	Possible beginnings of underground river shown on the 'lost rivers of London' map to the south west of the site, although no water was encountered during the SI works
9	Is the site within an area of previously worked ground?	NO	A small amount of overlying fill indicating rationalising and terracing of the land transversely across the property
10	Is the site within an aquifer? If so will the proposed basement extend beneath the water table such that dewatering may be required during the construction?	NO	BGS records indicate non water bearing London Clays to significant depths at least 30m below the ground level
11	Is the site within 50m of the Hampstead Heath ponds?	NO	Ponds are some 1000+m away to the east, and around 300m away to the north
12	Is the site within 5m of a highway or pedestrian right of way?	NO	The house is set back from the road with a sweeping driveway
13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	NO	The excavations proposed are all less than a metre beneath the existing floor level
14	Is the site over (or within exclusion zone of) any tunnels e.g. railway lines?	NO	The nearest line is the northern (underground) to the east

SCREENING CHECKLIST: SURFACE FLOW AND FLOODING IMPACT IDENTIFICATION			
CONSIDERATION		RESPONSE	JUSTIFICATION
1	Is the site in the catchment of the pond chains in Hampstead Heath	NO	The property is located topographically down-stream of the pond chain
2	As part of the proposed site drainage, will surface water flows (eg volume of rainfall and peak run-off) be materially changed from the existing route?	NO	The existing drainage routes and rainwater catchment will be unchanged

3	Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	NO	The works outside of the building footprint (the rear extension) do not add further drained hard areas
4	Will the proposed basement result in changes to the profile of the inflows (instantaneous and long term) of the surface water being received by adjacent properties or downstream watercourses?	NO	The rear extension will neither increase or decrease the natural surface water flows
5	Will the proposed basement development result in changes to the quality of of surface water being received by adjacent properties or downstream watercourses?	NO	All hard paved areas will discharge run-off to existing sewers as currently

3.2 STAGE 2: SCOPING

The screening assessment identifies the following matters, which are required to be studied and justified or discussed further.

- The site is within 100m of a potential watercourse

Due to the fact this is topographically down-stream of this historical spring, and that it has not been found through targeted site investigation, we do not consider that this requires further investigation. In the case of the lost rivers mapping, many of the watercourses have been culverted, or changed by other environmental factors over the course of time, and therefore the accuracy of these maps cannot be accurately relied upon.

4. STAGE 3: SITE INVESTIGATION

A site investigation was carried out in July 2017, consisting of 4 trial pits, with a single borehole to 13.5m depth (terminated due to rock obstruction at depth) within the vicinity of the proposed basement. The findings of this are shown within the RSA report ref 14826SI. A thin layer of made ground was penetrated to find the bearing substratum of the Bagshot Formation, comprising silty sandy clays. The Claygate strata was found at a depth of 11.2m, comprising a firm grey silty clay, which became sufficiently stiff so as to be obstructive to borehole drilling at 13.4m depth.

The proposed new basement excavation is to be notionally at the level of the deepest existing foundation as located at the rear of the property within the cellar. The bedrock geology and groundwater conditions are therefore apparent by trial pit investigation and borehole to comprise favourable conditions, with low shrinkage soils and no shallow water, these being entirely within the upper strata (Bagshot Formation).

4.1 CONTAMINATION TESTING

Contamination testing is to be carried out by the contractor during the excavation works to allow WAC classification for disposal.

4.2 GROUNDWATER

The trial pits were found to be dry upon completion. These was water discovered within WS1 on the first return visit, although this was thought to have collected into the standpipe from surface, and had drained away by the third monitoring visit. The groundwater is therefore thought to lie near the base of the Bagshot Formation, and is therefore not considered to be a risk to the proposed basement works.

4.3 STABILITY OF EXCAVATIONS

In general terms, excavations in made ground are likely to be unstable and so may require temporary support. Excavations within the Bagshot Formation are expected to be potentially unstable in the short term, and so will require considered propping during the basement works. For this site, the predominant excavation will be in sandy soils which has inherent temporary instability. Consideration will therefore need to be given for the temporary stability of all excavation works, both underpinning, and the main level reduction to form the new basement area.

5. STAGE 4: IMPACT ASSESSMENT

5.1 SURFACE FLOW AND FLOODING IMPACT

With reference to the Environment Agency's Flood Risk map, it can be seen that the site lies outside any flood risk zones. The site is on higher ground than the areas that historically experienced flooding most recently in 1975, as is indicated on the flood risk maps, [Figure 4]. As such, no detailed Flood Risk Assessment is deemed required.

The hard-standing and new roof areas combined do not materially increase in the proposed scheme, and so the outflows into the public sewer system from the site due to surface waters will be comparable to the existing site.

[FIGURE 5] LOST RIVERS OF LONDON MAP

5.2 SUBTERRANEAN GROUNDWATER FLOW IMPACT

The existing subsoils are of London Clay. The trial pit investigation showed a nominal build-up of made ground underlain by a sandy clay, upon which the original foundations are situated. No ground water was encountered.

Because the property has structural foundations already extending to the depth of the proposed excavations, including a cellar and lower ground floor, the penetration of the building structures will not be increased in depth by the proposed development. The proposed extensions also have a negligible volumetric impact upon the subsoils. The clay subsoils are relatively impermeable, and so any lateral ground water flows would be minimal. As such, the proposed extension is deemed to have no significant effect on the local hydrogeology.

5.3 PUBLIC HIGHWAY BOUNDARY PROXIMITY IMPACT

The proposed works are sufficient far from the public highway to ensure that the highway does not sit within the zone of influence for ground movement.

6. DETAILED PROPOSALS AND DESIGN CONSIDERATIONS

6.1 CONVERSION & EXTENSION OF CELLAR TO FORM ACCOMMODATION/PLANT SPACE

The protection of the neighbouring properties and boundary structures has been carefully considered, such to ensure that during the works, the boundary and neighbouring structures are protected from ground movement. The techniques proposed therefore are designed to conform with this.

6.1.1 UNDERPINNING

Under the house, short sections of the rear cellar side walls are to be underpinned in 1m long bays, carried out in a hit/miss 5 bay sequence, to facilitate localised floor lowering adjacent the new section of basement to the rear garden area.

6.1.2 FLOOR SLAB

It is proposed to create a reinforced ground bearing concrete slab to the new section of basement, with integral sumps for cavity drainage, and also foul.

6.1.4 HEAVE PROTECTION

The nature of the sandy clay soil is such that heave under the shallow excavation will not be of significance. As such, no allowance is considered necessary to be made for a heave mat.

6.1.5 WATER PRESSURE AND CONTROL

No groundwater was evident that would impose load to the new floor slab. Investigations suggest that in the temporary as well as the permanent condition, no groundwater is likely to be encountered. As such dewatering is not likely to be needed.

6.2 DESIGN CODES

The following design codes will be followed during the detailed design stage:

The Building Regulations 2010 - Approved Document A

- BS 648 - Weights of building materials
- BS 5950:1 - Structural use of steelwork in building
- BS 5268 - Structural use of timber
- BS 5628-1:2005 - Code of practise for the use of masonry
- BS 6399:1 - Loadings for buildings (Dead and imposed loads)
- BS 6399:2 - Loadings for buildings (Wind loads)
- BS 8000:Section 2.2:1990 - Workmanship on building sites
- BS 8002 - Earth retaining structures
- BS 8004 - Foundations
- BS 8102 - Protection of structures against water from the ground
- BS 8110:1 - Structural use of Concrete

7. CONSTRUCTION METHODOLOGY

7.1 SEQUENCE OF WORKS

The outline construction sequence and temporary works assumed in the design and described in this report will be superseded by the Contractor's construction proposals. The Contractor will be required to provide full proposals, method statements and calculations to the engineer prior to the commencement of any works on site and these will be considered in conjunction with the permanent structures and verified as suitable before the works are implemented.

The appointed contractor will be required to provide a detailed works sequence with their tender submission. An outline sequence of the substructures works is likely to be as follows:

- Secure site, erect hoardings, establish welfare facilities, and divert on-site services
- Enabling works, demolition and stripping out works. Detailed sequence by specialist contractor. Remove debris and excavation arisings from site via the highway, in accordance with agreed management plan
- Prepare ground to area of new GF slab, stool up existing external wall using hit miss abbey pynford method
- Excavate underpins for perimeter wall adjoining the neighbouring properties and front wall in sequenced bays 1.0m wide. Cast mass concrete against soil to the rear and formwork to the front face with a "letterbox" at the top. Terminate concrete 75mm below the underside of the existing footing.
- 24 hours after casting concrete, ram dry-pack mortar onto the gap between pre-existing footing and new underpin.
- Continue until walls have been underpinned following standard timings for underpinning, ensuring no excavation is carried out until at least 48 hours after casting an adjacent underpin.
- Reduce level of soil internally
- Lay sand blinding
- Arrange reinforcement for slab then cast concrete slab
- Excavate forecourt providing shoring to preserve integrity of north, south and east boundaries
- Construct slab and retaining wall base
- Construct retaining walls, progressively, removing shoring as this progresses
- Once cured, remove temporary upper level props

7.2 MOVEMENT CONTROL

The techniques proposed are proven to produce minimal or negligible movement effects to the party walls, and the deflection of the retaining walls can be practically limited so as to avoid disturbance to the retained ground.

It is reasoned that on the Burland scale, it is practical to achieve a level of 1 [very slight damage], such to be limited to visual appearance only.

A heave response, due to the relatively minor overburden relief, is not considered to represent a practical risk due to the depths of excavation in combination with with the local ground conditions.

7.3 MONITORING OF ADJACENT STRUCTURES

It is proposed that the integrity of the adjacent properties is safeguarded by a system of movement monitoring. The Contractor shall appoint a specialist survey company to establish monitoring positions (targets) to key elements of the neighbouring buildings as deemed required.

The external facades and Party Walls will be monitored at these positions and the targets shall be firmly attached to allow 3D location measurement for the duration of the work, to a continuous and uninterrupted accuracy of +/- 1mm. Suitable remote reference bases unaffected by the works will be adopted.

Two series of baseline readings shall be taken before the work begins then readings shall be taken shortly after the start of excavation then at weekly intervals during the basement construction until the RC shell is complete and propped after which point the frequency will be reduced to then a final reading 6 months after completion.

All measurements will be plotted graphically, clearly indicating any movements over time. Results shall be submitted and circulated to all relevant parties including the appointed Party Wall Surveyors within 24 hours of being measured.

Trigger levels are to be as set out below. In the event of a ‘red’ value being reached the Contractor must immediately stop, make safe the works, notify the Party Wall Surveyors and only recommence when agreed by the appointed Surveyors.

Trigger Levels for movement:

Vertical movement of Party Walls (including garden walls):

Amber +/- 5mm	All parties notified
Red +/- 8mm	Work stopped and reviewed

Lateral movement of Party Walls (including garden walls):

Amber +/- 4mm	All parties notified
Red +/- 6mm	Work stopped and reviewed

Lateral or vertical movement of facades:

Amber +/- 5mm	All parties notified
Red +/- 8mm	Work stopped and reviewed

7.4 NOISE, DUST AND VIBRATION

All demolition and construction works will be carried out by a competent and qualified contractor, who will be required to accord with the Considerate Constructors Scheme, and take all necessary measures to minimise the short term disturbances in terms of noise, vibration and dust which might impact on the local environment and the neighbouring residents and businesses.

The following measures and actions will be implemented:

Noise – Neighbours will be notified in advance of noisy activity, in particular where these are on or near boundary structures. Where there is particular sensitivity, activity will be restricted to 09:00-17:00 Monday to Friday.

In all cases where possible, electrically operation tools will be used in preference to engine driven machinery.

The use of site radios will be considered carefully in terms of their locations and volume levels, and if any neighbour complaints are received, a firm prohibition of their use will be enforced.

Vibration – While the use or percussive, powered machinery upon hard construction materials in many situations will likely give rise to inevitable vibration, wherever possible and in accordance with CCS Code, unnecessary vibration will be avoided and mitigated. This will take the form of the careful planning and consideration of the hardness of the material being demolished, and the works planned and notified accordingly, and where considered particularly unavoidable, the 09:00-17:00 working hours principle be observed.

Dust – Most of the works will be internal and so can be relatively easily isolated from becoming airborne and dispersing to neighbours and the local environment. External activity shall be contained as best as possible using suitable hoardings and sheeting.

Materials stored externally would be covered or contained to avoid wind and weather disturbance to granular and particulate materials. Structural concrete will be typically mixed off-site and delivered, but where small quantities or mortar are to be site mixed, this can be done in an enclosed area to limit cement dust from becoming airborne.

Deliveries of materials shall be covered where potential for dust is prevalent. Waste skips and excavated soils are to be covered whenever practicable.

For activities that generate dust, surface wetting-down, and water misting will be used to suppress dusting. Rotary cutters will use water as a dust suppressant.

Housekeeping – Shared driveways, external pavements on the site and in front of, will be regular swept, and should vehicles or windows become soiled, the contractor shall arrange cleaning as the neighbour so desires.

8. TEMPORARY WORKS

Temporary works design and coordination is to be carried out by a suitably qualified and experienced specialist and full design details (drawings and calculations) will be submitted to the engineer for comment. This specialist will be appointed by the Contractor who will be responsible for the design, erection and maintenance of all temporary works to ensure the stability of the existing structure, excavations and adjacent structures at all times.

9. SUMMARY

During construction, lateral and vertical stability of the building will be maintained by directly underpinning and temporarily propping, such that no significant adverse movement is expected.

Environmental impacts have been assessed, and the response to geotechnical and hydrological aspects have been considered. The proposals are deemed to not have any adverse impact in this respect.

Once complete, the new structure will provide a robust and secure support for both new and existing structure without detriment to the overall stability of the building or adjoining property.

None of the proposed superstructure alterations will fundamentally affect the integrity and stability of the original structures upon and adjacent the site.

Paul Longdin BEng CEng MIStructE

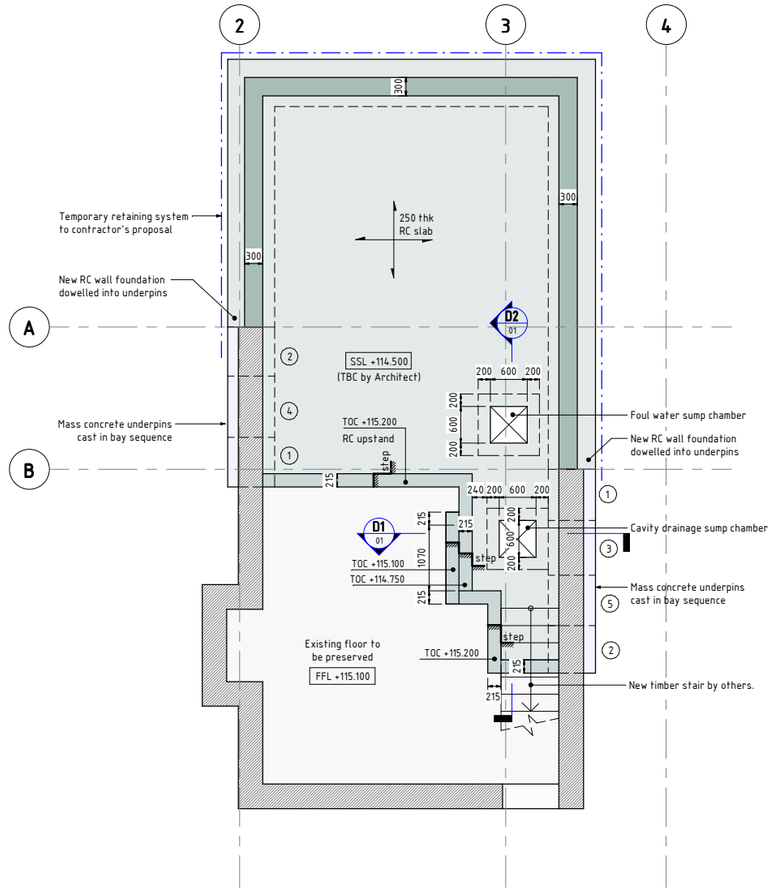
Director

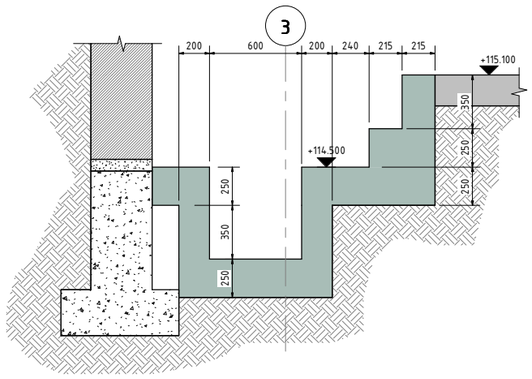
for Constructure Ltd

APPENDICES.

APPENDIX A: DRAWINGS

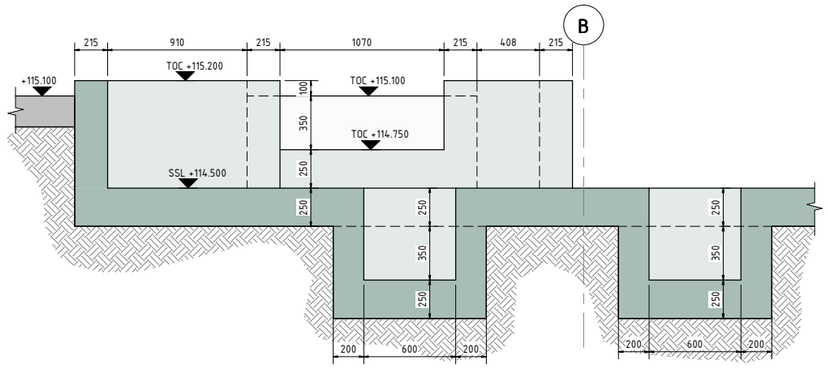
APPENDIX B: CONSTRUCTION SEQUENCE





DETAIL D1

SCALE 1 : 20



DETAIL D2

SCALE 1 : 20

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Legend :

- Existing structure.
- Structure under.
- Reinforced concrete section.
- Reinforced concrete surface.
- Mass concrete.
- Blockwork.
- Brickwork.
- Partition wall (build-up to Architect's details)

Status

PLANNING

Rev	Date	Drawn	Eng	Amendment
P1	29.08.17	TC	DC	Issued for Planning

Project

93 REDINGTON ROAD

BASEMENT

Drawing No.	1582 / 01	Rev	P1
Scale @ A1	1 : 50	Scale @ A3	1 : 100
Drawn	TC	Engineer	DC

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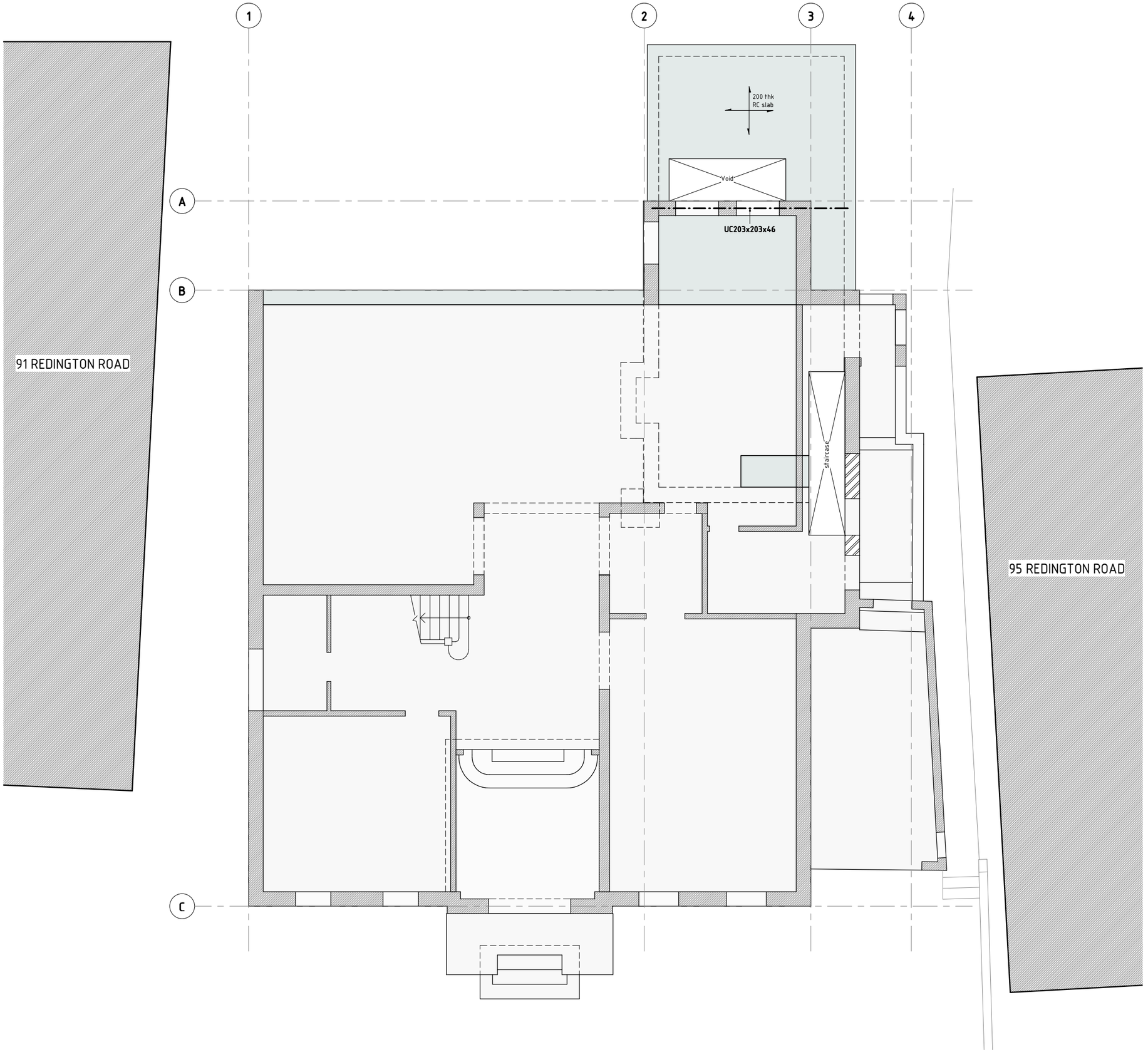

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Rev	Date	Drawn	Eng	Amendment
P1	29.08.17	TC	DC	Issued for Planning

Project

93 REDINGTON ROAD

GROUND FLOOR PLAN

Drawing No.	1582 / 02	Rev	P1
Scale @ A1	1 : 50	Scale @ A3	1 : 100
Drawn	TC	Engineer	DC

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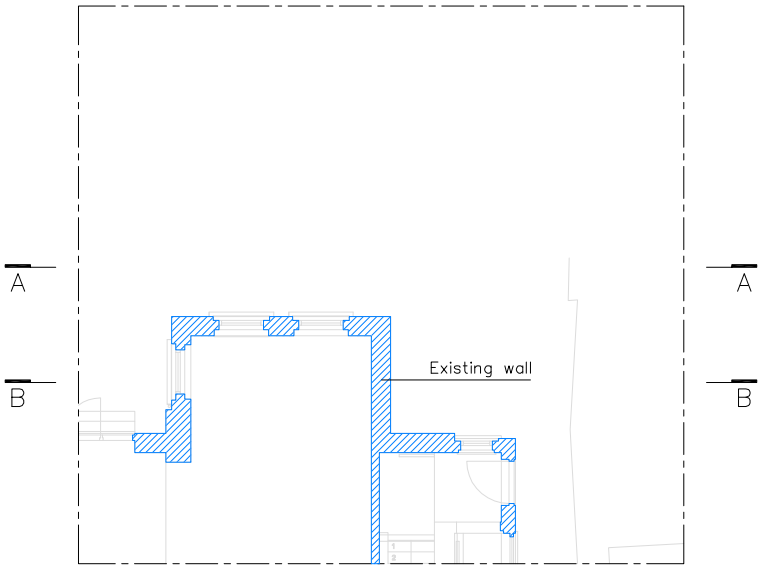
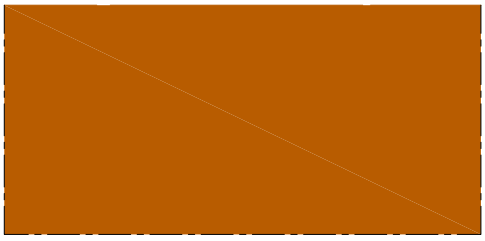
STAGE 0:

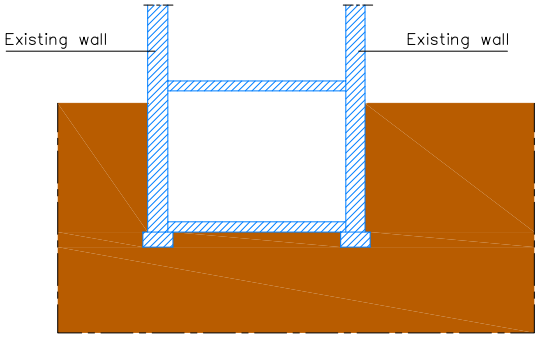
– Existing structure



G.F. PLAN



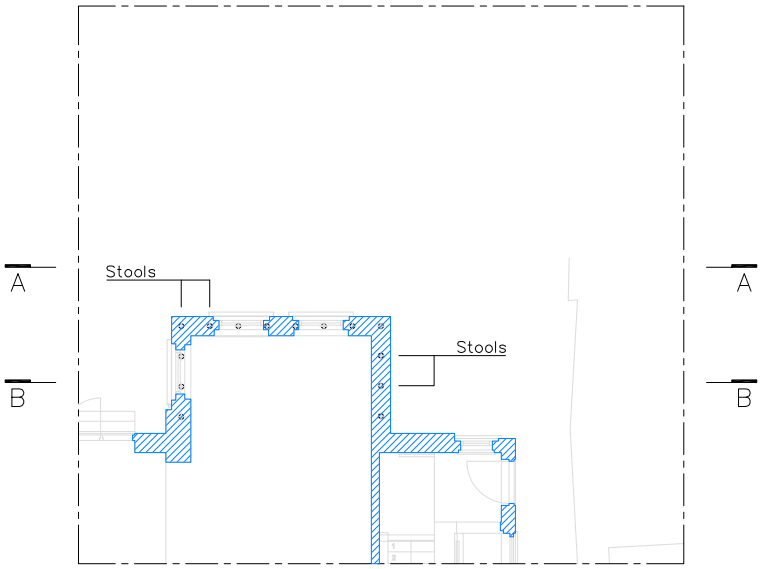
SECTION AA



SECTION BB

STAGE 1:

– Create openings in the existing masonry walls and install stools (Pynford Abbey method);



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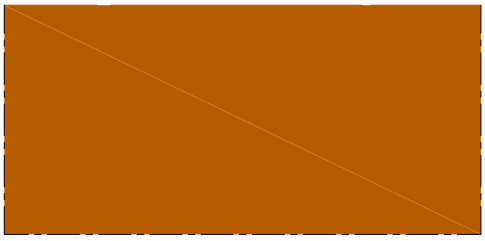
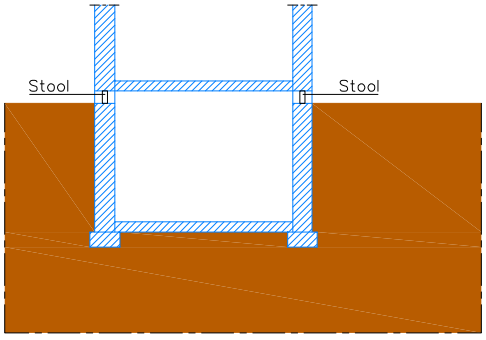


SECTION AA

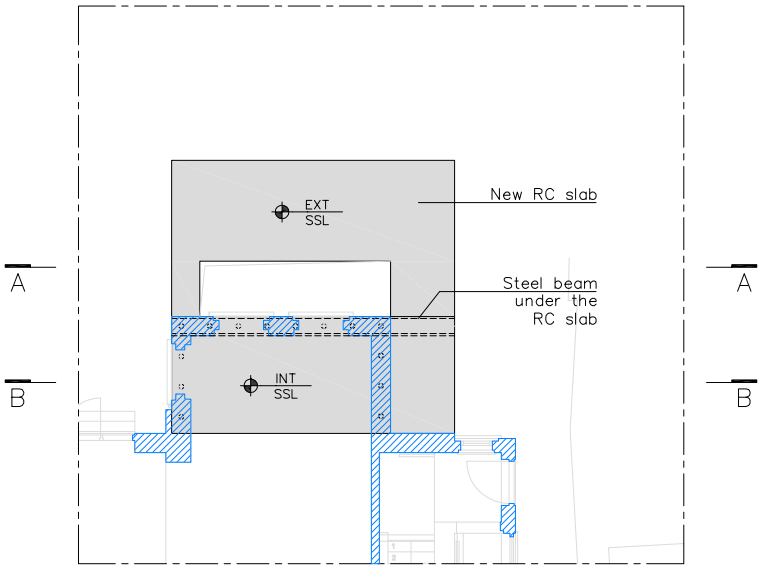


SECTION BB

STAGE 2:

- Prepare formwork and rebar for the PHASE 1 RC slab;
- Form PHASE 1 RC slab.
- Install steel beam under the PHASE 1 RC slab to support the existing masonry wall above.

Note: PHASE 1 RC slab limits, internal and external slab levels and opening dimensions to be confirmed with the Architect.



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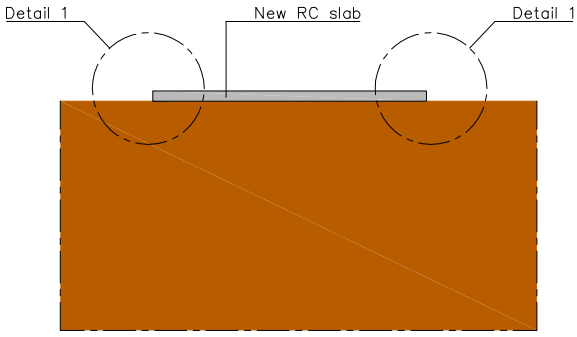
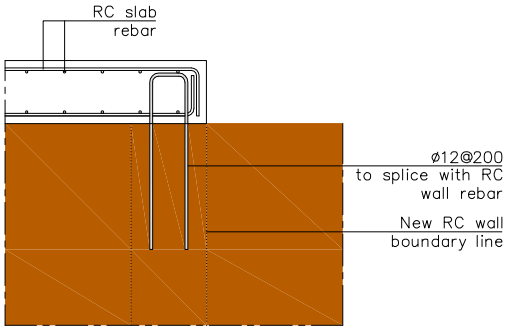
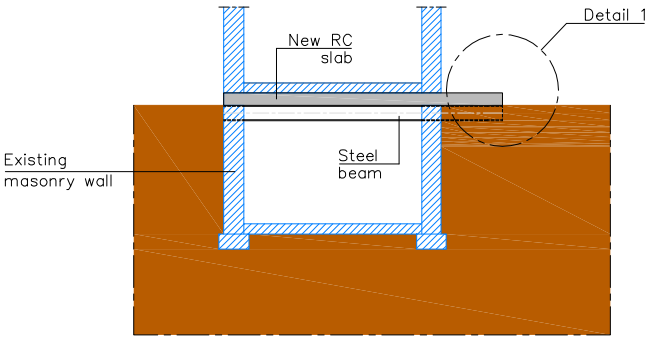


SECTION AA



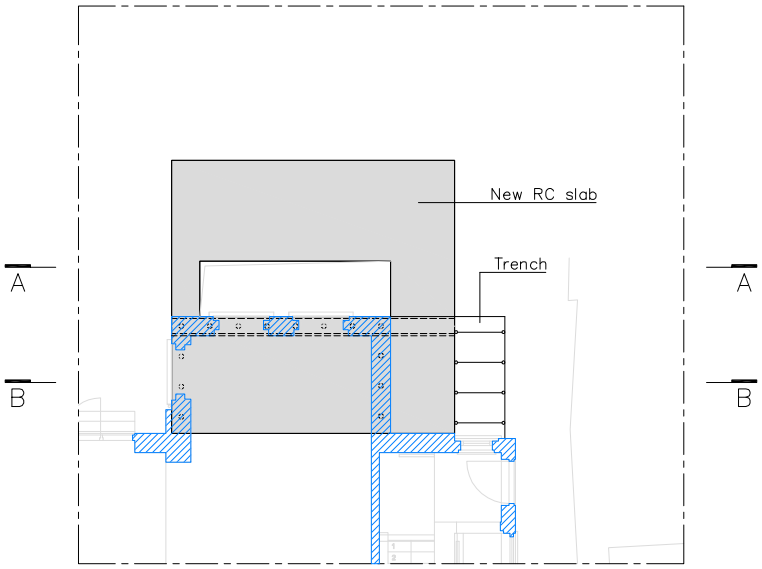
DETAIL 1



SECTION BB

STAGE 3:

– Dig trenches (segments <600mm in length) under the new PHASE 1 RC slab to the level of the bottom face of the new RC wall foundation (underpinning type method).



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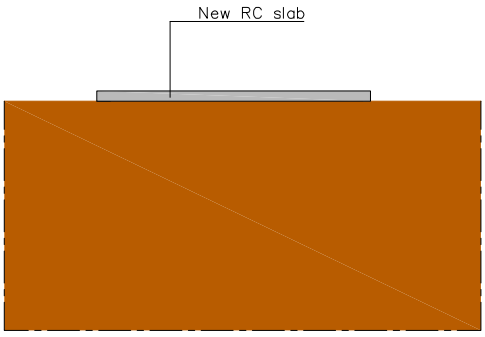
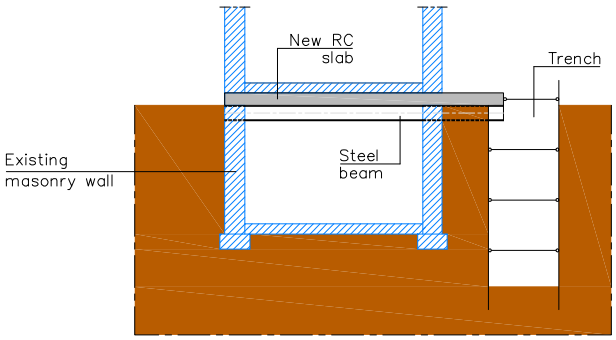


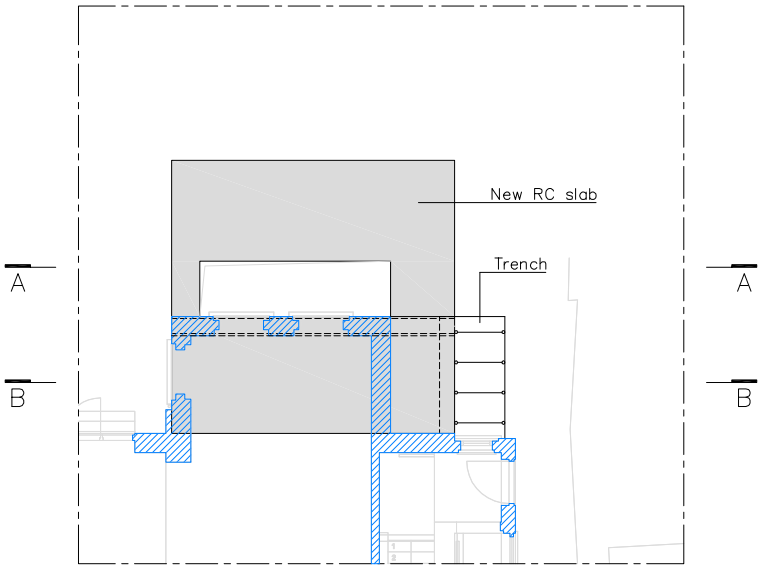
SECTION AA



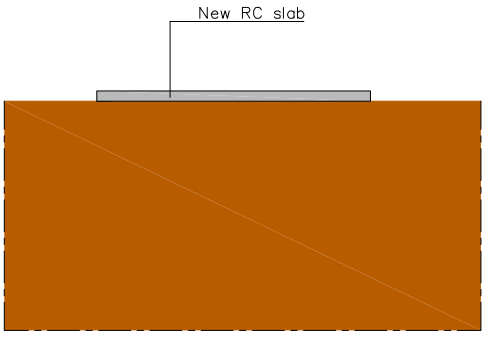
SECTION BB

STAGE 4:

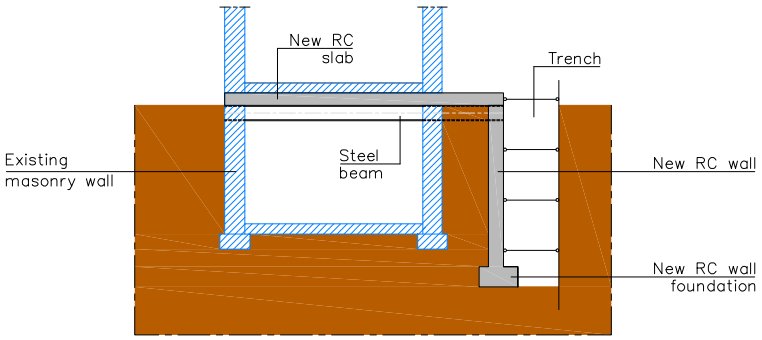
- Install formwork and rebar for the RC wall and respective foundation;
- Form PHASE 1 RC wall and foundation.



G.F. PLAN



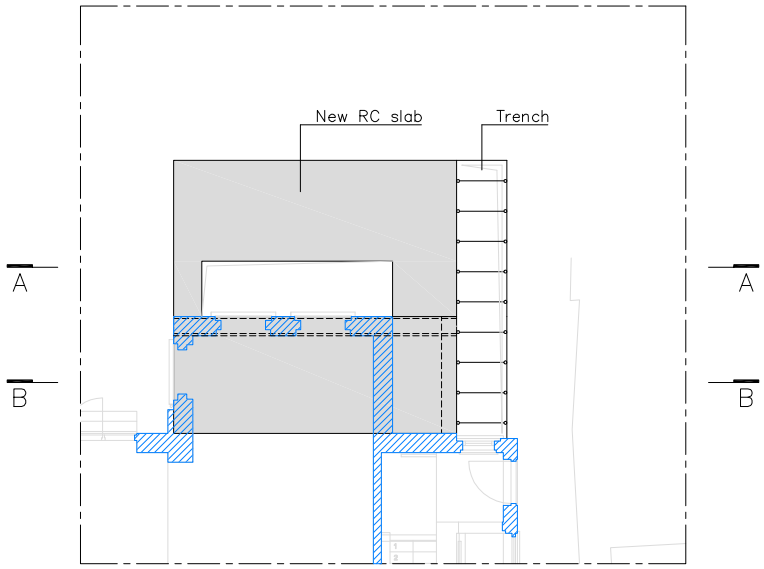
SECTION AA



SECTION BB

STAGE 5:

– Dig trenches on the right hand side of the PHASE 1 RC slab (segments <600mm in length).



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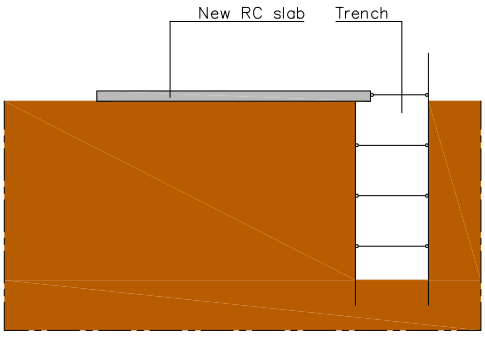

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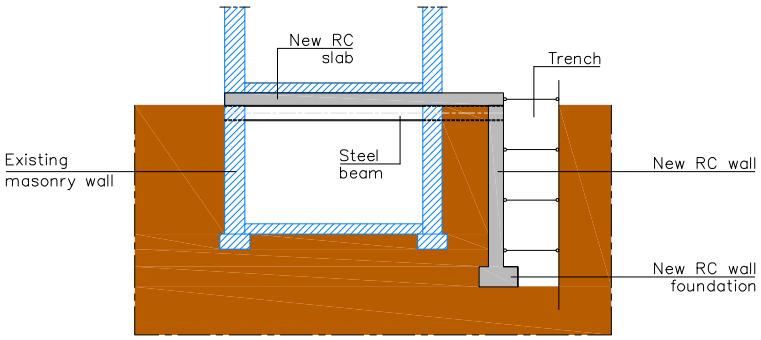
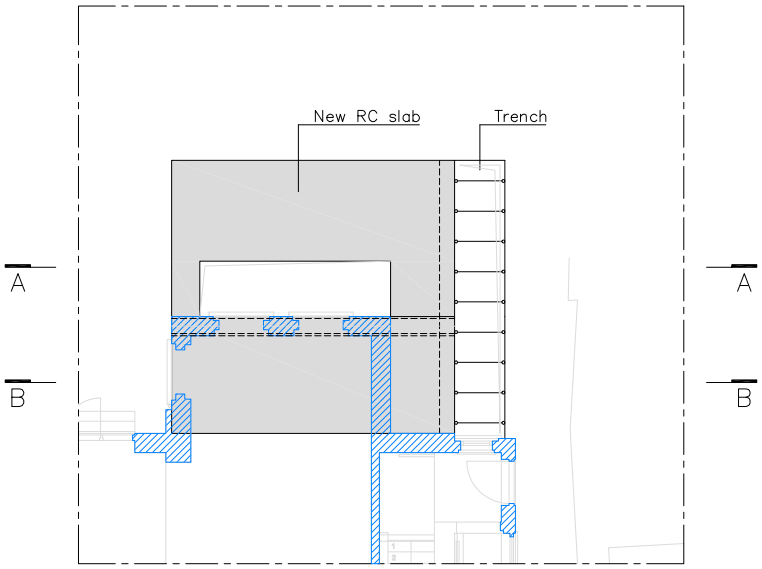


SECTION BB

STAGE 6:

- Install formwork and rebar for the RC wall and respective foundation;
- Form RC wall and foundation.



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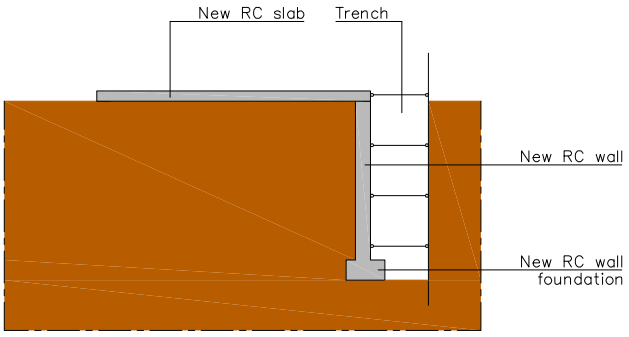

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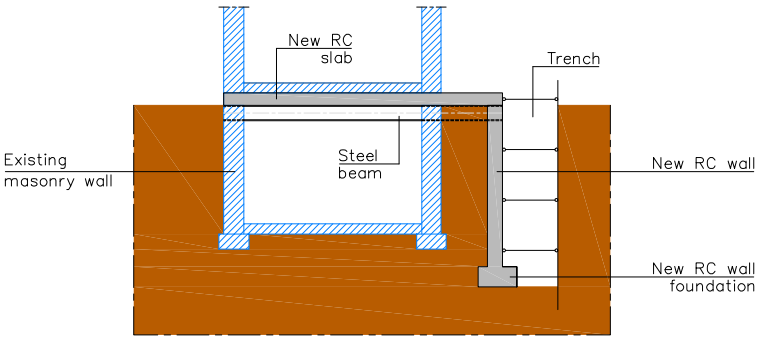
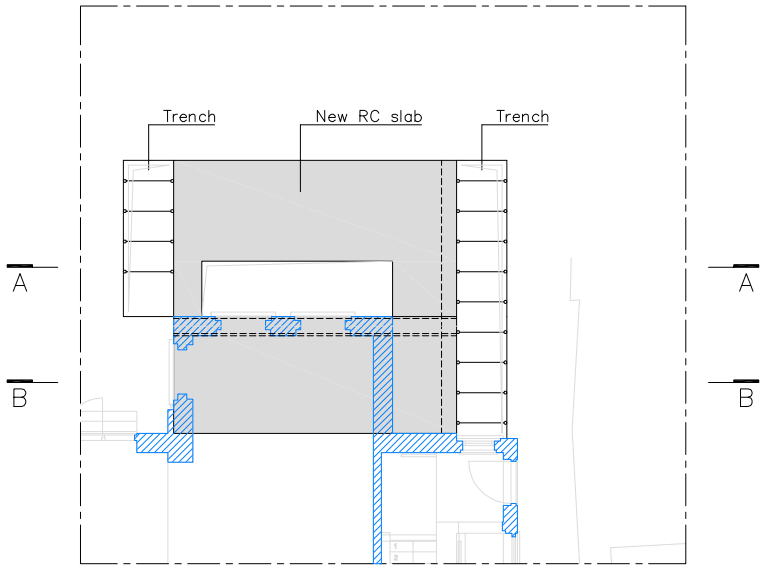


SECTION BB

STAGE 7:

– Dig trenches on the left hand side of the PHASE 1 RC slab (segments <600mm in length).



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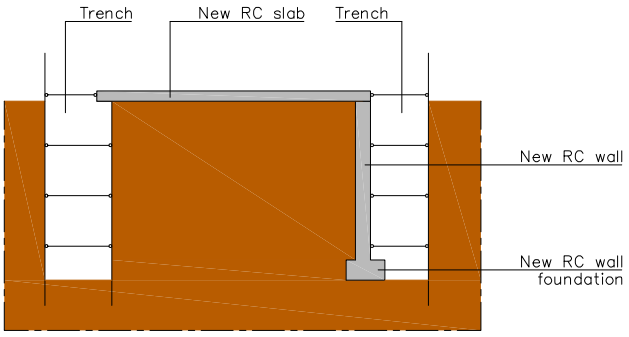
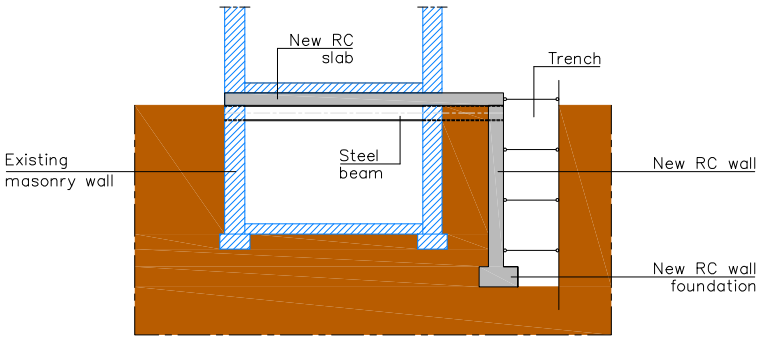


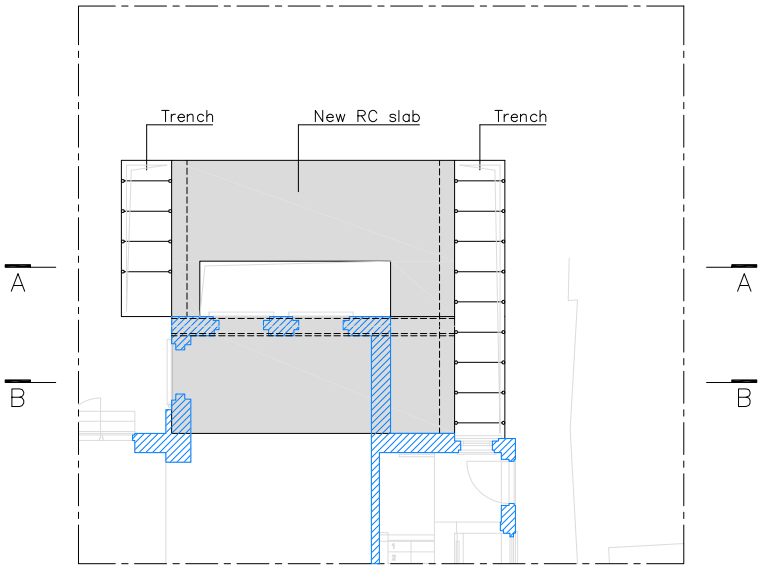
SECTION AA



SECTION BB

STAGE 8:

- Install formwork and rebar for the RC wall and respective foundation;
- Form RC wall and foundation.



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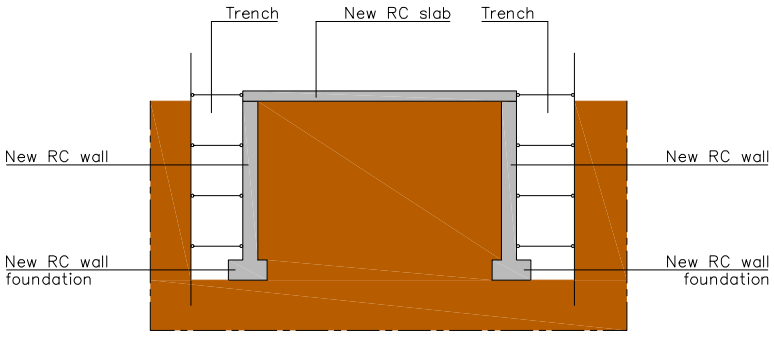
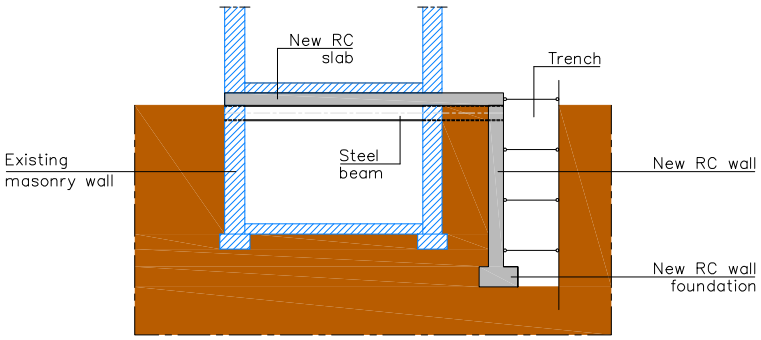


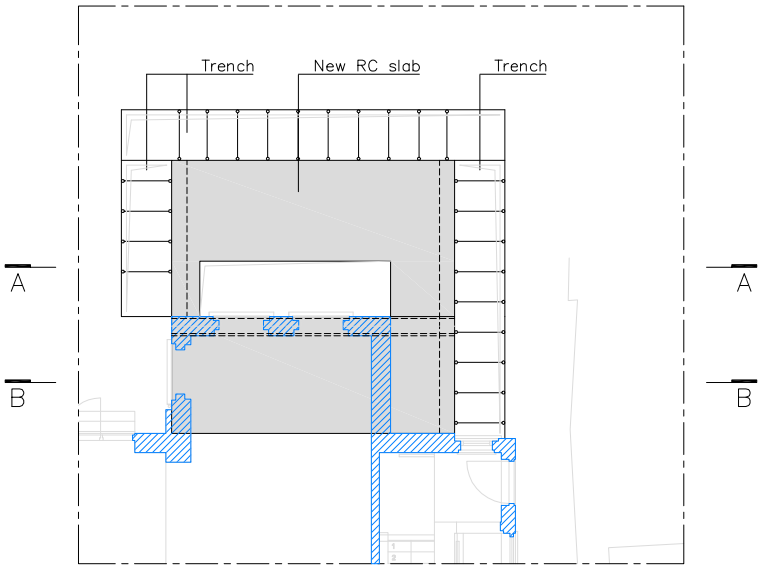
SECTION AA



SECTION BB

STAGE 9:

– Dig trenches on the rear side (segments <600mm in length).



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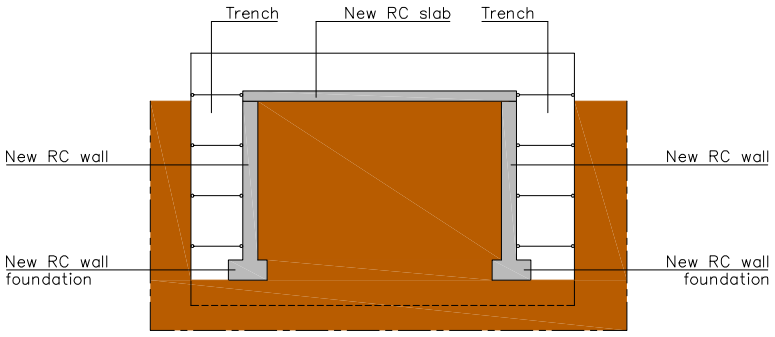

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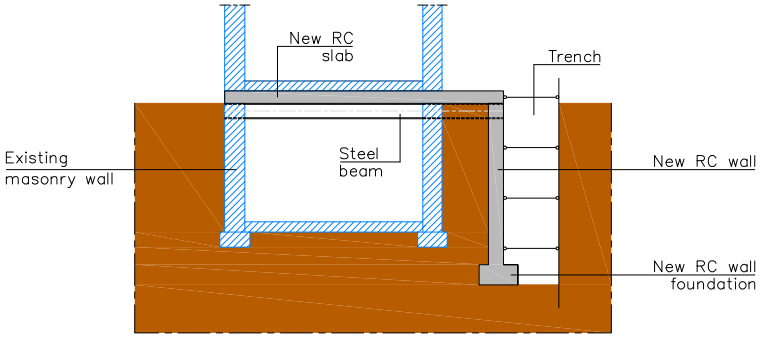
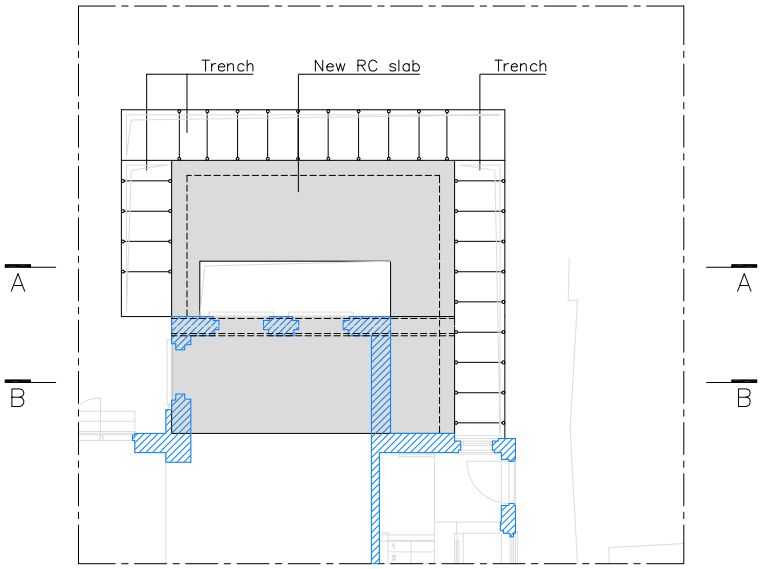


SECTION BB

STAGE 10:

- Install formwork and rebar for the RC wall and respective foundation;
- Form RC wall and foundation.



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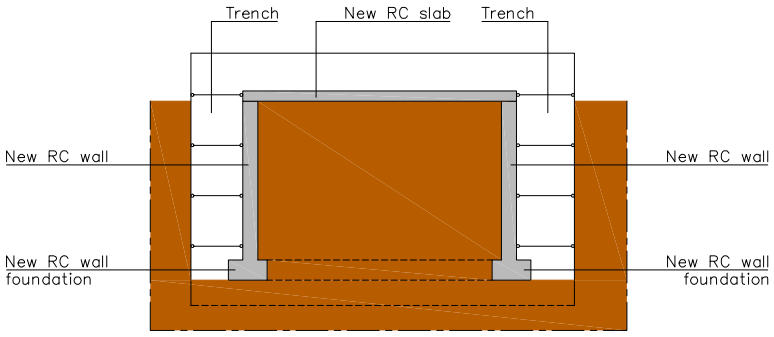
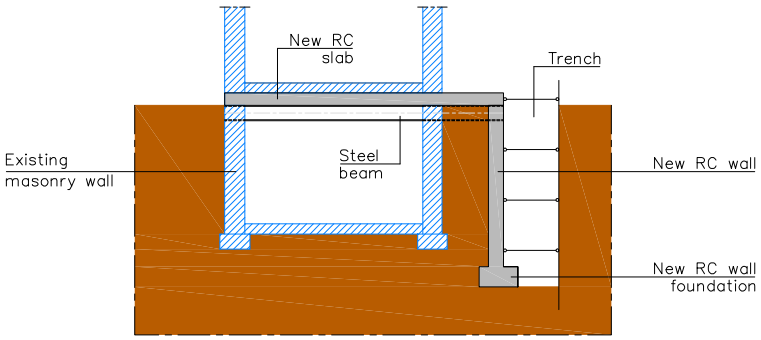


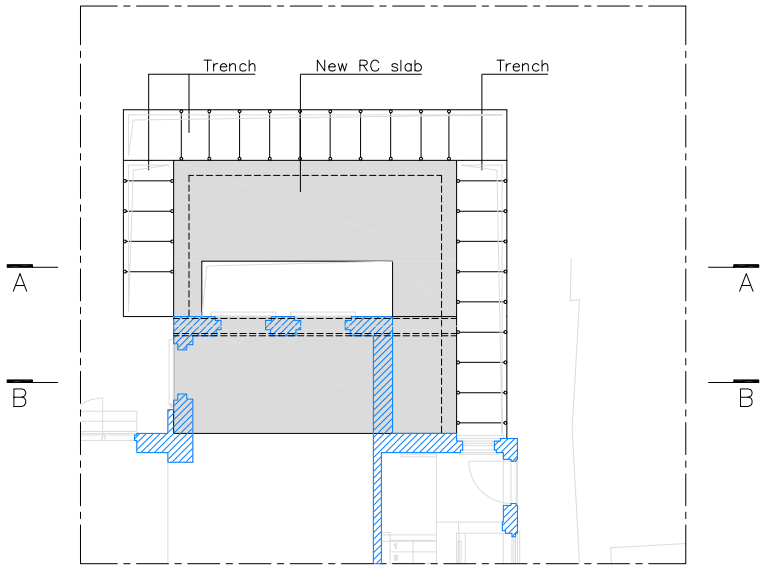
SECTION AA



SECTION BB

STAGE 11:

– Remove soil and install horizontal bracings.



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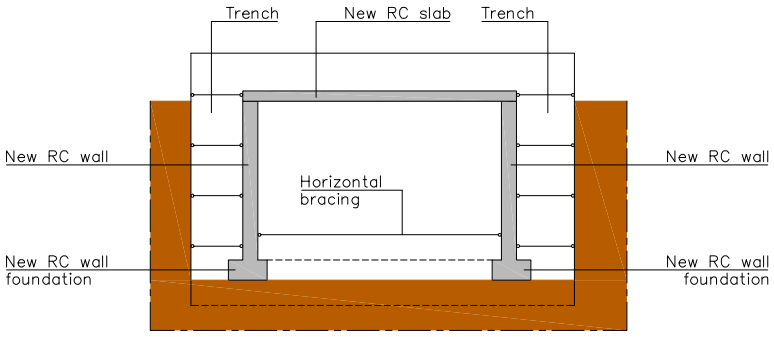
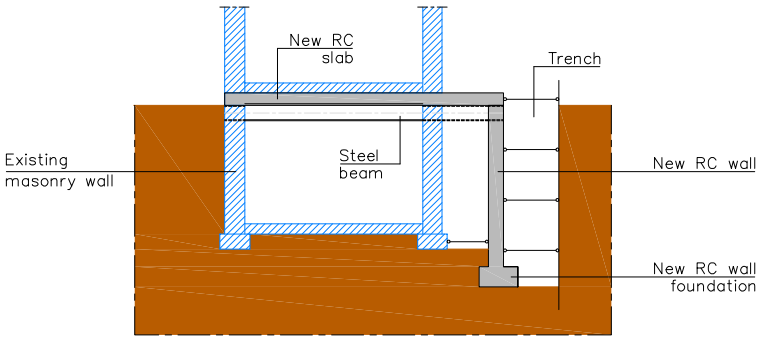


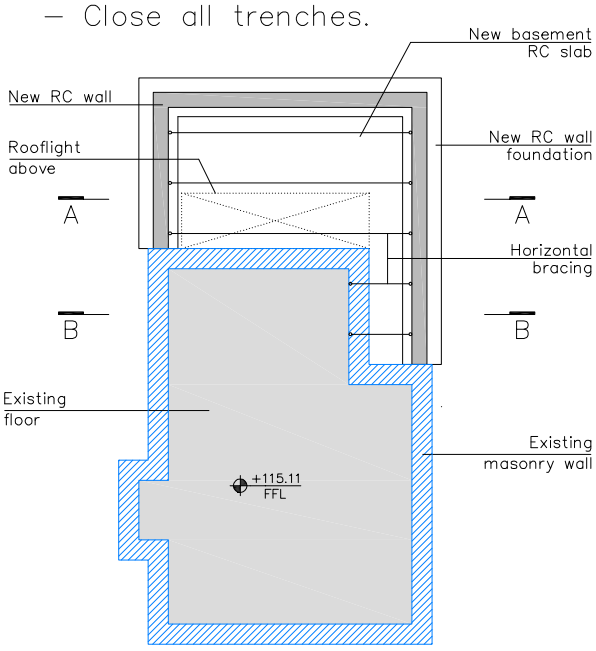
SECTION AA



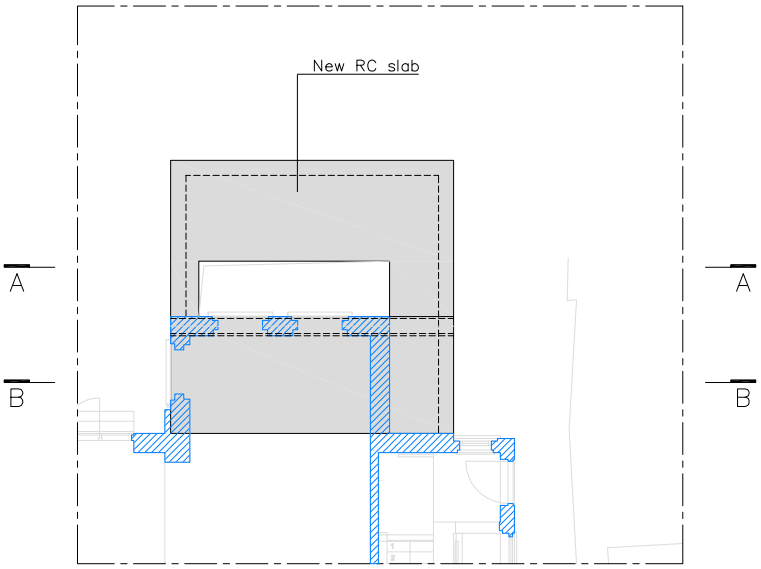
SECTION BB

STAGE 12:

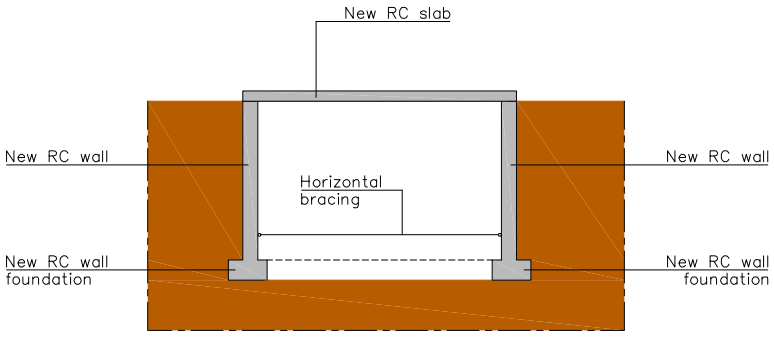
– Close all trenches.



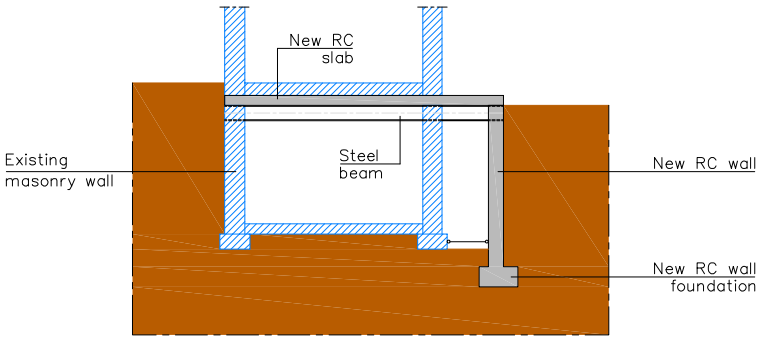
BASEMENT PLAN



G.F. PLAN



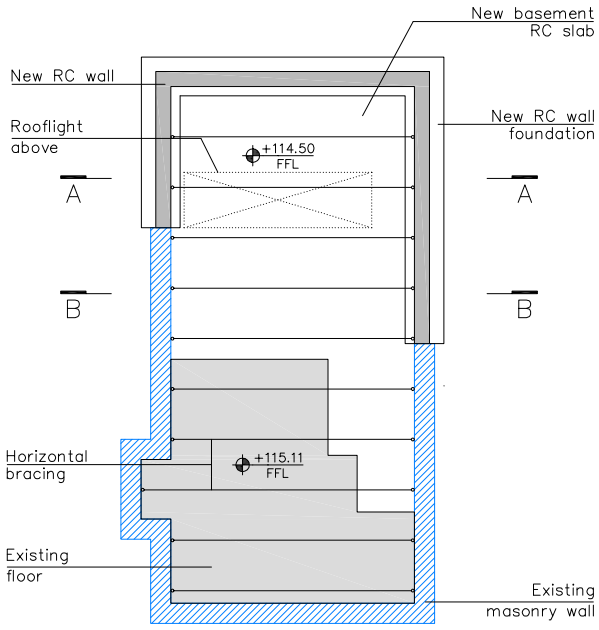
SECTION AA



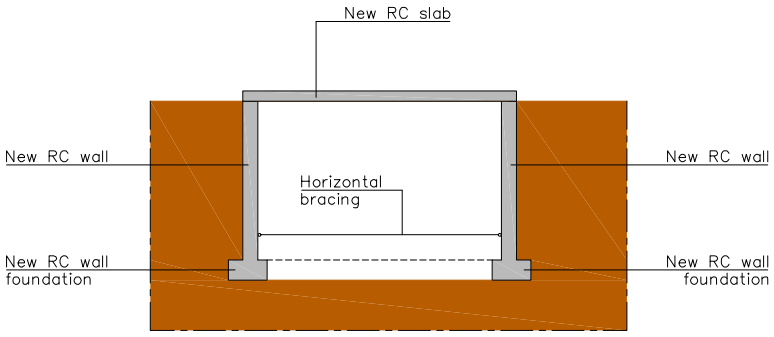
SECTION BB

STAGE 13:

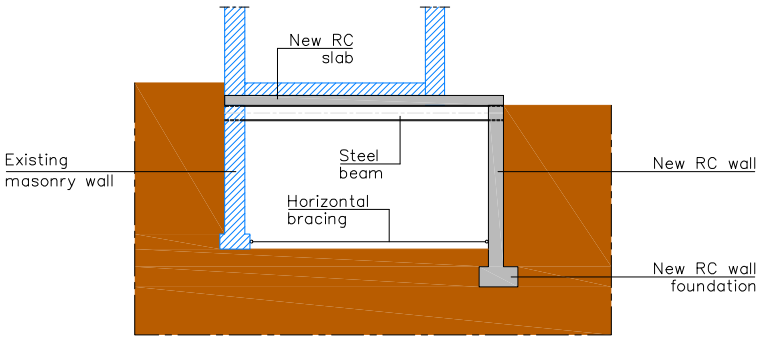
- Demolish existing masonry wall and respective foundation below PHASE 1 RC slab.
- Demolish basement floor area to be lowered.
- Install horizontal bracings.



BASEMENT PLAN



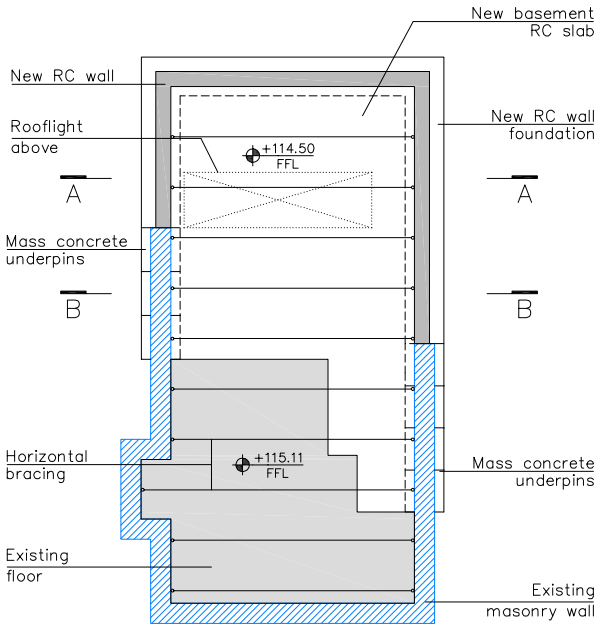
SECTION AA



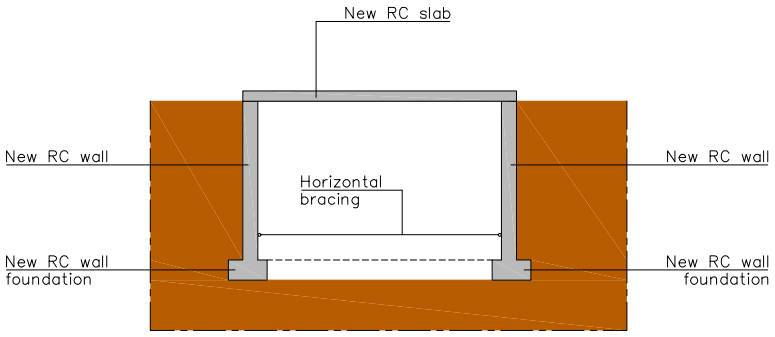
SECTION BB

STAGE 14:

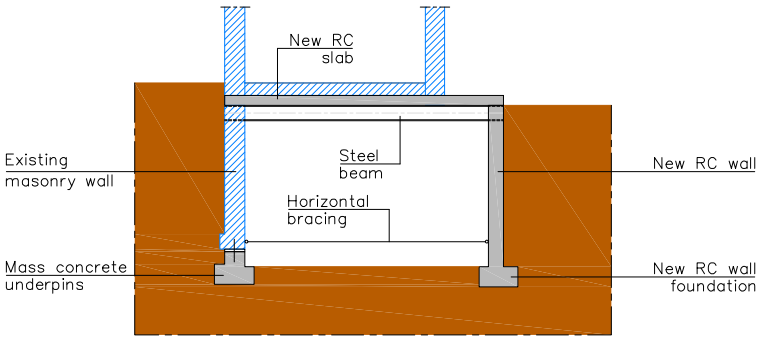
- Install mass concrete underpins cast in bay sequence.
- Remove soil down to bottom face of the new RC slab



BASEMENT PLAN



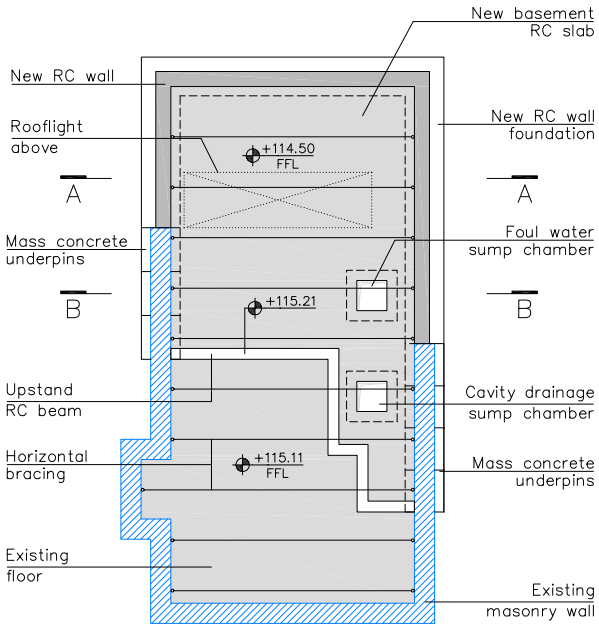
SECTION AA



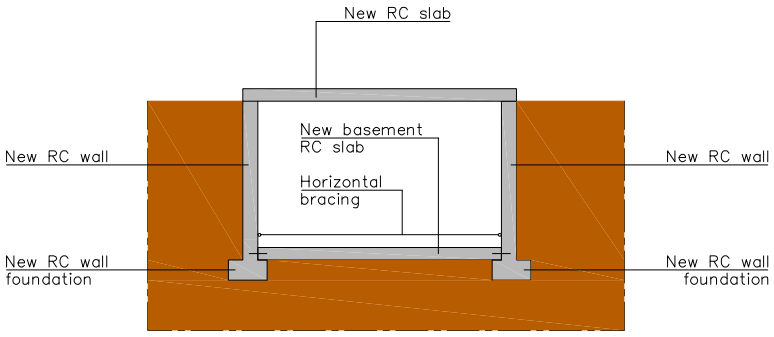
SECTION BB

STAGE 15:

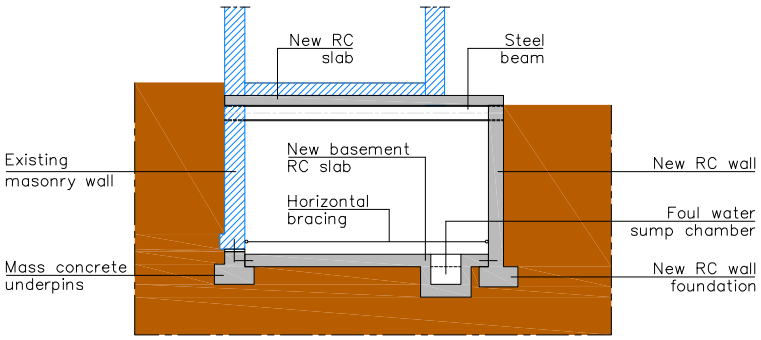
- Install formwork and rebar for the new basement RC slab and sump chambers;
- Form new basement RC slab and sump chambers.



BASEMENT PLAN



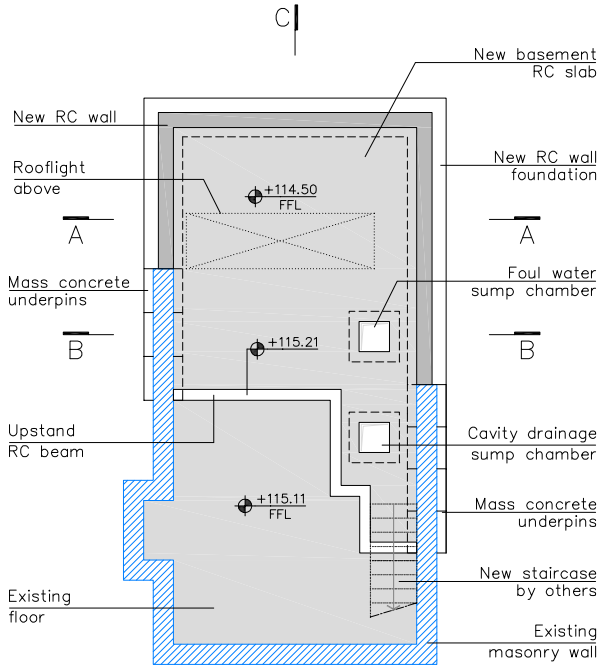
SECTION AA



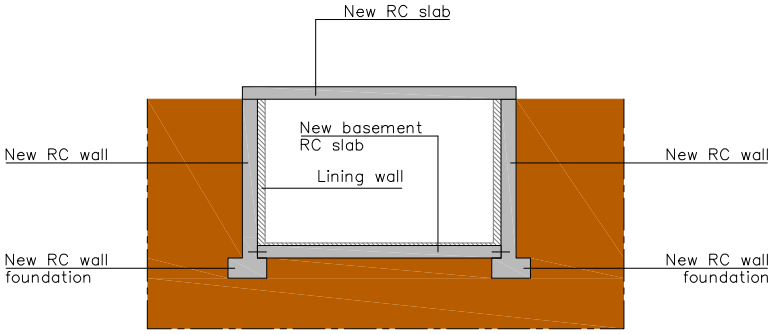
SECTION BB

STAGE 16:

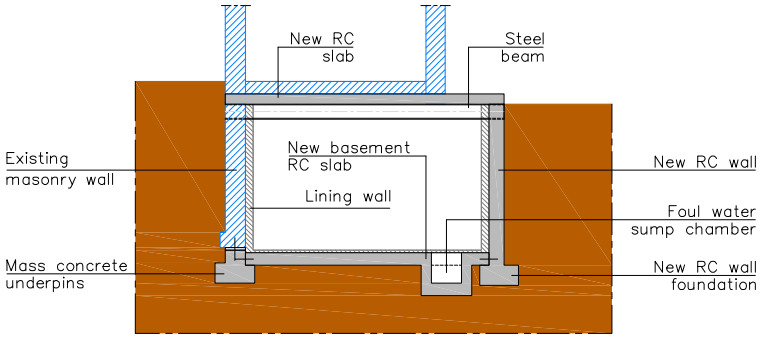
- Remove horizontal bracings.
- Install lining and internal partition walls.
- Install floor tiles.
- Install new timber stairs by others.



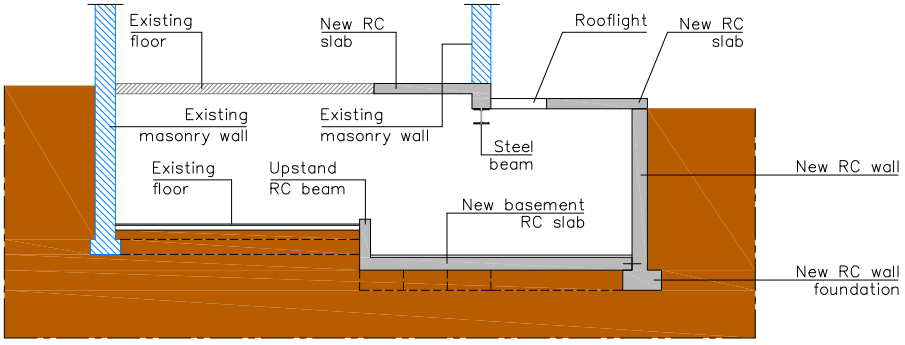
BASEMENT PLAN



SECTION AA



SECTION BB



SECTION CC