16 Daleham Gardens
London NW3 5DA

Basement Impact Assessment

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Document Control

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date:	2nd Sept 2011	signature:	S. Bouhala S Treillard	signature:	GPovey

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Appendices (included as a separate Appendices Report)

Introduction

This statement has been compiled by Stephanie Bouhala of Elliott Wood Partnership LLP, Consulting Structural and Civil Engineers, to accompany the planning application submitted by Milk Studio Architects.

The existing building at 16 Daleham Gardens is situated on the east side of Daleham Gardens. It is a detached four storey house including a lower ground floor level and a single storey side garage at ground floor. The building is currently unoccupied. The proposal includes refurbishment of the upper floors and creation of a new basement level below lower ground floor. The basement will include some storage and plant rooms and will be founded approximately 5 metres below the existing lower ground floor level of the house.

This statement should be read in conjunction with Elliott Wood Partnership drawings 211338/S.01-S.03, S.21, Milk Studio Architects drawings, Site Analytical Service's Site Investigation Report dated from August 2011, Paulex Environmental Consulting's Groundwater Impact Assessment report dated from August 2011 (Ref 1121/R1), GEA's Land Stability Impact Assessment report dated from August 2011 (Ref J11190) and Water Environment's Surface Flow and Flood Impact Assessment report dated from September 2011 (Ref 11067).
This report follows the guidance given in the Camden Planning Guidance on Basements and lightwells CPG4.
This assessment has been prepared in accordance with the guidance given in CPG4, DP23 and DP27.
The Basement Impact assessment has been carried out, by persons holding the required qualifications relevant to each stage.

Executive Summary

To carry out this Basement Impact Assessment, guidance from Ove Arup's report "Camden geological, hydrogeological and hydrological study- Guidance for subterranean development" has been followed, in terms of Site Investigation (desk study, Intrusive testing, monitoring and interpretive report) and in terms of the various Impact assessments as well as reference to Camden's BIA.
Four different companies have worked together to put the Impact Basement Assessment for 16 Daleham Gardens to be able to cover the required qualifications as mentioned in the Camden Planning Guidance cgp4.

All reports have lead to the same conclusion: the deepening of the existing lower ground floor and the creation of a basement under the partial footprint of the building will not have any adverse affect on the neighbouring properties, groundwater, surface water or slope stability.

Desk Study Report

1.0 Introduction

The following section is a summary of Elliott Wood Partnership's site desk study and 'Phase 1 Preliminary Risk Assessment' carried out by Site Analytical Services, full details of which are included in the Appendix.

Recognition is made of the screening, scoping etc. requirements of London Borough of Camden Planning Guidance Basements and Lightwells CPG4.

2.0 Site History

The historical maps show that the site was agricultural land until about 1896. From that date, a residential property appears and does not change in size or shape to present day.

3.0 Geology

Ground conditions

London belongs to the Thames Basin which is a broad syncline of chalk occupied in its centre by sands and clays. Fluvial deposits associated with the former deposits of the River Thames lie on top of the bedrock. These different terraces are the remains of the river's floodplains.

The site is likely to be underlain by a certain quantity of Made Ground due to its long history.

According to the British Geological map for North London (sheet 256), the site is underlain by Superficial Head deposits overlying the London Clay.

The deep geology is likely to comprise the Lambeth Ground, Thanet Sands and finally the Upper Chalk at depths.

Hydrology and Hydrogeology

London Clay effectively divides London hydrology into two units: upper aquifer, primarily formed by Pleistocene terrace deposits; and lower aquifer, primarily formed by Upper Chalk often in combination with the overlying Thanet Sands.

A perched water table may be present at the base of the Made Ground resting on top of the relatively impermeable London Clay.
Groundwater levels are subject to variations caused by changes in the local drainage conditions and also by seasonal effects (i.e. Summer/Winter conditions).

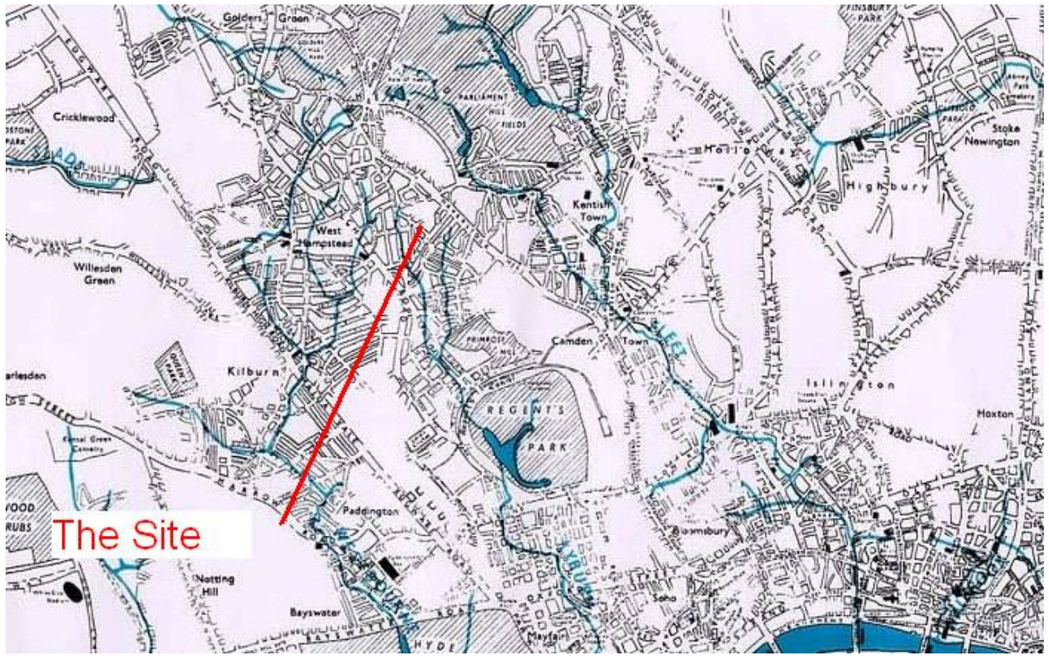
The site is located 279m north west of a Zone II (Outer Protection) Groundwater Source Protection Zone. The Environment Agency has defined Groundwater Source Protection Zones (SPZs) for sources used in the supply of public drinking water. The London Clay below should provide a natural barrier to prevent contaminants migrating to the deep Chalk Aquifer.

The underlying geology (Superficial and Bedrock) is classified as Unproductive Strata according to the Environment Agency maps and to the Envirocheck Report. They are of a low permeability that has negligible significance for water supply or river base flow.

Lost Rivers of London

An extract from the map (see below) showing the 'lost rivers' of London (Barton, 1992) shows that the site is located close to two tributaries of the lost river Tyburn that runs through Regents Park, although these are believed to be too far to affect the site.

The majority of the natural tributary rivers of the River Thames have been culverted or infilled as development of the city has progressed.



A portion of the map showing the course of the River Tyburn taken from Lost Rivers of London ©1962 and 1992 by Nicholas Barton, used by kind permission of Historical Publications Ltd

4.0 Potential Environmental Issues

The site and the surrounding land appear to have been occupied by mainly residential houses.

There appear to have been no industries or potentially contaminative uses located in the area. No major on-site or off-site contamination issues have been identified from the study of the available historical maps.

The only potential contaminative uses are limited. They are identified as dry cleaners, depots or garages and are listed in the Envirocheck environmental report available in the SAS desk study report.
There are also some sub-stations located in the general areas that could be an off-site potential source of contamination.

Contamination associated with the UXO and bomb damage should be limited as the site and the area were lightly affected by the bombing of the city during the Second World War.

Ground Gas

The site investigation has identified a low to intermediate gas regime which requires low level gas protection measures.

5.0 General site constraints

Underground structures

It is understood that the site was agricultural land before being developed with the construction of the present house. Unknown buried foundations or structures should consequently be limited.

Unexploded Ordnance Survey (UXO) and Bomb damage

The site was not severely affected during World War II bombing. The London bomb damage map shows that the site and its surroundings were also unaffected.

Tunnels

From EWP searches, there are no known tunnels in the vicinity of the site.

Two railway tunnels are located to the north under Nutley Terrace but are considered too far to affect the site. They are visible on some of the historical maps.

Archaeology

It is unknown at present if the site could be of any archaeological interest. This will need to be confirmed with further searches.

If archaeological remains were to be found, the presence of the existing building(s) on the site means that they may have been partially truncated by foundation and/or service trench excavations.

If any excavation works are to be undertaken, archaeology may be a potential risk and an archaeological specialist should be appointed to advise on the specific risk. If any archaeological remains are found, it might impact on the program and also have an impact on the structural design.

Structural Engineering Notes

1.0 Introduction

The purpose of the statement is to demonstrate a suggested method, form and sequence of construction for the design of the new basement and the refurbishment of the existing house that will not adversely affect any structures.

The Contractor will, however, have to provide a detailed method statement including all temporary works taking in to account the permanent works design before the works can commence on site. However, we have carried out some calculations to demonstrate that these works are not likely to affect surrounding buildings and this building. Refer to calculations and our conclusion on page 10.

The Contractor is to accept full responsibility for the stability and structural integrity of the works during the Contract and provide temporary support as necessary. He shall also prevent overloading of any completed or partially completed elements.

The undertaking of such projects is specialist work and Elliott Wood Partnership will be involved in the selection of a competent Contractor who will need the relevant expertise and experience for this type of project. The Contractor will have to demonstrate his experience and competency to undertake the construction of this building. The final proposals will, of course, be submitted to Building Control for Building Regulations Approval and will also be subject to the requirements of the Party Wall Act.

This statement should be read in conjunction with Elliott Wood Partnership drawings 211338/S.01-S.03, S.21, Milk Studio Architects drawings and Site Analytical Services Ltd site investigation report dated from August 2011.

2.0 Description of Existing Building and Site Conditions

The existing building at 16 Daleham Gardens is situated on the east side of Daleham Gardens.

The existing building is constructed as a load bearing masonry structure supporting timber joist floors and beams at each level. The foundations of the loadbearing walls, including the party walls, are brick corbels of varying depths and widths.

A site investigation has been carried out which indicates that the underlying ground appears to be a silty clay overlaid by a thin layer of made ground.
Over the three standpipes monitoring, two were dry at new basement level and one was wet which means that the groundwater is below the new basement level.

There are a number of mature trees both in the garden of number 16 and in adjacent gardens. The proximity of the existing and new trees will need to be considered in the final design of the basement and its foundations.

3.0 The proposals

The proposal includes refurbishment of the upper floors and creation of a new basement level below lower ground floor. The basement will include some storage and plant rooms and will be founded approximately 5 metres below the existing lower ground floor level of the house.

It is assumed that the existing roof will be removed as well as the rear façade. Temporary support will be installed to retain the remaining existing walls when the existing floors are removed..

The new basement will be constructed by installing reinforced concrete underpins under the existing perimeter walls to transfer the vertical loads to a lower level. Some of the lightwells' retaining walls will be built assuming the soil can be raked at a safe angle.

The underpins will be designed to safely support all the earth and surcharge loads applied to it in the temporary and permanent condition.

The underpinning may need to be propped at various levels. This will allow the basement to be constructed within the underpins without undermining the existing footings either during excavation or during construction of the permanent works. The propping will provide lateral restraint to the underpins during excavation and therefore limit any potential movement of surrounding walls and floors to an acceptable amount.

Suitable monitoring arrangements should be agreed with the adjoining owners and specified to ensure that movements are maintained within acceptable limits as stipulated in BIA and that early and immediate action can be taken to prevent any unexpected deflections or settlement.

Assumed Sequence of Construction

1.0 Sequence of works enabling excavation of the new basements

Below is an assumed sequence of works, this needs to be clarified by the contractor prior to commencement of works:

- Breakout floor locally and install underpins to all the necessary walls including side boundary walls in a sequence to be agreed. Allowance for the permanent loads should be made in the design of the width of the toe of the new concrete underpins. Install upper level propping to the underpins as appropriate.
- Cast the new RC retaining wall along the boundary between 14 and 16 Daleham Gardens in a sequence of 1m length maximum as well as the retaining wall along the passageway between 14 and 16 Daleham Gardens.
- Install temporary beams under the front bays to the house at ground floor, supported off the RC underpins and temporary propping.
- Install temporary concrete bases for the existing structure that remains as necessary.
- Install the temporary needles and props such that they will be supported by the temporary concrete bases.
- Remove the existing roof, floors and rear façade.
- Break off the existing toe of the brick corbel footings to the surrounding walls once the underpinning is complete and props are in place.
- At the front of the house, rake back ground to a safe angle. Excavate to the new lower ground floor.
- Cast some of the internal RC retaining walls in a sequence of 1m length maximum to be agreed. The deeper underpins may have to be done in two sections.
- Cast the remaining RC retaining walls of the basement after raking back the ground to a safe angle.
- Cast the pad foundations
- Excavate to the lowest level ensuring continued back propping of the underpins as the ground is reduced.
- Cast the new reinforced concrete basement slabs and allow them to gain sufficient strength before removing lowest level props.
- Cast the reinforced concrete walls and allow in the design for them to act as vertical cantilevers in the temporary and permanent case so that props can be removed above the cast sections.
- Cast the next level of floor slabs and allow them to gain strength before removing the next level of propping.
- Complete the superstructure works once the basement is complete.

2.0 Construction of superstructure

The new superstructure of the main house will be a new combination of the steel frame and joists, which will be partially supported by the existing walls. The existing structure will, in turn, be supported by the new structure at lower levels which will largely be made up of reinforced concrete slabs on concrete walls or underpins.

3.0 Summary and Conclusions

It is assumed that the above measures and sequence of works demonstrate the design and construction of the proposed works can be realised without significant affect on neighbouring properties.

Detailed method statements and calculations for the enabling and temporary works will need to be prepared by the Contractor for both approval and comment by all relevant parties including party wall surveyors and their engineers.

Some calculations have been done to understand the structural impact of the construction process.
Please refer to the calculations on the following page (which follows the guidance of the Appendix D on the Effects of excavation on foundation strength) to find out that the underpinning of the current foundations won't change the load bearing capacity of the soil by more than 10% which means that is unlikely to have any adverse effect on the structure being supported.

From the previous calculations and the ground properties (clay), the effect of the excavation will not affect the neighbour's properties beyond the Burland category as "slight" as developed in the Camden Planning guidance.

Some suitable monitoring arrangements will be agreed with the adjoining owners and specified to ensure that movements are maintained within acceptable limits and that early and immediate action can be taken to prevent any unexpected deflections or settlement

Project name: 16 Daleham Gardens
Project number: 211338
Sheet: 1
Revision: P1
Date: 19/8/11
Engineer: SBO
Checked:

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POTENTIAL EFFECTS OF LOSS OF OVERBURDEN DUE TO EXCAVATION

When excavating some foundations, the soil bearing capacity around the excavation might be affected due to overburden.

The present calculation is going to prove that in the case of the above project, the excavations carry out will not affect the foundations of the neighbouring's house, as per "appendix D of Camden geological, hydrogeological and hydrological study."

Project name: 16 Daleham Gardens
Project number: 211338
Sheet: 2
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Checked:

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From our structural scheme, we are going to use strip foundations, so the load capacity formula given by Brinch Hansen is

$$q_{ult} = [0.5 \times \gamma \times B \times N_\gamma] + [cN_c] + [\gamma D N_q]$$

γ: self-weight of soil $= 1.9\ t^3kg/m^3 = 1900\ kg/m^3$
$= 1.9\ T/m = 19kN/m^3$

B: width of foundation = 650 mm (existing) ≈ 0.65 m | new 1.5m
590 mm $= 0.59$ m

D: depth of foundation below ground level $= 140\ mm = 0.14\ mm$

c: soil cohesion $= 100\ kN/m^2$

$N_\gamma = 4$ from figure 2.8 of foundation design and construct
$N_c = 16$
$N_q = 7$

$q_{ult} = 0.5 \times 19 \times 1 \times 4 + 100 \times 16 + 19 \times 1.45 \times 6.5$
$= 38 + 1600 + 182$
$= 1820\ kN/m^2$

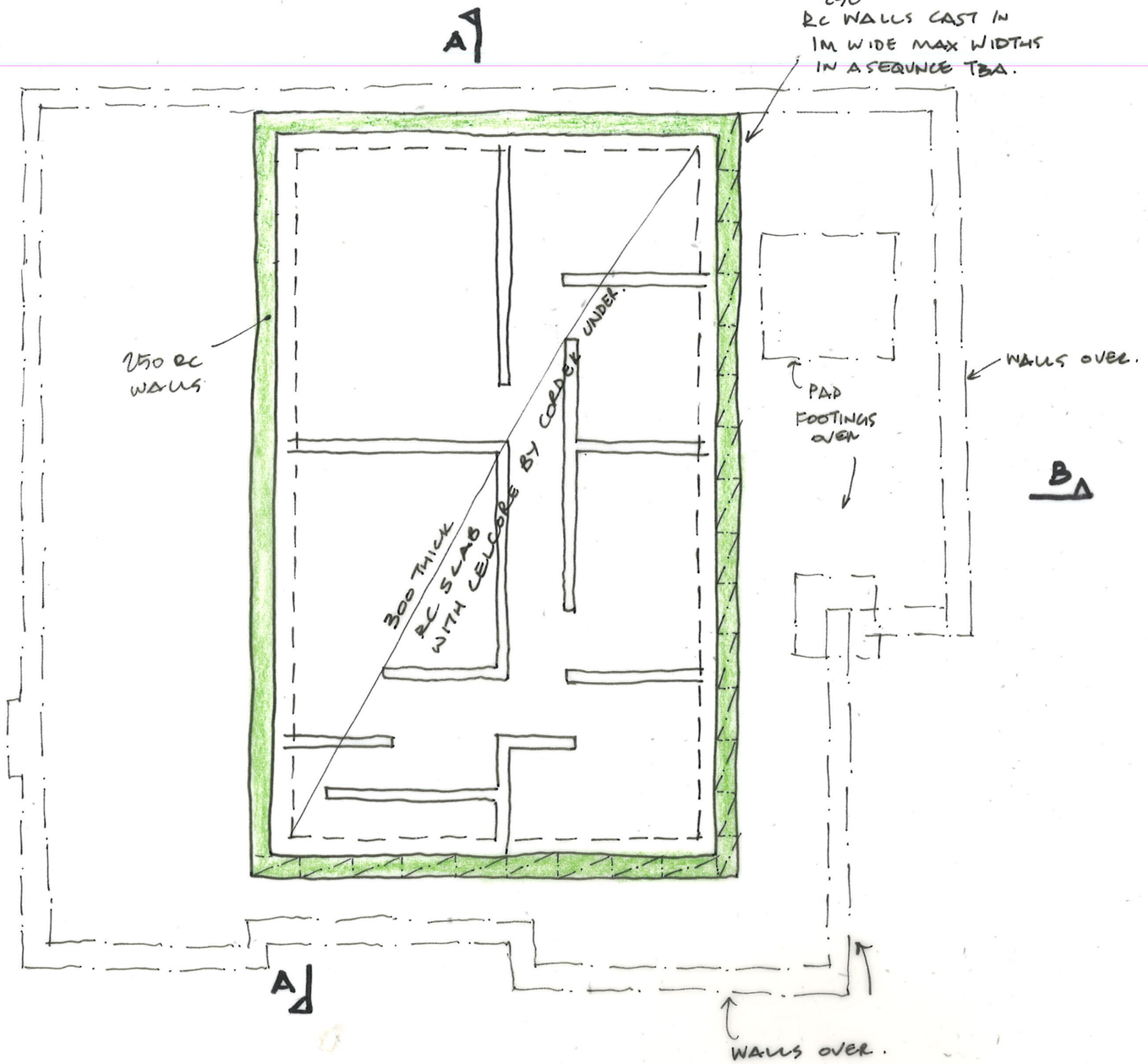
before digging

After digging, $q_{ult} = 1638\ kN/m^2$

=> there is only 10% post-dig reduction in the ultimate bearing capacity => little adverse effect

Structural Drawings

ALL TEMPORARY AND ENABLING WORKS ARE THE RESPONSIBILITY OF THE CONTRACTOR



This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

ALL REINFORCED CONCRETE BELOW GROUND TO HAVE A WATERPROOF ADDITIVE SUCH AS XYPEX OR SIMILAR APPROVED.

revision	date	by	checked	approved
P3	22.8.11	CP		
ISSUED FOR PRELIM COSTING.				

elliottwood

elliott wood partnership llp, 241 the broadway, london sw19 1sd
consulting structural and civil engineers. www.elliottwood.co.uk
tel: (020) 8544 0033 fax: (020) 8544 0066 info@elliottwood.co.uk

job title

16 DALEHAM GARDENS

drawing title

PROPOSED BASEMENT PLAN

scale(s)	date	drawn
N 1:100	22.8.11	CP

drawing status

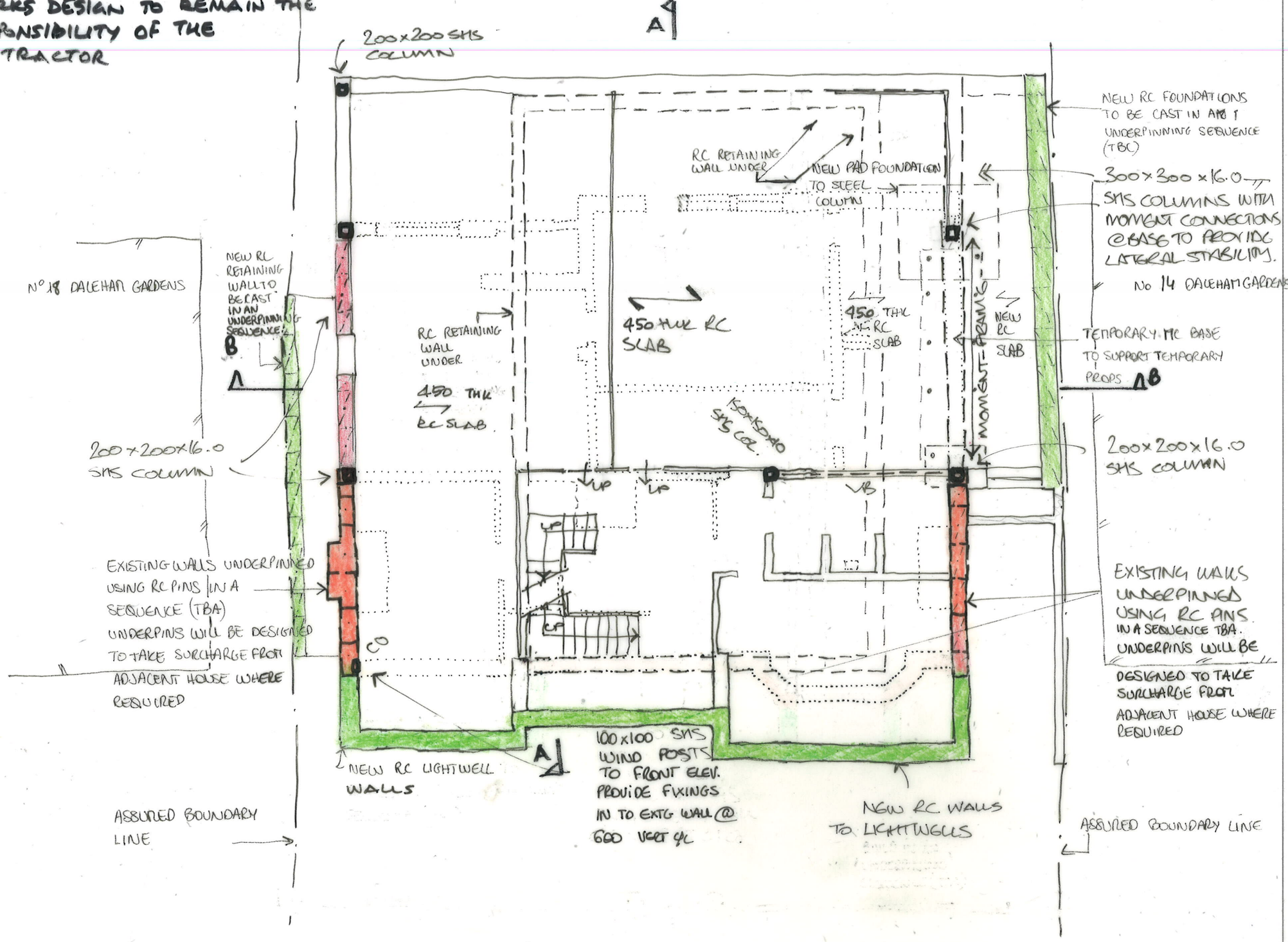
PRELIMINARY

job no	drawing no	revision
211338	S/01	P3

N.B.: - PROPOSED AND TEMPORARY WORKS ASSUMED IN DESIGN

ALL TEMPORARY AND ENABLING WORKS DESIGN TO REMAIN THE RESPONSIBILITY OF THE CONTRACTOR

ALL DESIGNS ASSUME LIGHTWEIGHT TIMBER FLOORS, TIMBER FRAME WALLS WITH LIGHTWEIGHT CLADDING, ALL TBC BY ARCHITECT



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ALL STEELWORK TO BE GRADE S355.

- - - ; STRUCTURE BELOW

::::: ; STRUCTURE TO BE REMOVED

revision	date	by	checked	approved
P2	24.8.11	CP		
ISSUED FOR PRELIM. COSTING.				
P1	12.8.11	GG		
FOR PLANNING				

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elliott wood partnership llp, 241 the broadway, london sw19 1sd
consulting structural and civil engineers. www.elliottwood.co.uk
tel: (020) 8544 0033 fax: (020) 8544 0066 info@elliottwood.co.uk

job title

16 DALEHAM GDN's

drawing title

LOWER GROUND FLOOR

scale(s)	date	drawn
N/1:100@A3	5/8/11	CG

drawing status

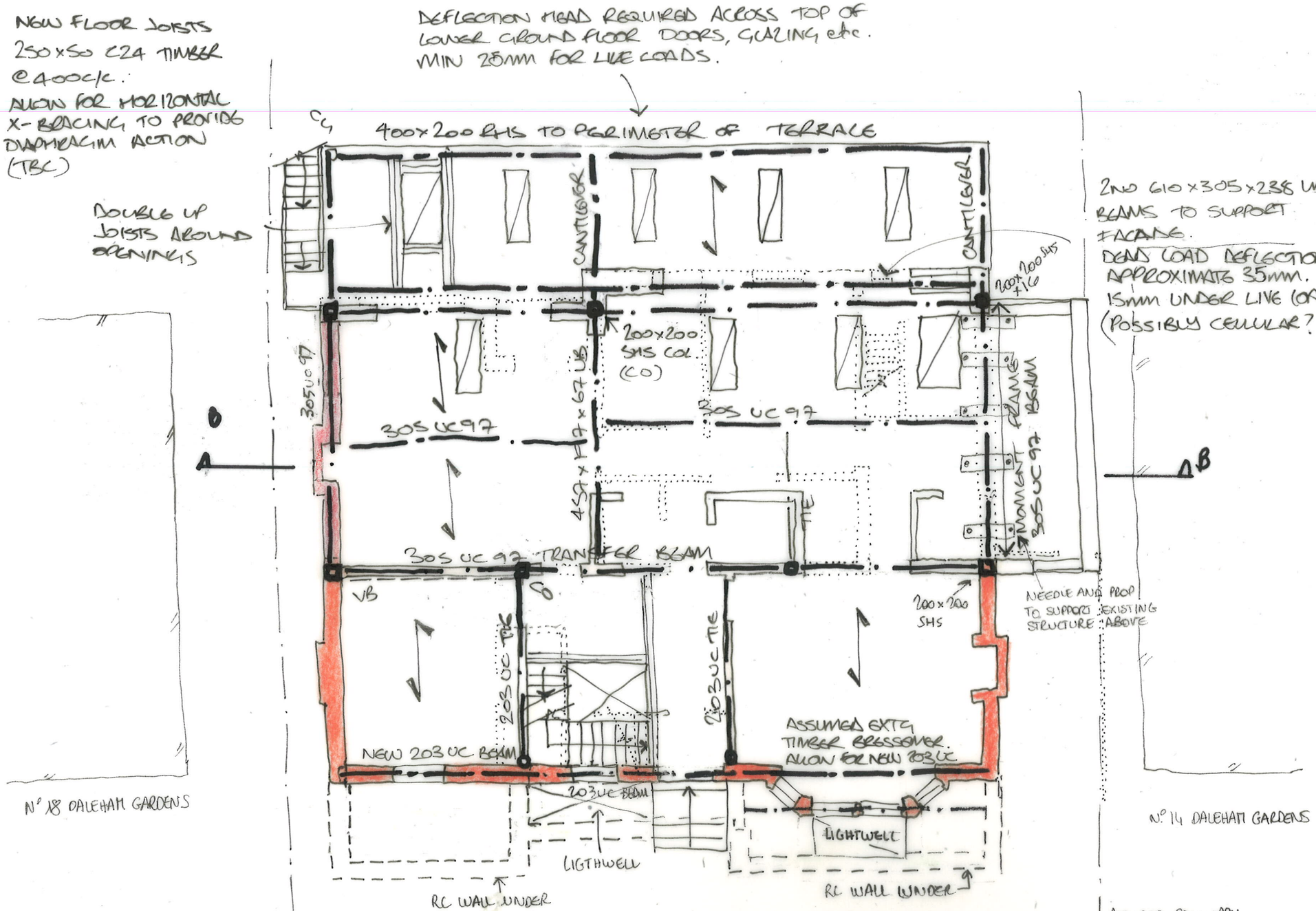
PRELIMINARY

job no	drawing no	revision
211338	S/02	P2

NEW FLOOR JOISTS
250x50 C24 TIMBER
@400c/c.
ALLOW FOR HORIZONTAL
X-BRACING TO PROVIDE
DIAPHRAGM ACTION
(TBC)

DOUBLE UP
JOISTS AROUND
OPENINGS

DEFLECTION HEAD REQUIRED ACROSS TOP OF LOWER GROUND FLOOR DOORS, GLAZING etc.
MIN 25mm FOR LIVE LOADS.



2NO 610x305x238 UB BEAMS TO SUPPORT FACADE.
DEAD LOAD DEFLECTION APPROXIMATE 35mm.
15mm UNDER LIVE LOAD.
(POSSIBLY CELLULAR?)

BEAMS TO BE PRE-CAMBERED TO TAKE OUT PROPOSED DEAD LOAD DEFLECTIONS.

VB - DENOTES VERTICAL X-BRACING. ALLOW FOR 100x15 FLATS.

CO - DENOTES COLUMN OVER. TYP 100x100 x10 SHS UNO.

N°18 DALEHAM GARDENS

ASSURED BOUNDARY LINE

N°14 DALEHAM GARDENS

ASSURED BOUNDARY LINE

N.B. :- PROPOSED AND TEMPORARY WORKS ASSUMED IN DESIGN

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revision	date	by	checked	approved
P2	24.8.11	GP		
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P1	12.8.11	GG		
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elliott wood partnership llp, 241 the broadway, london sw19 1sd
consulting structural and civil engineers. www.elliottwood.co.uk
tel: (020) 8544 0033 fax: (020) 8544 0066 info@elliottwood.co.uk

job title
16 DALEHAM GDNS

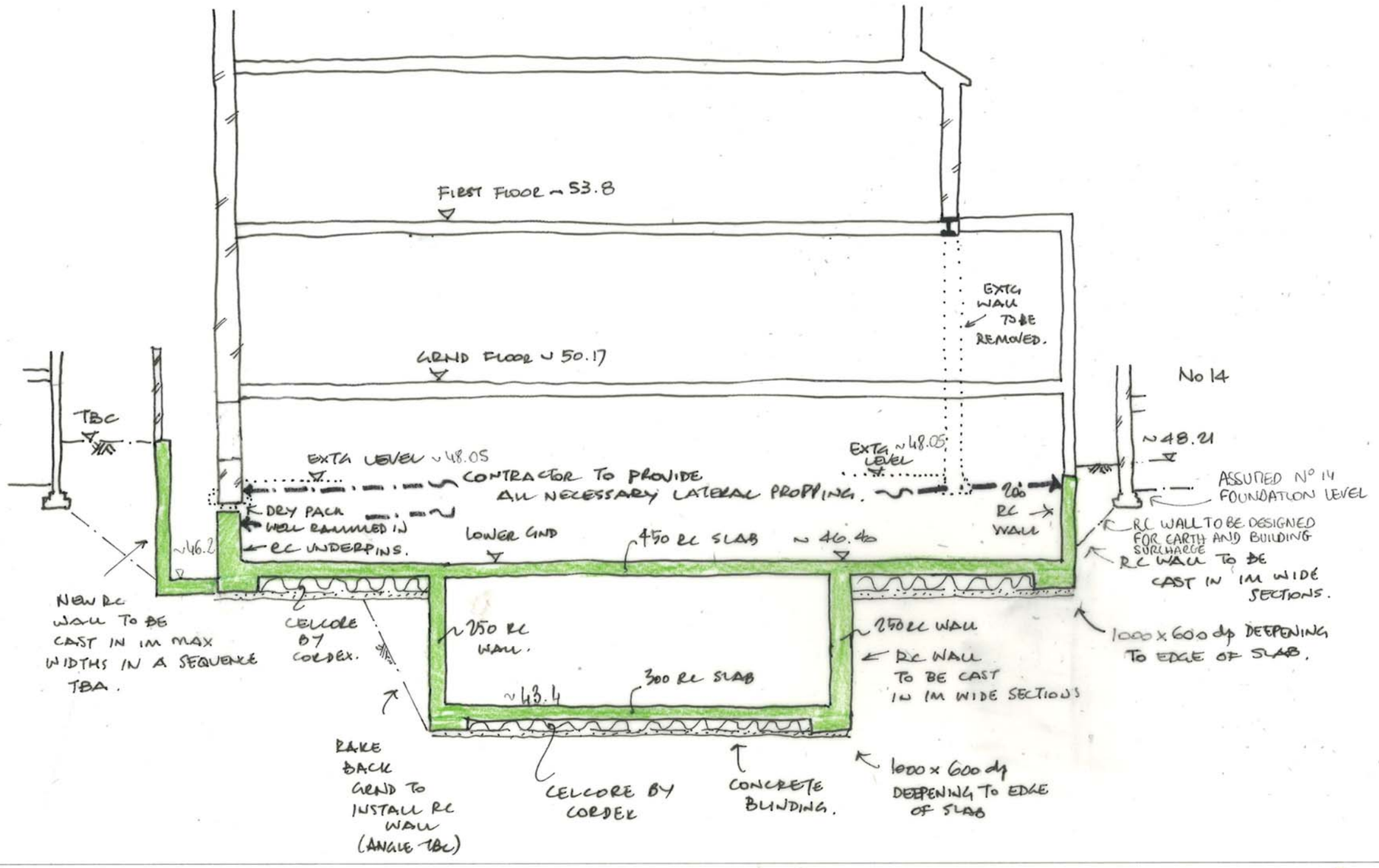
drawing title
GROUND FLOOR

scale(s)	date	drawn
N1:100@A3	5/8/11	GG

drawing status
PRELIMINARY

job no	drawing no	revision
211338	S/03	P2

ALL TEMPORARY AND ENABLING WORKS TO REMAIN THE RESPONSIBILITY OF THE CONTRACTOR.



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revision	date	by	checked	approved
P4	24.8.11	GP		
REDRAWN/ISSUED FOR PRELIM COSTING				

elliottwood

elliott wood partnership llp, 241 the broadway, london sw19 1sd
consulting structural and civil engineers. www.elliottwood.co.uk
tel: (020) 8544 0033 fax: (020) 8544 0066 info@elliottwood.co.uk

job title
16 DALEHAM GARDENS

drawing title
B-B

scale(s)	date	drawn
N1:100	22.8.11	GP

drawing status
PRELIMINARY

job no	drawing no	revision
211338	S/21	P4