102 Camden Mews, Camden, London

Basement Impact Assessment (Screening and Scoping)

On behalf of: **City and County Group Ltd**

Project Ref: 32472/3501 | Document: R001/rev1| December 2014

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Document Control Sheet

Project: **102 Camden Mews, Camden, London**

Project Ref: **32472/3501**

Document: **Basement Impact Assessment (Screening and Scoping)**

Doc Ref: **R001/rev1**

Date: **December 2014**

	Name	Position	Signature	Date
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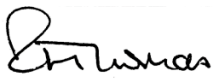
Approved and Reviewed by:	Richard Thomas CGeol	LLP Director		22/12/2014
For and on behalf of Peter Brett Associates LLP				

Issue	Date	Description	Prepared	Reviewed	Approved
rev0	Oct 2014	Issued final to Client	az	rht	rht
rev1	Dec 2014	Revised final with Qualifications	az/rf	rht	rht

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1.0 Introduction

Peter Brett Associates LLP, PBA, have been retained by City and County Group Limited, the Client, to undertake a screening and scoping study for the Basement Impact Assessment (BIA) of the proposed redevelopment of a residential property located at 102 Camden Mews, Camden, London, NW1 9AG.

The report has been carried out to review the potential impacts that the proposed basement has on the stability, the hydrogeology and the hydrology in the vicinity of the property. It is understood that a planning application (Application Ref: 2014/5589/P) for the demolition of the existing dwelling and garages and the construction of a basement and a two storey dwelling was submitted to the London Borough of Camden (LBC). LBC has requested that a Basement Impact Assessment (BIA) be carried out to support the planning application for the proposed dwelling and basement.

The assessment has been carried out generally in accordance with the Camden Borough Council Camden Planning Guidance CPG4 – Basements and Lightwells (LBC, 2013) that provides guidance on basement development.

The methodology used in the basement impact assessment includes a phased approach to assess potential impacts to neighbouring properties and water environment. The methodology used for this report follows the guidance given in CPG4 and in the Guidance for subterranean development (Arup, 2010) which has five stages as follows:

- **Stage 1 - Screening** Identify whether there are matters of concern which should be investigated using a Basement Impact Assessment.
- **Stage 2 - Scoping** Produces a statement that defines further the matters of concern identified in the screening stage.
- **Stage 3 - Site investigation and Study** – Is undertaken to establish the baseline ground conditions.
- **Stage 4 - Impact Assessment** Is undertaken to determine the impacts from the proposed basement and any mitigation measures proposed.
- **Stage 5 - Review and Decision Making** Review is carried out by Camden Council in respect of the BIA and the residual impacts of the proposed basement.

The baseline conditions at the site are presented in **Sections 2.0** and **3.0**. Screening and Scoping, if required are presented in **Section 4.0**.

The guidance requires the proposed development to mitigate against any potential effects of ground and surface water flooding, and groundwater, if required, to ensure that the proposed basement does not impact neighbouring property or the water environment by way of changing the groundwater or surface water drainage regimes. The assessment in the report has been undertaken using information available in the public domain with regard to hydrogeology, stability and hydrological settings of the Site.

A stability assessment is carried out as part of this report to consider the impact that the proposed basement may have on the stability in the area of the property and to estimate the risk of large scale ground instability such as landslides etc. as a result of the proposed development.

The report includes a hydrogeological assessment on the likely impact of the proposed works on the local groundwater regime. The assessment was carried out using readily available published information and ground investigation data from similar sites in the same geological settings.

Guidance on the context of this report and any general limitations or constraints on its content and usage are given in a guidance note included after the text of this report

2.0 The Site

2.1 Site Location

The Site is centred on Ordnance Survey (OS) National Grid Reference TQ 298 848 at 102 Camden Mews NW1 9AG in the eastern part of London Borough of Camden as shown on **Figure 1**, Site Location Plan.

2.2 Site Description

Historically the Site was undeveloped until the 1870s when terraced housing was constructed along Camden Mews. The Site and its immediate surroundings have remained in residential use since.

The Site is largely rectangular in shape with overall plan dimensions of about 10 m by 8 m. The Site is occupied by a two storey dwelling at the north end of the Site and by two garages at the southern end. The Site fronts on to Camden Mews to the northwest, bounded to the northeast and southwest with terraced properties, and communal gardens to the southeast.

There are two trees and a hedge within the communal gardens situated in the immediate vicinity of the Site. The Arboricultural Report submitted to support the planning application for the proposed development concluded that pruning is not required for any of the retained trees or shrubs in the vicinity of the Site. Furthermore the report concluded that the proposed dwelling is situated outside of the assessed Root Protection Area (RPA) of all of the trees in the vicinity of the Site (GHAT, 2012).

The Site is situated on ground that gently slopes to the southwest towards the River Fleet (now culverted) about 0.6 km southeast of the Site. The ground level at the junction of York Way and Cliff Road situated about 80 m to the northeast of the site is about 50 m Ordnance Datum (OD) falling to about 45 m OD at the junction of Camden Road with Torriano Avenue, about 110 m south of the Site. The ground level in the vicinity of the Site is about 47 m OD.

The overall slope angle of the ground assessed using the topographical contours on the OS map is estimated to be about 2 degrees to the horizontal. According to the slope angle map included in the Guidance for subterranean development for Camden the Site is situated in an area where the slope angle is less than 7 degrees (Arup, 2010).

2.3 Proposed Development

The proposed development comprises the demolition of the existing dwelling and garages, and the construction of a two/three storey dwelling and single storey basement across the footprint of the existing property and garages.

Plans and sections provided by the Architect Dols Wong that show the layout of the existing and the proposed dwelling and basement are included in **Appendix 1**.

3.0 Geology, Hydrogeology and Hydrology

3.1 Geology

3.1.1 Published Geology

The 1:50 000 scale geological map of the area (BGS, 2006) and the geological memoir (BGS, 2004) indicate that the Site lies directly on the London Clay Formation underlain by the Lambeth Group (formerly denoted the Woolwich and Reading Beds) and Thanet Sand Formation with the Seaford and Newhaven Chalk Formations (formerly denoted the Upper Chalk) present at depth.

It is expected that the natural deposits are overlain by Made Ground associated with the former and current developments of the Site.

3.1.2 Historical Borehole Records

The British Geological Survey (BGS) archives contain records of a number of boreholes in the vicinity of the property. Copies of a number of borehole records have been obtained from the archives have been reproduced and presented in **Appendix 2**.

The BGS borehole locations are shown on the Site Location Plan, **Figure 1**.

The historical borehole records indicate that the solid geology in the vicinity of the property comprises the London Clay Formation locally below a thin layer of Made Ground. The London Clay Formation is recorded to comprise soft, firm to stiff increasing to hard with depth brown and grey fissured CLAY locally silty with partings of fine sand. The London Clay was investigated to a maximum depth of 21 m below ground level. All the available records indicate that groundwater was not encountered during the drilling of the boreholes.

3.2 Hydrogeology

The published groundwater vulnerability map of the area (NRA, 1995) indicates the London Clay Formation is classified as an Unproductive Strata (formerly non-aquifer), these are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

3.3 Hydrology

The nearest water course is the River Fleet situated about 0.6 km to the southwest of the Site flowing in general direction to the southeast towards the River Thames. The River Fleet was culverted in the 1870s during the residential development around the river.

The Regent's Canal was constructed by the 1810s and is situated about 1.0 km to the southwest of the Site.

The ponds of Hampstead Heath Site are situated about 1.0 km to the northwest of the Site. The Site is not situated within the catchment of these ponds.

4.0 Screening and Scoping

4.1 Introduction

This section of the report is undertaken to determine the potential impacts from the proposed basement, based on the baseline conditions as established in the previous sections.

A screening process in accordance with CPG4 is undertaken to determine whether or not a full 'Basement Impact Assessment' is required for the proposed development. In the case that there are likely impacts caused by the proposed basement development then a scoping is required to determine the scope of work required. A series of checklists for screening including proposed mitigation measures (if required) are presented in the following sections.

A number of screening tools are recommended in the CPG4 and in the Guidance for the subterranean development (Arup, 2010) that include a series of questions within a screening flowchart for three categories; groundwater flow; land stability; and surface water flow. Responses to the questions are tabulated below in the relevant sections.

4.2 Hydrogeological Initial Assessment

4.2.1 Hydrogeological Screening

The screening assessment by PBA for the proposed basement at the site following the screening flowcharts in CPG4 (Camden, 2013) is presented in the table below.

Table 4.1 Subterranean (groundwater) Screening Assessment

	Screening Flowchart Questions	Answer
1(a)	Is the site located directly above Aquifer	No, the site lies directly on the London Clay Formation
1(b)	If Yes 1(a) will the proposed basement extend beneath the groundwater table?	Not Applicable
2	Is the Site within 100 m of a watercourse, well or potential spring line?	No
3	Is the Site within the catchment of the pond chain on Hampstead Heath?	No
4	Will the proposed basement development result in change in area of hard surfaced/paved area?	No
5	As part of site drainage, will more surface water then present be discharge to the ground?	No
6	Is the lowest point of the proposed excavation close to, or lower than the mean water level in any local pond or spring line?	Not Applicable

4.2.2 Hydrogeological Scoping

The above screening flowchart has identified that there are no potential issues related to groundwater that requires further assessment.

4.3 Slope Stability Initial Assessment

4.3.1 Slope Stability Screening

The screening assessment by PBA for the slope stability at the site is presented in the table below.

Table 4.2 Slope Stability Screening Assessment

	Screening Flowchart Questions	Answer
1	Does the Site include slopes natural or man made greater than 7degrees?	No
2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7degrees?	No
3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees?	No
4	Is the site within a wider hillside setting in which the general slope is greater than 7 degrees?	No
5	Is the London Clay the shallowest strata at the site?	Yes
6	Will any tree/s be felled as part of the proposed development and/or are any works proposed within any 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?	Unknown
8	Is the site within 100m of a watercourse or a potential spring line?	No
9	Is the site within an area of previously worked ground?	No
10 (a)	Is the site within an aquifer?	No
10 (b)	If yes to (a), will the proposed basement extend beneath the water table such that dewatering may be required during construction?	Not Applicable
11	Is the site within 50m of the Hampstead Heath ponds?	No
12	Is the site within 5m of a highway or pedestrian right of way?	Yes
13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes
14	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No

The above screening flowchart has identified the following potential issues that need to be assessed further:

Q5 London Clay is the shallowest strata on site.

Q7 The London Clay is known to be affected by seasonal shrink swell subsidence.

Q12 The proposed basement is bounded by a pavement of Camden Mews.

Q13 The proposed basement will significantly increase the differential depth of foundations relative to neighbouring properties.

4.3.2 Stability Scoping

Based on the screening flowchart the overall ground stability in the vicinity of the property can be scoped out and does not require further assessment.

Excavation and construction of the new basement will potentially cause some strain in the surrounding ground potentially triggering associated movement in adjacent buildings and the pavement adjacent to the basement.

A Stage 3 Ground Investigation has been commissioned to confirm the ground conditions at the Site.

The proposed basement will be designed by the Structural Engineer appointed for the scheme in accordance with current legislation, British Standards and industry guidance and the design will include

mitigating potential movements of adjacent structures. Furthermore, the Structural Engineer, Contractor and temporary works designer will address potential stability issues during temporary works and stipulate the construction method of the basement to address any stability issues.

The London Clay is a very plastic shrinkable clay with a high shrinkage or swelling potential in respect of changes in moisture content resulting from seasonal or climatic changes, or from the effects of vegetation. The phenomenon is addressed by geotechnical engineers and foundations designers via established codes of practice, technical standards and guidance. The impact of existing and any new foundation elements within the tree root zone of influence of trees or within the surface zone of seasonal influences, will be addressed and designed accordingly by the Structural Engineer appointed for the scheme.

A Stage 4 Impact Assessment will be undertaken by the Structural Engineer and submitted to LBC to determine the above impacts from the proposed basement and any mitigation measures proposed.

It should be noted that this report does not assess the stability of temporary or permanent works during the construction, design of retaining walls and foundations, assessment of ground movement behind retaining walls, clay shrinkage or heave etc. All these issues will be addressed during the design of the basement by the structural and geotechnical engineers responsible for these aspects of the works.

4.4 Surface Water Screening Assessment

4.4.1 Surface Water Screening

The screening assessment by PBA for the surface water drainage regime and flood risk at the site is presented in the table below.

Table 4.3 Surface Water and Flooding Screening Assessment

	Screening Flowchart Questions	Answer
1	Is the site within the catchment of the pond chains on Hampstead Heath?	No
2	As part of the site drainage, will surface water flows (e.g. rainfall and run-off) be materially changed from the existing route?	No
3	Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No
4	Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	No
5	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream?	No

4.4.2 Surface Water Scoping

The above screening has identified that there are no potential issues related to surface water flooding that requires further assessment.

5.0 Conclusions

5.1 Groundwater

The potential impacts from the proposed basement on the groundwater regime in the vicinity of the property are scoped out by the screening study and do not require further assessment.

This is because the Site is situated in the London Clay Formation which is a Non Aquifer with a very low permeability so that any changes to the groundwater regime will be negligible. On this basis, it is concluded that the proposed basement can be constructed without any risk of detrimental effect on the groundwater regime.

5.2 Stability

It is considered that the proposed basement at 102 Camden Mews will not have a negative impact on the overall ground slope stability in the vicinity of the property.

Potential strain on the ground during and/or following the basement construction triggering movement of adjacent properties and/or pavements will need to be assessed further. Similarly, the high shrinkage or swelling potential of the London Clay Formation in respect of changes in moisture content will need to be addressed.

In accordance with the guidance for the Basement Impact Assessment in CPG4 (LBC, 2013) a Stage 3 ground investigation has been commission and will be carried out at the site. A Stage 4 Impact Assessment will be undertaken by the Structural Engineer to determine the local stability and temporary works impacts from the proposed basement and any mitigation measures proposed.

5.3 Surface Flow and Flooding

The potential impacts from the proposed basement on the surface water regime in the vicinity of the property are scoped out by the screening study and do not require further assessment.

References

Arup (2010) Camden geological, hydrogeological and hydrological study. Guidance for sub terrain development. Ove Arup & Partners Ltd, London.

BGS (2004) Geology of London, Special Memoir for 1:50 000 Geological sheets 256 (North London), 257 (Romford), 270 (South London) and 271 (Dartford) England and Wales. British Geological Survey, Keyworth, Notts.

BGS (2006) North London, England and Wales Sheet 256, Solid and Drift Geology, 1 to 50 000 scale. British Geological Survey, Keyworth, Notts.

GHAT (2012) Arboricultural and Planning Integration Report: 102 Camden Mews, London, NW1 9AG. Report Ref: GHA/DS/1980:12. GHA trees arboricultural consultancy, Farnham Common, Bucks.

LBC (2013) Basements and lightwells, Camden Planning Guidance CPG4. London Borough of Camden, London.

NRA (1995) Groundwater Vulnerability of West London, Sheet 39, 1 to 100 000 scale groundwater vulnerability map. Environment Agency (formerly National Rivers Authority), Bristol.

Guidance on the Context of the Report

This report has been prepared within an agreed timeframe and to an agreed budget that will necessarily apply some constraints on its content and usage. The remarks below are presented to assist the reader in understanding the context of this report and any general limitations or constraints. If there are any specific limitations and constraints they are described in the report text.

i) The opinions and recommendations expressed in this report are based on statute, guidance, and best practice current at the time of its publication. Peter Brett Associates LLP (PBA) does not accept any liability whatsoever for the consequences of any future legislative changes or the release of subsequent guidance documentation, etc. Such changes may render some of the opinions and advice in this report inappropriate or incorrect and we will be pleased to advise if any report requires revision due to changing circumstances, especially those over one year old. Following delivery of any report PBA has no obligation to advise the Client or any other party of such changes or their repercussions.

ii) Some of the conclusions in this report may be based on third party data. No guarantee can be given for the accuracy or completeness of any of the third party data used. Historical maps and aerial photographs provide a “snap shot” in time about conditions or activities at the site and cannot be relied upon as indicators of any events or activities that may have taken place at other times.

iii) The conclusions and recommendations made in this report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be taken into account in any analysis and reporting.

iv) Unless specifically stated to the contrary, this report does not purport to be a “Geotechnical Design Report” as defined in Clause 2.8 of Eurocode 7 (Geotechnical Design BS EN 1997-1:2004). Some of the data contained herein and used to support any geotechnical assessment presented in this report may be historical or for other reasons not fully compliant with the requirements of that code.

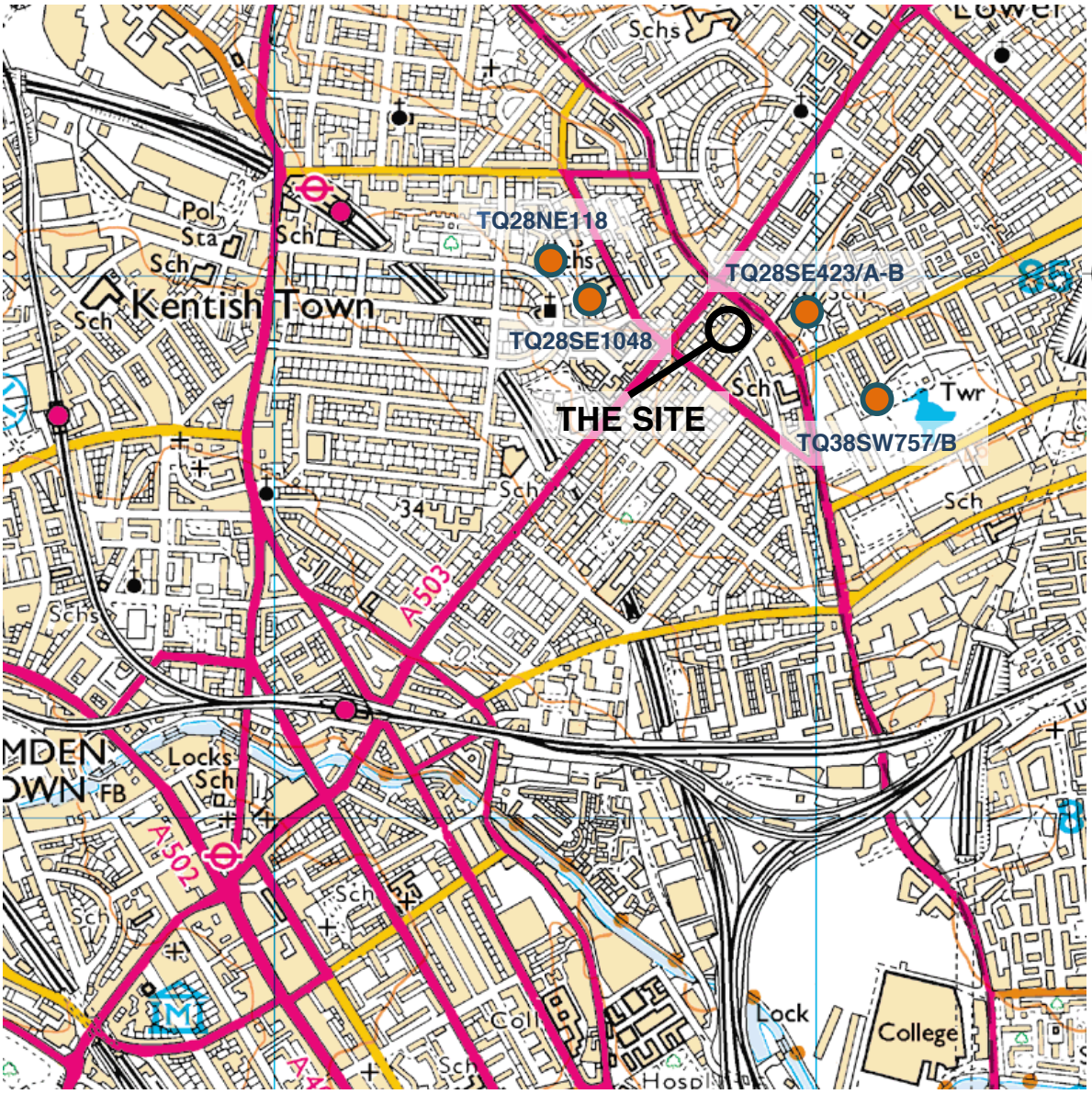
v) It should be noted that groundwater levels, groundwater chemistry, surface water levels, surface water chemistry, soil gas concentrations and soil gas flow rates can vary due to seasonal, climatic, tidal and man made effects.

vi) This report has been written for the sole use of the Client stated at the front of the report in relation to a specific development or scheme. The conclusions and recommendations presented herein are only relevant to the scheme or the phase of project under consideration. This report shall not be relied upon or transferred to any other party without the express written authorisation of PBA. Any such party relies upon the report at its own risk.

vii) The interpretation carried out in this report is based on scientific and engineering appraisal carried out by suitably experienced and qualified technical consultants based on the scope of our engagement. We have not taken into account the perceptions of, for example, banks, insurers, other funders, lay people, etc., unless the report has been prepared specifically for that purpose. Advice from other specialists may be required such as the legal, planning and architecture professions, whether specifically recommended in our report or not.

viii) Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as the Environment Agency, Natural England or Local Authority) have taken place only as part of this work where specifically stated.

FIGURES



National Grid Reference	TQ 298 848
Coordinates	N51:32:53 W0:07:44
Nearest Post Code	NW1 9AG

Key

Approximate Location of Boreholes for which BGS hold records

peterbrett
Caversham Bridge House, Waterman Place, Reading, RG1 8DN
Tel 0118 950 0761 Fax 0118 959 7498

Client

CITY AND COUNTY GROUP LIMITED

SITE LOCATION PLAN

102 CAMDEN MEWS, LONDON

Date	Oct 2014
A4 Scale	1:12 500
Drawn	az
Checked	az
Figure	1

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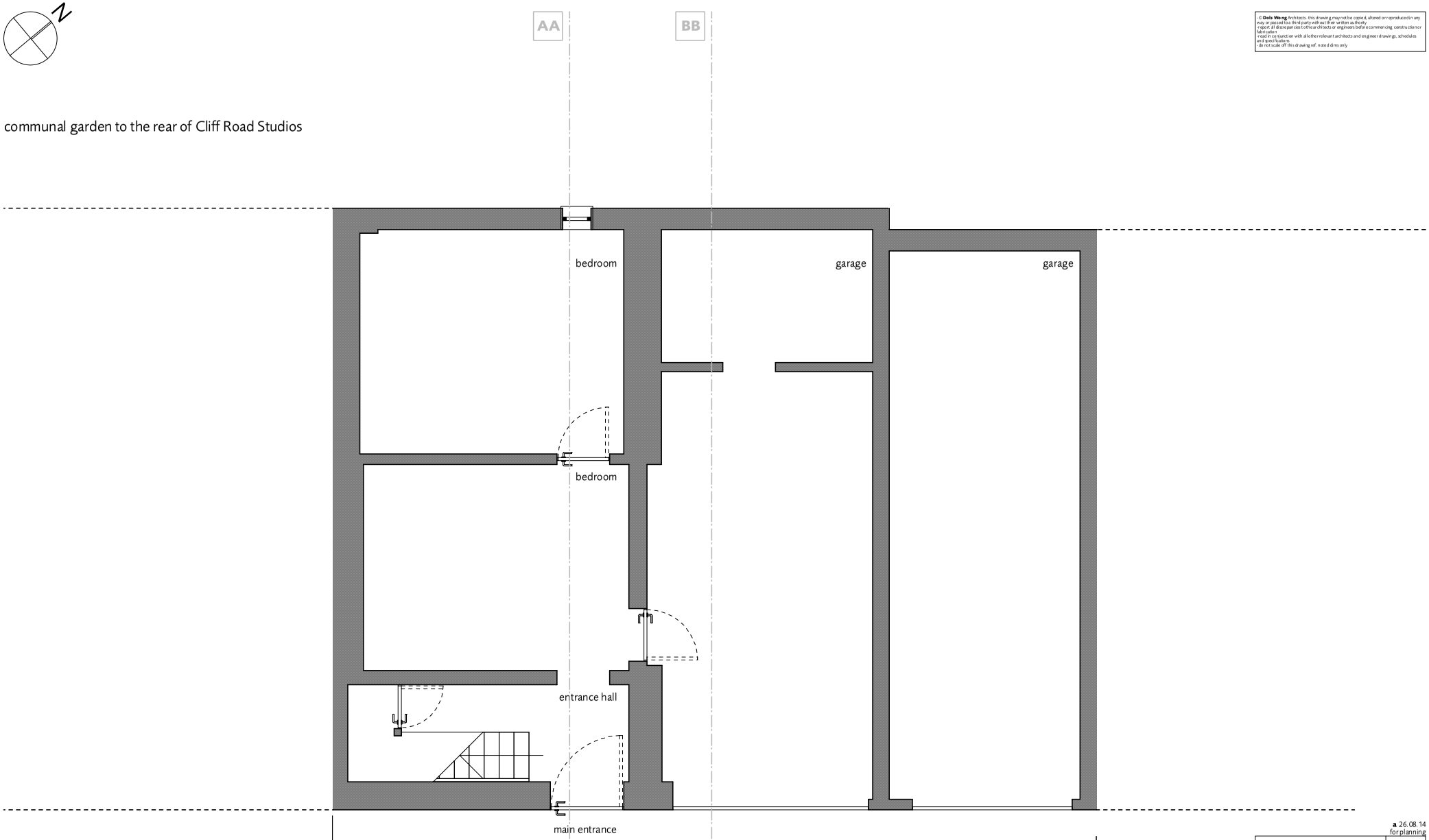
APPENDIX 1

communal garden to the rear of Cliff Road Studios



a 26.08.14
for planning

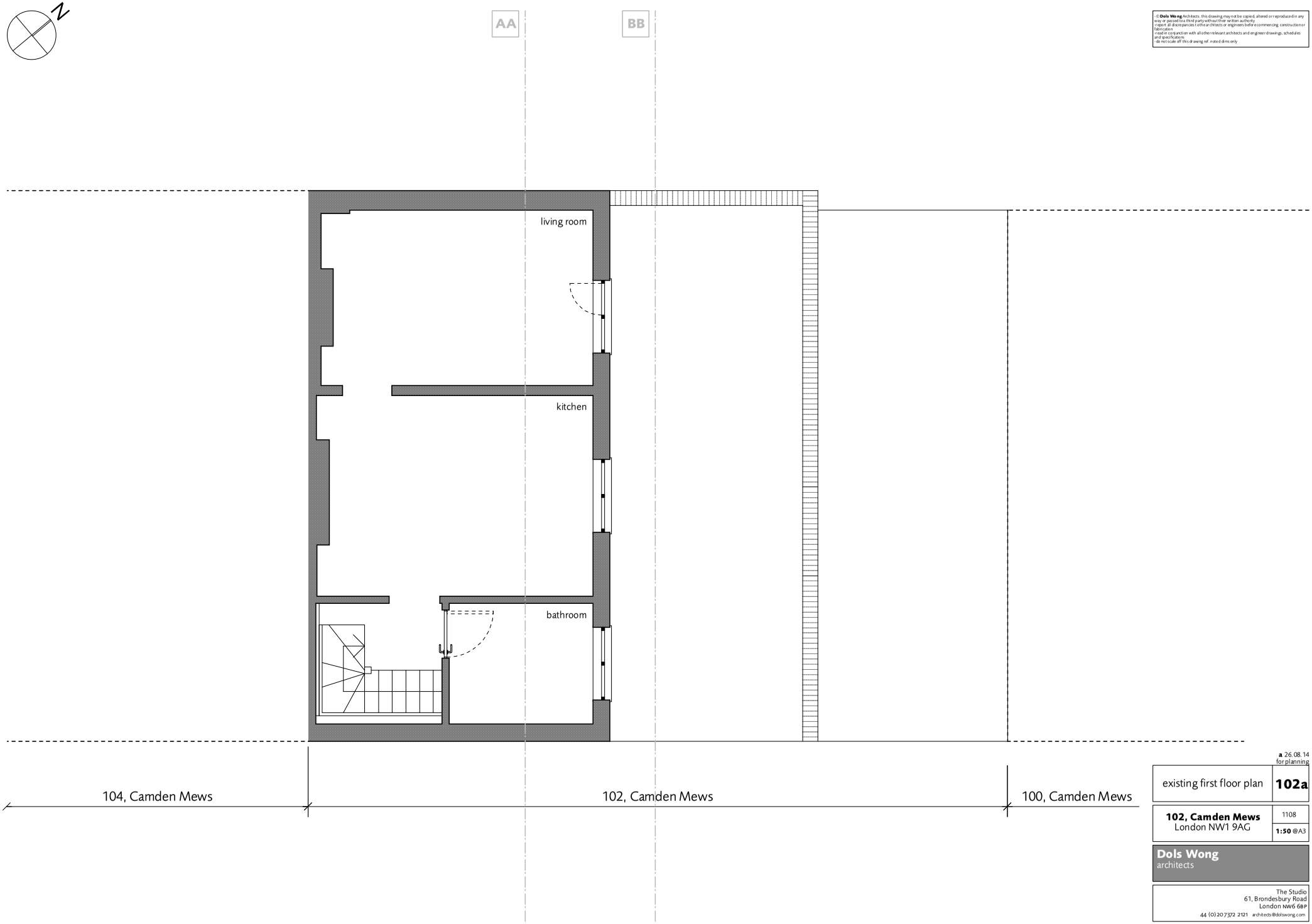
existing ground floor plan **101a**

102, Camden Mews
London NW1 9AG

1108
1:50 @A3

Dols Wong
architects

The Studio
61, Brondesbury Road
London NW6 6BP
44 (0)20 7372 2121 architects@ddswong.com



a 26.08.14
for planning

existing first floor plan **102a**

102, Camden Mews
London NW1 9AG

1108
1:50 @A3

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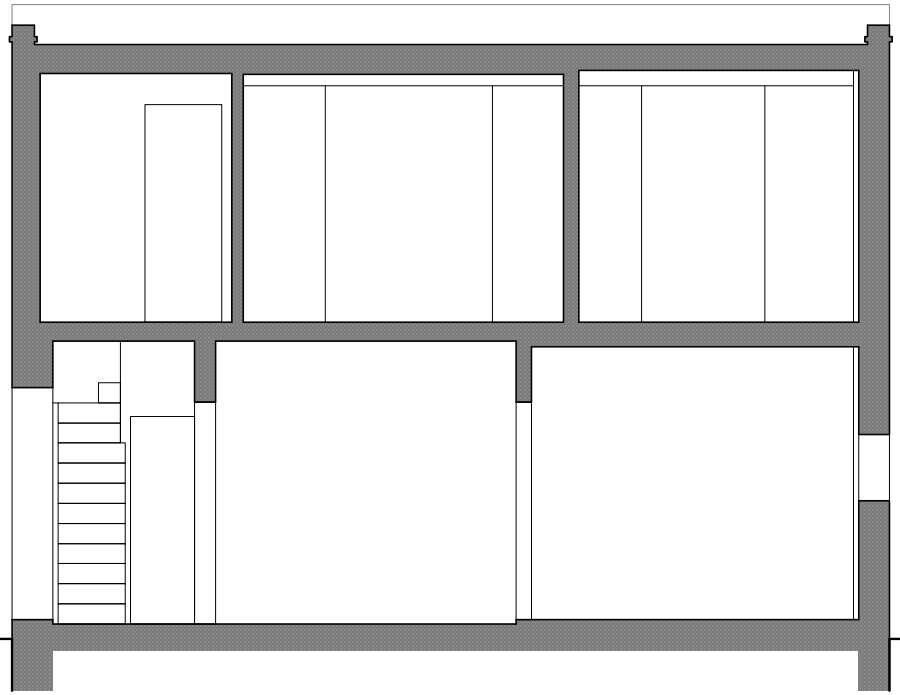

Camden Mews

communal garden to the rear of Cliff Road Studios

a 26.08.14
for planning

existing section AA **110a**

102, Camden Mews
London NW1 9AG

1108
1:50 @A3

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Camden Mews

communal garden to the rear of Cliff Road Studios

b 26.08.14
for planning

existing section BB — **111b**

102, Camden Mews
London NW1 9AG

1108
1:50 @A3

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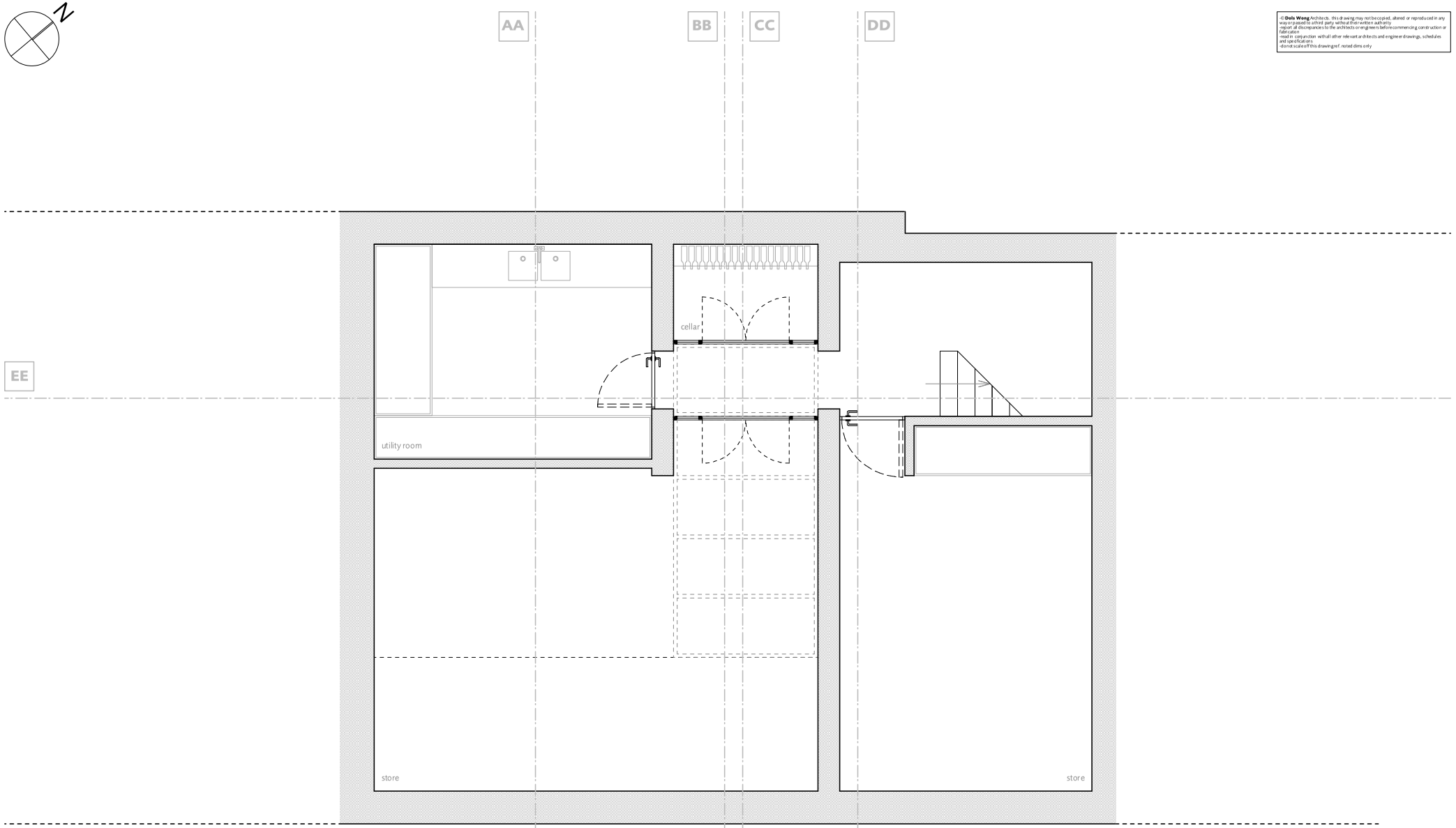

104, Camden Mews

102, Camden Mews

100, Camden Mews

c 26.08.14
for planning

proposed basemet plan	**120c**
102, Camden Mews London NW1 9AG	1108
	1:50 @A3

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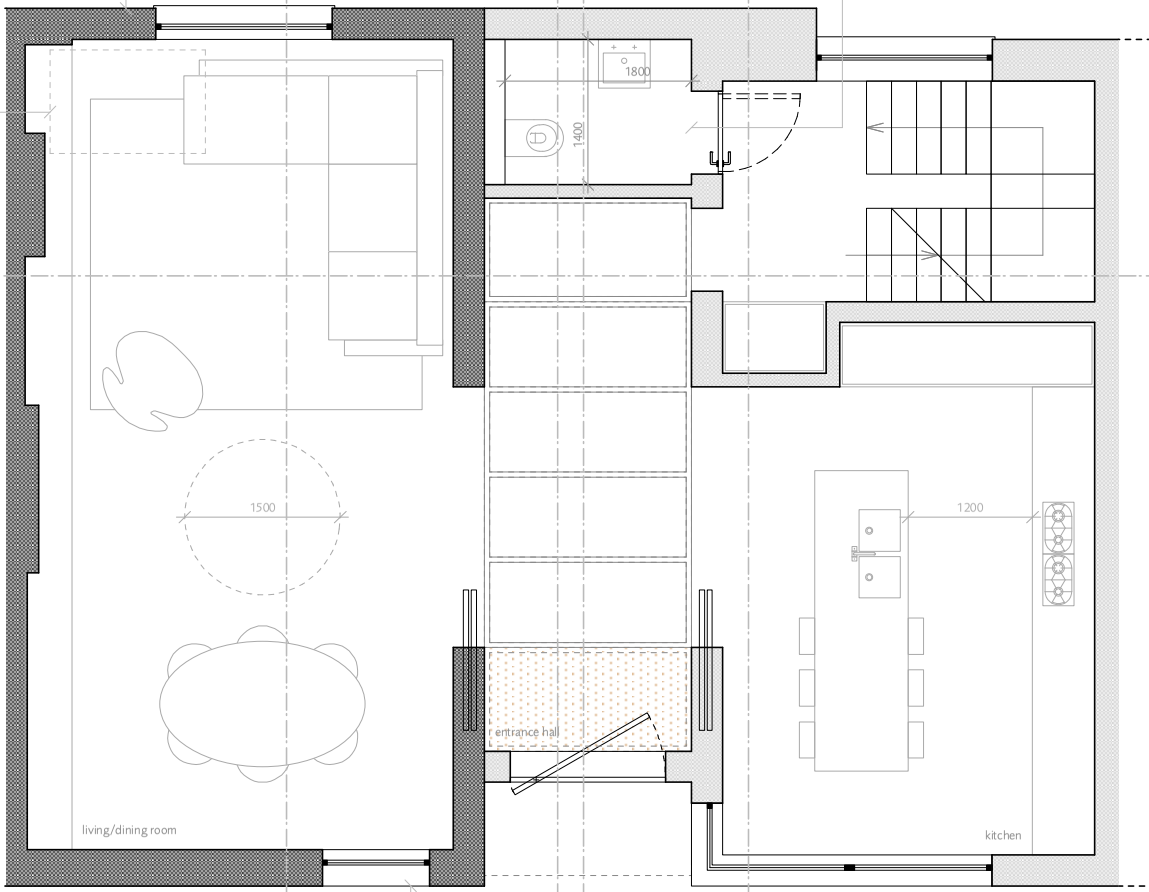
existing walls to be made good and retained

AA BB CC DD EE

toilet areas dimension to comply with Criterion 14 of LIFEHOME CRITERIA, provisions for the installation of a floor level shower

communal garden to the rear of Cliff Road Studios

potential position for a through-floor lift



exisitng opening to be retained

104, Camden Mews

102, Camden Mews

100, Camden Mews

c 26.08.14
for planning

proposed ground floor plan	**121c**
102, Camden Mews London NW1 9AG	1108
	1:50 @A3

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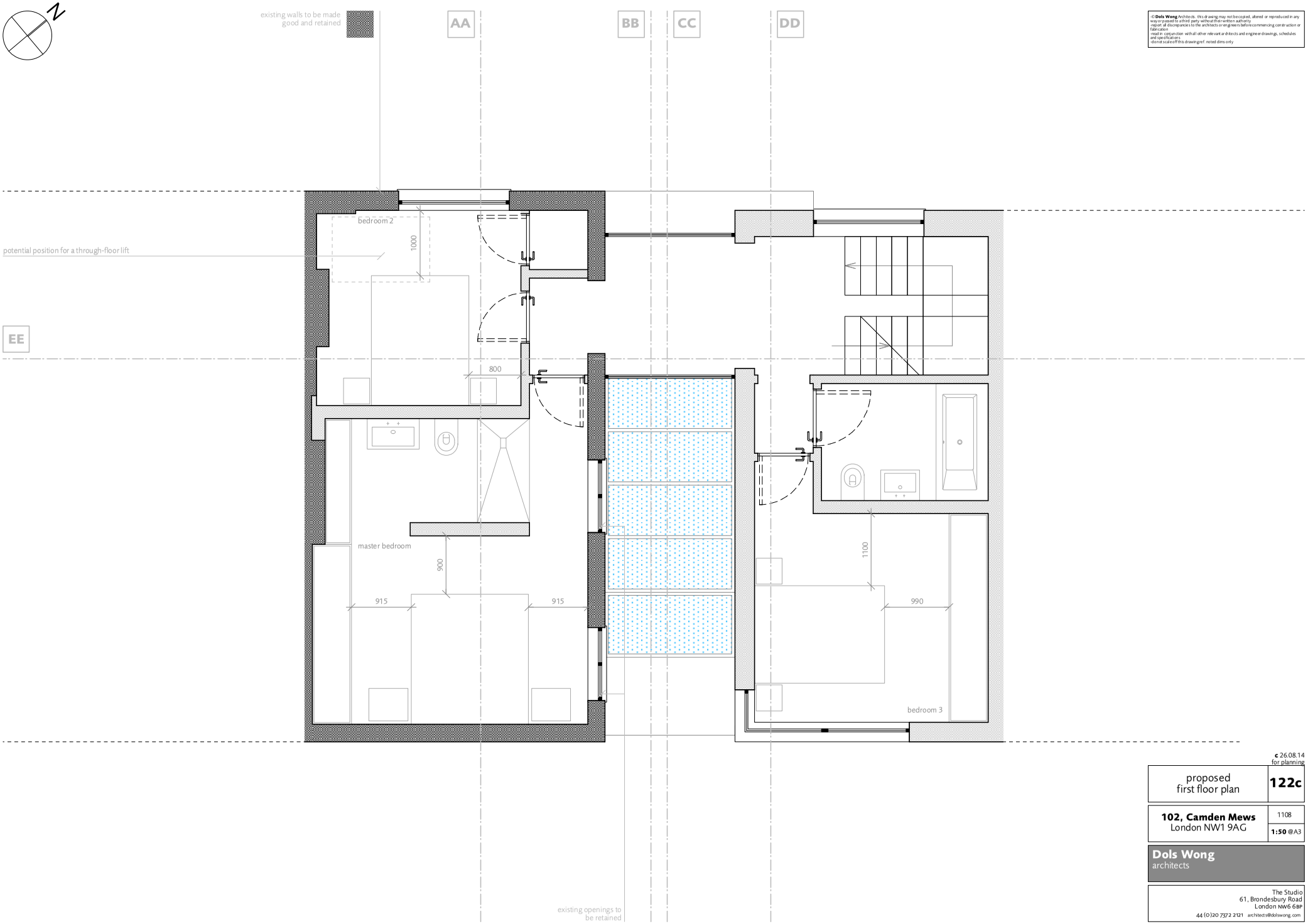

c 26.08.14
for planning

proposed first floor plan	**122c**
102, Camden Mews London NW1 9AG	1108
	1:50 @A3

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existing painted facing brick wall made good and repainted

glass balustrade on top of existing wall to reach the required 1100 mm

new glass link building

painted render to match bricks colour

new double glazed aluminum windows

new double glazed aluminum windows

104, Camden Mews

102, Camden Mews

100, Camden Mews

double glazed frosted glass screen to existing opening

main door

timber cladding

painted render

new double glazed aluminum windows at high level

c 26.08.14
for planning

proposed front elevation	**125c**
102, Camden Mews London NW1 9AG	1108 **1:50** @A3

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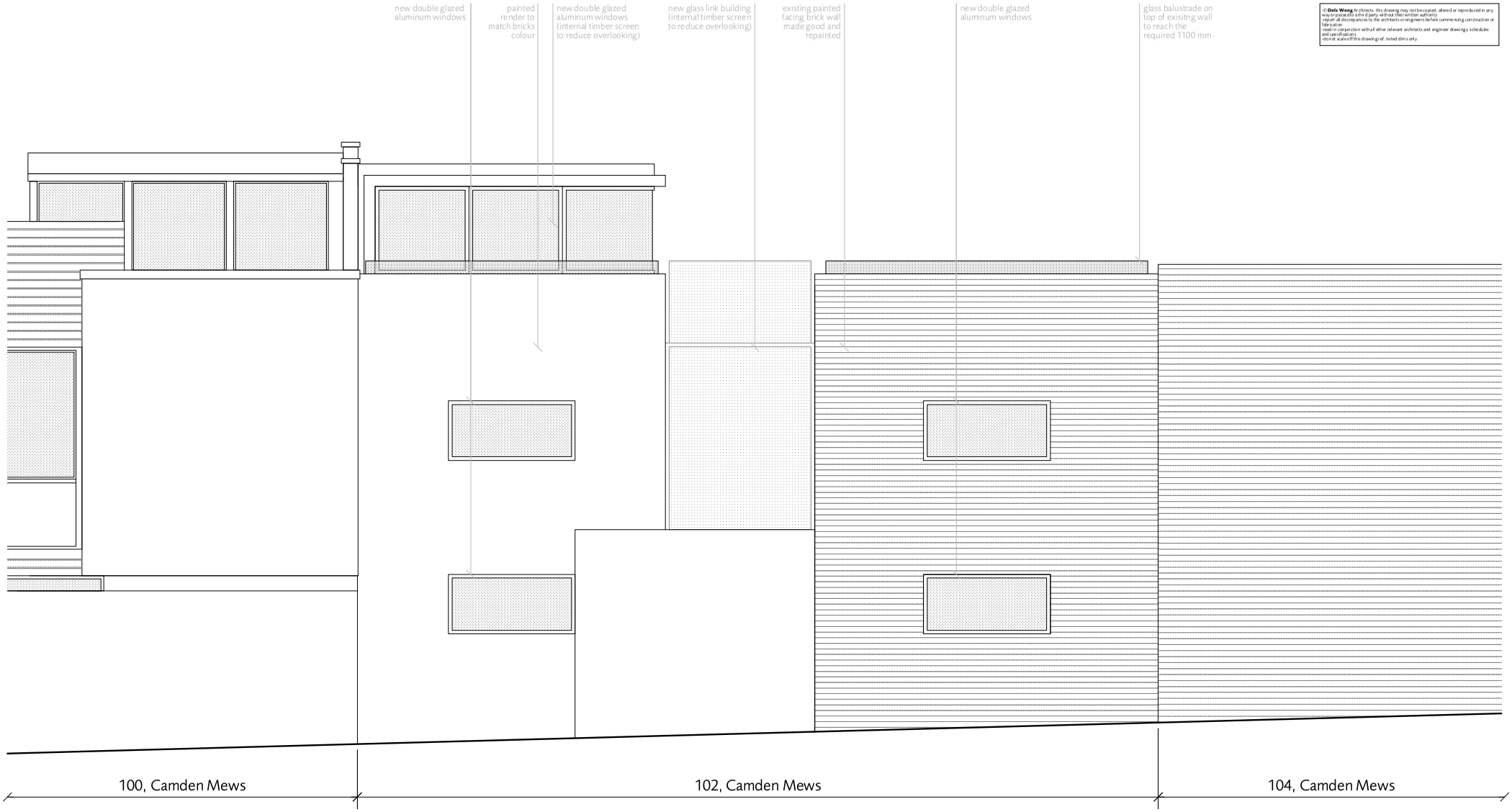

a 26.08.14
for planning

proposed rear elevation	**126a**
102, Camden Mews London NW1 9AG	1108 **1:50** @A3

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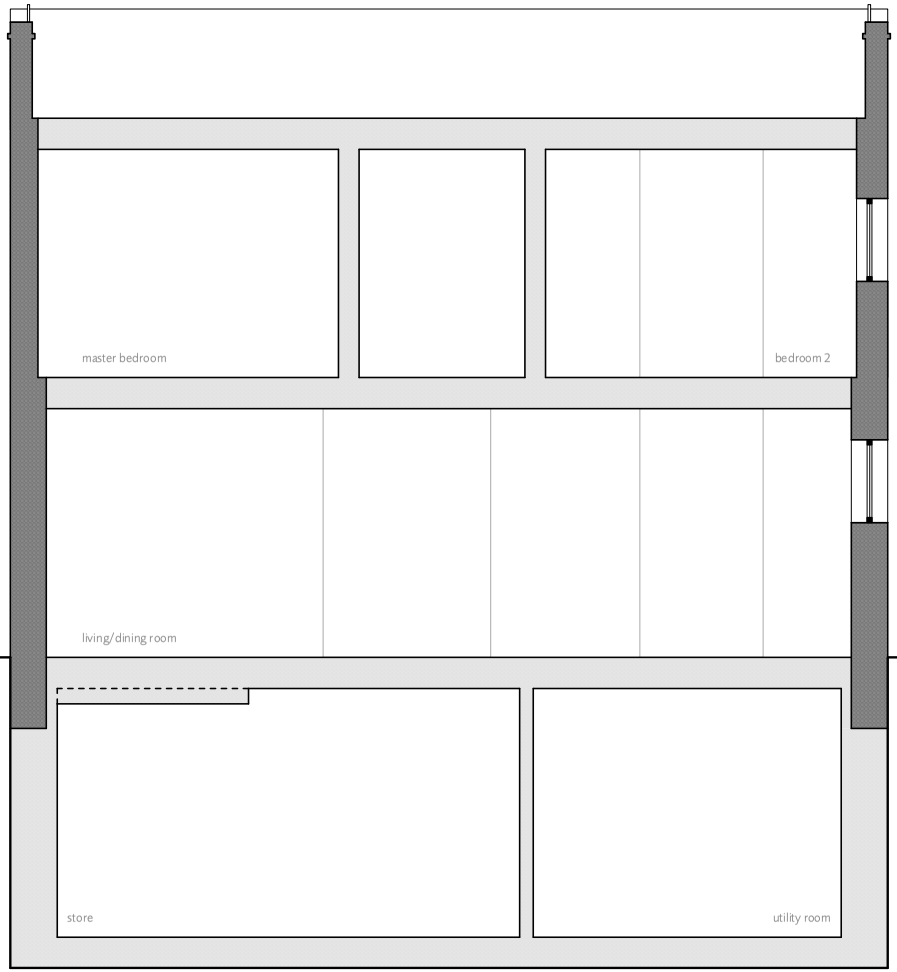

Camden Mews

communal garden to the rear of Cliff Road Studios

a 26.08.14
for planning

proposed section AA	**130a**
102, Camden Mews London NW1 9AG	1108 **1:50** @A3

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Camden Mews

communal garden to the rear of Cliff Road Studios

a 26.08.14
for planning

proposed section BB	**131a**
102, Camden Mews London NW1 9AG	1108 **1:50** @A3

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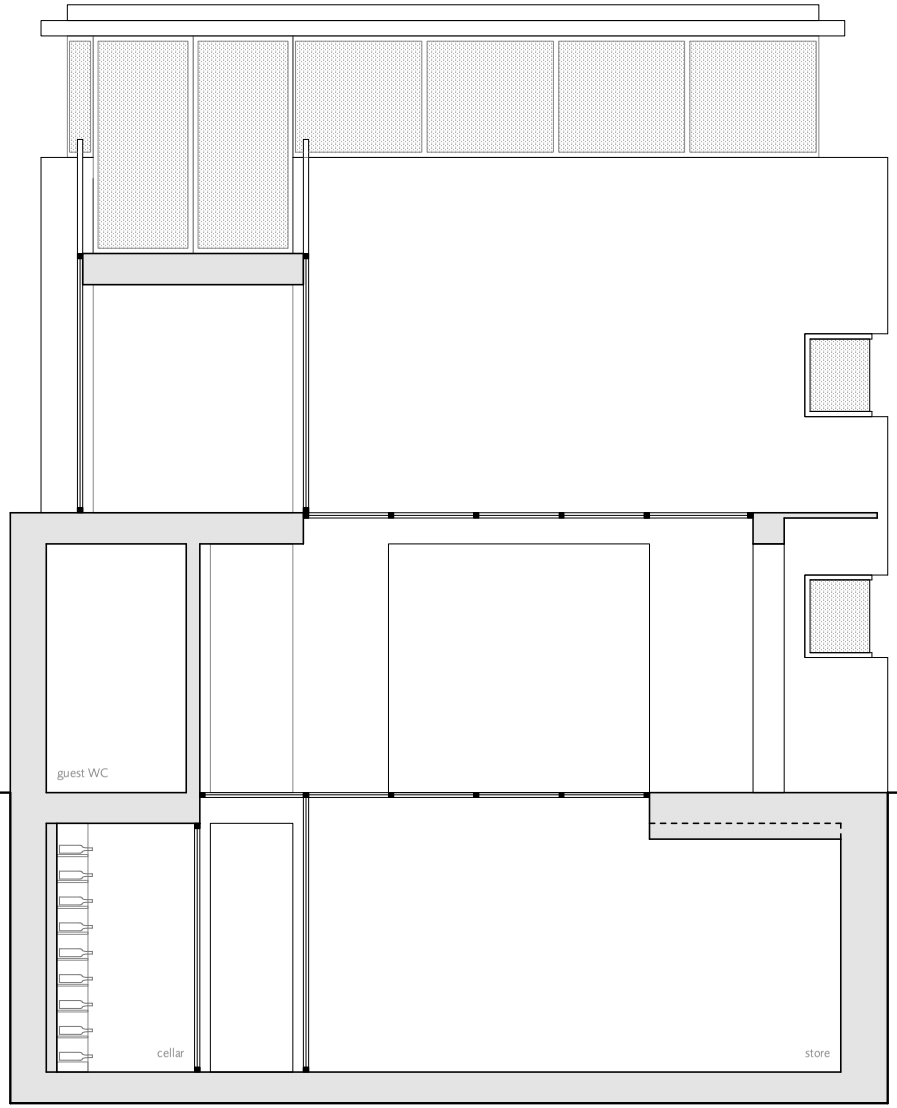
London NW6 6BP
44 (0)20 7372 2121 architects@dolswong.com



communal garden to the rear of Cliff Road Studios

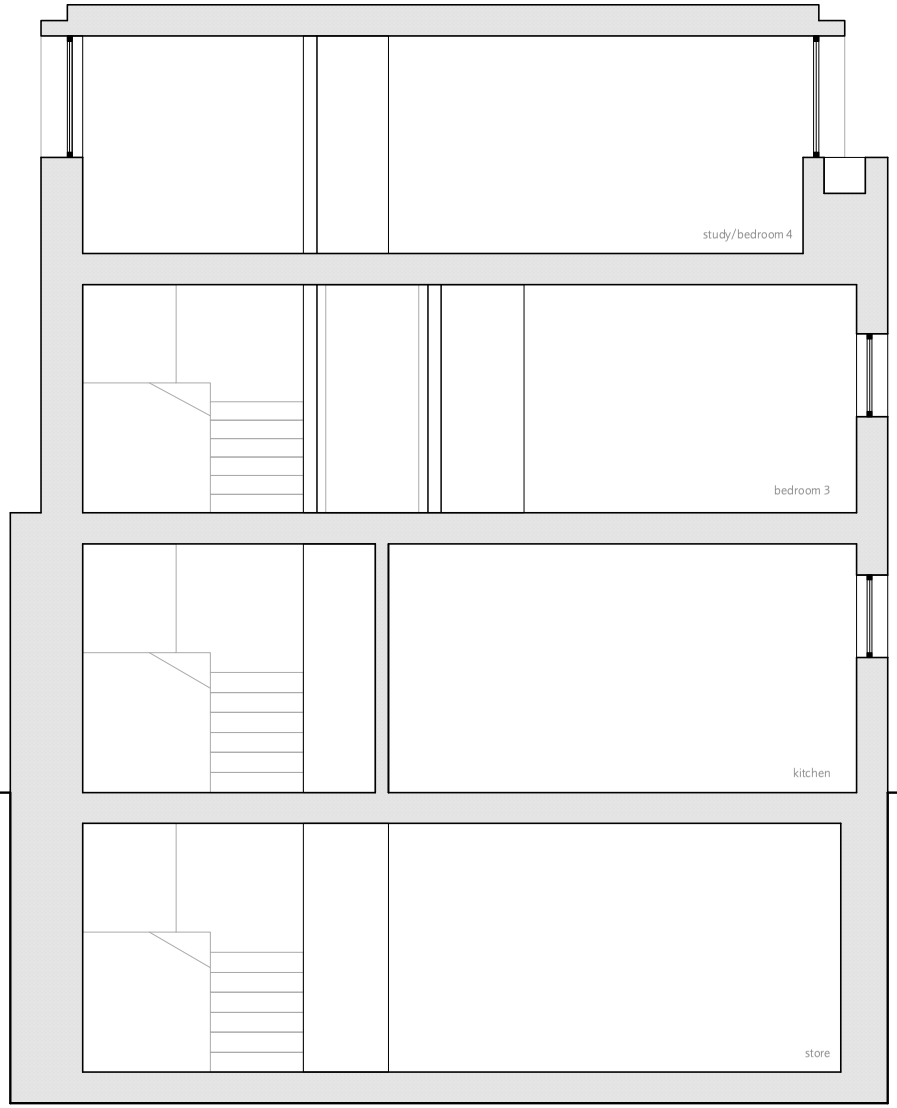
Camden Mews

a 26.08.14
for planning

proposed section CC	**132a**
102, Camden Mews London NW1 9AG	1108 **1:50** @A3

Dols Wong
architects

The Studio
61, Brondesbury Road
London NW6 6BP
44 (0)20 7372 2121 architects@dolswong.com



communal garden to the rear of Cliff Road Studios

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proposed section DD	**133a**
102, Camden Mews London NW1 9AG	1108 **1:50** @A3

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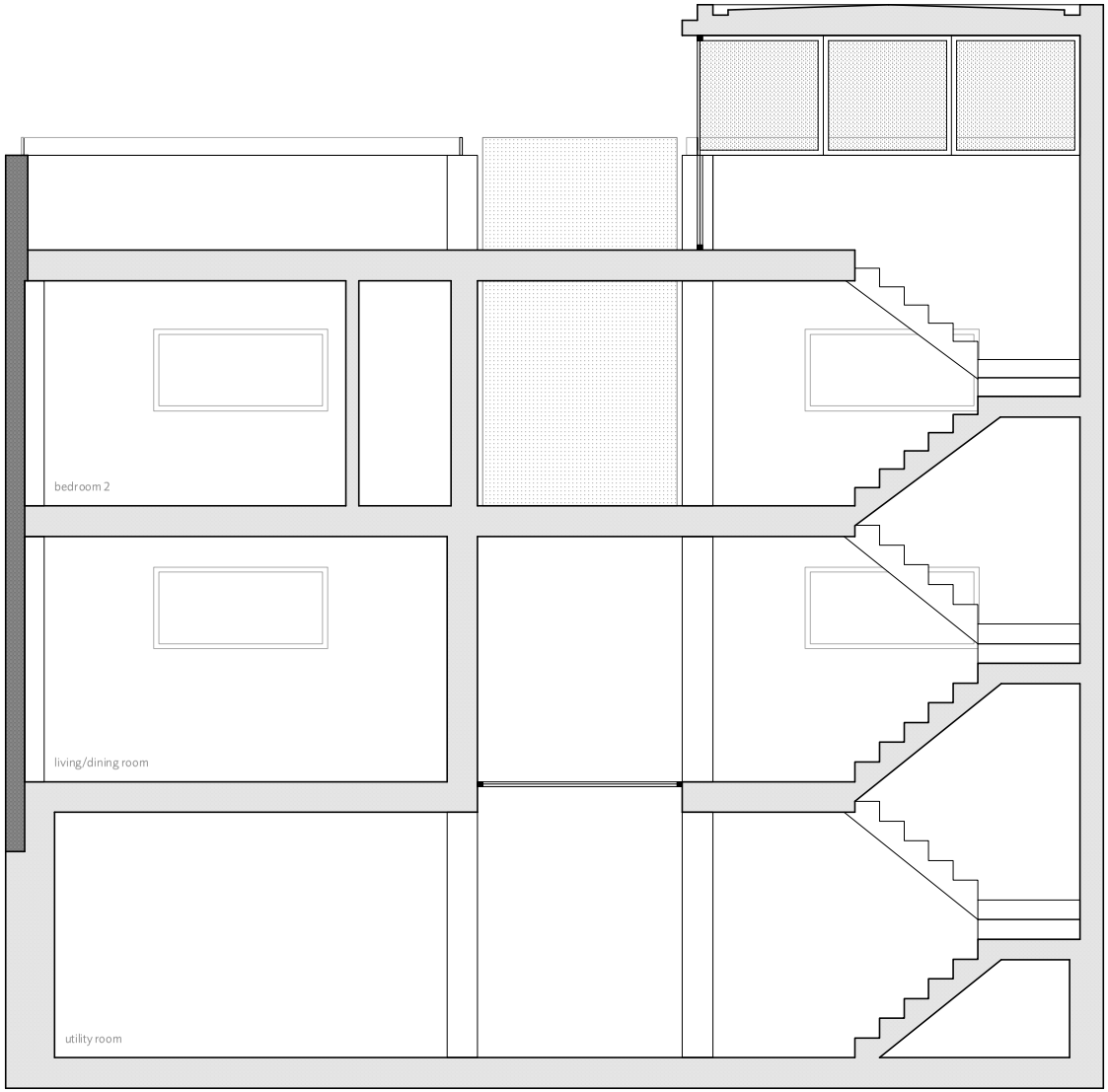

a 26.08.14
for planning

proposed section EE	**134a**
102, Camden Mews London NW1 9AG	1108 **1:50** @A3

Dols Wong
architects

The Studio
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London NW6 6BP
44 (0)20 7372 2121 architects@dolswong.com

APPENDIX 2

GEOLOGICAL SURVEY OF GREAT BRITAIN

RECORD OF SHAFT OR BORE FOR MINERALS

(For Survey use only)

6-inch Map Registered No.

TQ 28 SE / 423 B (Box)

Name of Shaft or Bore given by Geological Survey: HANGER FORD INFANTS SCHOOL – BH. 2

Name and Number given by owner:

For whom made E.L.C

Town or Village ..... County .....

Exact site ..... { Attach a tracing from a map, or a sketch-map, if possible.

Purpose for which made Trial

Nat. Grid Reference 2998 8493

1" N.S.Map No.	1" O.S.Map No.	Confidential or not
256		

Ground Level at shaft bore relative to O.D. ..... If not ground level give O.D. of beginning of shaft bore .....

Made by ..... Date of sinking Sept 1968

Information from ..... Date received .....

Examined by .....

SPECIMEN NUMBERS AND ADDITIONAL NOTES

(For Survey use only) Geological Classification	DESCRIPTION OF STRATA	Thickness Ft.	Thickness In.	Depth Ft.	Depth In.
	BH2 +163.0 49.68m				
	3'-0" 0.91m Made ground (brick rubble and dark clay.)				
	5'-2" 1.52m Made ground (grey fissured clay with traces of brick.)				
	13'-0" Brown mobbled fissured clay.				
	5.49m				
	12'-0" Brown fissured clay.				
	30'-0" 9.14m				

(5412) Wt.32837/PS.154 2m 10/64 G.W.B.Ltd. Gp.863

...DATION ENGINEERING Ltd.

BOREHOLE LOG

TQ/28NE/118

2952-8501

LOCATION : OSENEY CRESCENT

BOREHOLE No. : 1.

BOREHOLE DIA. : 8"

GROUND LEVEL :

DATE (Start) : 27-6-1964

WATER LEVEL : Borehole dry.

Description	Thickness	Depth	Sample	Remarks
Peaty TOPSOIL.	1'-0"	0'-0"	1	
		1'-0" 0.31		
Soft to firm brown CLAY. LC (w).	4'-0"		2	28 blows to drive 1'-0"
		5'-0" 1.52		
Firm brown CLAY. LC (w)	2'-6"	7'-6" 2.28	3	
Firm brown slightly silty CLAY. LC (w)	5'-0"		4	30 blows to drive 1'-0"
		12'-6" 3.81	5	
			6	81 blows to drive 1'-0"
			7	
			8	29 blows to drive 1'-0"
Stiff brown silty CLAY changing to stiff to hard. LC	22'-6"		9	
			10	42 blows to drive 1'-0"
			11	
			12	25 blows to drive 1'-0"
			13	
			14	31 blows to drive 1'-0"
		35'-0" 10.67	15	
Hard grey CLAY. LC	4'-6"		16	43 blows to drive 1'-0".
		39'-6" 12.03		BOREHOLE COMPLETED.

...TURBED SAMPLE U : UNDISTURBED SAMPLE — STANDARD PENETRATION TEST

TION ENGINEERING Ltd.

BOREHOLE LOG

TQ/28NE/118

2952-8501.

LOCATION : OSENEY CRESCENT BOREHOLE No. : 2

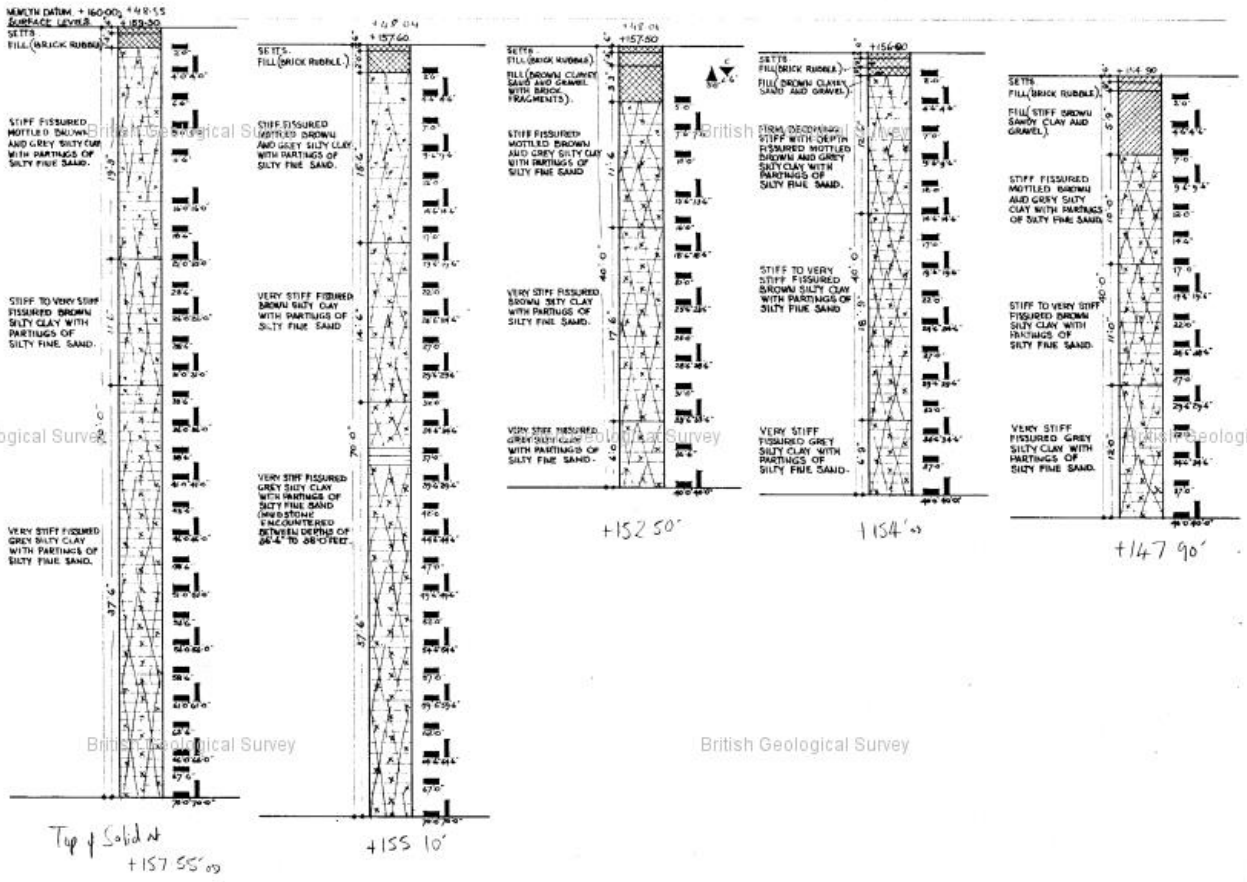
BOREHOLE DIA. : 8" & 6" GROUND LEVEL :

DATE (Start) : 18-6-1964 WATER LEVEL : Borehole dry.

Description	Thickness	Depth	Sample	Remarks
MADE GROUND: HARD	0'-3"	0'-0" 0'-3" 0.07	1	
Soft brown CLAY.	4'-3"			
LC (v)		4'-6" 1.37	2	39 blows to drive 1'-0"
			3	
			4	68 blows to drive 1'-0
Firm grey/brown CLAY.	18'-0"			
LC.			5	75 blows to drive 1'-0"
			6	58 blows to drive 1'-0
		22'-6" 6.85	7	
			8	51 blows to drive 1'-0"
Stiff LONDON CLAY.	16'-6"		9	63 blows to drive 1'-0"
			10	74 blows to drive 1'-0"
		39'-0" 11.88	11	
			12	39 blows to drive 1'-0"
Hard LONDON CLAY.	12'-1"		13	48 blows to drive 1'-0"
			14	56 blows to drive 1'-0"
BOREHOLE COMPLETED.		51'-1" 15.57		

STANDARD PENETRATION TES

TQ 38 SW/757



NOTES

SOIL SYMBOLS AS C.P 2001 (1957).
I INDICATES DISTURBED SAMPLE
↕ " UNDISTURBED "
" BULK DISTURBED "
" DYNAMIC CONE PENETRATION TEST.

FOR KEY PLAN SHOWING POSITION OF BORINGS ALSO SECTIONS OF BORINGS SEE DRAWINGS Nos HO/672/04, 06 AND 07.

REVISIONS

No.	Date

LONDON COUNTY COUNCIL
ARCHITECT'S DEPARTMENT
HOUSING DIVISION
Waterloo 5000 Extension:

Herbert Bennett
Architect to the Council
Drawn: Checked: W.W.L.

Job
CALEDONIAN MARKET, ISLINGTON.

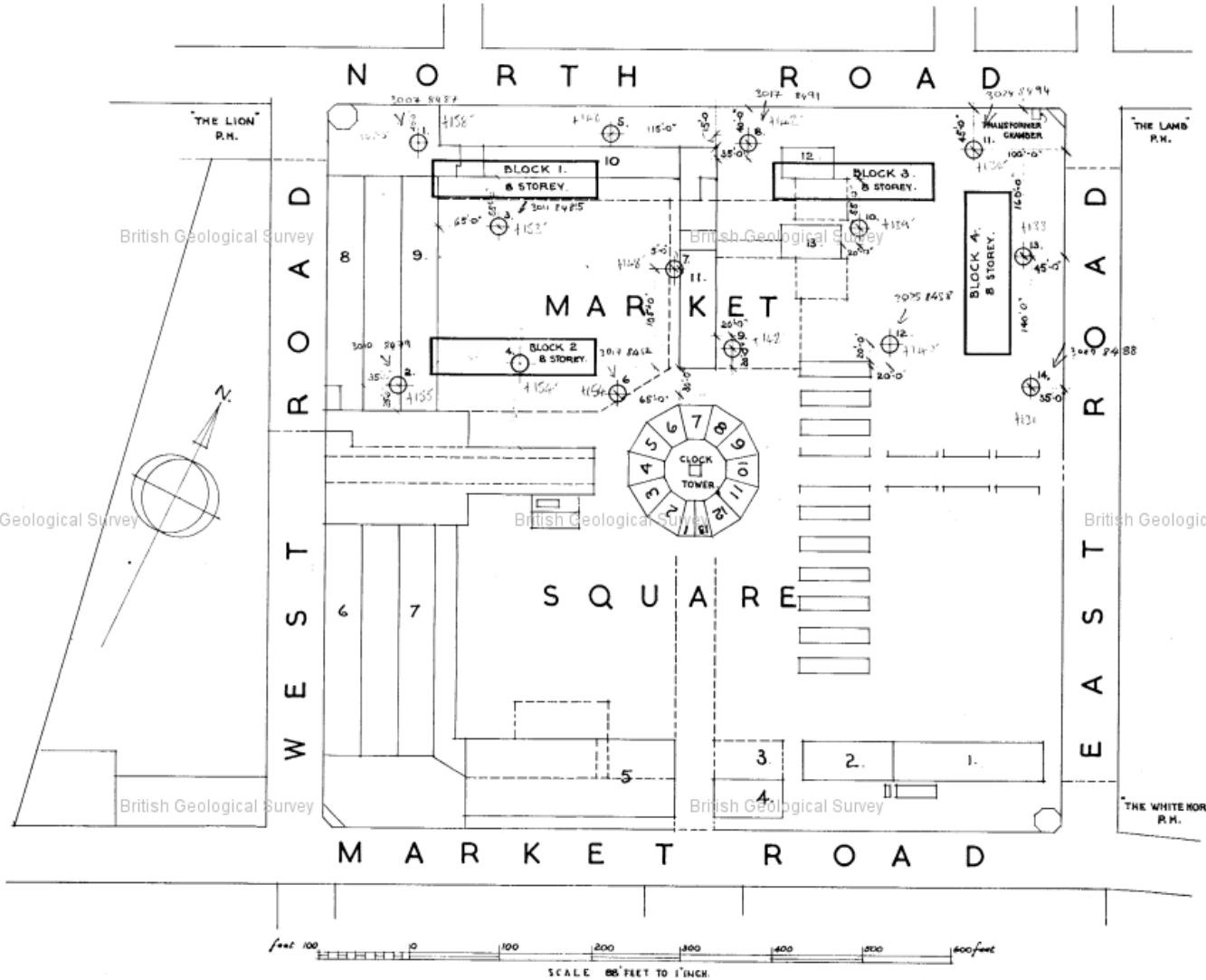
Title
TRIAL BORINGS Nos 1, 2, 3, 4 AND 5.

Scale (VERTICAL) 8 FEET TO 1 INCH
Date 25·6·64.

Div	Job No.	Drwg.	Rev.
HO	672	05	

TQ 38 SW/757

NOTE:-
TRIAL BORINGS Nos 1,2,8,9,11 AND 14 TO 70'0 DEEP.
" " - 3,4,5,6,7,10,12 AND 13 TO 40'-0" DEEP.



NOTES

REVISIONS

No.	Date

LONDON COUNTY COUNCIL
ARCHITECT'S DEPARTMENT
HOUSING DIVISION
Waterloo 5000 Extension:

Hubert Bennett
Architect to the Council
Drawn: Checked: W.H.L.

Job
CALEDONIAN MARKET ISLINGTON.

Title
TRIAL BORINGS. 1 TO 14.

Scale	Date
88 FEET TO 1 INCH	24-1-64.

Div	Job No.	Drwg.	Rev.
HO	672	04.	

BGS Reference: TQ28SE41048
British National Grid: 529980,184930
Depth: 3.05 m

TQ 2856/1048 – 1051

1048
A

+150·0

Topsoil 2'-0"

Soft Yellow Clay 1'-0"

Soft Brown mottled friable Clay with clay stones medium to large. 5'-0"

8'-0"

1049
B

+151·8

Topsoil 2'-6"

Soft Brown mottled friable Clay with clay stones medium to large. 5'-6"

8'-0"

1050
C

+151·0

Topsoil 2'-0"

Soft Brown mottled friable Clay with clay stones medium to large. 4'-6"

6'-6"

1051
D

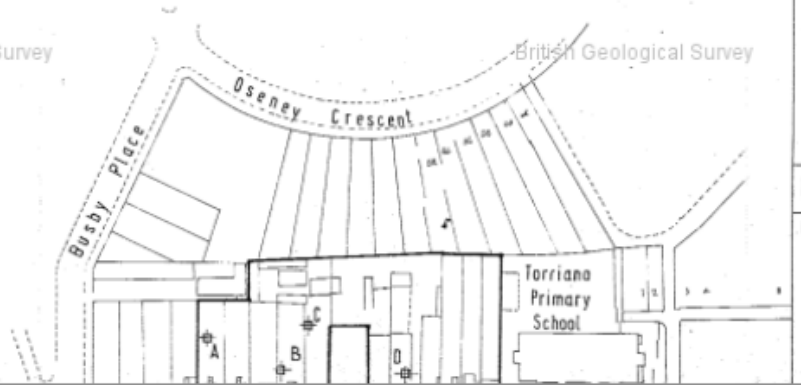
+150·5

FILL Topsoil and Rubble. 2'-0"

Soft Yellow Clay 1'-0"

Soft Brown mottled friable Clay with clay stones medium to large. 7'-0"

10'-0"



div	job no.	drg. no.	rev.
S	564	01	

JOB
TORRIANO PRIMARY SCHOOL CAMDEN

TITLE
TRIAL DIGGINGS A – D
KEY PLAN & SECTIONS

scale ½ VERTICAL Inch to 1 Foot

date 23. 4. 1970 | drawn | checked

GLC ILEA
Dept of Architecture and Civic Design

Architect Herbert Bennett

01-928 5000 Ext. 8381

NOTES

1. ⊕ Denotes Trial Digging
2. Water was not encountered at the time of digging in April 1970.
3. The diggings were inspected on 22.4.1970 by:– Mr. P.E. Wheatley, Struct. Eng. G.L.C. Mr. McGowan, D.S. Assistant
4. It was provisionally agreed to found at 1'-0" below top of clay and ½ Ton pressure p.f.s.
5. Newlyn Datum Levels

REVISIONS

no.	date

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon,
Ware, Herts, SG11 1NJ

Telephone : Ware (01920) 822233
Fax: Ware (01920) 822200

9th February 2015

Our Ref : MRS/12419

Martin Redston Associates
3 Edward Square
London
N1 0SP

For the attention of J.Hutchins Esq,:.

Dear Sir,

Re: 102 Camden Mews, Camden, NW1 9AG : Site Investigation

1.0 Introduction

1.01 In accordance with your instructions, we visited the above site during October 2014 .

1.02 The purpose of our visit was to carry out an investigation into the subsoil conditions with a view to foundation design.

1.03 The comments and opinions expressed are based purely on the conditions encountered and the subsequent laboratory testing.

1.04 Therefore, it is possible that some special conditions prevailing on site have not been encountered or taken into account.

1.05 All ground water recordings or their absence relate to short term observations and do not allow for fluctuations due to seasonal or other effects.

2.0 Description of Site

2.01 The site is situated at 102 Camden Mews, Camden, NW1 9AG

2.02 At the time of our visit the site was generally flat.

3.0 Fieldwork

3.01 One borehole was sunk to a maximum depth of 7.00m by means of a window sampler drilling rig togeter with exposing the existing foundations.

3.02 The location of the works is indicated on the site plan forming appendix one.

3.03 The various strata and details encountered were noted and are recorded on the borehole logs forming appendix two.

3.04 Insitu strength tests were carried out in the boreholes, the results of which can be seen on the aforementioned logs.

3.05 A full range of samples were recovered as noted and retained for subsequent laboratory testing.

3.06 The location, type and height of any trees should be taken from a survey for later use with NHBC Chapter 4.20, if required.

4.0 Laboratory Testing

4.01 All samples were tested in accordance with BS:1377:1990 Methods of Test for Soils for Civil Engineering purposes.

4.02 Selected samples were tested to determine their atterberg limits, triaxial strength, soluble sulphate content and pH value.

4.03 The results of all laboratory testing are summarised in appendix three.

5.0 Conclusions and Recommendations

5.01 By inspection of the borehole logs it can be seen that the subsoil consists of Cobble over Gravely SAND to 0.25m where a Loose Dark grey To Black Claybound Gravely Brick Concrete FILL overlies at 1.20m a Firm To Stiff Brown Mottled grey CLAY to 3.00m where a Stiff grey Brown CLAY is encountered and present to the base of the excavation.

5.02 No water was encountered upon excavation of the borehole as described on the borehole logs, a standpipe was installed at 5.00m . The water level was 1.25m below ground level on the 21st January 2015

5.03 Standard Penetration Tests in the Fill gave N values of 8 indicating a low bearing capacity.

5.04 No significant roots were encountered in the borehole.

5.05 The existing footings were exposed in January 2015 and the details are enclosed.

5.06 Laboratory testing proved the clays to be of very high plasticity (PI=46 - 47 %) which indicates a high susceptibility to movement associated with moisture content change.

5.07 Triaxial testing proved the CLAYS to have cohesion values between 106 - 136 Kn/m² these values are generally seen to increase with depth.

5.08 Therefore when considering the information available we are of the opinion that a the basement can take the form of a reinforced raft with walls designed to take the pressure of the retained soil.

5.09 Further investigation may be required in order to locate existing foundations within the area of the site which may restrict any future works.

5.10 As the site contains less than 0.50g/L of soluble sulphate it can be categorised as a class 1 site in accordance with BRE Digest, and as such any concrete in contact with the subsoil needs no special precautions.

5.11 Chemical testing is enclosed to allow material to be taken to the tip, the upper FILL material is contaminated with hydrocarbons and will need to be removed from the site, whereas the lower natural soil has no elevated levels of contamination.

We hope that this is satisfactory, however if you should require any further information, please do not hesitate to contact us.

Yours faithfully,

M. R. Smith M.Sc
Principal Engineer

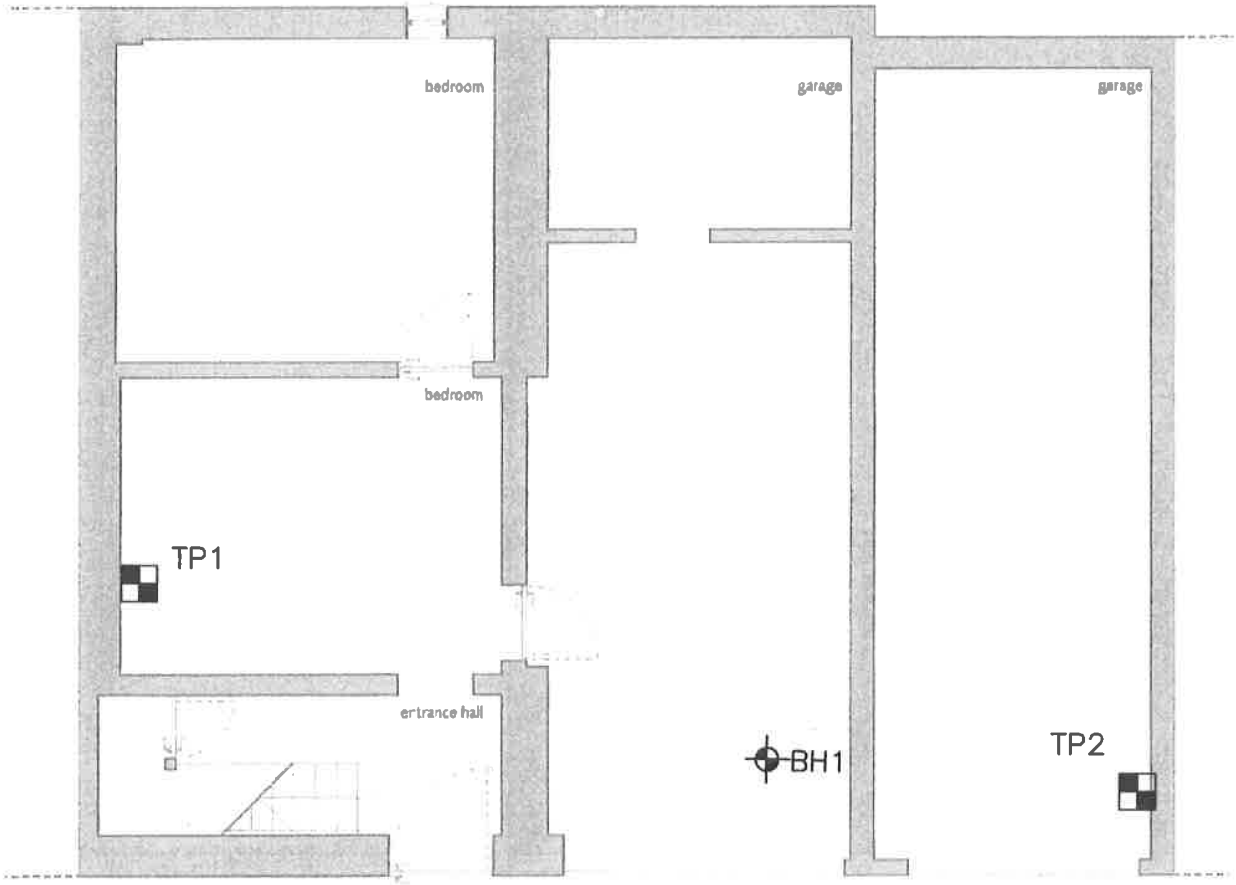
HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts SG11 1NJ
Telephone: Ware (01920) 822233
Fax: Ware (01920) 822200

Appendix No.	1
Sheet No.	1
Job No.	12419
Date	Feb 2015

102 Camden Mews, Camden, NW1 9AG

Site Plan



Not to Scale

H&ESI

102 Camden Mews, London, NW1 9AG

Existing Footing Detail

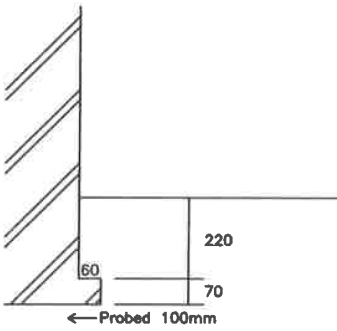
Appendix No 2

Sheet No 1

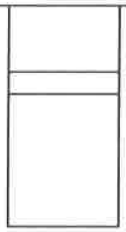
Job No. 12419

Date Feb 2015

Trial Pit One



B1 @ F.L. (290mm)
V= 84



Closed @ 0.60m

Roots to Close

Concrete

Weak concrete over compact brick fragments
Stiff dark orange brown mottled grey slightly Silty CLAY

Scale 1 : 20

NOTES

▽ = Standing Water
▼ = Water Strike
B = Bulk Sample
V = Shear Vane Test (kN/M^2)
N = SPT 'N'-Value

H&ESI

102 Camden Mews, London, NW1 9AG

Existing Footing Detail

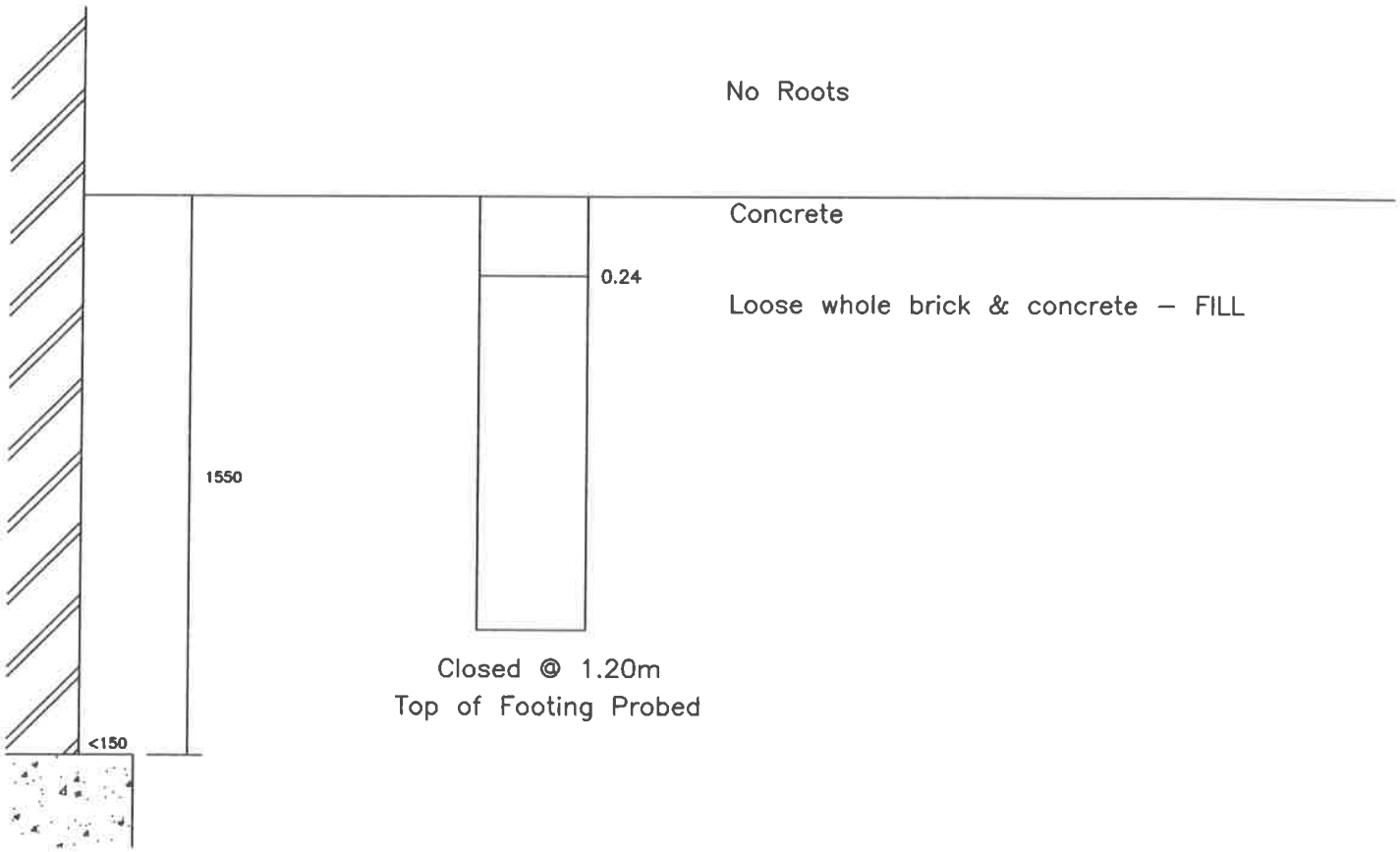
Appendix No 2

Sheet No 2

Job No. 12419

Date Feb 2015

Trial Pit Two



Scale 1 : 20

NOTES

▽ = Standing Water
▼ = Water Strike
B = Bulk Sample
V = Shear Vane Test (kN/M^2)
N = SPT 'N'-Value

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts SG11 1NJ
Telephone: Ware (01920) 822233
Fax: Ware (01920) 822200

Appendix No. 2
Sheet No. 3
Job No. 12419
Date OCT 2014

102 Camden Mews, Camden, NW1 9AG

Borehole One

Description of Strata	Depth	Reduced Level	Legend	Thickness (m)	Water Level	Samples No.	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	Casing Depth (m)
Cobble Over Light Brown Gravely SAND	0.25			0.25	DRY	1	U	0.00		
Loose Dark Grey To Black Claybound Gravely Brick Concrete FILL	1.20			0.95		2	U	1.00	N=8	1.00
Firm To Stiff Brown Mottled Grey CLAY	3.00			1.80		3	U	2.00		
						4	U	3.00		
Stiff Grey Brown CLAY	7.00			4.00		5	U	4.00		
						6	U	5.00		
						7	U	6.00		
								7.00		
Borehole Complete At 7.00m Standpipe Installed at 5.00m										

Remarks: Standpipe Installed at 5.00m

Scale 1:50

Key : U–Undisturbed Sample (100mm diameter) B –Bulk Sample ▼–Water Struck D –Disturbed Sample ▽–Water Standing W–Water Sample P–Piston Sample N–S.P.T. N–Value V–Vane Strength (kN/m²)

HERTS & ESSEX SITE INVESTIGATIONS

Warren House, Bells Hill, Bishop's Stortford, Herts. CM23 2NN
Telephone: Bishops Stortford (01279) 506725
Fax: Bishops Stortford (01279) 506724

Appendix No. 3
Sheet No. 1
Job No. 12419
Date Nov 2014

LOCATION 102 Camden Mews, London NW1

LIQUID AND PLASTIC LIMIT TEST RESULTS

Borehole	Depth (m)	Sample	Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Group Symbol	Desiccation Profile	Percentage Retained 425 Micron Sieve (%)
1	2.00	U	31	71	25	46	CV		0
1	4.00	U	31	72	25	47	CV		0
1	6.00	U	29	73	26	47	CV		0

HERTS & ESSEX SITE INVESTIGATIONS

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Telephone: Bishops Stortford (01279) 506725
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Appendix No. 3
Sheet No. 2
Job No. 12419
Date Nov 2014

LOCATION 102 Camden Mews, London NW1

UNDRAINED COMPRESSION TEST RESULTS

Borehole	Depth (m)	Sample	Natural Moisture Content (%)	Bulk Density (Mg/m^3)	Lateral Pressure (kN/m^2)	Deviator Stress (kN/m^2)	Apparent Cohesion (kN/m^2)	Angle of Shearing Resistance	Remarks
1	2.00	U	31	1.99	40	220	110		
1	3.00	U	35	2.00	60	212	106		
1	4.00	U	31	2.01	80	228	114		
1	5.00	U	28	2.00	100	252	126		
1	6.00	U	29	2.00	120	262	131		
1	7.00	U	29	2.03	140	272	136		

HERTS & ESSEX SITE INVESTIGATIONS

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Telephone: Bishops Stortford (01279) 506725
Fax: Bishops Stortford (01279) 506724

Appendix No. 3
Sheet No. 3
Job No. 12419
Date Nov 2014

LOCATION 102 Camden Mews, London NW1

SULPHATE ANALYSIS TEST RESULTS

Window Sampler	Depth (m)	Sample	Concentrations of Soluble Sulphate			Classification	pH
			Soil		Groundwater		
			Total SO_4 (%)	SO_4 in 2:1 water:soil (g/l)			
1	2.00	U		0.31			7.51
1	4.00	U		0.24			7.77
1	6.00	U		0.05			7.72

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

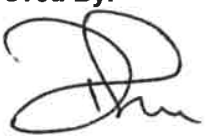
2183

Final Report

Report Number:	14-13210 Issue-1
Initial Date of Issue:	04-Nov-14
Client:	Herts & Essex Site Investigations
Client Address:	The Old Post Office Wellpond Green Standon Ware Hertfordshire SG11 1NJ
Contact(s):	Martyn Smith
Project:	12419 - 102 Camden Mews, London NW1

Quotation No.:		**Date Received:**	31-Oct-14
Order No.:		**Date Instructed:**	31-Oct-14
No. of Samples:	2	**Results Due:**	04-Nov-14
Turnaround: (Weekdays)	3		
Date Approved:	04-Nov-14		

Approved By:



Details: Darrell Hall, Laboratory Director

Chemtest
The right chemistry to deliver results

Results Summary - Soil

Project: 12419 - 102 Camden Mews, London NW1

Client: Herts & Essex Site Investigations			Chemtest Job No.:		14-13210	14-13210
Quotation No.:			Chemtest Sample ID.:		64309	64310
Order No.:			Client Sample Ref.:			
			Client Sample ID.:		WS1	WS1
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.80	1.50
			Bottom Depth(m):			
			Date Sampled:		27-Oct-14	27-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192			-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.02	18	21
Stones	N	2030	%	0.02	< 0.020	< 0.020
Soil Colour	N				brown	brown
Other Material	U				stones	none
Soil Texture	N				loam	loam
pH	M	2010			8.2	8.0
Electrical Conductivity (2:1)	N	2020	µS/cm	1	830	810
Boron (Hot Water Soluble)	M	2120	mg/kg	0.4	32	1.6
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.01	0.22	0.27
Cyanide (Total)	M	2300	mg/kg	0.5	0.80	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.5	< 0.50	< 0.50
Sulphate (Total)	M	2430	%	0.01	1.1	0.16
Arsenic	M	2450	mg/kg	1	82	15
Cadmium	M	2450	mg/kg	0.1	< 0.10	0.13
Copper	M	2450	mg/kg	1	1200	67
Mercury	M	2450	mg/kg	0.1	< 0.10	< 0.10
Nickel	M	2450	mg/kg	1	57	58
Lead	M	2450	mg/kg	1	510	49
Zinc	M	2450	mg/kg	1	91	130
Chromium (Trivalent)	N	2490	mg/kg	5	17	70
Chromium (Hexavalent)	N	2490	mg/kg	0.5	< 0.50	< 0.50
Organic Matter	M	2625	%	0.4	33	1.2
Naphthalene	M	2700	mg/kg	0.1	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.1	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.1	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.1	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.1	1.4	< 0.10
Anthracene	M	2700	mg/kg	0.1	0.24	< 0.10
Fluoranthene	M	2700	mg/kg	0.1	5.4	< 0.10
Pyrene	M	2700	mg/kg	0.1	6.3	< 0.10

Chemtest
The right chemistry to deliver results

Results Summary - Soil

Project: 12419 - 102 Camden Mews, London NW1

Client: Herts & Essex Site Investigations			Chemtest Job No.:		14-13210	14-13210
Quotation No.:			Chemtest Sample ID.:		64309	64310
Order No.:			Client Sample Ref.:			
			Client Sample ID.:		WS1	WS1
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.80	1.50
			Bottom Depth(m):			
			Date Sampled:		27-Oct-14	27-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Benzo[a]anthracene	M	2700	mg/kg	0.1	2.5	< 0.10
Chrysene	M	2700	mg/kg	0.1	2.2	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.1	4.0	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.1	1.1	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.1	2.3	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.1	1.3	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.1	0.35	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.1	1.5	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2	29	< 2.0
Total Phenols	M	2920	mg/kg	0.3	< 0.30	< 0.30

Chemtest
The right chemistry to deliver results

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 1 month following the date of the test report
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

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BASEMENT IMPACT ASSESSMENT
FOR
102 CAMDEN MEWS
LONDON
NW1 9AG

12.568 February 2015

	Name	Position	Signature
Prepared:	Jenna Sewell BEng	Structural Engineer	
Checked:	Martin Redston BSc,CEng, MICE	Principal Engineer	pp

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Ref 12.568

Impact Assessment for:
102 Camden Mews, London NW1

The subterranean development in the permanent condition will not cause the property or adjoining properties to become unstable.
The method of underpinning has been specified to minimise movement or damage to the existing structures both within the site and to the adjoining properties on either side. External walls are to be shored adequately during the work, as per the temporary works drawing T1 by MRA, and internal structure propped as necessary to ensure that minor movements are controlled.
The permanent and temporary works have been designed to minimise any damage to the existing structures both within the site and to the adjoining properties on either side. Any damage that does occur is expected to be minor cracking that can be repaired by a Helifix masonry repair system, or equivalent, the cracks can then be refilled and redecorated over.
The permanent and temporary works have been designed to minimise any damage to the adjacent minor cobbled road. There should not be any cracking or repairs to be made.
The permanent and temporary works have been designed to minimise any damage to any drainage and sewage close to or within the site. In the unlikely event that any leaks occur, the pipework will be repaired accordingly.

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Ref 12.568 A

Proposed Monitoring Regime and Contingency Plan for: 102 Camden Mews, London NW1

Contractually cause and oblige the contractor to set up line and level monitors on the Adjoining Owners' building. The monitoring firm instructed by the Building Owner's contractor will commence monitoring prior to the excavation works to establish base readings.

During the excavation stage the monitoring shall be undertaken on a weekly basis with the reports issued to the Appointed Surveyors and Adjoining Owners' Checking Structural Engineer. During the formation and the construction of the basement the contractor should aim to limit vibrations to <3mm.

The trigger level on the monitoring equipment will be set to 3mm for amber and 5mm for Red.
If the amber limit is reached, additional shoring should be installed to any excavations, and the Adjoining Owners' surveyor and engineer are to be informed of the movement within 24 hours of the survey taking place. The engineer should make an assessment of why the movement has occurred and provide details of how to prevent any further movement occurring.
Should the red limit be reached, additional shoring should be installed to any excavations, and the works must stop. The engineer should make an assessment of why the movement has occurred and provide details of how to prevent any further movement occurring. The work may only continue once all parties have agreed a way forward.

The contractor is to continue to monitor for a period of three months following completion of the notifiable works. Should readings during this time show any abnormal movement, the monitoring is to continue until agreed by the Adjoining Owners' surveyors that monitoring can cease. Following completion of the monitoring period, targets are to be removed from the Adjoining Owners' building and any disturbed surfaces made good. The monitoring should be measure "line, level & plumb".

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Ref 12.568 B

Proposed Construction Method Statement and Sequence of Works for: 102 Camden Mews, London NW1

2nd October 2014

This method statement is to be read in conjunction with all relevant specifications, drawings and calculations. Any variations deemed necessary due to site conditions are to be agreed with all relevant parties prior to carrying out the work.
The work consists of essentially three parts:
1. The refurbishment of the existing building, demolition of some existing internal walls.
2. The construction of a new basement room under the entire house by R.C. Retaining Walls.
3. The construction of an additional storey.

General:

102 Camden Mews is a standalone building.
All work will be carried out in a logical sequence with due regard for health and safety issues.
Any unforeseen problems encountered will be notified to both the permanent and temporary works engineers to enable a solution to be agreed upon.
Existing drainage and sewage should not be affected by the proposed development. New drainage within the proposed scheme will have a pumped facility to connect to the Thames Water Sewer.

Geotechnical Information:

The British Geological Survey shows that the bedrock geology is made up of London Clay. The trial pits excavated by Herts and Essex show varying ground conditions of silty caly to brick and concrete fill.
The net bearing capacity can be taken as 100kN/m^2.
Herts and Essex recorded the average water level in the standpipe to be at 1.25m below ground level.

Construction Sequence:
The temporary works proposal is designed to prevent instability occurring to adjoining structures during the excavation and construction process.

1.1 Refurbishment
• Infill existing openings as required with solid masonry; all new masonry to be either toothed into existing or connected with furfix profiles.
• Install temporary propping.
• Demolish internals as required.
• Install steelwork and structural timber as per the engineering drawings.

1.2 Basement
• Excavate soil to required level; local pumping will be required to remove ground water. If required baffle boxes will be installed to prevent loss of fines, however this is considered unlikely as the ground consists largely of clay.
• Construct Underpinning/Retaining Wall Base; repeat in numerical order for all sections as per the engineering drawings.
• Construct Underpinning/Retaining Wall Stem; repeat in numerical order for all sections as per the engineering drawings.
• Central soil in basement area to be excavated and temporary supports installed from the base of retaining walls up, across the site with waling beams and struts; as per drawing T1 by Martin Redston Associates.
• Cast new infill basement slabs.

1.3 Build Additional Floor
• Construct new walls upon existing structure.
• Install structure as per the engineering drawings (to be issued).

The Refurbishment & Demolition:
Refurbishment works are to be carried out in accordance with good construction practices.
Demolition works to be carefully carried out as per the Architect's drawings.

The Retaining Walls & Underpins:
The proposed retaining walls to the side, front and rear of the property are to be constructed using an underpinning sequence. There are no party walls to this structure, all perimeter walls are independent of any neighbouring properties.
The proposed underpinning sequence should be carried out by excavating under existing wall in 1.2m sections in numerical order.
The ground bearing slab is to be dowelled into the new retaining walls.
The area between retaining wall bases to each side is to remain until all retaining walls are fully cured for stability.

The Additional Floor:
Build new walls in load bearing timber stud.

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CALCULATIONS FOR RETAINING WALLS FOR 102 CAMDEN MEWS LONDON NW1 9AG

12.568 October 2014

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Date 01/10/14 | Sheet No. 1
Eng. JC
Job No. 12.568
102 CAMDEN MEWS
LONDON
NW1 9AG

RETAINING WALLS

Side walls :

	kN/m PI	kN/m VL
s/w b/wk: (5.1kN/m² x 4.9m) + (7.8kN/m² x 3.0m)	48.4	
s/w roof: 0.75kN/m² x 2.0m x 2	3.0	
VL roof: 0.75kN/m² x 2.0m x 2		3.0
s/w floor: 0.5kN/m² x 2.0m x 2 x 3	6.0	
VL floor: 1.5kN/m² x 2.0m x 2 x 3		18.0
	57.4	21.0

Front and rear wall:

s/w b/wk: (5.1kN/m² x 3.4m) + (7.8kN/m² x 3.0m)	40.8	
s/w stud: 1.0kN/m² x 1.5m	1.5	
s/w roof: 0.75kN/m² x 1.55m MAX LOADING	1.2	
VL roof: 0.75kN/m² x 1.55m		1.2
s/w floor: 0.5kN/m² x 1.55m x 3	2.4	
VL floor: 1.5kN/m² x 1.55m x 3		7.0
	45.9	8.2
s/w b/wk: (5.1kN/m² x 2.7m) + (7.8kN/m² x 2.8m) MIN LOADING worst case	35.6	

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Martin Redston Associates 6 Hale Lane London NW7 3NX	Project 102 Camden Mews, London, NW1 9AG			Job no. 12.568	
	Calcs for Front Wall Retaining Wall			Start page no./Revision 6	
	Calcs by J	Calcs date 01/10/2014	Checked by	Checked date	Approved by	Approved date

RETAINING WALL ANALYSIS

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.4.08

Retaining wall details

Stem type	Cantilever		
Stem height	h_{stem} = **2400** mm		
Prop height	h_{prop} = **0** mm		
Stem thickness	t_{stem} = **330** mm		
Angle to rear face of stem	α = **90** deg		
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1200** mm		
Heel length	l_{heel} = **100** mm		
Base thickness	t_{base} = **350** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **2400** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **1600** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

Soil type	Soft clay		
Moist density	γ_{mr} = **17** kN/m^3		
Saturated density	γ_{sr} = **17** kN/m^3		
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **18** deg	
Characteristic wall friction angle		$\delta_{r.k}$ = **9** deg	

Base soil properties

Soil type	Firm clay		
Moist density	γ_{mb} = **18** kN/m^3		
Characteristic effective shear resistance angle		$\phi'_{b.k}$ = **18** deg	
Characteristic wall friction angle		$\delta_{b.k}$ = **9** deg	
Characteristic base friction angle		$\delta_{bb.k}$ = **12** deg	
Presumed bearing capacity	$P_{bearing}$ = **100** kN/m^2		

Loading details

Variable surcharge load	$Surcharge_Q$ = **10** kN/m^2
Vertical line load at 1365 mm	P_{G1} = **35.6** kN/m

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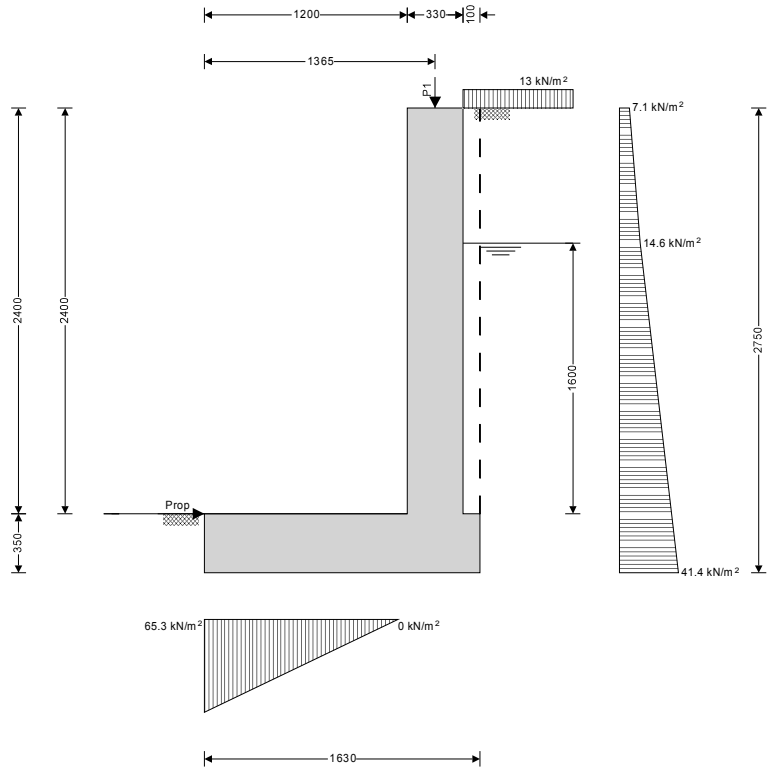
	Calcs for Front Wall Retaining Wall			Start page no./Revision 7	
	Calcs by J	Calcs date 01/10/2014	Checked by	Checked date	Approved by	Approved date



Calculate retaining wall geometry

Base length	l_{base} = **1630** mm		
Saturated soil height	h_{sat} = **1600** mm		
Moist soil height	h_{moist} = **800** mm		
Length of surcharge load	l_{sur} = **100** mm		
Vertical distance	x_{sur_v} = **1580** mm		
Effective height of wall	h_{eff} = **2750** mm		
Horizontal distance	x_{sur_h} = **1375** mm		
Area of wall stem	A_{stem} = **0.792** m²	Vertical distance	x_{stem} = **1365** mm
Area of wall base	A_{base} = **0.571** m²	Vertical distance	x_{base} = **815** mm
Area of saturated soil	A_{sat} = **0.16** m²	Vertical distance	x_{sat_v} = **1580** mm
		Horizontal distance	x_{sat_h} = **650** mm
Area of water	A_{water} = **0.16** m²	Vertical distance	x_{water_v} = **1580** mm
		Horizontal distance	x_{water_h} = **650** mm
Area of moist soil	A_{moist} = **0.08** m²	Vertical distance	x_{moist_v} = **1580** mm
		Horizontal distance	x_{moist_h} = **1186** mm

Using Coulomb theory

Active pressure coefficient	K_A = **0.483**	Passive pressure coefficient	K_P = **2.359**

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{sat\_v} + F_{moist\_v} + F_{water\_v} + F_{sur\_v} + F_{P\_v}$ = **74.7** kN/m

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Horizontal forces on wall

Total $F_{total\_h} = F_{sat\_h} + F_{moist\_h} + F_{water\_h} + F_{sur\_h} = \mathbf{53.5}$ kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sat} + M_{moist} + M_{water} + M_{sur} + M_P = \mathbf{42.8}$ kNm/m

Check bearing pressure

Propping force $F_{prop\_base} = \mathbf{53.5}$ kN/m

Bearing pressure at toe $q_{toe} = \mathbf{65.3}$ kN/m^2 Bearing pressure at heel $q_{heel} = \mathbf{0}$ kN/m^2

Factor of safety $FoS_{bp} = \mathbf{1.531}$

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

RETAINING WALL DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigendum dated January 2008 and the UK National Annex incorporating National Amendment No.1

Tedds calculation version 2.4.08

Concrete details - Table 3.1 - Strength and deformation characteristics for concrete

Concrete strength class C32/40

Char.comp.cylinder strength $f_{ck} = \mathbf{32}$ N/mm^2 Mean axial tensile strength $f_{ctm} = \mathbf{3.0}$ N/mm^2

Secant modulus of elasticity $E_{cm} = \mathbf{33346}$ N/mm^2 Maximum aggregate size $h_{agg} = \mathbf{20}$ mm

Design comp.concrete strength $f_{cd} = \mathbf{18.1}$ N/mm^2 Partial factor $\gamma_C = \mathbf{1.50}$

Reinforcement details

Characteristic yield strength $f_{yk} = \mathbf{500}$ N/mm^2 Modulus of elasticity $E_s = \mathbf{200000}$ N/mm^2

Design yield strength $f_{yd} = \mathbf{435}$ N/mm^2 Partial factor $\gamma_S = \mathbf{1.15}$

Cover to reinforcement

Front face of stem $c_{sf} = \mathbf{20}$ mm Rear face of stem $c_{sr} = \mathbf{75}$ mm

Top face of base $c_{bt} = \mathbf{20}$ mm Bottom face of base $c_{bb} = \mathbf{75}$ mm

Check stem design at base of stem

Depth of section h = **330** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **50.6** kNm/m K = **0.026** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sr.req} = \mathbf{496}$ mm^2/m

Tens.reinforcement provided 16 dia.bars @ 200 c/c Tens.reinforcement provided $A_{sr.prov} = \mathbf{1005}$ mm^2/m

Min.area of reinforcement $A_{sr.min} = \mathbf{388}$ mm^2/m Max.area of reinforcement $A_{sr.max} = \mathbf{13200}$ mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control - Section 7.3

Limiting crack width $w_{max} = \mathbf{0.3}$ mm Maximum crack width $w_k = \mathbf{0.203}$ mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force V = **57.6** kN/m Design shear resistance $V_{Rd.c} = \mathbf{128.1}$ kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement $A_{sx.req} = \mathbf{330}$ mm^2/m Max.spacing of reinforcement $s_{sx\_max} = \mathbf{400}$ mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c Trans.reinforcement provided $A_{sx.prov} = \mathbf{393}$ mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Check base design at toe

Depth of section h = **350** mm

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Rectangular section in flexure - Section 6.1

Design bending moment M = **58.5** kNm/m K = **0.026** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{bb.req}$ = **535** mm²/m

Tens.reinforcement provided 20 dia.bars @ 200 c/c Tens.reinforcement provided $A_{bb.prov}$ = **1571** mm²/m

Min.area of reinforcement $A_{bb.min}$ = **417** mm²/m Max.area of reinforcement $A_{bb.max}$ = **14000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control - Section 7.3

Limiting crack width w_{max} = **0.3** mm Maximum crack width w_k = **0.153** mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force V = **79.6** kN/m Design shear resistance $V_{Rd.c}$ = **158.5** kN/m

PASS - Design shear resistance exceeds design shear force

Rectangular section in flexure - Section 6.1

Design bending moment M = **0.4** kNm/m K = **0.000** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{bt.req}$ = **3** mm²/m

Tens.reinforcement provided 12 dia.bars @ 200 c/c Tens.reinforcement provided $A_{bt.prov}$ = **565** mm²/m

Min.area of reinforcement $A_{bt.min}$ = **509** mm²/m Max.area of reinforcement $A_{bt.max}$ = **14000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control - Section 7.3

Limiting crack width w_{max} = **0.3** mm Maximum crack width w_k = **0.001** mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force V = **7.7** kN/m Design shear resistance $V_{Rd.c}$ = **153.1** kN/m

PASS - Design shear resistance exceeds design shear force

Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement $A_{bx.req}$ = **314** mm²/m Max.spacing of reinforcement s_{bx_max} = **450** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c Trans.reinforcement provided $A_{bx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

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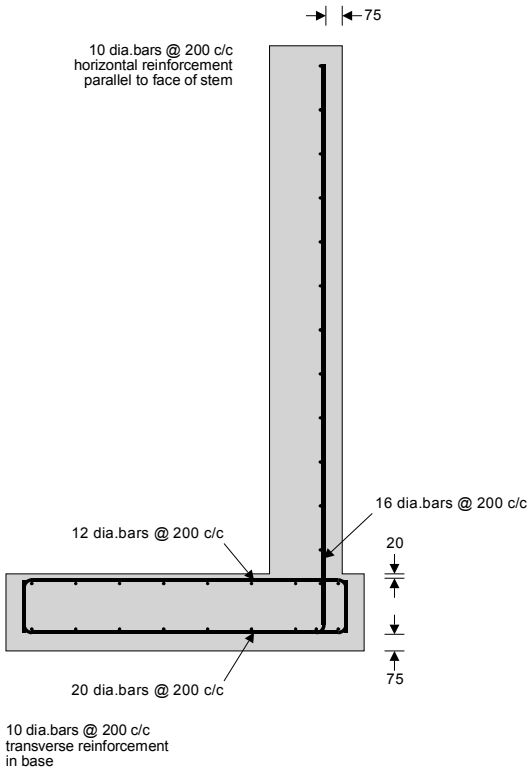
	Calcs for Front Wall Retaining Wall				Start page no./Revision 10	
	Calcs by J	Calcs date 01/10/2014	Checked by	Checked date	Approved by	Approved date



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	Calcs for Rear Wall Retaining Wall			Start page no./Revision 11	
	Calcs by J	Calcs date 01/10/2014	Checked by	Checked date	Approved by	Approved date

RETAINING WALL ANALYSIS

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.4.08

Retaining wall details

Stem type	Cantilever		
Stem height	h_{stem} = **2400** mm		
Prop height	h_{prop} = **0** mm		
Stem thickness	t_{stem} = **330** mm		
Angle to rear face of stem	α = **90** deg		
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1200** mm		
Heel length	l_{heel} = **100** mm		
Base thickness	t_{base} = **350** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **2400** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **1600** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

Soil type	Soft clay	
Moist density	γ_{mr} = **17** kN/m^3	
Saturated density	γ_{sr} = **17** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **18** deg
Characteristic wall friction angle		$\delta_{r.k}$ = **9** deg

Base soil properties

Soil type	Firm clay	
Moist density	γ_{mb} = **18** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{b.k}$ = **18** deg
Characteristic wall friction angle		$\delta_{b.k}$ = **9** deg
Characteristic base friction angle		$\delta_{bb.k}$ = **12** deg
Presumed bearing capacity	$P_{bearing}$ = **100** kN/m^2	

Loading details

Variable surcharge load	$Surcharge_Q$ = **3** kN/m^2
Vertical line load at 1365 mm	P_{G1} = **35.6** kN/m

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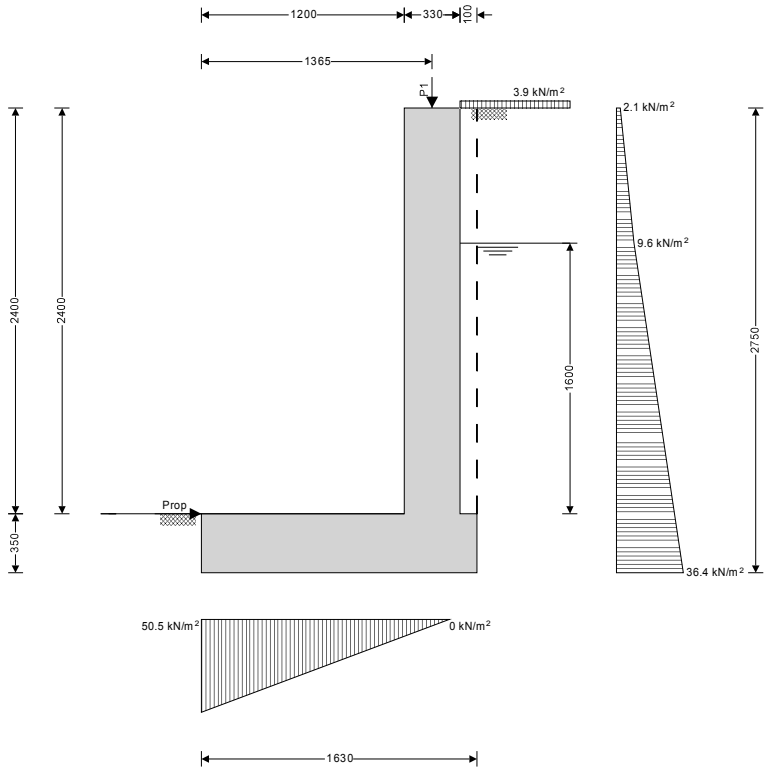
	Calcs for Rear Wall Retaining Wall				Start page no./Revision 12	
	Calcs by J	Calcs date 01/10/2014	Checked by	Checked date	Approved by	Approved date



Calculate retaining wall geometry

Base length	l_{base} = **1630** mm		
Saturated soil height	h_{sat} = **1600** mm		
Moist soil height	h_{moist} = **800** mm		
Length of surcharge load	l_{sur} = **100** mm		
Vertical distance	x_{sur_v} = **1580** mm		
Effective height of wall	h_{eff} = **2750** mm		
Horizontal distance	x_{sur_h} = **1375** mm		
Area of wall stem	A_{stem} = **0.792** m²	Vertical distance	x_{stem} = **1365** mm
Area of wall base	A_{base} = **0.571** m²	Vertical distance	x_{base} = **815** mm
Area of saturated soil	A_{sat} = **0.16** m²	Vertical distance	x_{sat_v} = **1580** mm
		Horizontal distance	x_{sat_h} = **650** mm
Area of water	A_{water} = **0.16** m²	Vertical distance	x_{water_v} = **1580** mm
		Horizontal distance	x_{water_h} = **650** mm
Area of moist soil	A_{moist} = **0.08** m²	Vertical distance	x_{moist_v} = **1580** mm
		Horizontal distance	x_{moist_h} = **1186** mm

Using Coulomb theory

Active pressure coefficient	K_A = **0.483**	Passive pressure coefficient	K_P = **2.359**

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{sat\_v} + F_{moist\_v} + F_{water\_v} + F_{sur\_v} + F_{P\_v}$ = **74** kN/m

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Horizontal forces on wall

Total $F_{total\_h} = F_{sat\_h} + F_{moist\_h} + F_{water\_h} + F_{sur\_h} = \mathbf{44.4}$ kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sat} + M_{moist} + M_{water} + M_{sur} + M_P = \mathbf{54.3}$ kNm/m

Check bearing pressure

Propping force $F_{prop\_base} = \mathbf{44.4}$ kN/m

Bearing pressure at toe $q_{toe} = \mathbf{50.5}$ kN/m^2 Bearing pressure at heel $q_{heel} = \mathbf{0}$ kN/m^2

Factor of safety $FoS_{bp} = \mathbf{1.981}$

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

RETAINING WALL DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigendum dated January 2008 and the UK National Annex incorporating National Amendment No.1

Tedds calculation version 2.4.08

Concrete details - Table 3.1 - Strength and deformation characteristics for concrete

Concrete strength class C32/40

Char.comp.cylinder strength $f_{ck} = \mathbf{32}$ N/mm^2 Mean axial tensile strength $f_{ctm} = \mathbf{3.0}$ N/mm^2

Secant modulus of elasticity $E_{cm} = \mathbf{33346}$ N/mm^2 Maximum aggregate size $h_{agg} = \mathbf{20}$ mm

Design comp.concrete strength $f_{cd} = \mathbf{18.1}$ N/mm^2 Partial factor $\gamma_C = \mathbf{1.50}$

Reinforcement details

Characteristic yield strength $f_{yk} = \mathbf{500}$ N/mm^2 Modulus of elasticity $E_s = \mathbf{200000}$ N/mm^2

Design yield strength $f_{yd} = \mathbf{435}$ N/mm^2 Partial factor $\gamma_S = \mathbf{1.15}$

Cover to reinforcement

Front face of stem $c_{sf} = \mathbf{20}$ mm Rear face of stem $c_{sr} = \mathbf{75}$ mm

Top face of base $c_{bt} = \mathbf{20}$ mm Bottom face of base $c_{bb} = \mathbf{75}$ mm

Check stem design at base of stem

Depth of section h = **330** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **36.1** kNm/m K = **0.019** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sr.req} = \mathbf{354}$ mm^2/m

Tens.reinforcement provided 16 dia.bars @ 200 c/c Tens.reinforcement provided $A_{sr.prov} = \mathbf{1005}$ mm^2/m

Min.area of reinforcement $A_{sr.min} = \mathbf{388}$ mm^2/m Max.area of reinforcement $A_{sr.max} = \mathbf{13200}$ mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control - Section 7.3

Limiting crack width $w_{max} = \mathbf{0.3}$ mm Maximum crack width $w_k = \mathbf{0.165}$ mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force V = **45.6** kN/m Design shear resistance $V_{Rd.c} = \mathbf{128.1}$ kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement $A_{sx.req} = \mathbf{330}$ mm^2/m Max.spacing of reinforcement $s_{sx\_max} = \mathbf{400}$ mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c Trans.reinforcement provided $A_{sx.prov} = \mathbf{393}$ mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Check base design at toe

Depth of section h = **350** mm

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Rectangular section in flexure - Section 6.1

Design bending moment — M = **43.1** kNm/m — K = **0.019** — K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required — $A_{bb.req}$ = **391** mm²/m

Tens.reinforcement provided — 16 dia.bars @ 200 c/c — Tens.reinforcement provided — $A_{bb.prov}$ = **1005** mm²/m

Min.area of reinforcement — $A_{bb.min}$ = **420** mm²/m — Max.area of reinforcement — $A_{bb.max}$ = **14000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control - Section 7.3

Limiting crack width — w_{max} = **0.3** mm — Maximum crack width — w_k = **0.2** mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force — V = **65.8** kN/m — Design shear resistance — $V_{Rd.c}$ = **137** kN/m

PASS - Design shear resistance exceeds design shear force

Rectangular section in flexure - Section 6.1

Design bending moment — M = **0.2** kNm/m — K = **0.000** — K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required — $A_{bt.req}$ = **1** mm²/m

Tens.reinforcement provided — 12 dia.bars @ 200 c/c — Tens.reinforcement provided — $A_{bt.prov}$ = **565** mm²/m

Min.area of reinforcement — $A_{bt.min}$ = **509** mm²/m — Max.area of reinforcement — $A_{bt.max}$ = **14000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control - Section 7.3

Limiting crack width — w_{max} = **0.3** mm — Maximum crack width — w_k = **0** mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force — V = **3.3** kN/m — Design shear resistance — $V_{Rd.c}$ = **153.1** kN/m

PASS - Design shear resistance exceeds design shear force

Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement — $A_{bx.req}$ = **201** mm²/m — Max.spacing of reinforcement — s_{bx_max} = **450** mm

Trans.reinforcement provided — 10 dia.bars @ 200 c/c — Trans.reinforcement provided — $A_{bx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

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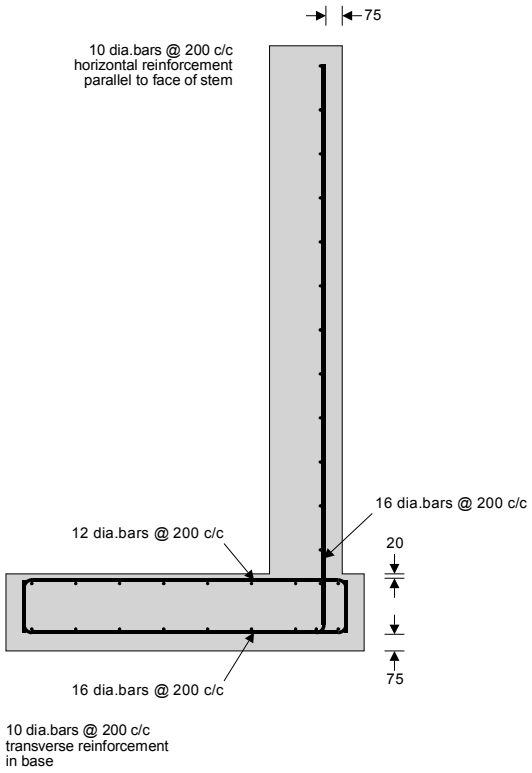
	Calcs for Rear Wall Retaining Wall				Start page no./Revision 15	
	Calcs by J	Calcs date 01/10/2014	Checked by	Checked date	Approved by	Approved date



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	Calcs for Side Wall Retaining Wall (adjacent to 104)				Start page no./Revision 16	
	Calcs by J	Calcs date 04/02/2015	Checked by	Checked date	Approved by	Approved date

RETAINING WALL ANALYSIS

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.4.08

Retaining wall details

Stem type	Cantilever		
Stem height	h_{stem} = **2400** mm		
Prop height	h_{prop} = **0** mm		
Stem thickness	t_{stem} = **390** mm		
Angle to rear face of stem	α = **90** deg		
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1200** mm		
Base thickness	t_{base} = **350** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **2400** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **1600** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

Soil type	Soft clay	
Moist density	γ_{mr} = **17** kN/m^3	
Saturated density	γ_{sr} = **17** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **18** deg
Characteristic wall friction angle		$\delta_{r.k}$ = **9** deg

Base soil properties

Soil type	Firm clay	
Moist density	γ_{mb} = **18** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{b.k}$ = **18** deg
Characteristic wall friction angle		$\delta_{b.k}$ = **9** deg
Characteristic base friction angle		$\delta_{bb.k}$ = **12** deg
Presumed bearing capacity	$P_{bearing}$ = **100** kN/m^2	

Loading details

Variable surcharge load	$Surcharge_Q$ = **3** kN/m^2
Vertical line load at 1365 mm	P_{G1} = **57.4** kN/m
	P_{Q1} = **21** kN/m

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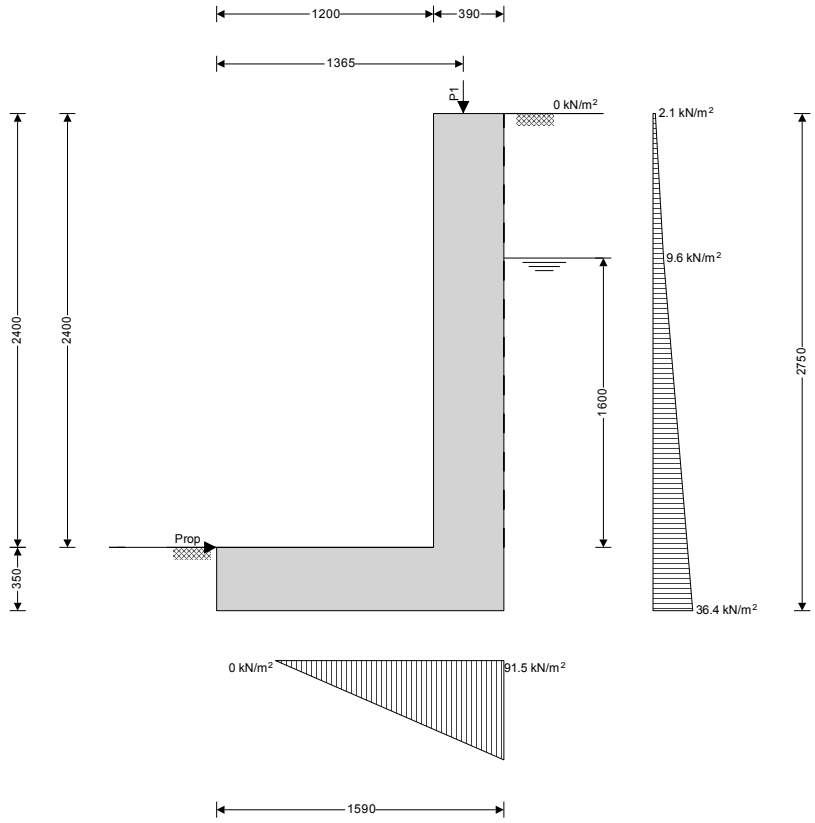
	Calcs by J	Calcs date 04/02/2015	Checked by	Checked date	Approved by	Approved date



Calculate retaining wall geometry

Base length	l_{base} = **1590** mm		
Saturated soil height	h_{sat} = **1600** mm		
Moist soil height	h_{moist} = **800** mm		
Length of surcharge load	l_{sur} = **0** mm		
Vertical distance	x_{sur_v} = **1590** mm		
Effective height of wall	h_{eff} = **2750** mm		
Horizontal distance	x_{sur_h} = **1375** mm		
Area of wall stem	A_{stem} = **0.936** m²	Vertical distance	x_{stem} = **1395** mm
Area of wall base	A_{base} = **0.557** m²	Vertical distance	x_{base} = **795** mm

Using Coulomb theory

Active pressure coefficient	K_A = **0.483**	Passive pressure coefficient	K_P = **2.359**

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{water\_v} + F_{P\_v}$ = **115.7** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sat\_h} + F_{moist\_h} + F_{water\_h} + F_{sur\_h}$ = **44.4** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sat} + M_{moist} + M_{water} + M_{sur} + M_P$ = **110.9** kNm/m

Check bearing pressure

Propping force F_{prop_base} = **44.4** kN/m

Bearing pressure at toe	q_{toe} = **0** kN/m^2	Bearing pressure at heel	q_{heel} = **91.5** kN/m^2
Factor of safety	FoS_{bp} = **1.092**		

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

RETAINING WALL DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigendum dated January 2008 and the UK National Annex incorporating National Amendment No.1

Tedds calculation version 2.4.08

Concrete details - Table 3.1 - Strength and deformation characteristics for concrete

Concrete strength class	C32/40		
Char.comp.cylinder strength	f_{ck} = **32** N/mm^2	Mean axial tensile strength	f_{ctm} = **3.0** N/mm^2
Secant modulus of elasticity	E_{cm} = **33346** N/mm^2	Maximum aggregate size	h_{agg} = **20** mm
Design comp.concrete strength		f_{cd} = **18.1** N/mm^2	Partial factor γ_C = **1.50**

Reinforcement details

Characteristic yield strength	f_{yk} = **500** N/mm^2	Modulus of elasticity	E_s = **200000** N/mm^2
Design yield strength	f_{yd} = **435** N/mm^2	Partial factor	γ_S = **1.15**

Cover to reinforcement

Front face of stem	c_{sf} = **20** mm	Rear face of stem	c_{sr} = **75** mm
Top face of base	c_{bt} = **20** mm	Bottom face of base	c_{bb} = **75** mm

Check stem design at base of stem

Depth of section h = **390** mm

Rectangular section in flexure - Section 6.1

Design bending moment	M = **36.1** kNm/m	K = **0.012**	K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required	$A_{sr.req}$ = **285** mm^2/m		
Tens.reinforcement provided	16 dia.bars @ 200 c/c	Tens.reinforcement provided	$A_{sr.prov}$ = **1005** mm^2/m
Min.area of reinforcement	$A_{sr.min}$ = **483** mm^2/m	Max.area of reinforcement	$A_{sr.max}$ = **15600** mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control - Section 7.3

Limiting crack width	w_{max} = **0.3** mm	Maximum crack width	w_k = **0.144** mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force	V = **45.6** kN/m	Design shear resistance	$V_{Rd.c}$ = **147.7** kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement	$A_{sx.req}$ = **390** mm^2/m	Max.spacing of reinforcement	s_{sx_max} = **400** mm
Trans.reinforcement provided	10 dia.bars @ 200 c/c	Trans.reinforcement provided	$A_{sx.prov}$ = **393** mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Check base design at toe

Depth of section h = **350** mm

Rectangular section in flexure - Section 6.1

Design bending moment	M = **41.2** kNm/m	K = **0.018**	K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required	$A_{bb.req}$ = **374** mm^2/m		
Tens.reinforcement provided	16 dia.bars @ 200 c/c	Tens.reinforcement provided	$A_{bb.prov}$ = **1005** mm^2/m
Min.area of reinforcement	$A_{bb.min}$ = **420** mm^2/m	Max.area of reinforcement	$A_{bb.max}$ = **14000** mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

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	Calcs by J	Calcs date 04/02/2015	Checked by	Checked date	Approved by	Approved date

Crack control - Section 7.3

Limiting crack width w_{max} = **0.3** mm Maximum crack width w_k = **0.191** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **87.6** kN/m Design shear resistance $V_{Rd.c}$ = **137** kN/m

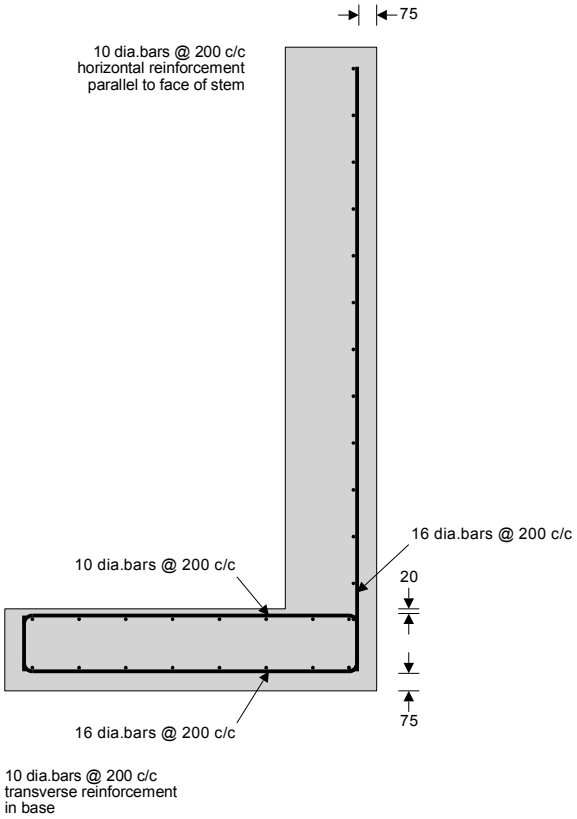
PASS - Design shear resistance exceeds design shear force

Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement $A_{bx.req}$ = **201** mm²/m Max.spacing of reinforcement s_{bx_max} = **450** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c Trans.reinforcement provided $A_{bx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required



RETAINING WALL ANALYSIS

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.4.08

Retaining wall details

Stem type	Cantilever		
Stem height	h_{stem} = **2400** mm		
Prop height	h_{prop} = **0** mm		
Stem thickness	t_{stem} = **250** mm		
Angle to rear face of stem	α = **90** deg		
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1200** mm		
Base thickness	t_{base} = **350** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **2400** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **1600** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

Soil type	Soft clay	
Moist density	γ_{mr} = **17** kN/m^3	
Saturated density	γ_{sr} = **17** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **18** deg
Characteristic wall friction angle		$\delta_{r.k}$ = **9** deg

Base soil properties

Soil type	Firm clay	
Moist density	γ_{mb} = **18** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{b.k}$ = **18** deg
Characteristic wall friction angle		$\delta_{b.k}$ = **9** deg
Characteristic base friction angle		$\delta_{bb.k}$ = **12** deg
Presumed bearing capacity	$P_{bearing}$ = **100** kN/m^2	

Loading details

Variable surcharge load	$Surcharge_Q$ = **3** kN/m^2
Vertical line load at 1325 mm	P_{G1} = **57.4** kN/m
	P_{Q1} = **21** kN/m

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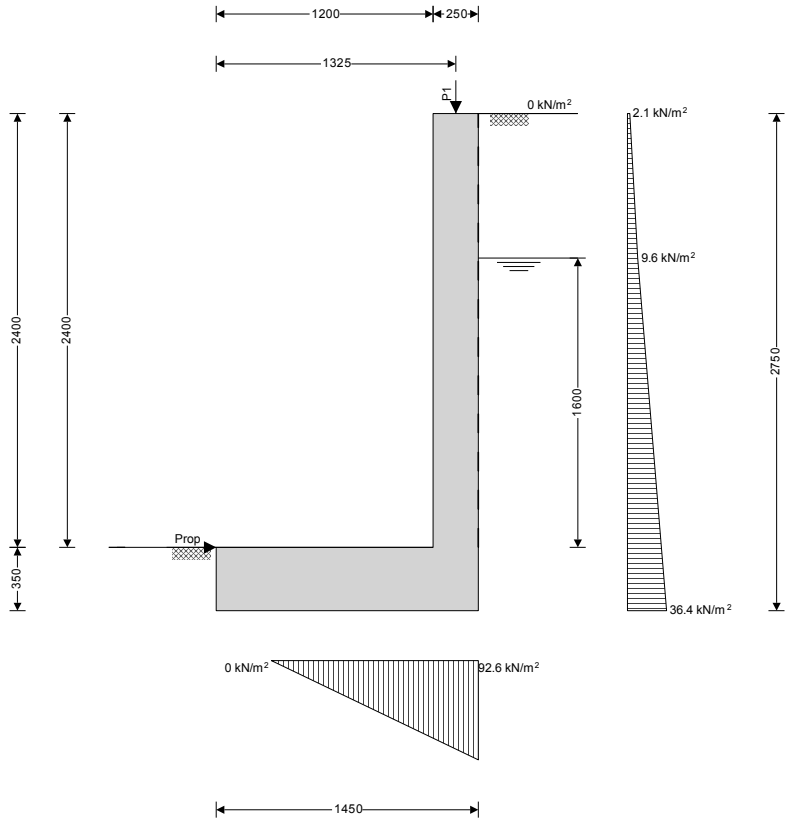
	Calcs by J	Calcs date 04/02/2015	Checked by	Checked date	Approved by	Approved date



Calculate retaining wall geometry

Base length	l_{base} = **1450** mm		
Saturated soil height	h_{sat} = **1600** mm		
Moist soil height	h_{moist} = **800** mm		
Length of surcharge load	l_{sur} = **0** mm		
Vertical distance	x_{sur_v} = **1450** mm		
Effective height of wall	h_{eff} = **2750** mm		
Horizontal distance	x_{sur_h} = **1375** mm		
Area of wall stem	A_{stem} = **0.6** m²	Vertical distance	x_{stem} = **1325** mm
Area of wall base	A_{base} = **0.508** m²	Vertical distance	x_{base} = **725** mm

Using Coulomb theory

Active pressure coefficient	K_A = **0.483**	Passive pressure coefficient	K_P = **2.359**

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{water\_v} + F_{P\_v}$ = **106.1** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sat\_h} + F_{moist\_h} + F_{water\_h} + F_{sur\_h}$ = **44.4** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sat} + M_{moist} + M_{water} + M_{sur} + M_P$ = **93.1** kNm/m

Check bearing pressure

Propping force F_{prop_base} = **44.4** kN/m

Bearing pressure at toe	q_{toe} = **0** kN/m^2	Bearing pressure at heel	q_{heel} = **92.6** kN/m^2
Factor of safety	FoS_{bp} = **1.079**		

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

RETAINING WALL DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigendum dated January 2008 and the UK National Annex incorporating National Amendment No.1

Tedds calculation version 2.4.08

Concrete details - Table 3.1 - Strength and deformation characteristics for concrete

Concrete strength class	C32/40		
Char.comp.cylinder strength	f_{ck} = **32** N/mm^2	Mean axial tensile strength	f_{ctm} = **3.0** N/mm^2
Secant modulus of elasticity	E_{cm} = **33346** N/mm^2	Maximum aggregate size	h_{agg} = **20** mm
Design comp.concrete strength		f_{cd} = **18.1** N/mm^2	Partial factor γ_C = **1.50**

Reinforcement details

Characteristic yield strength	f_{yk} = **500** N/mm^2	Modulus of elasticity	E_s = **200000** N/mm^2
Design yield strength	f_{yd} = **435** N/mm^2	Partial factor	γ_S = **1.15**

Cover to reinforcement

Front face of stem	c_{sf} = **20** mm	Rear face of stem	c_{sr} = **75** mm
Top face of base	c_{bt} = **20** mm	Bottom face of base	c_{bb} = **75** mm

Check stem design at base of stem

Depth of section h = **250** mm

Rectangular section in flexure - Section 6.1

Design bending moment	M = **36.1** kNm/m	K = **0.040**	K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required	$A_{sr.req}$ = **524** mm^2/m		
Tens.reinforcement provided	16 dia.bars @ 200 c/c	Tens.reinforcement provided	$A_{sr.prov}$ = **1005** mm^2/m
Min.area of reinforcement	$A_{sr.min}$ = **263** mm^2/m	Max.area of reinforcement	$A_{sr.max}$ = **10000** mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Crack control - Section 7.3

Limiting crack width	w_{max} = **0.3** mm	Maximum crack width	w_k = **0.214** mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force	V = **45.6** kN/m	Design shear resistance	$V_{Rd.c}$ = **93.5** kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement	$A_{sx.req}$ = **251** mm^2/m	Max.spacing of reinforcement	s_{sx_max} = **400** mm
Trans.reinforcement provided	10 dia.bars @ 200 c/c	Trans.reinforcement provided	$A_{sx.prov}$ = **393** mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Check base design at toe

Depth of section h = **350** mm

Rectangular section in flexure - Section 6.1

Design bending moment	M = **43.1** kNm/m	K = **0.019**	K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required	$A_{bb.req}$ = **391** mm^2/m		
Tens.reinforcement provided	16 dia.bars @ 200 c/c	Tens.reinforcement provided	$A_{bb.prov}$ = **1005** mm^2/m
Min.area of reinforcement	$A_{bb.min}$ = **420** mm^2/m	Max.area of reinforcement	$A_{bb.max}$ = **14000** mm^2/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

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	Calcs for Side Wall Retaining Wall (adjacent to 100)				Start page no./Revision 23	
	Calcs by J	Calcs date 04/02/2015	Checked by	Checked date	Approved by	Approved date

Crack control - Section 7.3

Limiting crack width w_{max} = **0.3** mm Maximum crack width w_k = **0.2** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **93.4** kN/m Design shear resistance $V_{Rd.c}$ = **137** kN/m

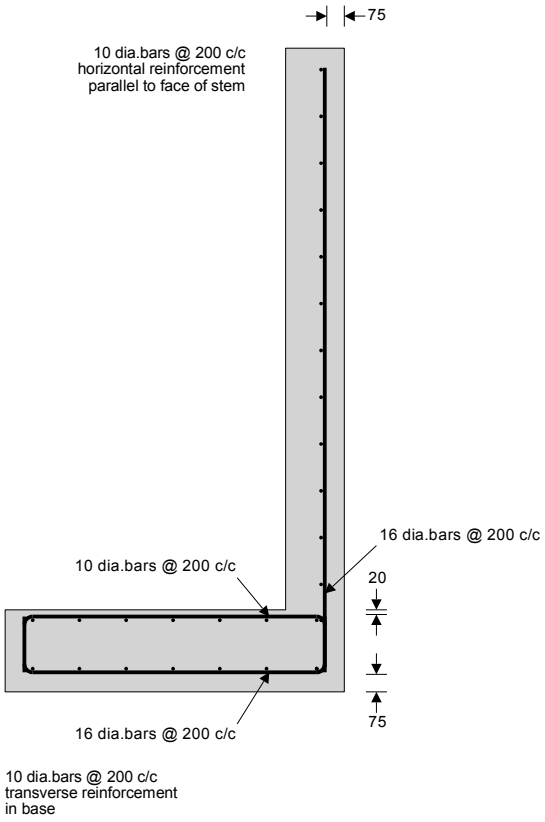
PASS - Design shear resistance exceeds design shear force

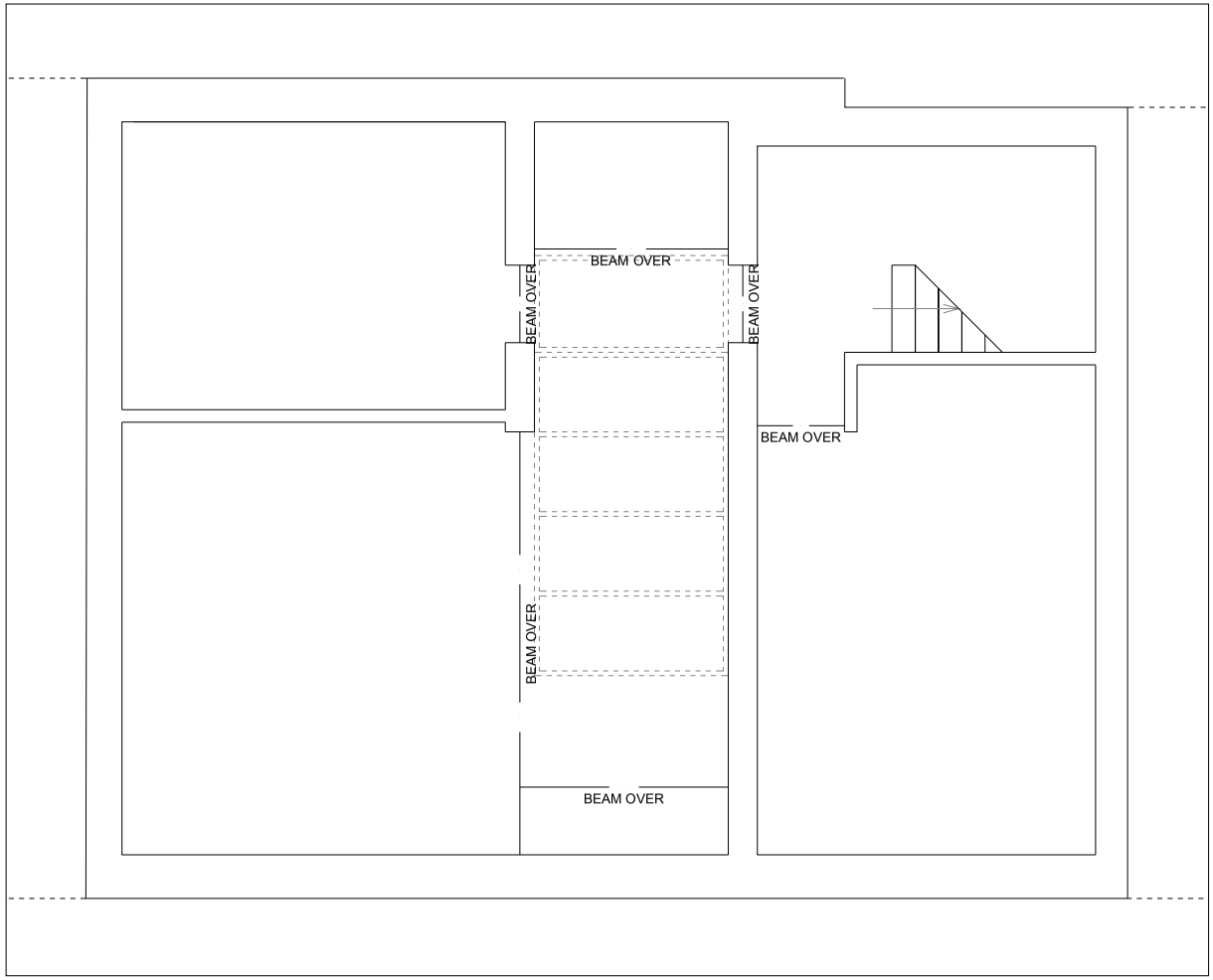
Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement $A_{bx.req}$ = **201** mm²/m Max.spacing of reinforcement s_{bx_max} = **450** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c Trans.reinforcement provided $A_{bx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required





PROPOSED BASEMENT PLAN SHOWING STRUCTURE OVER

NOT FOR CONSTRUCTION

Martin Redston Associates
Consulting Civil & Structural Engineers

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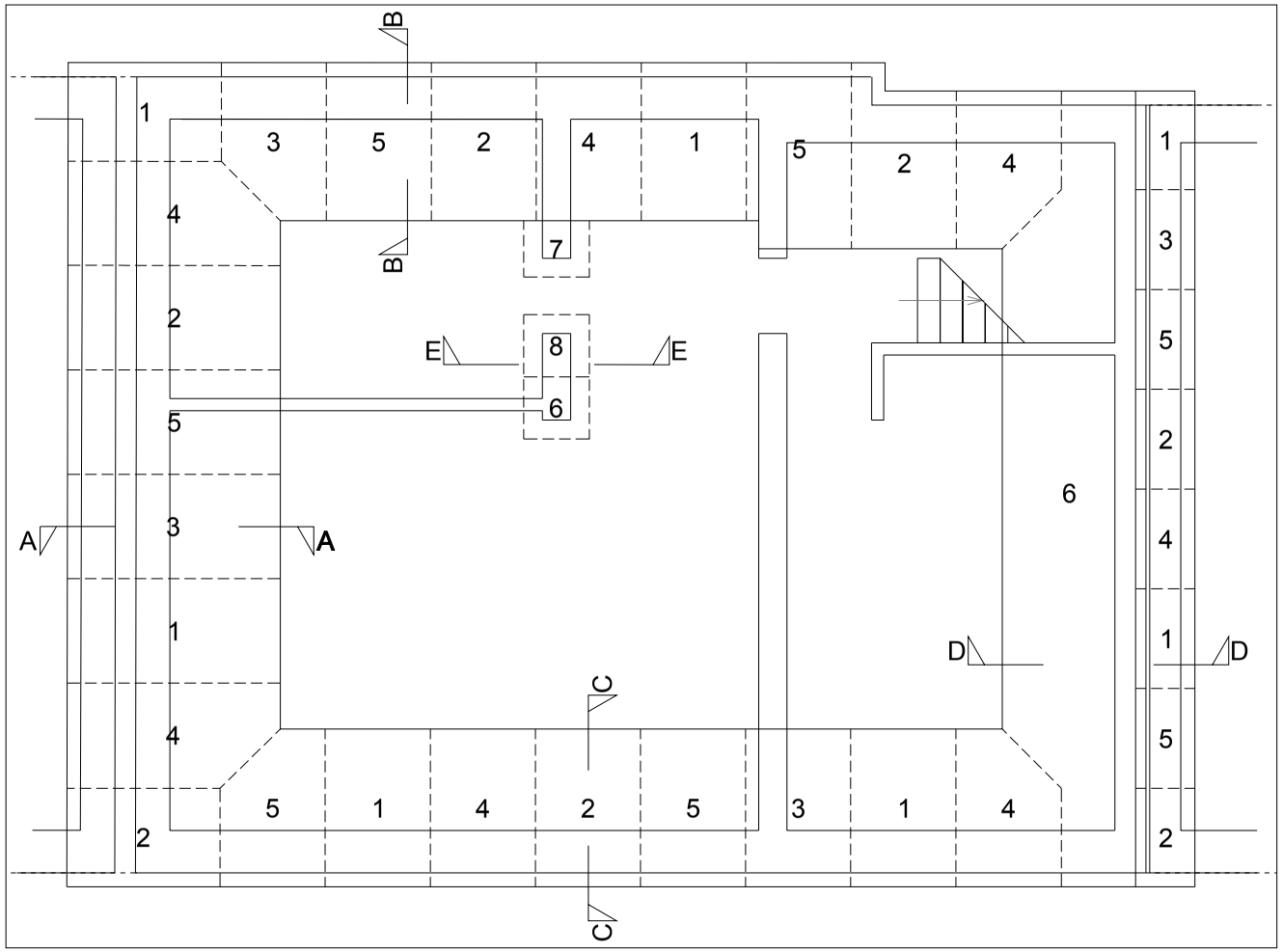
Date: 02/10/2014	Sheet No. 1
Eng.: JC	
Job No.: 12.568	
Project: 102 Camden Mews, London, NW1 9AG	
Drawing Title: Proposed Basement Plan Showing Structure Over	

SEQUENCE OF CONCRETE UNDERPINNING

1. WORKING IN STRIPS NOT EXCEEDING 1.2m LONG EXCAVATE TO REQUIRED DEPTH BENEATH EXISTING FOOTING.
2. CAREFULLY CUT AWAY TO PROVIDE LEVEL SOFFIT TO EXISTING BRICK FOOTING AND THOROUGHLY CLEAN BEFORE UNDERPINNING.
3. CAST NEW CONCRETE TO WITHIN 50mm OF SOFFIT OF EXISTING FOOTING AND ALLOW 24 HOURS TO CURE.
4. RAM IN DRY PACK MORTAR BETWEEN NEW AND EXISTING FOOTINGS.
5. NEVER EXCAVATE TWO ADJACENT STRIPS WITHOUT ALLOWING 3 DAYS FROM TIME OF DRY PACKING.
6. WHEN ADJACENT SECTIONS ARE OPENED UP THE EXPOSED CONCRETE SURFACES SHOULD BE THOROUGHLY CLEANED OF ALL LOOSE MATERIAL AND SCABBLED TO FORM A GOOD KEY.
7. UNDERPINNING WIDTH TO BE AS NOTED ON THE DRAWINGS.
8. ALL NEW CONCRETE BELOW GROUND TO BE SULPHATE RESISTING CEMENT CONC. GRADE C 40.
9. DRY PACK - 1:3 CEMENT/SAND.
10. ALL UNDERPINS ARE TO BE DOWELLED TOGETHER WITH H20 BARS 800mm LONG O/A AT 500mm CENTRES VERTICALLY. ALTERNATIVELY PROVIDE FULL WIDTH TOOTHED JOINTS ONE THIRD HIGH AND 250mm DEEP AT MID HEIGHT OF ALL UNDERPINS.

SEQUENCE OF B/WK UNDERPINNING

1. WORKING IN STRIPS NOT EXCEEDING 1M LONG EXCAVATE TO REQUIRED DEPTH BENEATH EXISTING FOOTING.
2. HACK AWAY TO PROVIDE LEVEL SOFFIT TO EXISTING BRICK FOOTING AND THOROUGHLY CLEAN BEFORE UNDERPINNING.
3. CONSTRUCT ENGINEERING BRICK STEM TO WITHIN 75mm OF EXISTING BRICK SOFFIT
4. RAM IN DRY PACK MORTAR BETWEEN NEW B/WK AND EXISTING FOOTINGS.
5. NEVER EXCAVATE TWO ADJACENT STRIPS WITHOUT ALLOWING 3 DAYS FROM TIME OF DRY PACKING.
6. WHEN ADJACENT SECTIONS ARE OPENED UP THE EXPOSED B/WK SURFACES SHOULD BE THOROUGHLY CLEANED OF ALL LOOSE MATERIAL TO FORM A GOOD KEY.
7. UNDERPINNING TO BE 900mm WIDE UNLESS NOTED OTHERWISE.
8. DRY PACK - 3 : 1 SAND CEMENT.
11. CONTRACTOR TO CAREFULLY INSPECT ALL EXISTING MASONRY PRIOR TO UNDERPINNING EACH BAY IN SEQUENCE. REPORT ANY ANOMALIES TO ENGINEER FOR ADVICE AND REASSESSMENT OF SCHEME.
12. UNDERPINNING SECTIONS TO BE CAST IN NUMERICAL ORDER; AS PER SUGGESTED UNDERPINNING SEQUENCE DRAWING.



SUGGESTED UNDERPINNING SEQUENCE

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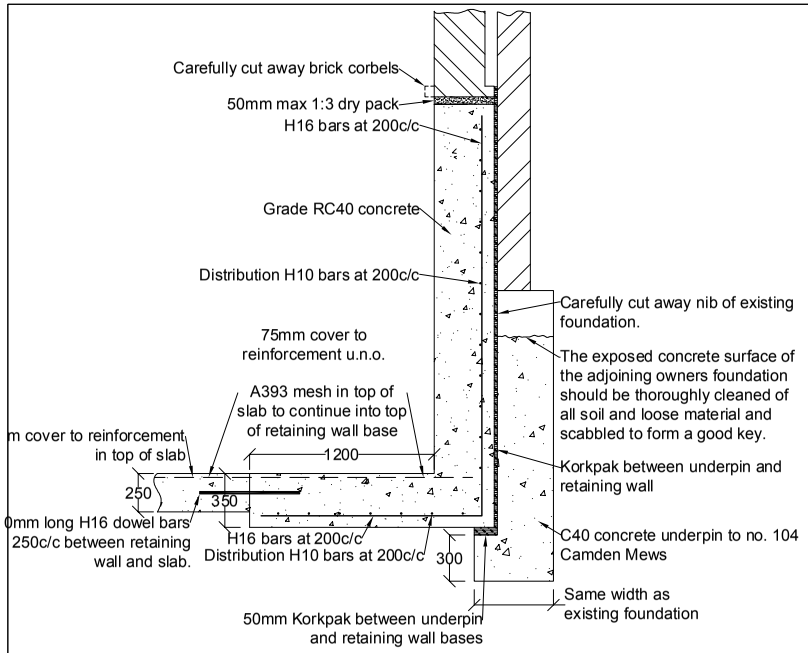
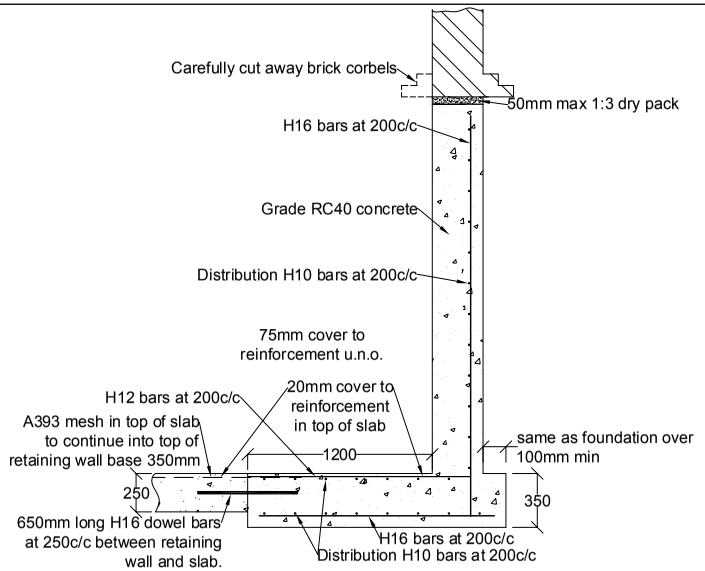
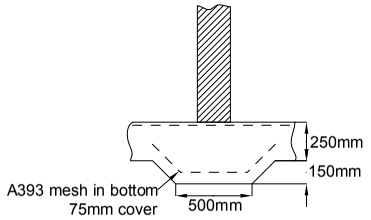
Date: 02/10/2014	Sheet No. 2B
Eng.: JC	
Job No.: 12.568	
Project: 102 Camden Mews, London, NW1 9AG	
Drawing Title: Suggested Underpinning Sequence	



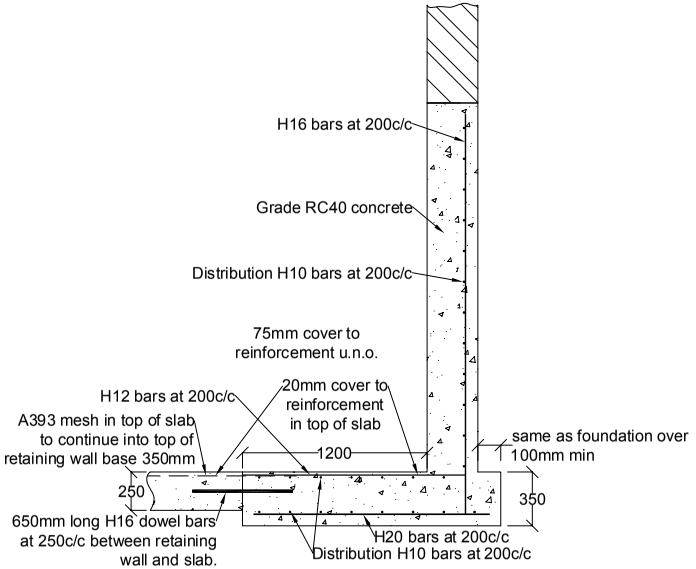
SECTION A-A



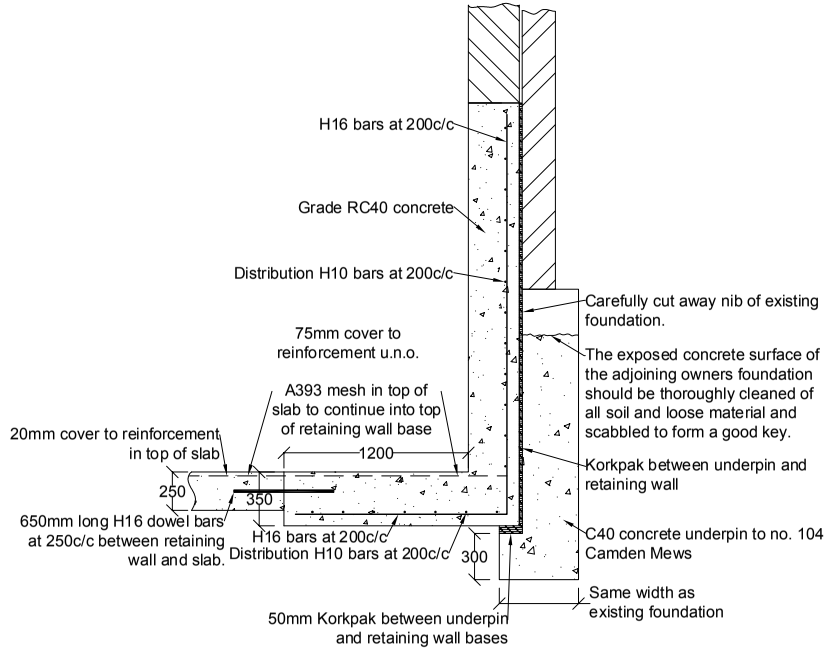
SECTION B-B



SECTION E-E



SECTION C-C



SECTION D-D

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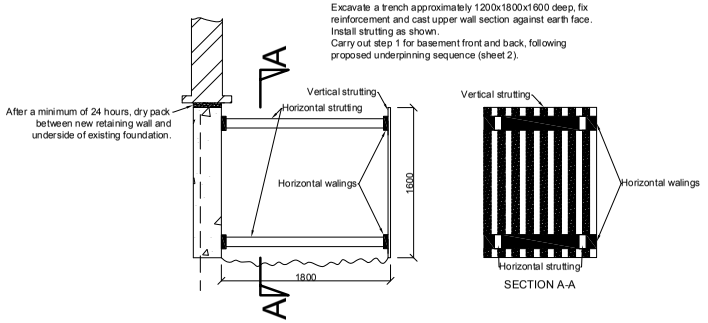
Date: 02/10/2014	Sheet No. 3 B
Eng.: JC	
Job No.: 12.568	
Project: 102 Camden Mews, London, NW1 9AG	
Drawing Title: Proposed Basement Sections	

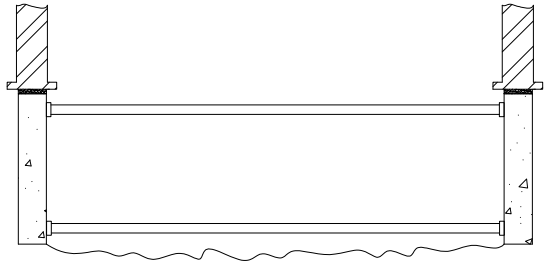
STEP 1

Excavate a trench approximately 1200x1800x1600 deep, fix reinforcement and cast upper wall section against earth face.
Install strutting as shown.
Carry out step 1 for basement front and back, following proposed underpinning sequence (sheet 2).



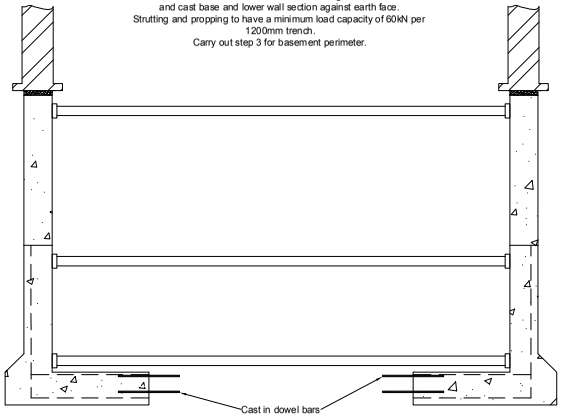
STEP 2

Reduce soil level throughout and prop across.



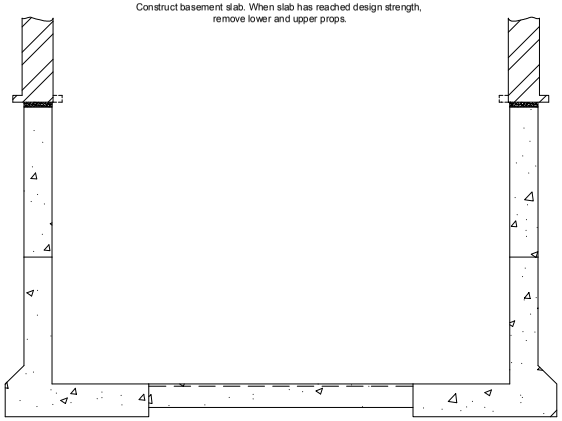
STEP 3

Excavate further 2400x1800 max, cast blinding, fix reinforcement and cast base and lower wall section against earth face.
Strutting and propping to have a minimum load capacity of 60kN per 1200mm trench.
Carry out step 3 for basement perimeter.



STEP 4

Construct basement slab. When slab has reached design strength, remove lower and upper props.



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Date: 02/10/2014	Sheet No. T1 A
Eng.: JC	
Job No.: 12.568	
Project: 102 Camden Mews, London, NW1 9AG	
Drawing Title: Proposed Underpinning Temporary Works Section Front to Back	