

**Flat 2, 55 Greencroft Gardens
London NW6 3LL**

**Basement Impact Assessment
Audit**

For
London Borough of Camden

Project Number: 12066-55
Rev: F1

November 2015

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Document Details

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1.0 NON-TECHNICAL SUMMARY

- 1.1. CampbellReith was instructed by London Borough of Camden (LBC) to carry out an audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Flat 2, 55 Greencroft Gardens (planning reference 2015/3981/P). The basement is considered to fall within Category B as defined by the Terms of Reference.
- 1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basements development in accordance with LBC's policies and technical procedures.
- 1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and review it against an agreed audit check list.
- 1.4. The BIA has been prepared by personnel who have suitable qualifications.
- 1.5. Flat 2, 55 Greencroft Gardens is a ground floor flat with rear garden access surrounded by flats at the front and side within No. 55 and also with No. 57, its adjoining semi-detached property.
- 1.6. The proposed development comprises the demolition of an existing single-storey extension and replacement with a longer single-storey extension, together with a new basement below the flat footprint and below the new extension.
- 1.7. The development will be founded in the London Clay and it is accepted that it will have no significant effect on either slope or ground stability nor the hydrogeology of the surrounding area.
- 1.8. It is accepted that the development is unlikely to be at risk from flooding, although Greencroft Gardens flooded in 1975 and 2002, and surface water flows into the sewer network and the ground will not be significantly altered. However, detailed proposals for the draining of the rear lower terrace and the discharge from the new extension roof are still required.
- 1.9. It is proposed to form the basement using underpinning techniques to two sides of the basement. Concerns remain over the detailed sequence of underpinning and temporary propping support of the head of each pin which should be clarified during the Party Wall process.
- 1.10. Concerns remain over the proposal to carry excavated spoil through the property and over the pavement on a conveyor into a roadside skip.
- 1.11. A building inspection survey report has been provided which indicates minor area of historic cosmetic cracking at variance with resident's concerns. A Ground Movement Analysis has been

carried out on seven no. surrounding walls and concluded that potential movement will be "Very Slight" (Burland Category 1) or less.

- 1.12. Although an acceptable movement monitoring procedure is identified in the BIA, this remains unrecognised in the Construction Method Statement. No comment is made regarding heave pressures on the underside of the basement slab due to the excavation of the London Clay.
- 1.13. Queries and requests for further information are summarised in Appendix 2.
- 1.14. It is recommended that outstanding detailed queries are resolved in a Basement Construction Plan prior to construction commencement.

2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 22 September 2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Flat 2, 55 Greencroft Gardens, Camden Reference 2015/3981/P.
- 2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.
- 2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
 - Camden Planning Guidance (CPG) 4: Basements and Lightwells.
 - Camden Development Policy (DP) 27: Basements and Lightwells.
 - Camden Development Policy (DP) 23: Water.
- 2.4. The BIA should demonstrate that schemes:
- a) maintain the structural stability of the building and neighbouring properties;
 - b) avoid adversely affecting drainage and run off or causing other damage to the water environment; and,
 - c) avoid cumulative impacts upon structural stability or the water environment in the local area.
- and evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.
- 2.5. LBC's Audit Instruction described the planning proposal as the *"Demolition and reinstatement of a single storey rear extension. Excavation of a single storey basement extension."*
- and confirmed that the basement proposals neither involved nor neighboured listed buildings.

- 2.6. CampbellReith accessed LBC's Planning Portal on 06 October 2015 and gained access to the following relevant documents for audit purposes:
- Basement Impact Assessment (BIA) and Appendices A to F – Chelmer dated July 2015
 - Ground Movement Analysis (GMA) – Chelmer dated September 2015
 - Architect's Proposed Drawings – Simon Goldstein Architecture.
- 2.7. Following the issue of CampbellReith's D1 revision audit report, a revised Construction Method Statement, authored by S.R. Brunswick, was issued electronically by LBC's Planning Officer to CampbellReith on 02 November 2015 with a request to review the additional information. Accompanying this document was a building survey letter report dated 20 October 2015 by Martin Redston Associates.
- 2.8. The original text in the Discussion, Section 4 of our D1 report has been maintained and commentary added where relevant. The additional information identified in item 2.7 has been included within Appendix 3 "Supplementary Supporting Documents".

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA Section 1.0.
Is data required by Cl.233 of the GSD presented?	Yes	BIA.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	BIA Sections 2.0 and 3.0.
Are suitable plan/maps included?	Yes	BIA Sections 2.0 to 6.0.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 7.3.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 7.2.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 7.4.
Is a conceptual model presented?	Yes	BIA Section 10.1.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 8.2.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	N/A	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 8.3.
Is factual ground investigation data provided?	Yes	BIA Appendix c.
Is monitoring data presented?	Yes	Standpipes monitored twice, see BIA Section 9.6.
Is the ground investigation informed by a desk study?	Yes	BIA Section 1.3.
Has a site walkover been undertaken?	Yes	BIA Section 1.3.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	BIA Section 2.10.
Is a geotechnical interpretation presented?	Yes	BIA Section 9.0.
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA Section 10.4.9.
Are reports on other investigations required by screening and scoping presented?	N/A	
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	BIA Section 10.0.
Are estimates of ground movement and structural impact presented?	Yes	BIA Ground Movement Analysis.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	BIA Section 10.8.
Has the need for monitoring during construction been considered?	Yes	BIA Section 10.6.
Have the residual (after mitigation) impacts been clearly identified?	Yes	BIA Section 10.8.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties maintained?	No	Construction Method Statement requested.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	But further information requested.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Construction Method Statement requested.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	But review requested.
Are non-technical summaries provided?	Yes	BIA Section 11.0.

4.0 DISCUSSION

- 4.1. The BIA has been carried out by a well established firm of consultants, Chelmer Consultancy Services, and the lead authors have suitable qualifications.
- 4.2. 55 Greencroft Gardens is a semi-detached four-storey property subdivided into a number of flats. Flat 2 is on the ground floor and has a party wall with Flat 1, front (north) and Flat 3 to the side (east) as well as No. 57 to its other side (west).
- 4.3. The proposed development comprises the demolition of an existing rear single storey extension and its replacement with a longer single storey extension. A single level basement will be created below the existing ground floor flat footprint and below the new extension.
- 4.4. Chelmer has produced a comprehensive BIA which has shown that the basement will be founded in the London Clay and will have no significant effect on slope or ground stability of the surrounding area and will not affect the hydrogeology of the surrounding area.
- 4.5. The BIA has identified that Greencroft Gardens suffered from the 1975 and 2002 flood events but the latest flood modelling by the Environment Agency and Camden SFRA gives a "Very Low" risk of flooding by surface water. However, appropriate mitigation design measures are proposed to lessen potential flooding into the basement.
- 4.6. Further information should be provided to determine potential methods to control surface water discharge including the possibility to discharge Flat 2's roof extension onto Flat 1's roof and the draining of the rear lower terrace.

The additional Construction Method Statement discusses the intended methodology of rainwater disposal but incorrectly identifies that "a soakaway will be constructed in the garden to drain the new roofs". The development site is underlain by London Clay and this solution is not possible. Chelmer's original BIA identified in its item 10.7.7 that "no direct connection to the mains drainage system is available at the rear of Flat 2". A solution is required to be identified that "must be attenuated by use of a Sustainable Drainage System (SUDS)... these SUDS schemes will require formal design, including accurate quantification of the design run-off volumes". This information is requested.

- 4.7. The BIA has a supplementary report entitled Ground Movement Analysis which evaluated the potential movement upon seven no. surrounding walls as well as a heave assessment on the basement slab. These all indicate a potential damage category of "Very Slight" – Burland Category 1 or less. The assessment assumes that temporary support will be provided in accordance with best practice.

- 4.8. The BIA has identified that Flat 1, No. 55 Greencroft Gardens was granted planning permission for a basement which, it is believed, was completed at the beginning of 2014. Adjacent and adjoining residents from Flat 7 of No. 55 and the owners of No. 57 have lodged concerns with the proposal for Flat 2 because they are still suffering apparent visual damage from the construction of Flats 1's basement. These issues should be investigated by the development team for Flat 2 and the Ground Movement Analysis and BIA adjusted to suit.

The CSM acknowledges that complaints were made during the basement development of Flat 1 by the top floor of no. 55. The CMS is accompanied by a letter report dated 20 October 2015 by Martin Redston Associates which identified "minor areas of plaster hairline cracking at various locations but these appear to be cosmetic and of no structural significance" following an inspection of the "external walls of the property (no. 55), the common hallway and staircase together with flat number 1, 3, 4, 5 and 8". This inspection has been previously carried out in October 2015 and was "in similar condition to currently". It is unfortunate that the survey did not include the two residents who have lodged complaints, namely Flat 7 of no. 55 and the occupiers of no. 57. Whether this was deliberate or access was not provided remains unclear. Taken at face value, the report appears to confirm that any cracking present is historical.

- 4.9. The BIA makes reference to a retaining wall analysis by engineers SR Brunswick as well as a Construction Method Statement. No details of either document are contained within the documentation for planning permission. This is particularly pertinent bearing in mind that there appears to be little or no scope for the removal of excavation spoil. The Method Statement should also include an indicative solution for the design of temporary works propping restraint during the underpinning process and the excavation of the basement. It is also apparent from the Architect's proposed floor layouts that a lightwell and two light slots are to be introduced adjacent to each flank party wall. Commentary from the Structural Engineer is required in the Method Statement to address the potential lack of lateral stability of the party walls generated by the introduction of these architectural features.

The CSM provides a detailed proposal for underpinning the party walls with no. 57 and Flat 3 of no.55. Whilst it is accepted that this can be achieved in principle, there are detailed aspects of the proposal that appear unacceptable e.g. the head of each pin should be propped horizontally to the existing Flat 1 underpinned wall before any excavation takes place, in order to minimise possible movement, until the sloping prop proposed can be bolted to the basement slab strip. Also greater clarity is required over the underpinning sequence below Flat 3's party wall. These concerns should be responded to either by the requirement for Basement Construction Plan or during the Party Wall Act approval process.

It is questionable whether the principle of "carrying excavated spoil through the property and then placed on a conveyor system... over the pavement and into a skip located in the parking bay on the roadway" will be acceptable to LBC and residents.

The CSM also provides an engineered solution to introduce structural steelwork box-frames to carry out the proposed structural alterations at ground floor and, at the same time, maintain structural stability to the party walls with Flat 1, no. 55 and no. 57. These proposals are acceptable and successfully allow the light slots, adjacent to each party wall to be formed. It should be noted, however, that the structural steel beam supporting the ground floor between Frames 1 and 2 will need to pass through the lightwell adjacent to Frame 1 and no. 57's party wall.

- 4.10. General references are made in the BIA to the underpinning of the existing walls, reinforced concrete retaining walls for the rear lightwell and a proposal for the monitoring of ground movements. These proposals should be incorporated into the Construction Method Statement and expanded with further specific proposals. It should contain additional information such as how the underpinning will be formed, an estimate of structural loads and confirmation that the bearing stratum is adequate, intentions for shuttering and propping, consideration of the heave pressures contained in the BIA acting on the basement slab and so on.

The CSM does not verify that the movement monitoring proposals contained in item 10.6 of the BIA will be incorporated into construction proposals. Although it provides information on underpinning proposals; structural loadings; maintenance of load bearing pressures; intentions for shuttering and propping, which have been commented upon, no comment is made regarding heave pressures on the underside of the basement slab due to the excavation of the London Clay.

- 4.11. Whilst there are a number of outstanding issues to be refined and accepted, as these are of a minor and detailed nature, it is recommended that these are developed in a Basement Construction Plan prior to construction commencement.

5.0 CONCLUSIONS

- 5.1. The BIA has been prepared by personnel who have suitable qualifications.
- 5.2. Flat 2, 55 Greencroft Gardens is a ground floor flat with rear garden access surrounded by flats at the front and side within No. 55 and also No. 57, its adjoining semi-detached property.
- 5.3. The proposed development comprises the demolition of an existing single-storey extension and replacement with a longer single storey extension, together with a new basement below the flat footprint and below the new extension.
- 5.4. The development will be founded in the London Clay and it is accepted that it will have no significant effect on either slope or ground stability nor the hydrogeology of the surrounding area.
- 5.5. It is accepted that the development is unlikely to be at risk from flooding, although Greencroft Gardens flooded in 1975 and 2002, and surface water flows into the sewer network and the ground will not be significantly altered. However, detailed proposals for the draining of the rear lower terrace and the discharge from the new extension roof are still required.
- 5.6. It is proposed to form the basement using underpinning techniques to two sides of the basement. Concerns remain over the detailed sequence of underpinning and temporary propping support of the head of each pin which should be clarified during the Party Wall process.
- 5.7. Concerns remain over the proposal to carry excavated spoil through the property and over the pavement on a conveyor into a roadside skip.
- 5.8. A building inspection survey report has been provided which indicates minor area of historic cosmetic cracking at variance with resident's concerns. A Ground Movement Analysis has been carried out on seven no. surrounding walls and concluded that potential movement will be "Very Slight" (Burland Category 1) or less.
- 5.9. Although an acceptable movement monitoring procedure is identified in the BIA, this remains unrecognised in the Construction Method Statement. No comment is made regarding heave pressures on the underside of the basement slab due to the excavation of the London Clay.
- 5.10. It is recommended that outstanding detailed queries are resolved in a Basement Construction Plan prior to construction commencement.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue Raised	Response
Ekizoglou	Flat 7, 55 Greencroft Gardens	12.08.2015 11.09.2015	Damage to building caused by completed basement to Flat 1.	See 4.7 to 4.10
Spender/Humphries	57 Greencroft Gardens	19.08.2015	Damage to building caused by completed basement to Flat 1.	See 4.7 to 4.10

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Rainwater Disposal	Draining of rear lower terrace and roof of new extension	SUDS attention scheme to be developed following quantification of run-off volumes, see item 4.6	To be provided in Basement Construction Plan
2	Movement Analysis	Review in light of ongoing damage from Flat 1 basement and CMS (item 3)	Survey report provided shows historical cracking but without inspecting complainant's properties, see item 4.8	To be provided in Basement Construction Plan
3	Construction Method Statement	To be provided and to include commentary upon at least: • Equipment and removal of excavation spoil • Indicative design of temporary works • Structural stability of party walls • Formation of underpinning • Estimation of structural loadings • Adequacy of bearing stratum • Retaining wall analysis • Heave pressures	Concerns remain over spoil removal process, see item 4.9 Concerns remain over temporary support, see item 4.9 Accepted Concerns remain over proposals, see item 4.9 Accepted Accepted Accepted No information provided, see item 4.10	To be provided in Basement Construction Plan

Appendix 3: Supplementary Supporting Documents

Flat 2 – 55 Greencroft Gardens

Construction Method Statement

1.0 Introduction

- 1.1 The following document has been prepared as a response to queries raised by Campbell Reith in their Basement Impact Assessment Audit dated October 2015.
- 1.2 I am Steven Brunswick CEng, FICE FCIQB a Chartered Engineer and have prepared the structural design for the proposed alterations to Flat 2 at 55 Greencroft Gardens, NW6 3LL, a copy of which is attached to this document and includes the underpin details and structural load assessment.
- 1.3 To maintain stability of the adjacent properties both to the side and above the existing load bearing walls have been designed to be replaced with box frames which will provide the necessary stability to the party walls and maintain the existing load paths.

2.0 Construction Method Statement

- 2.1 Prior to the start of the underpinning trial holes are to be dug to confirm the level of the existing foundations and their configuration. This is to be recorded and advised to the Structural Engineer to review to ensure that the proposals contained in the current design are appropriate. It is anticipated that the depth of underpinning required is no more than 1.2m deep and the walls are of masonry construction with stepped brick footings founded on levelling mortar poured over London clay. One party wall, adjacent to Flat 1 has been previously underpinned and the proposed levels match those in Flat 1 so no further underpinning will be required to that wall.
- 2.2 The excavation will be undertaken primarily using hand tools but if possible a small tracked excavator will be used for the bulk dig for the formation of the slab. All spoil will be carried through the property and then placed on a conveyor system to carry the spoil over the pavement and into a skip located in the parking bay on the roadway.

2.3 The Underpinning will be carried out in the sequence shown working on the pins in the order given ensuring that pins and underpinning have cured prior to adjacent pins being worked on. The underpinning sequence will be as follows to maintain stability and will include the formation of the LG floor slab to act as a prop between party walls.

- 2.3.1 Excavate below the existing wall for all pins marked "1" supporting the exposed earth face with steel trench sheets back propped to the retained ground with steel walings top and bottom. The back line of the underpin is to be the line of the masonry wall and not the step footing to allow for potential development to the adjacent property. The formation of the underpin is to be checked to ensure that ground is suitable and if necessary any soft spot is to be dug out and backfilled with C20 concrete to formation level.
- 2.3.2 The base of the underpinned is to be widened by the provision of a heel to match the width of the stepped footing so that the foundation width is maintained and the GBP is not increased.
- 2.3.3 As the underpin is dug out a trench is to be formed to allow construction of the reinforced ground bearing floor slab and the sides battered back or sheeted and propped.
- 2.3.4 The underside of the existing masonry footing is to be cleaned to remove any soil and any loose masonry.
- 2.3.5 The reinforcement as detailed is to be fixed in place ensuring the designated cover and laps are achieved and the vertical face is to be shuttered.
- 2.3.6 The pin and associated section of slab are then to be cast and left for 48 hours to cure.
- 2.3.7 Once the pin has cured the 75mm gap between the underside of the party wall and the new underpin is to be dry packed using a 1 : 3 damp cement sand mix with a non-shrink additive.
- 2.3.8 The reinforced underpin is designed to act as a retaining wall for the height retained but to ensure any movement is controlled an RMD slimshore is to be provided to prop the top the underpin and be bolted using 4/M12 chemical

anchors to both the slab and the underpin with the prop at 30 degrees to the horizontal.

2.3.9 The sequence 2.2.1 to 2.2.8 is to be repeated for pins marked "2"

2.3.10 The sequence 2.2.1 to 2.2.8 is to be repeated for pins marked "3"

2.3.11 The sequence 2.2.1 to 2.2.8 is to be repeated for pins marked "4"

2.3.12 The sequence 2.2.1 to 2.2.8 is to be repeated for pins marked "5"

2.4 On completion of the underpinning the reinforced slab is to be completed with the box frames in place so that they can form part of the new construction and act with the new foundations.

2.5 Once the basement slab is complete and cured for 7 days the temporary propping can be removed.

2.6 The box frames are to be bolted to the party wall using M8 chemical anchors at 600 vertical ctrs in pairs and then any gap dry packed to provide stability to the party wall. This will ensure that the party walls are stable in the long term.

3.0 Rainwater disposal

3.1 The area of solid construction is not significantly increased over the current condition so the volumes of rainfall entering the drainage system will not be greatly increased.

3.2 The rainwater from the new roofs will be collected and discharged into the existing drainage system utilising the new pitched roofs and guttering before discharging using new plastic down pipes.

3.3 The down pipe will discharge into a new gully located at the head of the extended existing drain. If this proves to be not possible, a soakaway will be constructed in the garden to drain the new roofs.

3.4 The existing main roof drainage will be maintained and a sealed chamber constructed within the property with access maintained to allow for future maintenance.

4.0 Movement Analysis

4.1 I am aware that complaints have been made that during the development of Flat 1 some movement has become apparent but I am unaware of the severity or history of these but understand that the areas of concern are on the top floor.

4.2 During any underpinning operation there is the potential for movement to occur and as there will be a load transfer from the existing to the new foundations and that can result in minor cracking of finishes. The sequencing of the work and limiting the extent of open work at any one time is designed to minimise this type of movement to the point where any movement comes under the category of minor redecoration to make good.

4.3 In advance of any works the Party Wall surveyor will visit all the apartments above and to the side of Flat 2 to draw up a condition survey and so establish a base condition to monitor against.

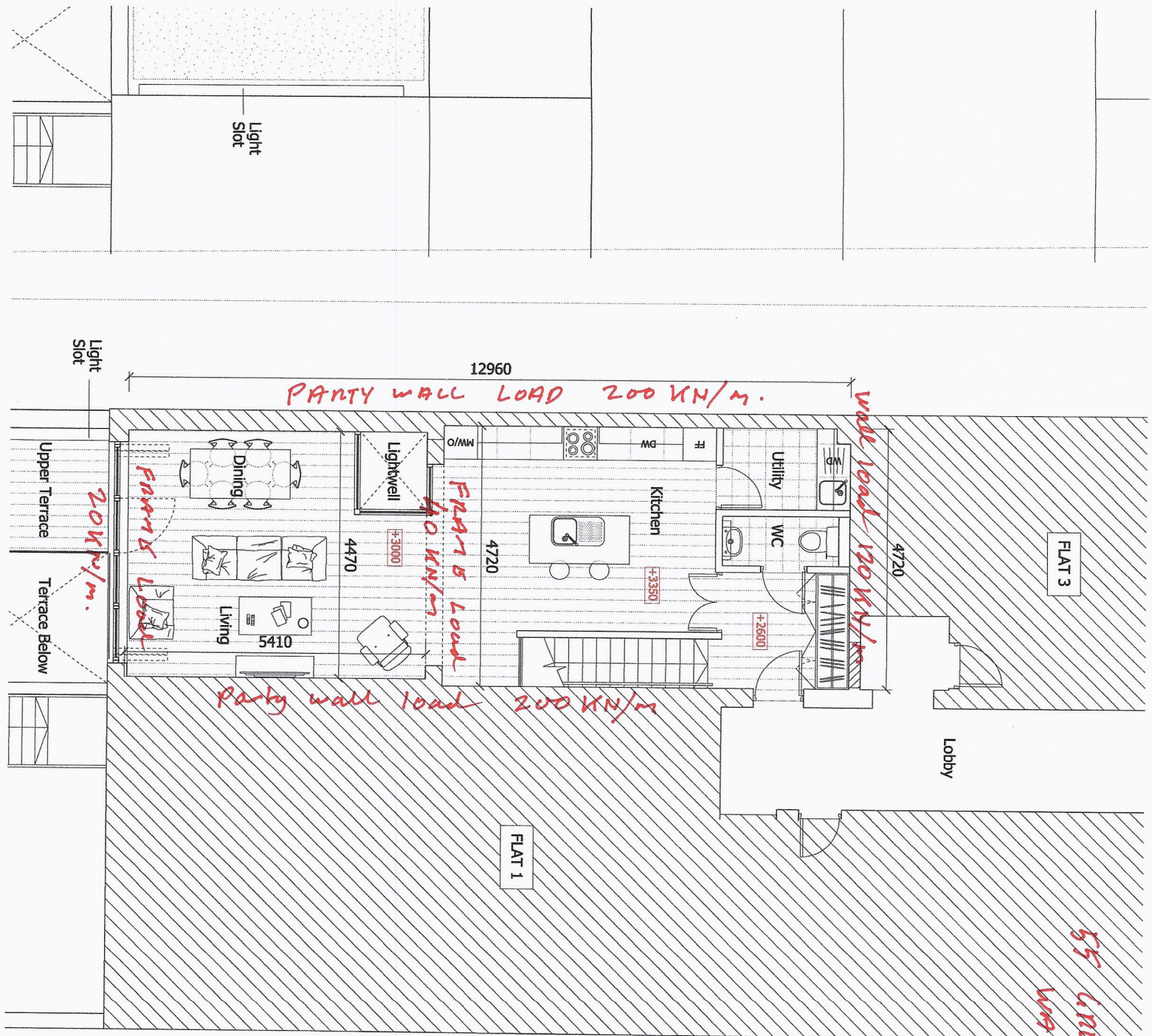
S R Brunswick CEng., FICE FCIOB

31st October 2015

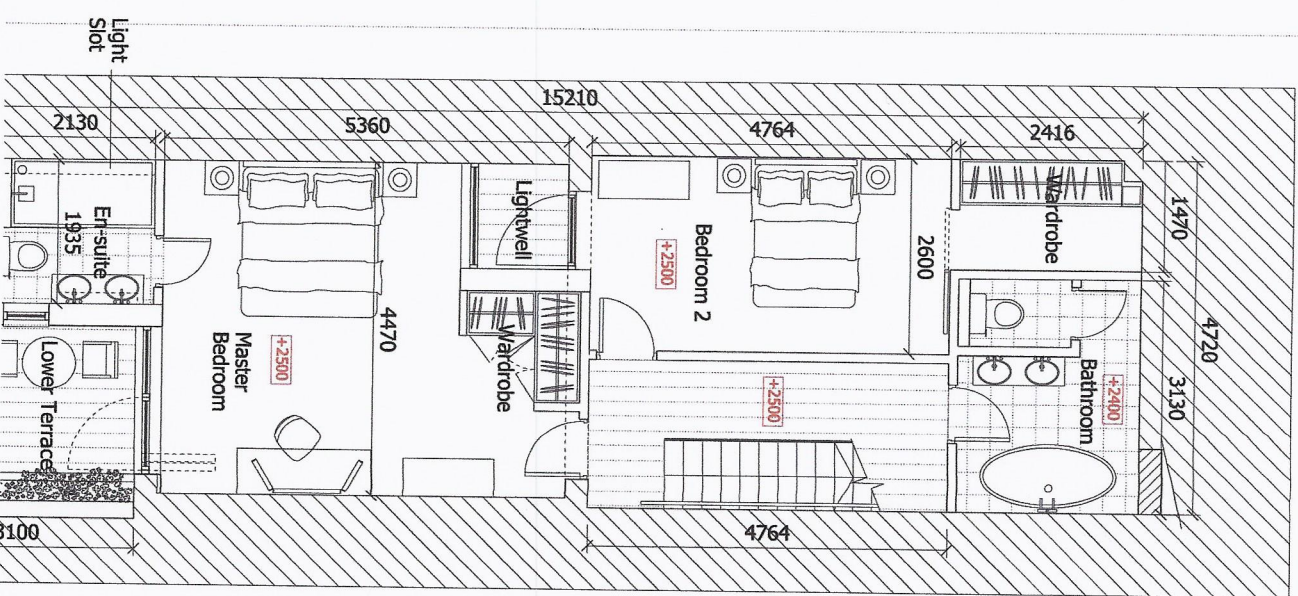
Ref: 1515 CMS-1

Appendix –

Structural Design & foundation load assessment



55 LINBROCK C/DNS.
WALL FOUNDATION LOADS.



S R BRUNSWICK CEng FICE

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Prepared by:

SRB

Checked by:

Sheet:

1515 - 1

Date:

May '15

55 Greencroft Gardens

The following calculations are for the design of an enlarged basement and internal alterations to this ground floor flat in a terraced property.

These calculations should be read in conjunction with all relevant Architects Drawings. The calculations have been prepared to comply with all relevant British Standards and Building Regulations.

Loadings

Roof - Terrace

Paving	1.20	KN/m2
Membrane	0.20	KN/m2
Rafters	0.10	KN/m2
P/bd and skim	0.30	KN/m2
	1.80	KN/m2

Super say 2.0 KN/m2 to allow for planters
UDL 3.8 KN/m2

Flat roof , no access say 1.9 KN/m2

Floor

Boards	0.15	KN/m2
Joists	0.15	KN/m2
Plasterboard & Skim	0.30	KN/m2
Super	1.50	KN/m2
	2.10	KN/m2

Partitions - stud say 0.60 KN/m2

Cavity Wall 3.60 KN/m2

Solid wall 215 say 4.50 KN/m2

Solid wall 340 say 7.2 KN/m2

Dormer cheek say 1.5 KN/m2

Timber to be Grade C16 to BS 5268

Steel to be Grade 43 to BS 449

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Sheet:

1515 - 2

Checked by:

Date:

May '15

55 Greencroft Gardens

Ground floor plan - Proposed - showing structure over



Rafters 200 x 50 @ 400 ctrs

R1 & R2 203 x 133 x 25 UB

Frame 1

Top member 203 UC 60

Mid member 203 x 133 x 25 UB

Bottom 203 UC 71 Concrete encased

Stanchions 203 UC 52

Frame 2

Top member 203 UC 46

Mid member 203 UC 46

Bottom 203 UC 46 concrete encased

Stanchions 203 UC 46

Min steel connection

4M16 Grade 8.8 bolts with
8mm end plate and 6mm full profile
fillet weld. Top flanges flush.

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Date:

May '15**55 Greencroft Gardens****Joists to flat roof**

Span 3900

UDL 1.9 KN/m²

$$\text{Max BM } 1.9 \times 3.9^2 / 8 = 3.6 \text{ KNm}$$

$$Z_{\text{reqd}} = 3.6 \text{ e}6 / 5.3 \times 1.1 \times 1.25 = 496 \text{ e}3 \text{ mm}^3/\text{m}$$

Try 175 x 50 @ 400 ctrs (Z = 560 e3 mm³ / m)

Deflection

$$5 \times 1.9 \times 0.4 \times (3.9)^4 \times \text{e}3 / 384 \times 8.8 \times 18.9 = 13.8 \text{ mm}$$

Too high

Provide

200 x 50 @ 400 ctrs

Defl = 9.1mm

0.0023 x span

Beam R1 carrying roof / skylight - (R2 Similar)

Span 5500

$$\text{UDL } 1.9 \times 4.5 / 2 + \text{say } 0.3 \text{ KN/m for glass} = 4.6 \text{ KN/m}$$

$$\text{Max BM } 4.6 \times 5.5^2 / 8 = 17.4 \text{ Knm}$$

Try 203 x 133 x 25 UB

$$L / R_y = 5500 / 31 = 178$$

$$D/T = 26$$

$$P_{bc} = 79 \text{ N/mm}^2$$

$$F_{bc} = 17.4 \text{ e}6 / 231.9 \text{ e}3 = 75 \text{ N/mm}^2$$

OK

Deflection

$$5 \times 4.6 \times (5.5)^4 \times \text{e}5 / 384 \times 210 \times 2356 = 11 \text{ mm}$$

Span / 500

OK

Provide

203 x 133 x 25 UB

Frame 1 on line of external wall above

The frame is to be a box frame bearing on the extg foundation
with intermediate beam to carry Grd floor

4300

Loading

Top beam

$$\text{Masonry } 4.5 \text{ KN/m}^2 \times 4.8 \text{ m} = 21.6 \text{ KN/m}$$

3300

$$\text{Roof terrace } 3.8 \text{ KN/m}^2 \times 2/2 = 3.8 \text{ KN/m}$$

$$\text{1st floor } 2.1 \text{ KN/m}^2 \times \text{say } 2 \text{ m} = 4.2 \text{ KN/m}$$

$$29.6 \text{ KN/m}$$

3300

For typical details
see sheet / 11

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Loading Grd floor

$$\text{floor } 1.9 \text{ KN/m}^2 \times 8 / 2 = 7.6 \text{ KN/m}$$

Top Member

UDL 29.6 KN/m

$$\text{Max BM } 29.6 \times 4.3^2 / 8 = 68.4 \text{ KNm}$$

Try 203 UC 60

$$L / R_y = 1.2 \times 4300 / 51.9 = 100 \quad D/T = 14.8$$

$$P_{bc} = 139 \text{ N/mm}^2$$

$$F_{bc} = 68.4 \text{ e}6 / 581.1 \text{ e}3 = 114 \text{ N/mm}^2$$

Deflection

$$5 \times 29.6 \times (4.3)^4 \times \text{e}5 / 384 \times 210 \times 6088 = 10.3 \text{ mm}$$

Span / 417

OK

Provide

203 UC 60 for
top member

Middle member

UDL 7.6 KN/m

$$\text{Max BM } 7.6 \times 4.3^2 / 8 = 17.6 \text{ KNm}$$

By Inspection
From sht / 3

Provide

203 x 133 x 25 UB

Bottom member

$$\text{UDL } 29.6 + 7.6 = 37.2 \text{ KN/m}$$

$$\text{Max BM } 37.2 \times 4.3^2 / 8 = 86 \text{ KNm}$$

Try 203 UC 60 concrete encased

$$F_{bc} = 86 \text{ e}6 / 581.1 \text{ e}3 = 149 \text{ N/mm}^2$$

OK

Deflection

$$5 \times 37.2 \times (4.3)^4 \times \text{e}5 / 384 \times 210 \times 6088 = 13.0 \text{ mm}$$

Span / 330

high Provide 203 UC 71

deflection 10.3mm

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Stanchion

Ht say 6600

Cap connection with total load = $37.2 \times 4.3/2 = 80 \text{ KN}$

BM

cap connection $80 \times 0.05 = 4.0 \text{ KNm}$

Stability $80 \times 6.6 \times 2.5\% = 13.2 \text{ KNm}$
17.2 KNm

Try 203 UC 46

L/Ry $1.5 \times 6600 / 51.1 = 194$ D/T = 18.5

Pbc = 86 N/mm²

Pc = 25 N/mm²

Fbc = $17.2 \text{ e6} / 449.2 \text{ e3} = 38 \text{ N/mm}^2$

Fc = $80 \text{ e3} / 58.8 \text{ e2} = 14 \text{ N/mm}^2$

UF = $38 / 86 + 14 / 25 = 1.1$

Too high

Provide
203 UC 52

Frame 2 on rear elevation

Loading
top member

Roof $1.9 \text{ Kn/m}^2 \times \text{say } 3\text{m} = 5.7 \text{ KN/m}$

masonry cladding $3.6 \text{ Kn/m}^2 \times 0.7 = 2.5 \text{ KN/m}$
8.2 KN/m

Middle member say as top as floor spans parallel

Use same section for all spans so assume UDL = 16 KN/m

Max BM $16 \times 4.3^2 / 8 = 37 \text{ KNm}$

Try 203 UC 46

Fbc = $37 \text{ e6} / 449.2 \text{ e3} = 82 \text{ N/mm}^2$

Deflection

$5 \times 16 \times (4.3)^4 \times \text{e5} / 384 \times 210 \times 4564 = 7.4 \text{ mm}$

OK

Stanchion by inspection to be 203 UC 46

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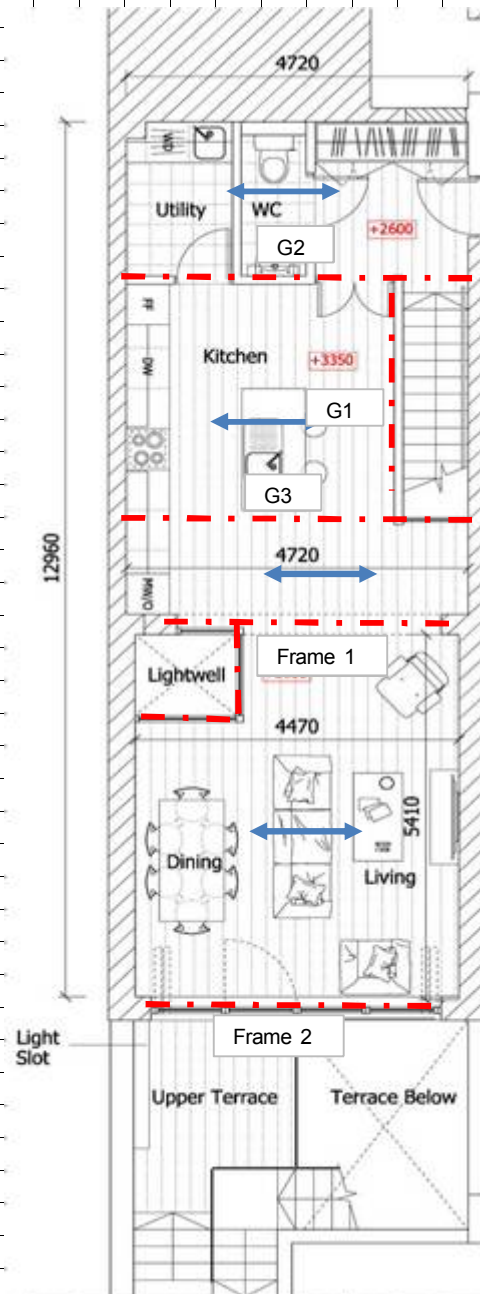
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Ground Floor Plan showing structure



G1, G2 & G3 - 203 x 133 x 25 UB

Framing to lightwell

203 x 133 x 25 UB in floors with
152 UC 23 stanchion

Floor joists 250 x 50 @ 400 ctrs Grade C16

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55 Greencroft Gardens**Design of floor joists**

Span 4800

UDL 2.1 Kn/m²Max BM $2.1 \times 4.8^2 / 8 = 6.0$ KNmZ reqd $6.0 \times 10^6 / 5.3 \times 1.1 = 1037 \times 10^3$ mm³/mTry 250 x 50 @ 400 ctrs (Z = 1165 e3 mm³ / m)

Deflection

 $5 \times 2.1 \times 0.4 \times (4.8) \times 10^3 / 384 \times 8.8 \times 56.9 = 11.6$ mm

0.0024 x span

Provide

250 x 50 @ 400 ctrs
Grade C16**Beam G1 trimming stair**

Span 4000

Loading

floor $2.1 \text{ KN/m}^2 \times 3.9 / 2 = 4.1 \text{ KN/m}$ Enclosing wall $0.6 \text{ KN/m}^2 \times 3.4 = 2.0 \text{ KN/m}$

6.1 KN/m

Reaction 12.2 KN

Max BM $6.1 \times 4^2 / 8 = 12.2$ Knm

Try 203 x 133 x 25 UB

L/Ry = $4 \times 10^3 / 31 = 129$

D/T = 26

Pbc = 102 N/mm²Fbc = $12.2 \times 10^6 / 231.9 \times 10^3 = 55$ N/mm²

Deflection

 $5 \times 6.1 \times (4)^4 \times 10^3 / 384 \times 210 \times 2356 = 4.1$ mm

OK

Provide

203 x 133 x 25 UB

Beam G2 & G3 carrying G1

Span 4800

Loading from G1 1m from support

BM $12.2 \times 1 \times 3.8 / 4.8 = 9.7$ Knm

By Inspection

Provide

203 x 133 x 25 UB

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Framing to lightwell

By inspection provide 203 x 133 x 25 UB floor beams and 152 UC 23 for the column.

Underpinning to Party walls to allow extension of LG floor



Lower Ground Floor Plan

wall previously underpinned to develop adjoining property

Note trial holes will be required to determine the exact level of the existing foundations currently LG floor is 1m below Grd floor so area to be lowered a maximum of 2.5m.

Existing party wall is likely to be min of 340mm Reinforced underpin to be equal to wall thickness with heel extended to existing foundation width

Underpin to be in max 1.2m widths and link with the slab to resist lateral loading reinforcement to be

Underpin to be min 300 thick but to support full wall width with heel to reflect any spread footing. Reinforcement to be H16 at 200 ctrs vertically in each face with H12 @ 200 ctrs distribution. Base to be reinforced with H16 @ 200 ctrs as wall

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Design of new retaining wall to LG floor

Ht retained say 2500

Assumed soil parameters for back fill material

density 18 KN/m²

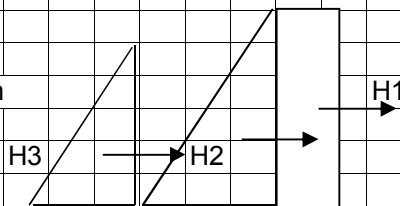
Ka = 0.38

Surcharge say 10 KN/m²

H1 10KN/m² x 0.38 x 2.5 = 9.5 KN/m

H2 soil = 18 x 0.38 x 2.5Sq/2

21.4 KN/m



H3 Water = 10KN/m² x 2.0Sq/2

20 KN/m

Total load = 62.2 KN/m

Max BM for cantilever

9.5 x 2.5/2 + 21.4 x 2.5/3 + 20 x 2/3 = 43 KNm

Ult load say 43 KN/m x 1.55 = 66.7 KNm

Try 300 thick RC wall

Cover say 50mm

d = 240

M/b*dsq*fcu = 66.7 e6 / (e3 x 240Sq x 35) = 0.033

a1 = 0.94

Ast = 66.7 e6 / (0.87 x 500 x 0.94 x 240) = 680 mm² / m

Provide H16 @ 200 ctrs (1010 mm²) in each face vertically

Distribution steel T12 @ 200 ctrs (566 mm² / m in each face)

min steel 0.13% area = 390 mm²/m

Check slenderness

Span / depth = 7

M/bdSq = 1.2

Mf = 1.8

Mf Comp = 1.1

Allowable span = 7 x 1.8 x 1.1 x 240 = 3300

OK

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General Notes

- 1) concrete section to be min 300mm thick but to match the existing wall thickness.
- 2) Concrete to achieve 35N at 28 days
- 3) Cover to reinforcement to be min 40mm each face
- 4) 100mm kicker to be provided at base and top of wall
- 5) Provide shear key between adjacent sections using 225 x 75 x 300 long shaped timber, orientated vertically, at

Dry Pack to be 1:3 cement:sand mix with non shrink additive and well

Party Wall

Main reinforcement -H16 @ 200 ctrs in each face.
 800mm lap
 Distribution reinforcement H12 @ 200 ctrs 600mm lap

Top of RC slab to be 250mm below FFL to allow for insulation, drainage layer and screed Rev A

Heel to be same width as existing foundation

Base reinforcement H16 @ 200 ctrs top and bottom in each direction, min lap 800mm

Corner bars top and bottom. L bar 1300 x 1300 - H16 @ 200 ctrs in each face

Wall and base to be built in max 1.2m widths to suit final profile

Underpinning / LG floor detail

Same detail is to be provided at rear lightwell

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Typical steelwork detail

Corner
Connection
10mm end
plate - 8mm
full profile fillet
weld.
2 x 4 M20
Grade 8.8

203 UC 60

203 x 133 x 25 UB

8mm end plate
4M20 Grade 8.8 bolts

203 UC 71 concrete encased

Bottom section to be concrete
encased, 75mm cover using
concrete that will achieve
35N/mm² at 28 days. section to be
wrapped in D49 wrapping fabric.
Encasement to be to all sections
below basement slab

NOTE: The frames are to be on existing
foundations and the new LG floor is to
encase the bottom section of the frame

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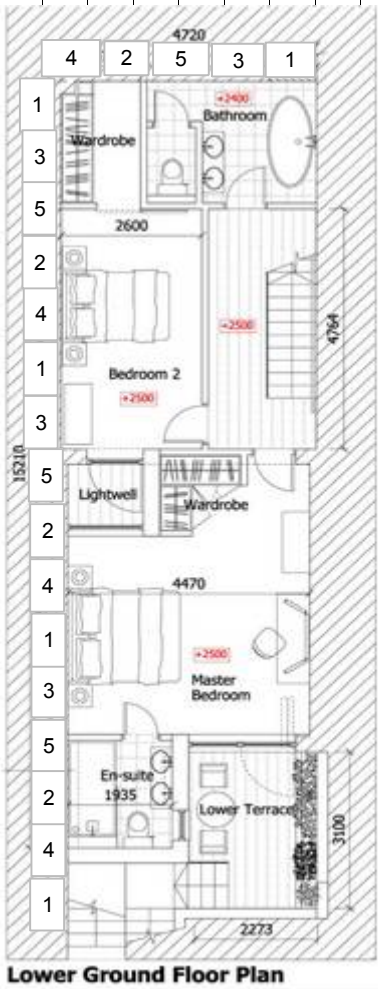
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Underpinning sequence

Rev A u/pin
sequence added



Indicative underpinning sequence
shown, pins to be constructed and
completed in sequence including drypacking

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Our ref: 15.640
20th October 2015

55 Greencroft Gardens
C/o Ms Shelley Fey
Parkfords Management
1 Regent Terrace
Rita Road
London SW8 1AW

Dear Ms Fey,

55 Greencroft Gardens, London NW6 3LL

Further to my visit to the property on the 1st of October 2015 I am writing to confirm that I have discovered no structural problems or other major issues in relation to the building structure. During my visit I was able to inspect the external walls of the property, the common hallway and staircase together with flat number 1, 3, 4, 5 and 8. There were minor areas of plaster hairline cracking at various locations but these appear to be cosmetic and of no structural significance. The front elevation indicated signs of minor easing of mortar joints, in particular over the front door, however these appear to be old and long standing in origin and did not appear to be of major structural significance.

As discussed I previously visited the property on 14th October 2014 and although I did not report formally at that time it is clear that the building was in a similar condition to currently, indicating that no deterioration has occurred over the last 12 months. I understand that the basement structure was completed in accordance with Building Control Guidelines and as far as can be ascertained no damage has occurred as a result of that work since completion.

Finally I would confirm my view that any minor damage to the property is typical of the structural conditions of many similar buildings in the immediate vicinity and therefore it is important that maintenance should continue on a regular basis to ensure that the structure remains in good condition in the future.

I trust that this information is according to your current requirements but if you have any further questions please do not hesitate to contact me. As agreed, a note of our professional fees is enclosed for your soonest attention.

Yours Sincerely,



Martin Redston.