FIRST FLOOR, UNIT 6
UNION PARK
PACKET BOAT LANE
UXBRIDGE UB8 2GH

TEL: 01895 430700
FAX: 01895 430550

MMP DESIGN

PROJECT No. 3961

224 FINCHLEY ROAD
CAMDEN
LONDON NW3 6DH

BASEMENT EXTENSION & ALTERATION

DESIGN PHILOSOPHY

Introduction to MMP Design
Evidence of Competence & Resources
The Site and Proposed Development
Existing Plans
Soil Conditions & Foundations
Site Investigation Report
Water & Potential Heave and Settlement
Effects on Adjacent Structures
Design Principles
Proposed Plans
Design Criteria
Designers Risk Assessment
Sequence of Construction

Prepared by

S. R. MASTERS
B.Sc.(Hons).,C.Eng.,M.I.Struct.E.,M.B.Eng.

INTRODUCTION TO MMP DESIGN

MMP Design Limited was formed as a private limited company in 1988 by one of the current Directors. Since then it has developed into it's present form as a firm of consulting engineers with expertise in Structural and Civil Engineering Services.

Within the Company experience has been gained in a range of projects from structural surveys through refurbishment to multi-million pound developments and the Directors have experience in residential, retail, commercial, community care and educational projects. The Company also has commitment to all types of work including Design and Construct projects.

The Company philosophy is to provide the fullest and most cost effective service to Clients. The Directors have a direct involvement with each project taking on the day to day control in order to provide the best possible service and the experience of the principals in the construction processes ensures that the objectives of buildability and cost effectiveness are met.

With regard to the Company's association with retro-fit basements, we have been working within this field since 1999 and during that time have had a direct involvement in the design of more than 550 such schemes.

MMP DESIGN DIRECTORS

Steven R. Masters - BSc(Hons).,C.Eng.,M.I.Struct.E.,M.B.Eng.
Philip Seastram - BSc(Hons).
Andrew J. Stone - BSc(Hons).,C.Eng.,M.I.C.E.,M.I.H.T.,Eur.Ing.

EVIDENCE OF COMPETENCE & RESOURCES

Details of Organisation

Name: MMP Design
Address: First Floor Unit 6
Union Park
Packet Boat Lane
Uxbridge UB8 2GH

Contact: S. R. Masters

Nature of Organisation

Consulting Civil, Structural and Highway Engineers

Incident/Accident Record

None recorded

Membership of Professional Bodies

S. R. Masters - BSc(Hons).,C.Eng.,M.I.Struct.E.,M.B.Eng.
A. J. Stone - BSc(Hons).,C.Eng.,M.I.C.E.,M.I.H.T.,Eur.Ing.

Professional Indemnity/Liability Insurance

PI is in place to cover our duties under CDM with cover limited to £1,000,000 and the liability period limited to 6 years. Details are available upon request.

Details of Persons to be Employed

S. R. Masters & A. J. Stone – Chartered Engineers & Project Leaders
P. Seastram – Project Leader & Designer
M. Kruz – Designer
N. King & E. Silva – CAD Operators

Familiarity with Construction Processes

The Directors have extensive experience in underpinning and retro-fit basement construction and have been instrumental in the development of some of the working practices adopted by the leading basement constructors.

Awareness of Relevant Health & Safety and Fire Regulations

Within the Company we have documentation relating to these matters which are regularly updated and circulated among the Directors and members of staff.

Health & Safety Practices

A copy of the Company's Health & Safety Policy is available upon request.

Management Systems

A Project Director is responsible for the design and resourcing of the project. Generally projects are undertaken in house with occasional external draughting only where necessary. Communications are by way of verbal and/or written instructions. All work is checked before leaving the office.

Resources

The Company comprises three working Directors together with full time and part time technical assistance sufficient to meet the design requirements for this project.

Technical Facilities to Support the Designer(s)

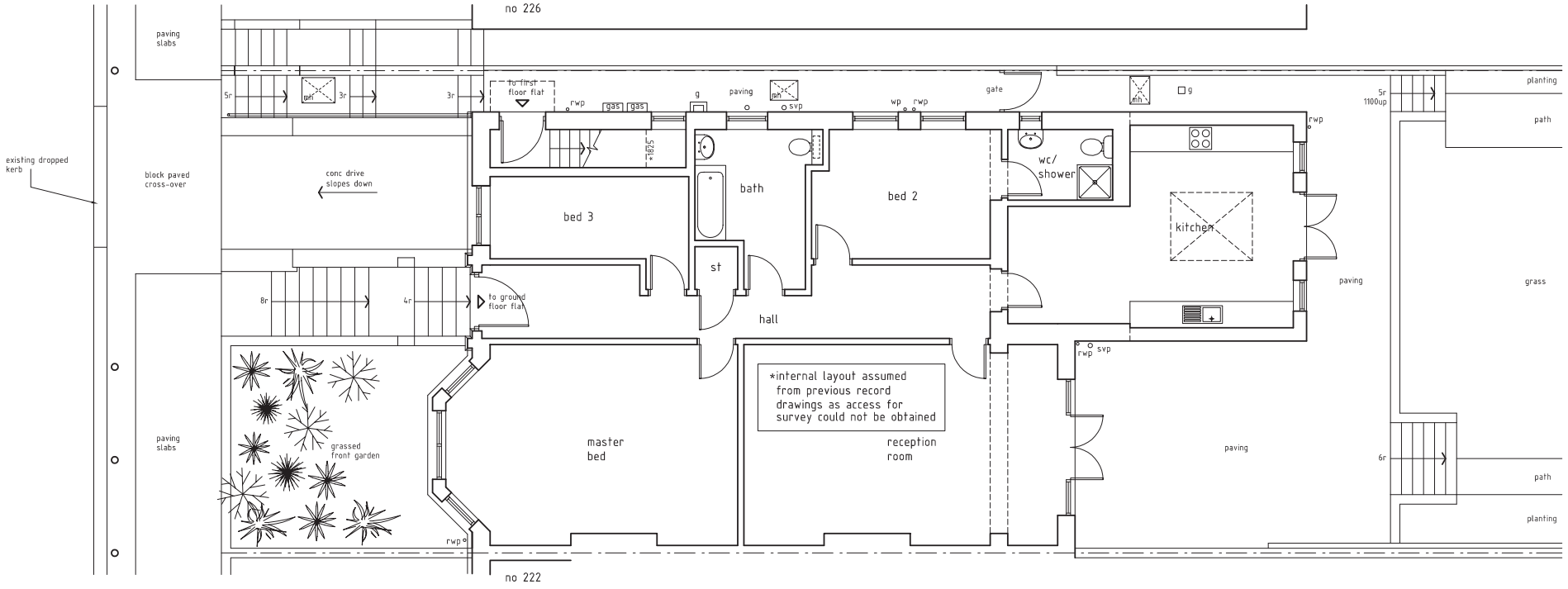
SCALE Structural Design suite
Staad/QSE Structural Analysis suite
Members of BSI
Members of TRADA
Members of BRE

Method of Communication Design Decisions

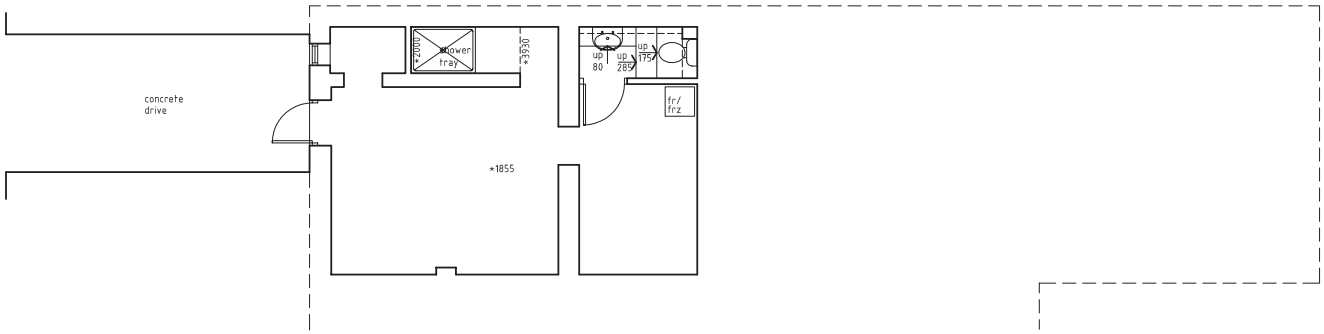
Design decisions are communicated verbally and confirmed in writing or by drawing revisions. All drawings are issued to relevant parties as required by the Lead Consultant and/or the Client.

Remaining Risks

Remaining risks will be communicated in writing to the appropriate Authority.



GROUND FLOOR PLAN (AS EXISTING)



LOWER GROUND FLOOR PLAN (AS EXISTING)

Client london basement

Job ref. LBJ 1156

Project Mr K Ayoubi
224 Finchley Road
London
NW3 6DH

Scale 1:100 @ A3

Date Sept 11

Drawing Title PREMISES AS EXISTING

Drawing No. 11/038-01

Sheet 1 of 3

the basement design studio

Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW
tel. 01628-826066 www.basementdesignstudio.co.uk

FRONT ELEVATION in true elevation
(AS EXISTING)

FRONT ELEVATION (AS EXISTING)

REAR ELEVATION (AS EXISTING)

LOCATION PLAN scale 1:1250

N

Client	london basement	Project	Mr K Ayoubi 224 Finchley Road London NW3 6DH	Scale	1:100 @ A3
Job ref.	LBJ 1156	Date	Sept 11	Drawing Title	PREMISES AS EXISTING
		Drawing No.	11/038-01		Sheet 2 of 3

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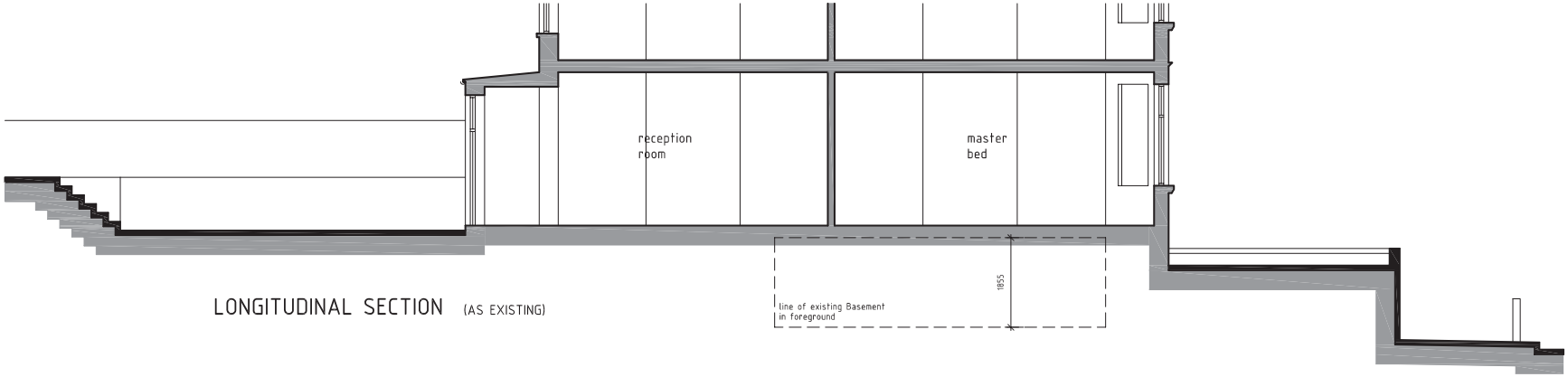
SIDE ELEVATION (AS EXISTING)



LONGITUDINAL SECTION (AS EXISTING)

CROSS SECTION (AS EXISTING)

Client london basement

Job ref. LBJ 1156

Project Mr K Ayoubi
224 Finchley Road
London
NW3 6DH

Scale 1:100 @ A3

Date Sept 11

Drawing Title PREMISES AS EXISTING

Drawing No. 11/038-01

Sheet 3 of 3

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THE SITE AND THE PROPOSED DEVELOPMENT

The property occupies a gently sloping site near the junction of the Finchley Road with Langland Gardens and shares a Party Wall with No. 222 Finchley Road.

It is proposed to extend the existing cellar to beneath the entire footprint of the property and to approximately 3.5m below the level of the existing ground floor.

EXISTING STRUCTURE

The existing structure is an early 20th century semi-detached property originally comprising three storeys beneath a flat roof, the uppermost floor enclosed by tile covered mansard walls. The external walls are of solid masonry which likely extend down to a corbelled brick and concrete footing; the internal load bearing walls are also of masonry at ground and first floor levels but change to timber studwork on the second floor.

Plans showing the existing configuration are attached.

SOIL CONDITIONS & FOUNDATIONS

A borehole formed at the site revealed the presence of approximately 0.7m of made ground overlying a stiff silty Clay to below the proposed foundation depth and with no water evident. This is consistent with similar basement schemes which have been constructed beneath other properties nearby.

In the absence of any laboratory testing of the soils, we have looked to BS.8002, BS.8004 and the Reinforced Concrete Designers Handbook (by Charles E. Reynolds and James C. Steedman) for a suggested range of parameters to be adopted for the design. For the soil profile previously described the guidance suggests an Angle of Internal Friction of 20-40˚ and an allowable Net Bearing Pressure (with no addition for depth of embedment) of 75-150 kN/m^2.

Hence the following parameters will be adopted.

ϕ = 30˚ (so Ka = 0.333) and δ = 18 kN/m^3
Allowable bearing stress at GL = 75 kN/m^2
Allowable bearing at Basement Level = 75 + soil removed, say = 125 kN/m^2

These parameters have been confirmed by previous testing regimes carried out over a period of more than 10 years and are accepted by the checking authorities of no less than 13 London Boroughs. They represent the long term condition which when combined with the design being based on active earth pressures results in a much simplified but rather conservative approach.

It should be noted that the nature of the construction of a basement ensures that the front lightwell excavation is formed first in order to gain access to the working area; in effect a substantial and full depth trial pit is formed before any foundation works are commenced. Should the conditions encountered vary in any way from those described above then the design will be re-visited before any underpinning works are commenced.

WATER

As previously described, the soil type anticipated at this site is London Clay and no significant water presence is anticipated. The Clay has a relatively low permeability to water and in essence presents an almost complete barrier but there can be some permeation albeit extremely slowly and there is also the possibility of some faster flow through fissures or localised zones of more granular material which could cause an occasional build up against the new basement wall. It is for these reasons that water will be assumed with the level being 0.75 x the retained depth or at 1m below the lowest GL, whichever is the worst condition.

HEAVE & SETTLEMENT

The underpinning process involves transferring the foundation loads to a lower level and inevitably this leads to some settlement. Some movement will also be caused by the sequential transfer of load between different parts of the structure but the careful control of the underpinning process and sequence will keep such movements to a practicable minimum. Particular care will be taken in the vicinity of the more vulnerable parts of the existing fabric.

The depth to the London Clay and the modest dimensions of the site are such that the heave of the Clay is unlikely to exceed a few millimetres or to have any discernible effect outside the site boundaries. Any movement that does occur will be further mitigated by the necessarily slow rate of the excavation and construction.

At the lower level of course, the basement floor slab will be used to resist these heave forces and by supporting the slab with the deeper underpinning and the internal column foundations, the resulting upward movement is used to counteract the increased settlements expected due to the increased dig depth.

EFFECTS ON ADJACENT STRUCTURES

Outside of the basement area the change of vertical stresses in the ground may result in limited upward movements but the underpinning of the party walls may also cause some very minor settlements and horizontal movements towards the new basement.

In addition the underpinning operations may cause localised settlements of the party walls only which might result in cracks forming at the junctions of the walls of the adjacent properties where they abut the party walls. It should be stressed however that any anticipated movements are expected to be minimal as they are generally suppressed by the stiffness of the structures above and those adjoining.

It is our experience that the potential for damage will be limited to the party walls but this can be mitigated by appointing a suitably experience Contractor familiar with propping techniques and sequential operations and by the Designer giving the necessary consideration to the risk by specifying measures to ensure that significant damage is avoided. This would typically be in the form of transitional underpins where we consider the structure above to be particularly vulnerable but otherwise by ensuring that the foundation transitions occur at inherently strong intersections of the more robust load bearing walls.

As a result we anticipate that should any damage occur it will be classified as Category 0 in the Category of Damage Chart, CIRIA C580. Category 0 is Negligible; hairline cracks of less than 0.1mm.

However, there will always be some movement as it can never be completely avoided and there are occasions where unforeseen conditions beneath the property which were not or could not be detected by the pre-construction investigations will result in more extensive damage. From our experience of designing almost 600 retro-fit basement the chance of such an occurrence is less than 2% and even then the damage would be classified as Category 1 in the Category of Damage Chart. Category 1 is Very Slight, fine cracks less than 1mm that can be easily treated during normal decoration.

A Factual Report on the

Site Investigation undertaken for

London Basement / Holbase Ltd

at

224 Finchley Road
London NW3

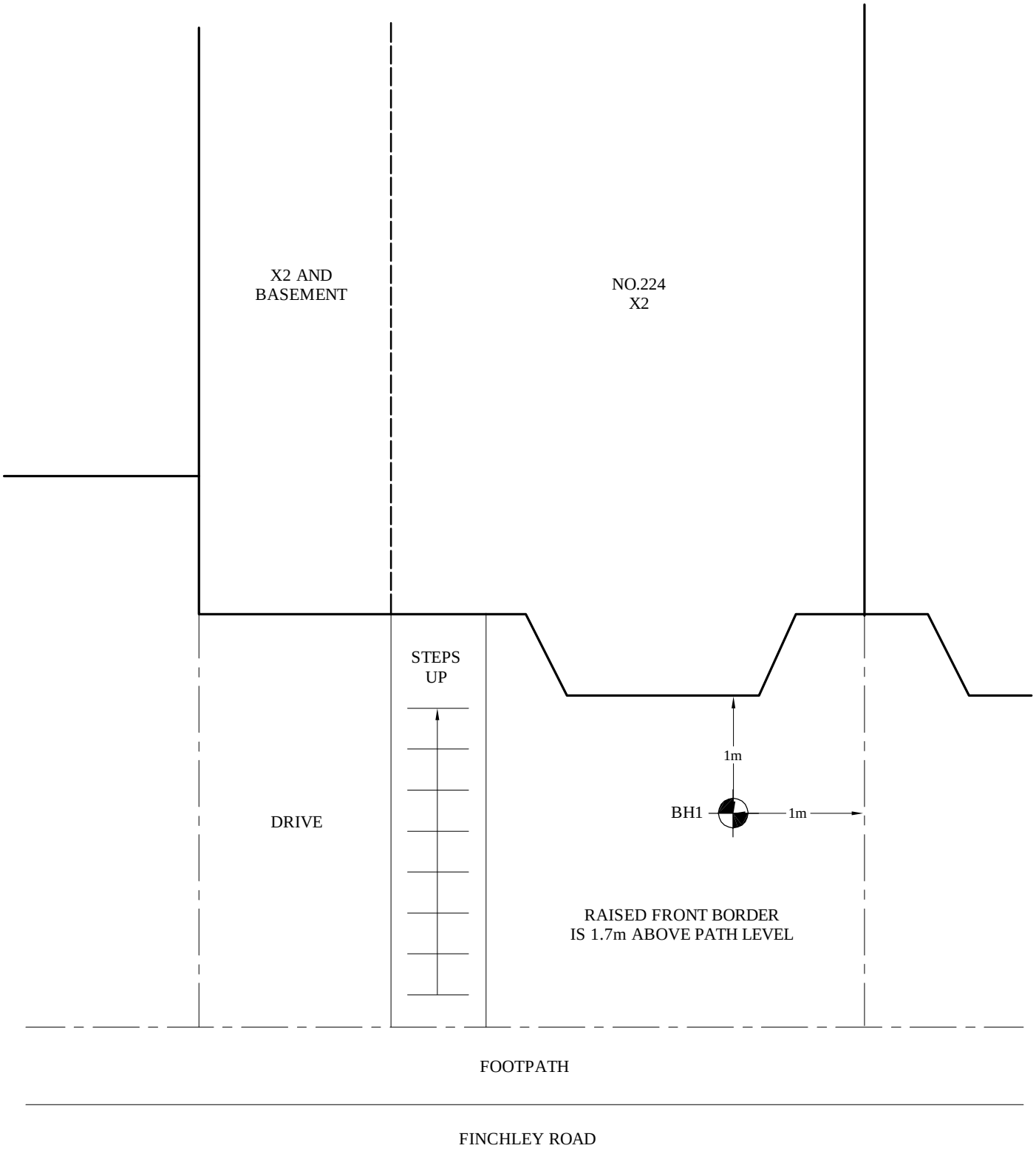
CSI Ref: 2782

Date: 2nd September 2011

Chelmer Site Investigation Laboratories Ltd. Unit 15 East Hanningfield Industrial Estate, Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933 Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Chelmer Site Investigations
Unit 15 East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933
Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Client:	London Basement/Holbase Ltd	**Scale:**	N.T.S.	**Sheet:**	1 of 1	**Date:**	2.9.11
Location:	224 Finchley Road, London NW3	**Job No:**	2782	**Weather:**	Sunny	**Drawn by: JG**	**Checked by: ME**



Notes:

On site tree identification for guidance only. Not authenticated.

Key:

Tree/Shrub | Borehole | Trial Pit | G Gully | Tree Stump | Rain Water/ Soil Pipe | MH Manhole

Chelmer Site Investigations
Unit 15 East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933
Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Client: London Basement/Holbase Ltd	**Scale:** N.T.S.	**Sheet No:** 1 of 1	**Weather:** Sunny	**Date:** 2.9.11	
Site: 224 Finchley Road, London NW3	**Job No:** 2782	**Borehole No:** 1	**Boring method:** Hand auger		

Depth Mtrs.	Description of Strata	Thick-ness	Legend	Sample	Test Type	Test Result	Root Information	Depth to Water	Depth Mtrs
G.L.									
0.15	SHINGLE OVER TOPSOIL	0.15							
	MADE GROUND: medium compact dark brown very silty clay with gravel and brick pieces and fragments.	0.65		D			Hair and fibrous roots to 1.3m.		0.5
0.8									
	Stiff mid brown/orange grey veined silty CLAY with partings of orange/brown silt and fine sand and crystals.	0.5		D	V	128 136			1.0
1.3							No roots observed below 1.3m.		
				D	V	140+ 140+			1.5
	Very stiff fragmented as above.	1.9		D	V	140+ 140+			2.0
				D	V	140+ 140+			2.5
				D	V	140+ 140+			3.0
3.2									
				D	V	140+ 140+			3.5
				D	V	140+ 140+			4.0
	Very stiff mid brown grey veined silty CLAY with partings of brown and orange silt and fine sand and crystals.	2.8		D	V	140+ 140+			4.5
				D	V	140+ 140+			5.0
				D	V	140+ 140+			5.5
				D	V	140+ 140+			6.0
6.0	Borehole ends at 6.0m								

Drawn by: JG **Approved by:** ME

Remarks: Borehole dry and open on completion.

Key: T.D.T.D. Too Dense to Drive
D Small Disturbed Sample J Jar Sample
B Bulk Disturbed Sample V Pilcon Van (kPa)
U Undisturbed Sample (U100) M Mackintosh Probe
W Water Sample N Standard Penetration Test Blow Count

Chelmer Site Investigations,
Unit 15, East Hanningfield Industrial Estate, Old Church Road,
East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933
Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

REPORT NOTES

Equipment Used

Hand tools, Mechanical Concrete Breaker and Spade, Hand Augers, 100mm/150mm diameter Mechanical Flight Auger Rig, GEO205 Flight Auger Rig, Window Sampling Rig, and Large or Limited Access Shell & Auger Rig upon request and/or access permitting.

On Site Tests

By Pilcon Shear-Vane Tester (Kn/m^2) in clay soils, and/or Mackintosh Probe in granular soils or made ground and/or upon request Continuous Dynamic Probe Testing and Standard Penetration Testing.

Note:

Details reported in trial-pits and boreholes relate to positions investigated only as instructed by the client or engineer on the date shown.

We are therefore unable to accept any responsibility for changes in soil conditions not investigated i.e. variations due to climate, season, vegetation and varying ground water levels.

Full terms and conditions are available upon request.

DESIGN PRINCIPLES

Ground Floor Structure

Where the existing internal below ground floor level load bearing structure is to be removed, replacement will be by the use of steel and/or timber beams supported by the existing load bearing walls or new load bearing brick piers and/or steel posts.

To ensure the continued stability of the structure without reliance from the adjoining properties, the existing and any new load bearing basement walls are strapped to the structural ground floor deck using 30mm x 5mm galvanised mild steel straps placed at 2m centres.

New beams are not considered 'restrained' unless there is a mechanical connection to the top flange (or within 75mm of it). Hence timber floor joists do not restrain the compression flange unless they are notched into the web or nailed/screwed to a timber flange plate.

In order to restrict any possible damage to the existing structure, the deflection in the new beams is restricted to 1/360th of the overall span, under the total characteristic load condition.

Timber

The exact structural layout of any existing ground floor joists is often unknown although sometimes the general direction of the span of the joists is. There will almost certainly be a foundation under each load bearing and/or masonry ground floor level wall; it also likely that there are numerous sleeper walls supporting nominal floor joists and experience would suggest that these are likely to be only 50mm x 100mm joists spaced at little more than 400mm centres. The spacing of the sleeper walls is also likely to be little more than 2.0m.

The new ground floor support structure will therefore need to replicate this arrangement. However, since the exact location of the sleeper walls is unknown, the main beam layout will be created first with a beam provided under each load bearing and/or masonry wall. It will then be necessary to provide additional beams to replace each sleeper wall. Hence sleeper wall beams will be designed to span up to various lengths and support at least 2.0m width of floor and ceiling. All main beams will then be designed assuming the worst ground floor loading case.

For DL of (2 x 0.6)+0.5 = 1.70 kN/m and IL of (2 x 1.5) = 3.00 kN/m,

Provide 152x152 UC.23 for spans up to 4.5m,
152x152 UC.30 for spans up to 5.0m,

Concrete

The exact structural detail of any existing concrete ground bearing ground floor is also unknown although the thickness has been assumed as 200mm (plus 50mm finishes) and the non load bearing masonry walls will likely have been built off the slab.

In such cases it will necessary to provide beams to support the slab; these will be spaced at approximately 600mm centres hence several floor support beams will be designed to span up to various lengths and support at least 0.6m width of floor and new ceiling. All main beams will then be designed assuming the worst ground floor loading case.

For DL of (0.60 x 6.00)+0.50 = 4.10 and IL of (0.60 x 1.50) = 0.90 kN/m,

Provide 152x152 UC.23 for spans up to 4.0m
152x152 UC.30 for spans up to 4.5m

Basement

The remaining load bearing structure will be underpinned in a traditional 'hit and miss' method to achieve the increased headroom required. The underpins comprise a vertical stem which is immediately beneath the existing wall and a base which usually has a toe and a nominal heel. The heel size is determined by ignoring the earth pressure and considering the maximum vertical load on the wall only, using this to find a minimum foundation width based on the soil bearing capacity.

The toe of the base is then determined by considering the minimum vertical dead load on the wall along with the maximum pressure from the retained soil and with the wall assumed to be acting as a cantilever. In calculating the toe size, the maximum allowable bearing pressure is not exceeded and a minimum factor of safety against overturning of 2.5 is achieved.

The toe and/or stem will only be reinforced when the underpin stem is subjected to tensile stresses due to the pressures from the retained material. This usually only occurs where the London Clays are present or where the retained depth of soil is large.

To check the stresses in the underpin stem, the overturning moment taken about the basement slab is used. However, the design of the toe and the overall stability is based on the overturning moment taken about the underside of the underpin base.

We assume the soil/stem interface to be friction free as ultimately this provides the most onerous design.

Lightwell

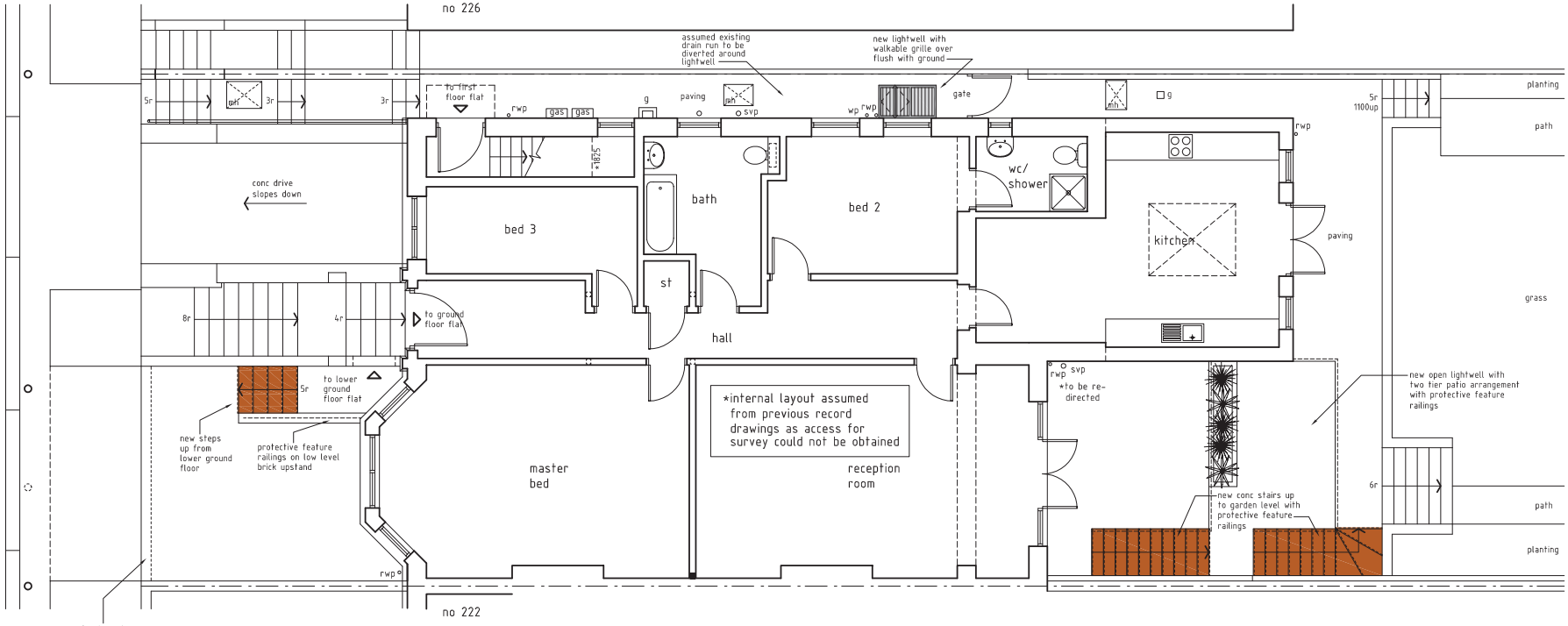
These are invariably formed within the front garden of the property and are therefore adjacent to the public highway. Consequently surcharge loads are considered and are taken as either of the following, whichever produces the more onerous design conditions.

a... a uniformly distributed load of 2.5 kN/m^2, applied from within the garden and assuming private vehicle parking is possible,

b... a uniformly distributed load of 10 kN/m^2, applied from the highway and/or footpath,

c... a point load of 40 kN (a typical wheel load), applied over an area 0.3m x 0.3m and assumed to act at a point 0.6m from the property boundary, out toward the highway.

The lightwell walls comprise a vertical stem and a base with a toe and occasionally a heel. The stem utilises concrete blockwork only as a permanent shutter but in doing this it naturally provides additional resistance to the compressive forces generated. Nevertheless, the reinforced concrete wall behind provides all of the necessary resistance to the applied overturning forces and is cast against the soil. The size of the base toe is determined by considering only the self-weight of the wall along with the maximum pressure from the retained soil and any surcharge. In calculating the toe size, the maximum allowable bearing pressure is not exceeded and a minimum factor of safety against overturning of 1.5 is achieved. Since the base is usually cast up against the front wall of the basement, the design of the toe and the overall stability is based on the overturning moment taken about the top of the wall base.



GROUND FLOOR PLAN (AS PROPOSED)

NOTES:

This drawing is intended as a scheme proposal and serves as a guide to clients to indicate possible room configurations.

Clients should be aware that these scheme proposals may indicate works that may not have been allowed for in the initial estimate such as additional excavation, enlarged or additional lightwells and/or the removal of chimneys.

This drawing has been based on a dimensional survey without the benefit of trial holes or other exploratory works.

As a consequence this drawing does not necessarily take account of perimeter wall thicknesses and/or foundation projections. Room sizes are therefore approximate and scaled dimensions should not be relied upon.

We cannot guarantee that all additional space indicated can be created in areas where access was not available.

Clients are advised that additional supports, piers, posts or buttresses may be required in the final structural design.

REV. A CLIENT AMENDMENTS 30-09-11

Client london basement

Job ref. LBJ 1156

Project Mr K Ayoubi
224 Finchley Road
London
NW3 6DH

Scale 1:100 @ A3

Date Sept 11

Drawing Title SCHEME DESIGNS

Drawing No. 11/038-02A

Sheet 1 of 4

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tel. 01628-826066 www.basementdesignstudio.co.uk

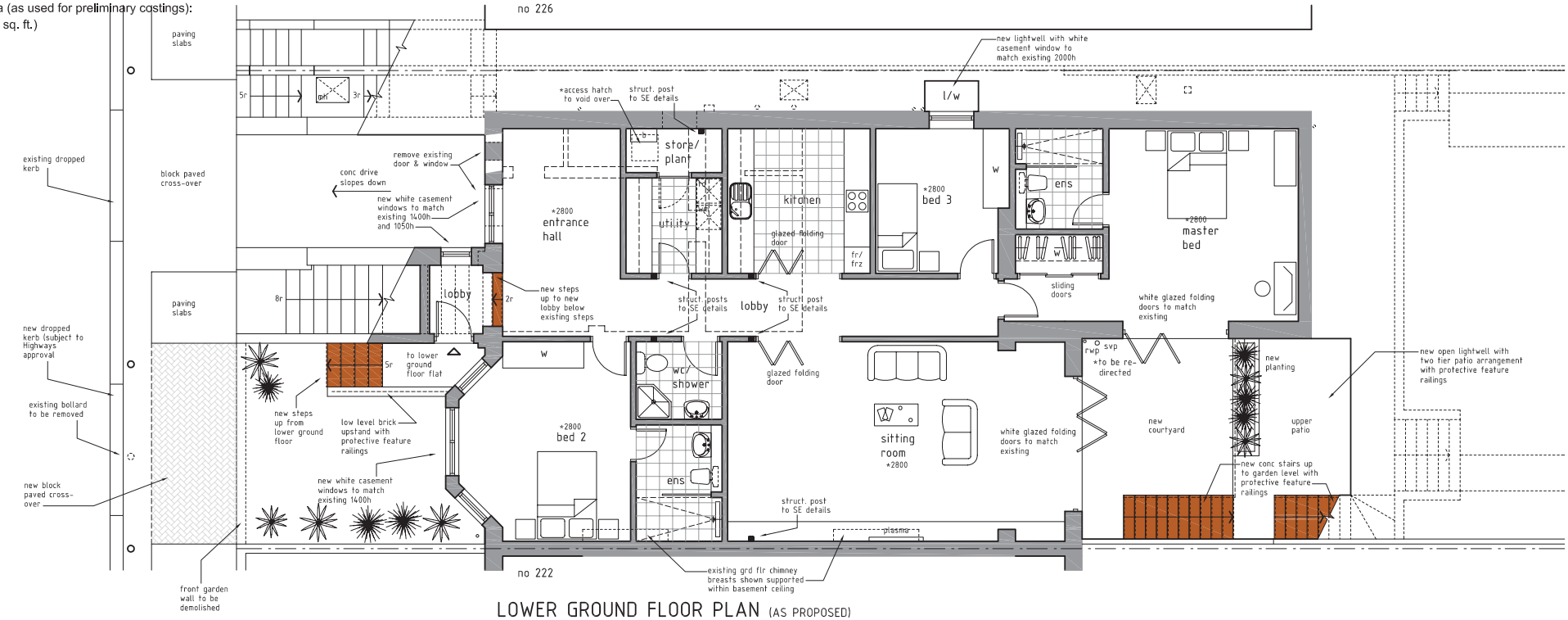
SCHEDULE OF AREAS:

(gross internal)

Existing Lower Ground (as drawn):
*32m2 (344 sq. ft.)

Proposed Basement (as drawn):
*148m2 (1593 sq. ft.)

Proposed Area (as used for preliminary costings):
*133m2 (1432 sq. ft.)



LOWER GROUND FLOOR PLAN (AS PROPOSED)

REV. A CLIENT AMENDMENTS 30-09-11

Client london basement

Job ref. LBJ 1156

Project Mr K Ayoubi
224 Finchley Road
London
NW3 6DH

Scale 1:100 @ A3

Date Sept 11

Drawing Title SCHEME DESIGNS

Drawing No. 11/038-02A

Sheet 2 of 4

the basement design studio

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FRONT ELEVATION in true elevation
(AS PROPOSED)

FRONT ELEVATION (AS PROPOSED)

REAR ELEVATION (AS PROPOSED)

CROSS SECTION (AS PROPOSED)

REV. A CLIENT AMENDMENTS 30-09-11

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Drawing Title SCHEME DESIGNS

Drawing No. 11/038-02A

Sheet 3 of 4

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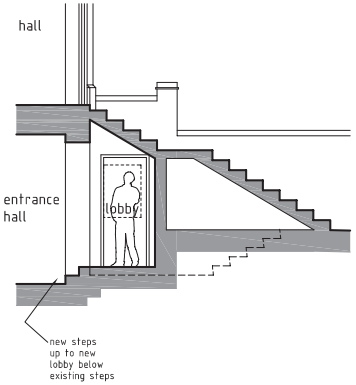
SIDE ELEVATION (AS PROPOSED)

LONGITUDINAL SECTION (AS PROPOSED)



FRONT STEPS SECTION
(AS PROPOSED)

REV. A CLIENT AMENDMENTS 30-09-11

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Scale 1:100 @ A3

Date Sept 11

Drawing Title SCHEME DESIGNS

Drawing No. 11/038-02A

Sheet 4 of 4

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DESIGN CRITERIA

Existing Brickwork

Assuming 7N bricks in lime mortar, from CP.111 the basic compressive strength = 0.49 N/mm^2
Hence under a concentrated load, bearing strength = 1.5 x 0.49, say 0.7 N/mm^2

Typical Underpinning Sequence

6	1	4	7	2	5	8	3	6	1	4	7

General

Concrete is grade C35 N/mm^2 using Sulphate Resisting cement unless otherwise directed.
Reinforcement is grade 500 N/mm^2
Mortar is Class (iii).

DESIGNERS RISK ASSESSMENT

Excavations

Care must be taken to prevent sides of excavations from collapsing.

Suspended Floors

The use of suspended insitu reinforced concrete ground slabs is expensive and impractical due to the extent of formwork required and the thickness of slab required.

Precast beam and block floors provide reduced weight and quick installation with holes and cutting for designed services carried out on site at the time of installation. However, during installation, and indeed before the floor is screeded, safety netting or air bags shall be provided to prevent injury due to operatives falling between the joists.

In-situ concrete slabs cast onto a profiled steel permanent shuttering provides a suitable alternative to the beam and block and removes the need for the netting or air bags. However, the manufacturer should always be consulted about temporary span propping that may be required prior to the concrete achieving it's design strength.

Masonry Walls

A 150mm minimum thickness is required for design load resistance and height to thickness ratios. However the blocks tend to be too heavy to manhandle and so load bearing blockwork walls will be specified as 215mm thick and formed from 100mm thick blocks laid on their side.

Steel Beams

Where possible, large span beams will be spliced to minimise manhandling. Other ways of minimising the weight of steel sections is to specify two channels bolted back to back in lieu of a single UB or UC section. However, there will be occasions where neither option will be practical and/or possible and the Contractor will be made aware of such situations.

Hazards & Risks Which Cannot be Designed Out

Potential Hazards	Action Required	Risk Assessment
Falls from Height	Works being carried out - provide hand rails and access scaffolding to all openings.	Medium
Falling Debris	Works carried out above public access - provide toe boards, netting and protection fans.	High
Materials Storage	Existing roofs and floors are not to be used for storage of materials without reference to the Engineer or for supporting access scaffolding.	High

Potential Hazards	Action Required	Risk Assessment
Lifting of Steelwork	Steel sections to be lifted using mechanical means where unable to be manually lifted.	High
Erection of Steelwork	Contractor responsible for providing method statement for erection procedure, including any temporary bracing.	Medium
Lifting of Timber	Timber rafters and joists to be lifted using mechanical means where unable to be manually lifted.	High
Fixing of Timber	Timbers to be fixed in accordance with good building practice.	Medium
Reinstate Existing Roof Finishes	Method statement to allow for temporary waterproofing if required.	Low
Use of Cutting Equipment – Flame or Disc.	Fire risk - use suitable protective methods – remove inflammable materials.	High
Painting	Touch up steelwork with primer – take precautions against vapour inhalation, eye and skin contact and fire. Wear protective clothing.	Low
Excavation	Take precaution against collapse of excavation and hazards of persons falling in.	High
Precast Concrete units	Lift into position using mechanical assistance. Storage at ground level in a safe manner.	Medium
Insitu Concrete Construction	Take precautions to prevent skin/eye contact. Protect public and site staff from falling objects and spillage. Ensure adequate care when fixing reinforcement.	Medium

Potential Hazards	Action Required	Risk Assessment
Formwork/Falsework	Design temporary works in a manner that makes allowances for all loadings, including accidental loads. Ensure adequate vertical and diagonal bracing. Supports not to be removed until period specified.	Medium
Forming new Openings in Walls	Provide temporary works to support wall and loads above opening. Install new support lintel and reinstate prior to removal of temporary supports.	Medium

SEQUENCE OF CONSTRUCTION

- The underpinning operations are to be carried out strictly in accordance with the sequence shown on the drawings.
- All concrete to be C35N/mm^2 @ 28 days.
- Each pin must not exceed 1000mm in length.
- A minimum of 24 hours must elapse after completion of dry-packing to one bay and the excavation of the next.
- At least the full width of the existing foundation must be replicated lower down and onto an acceptable bearing strata.
- Excavations are to be kept free of water and the sides of excavations are to be supported as necessary.
- Underpinning in each section should commence as soon as possible after an agreed formation depth has been achieved.
- Building Control will be given 24 hours notice to inspect and approve the required formation level and suitable bearing strata of the first pin. Any variations in the nature of the sub-strata will be notified immediately.
- The soffit of the exposed foundations is to be cleaned off prior to concreting.
- As indicated on the attached drawing the concrete is to be poured to a level approximately 75mm below the existing footings and allowed to cure for a minimum period of 24 hours. The void is then to be filled using a semi-dry cement and sand mix (in a 1:1 proportion) and rammed home to ensure a uniform transfer of load.
- As underpinning work is carried out against already completed bays, the concrete surface of the adjacent section should be hacked off and keyed to form a good key prior to the new concrete being cast. Starter bars will be drilled and inserted.
- Any supports to the excavations are to be removed progressively as concrete operations proceed so that no voids exist.
- All workmanship and materials must be approved by the BCO.