CampbellReith
consulting engineers

294 – 295 High Holborn, London WC1V 7JG

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-92

Revision: F1

October 2017

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Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	August 2017	Comment	GKemb12466-92-030817-J294-295 High Holborn-D1.docx	GK	CC	RM
F1	October 2017	Planning	GKemb12466-92-060917-294-295 High Holborn-F1.docx	GK	CC	RM

Document Details

Last saved	23/10/2017 15:32
Path	GKemb12466-92-060917-294-295 High Holborn-F1.docx
Author	G Kite, BSc MSc DIC FGS
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Project Number	12466-92
Project Name	294 – 295 High Holborn
Planning Reference	2017/1827/P

Contents

Appendix

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 submitted as part of the Planning Submission documentation for 294 – 295 High Holborn, London WC1V 7JG (planning reference 2017/1827/P). The basement is considered to fall within Category C 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 basement 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 reviewed it against an agreed audit check list.

1.4. The BIA has been prepared by LBH Wembley Engineering (LBH), with supporting documents by Geotechnical and Environmental Associates (GEA), Card Geotechnics Ltd (CGL) and Michael Barclay Partnership (MBP). The qualifications of the authors are in accordance with LBC Guidance.

1.5. The proposed development comprises the construction of a nine-storey mixed commercial and residential building with a single level basement. The previous building on site has been demolished to basement slab level and temporary propping of retaining walls and adjacent structures has been left in place. The new development requires a slight deepening of the basement, <1m, and underpinning of adjacent structures' foundations, plus the installation of bearing piles.

1.6. The BIA includes the majority of the information required from a desk study in line with the LBC guidance. In the revised submissions, an outline construction programme is presented.

1.7. A site investigation was undertaken by GEA in 2007. Additional trial pits excavated in 2017 are referred to and, in the revised submissions, trial pit logs have been provided for review. The ground conditions comprise Made Ground over the Lynch Hill Gravel and London Clay.

1.8. Groundwater was encountered during drilling and, from limited subsequent monitoring in 2007, a design ground water level within the Lynch Hill Gravel slightly below proposed basement slab level has been adopted. Groundwater is likely to be encountered during underpinning works. It is recommended that the Contractor and Engineer satisfy themselves of current groundwater levels prior to undertaking works, to inform temporary and permanent works design.

1.9. Geotechnical interpretation, including retaining wall design parameters, are included within the CGL report.

1.10. The new basement construction is to comprise reinforced concrete retaining walls bearing on a piled raft foundation. A combination of mass concrete and reinforced concrete underpinning will be undertaken below adjacent foundations. An internal cavity drainage system will be employed. Temporary works are described and presented within the MBP report and drawings. Retaining wall calculations have been provided.

1.11. The BIA states that groundwater control will be required in order to construct the basement, which may include permeation grouting to stabilise soils and reduce groundwater inflows. It is recommended that the permeation grouting works specifically are subject to an appropriate review of design and implementation methodology via a Basement Construction Plan (BCP).

1.12. A ground movement assessment (GMA) and damage impact assessment by CGL has been presented. Adjacent structures have been considered and it is stated that damage impacts will be limited to a maximum of Category 1 (Very Slight). This is accepted as achievable, considering the limited depth of underpinning and the temporary works and propping scheme to be adopted.

1.13. An outline methodology and guidance for monitoring structural movements and limiting damage impacts has been provided by MBP. Generally, the scheme is accepted, and in the revised submissions the trigger values have been updated to be consistent with the assessment and recommendations of the CGL report.

1.14. It is accepted that there are no risks or impacts to slope stability.

1.15. It is accepted that there should be no impact to the wider hydrogeological environment.

1.16. It is accepted that there will be no increase in impermeable site area. The drainage strategy does not include any proposals for attenuation, with direct off-site connections to combined sewers proposed. There should be no impact to the wider hydrological environment

1.17. The site is located within the Critical Drainage Area Group 3-005 but is not located within a Local Flood Risk Zone. Whilst the site itself is identified as being at very low risk of flooding, the immediately adjacent land to the south and south east is identified in the MBP report as having a low risk of surface water flooding. The revised submissions confirm that the development site level will be raised compared to the adjacent areas at risk of flooding.

1.18. Queries and matters requiring further information or clarification are summarised in Appendix 2. Considering the revised submissions, the BIA meets the criteria of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 27 July 2017 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 294 – 295 High Holborn, London WC1V 7JG, Camden Reference 2017/1827/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.
- The Local Plan (A5 Basements) 2017.

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 instruction describes the proposal as: "Erection of a 9 storey building comprising retail use (Classes A1-A3) at basement and ground floor levels, office use (Class B1) at first and second floor levels and 10 residential units (2 x -bed and 8 x 2-bed) (use class C3) above including plant and associated works."

LBC's instruction also confirmed the site is not adjacent to any listed properties.

2.6. CampbellReith accessed LBC's Planning Portal on 5th August 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (ref LBH4455bia) Ver 1.0 by LBH Wembley Engineering dated May 2017.
- Structural Engineer's Report for Planning (ref 6940) Revision 2 by Michael Barclay Partnership LLP dared 28 March 2017, including Structural Drawings, Calculations and Movement Monitoring Drawings.
- Ground Movement Report (ref CGL/09162) Revision 1 by Card Geotechnics Limited dated 28 March 2017.
- Desk Study and Ground Investigation Report (ref J07148) Issue 2 dated 22 August 2007 by Geotechnical & Environmental Associates.
- Construction Management Plan dated March 2017 by DP9 Ltd.
- Correspondence with London Underground Infrastructure Protection, 2017.
- Correspondence with Cushman & Wakefield, June 2017.
- Comments and objections to the proposed development.

2.7. The following documents were provided to CampbellReith between August and October 2017 for audit purposes:

- Email to LBC dated 22 August 2017 from DP9 Ltd.
- Outline Programme for Planning by Beadmans.
- Trial Pit Records.
- Movement Monitoring Strategy Drawings.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	The qualifications of the authors of the BIA are in accordance with CPG4 guidelines.
Is data required by Cl.233 of the GSD presented?	Yes	Updated in revised submissions.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
Are suitable plans/maps included?	Yes	
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	
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	However, noted that MBP report 2017 indicates a low risk of surface flooding immediately adjacent to the site, and potential for groundwater flooding.
Is a conceptual model presented?	Yes	The CM indicates the proposed development in the context if the existing site conditions and adjacent structures.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	However, its noted that design groundwater levels are based on 2no readings from 2007. In advance of the works it is recommended the Contractor / Engineer satisfy themselves of current groundwater levels to appropriately inform final designs.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	There is a slight reduction in impermeable site area. Drainage is proposed directly to combined sewers without attenuation.
Is factual ground investigation data provided?	Yes	GEA report, 2007, summarised in CGL report, 2017.
Is monitoring data presented?	Yes	Referred to in all reports; summarised in GEA report 2007. Water level reported as confirmed in 2017 Trial pits.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Adjacent foundation / basement levels established by SI.
Is a geotechnical interpretation presented?	Yes	GEA report, 2007; summarised in CGL report, 2017.
Does the geotechnical interpretation include information on retaining wall design?	Yes	CGL report, 2017.
Are reports on other investigations required by screening and scoping presented?	Yes	SI, GMA
Are baseline conditions described, based on the GSD?	Yes	

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	LBH report, 2017; CGL report, 2017.
Are estimates of ground movement and structural impact presented?	Yes	CGL report, 2017.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Updated in revised submissions.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Updated in revised submissions.
Has the need for monitoring during construction been considered?	Yes	Trigger levels updated in revised submissions.
Have the residual (after mitigation) impacts been clearly identified?	N/A	No residual impacts identified.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Monitoring strategy trigger updated in revised submissions.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	However, monitoring strategy trigger levels to be amended considering building specific movement limits as per CGK report, 2017.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	CGL report, 2017. Movement restrictions to maintain a maximum of Category 1 damage are considered achievable.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	Yes	Not explicitly stated as non-technical, but summaries / conclusions to CGL, LBH and MBP reports provided and considered appropriate.

4.0 DISCUSSION

4.1. The BIA has been prepared by LBH Wembley Engineering (LBH), with supporting documents by Geotechnical and Environmental Associates (GEA), Card Geotechnics Ltd (CGL) and Michael Barclay Partnership (MBP). The qualifications of the authors are in accordance with LBC Guidance.

4.2. The proposed development comprises the construction of a nine-storey mixed commercial and residential building with a single level basement. The previous building on site has been demolished to basement slab level and temporary propping of retaining walls and adjacent structures has been left in place. The new development requires a slight deepening of the basement, <1m, and underpinning of adjacent structures' foundations, plus the installation of bearing piles. Immediately to the front of the development is the highway (High Holborn) and, to the rear, is Lincolns Inn Fields.

4.3. The BIA includes the majority of the information required from a desk study in line with the GSD Appendix G1. Site history, geological information and a conceptual site model are presented. The MBP report confirms that there are no sensitive utilities within the zone of influence of the development. It has been identified that London Underground (LUL) tunnels run below High Holborn. Correspondence from LUL confirms that the development should proceed only once LUL have been presented with detailed design information and have assessed impacts to their assets as acceptable.

4.4. It has been identified that Royal Mail tunnels run below High Holborn. Correspondence with Cushman and Wakefield confirms there will be no impacts to the tunnels from the proposed development.

4.5. An outline Construction Management Plan is presented. In the revised submissions, an outline construction programme is presented.

4.6. A site investigation was undertaken by GEA in 2007, comprising boreholes and trial pits to identify foundation depths to adjacent buildings and retaining walls. The ground conditions comprise Made Ground over the Lynch Hill Gravel and London Clay. Foundation depths have been adopted in the temporary works design and ground movement assessment (GMA).

4.7. Additional trial pits excavated in 2017 are referred to in the BIA. Trial pit logs are presented in the revised submissions.

4.8. Groundwater was encountered during the 2007 investigation and, from limited subsequent monitoring in 2007, a design ground water level within the Lynch Hill Gravel slightly below proposed basement slab level has been adopted.

4.9. Notwithstanding 4.8, as the design groundwater level is based on observations from 2007, it is recommended that the Contractor and Engineer satisfy themselves of current groundwater levels prior to undertaking works, to inform temporary and permanent works design. The revised submissions confirm that groundwater level will be confirmed prior to construction.

4.10. The BIA states that there would be no impact or cumulative impact to the wider hydrogeological environment, as the basement level would be above the design groundwater level, the piles allow groundwater flow around them, and the surrounding buildings' basements are higher and do not obstruct groundwater flow. This is accepted, noting that the permanent structure will need to adopt the drained cavity proposed to deal with any surface water percolation / infiltration and fluctuations in groundwater level, if applicable.

4.11. Geotechnical interpretation including retaining wall design parameters, broadly in accordance with LBC guidance, is included within the CGL report. The interpretation is considered appropriate.

4.12. The new basement construction is to comprise reinforced concrete retaining walls bearing on a piled raft foundation. Retaining wall calculations are provided. A combination of mass concrete and reinforced concrete underpinning will be constructed below adjacent foundations. The site investigation has identified the depth of foundation along each boundary of the site, and typically underpin depth are in the range <1m to 1.5m, to bear on the dense Lynch Hill Gravel. At the southern boundary, underpinning of the retaining wall foundations will be in the order of 2m depth. There are no adjacent buildings along this boundary, with Lincolns Inns Fields adjoining.

4.13. Temporary works are described and presented within the MBP report and drawings. Multi-level temporary propping to thrust blocks are proposed at each stage of the works until the permanent structure is completed. A sequence of works is presented. Groundwater is likely to be encountered during underpinning works. The BIA states that groundwater control will be required in order to construct the basement, which may include permeation grouting to stabilise soils and reduce groundwater inflows. It is recommended that the permeation grouting works specifically are subject to an appropriate review of design and implementation methodology via a BCP.

4.14. The BIA notes that care must be taken to prevent the destabilisation and ground movements from these groundwater control activities. It is considered that no further assessment of these proposals is required within the BIA, providing that the proposed structural monitoring (see 4.17) has been adopted in advance of the works, which would control these elements of construction as required.

4.15. A GMA and damage impact assessment by CGL has been presented. In general terms, CGL have stated that the works proposed should generate very small ground movements and very limited impacts. They have then undertaken a site specific heave assessment, based on the proposed sequence of works, and assessments broadly in accordance with CIRIA C580 to predict vertical and horizontal movements, considering that the effects of underpinning are not specifically addressed by the guidance.

4.16. The predicted movements are in line with expectations for the limited depth of underpinning and basement excavation proposed, assuming groundwater has been controlled and the works are stiffly propped as proposed. The BIA states that damage impacts will be limited to a maximum of Category 1 (Very Slight). The CGL report presents maximum horizontal movements that the neighbouring structures can be subjected to in order to maintain damage impacts to Category 1, of between approximately 5mm and 7mm. This is accepted as achievable.

4.17. An outline methodology and guidance for monitoring structural movements and limiting damage impacts has been provided by MBP, stated in their Structural Engineering Report with accompanying drawings indicating the layout of monitoring points. In the revised submissions, the trigger values to be adopted have been updated to reflect the movement sensitivities indicated in the CGL report. Amber triggers are at 4mm and red triggers are 7mm.

4.18. It is accepted that there are no risks or impacts to slope stability. Temporary batter slopes will be formed during construction, but will not be present in the permanent case.

4.19. It is accepted that there will be no increase in impermeable site area, from the current situation. The drainage strategy does not include any proposals for attenuation, with direct off-site connections to combined sewers proposed.

4.20. The site is located within the Critical Drainage Area Group 3-005 but is not located within a Local Flood Risk Zone. Whilst the site itself is identified as being at very low risk of flooding, the immediately adjacent land to the south and south east is identified in the MBP report as having a low risk of surface water flooding. The revised submissions confirm that the development site level will be raised compared to the adjacent areas at risk of flooding.

5.0 CONCLUSIONS

5.1. The qualifications of the authors are in accordance with CPG4 guidelines.

5.2. The proposed development comprises the construction of a nine-storey mixed commercial and residential building with a single level basement.

5.3. A BIA in accordance with the relevant guidance has been prepared.

5.4. A site investigation has confirmed the underlying ground conditions to comprise Made Ground over the Lynch Hill Gravel and London Clay.

5.5. A design ground water level within the Lynch Hill Gravel slightly below proposed basement slab level has been adopted. It is recommended that the Contractor and Engineer satisfy themselves of current groundwater levels prior to undertaking works, to inform temporary and permanent works design.

5.6. Geotechnical interpretation, including retaining wall design parameters, is presented. Outline temporary and permanent works are described and structural calculations have been provided.

5.7. It is recommended that the permeation grouting works specifically are subject to an appropriate review of design and implementation methodology via a Basement Construction Plan (BCP).

5.8. A GMA and damage impact assessment has been presented. Damage impacts to neighbours will be limited to a maximum of Category 1 (Very Slight). This is accepted as achievable.

5.9. An outline strategy for monitoring structural movements has been provided in the revised submission which is considered appropriate.

5.10. It is accepted that there should be no impacts to slope stability, or the wider hydrogeological and hydrological environments.

5.11. The site is identified as being at very low risk of flooding. The revised submissions confirm threshold levels will be suitably elevated compared to adjacent areas at risk of flooding.

5.12. Queries and matters requiring further information or clarification are summarised in Appendix 2. Considering the revised submissions, the requirements of CPG4 have been met.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Groundwater	The Contractor / Engineer should satisfy themselves of current groundwater levels in advance of construction	Note only. Outline assessment considered appropriate.	N/A
2	BIA	Outline construction programme.	Closed	October 2017
3	Land Stability	Monitoring strategy – trigger values to be amended (text /drawings) to reflect building specific limiting movements required to maintain Category 1 damage (as per CGL report, 2017).	Closed	October 2017
4	Hydrology	Low risk of surface water flooding identified in MBP report.	Closed	August 2017
5	Land Stability	Correspondence from LUL confirms that the development should proceed only once LUL have been presented with detailed design information and have assessed impacts to their assets as acceptable	Note only.	N/A
6	Land Stability	Permeation Grouting	It is recommended that the permeation grouting works specifically are subject to an appropriate review of design and implementation methodology via a Basement Construction Plan (BCP).	N/A - BCP

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Appendix 3: Supplementary Supporting Documents

Email to LBC dated 22 August 2017 from DP9 Ltd

Outline Programme for Planning by Beadmans

Trial Pit Records

Movement Monitoring Strategy Drawings

RE: 2017/1827/P 294-295 High HolbornHarry Manley to: Fowler, David 22/08/2017 09:38
Cc: "camdenaudit@campbellreith.com", "GrahamKite@campbellreith.com", "Barnaby Collins"
From: Harry Manley <harry.manley@dp9.co.uk>
To: "Fowler, David" <David.Fowler@camden.gov.uk>
Cc: "camdenaudit@campbellreith.com" <camdenaudit@campbellreith.com>, "GrahamKite@campbellreith.com" <GrahamKite@campbellreith.com>, "Barnaby Collins" <barnaby.collins@dp9.co.uk>

2 Attachments

MBP Trial Holes - DiagramsRD.PDF 294-295 High Holborn-Construction Management Plan.pdf

David,

Please see below further to the points raised:

- Construction Monitoring Plan and Trial Hole diagrams attached pursuant to points 1 and 2.
- In response to point 3, please see the statement below:

  "All groundwater monitoring undertaken for the site has been captured in the 2007 GEA report. Groundwater was encountered and recorded in the borehole logs, and the groundwater level was recorded again when a sample was taken for contamination testing. These records are attached here. In line with the Land Contamination Risk Assessment undertaken by LBH Wembley, additional land contamination testing will be undertaken over the site to bring the 2007 results up-to-date. Although we are not expecting to encounter any significant variation in groundwater levels from the 2007 records during construction, there will be the opportunity to undertake further measurements of groundwater levels during this testing."

- In response to point 4, please see the statement below.

  "From the flood maps that there is a low risk of up to 300mm surface water collecting in the adjacent low level area behind Lincoln House. The ground level here is shown to lie at a level +19.0 m OD on the topo survey. So given that the max envisaged flood level of +19.3m OD is below the new basement level of +19.5m OD on this basis there is nothing to report and no mitigation to consider."

We hope the above responses satisfies the queries raised. Happy to provide further information where required.

Best

Harry

Harry Manley
Associate

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mobile: 07711 556893
e-mail: harry.manley@dp9.co.uk

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100 Pall Mall
London
SW1Y 5NQ

telephone: 020 7004 1700 facsimile: 020 7004 1790 website: www.dp9.co.uk

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From: Fowler, David [mailto:David.Fowler@camden.gov.uk]
Sent: 16 August 2017 15:56
To: Harry Manley <harry.manley@dp9.co.uk>
Cc: camdenaudit@campbellreith.com; GrahamKite@campbellreith.com; Barnaby Collins <barnaby.collins@dp9.co.uk>
Subject: RE: 2017/1827/P 294-295 High Holborn

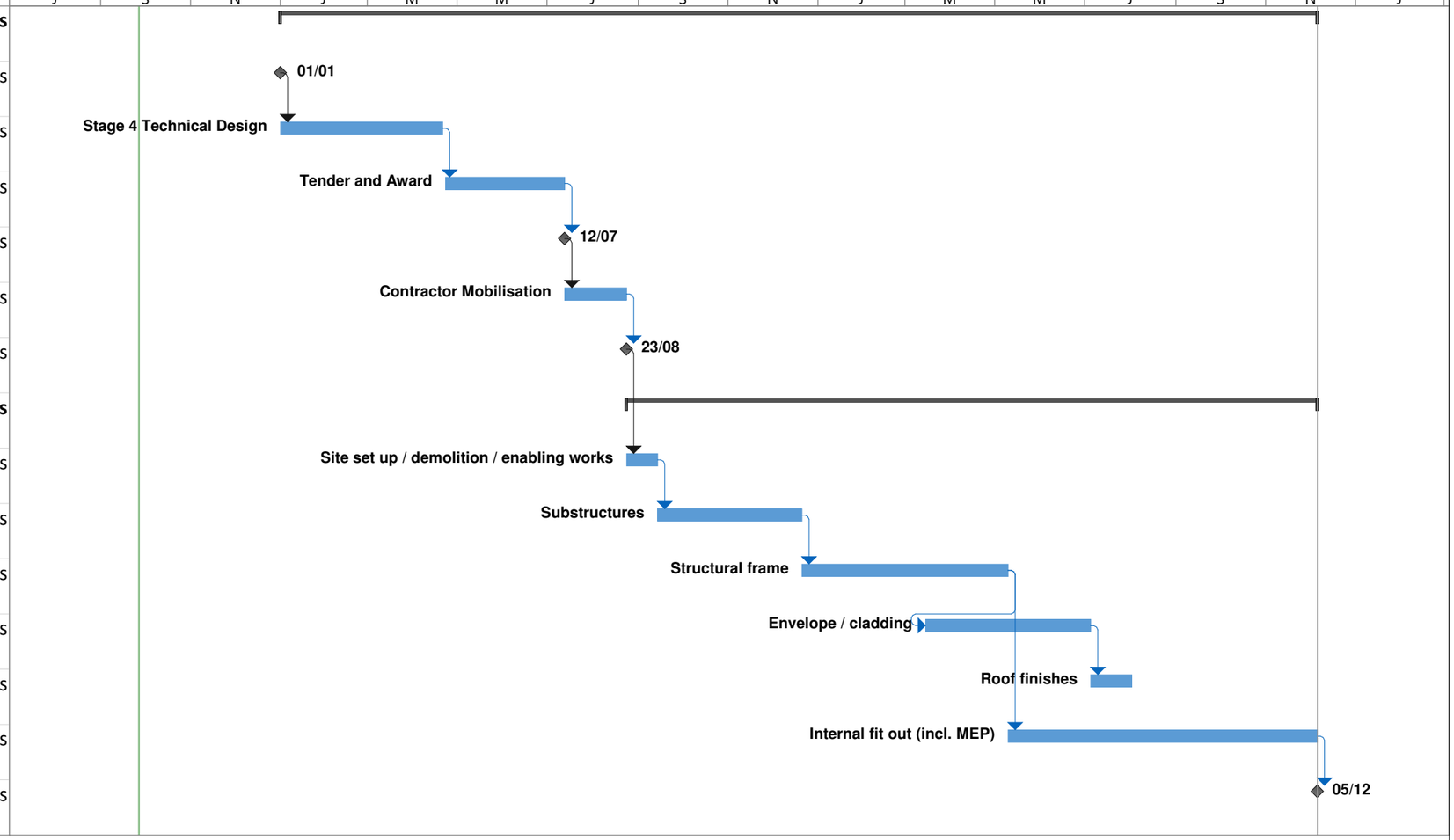
Thanks Harry.

It would actually be easier to assess all the responses at the same time - this makes the process more efficient and avoids confusion between projects. Once you have the information you are waiting for, please can you respond to all of Graham's queries in one email? That would be helpful.

BEADMANS
Construction Project Cost Management

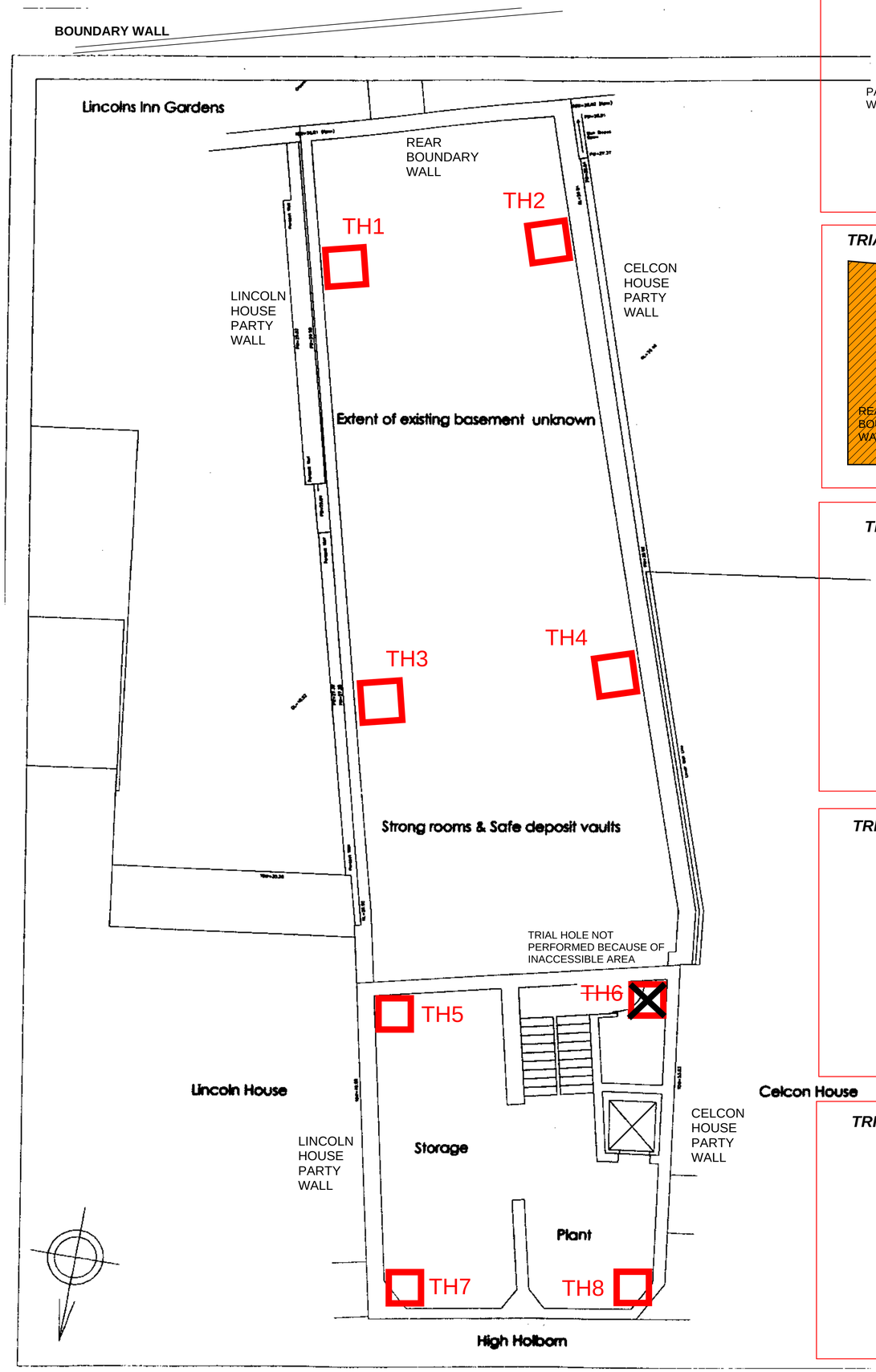
294-295 High Holborn

ID	Task Name	Duration
1	**294-295 High Holborn, London, WC1V 7JG**	**101 wks**
2	Planning Approval	0 days
3	Stage 4 Technical Design	16 wks
4	Tender and Award	12 wks
5	Contract Award	0 days
6	Contractor Mobilisation	6 wks
7	Start on Site	0 days
8	**Construction**	**67 wks**
9	Site set up / demolition / enabling works	3 wks
10	Substructures	14 wks
11	Structural frame	20 wks
12	Envelope / cladding	16 wks
13	Roof finishes	4 wks
14	Internal fit out (incl. MEP)	30 wks
15	Practical Completion	0 days



Project: High Holborn_Indicative Maste
Date: Wed 27/09/17

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	



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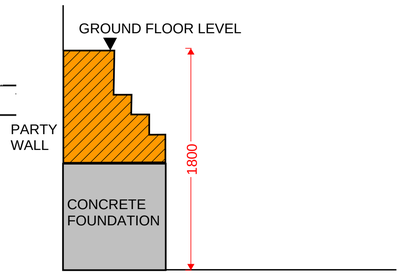

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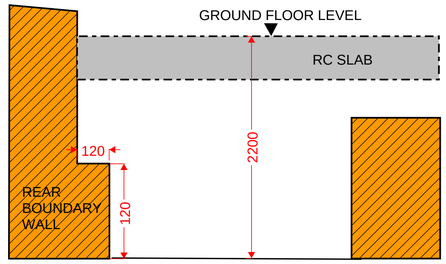
TRIAL HOLE 2



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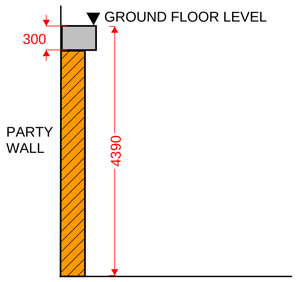
TRIAL HOLE 3



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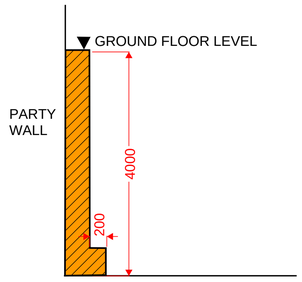

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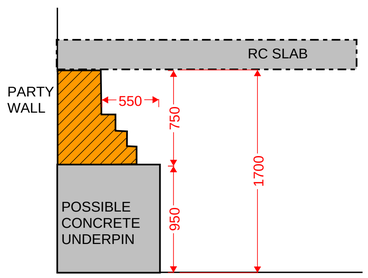
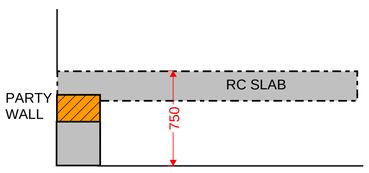
TRIAL HOLE 5



PHOTOS: TH5.1

TRIAL HOLE 7



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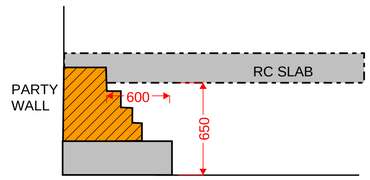
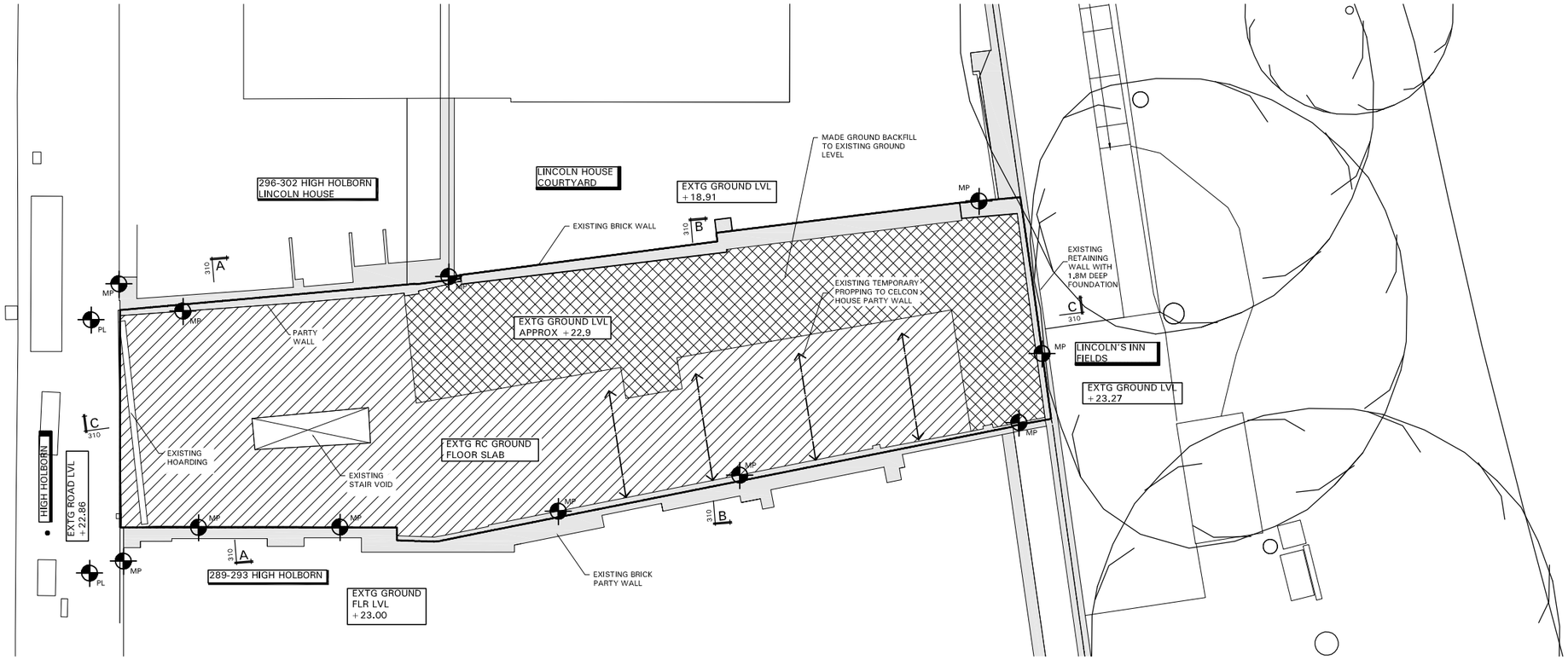
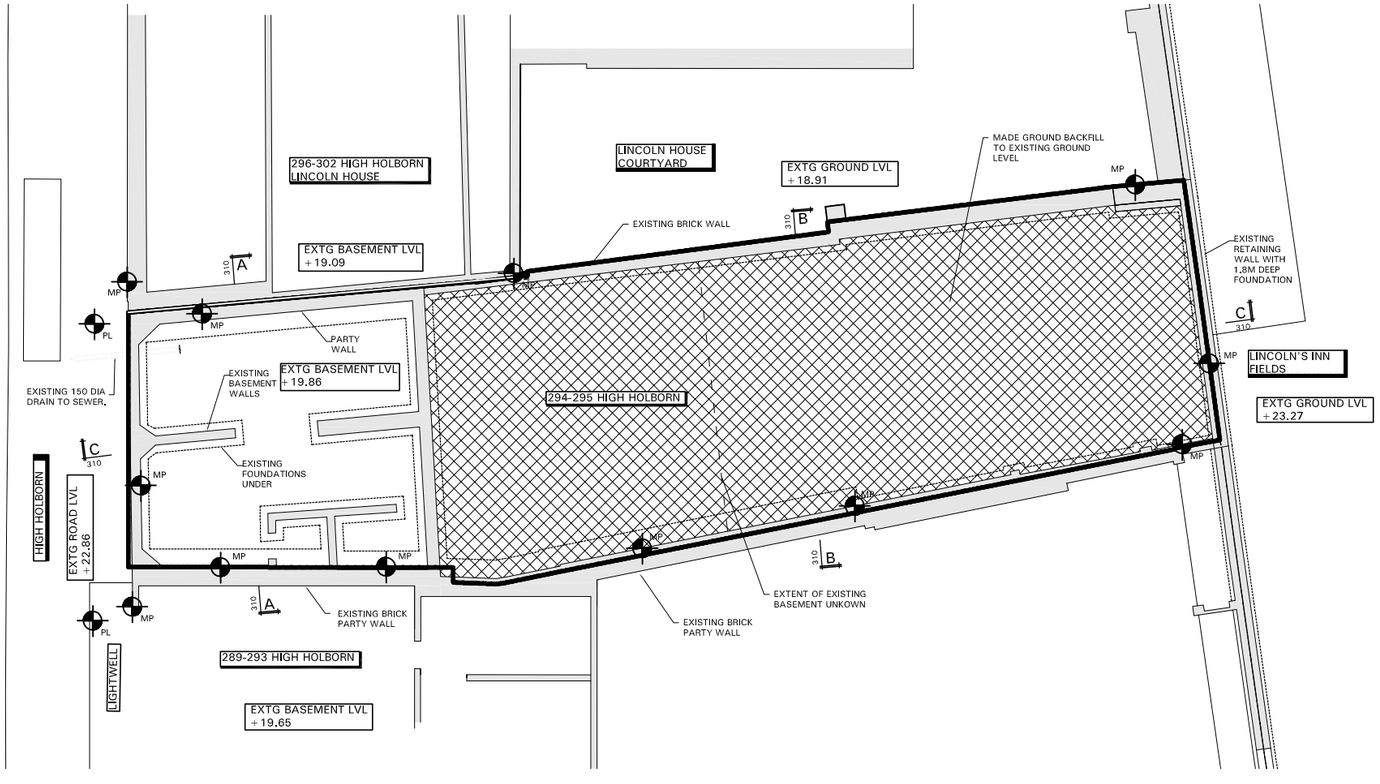


PHOTOS: TH8.1



EXISTING GROUND FLOOR PLAN



EXISTING BASEMENT PLAN

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. FOR SETTING OUT REFER TO ARCHITECT'S DRAWINGS.
3. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
4. DO NOT SCALE FROM THE DRAWING OR THE COMPUTER DIGITAL DATA. ONLY FIGURED DIMENSIONS TO BE USED.

NOTES

1. GROUND MOVEMENTS AND MOVEMENT TO THE EXISTING STRUCTURE IS TO BE MONITORED FOR HORIZONTAL AND VERTICAL MOVEMENT FOR THE DURATION OF THE WORKS.

TRIGGER LEVELS TO BE ADOPTED ARE AS FOLLOWS:
- AMBER 4mm (X,Y,Z)
- RED 7mm (X,Y,Z)

LEGEND:

MP — MONITORING POINT

PL — PRECISE LEVEL

Rev	Date	Description	By
P2	24/09/17	UPDATE TRIGGER LEVELS	JMG
P1	20/03/17	PRELIMINARY PLANNING	JMG

Drawing Status

PLANNING

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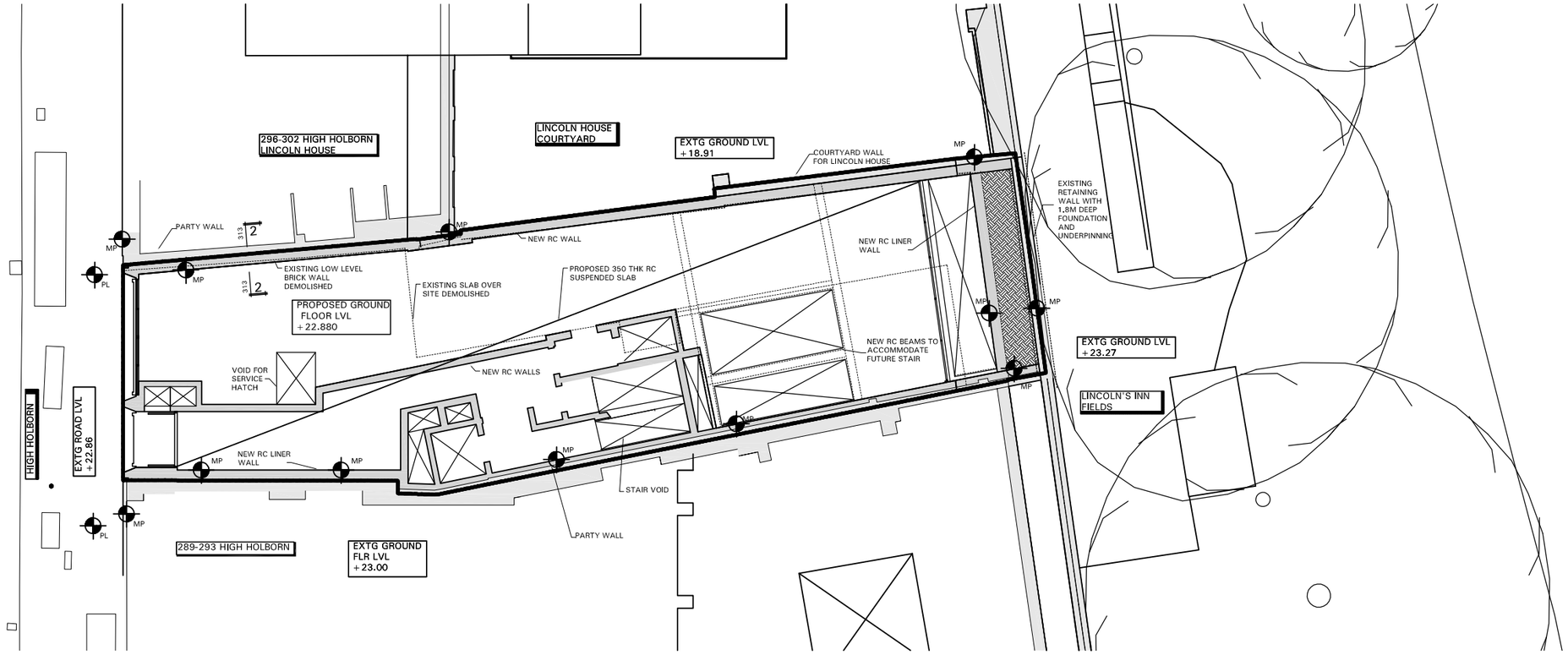
Title

MOVEMENT MONITORING POINTS
SHEET 1

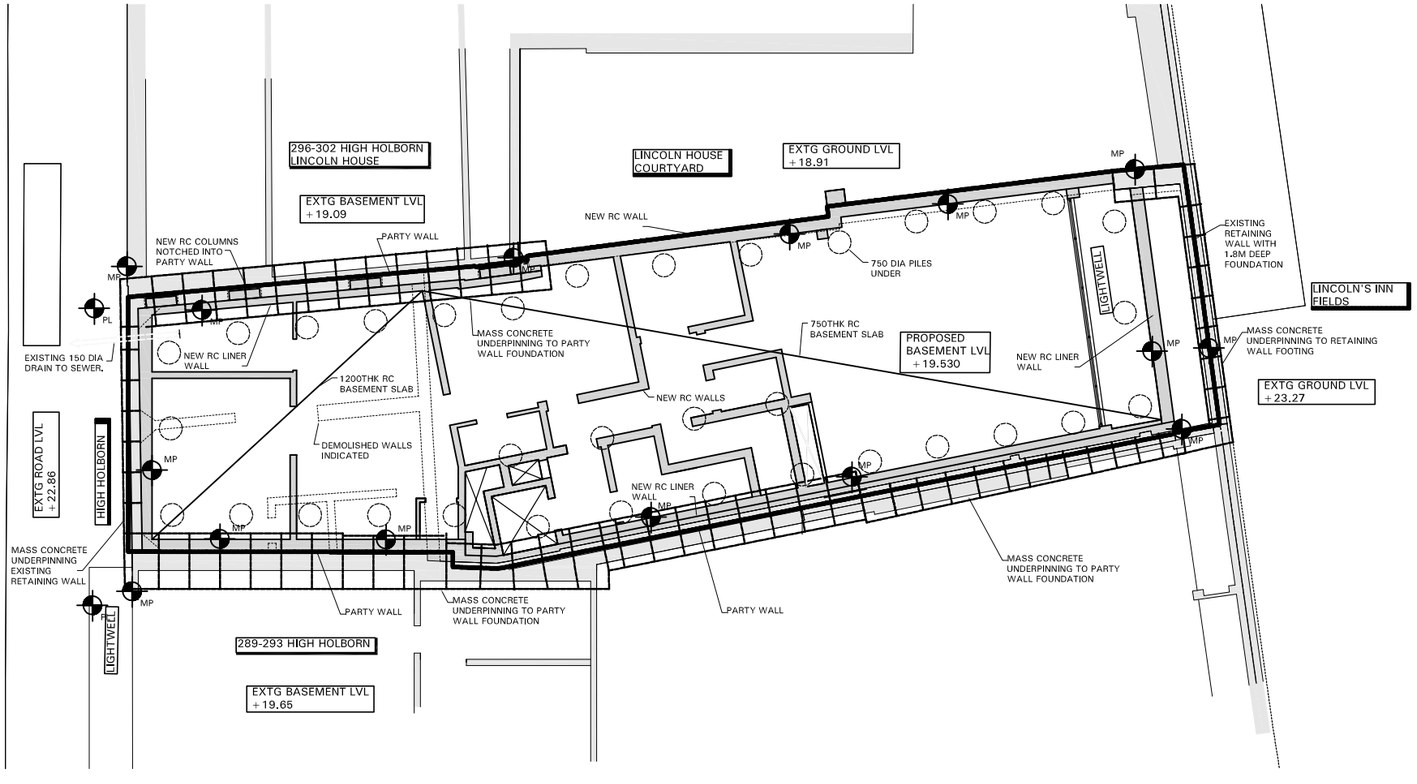
Scale	Date	By	Checked
1:200@A3	MAR 17	JMG	AJB

Drawing Number: 6940 / 330

Revision: P2



PROPOSED GROUND FLOOR PLAN



PROPOSED BASEMENT PLAN

NOTES:

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LEGEND:

MP — MONITORING POINT

PL — PRECISE LEVEL

Rev	Date	Description	By
P2	24/09/17	UPDATE TRIGGER LEVELS	JMG
P1	20/03/17	PRELIMINARY PLANNING	JMG

Drawing Status: PLANNING

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Title: MOVEMENT MONITORING POINTS SHEET 2

Scale	Date	By	Checked
1:200@A3	MAR 17	JMG	AJB

Drawing Number: 6940 / 331

Revision: P2

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