3 - 6 Spring Place

Spring Place Ltd

Basement Impact Assessment

Heyne Tillett Steel

September 2016

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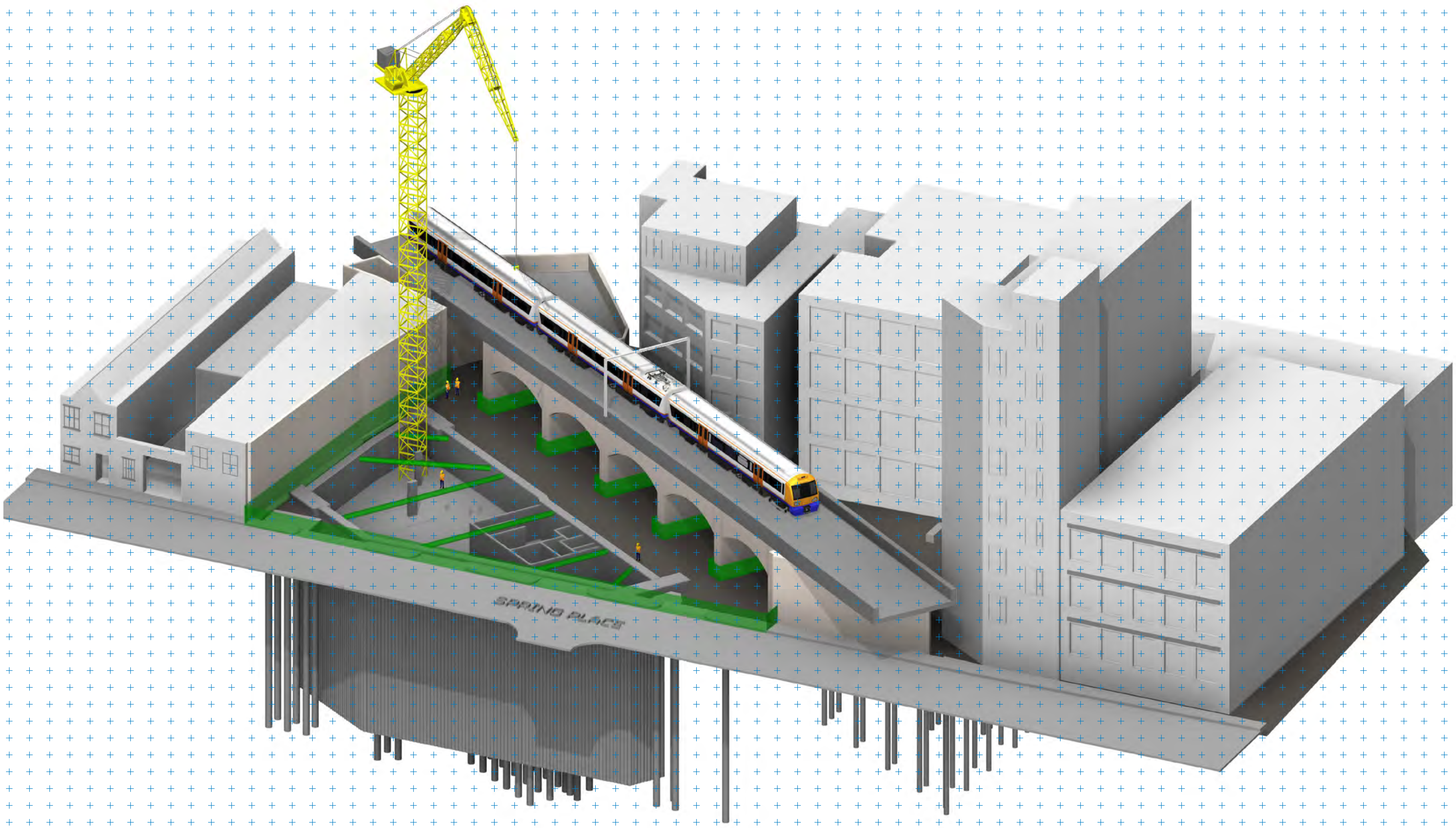

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Appendices

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HEYNE TILLETT STEEL

1 Introduction

Heyne Tillett Steel Limited has been asked by Spring Place Ltd to consider the construction aspects and impact of the proposed subterranean development, in support of a planning application to the London Borough of Camden (LBC). The proposed development includes the excavation of a new single storey basement under the main building. The basement has been introduced to the scheme to minimise the plant at the roof level, accommodate cycle parking and is necessary to create an efficient and useable ground floor space.

This Basement Impact Assessment (BIA) has been prepared by Heyne Tillett Steel in combination with Geotechnical and Environmental Associates (GEA) and in line with the Camden Planning Guidance CPG4 – Basement and Lightwells along with section DP27. Basement and Lightwells of Camden's Development Policies 2015 and supplementary reference documentation within these documents. The report provides specific details of each stage of the basement impact process as well as information on the excavation, temporary works and construction techniques, including details of the potential impact of the subterranean development on the existing and neighbouring structures, based on the specific site characteristics, geology and hydrogeology.

In support of the BIA, a Geotechnical Report has been conducted by Geotechnical and Environment Associates Ltd (GEA), available in Appendix E. GEA's report considers the geotechnical, hydrological and hydrogeological aspects of the structural scheme. It also summarises the 5 stages required for any BIA within Camden, these being Screening, Scoping Points Raised, Site Investigation and Study and Basement Impact Assessment. A report into the expected Ground Movement is also included.

This structural engineering and geotechnical report has been organised in a format and sequence which best addresses the engineering matters being discussed. This format is best presented to follow the previously highlighted 5 stages of any BIA in Camden. A summary of each stage is given below including where each stage is dealt with.

The remainder of this document will discuss the existing conditions on site along with proposals in line with the GEA report and includes the previous highlighted sections above.

Camden CPG4 Stage	Response and/or Reference Location
1.0 Screening	
1.1 Subterranean Screening Assessment	GEA Report Section 3.1.1
1.2 Stability Screening Assessment	GEA Report Section 3.1.2
1.3 Surface Flow and Flooding Screening Assessment	GEA Report Section 3.1.3
2.0 Scoping	Summary of Potential Impacts provided with GEA Report Section 4.1 and investigation of these potential impacts detailed in GEA Report Section 13.0
3.0 Site Investigation and Study	GEA Report Section 4.0
4.0 Impact Assesment	GEA Report Section 13.0 and Section 8 of HTS Report
5.0 Review and Decision Making	Audit Review Undertaken by LB Camden

Camden CPG Stages

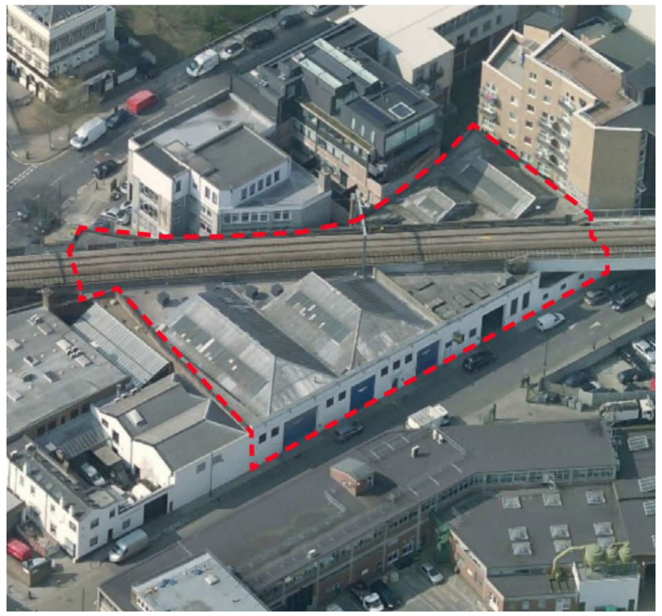
2 Existing Conditions

2.1 The Site

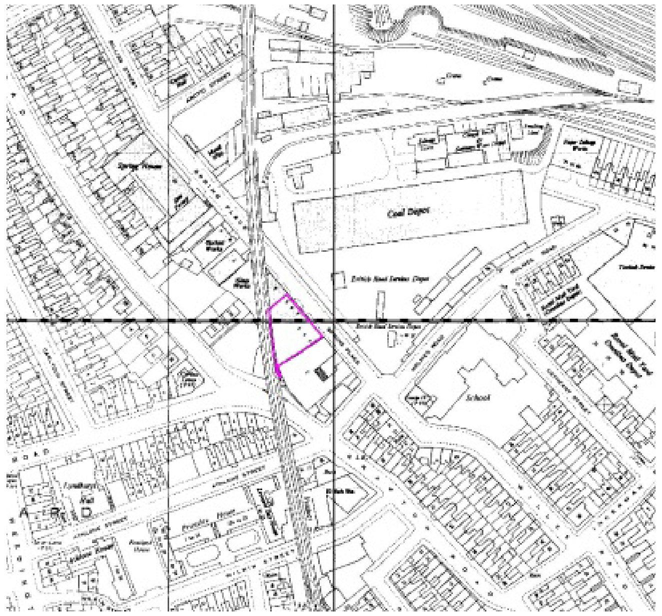
The site is approximately 0.222 ha in area, is triangular in shape and is located in the London Borough of Camden to the West of Spring Place. It includes an existing Network Rail viaduct in the centre, with existing commercial and residential buildings to the East that lead onto Grafton Road.

The OS coordinates for the centre of the site are - E: 528574, N: 184989.

3D Image of existing building



Aerial photograph of site location



Historical Map published 1953-54

2.2 Existing Buildings

Bomb maps show that a V1 Second World War bomb landed just to the west of the site with significant damage caused to the buildings on the site. The historical maps seem to show that the buildings around the viaduct where rebuilt after the first world war in the 1950s.

The existing building is currently being used as a garage (service centre for Addison Lee). The building is made up of `double height' single storey spaces, either side of a railway viaduct, and includes the space under the arches of the viaduct. The majority of the space is used for vehicle maintenance with ancillary accommodation. There is a small area of 2 storey space providing a mezzanine office space with an electrical substation below it.

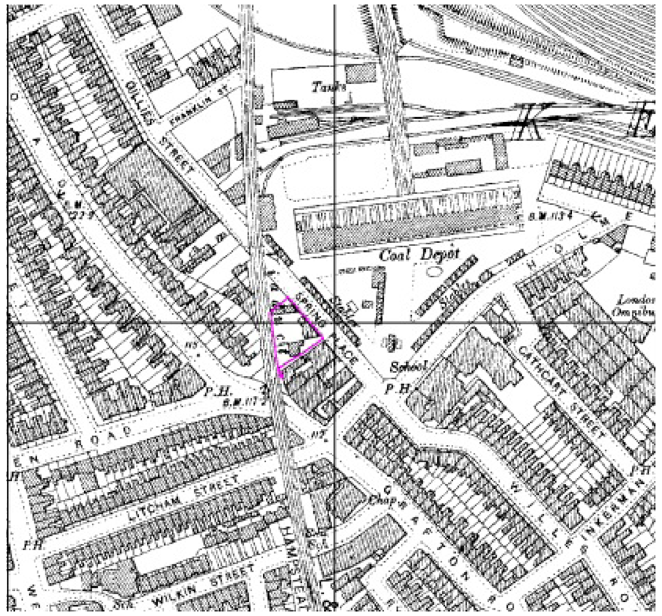
The double height garage spaces have large span roof structures supported on the perimeter walls and a number of internal steel columns. The make-up of the roof is formed with pitched steel trusses, supporting a lightweight roof system. The trusses are supported on gutter beams and by a series of masonry piers on the perimeter walls.

The viaduct structure is of traditional Victorian masonry construction, with thick masonry walls running perpendicular to the rail direction supporting large brick arches.

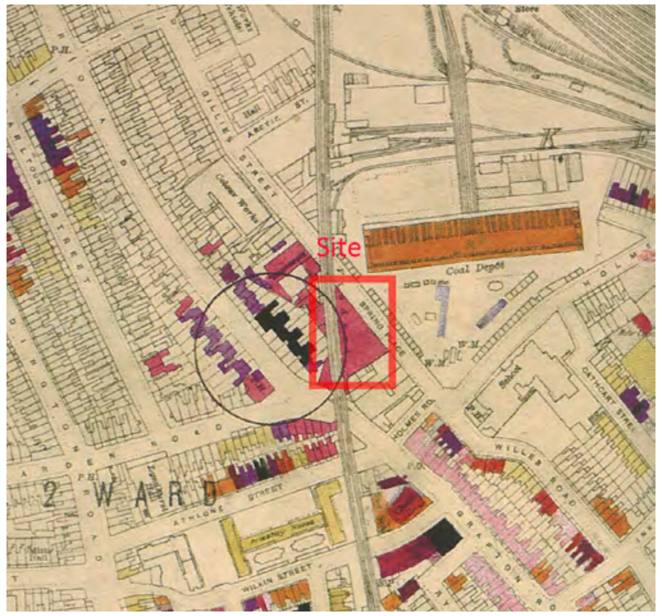
The garage floors are made up of concrete slabs, laid to falls with construction joints at regular centres. The slab level raises significantly in the North West corner of the site.

The existing mezzanine is typical of post war construction and seemed to have been built as part of the original building. The floors are of concrete construction, likely to be filler joist, supported on large steel beams encased in concrete. The steel beams were supported on a mixture of steel columns and masonry walls.

The front façade to Spring Place is of masonry construction with 440mm thick brickwork piers and 330mm brick spandrel panels. The door and window opening have concrete lintels over them supported on the brickwork.



Historical Map published 1895



WWII Bomb Map

Photographs of existing site

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2.3 Existing Ground Conditions

2.3.1 Site Investigations

On the basis of the previous desk study findings an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- two cable percussion boreholes advanced to depths of 20.45 m and 24.00 m, by means of a dismountable rig;
- standard penetration tests (SPTs), carried out at regular intervals in the cable percussion boreholes to provide quantitative data on the strength of the soils;
- five open-drive sampler boreholes advanced to depths of up to 6.00 m;
- five trial pits pre-cored and hand-excavated to depths of between 0.75 m and 0.90 m, to expose the existing foundations of the perimeter walls;
- a soil vapour survey carried out at 30 locations within the north eastern corner of the site, in the area of suspected former buried fuel tanks, using a Photo-Ionisation Detector (PID);
- headspace testing on all shallow samples of recovered soils the boreholes and trial pits
- installation of three groundwater monitoring standpipes; two pipes to depths of 6.00 m and a single standpipe to a depth of 1.50 m;
- installation of a 19 mm diameter standpipe piezometer to a depth of 6.00 m in order to determine pore water pressures in the London Clay;
- two subsequent groundwater monitoring visits undertaken over a period of four weeks to monitor groundwater levels;
- testing of selected soil samples for contamination and geotechnical purposes;

The investigation generally encountered the expected ground conditions. Beneath a moderate to significant thickness of made ground, London Clay was encountered and proved to the maximum depth investigated of 24.00 m (11.51 m OD). The made ground generally comprised brown silty sandy clay with flint gravel, brick and concrete fragments and extended to depths of between 1.30 m and 2.10 m (33.92 m OD and 32.33 m OD), although extended to a depth of at least 2.50 m at a single location. The London Clay initially comprised firm becoming stiff fissured medium strength becoming high strength brown mottled grey silty clay, becoming brownish grey from a depth of about 6.00 m which extended to depths of 8.90 m and 9.00 m (25.48 m OD and 26.51 m OD). Below this depth, stiff becoming very stiff fissured high strength becoming very high strength grey silty clay was encountered. Claystones were encountered at various depths within the London Clay.

GEA Geotechnical & Environmental Associates, Widbury Barn, Widbury Hill, Ware, Herts, SG12 7QE

Site	Borehole Number
3-6 Spring Place, London, NW5 3BA	BH2

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to m		Spring Place Limited	J16143
	Location	**Dates**	**Engineer**	**Sheet**
		15/07/2016-16/07/2016		1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40) 0.40	MADE GROUND (150 mm concrete, over 50 mm concrete, over 200 m brick and concrete mix - no reinforcement)		
0.50 0.50-1.00	D1 D3			PID = 0 ppm PID = 0 ppm PID = 0 ppm		(0.60) 1.00	MADE GROUND (brown gravelly clay with brick)		
1.00	D2			PID = 0 ppm			MADE GROUND (brown clay)		
1.20-1.65 1.20-1.65 1.50	SPT N=2 D4 D5		DRY	1,1/0,1,0,1 PID = 0 ppm		(0.50) 1.50			
						(0.60) 2.10	Reworked CLAY		
2.00-2.45 2.00-2.45 2.00-2.50	SPT N=5 D6 D7	2.00	DRY	1,0/1,1,1,2			Firm becoming stiff brown mottled grey silty fissured CLAY		
2.50 2.50	D8 D9								
3.00-3.45	U10								
3.50	D11								
4.00-4.45	SPT N=11	2.00	DRY	1,1/2,2,3,4					
4.50	D12								
5.00-5.45	U13								
5.50	D14					(6.90)			
6.50-6.95	SPT N=15	4.00	DRY	2,2/3,4,4,4					
7.00	D15								
8.00-8.45	U16								
8.50	D17			Water strike(1) at 8.50m.					∇1
						9.00	Stiff grey silty fissured CLAY		
9.50-9.95 9.50 9.50-9.95	SPT N=22 D18 D19	4.00	DRY	3,4/5,5,6,6					

Remarks	Scale (approx)	Logged By
Hand-dug starter pit to 1.2 m (60 minutes) Groundwater not encountered during drilling Standpipe (50 mm diameter) installed to a depth of 6.00 m - response zone from 2.00 m to 6.00 m Water measured in standpipe at a depth of 1.64 m on 20/07/2016	1:50	PRELIM
	Figure No.	
	J16143.BH2	

Borehole Log

Seepages were encountered from the made ground locally and perched water was encountered around claystones. Monitoring has measured groundwater at depths of between 1.17 m and 1.64 m (33.96 m OD and 33.16 m OD). Vapours were detected during a soil vapour survey and during headspace analysis on recovered soils in the south-eastern corner of the site.

Contamination testing has not measured any elevated concentrations of contaminants on the basis of a commercial end use; however, asbestos has been identified within the made ground during routine screening. Further details can be found in the section 6.4 of the Ground Investigation Report (Appendix E).

2.4 Existing Foundations

From the trial pits investigations included within GEA Report (Appendix E) it can be seen that the majority of the existing foundations comprise concrete footings that extend to depths of between 0.50 m and 0.85 m, bearing on made ground.

2.4.1 Party Wall with No. 1-2 Spring Place

The support to the party wall with No.1-2 Spring Place has been inspected at 2No. locations (TP1 and TP2). The results of those investigations have been included in the Appendix I. The maximum recorded depth of foundations measured from top of ground floor slab is approximately 700mm.

2.4.2 Existing Wall along Spring Place site boundary

The depth of existing strip foundations along the eastern boundary varies along its length with maximum recorded depth of concrete footing at approx. 840mmm measured from top of the ground floor slab level.

2.4.3 Network Rail Viaduct Foundations

The existing masonry viaduct walls are expected to be supported on corbelled masonry footings on a base of crushed brick/concrete. The exact extent and depth of the existing foundations is currently unknown but is expected to be in excess of 2m deep.

Further intrusive investigations around the viaduct footings required to confirm the size and depth of the existing foundations will be carried out in due course following approval of the proposed works by Network Rail. The scope of those investigations has been included in the Appendix H.

2.5 Existing Drainage

Based on the information contained within the Thames Water Asset Search and the CCTV survey report included within Appendix F the existing foul and surface water drainage from the site is combined within the property and discharged into the existing combined sewers at the front of the building and sewer crossing the west corner of the site.

The Thames Water asset records indicates that there is a 300mm combined sewer within Spring Place that runs in a south direction towards the junction with Spring Place and Holmes Road. The sewer is approximately 3.40m deep, with the invert level being approximately 31.390m.

There is also a combined TW sewer that crosses the west corner of the site, runs under the Network Rail viaduct and later runs along the viaduct on the eastern side. Based on the recent CCTV survey the sewer is located approx. 2.8m from the face of the viaduct therefore adjacent to the proposed basement wall. Build over consent from Thames Water will be required for any works in vicinity of the sewer.

2.6 Existing Hydrogeology and Hydrogeology

GEA have carried out an assessment of the existing hydrogeology which is summarised as follows:

The London Clay is classified as "Unproductive Strata", as defined by the Environment Agency as rock or drift deposits with low permeability that have negligible significance for water supply or river base flow. Groundwater was encountered within the Alluvium during drilling of the aforementioned BGS borehole.

There are no surface water features or listed water abstraction points within 250 m of the site.

The site is not located within a Groundwater Source Protection Zone, as defined by the Environment Agency. Reference to the Lost Rivers of London6 indicates that the site is located between the western and eastern tributaries of the River Fleet, which flowed about 200 m to the west and roughly 230 m to the east. The tributaries joined just to the west of Kentish Town Road. The Fleet has since been diverted, culverted and is now contained in a sewer.

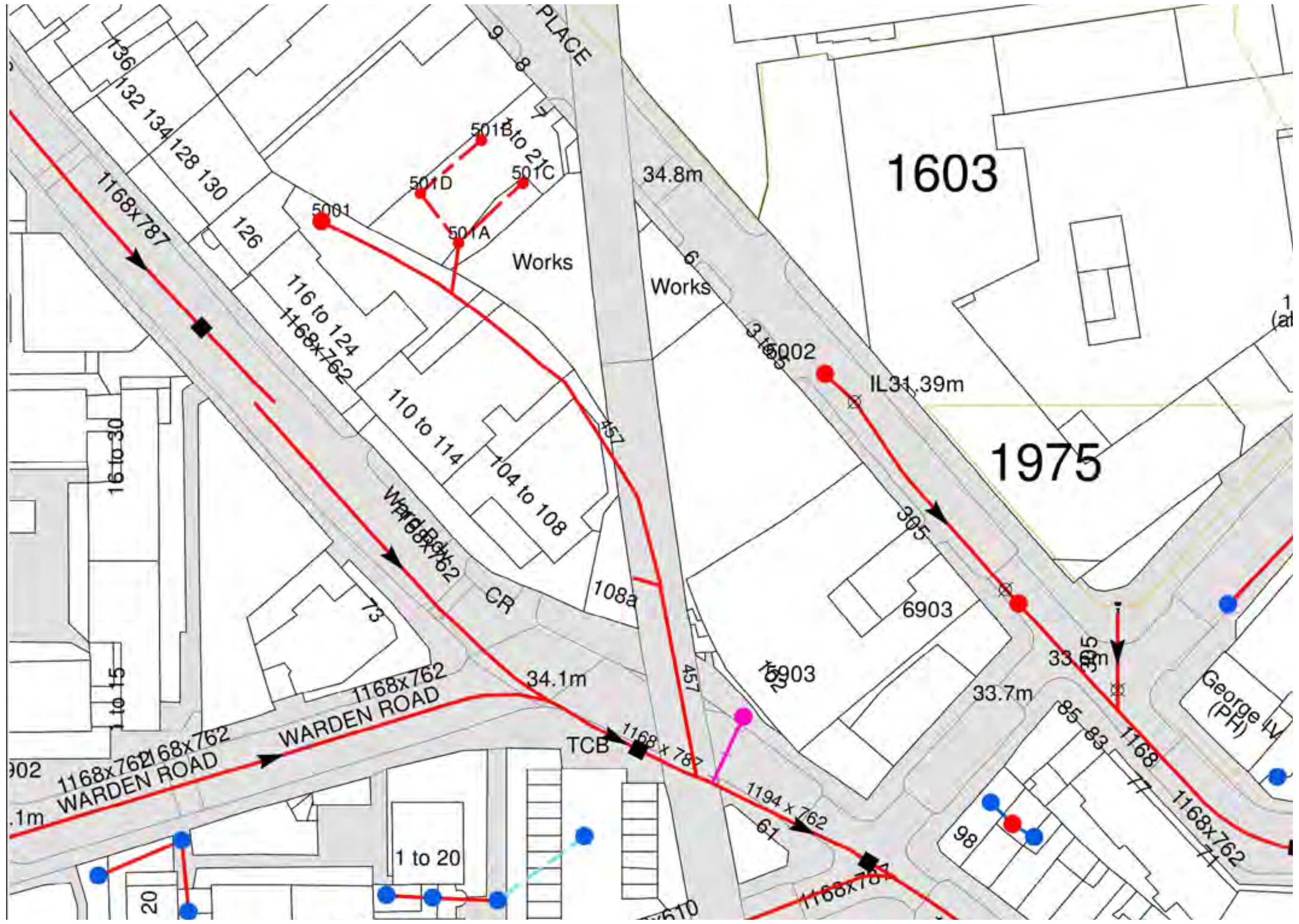
The site lies outside the catchment of the Hampstead Heath chain of ponds.

Due to the predominantly cohesive nature of the soils, the groundwater flow rate beneath the site is likely to be negligible.

Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1 x 10-10 m/s and 1 x 10-8 m/s, with an even lower vertical permeability.

The site is not at risk of flooding from rivers or sea, as defined by the Environment Agency and Spring Place and Grafton Road have not been identified as a street at risk of surface water flooding, specified in the London Borough of Camden (LBC) Planning Guidance CPG4.

The site is entirely covered by the existing building and hardstanding and therefore infiltration of rain water into the ground beneath the site is limited and therefore the majority of surface runoff is likely to drain into combined sewers in the road.



Thames Water asset plan

3 Basement Impact: Stage 1 Screening

The LB of Camden guidance suggests that any development that includes a basement should be screened to determine whether or not a full Basement Impact Assessment (BIA) required.

A screening assessment toolkit is included in the Arup document and form the basis of section 3.0 of GEA Report. This forms the basis of the next 3 stages of any BIA and continues accordingly.

4 Basement Impact: Stage 2 Scoping /Stage 3 SI and Study

As noted within Section 4.1 of the GEA Report there are a number of scoping points that have a potential impacts and require further assessment by site investigation.

GEA have provided the design of the site investigation to correctly assess these scoping points and have concluded each point within section 13.0

To summarise both of these stages a table containing the potential impacts, consequence and conclusion of the site investigation is summarised below.

Potential Impact	Consequence	Site Investigation Conclusion
London Clay is the shallowest stratum on the site.	The London Clay is prone to seasonal shrink-well and can cause structural damage.	The London Clay is the shallowest stratum at the site and laboratory testing has indicated a high low volume potential change. Shrinkable clay is present within a depth that can be affected by tree roots. No evidence of desiccation of the clay soils was noted and there is only one tree on Grafton Rd. However, new foundations will need to be designed in accordance with NHBC guidelines to protect from future shrinking and swelling associated with tree removal / growth. Subject to inspection of foundation excavations in the normal way.
Seasonal shrink-swell	If a new basement is not dug to below the depth likely to be affected by tree roots this could lead to damaging differential movement between the subject site and adjoining properties.	The London Clay is the shallowest stratum at the site and laboratory testing has indicated a high low volume potential change. Shrinkable clay is present within a depth that can be affected by tree roots. No evidence of desiccation of the clay soils was noted and there is only one tree on Grafton Rd. However, new foundations will need to be designed in accordance with NHBC guidelines to protect from future shrinking and swelling associated with tree removal / growth. Subject to inspection of foundation excavations in the normal way.
Site within 5 m of a public highway.	Excavation of a basement may result in structural damage to the road or footway	The investigation has not indicated any specific problems, such as weak or unstable ground, voids or a high water table that would make working within 5 m of public infrastructure particularly problematic at this site. A retention system will be adopted that maintains the stability of the excavation at all times.
Increase in depth of foundations	If not designed and constructed appropriately, the excavation of a basement may result in structural damage to neighbouring buildings and structures, including the nearby Network Rail viaduct.	The existing foundations may need to be underpinned to form the basement and these underpins will need to be designed to minimize movement of the adjacent structures. A ground movement analysis and building damage assessment has been undertaken to confirm that the damage category remains within acceptable limits and the results are presented within Part 3 of the Ground Investigation Report.
Location of the Railway Viaduct	Excavation of a basement may result in structural damage to the Railway Viaduct Foundations	A ground movement assessment has been undertaken to confirm movements that may affect the viaduct as a result of demolition of the existing building and construction of two new buildings and the results are discussed in Section 3 of this report. Consultation will be required with Network Rail prior to commencement.

5 Basement Impact: Stage 4 Impact Assessment

5.1 BIA Conclusion

As noted in the executive summary of the report the conclusions of the GEA BIA is as follows:
The BIA has not indicated any concerns with regard to the effects of the proposed basement on the site and surrounding area. It has been concluded that the impacts identified can be mitigated by appropriate design and standard construction practice. A ground movement analysis and building damage assessment have been carried out in support of the planning application and the findings are included in this report and a copy will need to be provided to Network Rail.

The BIA has indicated that the proposed development will not have an effect of the local hydrological and hydrogeological setting, whilst the ground movement analysis has indicated that potential damage, as a result of the proposed basement construction, falls within acceptable limits.

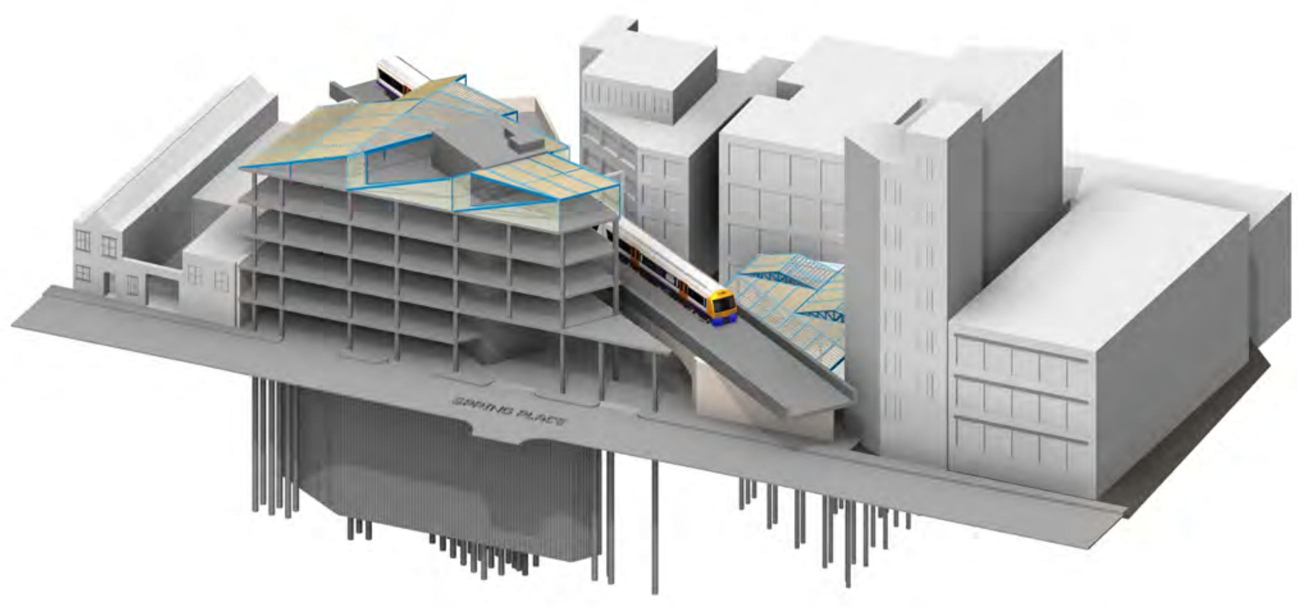
6 Proposed Works

6.1 Proposed Development

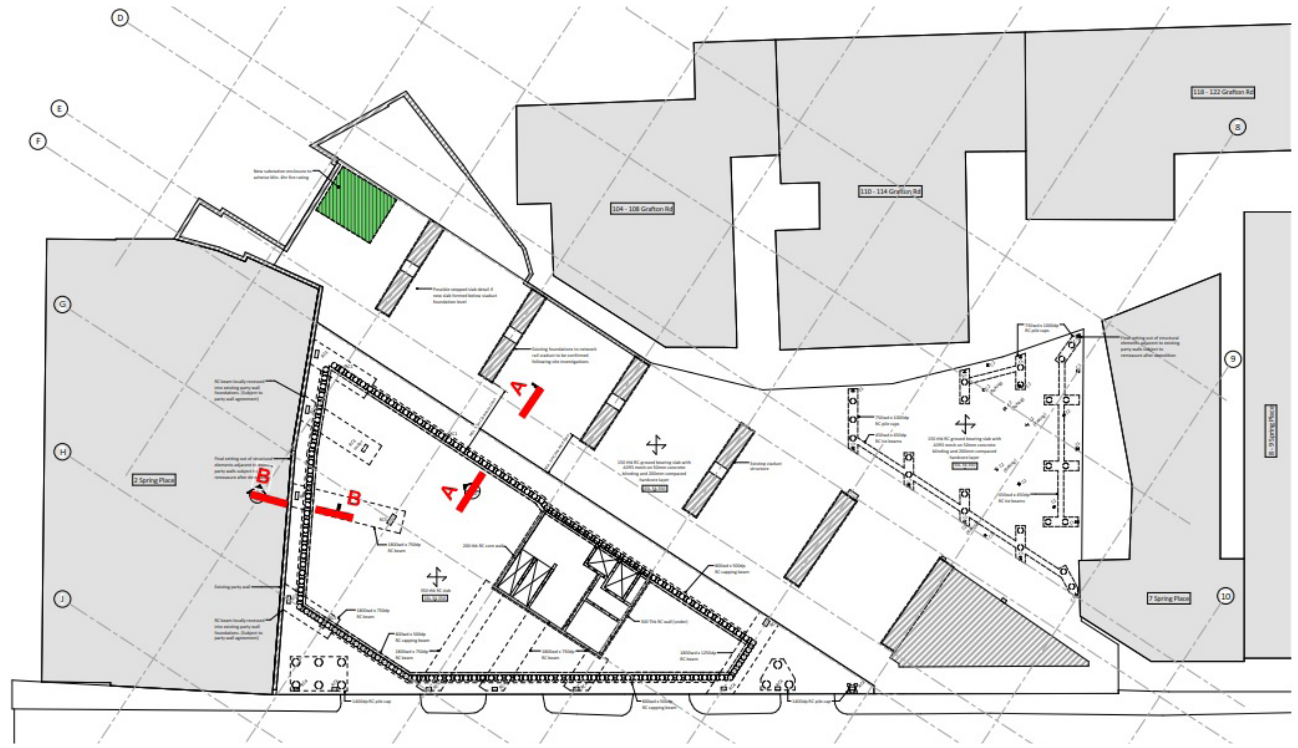
The proposed structural works are described in detail on the HTS drawings, in Appendix D, and are summarised as follows.
The proposed scheme involves the demolition of the existing double height garage buildings located on site and construction of a 6-storey reinforced concrete frame office block with a single storey basement on the east side of the railway viaduct. A double height steel frame building is proposed for the other side of the viaduct.

6.2 Proposed Substructure

Given the magnitude of load applied by the new buildings, piled foundations are being adopted for the majority of the development. The piles and associated pile caps will be located below columns and core walls. Where the new construction is tight to the site boundary or party walls cantilevered foundations will be used. The new foundations will need to be kept clear from the exclusion zone imposed by Network Rail.
Formal consultation with Network Rail has been undertaken to ensure that all the requirements are met throughout the design and construction process. Evidence of the consultation with Network Rail has been included in the Appendix K.



3D Image of proposed building



Proposed Ground Floor

6.2.1 Basement

The new basement will cover a portion of the building's footprint and it is proposed to be set back from the site boundary and the viaduct.

All piles within the basement wall will have their centres set back from the site boundary and party walls by approx. 1m with exception of the viaduct side where piles will be approx. 5.5meters from the face of the rail viaduct.

The new basement structure will comprise a minimum 200mm thick RC retaining wall with an allowance of 100mm for piling tolerances, cast in front of a piled wall around the entire perimeter to maintain stability of the ground. The retaining walls will be propped by the basement and ground floor slabs in the permanent case thereby distributing the horizontal loads imposed by the ground back to pile caps and the ground minimising movement of the retained ground. Horizontal propping of the capping beam during construction will be required.

On the basis of the monitoring to date, contiguous bored pile wall will be adopted. Localised grouting and / or pumping will be introduced if necessary in order to deal with shallow inflows of perched water. Further site investigations including deep trial pit will be undertaken prior to construction to confirm the rate of groundwater inflow.

The proposed excavations will result in elastic heave and long term swelling of the London Clay. The effects of the longer term swelling movement will to a certain extent be counteracted by the applied loads from the development.

It is proposed to design the basement slab as a suspended slab with heave protection to reduce the effects of uplift forces from a release of overburden forces.

The piled wall will be designed by specialist contractor to transfer both horizontal (due to earth and surcharge pressures) and vertical loads into the underlying ground. Each of the walls will designed to limit any settlement/ deflection to suitable limits and designed to ensure any damage to the party wall is limited an agreed limit with the Party Wall Surveyor. This is assumed to be Damage Category 1 – Very Slight in line with Ciria C580 Stage 2.

The basement will be used for cycle storage, plantrooms, showers and kitchen. A grade 2 environment in accordance with BS8102 will be therefore applicable. To satisfy this environment, there must be no water penetration but damp areas and moisture vapour should be tolerable. Electrical plantrooms may require a higher basement environment (Grade 3) to be achieved locally where the plantroom forms the basement perimeter wall. A Grade 3 environment does not allow water penetration nor moisture vapour. In terms of waterproofing this basement, a cost exercise will be undertaken to determine the most cost efficient waterproofing system.

6.3 Proposed Superstructure

The superstructure will comprise an RC frame of flat slab construction with lightweight steel frame roof. Various upstands and downstands are proposed to reduce deflections and transfer columns respectively.

6.4 Proposed drainage

The existing below ground drainage will be replaced in its entirety and new connections will be made to the existing sewers located adjacent to the site.

For the proposed below ground drainage strategy refer to drawings 1399/DR600 and 1399/DR601 included in the Appendix D.

6.5 Stability

Lateral stability of the proposed building will generally be provided by the concrete core walls located around the lifts and staircases. These walls run full height up the building. The lateral loads will be transmitted to the walls through diaphragm action of the concrete floor slabs at each level. The loads in the walls will then be transmitted to the underlying ground through the piled foundation structure. In practice additional stability will be provided by the monolithic nature of the slab-to-column connections.

6.6 Disproportionate Collapse

The new structure will be designed for disproportionate collapse in accordance with the Building Regulations and the current material codes and standards.

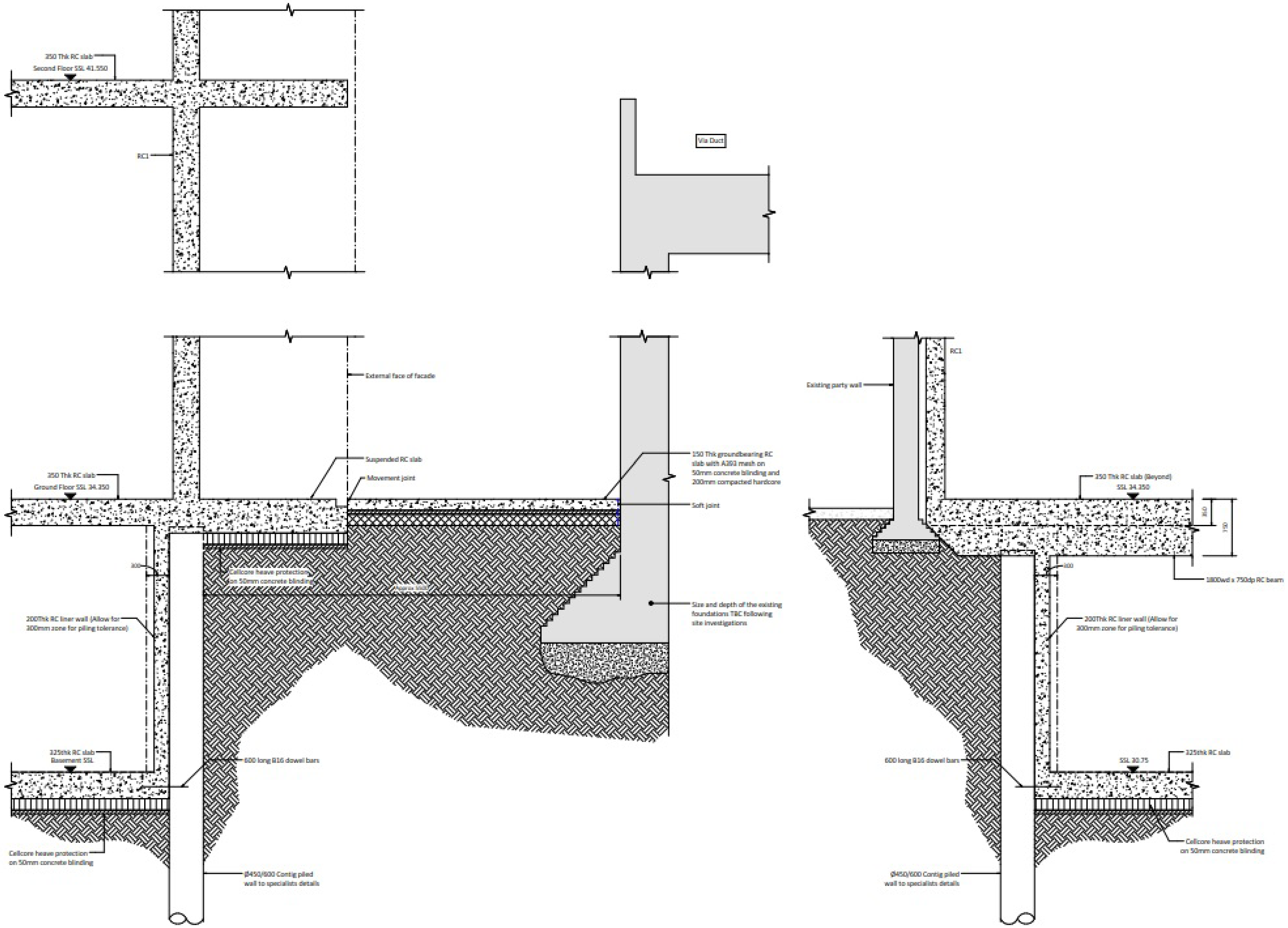
The new 6 storey office building is classified as a class 2B structure in accordance with the guidelines of Approved Document A of the Building Regulations. Under this classification the most preferable way to limit any risk of disproportionate collapse is to ensure the building is framed, and to provide sufficient horizontal and vertical 'ties' in all supporting columns and walls in accordance with the relevant material codes of practice.

A reinforced concrete frame can satisfy these requirements with robust detailing of the reinforcement at column/ wall to slab connections.

6.7 Hydrogeology - assessment of the impact on groundwater flows

The London Clay is classified by the Environment Agency as Unproductive Strata; not capable of storing and transmitting groundwater in sufficient quantities to support baseflow to watercourses or private supplies.

On the basis of the results of the ground investigation, it is not considered that the proposed basement would result in a significant change to the groundwater flow regime in the vicinity of the proposal or on the amount of annual recharge into the London Clay. This is due to its very low permeability and its inability to conduct groundwater flow.



Proposed Basement Wall Sections

7 Temporary Works & Sequence of Construction

7.1 Introduction

Some of the issues that affect the sequence of works on this project are:

- The stability of adjacent buildings
- Structural works in vicinity of Network Rail assets
- Relocation of existing UKPN Substation
- Forming sensible access onto the site to minimise disruption to the neighbouring residents
- Providing a safe working environment

The proposed works involve the construction of a new 6-storey concrete frame office building with a single storey basement. It is expected that the works will be completed as a bottom up type construction.

HTS will be involved in the selection of an appropriate contractor who will need the relevant experience and expertise for this type of project. Thereafter HTS will have an on-going monitoring role during the works on site to review that the works are being carried out in accordance with our design and specification. This role will typically involve site visits where a written report of each site visit is provided for the design team, contractor and party wall surveyor. The site visit reports will act as an on-going snagging tool which will be signed off by the contractor at the end of the project.

The Contractor will be entirely responsible for maintaining the stability of all existing buildings and structures, within and adjacent to the works, and of all the works from the date for possession of the site until practical completion of the works.

A full set of temporary works drawings and calculations will be provided by the contractor and will be reviewed by HTS prior to works starting on site.

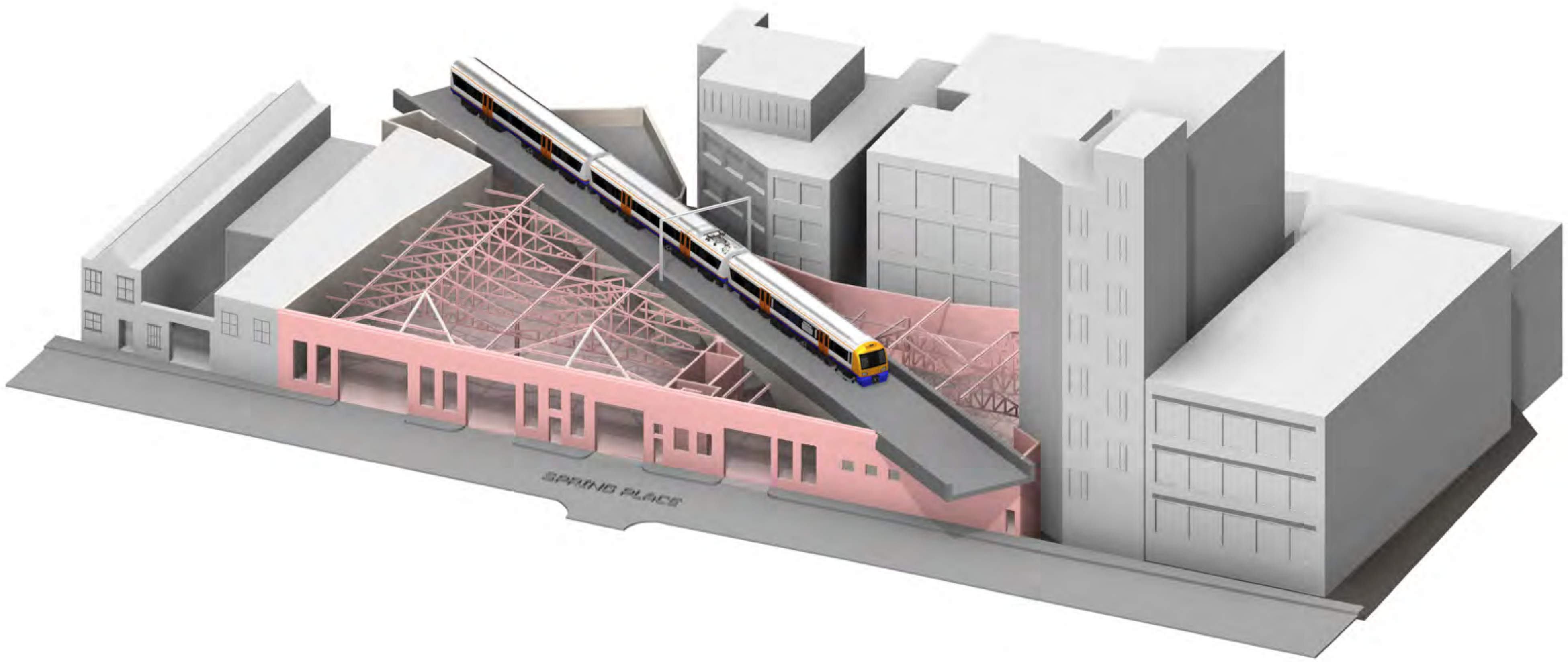
7.2 Site Set Up

- It is noted that LB Camden require the contractor and subcontractors to be members of the Considerate Contractors Scheme. If approved this will be a condition of all the tendering contractors and sub-contractors for the projects.
- The access is only available from Spring Place so it is assumed that all deliveries, removals and access for operatives will be made from here, this is further explained within the Construction Management Traffic Plan include within Appendix G.
- Existing services to be terminated and diverted as required.
- Site hoarding will be constructed along the pavement boundary to provide protection from passers-by. The hoarding will also be required locally along the party wall with Spring Place 1-2 with additional protection provided around the viaduct arches.

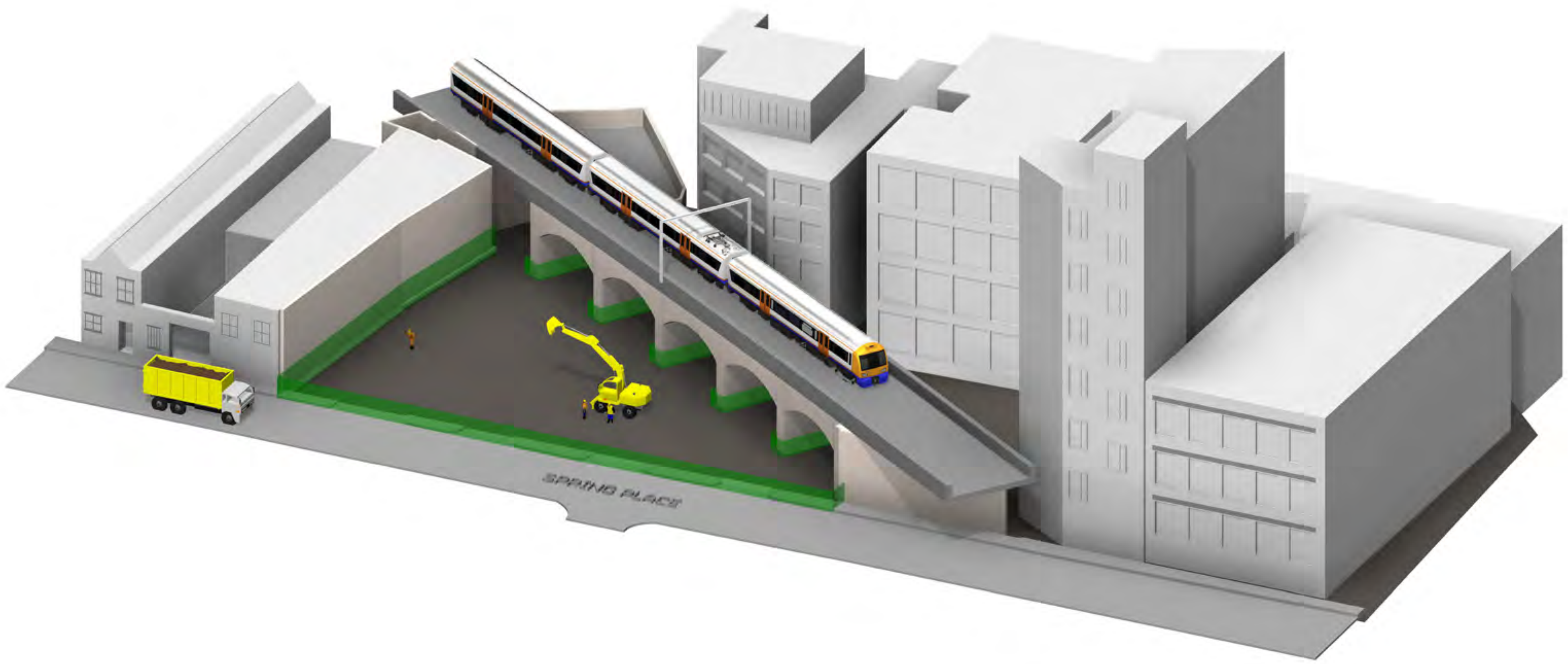
3D Image of Existing site

7.3 Demolition of Existing Buildings

- Commence demolition of existing buildings with the exception of party walls.
- Demolition works in vicinity of the rail viaduct to be carried out in accordance with Network Rail requirements.
- Overground viaduct structure monitoring will be carried out by Network Rail certified specialist contractor with HTS supervision.
- The temporary propping of 1-2 Spring Place Party wall might be required – subject to temporary works engineers' evaluation. Wall monitoring to be adopted as per sketch SK028– Appendix I. This will be undertaken by the contractor with HTS supervision.
- The demolition to be carried out 'top-down' with care taken to avoid damage to boundary structures.
- Removal of rubble and waste materials via grab lorry and skips to contractor's preference.
- The site waste to be removed and recycled in accordance with ICE Demolition Protocol 2008.
- The foundation structure to be grubbed out and site levels reduced to required level approx. -500mm from proposed SSL levels.
- Undertake reduced level dig along the party walls to expose the existing footings.



3D Image of Demolition



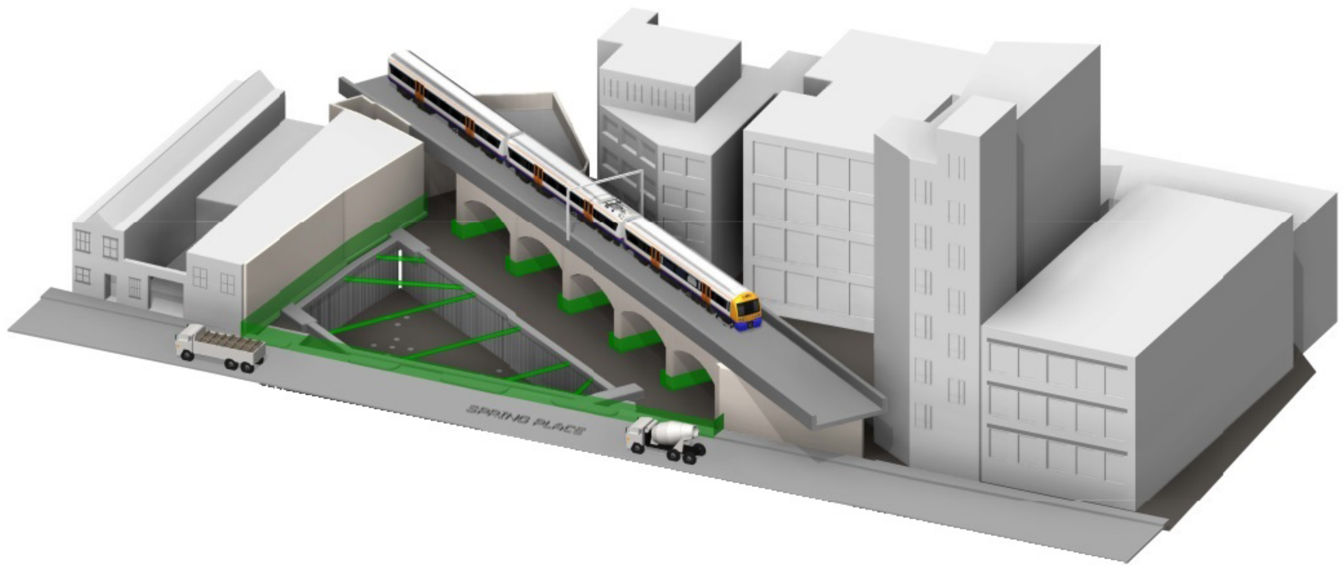
3D Image of Demolition

7.4 Piling & Excavation to Basement Level

- Piling mat to be installed in accordance with specialist design.
- The contiguous pile walls to be constructed with guide walls to limit positional and inclination tolerance.
- Commence piling to perimeter walls (required depth to be agreed with specialist sub-contractor).
- All piles to be installed from ground level, care to be taken to avoid damage to neighbouring walls, party walls and services.
- All piled walls to be formed by installing CFA piles. The reinforcement cage will be pushed into position through the wet concrete or vibrated to a lower level using a vibrator and steel mandrel.
- The piles within and outside the footprint of the basement also to be installed.
- Initial reduced level dig to be undertaken to allow casting of capping beams.
- The piles will be designed to either cantilever beyond the exaction of the proposed basement slab or be required to be propped in the temporary case by whaler beams and flying shores spanning across the width of the basement. In the permanent case the propping will be provided by the new suspend slab and beam arrangement.
- Following the installation of temporary works commence excavation down to below capping beam.
- Continue excavation to suspended basement slab formation level. It is assumed that excavated earth will be collected by a waiting lorry or skip located within the site boundary.
- Bearing piles to be cut down to formation level.
- Overground viaduct structure monitoring will be carried out by Network Rail certified specialist contractor with HTS supervision.
- Movement monitoring of the adjacent properties will be undertaken by the contractor with HTS supervision.

3D Image of Reduced Level Dig + Temporary works

3D Image of Piling

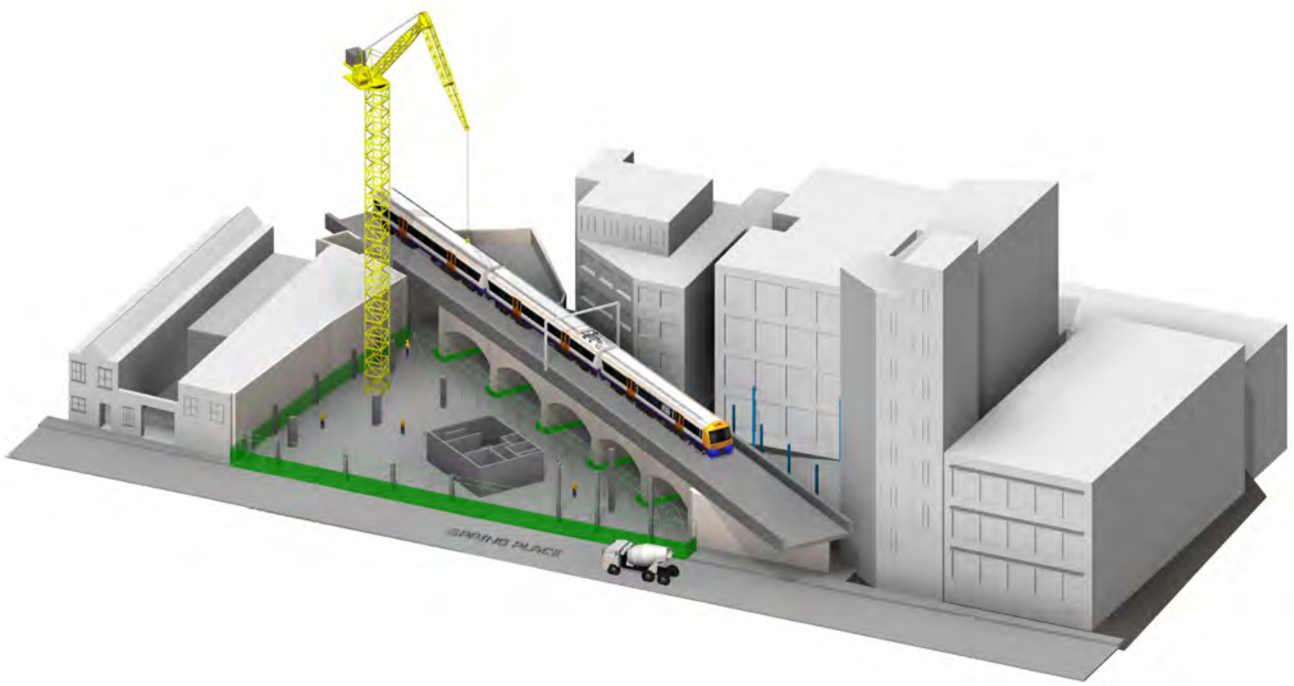


3D Image of Full Depth Basement Dig

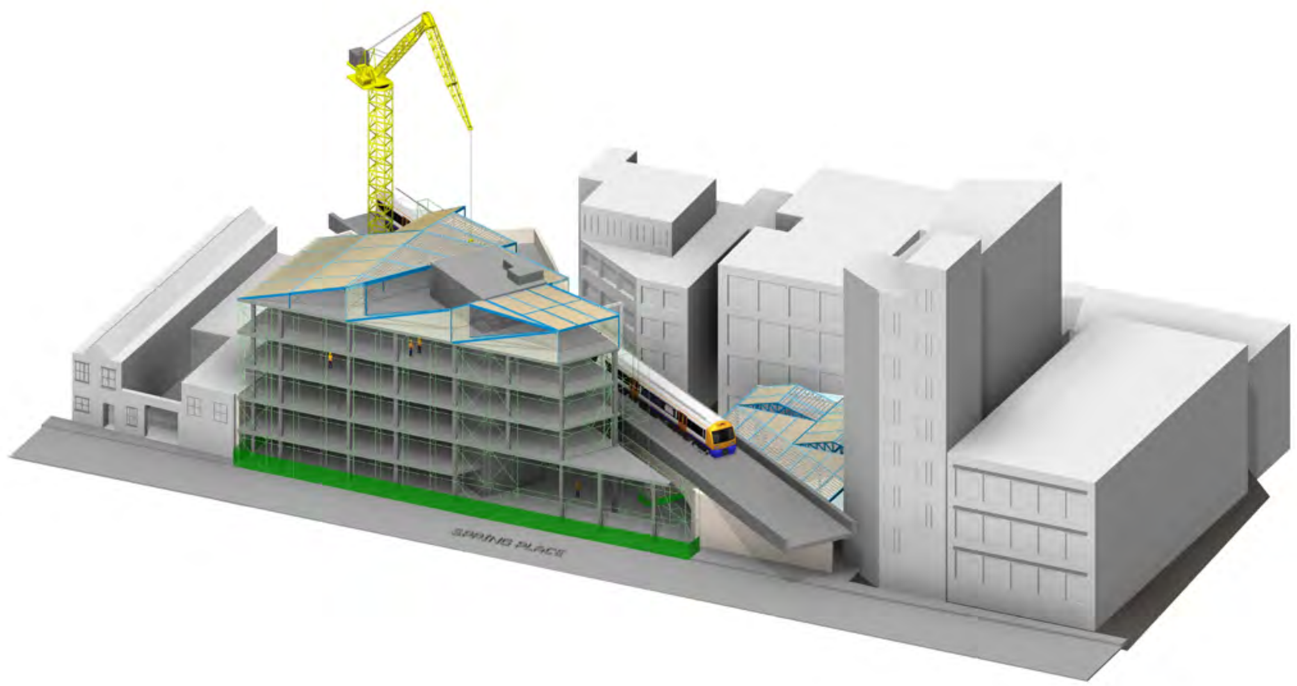
7.5 Bottom-up Construction & Superstructure

- Install buried drainage.
- Install lean mix blinding.
- Cast pile caps and suspended basement slab.
- Construct RC retaining liner walls to the underside of the capping beams using traditional formwork off basement slab.
- Sequenced removal of the ground floor propping will be undertaken to allow the installation of the ground floor structure.
- To enable the removal of the propping, the ground floor slab is required to be cast to act as the permanent prop to the basement walls.
- Blind/shutter and cast ground floor slab. The RC ground floor slab will be suspended spanning between pile caps and basement RC walls and columns.
- Continue with superstructure works from ground level upwards.
- The RC frame to be constructed using traditional shuttering and formwork, with cast-ins for the fixing of brick façade bracketry.
- The structural works are now complete and the work can concentrate on making the building weather tight, upon which the finishing trades can commence. At this stage further discussion.
- Overground viaduct structure monitoring will be carried out by Network Rail certified specialist contractor with HTS supervision.
- Movement monitoring of the adjacent properties will be undertaken by the contractor with HTS supervision.

3D Image of Basement Bottom-up Construction



3D Image of Ground Floor Completed



3D Image of Frame Complete

8 Impacts of Subterranean Development on Existing & Neighbouring Structures

8.1 Stability of Neighbouring Buildings

The proposed basement construction will be within the vicinity of the boundary with No.1-2 Spring Place (Autograph Building) and existing Overground Viaduct Structure. The basement wall will be set back from the site boundary by approximately 1.0m at the closest point.

The distance of the adjacent building from the proposed basement line will mean that the surcharge from shallow footings on the basement wall will be relatively small.

On the viaduct side the basement wall will be set back by approx. 5.5m from the face of the existing viaduct structure as advised by Network Rail.

The piled walls will be designed to support all existing building & vehicle surcharge loadings, including all construction and future vehicle loads. The internal liner wall will be designed to withstand hydrostatic pressures thereby resisting the flow of water into the basement. This will ensure stability of the ground prior to excavation, during and post construction.

To prevent lateral movement and provide lateral stability of the ground throughout excavation, new contig pile walls will be propped horizontally at the head. The capping beams will be designed to span horizontally between the propos in the temporary case. The temporary props will be located just below the proposed ground floor level and are to remain in place until the permanent basement structure is completed. The props will ensure that the surrounding ground beyond the excavation is continuously supported throughout construction.

As described above, the stability and structural integrity of the surrounding earth and the neighbouring properties will be maintained throughout construction without any structurally detrimental effect to existing conditions.

As a precautionary measure a set of monitoring targets may be installed onto the external adjoining walls with 1-2 Spring Place. These will be monitored throughout the building process for 3 dimensional movements and will act as an early warning system to identify any unexpected movement allowing time for remedial action to be taken.

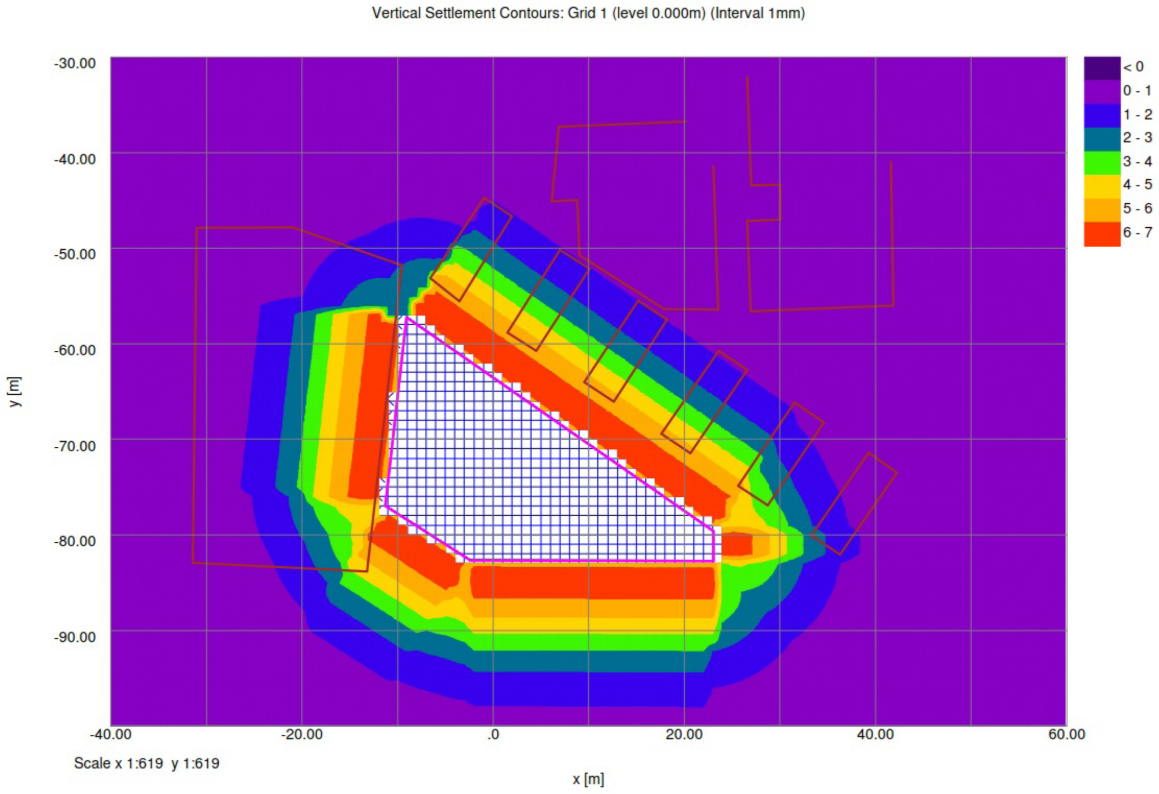
The monitoring of the viaduct structure will be carried out by Network Rail certified specialist subcontractor to Network Rail requirements.

8.2 Predicted Movements

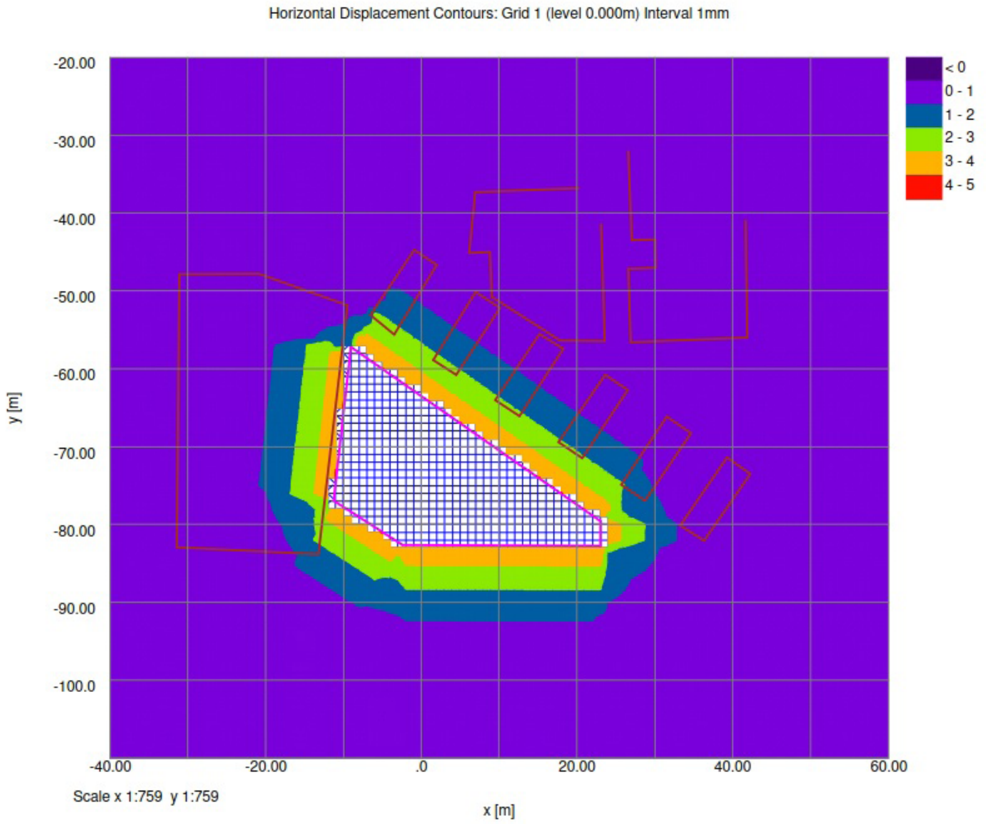
Included with the GEA BIA report in Appendix E is a report specifically related to the expected ground movement and design calculations by GEA Ltd.
The summary of this report is as follows:

The analysis has concluded that the predicted damage to the neighbouring properties would generally be between 'negligible' and 'very slight' which is acceptable and consistent with other similar London office developments.

The separate phases of work, including the installation of contiguous bored pile retaining walls and subsequent excavation of the proposed basement, will in practice be separated by a number of weeks. This will provide an opportunity for the ground movements during and immediately after excavation to be measured and the data acquired can be fed back into the design and compared with the predicted values. Such a comparison will allow the ground model to be reviewed and the predicted wall movements to be reassessed prior to the main excavation taking place so that propping arrangements can be adjusted if required.



GMA - Vertical Settlement Contours



GMA - Horizontal Displacement Contours

Appendix A

Design Criteria

Design criteria

A.1 Codes of Practice:

A1.1 Eurocodes:

Basis of Design	BS EN 1990 (EC0)
Loading	BS EN 1991 (EC1) Part 1-1 (Dead
& Imposed Loads)	
Part 1-3 (Snow Loads)	
Part 1-4 (Wind Loads)	
Concrete	BS EN 1992 (EC2)
Steelwork	BS EN 1993 (EC3)
Timber	BS EN 1995 (EC5)
Masonry	BS EN 1996 (EC6)

A.1.2 Building Regulations 2000:

- Approved Document A – Structure (2004 edition incorporating 2004, 2010 and 2013 amendments)
- Approved Document H – Drainage & Waste Disposal (2002 edition incorporating 2010 amendments)

A.1.3 Design guidance

British Council for Offices – Best Practice in the Specification of Offices

A.2 Design Loadings (in accordance with BS EN 1991)

A.2.1 Imposed Loadings:

UDL qk - kN/m^2

a. Office space	4.0
b. Corridors/stairs /landings/reception	4.0
c. Plant areas – Tenant	7.5
d. Roof (maintenance access only)	0.75

A.2.2 Wind Loadings

The basic wind speed for the site is Vb,map = 21.5 m/s in accordance with BS EN 1991-1-4 (EC1 Part 1-4).

Calt = 1.013
Cdir = Cseason = Cprob = 1.0 (Cdir = 1.0 worst case, reduce where necessary in accordance with EC1)

Vb = 21.8 m/s

Cladding and roofing designers are to utilise BS EN 1991-1-4 (EC1, Part 1-4) to determine the relevant pressure coefficients for their design

A.3 Design Life

All new structural elements will have a design life of 60 years. Long term durability of the concrete structure will be achieved by providing adequate cover to reinforcement as recommended in BS EN 1992-1-1. Painted steelwork will have a design life of 10-15 years to first maintenance.

A.4 Deflections

The deflections of the new concrete elements (in situ and precast) of the structure will be designed to meet the following criteria:

Vertical deflection of floor slabs and beams will be limited to:

Deflections under total loads	continuous = [span / 250] cantilevers = [span / 125]
Deflections under live loads	internal = [span / 350]* perimeter = [span / 500]* cantilevers = [span / 175]*

*or 20mm whichever is the lesser

Differential deflection between any two floors = +20mm

All cladding, finishes and services must be designed and detailed to accommodate the worst combination of these.

A.5 Movement

The overall size and form of the building is such that it will not be necessary to introduce movement joints within the primary structure.

A.6 Durability

Corrosion protection of any steel structures will be achieved by a suitable paint system which provides a life to first major maintenance of 10 to 15 years.

A.7 Tolerances

The frame will be constructed to be within the tolerances set down in the technical specifications and the recommendations of BS 5606. All finishes, cladding, services, internal partitions are required to be detailed to accommodate the worst combination of these. All tolerances to concrete elements are to comply with the tolerances given in the National Structural Concrete Specification (NSCS) Part 1 Section 7.

A.8 Structural Robustness

The building is Class 2B according to the Building Regulations. The proposals will consequently be designed in line with this class.

A.9 Temporary Works

The contractor is responsible for the design, installation and maintenance of all necessary temporary works to ensure the strength and stability of the building throughout the construction process

HEYNE TILLETT STEEL

Appendix B

Outline Specification

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Outline specification

B.1 General:

1.1.1

The following design elements should be in accordance with the Architects details:

- Water and damp proofing
- Setting-out
- Fire protection provided by plasterboard
- Floor separation and acoustic isolation
- Landscaping
- Internal partitions

B.2 Concrete:

B.2.1

The concrete grades to be used are as follows:

- Blinding: GEN1
- Mass concrete: GEN3
- Reinforced concrete elements, generally: C32/40
- Reinforced concrete elements, columns: C40/50

B.2.2

All formed surfaces to be Type A (basic) finish in accordance with the National Structural Concrete Specification (NSCS). Tops of ground beams to be uniformly levelled and tamped to a basic finish.
Floor slabs to be finished to tolerance class SR2 in accordance with BS 8204, with abrupt changes limited to 2mm.

B.2.3

All concrete reinforcement to be characteristic strength 500MPa in accordance with BS EN 1992 (EC2).

B.3 Steelwork:

B.3.1

Steelwork Grade S355 and Grade S275 are to be used as noted on the drawings, to BS EN 10025 and in accordance with BS EN 1993 (EC3). All hollow section steelwork to be Grade S355.

B.3.2

All connections to have minimum 2No. M16 bolts, with minimum 6mm leg length continuous fillet welds, unless specifically noted. The steelwork fabricator will be responsible for the design and detailing of all steelwork connections.

B.3.3

All steelwork to be blast cleaned to SA2½. Internal steelwork painted with 75μm of zinc phosphate primer, 75μm sealant. External steelwork to be galvanised to 140μm. All primers for steelwork to be compatible with the chosen intumescent paint.

B.3.4

All steelwork to have intumescent paint fire protection to provide the following fire resistance period:

- Generally: 60 minutes

Intumescent paint to be factory applied to new steel where possible. Where paint protection is damaged on site due to construction processes and any site welding, these are to be repaired in-situ with hand applied intumescent paint. Samples of paint on visible steelwork to be submitted to the Architect for approval prior to construction.

B.4 Temporary Works:

B.4.1

The contractor is responsible for the design, installation and maintenance of all necessary temporary works to ensure the strength and stability of the building throughout construction.

B.5 Piling:

B.5.1

The selection of pile type, design and installation will be the responsibility of the piling sub-contractor.

Appendix C

Existing Building

100mm @ A0 (50mm @ A2)

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

2 Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the above bar should be 100mm

Rev	Date	By	Eng	Amendments
P1	02.09.16	LG	SL	BIA Issue

HEYNE TILLETT STEEL

STRUCTURAL ENGINEERS

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Job Name
3 - 6 Spring Place, London

Drawing Title
Existing Site - Isometric View

Purpose of Issue **Preliminary** Scale at A0

Drawing No **1399 / P005** Rev **P1**

100mm @ A0 (50mm @ A2)

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
2. Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the above bar should be 100mm long
3. Add notes
4. Add notes

NOTE:
All existing details shown are based on archive drawings and limited opening up works. Assumptions have been made regarding existing construction. Materials, construction, framing and spans of existing slabs and walls to be confirmed during enabling works.

Existing Column Schedule

C1	203x203x46 UC

Existing Beam Schedule

B13	203x203x46 UC

Existing legend

E	Existing RC floor as indicated on drawing
e	Existing timber joists, dimensions, crs and span as indicated on drawing.
	Existing structural walls
	Existing structure below
	Existing padstone, TBC on site

Rev	Date	By	Eng	Amendments
P1	02.09.16	LG	SL	BIA Issue

HEYNE TILLETT STEEL
STRUCTURAL ENGINEERS
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Job Name
3 - 6 Spring Place, London

Drawing Title
Existing Ground Floor

Purpose of Issue **BIA Issue** Scale at A0 **1 : 100**

Drawing No **1399 / E100** Rev **P1**

100mm @ A0 (50mm @ A2)

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
2. Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the above bar should be 100mm long
3. Add notes
4. Add notes

NOTE:
All existing details shown are based on archive drawings and limited opening up works. Assumptions have been made regarding existing construction. Materials, construction, framing and spans of existing slabs and walls to be confirmed during enabling works.

Existing Column Schedule

C1	203x203x46 UC

Existing Beam Schedule

B13	203x203x46 UC

Existing legend

E	Existing RC floor as indicated on drawing
e	Existing timber joists, dimensions, crs and span as indicated on drawing.
	Existing structural walls
	Existing structure below
	Existing padstone, TBC on site

Rev	Date	By	Eng	Amendments
P1	02.09.16	LG	SL	BIA Issue

HEYNE TILLETT STEEL
STRUCTURAL ENGINEERS
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Job Name
3 - 6 Spring Place, London

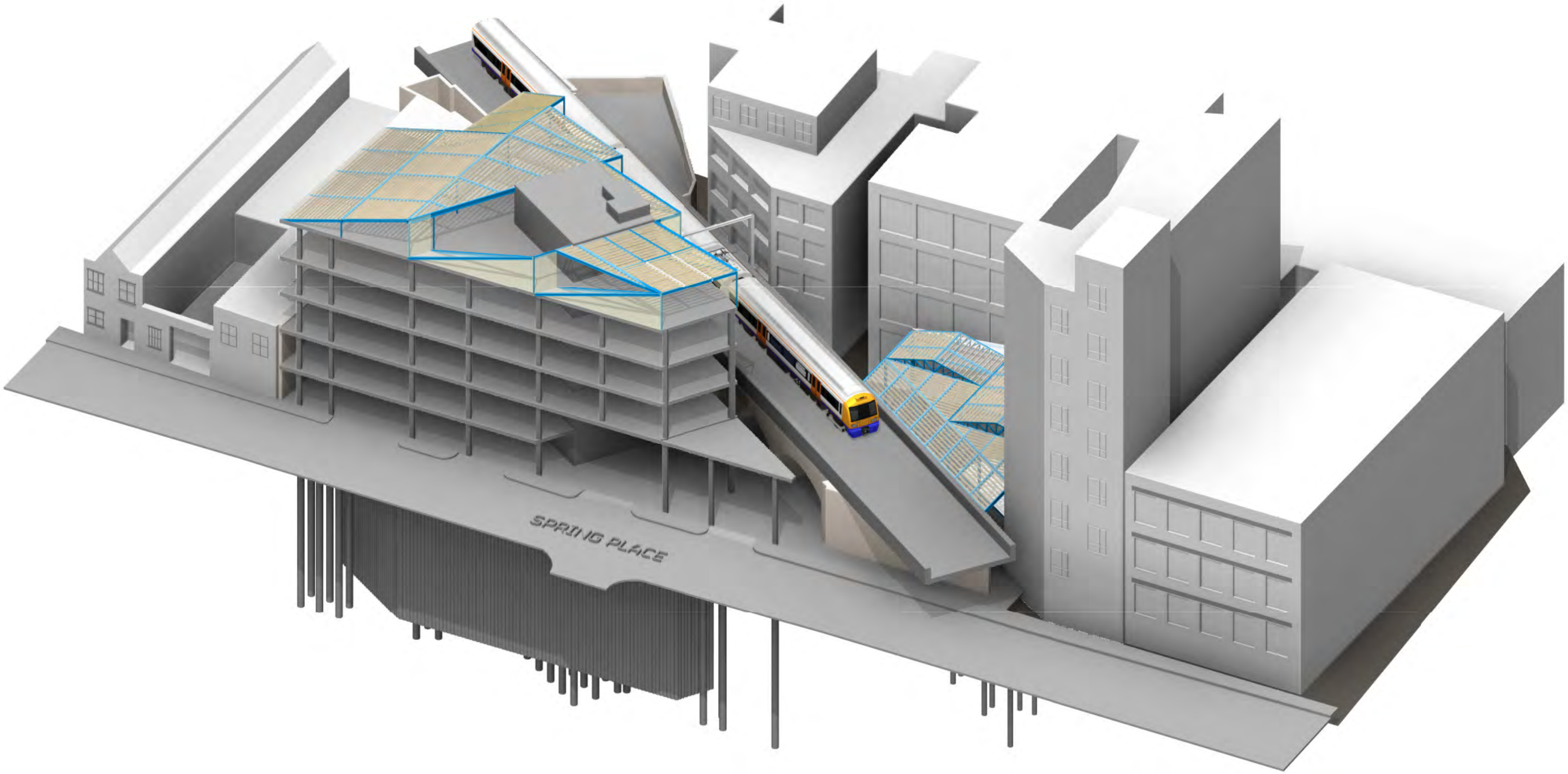
Drawing Title
Existing Roof

Purpose of Issue **BIA Issue** Scale at A0 **1 : 100**

Drawing No **1399/E110** Rev **P1**

Appendix D

Proposed Structure



100mm @ A0 (50mm @ A2)

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

2 Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the above bar should be 100mm

Rev	Date	By	Eng	Amendments
P1	02.09.16	LG	SL	BIA Issue

HEYNE TILLETT STEEL

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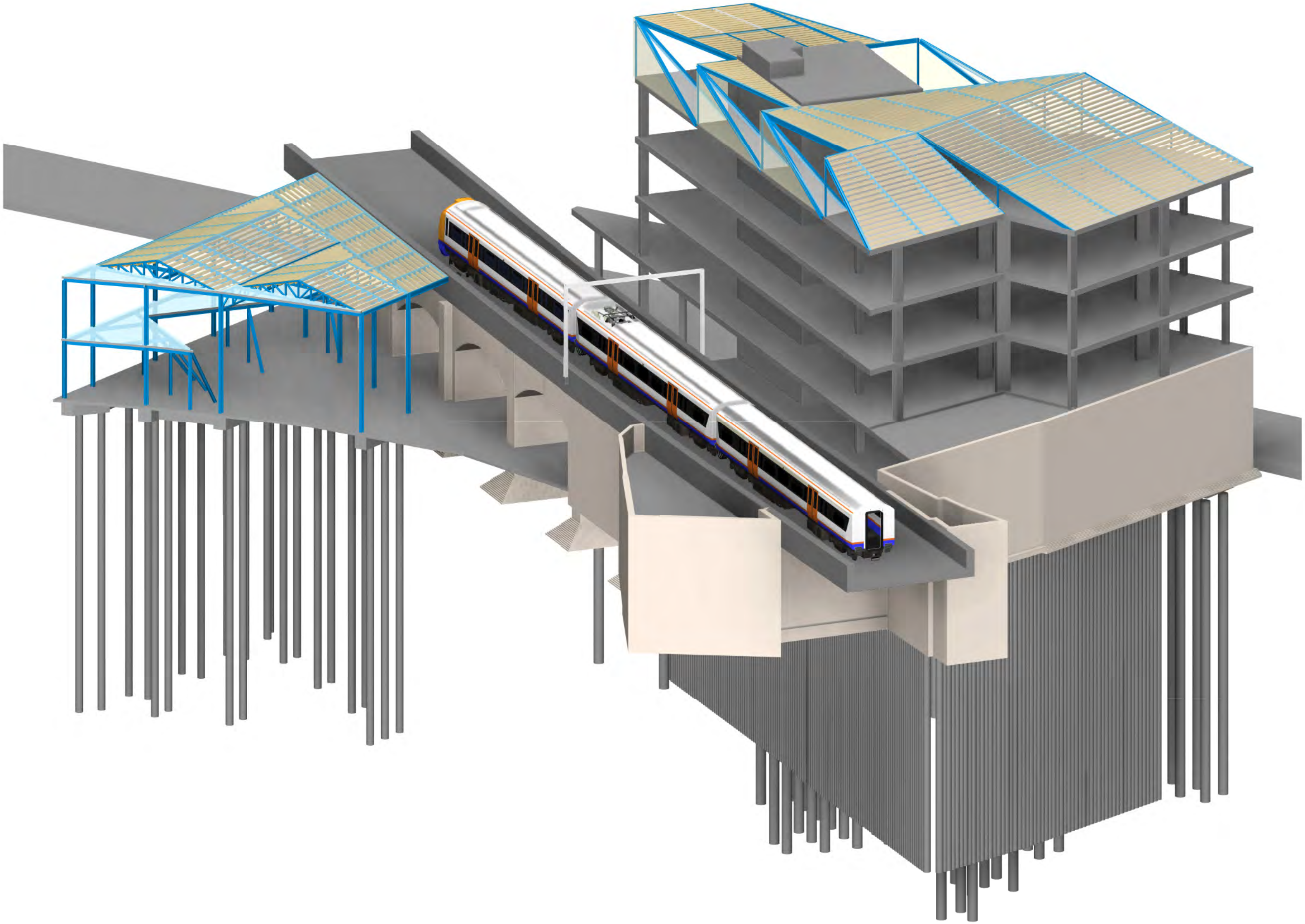
Job Name
3 - 6 Spring Place, London

Drawing Title
Proposed Isometric View

Purpose of Issue **BIA Issue** Scale at A0

Drawing No 1399 / P010 Rev P1



100mm @ A0 (50mm @ A2)

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

2 Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the above bar should be 100mm

Rev	Date	By	Eng	Amendments
P1	02.09.16	LG	SL	BIA Issue

HEYNE TILLETT STEEL

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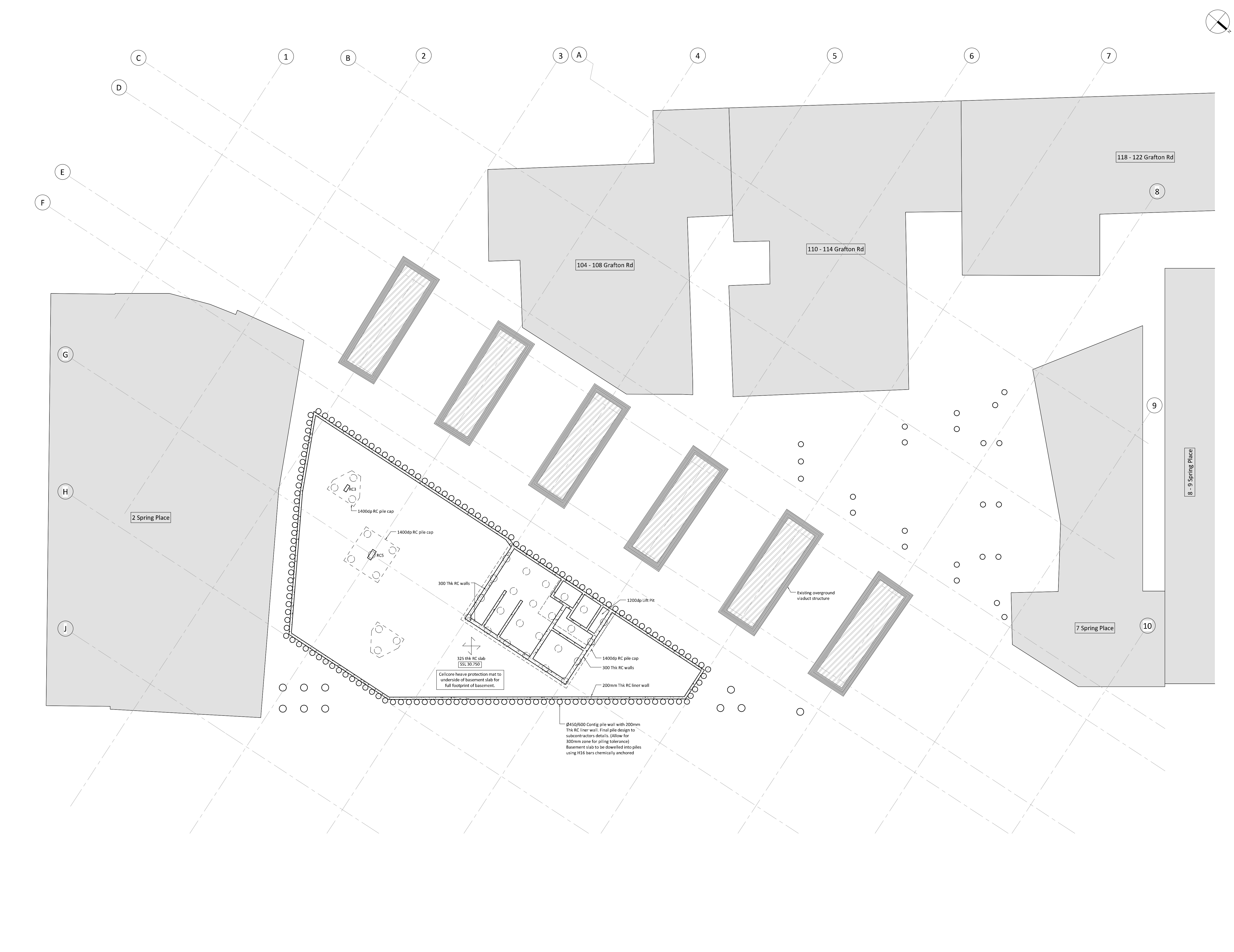
Job Name
3 - 6 Spring Place, London

Drawing Title
Proposed Isometric View 2

Purpose of Issue **BIA Issue** Scale at A0

Drawing No 1399 / P011 Rev P1



100mm @ A0 (50mm @ A2)

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
2. Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the above bar should be 100mm
3. All steelwork to be S355 grade unless noted otherwise
4. Secondary steelwork for facade support by others

Column Schedule

C1	203x203x46 UC
C2	152x152x30 UC
C3	100x100x8 SHS
RC1	350 x 500 RC
RC3	250 x 600 RC
RC4	250 x 400 RC
RC5	350 x 850 RC

Beam Schedule

B1	203x133x25 UB
B2	305x165x46 UB
B3	203x133x30 UB
B4	254x102x28 UB
B5	254x146x37 UB
B6	305x165x54 UB
B7	356x171x67 UB
B8	457x191x98 UB
B9	356x127x33 UB
B10	203x203x71 UC
B11	254x254x132 UC
B12	254x146x43 UB
B13	203x203x46 UC
B14	406x178x85 UKB

Legend

2	200d x 50w C24 joists at 400 crs with 18 thk plywood screwed to top face of joists
	Proposed RC structure
	Proposed WRC structure
	Proposed Steel Framing
PSx	PS1 - 450lg x 215wd x 150dp MC padstone PS1 - 600lg x 215wd x 215dp MC padstone

ST Connection Strengthening
C Crank
S Splice
M Moment connection
TB Thermal Break
B1 [25mm] Pre-camber
BR Break in beam

Wall Notation

All RC walls to be 200thk U.N.O

Lintel Notation

All brickwork above windows, if not supoorted by proprietary support system, to recieve Catnic standard duty angle lintels.

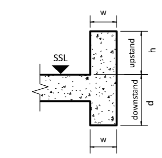
Lintels to internal blockwork walls (U.N.O) to be:

Up to 1500 span = 100dp prestressed lintel
1501 to 2500 span = 140dp prestressed lintel
2501 to 3500 span = 215dp prestressed lintel

Staircase Notation

All internal staircases to be In-situ concrete on stairmaster permanent formwork with 150mm thick waist & 200mm thick landing

Upstand/Downstand Notation



Rev	Date	By	Eng	Amendments
P1	02.09.16	LG	SL	BIA Issue

HEYNE TILLETT STEEL
STRUCTURAL ENGINEERS
hts.uk.com

Job Name
3 - 6 Spring Place, London

Drawing Title
Proposed Basement

Purpose of Issue **BIA Issue** Scale at A0 **1 : 100**

Drawing No **1399 / P100** Rev **P1**