HEAL & SON ESTABLISHED 1818 REBUILT 1854 HEAL & SON

HEAL AND SON

BEDSTEADS, BEDDING, CARPETS, FURNITURE.

HEAL AND SON BEDSTEADS AND BEDDING HEAL AND SON BED ROOM FURNITURE HEAL AND SON

10.0 | CONSULTATIONS

1. English Heritage Consultation - 30 September 2011

Meeting with Historic Buildings and Areas Adviser and Conservation Officer on site

Richard Parish from English Heritage and Catherine Bond from London Borough of Camden were consulted during the design development.

Summary

In general the proposals were well received, as the project will improve access to the more significant historic areas of the complex. Some adaptations to the proposal were discussed, and agreed, on site.

These changes, which are outlined below, have now been incorporated in the submitted design.

- Retention of existing openings and brick arches to create new seating areas on west wall of entrance passage
- Retention of the significant door in the courtyard at ground floor level. The courtyard level will be raised to provide level access through the door.
- In addition it was agreed by all that detail of the bridge connections, and the new openings in the existing external wall are critical to the success of this historic space. These will be provided as the detailed design develops.

2. Public Consultation - 15 November 2011

A public consultation was held on the 15th November. A summary of the comments raised are listed below:

- The noise from proposed new plant located at roof level
- Possible noise and dust appearance during the construction period
- Access to the site during construction

Development of Scheme

Comments raised by local residents have been considered in the development of the scheme design. John McAslan + Partners and Cundall - M+E Consultants have carefully considered the plant to be used, the enclosures, the attenuation needs to be achieved and location to reduce noise level. Also a background noise survey was carried out. Further details can be found in

- Section 5.09 - Design and Access Statement
- M+E Report - Appendix A
- Acoustic Report - Appendix F

A Construction Management Plan is submitted with this application and can be found in Appendix E.

3. Archaeological Advisory Consultation

The Greater London Archaeological Advisory Service was consulted during the design development and Kim Stabler - Archaeological Advisor has confirmed that an initial desk-based assessment is not required at planning stage. A watching brief will be instructed for the construction phase.

An archaeological monitoring exercise was conducted on the excavation of four geotechnical test pits on 10th August 2011. These were positioned towards the rear of the Heal's building which fronts Tottenham Court Road.

An Archaeological Watching Brief on Geotechnical Test Pits Excavated at The Heal's Building, 196 Tottenham Court Road, London Borough of Camden, W1T 7LQ

Site Code HBG11

Richard Humphrey, Pre-Construct Archaeology Ltd., August 2011

An archaeological monitoring exercise was conducted on the excavation of four geotechnical test pits on 10th August 2011. These were positioned towards the rear of the Heal's building which fronts Tottenham Court Road. The site was accessed by the entrance to a property at 22 Torrington Place.

The proposed development of the property includes the excavation of a lift pit. The purpose of the geotechnical test pits was to locate and define the extent of a disused fuel tank known to exist in the area.

The site is positioned within a light well and is bounded by the Heal's building to the south and west and by the backs of buildings fronting Torrington Place to the north and east. The ground level was paved with stone slabs and timber decking, flower beds and areas of landscaped cobble beds.

What follows is a description of the soil horizons observed in each test pit. Heights are given in distances below ground level (BGL) as no ordnance datum level data was available.

Test Pit 1

This was positioned in a cobble bed to the west of the area and measured approximately 0.20m² in plan. It was excavated up against a concrete wall that formed the eastern edge of a basement currently used by the Heal's store.

Modern concrete was observed at a height of 0.35m BGL and excavation ceased at this point.

This was overlain by approximately 0.15m of modern topsoil, used as a bedding layer for 0.20m of cobblestones used as part of the areas landscaped design.

Test Pit 1

Test Pit 2

This was positioned in the southeast corner of a cobble bed to the east of the central paved area. It measured approximately 0.45m² in plan. Modern concrete was seen at a height of 0.38m BGL. A cobble stone, presumed to be related to a historic surface was also seen at this height, although not thought to be *in situ* as it was bedded into modern concrete. Excavation of the concrete layer ceased at a height of 0.48m BGL.

Approximately 0.06m of a modern dark brown soil sealed the concrete surface. This was in turn overlain by 0.14m of loose, rounded pebbles used as ground raising for the landscaped area. A loosely bonded concrete bedding layer sealed this and measured less than 0.10m thick. The sequence was completed in this test pit by 0.08m of rounded landscaped pebbles.

Test Pit 2

Test Pit 3

Test Pit 3

This was located towards the eastern side of the site and excavated within a flower bed and measured 0.35m² in plan. It was positioned near to where fuel pipes were seen attached to the eastern wall of the area.

Modern concrete was exposed at 0.60m BGL. This was identified with a metal bar as the overlying horizon of loose pebbles that kept slipping into the test pit prevented clearer examination. These measured approximately 0.20m in depth and were overlain by 0.40m of modern topsoil used for the plant bed.

Test Pit 4

This was positioned approximately 2m north of Test Pit 2, in line with the fuel pipes seen on the eastern wall of the area. It measured 0.35m² in plan and was later extended a further 0.20m to the south.

Modern concrete was seen in the northern half of the test pit at 0.35m BGL. At the same height, the metal fuel tank was seen in the southern half of the test pit. This was covered with a thick plastic membrane.

Loose cobbles measuring 0.25m deep sealed the plastic membrane. These were in turn overlain by 0.06m of a loose bedding surface for the landscaped pebble bed measuring 0.05m deep.

Test Pit 4, showing edge of metal tank

Conclusions

The purpose of the geotechnical pits was to locate and define the extent of a disused fuel tank. This was partially achieved by the observation of the tank in Test Pit 4. The absence of the tank in Test Pits 1 and 2 to the west and south suggests the tank did not extend this far. No archaeological finds, features or deposits were recorded during the geotechnical investigation.

Oasis Form

OASIS ID: preconst1-107532

Project details

Project name	An Archaeological Watching Brief on Geotechnical Test Pits Excavated at The Heal's Building, 196 Tottenham Court Road
Short description of the project	An archaeological monitoring exercise was conducted on the excavation of four geotechnical test pits on 10th August 2011. These were positioned towards the back of the Heal's building which fronts Tottenham Court Road. The site was accessed by the entrance to a property at 22 Torrington Place. The proposed development of the property includes the excavation of a lift pit. The purpose of the geotechnical test pits monitored was to locate and define the extent of a disused fuel tank known to exist in the area.
Project dates	Start: 10-08-2011 End: 11-08-2011
Previous/future work	No / Yes
Any associated project reference codes	HBG11 – Site code
Type of project	Recording project
Site status	Local Authority Designated Archaeological Area
Current Land use	Industry and Commerce 2 - Offices
Investigation type	'Watching Brief'

Project location

Country	England
Site location	GREATER LONDON CAMDEN CAMDEN Heal's Building, 196 Tottenham Court Road

10.0 | **CONSULTATIONS I** ARCHAEOLOGICAL ADVISOR CONSULTATION

Postcode	W1T 7LQ

Project creators

Name of Organisation	PCA
Project brief originator	Mills Whipp
Project design originator	Mike Hutchinson
Project director/manager	Tim Bradley
Project supervisor	Richard Humphrey
Type of sponsor/funding body	Developer

Project archives

Physical Archive Exists?	No
Digital Archive Exists?	No
Paper Archive Exists?	No

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	An Archaeological Watching Brief on Geotechnical Test Pits Excavated at The Heal's Building, 196 Tottenham Court Road, London Borough of Camden, W1T 7LQ
Author(s)/Editor(s)	Humphrey, R.
Date	2011

Entered by	Richard Humphrey (rhumphrey@pre-construct.com)
Entered on	11 August 2011

APPENDICES

A | M+E REPORT

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Threadneedle Pensions Limited & The Bedford Estates

Heal's Building Redevelopment

Stage C M&E Report

Job No: 1003634

Latest Revision: R1

Date: 9 December 2011

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Document Quality Validation & History

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Contents

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Mechanical, Electrical & Public Health Services

1.0 Introduction

The Engineering Services Brief is intended to state the basis for the design of the mechanical, public health and electrical engineering services. It is intended that the document will be revised and amplified as systems evolve through discussions with the client, design team, statutory authorities, etc. such that at all times the report will provide a concise record for the current status of the engineering services design intent.

There will need to be modifications and new interfaces created to establish these links through cohesive properly engineered design solutions.

To summarise the services scope will include:

- The base build scheme will include the isolation, disconnection, removal and diversion of utility services to clear the Commercial site areas for demolition and construction
- The construction of new dedicated Mechanical and Electrical Services risers throughout the existing building including the extension in terms of area of a number of existing risers to cater for the Commercial tenants as well as the future provision for the Retail tenants
- The allocation of new rooftop Mechanical plant space to serve each riser which includes space allocation on the roof and in the riser for retail tenants
- The diversion of the existing basement level boiler room ventilation ductwork and associated terminations
- The removal of the condenser compound and all associated condensers located externally within the existing lightwell.
- The relocation of the existing sprinkler stop valves which are currently within the proposed new Atrium area
- The diversion of the basement level ductwork which is currently terminating within the proposed new Atrium area
- Bulkhead housing boiler room flues, located in the Torrington place reception, must remain.
- A natural ventilation scheme for the new Atrium area utilising motorised openings within the proposed ETFE roof structure
- A new vertical transportation scheme which will include 2no new feature lifts within the Atrium area and the introduction of a new disabled hoist in the Torrington Place reception area
- The possible decommission of lift 2 as the introduction of the new Atrium lifts and walkway will effectively render this lift redundant
- The upgrading of the existing Utility electrical supply by the replacement of one 800kVA UK Power Network transformer located in Alfred Mews with one new transformer of minimum capacity 1000kVA. The upgraded supply will require the upgrade of the Utilities Distribution Board for this transformer from 800A to 1200A per phase. (**N.B**. The original 800kVA transformer has just been replaced as it failed).
- The installation of new main low voltage switch panels to provide control and protection for sub-main supplies to the refurbished commercial office spaces, Landlord common areas, mechanical plant and future refurbishment of the retail stores and associated back of house areas. The location of this switchgear will need to be agreed.
- The installation of new rising main bus bar systems within existing and new risers.
- The installation of Moulded Case Circuit Breaker (MCCB) tap off units to the rising bus bar systems to feed new miniature circuit breaker distribution boards (MCB DBs).
- The installation of new MCB DBs to each commercial office space and Landlord common areas complete with Landlords check metering
- The installation of new sub-main electrical supplies for mechanical equipment.
- The installation of a new analogue addressable fire alarm system to serve Landlord common areas and to provide an interface device at each commercial office for the extension of the system into the offices or connection of future Tenant's own standalone systems.
- The installation of small power and lighting to designated Landlord areas, internally and externally.
- The installation of small power and lighting to tenanted commercial spaces in line with the agreed procurement route, i.e. Shell and Core; Cat 'A' or Cat 'B' fit out.
- The installation of supplies to new vertical transport facilities.
- The provision of distress alarms to disabled toilets as detailed by the architect.
- Provision of communication facilities at any refuge areas with the fire access point, as designated by the architect.

The new development of the HEAL's building provides an opportunity for delivering the principles of a sustainable development, which in the UK context has been expressed as achieving environmental protection and prudent resource use, whilst attaining social progress and economic viability.

The systems to be installed within the HEAL's commercial development must satisfy the following primary functions:-

- To provide a comfortable environment for those working and visiting the centre, whilst consuming minimal energy and consequently minimising carbon production.
- To provide flexibility and adaptability to meet tenants current and longer term retail trends.

2.0 Design Development

This report describes the Mechanical, Electrical and Public Health (MEP) services up to RIBA stage C. The relevant parts from the subsequent RIBA stages will be utilised for the hybrid planning application which is expected to be submitted final quarter 2011.

3.0 Design Criteria

3.1 Design Parameters – All Systems

Design parameters for the scheme are as detailed in the Tables below.

Typical Internal Thermal Design Criteria

	Internal Temperatures		Relative Humidity
	Winter	**Summer**	
Office Areas	22˚C ± 2˚C	22˚C ± 2˚C	Uncontrolled
Retail Areas	To be determined by tenant		
WCs	18 ˚C	24˚C ± 2˚C	Uncontrolled
Stair Cores	12 ˚C	Uncontrolled	Uncontrolled
Service Corridors	12 ˚C	Uncontrolled	Uncontrolled
Car Park	Uncontrolled	Uncontrolled	Uncontrolled
Loading Bay	Uncontrolled	Uncontrolled	Uncontrolled

Typical Internal Occupancy, Ventilation and Noise Design Criteria

	Occupancy	Ventilation	Noise Rating
Office Areas	1 person / 10m²	10l/s/person	NR38
WCs	N/A	10 ach^{-1}	NR45
Stair Cores	N/A	uncontrolled	NR45
Service Corridors	N/A	uncontrolled	NR45
Car Park	N/A	As existing	NR55
Loading Bay	N/A	As existing	NR55

Typical Internal Lighting Levels

	Lighting Levels
Office Areas	350 Lux
WCs	200 Lux
Stair Cores	200 Lux
Service Corridors	150 Lux
Loading Bay	100 Lux (300 Lux at entrance)

External Design Criteria

	Dry Bulb Temperature	Wet Bulb Temperature
Winter	-4˚C	-4˚C
Summer	29˚C	20˚C
Winter (For Plant Design)	-4˚C	-4˚C
Summer (For Heat Rejection)	35˚	24˚C

Plant and equipment Life

All systems will be designed with a plant life of 20 years. Distribution systems will have a minimum life of 25 years

3.2 Design Philosophy

The principle that will underpin the environmental design of the Heal's refurbishment is that the building fabric acts as a moderator of the external climate and the heating, ventilation and lighting installations to deal with the reduced demands of the moderated internal climate.

The building and its engineering systems for the Commercial areas are therefore being designed as a single entity, able to produce a satisfactory internal environment, with the minimum expenditure of energy. The design philosophy has four strands:

A well-insulated building fabric.

The Atrium area shall be naturally ventilated.

Heating and cooling for the Commercial units shall be either by landlord or tenant installed refrigeration/heat pump equipment.

Each tenant shall have a designated area for all VRV plant at rooftop level for heat rejection and mechanical ventilation.

3.3 Thermal Comfort

The main Atrium areas will be naturally ventilated.
All internal closed off commercial areas will be cooled, heated and mechanically ventilated as necessary.

3.4 Winter Comfort

Internal common parts such as internal corridors, toilet accommodation etc shall have the existing LTHW heating system stripped out.

3.5 Summer Time Thermal Comfort

The Atrium area shall be cooled by natural means making dual use of any roof mounted smoke vents. Analysis of the free area of these openings shall be conducted to determine their effect on peak summer time temperatures, and whether any additional openings may be needed to maintain a suitably comfortable environment.

As the project progresses to Stage D full consideration will need to be given to the radiant heat affects underneath the proposed ETFE roof structure to see if the form needs to be adjusted or additional open areas are provided to aid summer time thermal comfort, or coatings are considered for the ETFE roof to limit solar radiation.

3.6 Energy Efficiency

The design for the passive and active environmental control systems must ensure that the new buildings will meet all the requirements of the Building Regulations.

New mechanical and electrical systems will meet or exceed the minimum performance specifications with regard to efficiency as specified in the Non Domestic Heating and Cooling Guide for the commercial areas. All luminaires will have a minimum efficacy as specified in Approved Document L2A and the relevant ILE and CIBSE guidance.

A well-insulated and airtight building fabric will minimise heat loss from the internal parts of the development.

Controls will be provided that provide adequate moderation of the internal environment including lighting, which are accessible and easy to use by occupants.

Daylight is utilised in all potential areas to minimise reliance on artificial lighting. Detectors in each space will control artificial lighting automatically. Luminaires utilise high frequency control gear, which enhances the efficiency of fluorescent lighting.

3.7 Maintainability

Engineering services plant will be housed in dedicated areas at rooftop level.

Services installed in ducts will also be accessible for maintenance, through hatches or doors. Where pipework is concealed in ceiling voids or in boxing, access will still be provided by removable panels. Low voltage transformers will be provided, to facilitate the safe use of power operated hand tools.

4.0 Public Health Engineering Report

4.1 Common Areas

Foul Drainage Above Ground

The above ground soil, waste, and ventilation system shall be retained for toilet refurbishment.

Soil risers and horizontal waste pipes above ground shall be installed to allow for gravity waste disposal and shall be installed to allow for self cleansing velocities.

Capped waste, and anti-syphon branches shall be provided for office areas to allow for future tea points.

Access branches shall be provided to all vertical risers at every floor level with additional access/rodding points at change of directions for suspended pipework. Full bore access branches shall be provided.

All soil waste risers shall terminate at roof level.

Sanitary water closets shall be specified with internal overflows to allow existing WC overflow pipe work to be removed.

The below ground drainage system has been CCTV surveyed and a report on the condition submitted to the client together with recommendations for descaling and remedial drain repairs.

Surface Water Drainage

The existing above ground rainwater system shall be retained

Access branches shall be provided to all change of directions to suspended rainwater pipelines.

Vertical risers shall be provided with full bore access branches at every other floor

access branches shall be provided prior to connecting to the below ground drainage system.

The below ground drainage system has been CCTV surveyed and a report on the condition submitted to the client together with recommendations for descaling and remedial drain repairs.

A rainwater harvesting storage tank and booster pump system was reviewed. In order to obtain the required credit a maximum 5..5M3 consumption per person is required. Currently the calculated water consumption is 8.27m3 per person. Assuming the water consumption figure could be adjusted the amount of harvest water requires all the proposed new roof outlets together with a large number of existing rainwater outlets to be reconfigured and rerouted back to a central harvested holding tank where the stored rainwater requires to be filtered prior to being used for toilet flushing use.

Drainage Design Criteria

BS 6367: 1983, and BS EN 12056 Part 3 and Part 5

BS EN 752-4: 1998

The Building Regulations Part H of the Building Act 1984.

Roof Areas: Design Rainfall Intensity:

202mm / hour (2 minute duration - providing a return period of 5 years)

Terraces, and Planters: Design Rainfall Intensity: 202mm/hour (2 minute duration - providing a return period of 5 years)

Identification labelling shall identify different systems used for the rainwater systems.

Water Services

The existing mains cold water service shall be retained to provide main potable cold water for the refurbishment.

The existing cold water storage tank shall be retained and refurbishment to meet current water regulations.

The existing cold water storage booster set and water treatment plant shall be retained to supply mains cold water to the existing retail units and office male and female toilets area.

Existing booster pump controls shall be retained.

Domestic hot water is currently being generated by gas boilers and the equipment shall be retained to continue meeting the hot water demand.
Distribution from the calorifier will be achieved via gravity with a pumped return circuit being supplied for temperature maintenance.

Solar heating shall also be provided at roof level (location to be agreed) which shall assist with meeting the daily hot water demand.

Water control flow restriction devices shall be provided to hot and cold water supplies to all basins to allow for reduced water flow.

Thermostatic mixing valves (TMVs) will be provided to all wash hand basins within common areas to limit the temperature at the outlet to 43˚C.

Pressure reducing valves shall be provided to hot and cold water distributing pipe work be ensure correct water pressure is provided to sanitary fittings.

Hot and cold water supplies serving each toilet shall be provided with solenoid valves linked to lighting circuit (PIR) for on/off water control

Capped mains cold water supplies for office areas shall be provided for tenant fit out use. Water meter provision to be confirmed by client.

5.0 Mechanical Engineering Report

5.1 Retail Areas

The Retail areas are to remain un-modified, with provision only made for future risers and plant space to allow for a refurbishment(s) at a future date with separation from the ageing landlord boiler and chilled water systems.

5.2 Commercial Areas

Heating and Cooling Services

Heating and Cooling will be provided to the Commercial areas within the Heal's building via a new VRV (Variable Refrigerant Volume) system.

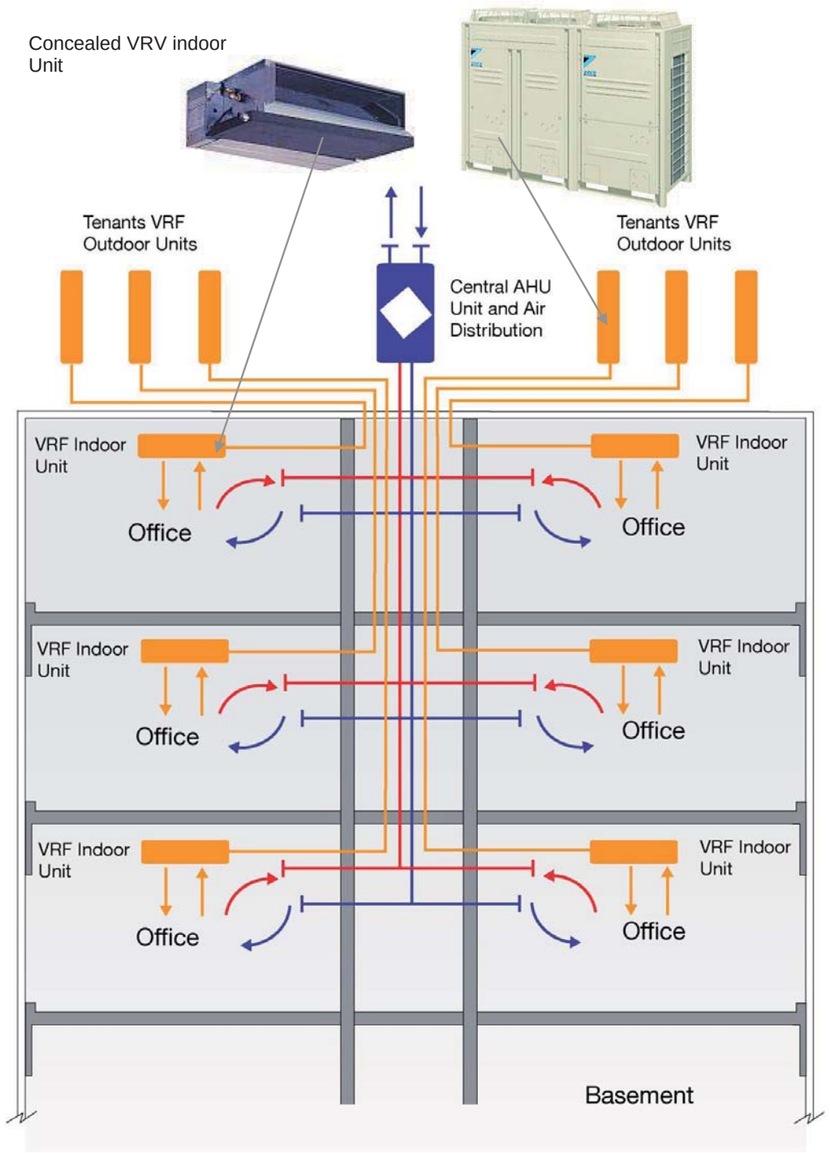
A VRV system provides considerable savings on energy, costs, and space requirements.

Indoor VRF units will be positioned in various locations within the commercial spaces i.e.(ceiling void, wall mounted or underneath windows). Outdoor units will be located at rooftop level with refrigerant pipework installed in between outdoor and indoor units with tenant mixing boxes located internally. Sufficient space has been allowed for within risers for possible future tenants supplementary cooling services.

Space allowance has been made within mechanical risers B, A+B and O&N for any future refurbishment works VRV requirements within the Retail areas at basement, ground, first and second floors.

Each tenant will be allocated adequate rooftop and riser space for external plant and refrigerant pipework respectively.

Typical Centralised AHU and VRV system integration schematic:



Ventilation Services

The Commercial office areas fresh air requirements will be supplied via a number of central air handling units located at rooftop level. The supply and extract ductwork shall be routed from roof level to each floor within new/extended risers dedicated to serve each block.

Space allowance has been made within mechanical risers B, A+B and O&N for any future refurbishment works ventilation requirements within the Retail areas at basement, ground, first and second floors.

The rooftop level Air Handling plant will incorporate heat recovery via a thermal wheel or a plate heat exchanger.

The fresh air ductwork distribution from the air handling plant will deliver air either directly into the ceiling void mounted cooling units or to separate ceiling mounted fresh air supply diffusers.

The extract ductwork system will extract vitiated air from the space via ceiling mounted return air outlets.

This system will be installed as part of the Cat ‘A’works with any modifications to suit the layout as part of the Cat ‘B’ works.

The atrium area will be ventilated naturally via louvres in the atrium roof and side walls.

Existing Mechanical Services

There are a number of removal and diversion works which need to be carried out to the existing buildings mechanical services to enable the proposed refurbishment works to proceed:

The existing ductwork from basement level which terminates within the existing lightwell will be diverted at basement level and rise vertically in existing riser E.

The riser which is currently behind the Torrington Place reception desk currently houses the central boiler plant flue and will have to remain. This is due to the continued operation of the central boiler system to provide heating service to the retail areas (see Appendix C).

The existing boiler room supply and extract ventilation ductwork which currently terminates within the lightwell will have to be diverted. The ductwork diversion strategy is shown on sketches MSK-020 & 021 in Appendix B.

It is an option to lower the slab in the basement calorifier room. This can be done but will incur significant capital cost in new plant and associated pipework reconfiguration (see photograph 1 in Appendix D).

There are currently 17no external DX condensers within the condenser compound in the lightwell (see photograph 3 in Appendix D).
The units belong to:

- 9no SOHO recording
- 7no RTKL (small)
- 1no RTKL large

The units serving these areas will be stripped out and the replacement cooling will be provided via the rooftop plant at roof level.

There will be pipework and plant stripping out to be carried out as part of the commercial refurbishment project as the existing centralised heating and cooling system is to be retained to serve the retail areas.

Building Energy Management System

Automatic Controls

Current Installation

The existing controls systems are in a poor condition, supplied by several manufactures, are nearing the end of their economic life and in some cases are obsolete. There is no supervisory computer.

New installation

All HVAC controls and instruments controlling new plant are to be replaced. An open protocol networked Building Management System (BMS) will be provided. Comprising controllers and gateways necessary to serve the new plant items, energy monitoring and additional functionality where required and / or adopted. The works will be sequenced to match the phased changeover of the plant and owing to the modularity of the BMS, changes should be achieved with minimal disruption to operating areas. The HVAC control system will require each element to be designed around the HVAC plant and / or systems that it will control and /or monitor. All elements of the HVAC control system will be set to run and operate standalone in the event of network equipment or communications failure.

The following works are envisaged to be required, the final extent will be determined as the design is developed:

- The existing MCP power and control panels will be replaced to suit the new plant installation.
- New power wiring and containment will be provided to serve motors fitted with variable speed drives (VSD's).
- New controls, instrumentation, wiring and strategies with new containment where possible will be provided to monitor and / or control:
  - Air Handling Unit (AHU) (enthalpies, CO2 and filtration)
  - Fans (faults and speed)
  - Office spaces (open plan and cellular), with the same finishes as the electrical components where available (temperature, CO2, humidity and set-point adjustment)
  - VRF monitoring and control via high level communications link
  - Water tanks (temperature and level)
  - Low Voltage (LV) panel (breakers open/closed, tripped/healthy, racked in/out)
  - Disabled toilet alarm system (alarm and fault)
  - Lift and escalator systems (alarm and fault)
  - Monitoring of fire alarm and fault conditions and shut down ventilation plant in a fire condition.

An operator workstation computer will be provided and allow user adjustment and monitoring and as a minimum the software will provide the following:

- Graphic system display with dynamic update of system parameters
- Monitor and logging of control/sensor points
- Intelligent optimum starts and stops of all thermal control systems
- Time clock stop/start
- DDC control algorithms as necessary
- Intelligent indication only of lead/lag and duty/standby plant cycling
- Password access to various security levels of BMS facilities
- Power failure restart schedule (limited to plant items that BMS can enable)
- Trend logging of incoming water flow with alarm
- Colour graphics facility and associated software
- Trend logging/historical data functions
- We recommend the following options be considered:
- All motors above 11kW will be considered for low harmonic (5%) Variable Speed Drives (VSDs)
- All new VSDs are equipped with communications cards and networked to the BMS
- All DX AC systems are equipped with communications cards and networked to the BMS

Metering

Energy metering will be provided to meet Part L of the building regulations and therefore CIBSE's guide TM:39.

"Sub-metering should enable at least 90% of the estimated annual energy consumption of each fuel to be allocated to specific energy end uses, i.e. what it is used for rather than where in the building it is used."

The data will be provided to enable the 'Energy Manager' to understand where energy is used throughout the facility.

The building's monitoring energy data will be displayed as:

- A total
- A total for each utility (electricity, gas and water)
- Utility and generated electricity
- Zoned area of usage
- Energy use (Catering, IT, etc.)

The BMS will provide a dynamic view of the buildings energy performance and will provide the following:

- Display of daily, monthly and YTD consumption of gas and electricity
- Traffic light indication against performance targets
- Carbon footprint

We recommend the following be considered:

A wall-mounted LCD screen provided in a high traffic area(s) (main entrance foyer, cafeteria or multiple) on which environmental and energy usage statistics and analyses are to be able to be displayed and explained in the form of charts, graphs and tables through an 'energy dashboard' display software using real-time and historic data provided by the BMS. Location of LCD screen to be confirmed by JMP Architects.

Such data will include:

- Carbon footprint
- Electrical energy drawn from the grid
- Electrical energy consumptions throughout the building
- Gas and water consumed
- External weather conditions – temperature, relative humidity, barometric pressure, wind speed and direction, rainfall.

6.0 Fire Engineering Services Report

6.1 Fire Fighting Systems

The extent and condition of the existing fire fighting systems provision was identified in the "Overview of Existing M&E Services" document issued on 8th February 2011.

The fire fighting systems currently existing are:

- Automatic sprinkler protection provided to the whole building, across the various demise lines and tenancies.
- Hose reels (part building only)
- FM200 system – modular system protecting the basement level transformer room

The general requirements for fire-fighting systems in terms of current legislation have been identified in the following documents:

- Cundall Fire Safety Strategy (Commercial) – Stage C document
- Cundall fire engineering strategic appraisal documents.

All of the applicable fire safety legislation post-dates the systems installed at Heals.

The base-build sprinkler and hose reel systems were originally installed in 1914, with a further extension to the sprinkler system in 1937. Although various modifications have been done to these systems in the intervening years to date, the current fire systems design standards cannot be insisted to be retrospectively applied. The approvals for the building will have been based on the existing service provision

The fire strategy document has determined that the height and floor areas of the individual building storeys are such that sprinkler protection would not be required to comply with either Building Regulations or Section 20 of the London Building Acts (Amendment) Act 1939. Camden Building Control however have the Heals Building listed as a section 20 structure. Liaison with Camden will be required to resolve this matter.

The removal of any of the existing systems to suit the new refurbishment works could be seen as a worsening of the current arrangements, meaning that the fire safety arrangements within the building as a whole would need to be reviewed. We would therefore recommend that the sprinkler system be retained within the retail sales, storage and office areas. Because the commercial offices can be structurally fire separated from the retail areas, the intent will be to decommission and remove the sprinklers in the commercial offices and undertake such system modifications that will allow this to be safely undertaken and to comply with water company requirements in terms of the system connections.

Hose reel systems are now not normally installed as part of an integrated fire protection strategy due to possibility of these being used by untrained personnel in a fire condition and their tendency to leak unless properly maintained. We would recommend that this system be removed because of this.

The FM200 system is a dedicated system protecting the basement transformer room. We would recommend that this should continue to be subject to regular maintenance checks and subject to a full service overhaul and canister/gas replacement to meet the 10 yearly stipulations imposed by the Pressure Equipment Directive (97/23/EC).

The building does not have the benefit of dry rising main systems which are required in retail buildings where the height of the topmost storey exceeds 7.5 m, with the floor area of any storey above the ground storey is not less than 900 m2. Although these cannot be retrospectively required to comply with building regulations requirements, the fire authorities could insist on such systems being installed to meet the requirements of the Regulatory Reform Act 2005.

This act came into force on 1st October 2006 and amended and consolidated a significant number of areas of fire safety law that previously were in place such as the Fire Precautions Act 1971 and the Fire Precautions (Workplace) Regulations 1997.

The Order places a general duty of fire safety care on employers, occupiers and owners of almost all premises and requires them to provide and maintain adequate fire precautions. Responsibility for complying with the Fire Safety Order rests with the 'responsible person'. In a workplace, this is the employer and any other person who may have control of any part of the premises, e.g. the occupier or owner.

For this reason, we would suggest that the integration of dry rising mains should be considered as part of the fire protection strategy. This is especially relevant if the hose reel system is to be removed. Such considerations can be further developed as part of the overall fire safety strategy for the building.

The sprinkler system arrangements will need to be developed by specialist LPCB approved contractors, who will have ultimate design responsibility for the system as will be detailed in the main works specification document.

It would be prudent to make them also responsible for the removal of the hose reel system and the introduction of dry risers (if agreed) as part of a contractor design portion supplement (CDPS) or by other agreed means formalising design responsibilities.

6.2 Automatic Sprinkler system

The intention is to remove the Sprinkler system from the commercial office areas. The sprinkler system will be retained in all other areas deemed as being used for retail purposes

A suitably qualified LPCB approved company, as listed in the list of approved Fire & Security products and services (as issued by BRE Global Ltd) shall be employed to design, modify, coordinate, fabricate, install, test and commission the sprinkler system.

Because of the need to retain the existing retail area sprinkler system and the system water supplies arrangements, it would not be the intention require the certification of the system under the LPS 1048 scheme.

The sprinkler system modifications should however be designed in accordance with the following standards and supplementary information:

- BS EN 12845:2004 +A2:2009 / LPC rules and technical bulletins.
- BS 8519:2010 - Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications – Code of practice
- BS 5839-1:2002 - Fire Alarms Code of practice (Sprinkler system interfacing requirements)
- BS 9999:2008 - Code of practice for fire safety in the design, management and use of buildings
- The approved Fire Safety Strategy document
- The fire alarm/detection cause and effect document covering the project
- Statutory requirements
- Local authority by-laws

There will be some alterations needed to the existing sprinkler system water supplies provision to meet water authority requirements in order to safeguard public health. The piping is also reaching the end of its natural life and there will be a number of areas (subject to detailed site inspection) where this will need to be renewed; especially where lead joints exist or where connections need to be made to link the new system to the old; or of course where backflow prevention to the Town's main supplies need to be incorporated.

The existing sprinkler water supply provisions would be classed as a "single" supply under current design guidance - although at this stage with the capacity of the Town's mains unchecked, it is unclear as to whether the supply is adequate in providing sufficient water to the sprinkler system. Where booster pumps are used to increase the available pressure of a Town's main connection a flow rate equal to the maximum system demand plus 20% (minimum) at a minimum inlet pressure of 0.5 Bar must be available. Confirmation on this point will need to be established.

Given the constraints on available space to install replacement sprinkler pumps and water storage tanks, the intention is to retain the two individual pumping units, which are noted to be around 7 years old, and to modify and replace the supply and delivery piping to and from these units to ensure compliance with water authority requirements and where thought to be in danger of mechanical failure.

These pumps, being electrically driven should really be provided with dual sources of power supply via mains supply connections and links to an emergency life safety generator. We did not see any evidence of dual supplies being available and this is something which will need further consideration.

The supply of water to the existing sprinkler installation appears to be taken from 3 No 150mm Ductile Iron connections from the Towns mains located in Tottenham Court Road and Torrington Place. The Towns mains were apparently upgraded in recent times as 400mm HPDE supplies (TBC) with the existing ductile connections fixed into these new mains.

With reference to the existing block plan details in the sprinkler valve chambers, it is thought that the main in Tottenham Court Road originally had an additional 150mm connection, but it is unclear whether this still is connected to the sprinkler system. For the avoidance of doubt, it should be assumed that this mains connection is still live.

We were not able to locate this additional feed and opening-up works may be needed to fully confirm if this supply still exists.

Two of the town's main connections serve individual mains water booster pumps, which in turn supply water to a common manifold (thought to be a ring main).

The third and possibly fourth Town's main connection/s form a direct supply into the common manifold/ring main, which runs across the site at basement level (both at soffit height and below ground) and additionally at ground floor level.

There are 7 No sets of main sprinkler system installation control valves (ICV's), plus 2 No sets of tail end air valves protecting the Car Park and delivery bay areas. As the main retail part of the building is not to be refurbished currently and the system piping to the commercial offices is linked to these valves, it is the intention to retain these ICV's in situ.

Note that the existing water supplies are not suitable to serve a high-hazard sprinkler system of the type used to protect high piled storage in storerooms, on loading bays or on delivery Lorries.

Any new sprinkler heads used shall be of the quick response type, having an RTI of less than 50 to increase the reliability and response time of the new installed protection.

6.3 Hose reel system

This system takes its water from a 50mm supply branch from the Town's main in Torrington Place.

This is configured as a direct connection feeding a hose reel booster pump - but has inadequate backflow prevention.

The complete system, including hose reels and distribution piping is proposed to be removed. The mains water supply is to be blanked off to prevent further use and the possibility of back contamination of the water supplies.

6.4 FM200 system

Retain as currently installed in the basement transformers and subject to major overhaul no later than 10 years from the date of original installation to comply with PED regulations.

6.5 Dry riser system

We recommend the provision of dry rising main installations to enhance the fire protection systems provision at Heals.

If approved for incorporation, the dry rising main systems will be designed in accordance with the following standards and supplementary information:

- BS 9990:2006 - Code of practice for non-automatic fire-fighting systems in buildings.
- BS 9999:2008 - Code of practice for fire safety in the design, management and use of buildings
- The approved Fire Safety Strategy document
- The fire alarm/detection cause and effect document covering the project
- Statutory requirements
- Local authority by-laws

If the dry riser systems are required to be electrically monitored then the following standards shall additionally be applied:

- BS 8519:2010 - Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications – Code of practice
- BS 5839-1:2002 - Fire Alarms Code of practice (Sprinkler system interfacing requirements)

Dry rising main installations are to be installed within all stair cores that could be classed as suitable for fire fighting purposes in accordance with the fire strategy

A dry riser is in effect an empty vertical pipe, which becomes a fire fighter's hose extension used to supply hydrant valves at each floor level. These systems provide the Fire service with a readily available means of quickly delivering considerable quantities of water - either to extinguish or to prevent the spread of fire within the building.

Each dry rising main would be fitted with inlet connections at ground floor and landing valve outlets at all floor levels within the building. In the majority of cases, landing valves are not fitted at ground floor level, but any such omission will need to be agreed in principle with the authorities. The basements are not of sufficient depth to require falling mains, but consultation on this point with the Authorities is suggested to formally clear this point.

In- line isolation valves are to be allowed at 10 metre intervals. These will be set in the open position for normal operation and be fitted with a padlock and chain to prevent inadvertent isolation. The valves will be fitted with tamper switch facilities, to allow electrical monitoring of the system if required by the end user at any future date. It is not however proposed to monitor the operation of these valves at this time

Provision of a secondary breeching inlet to each dry riser could be considered but given the proposed position of the primary breeching connections, these are not thought to be necessary. Confirmation approval from the authorities will be required.

7.0 Electrical Engineering Report

7.1 REC Electrical Supplies and Infrastructure

Existing Utility Infrastructure
The existing utility electrical supply is provided by UK Power Networks, (formally EDF), and consists of 1 no. 800kVA 1100/400v transformer located within the basement of Block O/N, and 1 no 1000kVA 1100/400v transformer located within the basement of Block G. We have been verbally informed that the two transformers are dedicated to the heals buildings but this should be confirmed by the Landlord.

As the refurbishment comprises of an upgrade to the mechanical ventilation and cooling requirements of the commercial offices and the introduction of additional vertical transportation and up-to-date power and data services infrastructure for the offices, the transformer capacity of Block O/N will need to be increased to 1000kVA. This transformers distribution board will also need to be upgraded from its original 800A per phase capacity to 1200A per phase to enable the increased load to be accommodated.

The supplies from the transformers will be terminated onto new main low voltage switchgear located adjacent, to serve all elements of the site including retail units, landlord areas and commercial spaces.

LV Cabling Infrastructure
The site houses considerable electrical infrastructure regarding low voltage distribution and consists of a number of low voltage switch panels which distribute supplies to both retail and commercial units via a number of risers.

In the main, supplies to the retail units Heals and Habitat, are afforded by on floor distribution boards fed from dedicated switch panels. Supplies to the commercial offices and Landlord areas are generally fed from rising main bus bars with tap off units feeding local distribution boards.

The Landlord has recently installed individual check metering to each tap off unit and it is proposed to maintain this arrangement. Any new supplies required to feed mechanical plant will also be subject to additional Landlord check metering.

Much of this infrastructure associated with the retail element will remain operational and therefore cabling must be protected throughout any works on site.

New Power Supplies
It is anticipated that new supplies to the existing office floor plate areas will be required and there will be a requirement for new supplies to roof top mounted mechanical ventilation and cooling plant.

The preliminary load calculation has been assessed on the following basis:

- The existing office demised areas have a gross internal area in the region of 6250m^2. Using a rule of thumb calculation of 100watts/m^2 for the fit out of office space with lighting, power mechanical ventilation and comfort cooling this gives a total undiversified power requirement of circa 625KW (780kVA at a power factor of 0.8).
- The existing Landlord demised areas have a gross internal area in the region of 5000m^2. Using a rule of thumb calculation of 30watts/m^2 for the fit out of Landlord spaces with lighting and power including lifts, this gives a total undiversified power requirement of circa 150KW (187kVA at a power factor of 0.8).
- The existing retail demised areas have a gross area in the region of 6600m^2. Using a rule of thumb calculation of 150watts/m^2 for the fit out of retail space with lighting, power, mechanical ventilation and comfort cooling this gives a total undiversified power requirement of circa 990KW (1240kVA at a power factor of 0.8).

Based on these factors the maximum undiversified demand for the whole development, including the retail areas, has been assessed to be in the order of 2.2MVA, which would be an increase in capacity of some 400kVA.

At this time we have concluded that the one of the existing transformers will need to be replaced with a unit of at least 1MVA. This will have a knock on effect with regards to switchgear and the distribution of supplies, i.e. existing switchgear and rising mains undersized for the increase in capacity requirements.

As this report is primarily concerned with the commercial offices refurbishment, the load profile for this aspect of the project is assessed at 967kVA and the associated switchgear and the distribution of supplies should be suitably sized in relation to it.

It is envisaged that these load profiles will be assessed in further detail during the development of the design.

7.2 Tenant's Electrical Supplies

Each office accommodation is presently provided with a low voltage supply generally fed from the Landlords rising main bus bar set up via tap off units located in associated risers and terminated into miniature circuit breaker distribution boards (DBs) either within the riser or in the individual offices. Most DBs are of an obsolete manufacture and will be replaced with new units of sufficient capacity to accommodate all the proposed mechanical and electrical installations.

Each of the existing supplies are presently being fitted with a Landlords check meter. It is proposed to renew all tenant's supplies with upgraded capacity to accommodate comfort cooling and modern IT intensive office space, utilising the Landlords check metering arrangements for billing purposes. New Distribution Boards will be installed within each associated office demise.

7.3 Landlord's Electrical Supplies

The existing Landlord rising main bus bar systems utilised throughout the site will be stripped out and new up-graded rising main bus bars will be installed within new and existing risers as necessary to serve all commercial offices and Landlord equipment including centralised fresh air mechanical ventilation. The bus bar systems will be complete with new Moulded Case Circuit Breaker (MCCB) tap off units. New Landlord DBs will be installed within the risers as appropriate to the area they are serving.

It is proposed to serve all retail units including Habitat and Heals department stores from separately metered supplies direct from the appropriate main low voltage switchgear.

Metering and sub-metering will be provided to all retail and commercial units in accordance with Part L of the Building Regulations, all linked to a Building Management System (BMS) to allow the Landlord to record and manage the electrical energy consumed on the site.

7.4 Life Safety Plant & Equipment

Back-up secondary electrical supplies are required to serve all items of life safety equipment.

At this time it is expected that life safety equipment will include:

- Fire Alarms

The fire alarm system control panel will be complete with an integral battery to provide the necessary back up in the event of a mains failure.

7.5 General Lighting and Emergency Lighting

It is not yet clear as to how the development is to be procured and whether the commercial spaces are left as shell and core or fitted out to a developers Cat A fit out , with the installation of suitable lighting for an open plan environment

If a Cat A fit out is to be installed then lighting will be installed to provide a compliant scheme in the offices and a functional and again compliant scheme in the circulation areas. Luminaires will be selected to complement the building architecture and interior design. All lighting will be linked to localised daylight sensors. Low energy lighting strategies will be utilised to provide the required ambience. This is likely to result in a combination of LED and fluorescent sources.

Lighting control will in the main be accomplished via PIRs and photocells for daylight linking, with luminaires supplied with Dali dimmable ballasts. During out of hours the luminaires will be switched off and only energised when a PIR is activated. Once activated they will energise to full output for a predetermined period and then switch off.

Emergency lighting batteries are to provide a continuous base level of illumination for a duration period of three hours.

The system will be designed to fully comply with the requirements of BS:5266 and give protection against both mains and local circuit loss of supply.

Maintained exit signs will be located throughout complete with pictograms and legends agreed with the fire authorities. The location of signage will be in accordance with the architect's fire strategy plan.

7.6 External Lighting

External lighting will be designed to provide an enhanced degree of personnel comfort and safety and provide specialist feature lighting to new external facades and features and will be developed with any appropriate input from our specialist lighting section, Cundall light4.

7.7 General Small Power

General small power will be available within the common areas. Cleaner's sockets will be provided, wired on separate circuits and protected by residual current circuit breakers (RCBOs).

If the procurement route is for a Cat A fit out then there will not be any small power installed within office accommodation except for cleaners sockets. The tenants will be responsible to install their own power distribution system from the relevant distribution board.

Suitably sized power outlets, protected to IP65 rating, will be provided as necessary at roof level for Landlord mechanical plant.

7.8 Wiring and Provisions for ICT (Integrated Solution)

There is no scope at present for any data wiring or containment. This element may be introduced at a later stage depending on the procurement route undertaken by the client.

7.9 Intruder Alarms

It is not envisaged that the Landlords intruder alarm system will be altered and it shall remain as is.

Any tenant intruder alarm systems will be installed by themselves.

7.10 CCTV

It is not envisaged that the Landlords CCTV system will be altered and therefore it shall remain as is.

Any tenant CCTV system will be installed by themselves.

7.11 Other Alarms

Distress alarms will be provided in all common area disabled WC facilities and will have local audio visual alarms as well as a remote signalling link to the security office. Lift alarms will also be linked to the security office.

Disabled refuge alarms, if the fire strategy demands them, will be provided and be installed to all disabled refuge points and monitored from the security office.

7.12 Access Control

The Landlords access control system will be amended to suit the new reception layout with additional door control where deemed necessary.

Any tenant access control system will be installed by themselves.

7.13 Fire Alarm and Smoke Detection System

A new automatic addressable Landlords "house" fire alarm system will be provided to comply with BS 5389 for a category L2 system, BS 8300 and BS 9999, in all common Landlord areas for this refurbishment. The system will be monitored and controlled from a main control panel located in the security office.

Office accommodation will be provided with interface devices to allow connection of tenants own installations to the "house" system. This could be either as an extension of the house system if capacity allows or indeed their own standalone system.

The systems will be interfaced with motor control centres (MCC), lifts and existing related equipment such as gas valves etc. Interface devices shall be isolatable at the main control panel when testing of the system is undertaken so as to prevent the devices from operating.

The fire alarm system will incorporate a battery backup for 72 hours in the event of mains failure.

A fire alarm interface unit will be provided to each retail unit.

7.14 Earthing and Bonding

All relevant metal construction elements including structural steelwork will be earthed and bonded as required by BS7671:2008, IEE Wiring Regulations 17th Edition.

7.15 Lightning Protection

A lightning protection system to BS EN 62305: 2006 will be provided to protect building and contents.

Transient overvoltage protection will be provided to the main incoming supplies.

The lightning protection system will consist of roof termination tape network running along the roof levels and bonding all the roof metalwork.

Connections are to be provided for tenant plant.

The choice of air terminations, down conductors and earth electrodes will all depend upon the structural construction and external finishes, to be determined. The new installation shall be linked to any existing system.

8.0 Vertical Transportation Report

General

8.1 Introduction

This report has been produced to establish the optimum lift configuration required to provide an improved operational quality of service for the Heal's Commercial offices.
The Heals / Habitat Store, itself is serviced by a number of lifts and is therefore not included in this report.
As the proposed lifts would serve Ground to 4th floor only, the Private Recording studios 1 & 2 in the basement and the Yellow Door offices on the 5th floor are also excluded from the calculations. Both of these offices are served by a dedicated single 1000kg passenger lift. (Requires refurbishment or replacement).

Glossary of Terms

The following terms are used in the report:

- Average Waiting Time (AWT).
  - The average time a prospective passenger waits at a floor before being able to board a lift.
- 5 Minute Handling Capacity .
  - The percentage of the building population that the lift system can move into the building in peak 5 minutes.
- Average Capacity Factor .
  - The average car fill percentage on departing the home floor.

DESIGN CRITERIA & STANDARDS

The lifts have been designed to the following design criteria and current standards.

Design Criteria

- Up peak arrival rate – 15% during peak 5-minute period. (BCO 2009)
- Maximum car load 60% of capacity. (BCO 2009) (normally 80% but reduced to 60 for glass lift cars)
- Target up-peak interval time (time between successive departures from main lobby) for passengers arriving at main lobby during peak period of 25 seconds with maximum allowance of 30 seconds. (BCO 2009)
- 10% Stair Factor.
- Client/Architectural aesthetic requirements.

Standards

- CIBSE Guide D – Transportation Systems in Buildings.
- BS ISO 4190-1 1999.
- BS EN 81 – Part 1 1998 - Electric Lifts.
- BS EN 81 – Part 70 2003 – Accessibility.
- Equality Act 2010, (Formerly the Disability Discrimination Act (DDA).
- Building Regulations Approved Document M.

Observations

The proposed lift lobby with comprise of two new passenger lifts with a glazed lift car installed within a glazed "Feature" lift shaft. The lifts will be controlled as a duplex pair with entrances to the front and rear of the lift car (Open through) The lifts will serve 4 newly created link levels, to each floor level.

The majority of traffic will be visitors & staff. There are additional lifts which would provide movement of goods in an FM duties.

Building Set Data

Level	Description	Floor to Floor Heights (m)	Population Per Floor
Entrance Level G	Main entry (Torrington)	4.163	*N/A*
Level 1	Offices	2.960	*60*
Level 2	Offices	2.930	*100*
Level 3	offices	2.940	*135*
Level 4	offices	Total 12.993	67
			Arrival rate 15%
		Up peak population during a 5 minute period	54

Populations have

8.2 Traffic Patterns

- Passenger lift simulation - Up peak and two traffic analysis to determine number and size of lifts required.

- Up-peak traffic flow is high during the morning and evening staff working periods between 8:00 and 9:00am and 5.00 to 6.00 pm. (Note; Current evidence suggests that the arrival time periods can extended due to flexible working patterns which can reduce the actual peaks)

- Two way traffic flows are increased during lunchtimes and the lifts should cater for this traffic.

The up-peak traffic profile is quick to rise and quick to fall. The lift installation must be able to handle the peak times, if a satisfactory service is to be provided. Industry practice is to size a lift installation to handle the number of passengers requesting service during the heaviest five minutes of the up-peak traffic condition.
If the up-peak traffic pattern is sized correctly, generally all other traffic patterns will be adequately served.

8.3 Lift Design Considerations

Car Size

- Disabled person requirements in accordance with the Equality Act 2010 (formally DDA Act). The minimum internal car size is 1100mm wide x 1400mm deep x 2000mh – equating to a car size of 8

person / 630kg, however this is usually considered small for office blocks and in actual use only accommodates 3-4 persons. We recommend minimum sizes of 10 or 12 person lifts for such applications. (800-900kg).

- Passenger lifts sized to accommodate wheelchairs and mobility impaired persons.
- Glazed lift cars typically fill to lower capacity percentage (60%).

Shaft Sizes

For lifts with a capacity of 900kg a nominal shaft size of 2000mmw x 1920mmd will be required. Pit depth 1200mm. Headroom will typically be 3600mm measured from the top floor served.

Car Speed

The speed of the passenger lifts should be no slower than 1m/s which has become the industry standard. Due to the glazed feature of the lift a faster speed may not be desirable as anecdotal evidence suggests that glazed lifts fill to a noticeably lower capacity particularly with a fast speed.

Door Size

Larger doors allow for quicker passenger transfer time

- Larger doors increase the door opening and closing times.
- Disabled access - minimum requirement of 800mm clear opening. (900mm recommended)
- Centre opening doors have quicker opening and closing times than side opening doors.

Recommendation

- Passenger lifts - two-panel, 900mm wide x 2100mm high, centre opening doors

Noise

It is recommended that the lift systems are designed to minimise background noise and vibration. Although the modern range of MRL type lifts offer considerable savings in space
The drive unit is mounted within the lift shaft and therefore perceived noise levels can be higher than conventional traction lifts.

Lift Type

Machine-Room-Less

With this type the hoisting machinery is located within the lift shaft, removing the need for a machine room. The benefits of this system are related to the space and cost.

8.4 Lift Traffic Simulation Results

The following summaries have been calculated using “Elevate 8.2” (lift traffic simulation).
Simulations indicate that the following lifts will provide the desired level of quality :

New Passenger Lifts

The passenger lifts have been sized on the peak 5 minute period during visiting hours; this assumes an arrival rate of 15% of the overall building population.

Two calculations have been carried out, the first based on one lift, and two lifts as per the architects scheme drawings.

Lift capacity and speed	Average waiting time (s) with 1 lift	Average waiting time (s) with 2 lifts
900kg capacity lift @1.mps	103.2 (unacceptable)	25.1 (Good)

As it can be seen the preferred option is for two lifts in order to meet the BCO 2009 requirements.

8.5 BREEAM

Energy Efficiency Performance objectives

Consideration has been given to the various types of “fit for purpose” lifts available in order to offer the most energy efficient installation in accordance with BREEAM energy guidelines.
To achieve one credit a traffic analysis way carried out (see first section of this report)
The following lift types were considered as being the most suitable for this type of relatively low rise building.

1. Hydraulic passenger lifts.
2. Motor room less electric traction lifts.

Energy Evaluation

Based on the traffic analysis results two 900kg lifts are required.

900kg and capacity passenger lift.	Hydraulic	Mrl Traction
Speed	0.63 m/s	1.0 m/s
Motor size (kW)	13.6	9.6
Typical current required (starting)	58 amps	37 amps
Typical current required (running)	32 amps	21 amps
Main fuse size	35 amps	25 amps
Energy consumption (kWh p.a.)100,000 starts	5000kWh/year	1870kWh/year
Thermal losses (kW)	3.7	1.2
Noise level	66dBa	60dBa

To achieve 2 credits the following energy efficient features have been evaluated to achieve the three that offer the greatest potential energy savings.

a. The lifts operate in a “standby” mode during off-peak periods. (e.g. the car lighting, control circuits and fans may automatically switch off if not used for a pre-determined period).

b. The use of efficient variable voltage variable frequency controllers for starting and slowing the drive motor.
c. Motor room less electric traction lift with variable voltage / variable frequency starting and slowing including a regenerative unit to return energy back to the grid during operation.

d. The use of energy efficient lighting and display illumination (> than 60 Lumens/Watt or fittings consuming less than 5W (e.g LED’s).

Counterbalancing ratio.

It is acknowledged that many passenger lifts do not actually fill to their rated capacity in use.(notional capacity*)
In view of this the lift manufacturer should consider reducing the counterbalance ratio from 50% providing this does not result in a loss of traction. As shown below a reduction in the counterweight mass will only reduce the motor size slightly and subsequently the energy consumed, however more significant savings could be achieved due to a reduction in the out of balance mass moved during periods when the lifts are used with a minimal occupancy.

The output (R) of a lift motor with an efficiency (η) is related to the out-of-balance load (B) and rated speed (v) by: $R = 0.981 \times \frac{B \times v}{n}$

Motor calculation for counterweight @ 50% = R =0.981 x 50 x 1000 x 1.6/90 = 8.2kW
Motor calculation for counterweight @ 45% = R =0.981 x 55 x *800 x 1.6/90 = 7.6kW

Due to the size of the lifts the anticipated usage a ratio of no higher than 48% can be achieved.

Conclusion

Two no lifts with a capacity of 900kg (12 persons) will provide a good level of service based on the known criteria.

The energy efficiency evaluation indicates that an Mrl traction type lift incorporating the features a, b, and d from the above list will offer the lowest level of energy consumption.

Passenger Lift type.

Capacity	900kg 12 persons.
Car Size	1400mmW x 1500mmD x 2200mmH.
Door Width	900mmW x 2100mmH.
Control	Duplex collective.
Travel	Approx 12.993 metres.
Serving	Five floors, with Five entrances (open through configeration).
Speed	1.0 m/s.
Finishes	TBA (controls to meet Equality Act 2010 (DDA requirements).

8.6 Challenges for Stage D - MEP Design

At Stage C of the project we have identified the following technical and design challenges which we will face in moving forward towards stages D and E:

- Development of plant-rooms, distribution routes and risers.
- Development of services routes and distribution strategies in agreement with the architect and client.
- London Borough of Camden planning approval for rooftop Mechanical plant.
- If the sprinkler system is decommissioned and removed then additional fire precautions may be required to ensure that the level of fire safety is not reduced from those existing. These could include the provision of dry rising mains and the introduction of additional emergency means of escape and fire separation.
- If the sprinkler system is decommissioned and removed then there may well be Insurance obstacles to overcome; plus Building control application issues to deal with for both the retail operations and multi-tenanted offices
- If the sprinkler system is decommissioned and removed then the existing hose reel system may need to be retained – currently suggested to be removed
- If the sprinkler system is retained then the replacement installation will need to be zoned to reflect mixed use operations and to allow phased replacement to suit the main project programme. These issues can be overcome by intelligent design and zoning related to the Client's development programme requirements.
- The sprinkler system infrastructure dates back to 1914 and as such there will be some water supply replacement issues to ensure compliance with current water authority and public health requirements. It is proposed to retain the existing pumping arrangements, but the supply and delivery piping will need replacement as it is approaching the end of its useful life. System downtime can be avoided by installing the replacement piping before removing/decommissioning the existing runs and connecting these into the pumps as a final installation activity.
- Completion of remedial works to below ground drainage system.
- Changeover of transformers disrupting services. Probably better to provide new sub stations if space allows
- Space for new low voltage switchgear in basement adjacent to new transformers
- Disruption to retail services in existing electrical riser cupboards
- Providing new rising bus bars in existing electrical risers
- Installing new sub main supplies to mechanical plant on roof tops if route includes existing risers
- Rewiring of general lighting and power in Landlord common areas if spaces still occupied
- Rewiring of fire alarm if spaces still occupied
- Accessibility to areas still occupied
- Redundant installations both mechanical and electrical
- Building construction being different in each building leading to alternative installation methods having to be undertaken
- Lack of suspended ceilings in common areas leading to surface mounted and exposed installations

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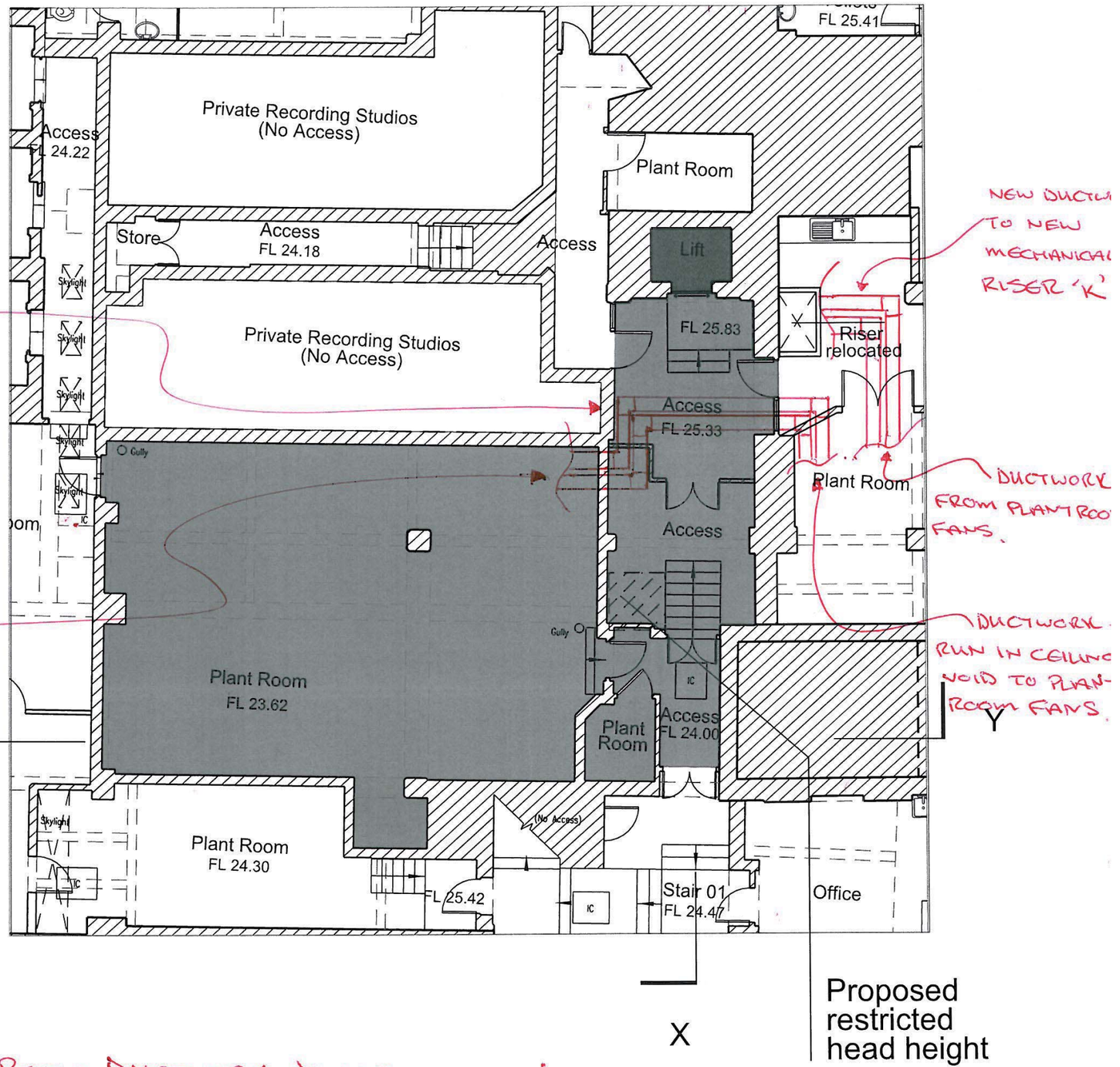
Appendix A - Boiler Room Ductwork Diversion

CUNDALL SKETCH
1003634-MSK-021
30/09/11

ACCESS AREA DUCTWORK TO BE CONCEALED IN NEW BULKHEAD.

NEW 450mm WIDE x 200mm HIGH DUCTWORK FROM PLANT ROOM AT HIGH LEVEL.

NOTE:
DUCTWORK TO BE CONCEALED IN NEW BULKHEAD AND CEILING VOID.



NEW DUCTWORK TO NEW MECHANICAL RISER 'K'

DUCTWORK FROM PLANT ROOM FANS.

DUCTWORK RUN IN CEILING VOID TO PLANT ROOM FANS.

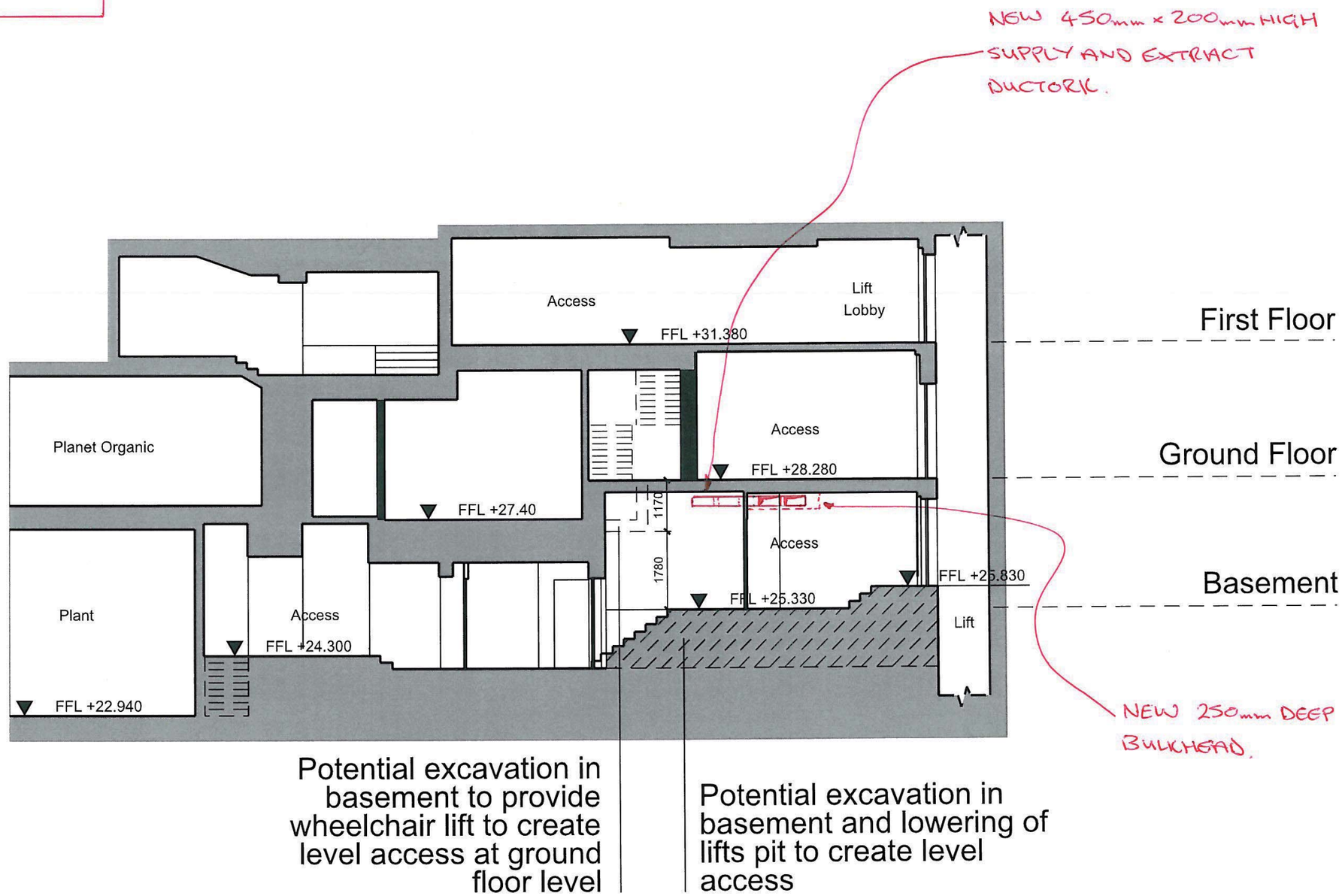
BOILER ROOM DUCTWORK DIVERSION.

Proposed Basement Plan

CUNDALL SKETCH
1003634-MSK-020
30/09/11

BOILER ROOM DUCTWORK DIVERSION

BASEMENT SECTION



Proposed Section X-X

(Existing profile in red)

Appendix B - Photographs

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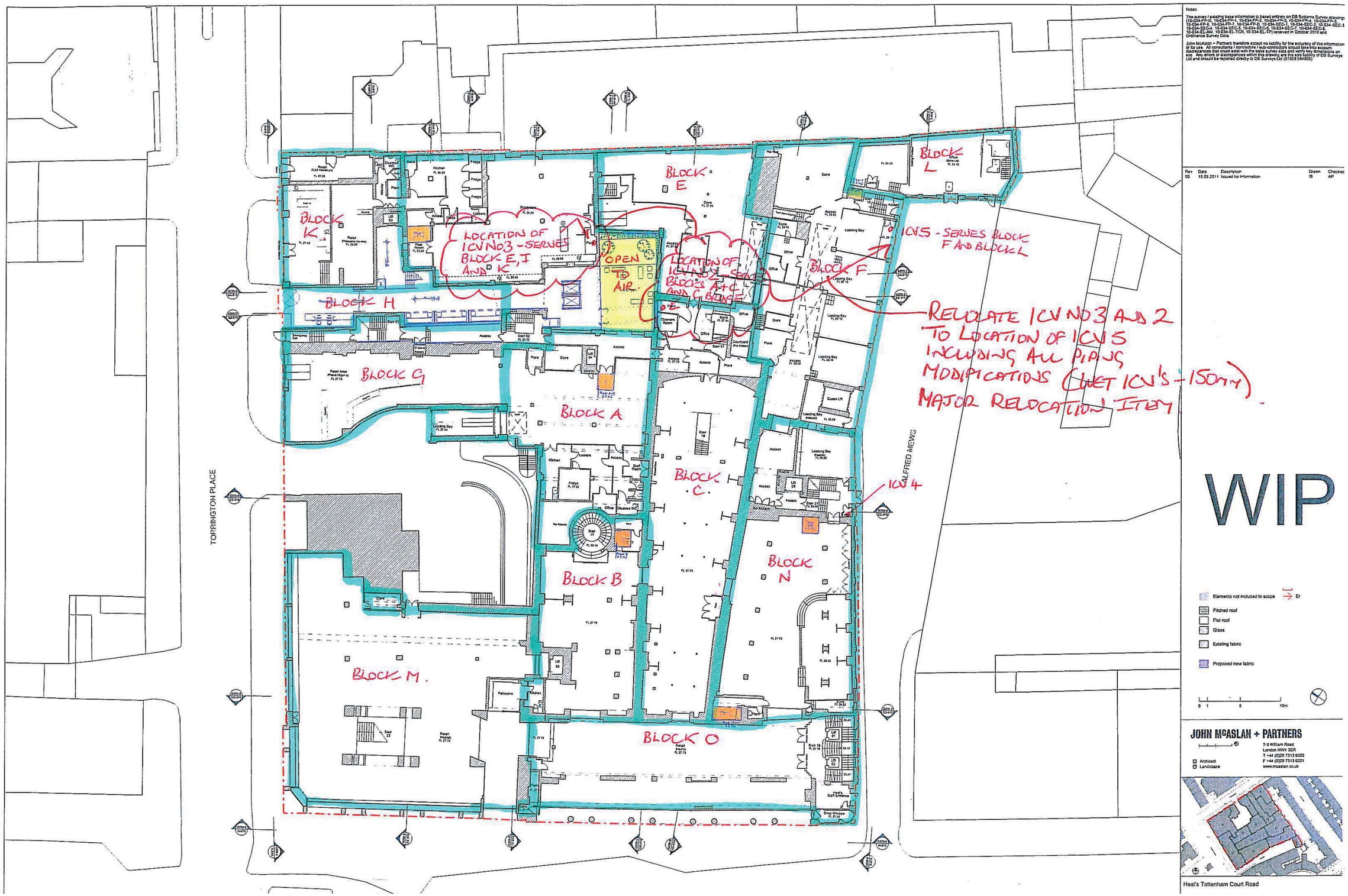
Appendix C - Relocation of Sprinkler Valves



Notes

The survey / existing base information is based entirely on DB Surveys Survey drawings 10-034-EX-A, 10-034-EX-1, 10-034-EX-2, 10-034-EX-3, 10-034-EX-4, 10-034-EX-5, 10-034-EX-6, 10-034-EX-7, 10-034-SEC-1, 10-034-SEC-2, 10-034-SEC-3, 10-034-SEC-4, 10-034-SEC-5, 10-034-SEC-6, 10-034-SEC-7, 10-034-ELEV-A, 10-034-ELEV-B, 10-034-EL-1(2), 10-034-EL-1(3) received in October 2010 and Ordnance Survey Data.

John McAslan + Partners therefore accept no liability for the accuracy of this information or its use. All consultants / contractors / sub-contractors should take into account discrepancies that could exist with the base survey data and verify key dimensions on site. Any errors or discrepancies within this drawing are the sole liability of DB Surveys Ltd and should be reported directly to DB Surveys Ltd (01926 584600).

Rev	Date	Description	Drawn	Checked
00	15.09.2011	Issued for Information	TB	AP

WIP

Elements not included in scope

Pitched roof

Flat roof

Glass

Existing fabric

Proposed new fabric

0 1 5 10m

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Heal's Tottenham Court Road

PROPOSED PLANT AREAS I ROOF PLAN

PROPOSED PLANT AREAS I ROOF PLAN

AREA 20m² OF SOLAR PANELS FOR HOT WATER GENERATION. TO BE ANGLED AT 30-40° TO THE PERPENDICULAR AND CIRCA 1-1.5m AT THEIR HIGHEST POINT - PANELS TO BE SOUTH FACING

PHOTO 4 POSSIBLE PLANT LOCATIONS.

PHOTO 5 EXISTING RTKL VRF CONDENSORS.

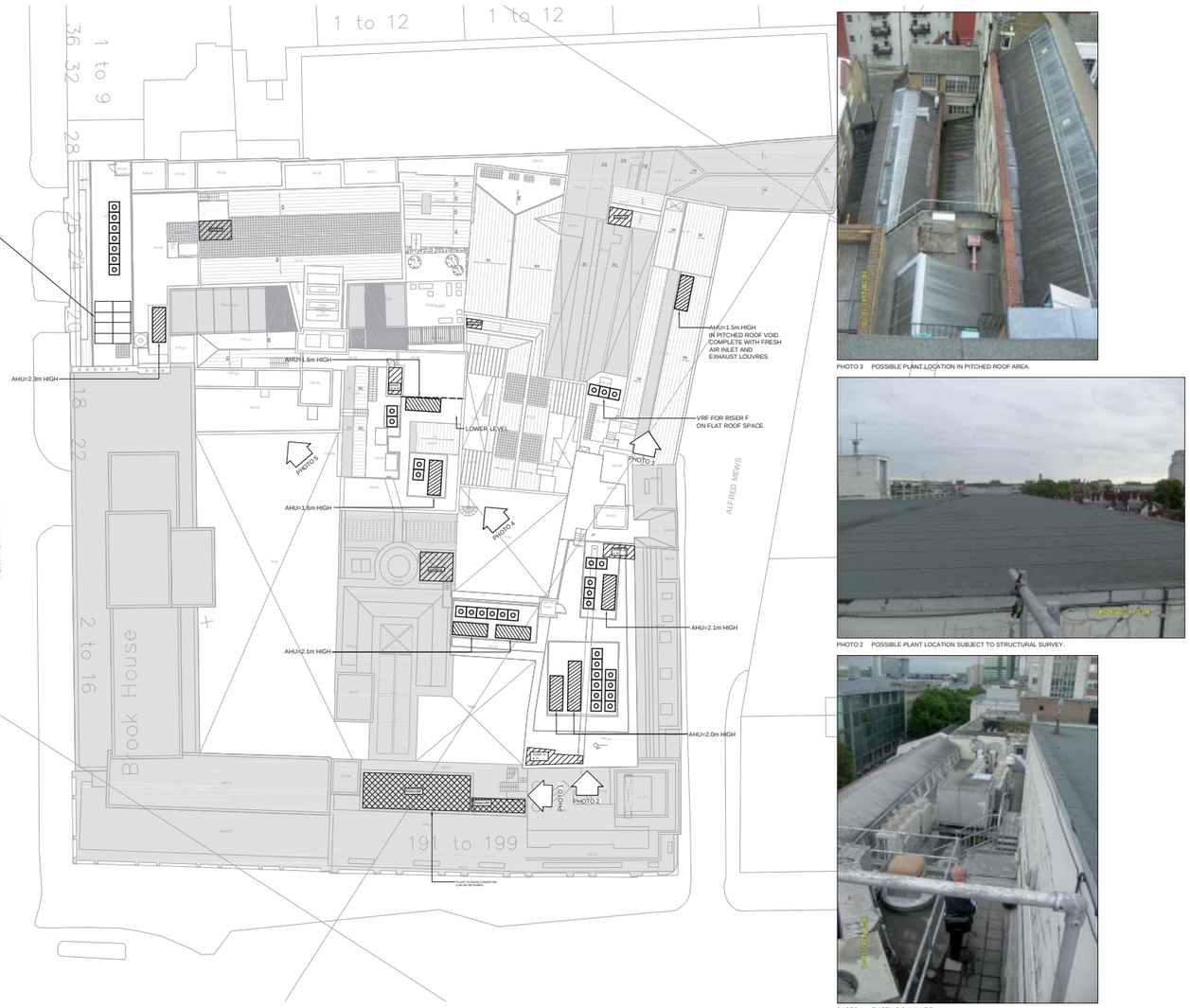

PHOTO 3 POSSIBLE PLANT LOCATION IN PITCHED ROOF AREA.

PHOTO 2 POSSIBLE PLANT LOCATION SUBJECT TO STRUCTURAL SURVEY.

PHOTO 1 EXISTING PUMA VRF.

TYPICAL AHU.

TYPICAL CONDENSER.

1003634 | A0

Based on Architects Drg No.	Rev
Structural Drg No.	Rev
Survey Drg No.	Rev
Other Drg No.	Rev
Other Drg No.	Rev

DO NOT SCALE FROM THIS DRAWING

Notes

1. ALL CONDENSING UNITS ARE 1680mm HIGH.
2. ALL CONDENSING UNITS ARE 65dBA@1.0m AND 1.5m FROM DECK. PLEASE REFER TO ATTACHED MANUFACTURERS DATA SHEET.
3. FOR AHU NOISE CRITERIA SEE ATTACHED MANUFACTURERS LITERATURE .
4. AIR HANDLING AND CONDENSER PLANT ARE ONLY A PRELIMINARY SELECTION.
5. CONDENSING UNITS WILL REQUIRE REFRIGERANT PIPEWORK FROM EXTERNAL UNIT TO ASSOCIATED RISER
6. AHU'S WILL REQUIRE SUPPLY AND EXTRACT DUCTWORK TO BE ROUTED FROM UNIT TO ASSOCIATED RISER

LEGEND

- POSSIBLE RISER LOCATIONS.
- EXISTING PLANT LOCATIONS.
- CONDENSING UNIT
- AIR HANDING UNIT

Issue	Date	Description	By	Chkd	Verfd
B	12/12/11	AMENDMENTS TO SUIT REVISED ARCHITECTS LAYOUT	PC	CO	SC
A	08/11/11	CUNDALL SKETCH 1003634-MSK-023 ROOF PLANT DIMENSIONS AND SOUND PRESSURE LEVELS	PC	CO	SC
–	07/09/11	ISSUED FOR INFORMATION	PC	CO	SC

Project: HEALS REDEVELOPMENT

Client: THREADNEEDLE & THE BEDFORD ESTATES

Architect: John McAslan + Partners

Title: ROOF SPACE PLANT AREAS

Drawing No.: 1003634(50)4000 | Issue: B

Job No.: 1003634 | Scale: 1:200

Drawing Status: STAGE C+

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Dec 12, 2011 – 4:20pm \\cjjp.co.uk\projects\1003634 Heal's refurbishment\08-CAD\Cundall\1003634(50)4000.dwg plotted by g.podgham

True scale at 1:1

B | Structure Report

CUNDALL

Threadneedle Pensions Limited & The Bedford Estates

Heal's Building Redevelopment

Stage C Structural Report

Job No: 1003634

Latest Revision: R1

Date: 30 September 2011

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Document Quality Validation & History

Job Title		Heal's Building Redevelopment			**Job Number**
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RO	30/09/11		Prepared by	Checked by	Verified by
		Name	L. Aiwerioghene	D. Currie	G. Rollison
		Signature			
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		Name			
		Signature			

Contents

1.0 Introduction

This section of the Stage C report details the Structural aspects of the project, describing considerations for the site and options for the structural engineering solutions, which may be suitable to deliver the Client's brief.

Before and during the preparation of this Stage C report, we have assisted the Architect, John McAslan and Partners, with retrieving the original record drawing information (where available), ascertaining the existing structural arrangements, including investigating the existing building structures where required. We have reviewed the architectural proposals and proposed structural solutions, which deliver the architectural and Client's requirements.

Where appropriate, we have considered and have contributed to solutions which will assist with the delivery of sustainable design, accessibility as well as site constraint aspects.

1.1 The site

The site in consideration is the Heal's Building on Tottenham Court Road in central London. The building contains Heal's and Habitat, being the two retail occupiers, and multiple commercial occupiers largely to the sides and rear of the building.

The redevelopment site comprises many different buildings constructed between the 1840's and 1962. The buildings' form and construction types vary greatly throughout the site. Nevertheless the building, particularly those parts fronting onto Tottenham Court Road, is historically significant and was listed as Grade II* in 1974. Additionally, the buildings have been subject to a number of refurbishments throughout their life.

We have undertaken a search for available structural and architectural drawings. The findings of our searches are given in Section 1.3 of our report.

1.2 Geology and Groundwater

A full site investigation is not needed to be carried out as the majority of the works will involve superstructure works and remodelling of existing structures. However, a limited site investigation has been carried out in the rear courtyard, where it is proposed to install the new lifts. The investigations were limited to the search of an existing oil tank buried in the ground, soil sampling for any potential contamination and the location of any basement.

Based on the published geological maps, the hydrogeology of the site is likely to be characterised by the presence of an unconfined shallow aquifer comprising the Lynch Hill Gravel Formation overlying the London Clay Formation. Confined by the London Clay Formation is a deep aquifer, comprising a sequence of deposits consisting of the lower part of the Lambeth Group and Thanet Sands (Basal Sands) and the White Chalk. These units are expected to be in hydraulic continuity.

Given the existing topography and history of development of the site, made ground is likely to be present within the courtyard. The pits dug within the courtyard were shallow, approximately down to 0.5m in depth and have confirmed the presence of made ground.

The site work carried out on 10th August 2011 by RSK STATS comprised the hand excavation of four trial pits to locate an existing basement wall to Block A, and an existing petrol tank. Pilot holes were also drilled into the raised floor area within the entrance area to enable inspection of the void underneath via an endoscope.

The location of the trial pits is shown on Appendix E. The line of the basement wall underneath block A was found under the timber sleepers within the courtyard. The findings suggest that the basement roof is higher than the courtyard level (and hence the stepped raised deck in this area). The Architectural proposals will need to take into account of the existing arrangements.

The existing petrol tank has been found in Trial Pit no. 3. The tank extends towards the centre and front of the courtyard, although the full extent could not be established due to the presence of solid slabs in the area.

Chemical analyses have been performed on three soil samples and no elevated contaminations have been detected.

The samples have also been tested for petroleum hydrocarbons (TPH-CWG). Concentrations of individual TPH-CWG aliphatic and aromatic fractions were not detected at concentrations in excess of the corresponding Generic Assessment Criteria. This indicates that there is no significant risk to human health in relation to hydrocarbons at the site, assuming a commercial end use.

The results of the Waste Classification tests indicate that the made ground soils are unlikely to be classified as hazardous waste. Waste Acceptance Criteria testing will be required prior to off-site disposal to identify any inert materials.

A Flood Risk Assessment has been prepared for the site. The report is presented in Appendix F.

An Envirocheck Report has not been prepared for this project and is deemed not to be necessary for a development of this nature.

1.3 Site constraints and existing buildings

The Heal's development is formed of a number of building structures constructed and redeveloped over the last 170 years. The buildings are of considerably different ages and construction forms.

We do not have details of all the various blocks, however, for some of them, we have been able to retrieve enough record information to be able to reasonably describe the existing structural arrangements.

Figure 1. Overall plan of the Heal's building indicating various blocks. (From Architect's report)

With reference to the original lettered parts of the building, as given in Figure 1 above, the structural information about various parts of the building determined during our searches and site visits is summarized in the following table. Blocks which form part of the current office scheme are identified with an asterisk.

As a whole, it is clear from the searches that the buildings forming the Heal's estate have undergone a series of refurbishments and reconstruction throughout the years to suit the various tenants and retail requirements. We have included a list of the drawings retrieved during these searches in Appendix D.

Block ref.	Information available
Block A*	No record drawings found. The rear elevation visible from the rear courtyard is rendered, hence it is not possible to determine the actual wall construction from a visual inspection.
Block B	This block forms part of the original Heal's building constructed in 1914. It appears to be a steel framed construction with either concrete or timber floors.
Block C*	Only architectural drawings were recovered for these blocks. They appear to be steel framed buildings with similar construction to Block B. The rear elevation, visible from the rear courtyard appears to be solid masonry construction.
Block E*	No specific record drawings found.
Block F	No specific record drawings found.
Block H*	The rear part of Block H was built as a lean to extension to Block M. Little record information has been retrieved for this area and its construction appears to be solid load-bearing masonry supporting concrete slabs forming the various floors. The part of Block H facing Torrington Place has been constructed as part of Block K and is a steel framed construction with concrete slabs.
Blocks I & K*	These blocks are of similar construction and both comprise concrete encased steel frames (columns and beams) with solid concrete slabs forming the floors and roof of the buildings. Both buildings are masonry clad and have a basement under their footprint. Spandrel beams form the edge of the slabs and support the external masonry skin.
Block L	No record information has been retrieved on this building. It is believed to be a load-bearing masonry construction.
Block M	Block M is of more recent construction (1960's). Details for this block were obtained during our searches and they indicate a concrete framed building with precast floor elements. The plans we have found also indicate details of the basement and foundation construction.
Block N	No specific details were uncovered, however, looking at the existing grids, it would appear to be of similar construction of Block B.
Block O	This block has been built as part of Block B and is of the same construction.

Table 1 – Summary of available information on the various blocks.

The proposed works will involve alterations to the existing structure and specific details will need to be ascertained, possibly by means of structural investigations, before the commencement of the works to finalize the design and detailing of the structural proposals. The majority of the buildings within the development are listed and have historical significance and scarce information is available relating to their structural forms. The supports and fixings of the new roofs and walkways will need to be designed to limit the disturbance of the existing building fabric, account for different building construction and possible differential movements between supports.

The details we have uncovered in our searches will need to be verified on site, where relevant, to the development proposals, to determine whether they are still applicable to the present construction (refer to Appendix B for list of further investigation required for proposal scheme).

2.0 Proposed Works

This section provides a structural assessment of the proposed redevelopment works, as currently presented by the Architect, for the retail and office areas.

2.1 Retail redevelopment works

The retail works for this phase involve a services upgrade or provision for future upgrade of the various units. Minor structural input is required for these works, and it mainly relates to the provision of new risers or the enlargement of existing riser penetrations through the existing slabs. Some work will be required at roof level to house new plant areas. An assessment of the existing roof slabs for their capacity to support the new loads will need to be carried out at Stage D as well as the provision of new plant platforms where the roof shape does not allow for the plant to sit directly onto the roof structure.

2.2 Office redevelopment works

The office works include the following:

1. Reconfiguration of Torrington Place entrance with the covering of the internal courtyard.
2. Enclosure of the rear courtyard and the installation of new lifts and bridge links.

2.2.1 Torrington Place entrance area

The works to the reception area will involve the removal of existing non load bearing blockwork walls to make space for a new reception desk and reconfigured entrance lobby. Structural steel columns within the masonry walls frame and support the building above. The walls, being non load-bearing can be removed without affecting the structural integrity of the building. However, the steel columns will need to remain in place and be incorporated within the new reception. These are indicated in drawing SK 001.

A level access is to be provided from the entrance area into the internal courtyard. The existing raised floor will need to be removed and the existing stairs and disabled lift repositioned. This has been investigated and found to be a non-structural raised deck built off the former access road, so it will be easily dismantled without any structural implications. Refer to photos in Appendix C.

In the areas in which the stairs and lift are to be repositioned to, the existing slab level is higher than the adjoining corridor level, possibly to maintain headroom in the basement underneath. The existing suspended ground floor slab, as shown shaded green above, will need to be demolished and re-cast at lower level using an in-situ concrete slab on metal deck used as a permanent shutter. Also, a hole for the platform lift will need to be created. New steel trimmer beams will be required to support the lift pit. There are existing ducts under this area which currently run from the plant area into the flue which is to be demolished. These will need to be relocated prior to the commencement of the works.

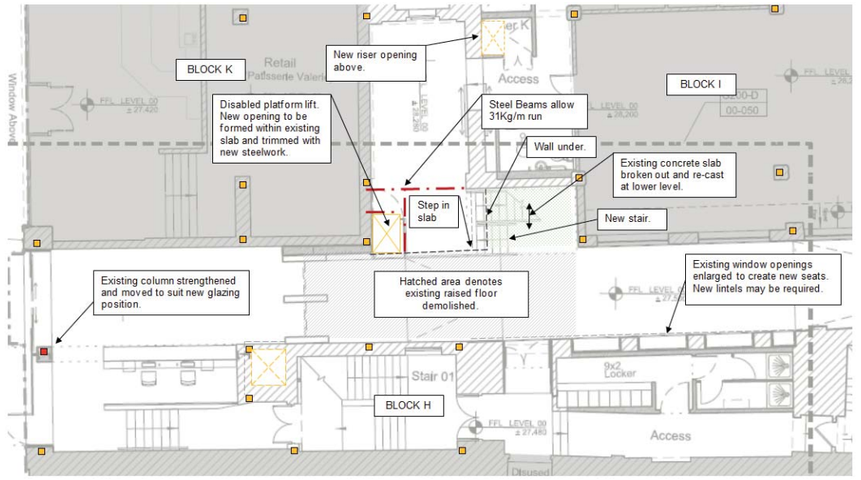

Figure 2. Extract of Sketch SK 001. Entrance area ground floor.

A new seating area is proposed adjacent to Stair 01, within Block H. The existing slab level in this area is higher than the adjoining corridor level with a plant area at the basement level below. Therefore it is proposed to retain the existing raised slab and creating the seats by increasing the height of the existing window openings down to slab level. New lintels may be required a large opening into the existing external masonry wall.

A new riser is proposed within the RTKL demise. This will be positioned such to avoid existing structural beams. New trimmer steels will be required to form the new opening. An allowance of steel beams weighing approximately 31kg/m run should be made for the steel trimmer beams.

It is proposed to move the existing column at the front entrance location inboards by approximately 100mm. This is to ensure that the new glazing can run in front of the column, externally. This can be done by strengthening the existing column (by means of adding steel channels either side of the column web) and cutting the existing steel back by the required amount. This operation may require some temporary propping to be installed while the works are carried out, to support the structure above.

2.2.2 New meeting rooms at second and fourth floor levels

It is proposed to create new meeting rooms at second and fourth floor levels, set outside the existing building façade. The meeting rooms will be glazed on three sides and the new floors will need to appear structurally independent from the buildings on the two sides.
This can be achieved structurally in different ways and we propose three options for consideration.

In all three options a timber floor has been chosen to limit self-weight of the floor deck, which will result in lighter supporting beams, and will facilitate the access and transportation of the materials onto the site. However, other structural options (such as concrete on metal deck) could also be taken into consideration.

Option 1 – Cantilevered structure off the rear of block K. This can be achieved by introducing new steelwork below the soffit of the existing floor slab to support the new meeting room floor joists. The depth of the steelwork can be kept to a minimum by adopting UC (Universal Column) steel sections, which are shallower but heavier than normal UB (Universal Beam) sections. The steel beams will be approximately 260mm deep, but will be considerably heavy (approximately 107kg/m run) to minimize deflections at the end of the cantilever. This option will mean that the glazed elevations can be kept free of any structural elements; however the ceiling in this area and within the adjoining office space may need to be lowered to hide the new structural beams.

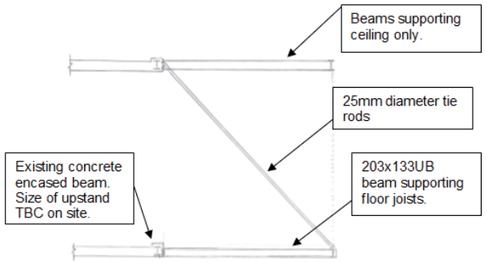

Figure 3. Mezzanine construction Option 1.

Option 2 – New structure tied back to the existing concrete edge beams using steel tie rods. With this solution, one end of the steel beam will be fixed to the concrete edge beam, and the other will be supported with steel tie rods off the floor above.

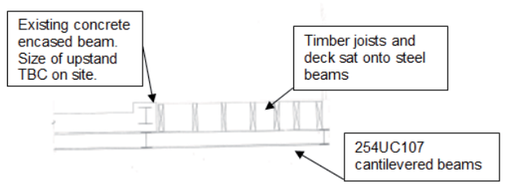

Figure 4. Mezzanine construction Option 2.

This solution will offer a lighter support structure for the deck (beams being 203mm deep, approximately 30kg/m run), and the advantage of fixing to the side of the existing edge beams, and hence not altering the ceiling level within the office space. However, the tie rods will be visible within the glazed elevations. The rod itself will be small in diameter (approx. 25mm), hence it will not obstruct the glazed elevations significantly and it may be aesthetically pleasing if a stainless steel solution is adopted.

Option 3 – A hybrid solution can be also adopted, where a steal beam spanning the width of the courtyards and supported off the existing structures is adopted. This can be set back from the meeting room elevation so that the meeting room structural floor can still be read as being independent from the adjacent structures. This option will have the advantage of reducing the span of the cantilevers supporting the floors, and hence resulting in a lighter and thinner structure (again, 203mm deep beams 30kg/m run in weight). Also with this arrangement, the meeting room floor structure can be fixed to the side of the existing structural slab or edge beam, and hence the ceiling level will not need to be altered as in Option 1.

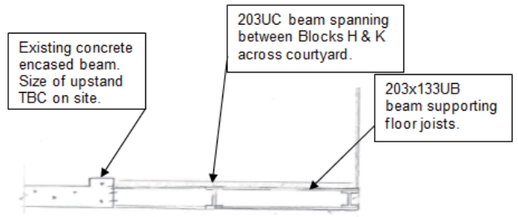

Figure 5. Mezzanine construction Option 3.

It is worth mentioning at this stage that from the existing structural record drawings it would appear that the existing concrete encased edge steel beams are set higher than the floor beam, hence creating a small upstand. The upstand size cannot be derived from the drawings, nor can it be ascertained on site without some minor investigative works. A small step or ramp may be required to access the meeting rooms from the office floor level.

2.2.3 New internal walkway roof cover

A new roof is proposed to cover the internal courtyard. The roof cover will be either glazed or formed with pneumatic cushions made of Ethylene Tetra Fluoro Ethylene (ETFE) material.
In either case, the design of the actual roof cover will be by specialist manufacturer, while the steel supports will be designed by the structural engineer.
At present, two general arrangement options are available for the roof coverings.

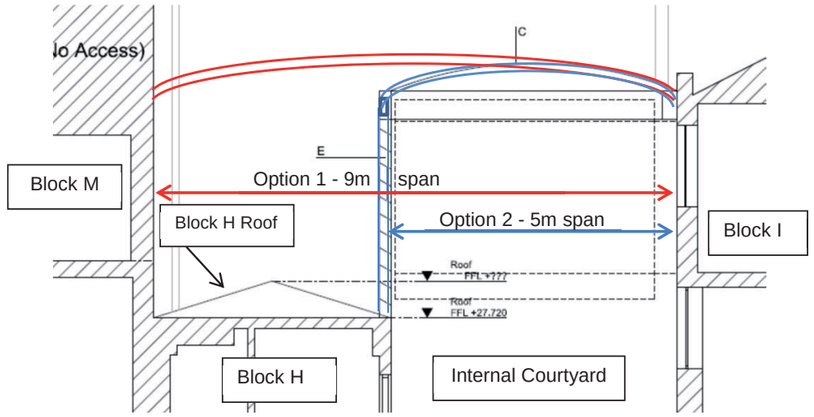

Figure 6. Section through internal courtyard indicating two different options.

Option 1 sees the steel supporting the new roof spanning the full width of the courtyard and above the Block H roof and internal courtyard below. The roof will take support from the existing Block I and M structures. Block I is a steel framed structure with concrete floors (including roof), while Block M is a concrete framed building. Hence solid supports can be found off these two buildings, provided that the proposed roof level matches with the existing floor levels. If the roof level does not match the existing floor or roof levels, then additional vertical steel posts will be required.

Figure 7. Extract of Sketch SK 006. Roof to internal courtyard – Option 1.

In Option 2, the roof is terminated in line with the external wall of Block H. Block H is lower than the proposed roof level so structural steel beams and posts need to be introduced, supported off the Block H external masonry wall. A glazed and lowered elevation will be provided to enclose the internal courtyard above Block H.

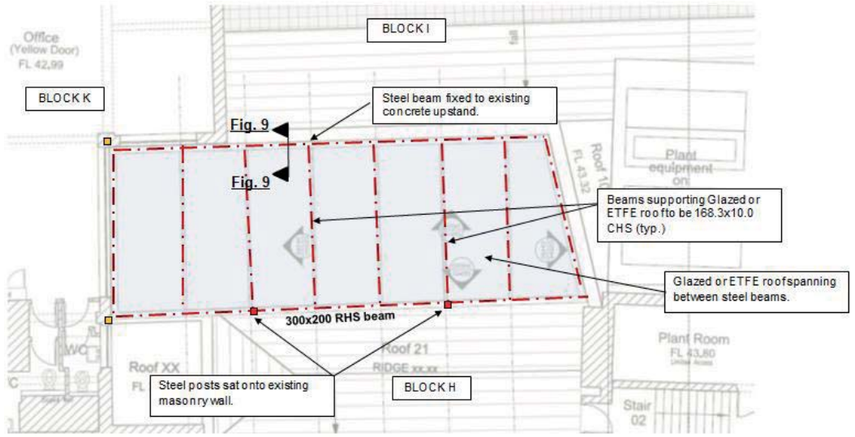

Figure 8. Extract of Sketch SK 007. Roof to internal courtyard – Option 2.

In both options, Circular Hollow Sections (CHS) beams will be adopted at roof level spanning the width of the opening. The glazed or ETFE roof will be seated onto the CHS beams using T-sections, welded onto the top of the steel beams. Where the new roof beams span onto roof parapets, a bolted connection will be provided on top of the existing concrete encased steel beams as given in figure 6 below. This arrangement will ensure that a reliable fixing is achieved.

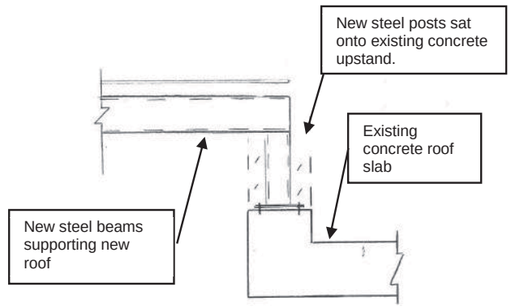

Figure 9. Extract of Sketch SK 007. Typical fixing detail onto roof parapet.

Another option taken into consideration for the structural support of the new ETFE roof was to introduce “tree” columns within the courtyard to support the roof structure independently from the existing buildings. However, this would have resulted in 16m high columns being placed within an already narrow passage, and after considering practical issues (both in terms of build-ability and space usage) this option will not be considered further.

2.2.4 New lifts and link bridges in rear courtyard

The rear courtyard is currently an open area with some hard landscaping and a fire access stair serving Block I. It is proposed that this area is enclosed (partially or in total) to create new lift access to the blocks and create a bridge link between the three blocks facing the courtyard.

A new double lift pit will be required to be dug in the courtyard to suit the new lifts. This will need to be approximately 1600mm deep from the proposed ground level.

An existing oil tank was found during the investigations in the courtyard and it will have to be removed prior to the commencement of the works. The exact size of the oil tank could not be established during the investigations without disturbing the existing paved area in the courtyard, however, a corner was exposed and located, and it clashes with the current lift location. As discussed in section 1.2, the full extent of the tank could not be investigated due to obstructions in the ground. However, at the time of the investigations, the tank location was deemed not to interfere with the installation of the lift. However, in the current Architectural proposals the lifts have moved back towards the building and now clash with the tank.

The new pit will be constructed in reinforced concrete and will be ground-bearing. Due to the nature and access restrictions on the site, boreholes could not be driven into the courtyard to establish the exact make-up of the soil under the proposed new lift pit at the time of the investigations. The contractor will therefore need to establish the soil bearing capacity once he has taken possession of the site. Cundall will size the foundations to limit the soil bearing stresses to a conservative figure.

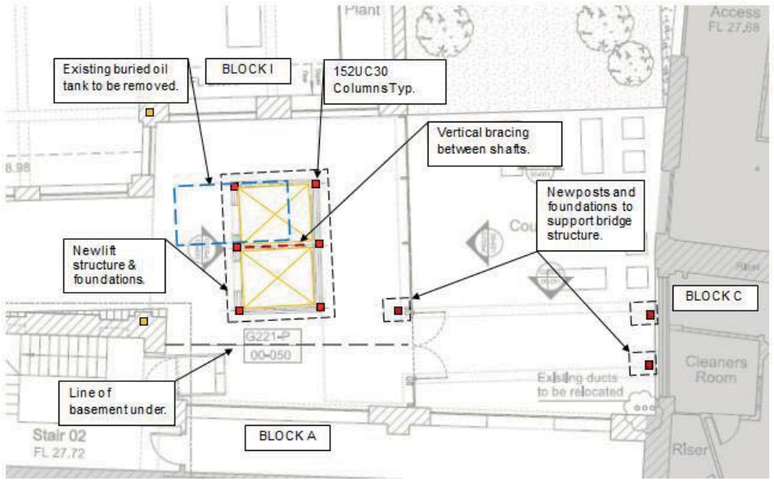

Figure 10. Extract of Sketch SK 010. Rear courtyard – Ground Floor.

The lifts will be glazed and the structure will be visible from the sides. Hence, no bracing will be located on the sides of the shaft. Any required bracing will be located in the separating wall between the lifts which will need to be screened.

The lift shaft will also support the bridge link structure at the upper floors. The bridge link structure will be supported by steel beams spanning between the existing buildings, the new lift and steel posts. It is assumed that timber joists and deck will be used to minimize the self-weight of the structure and reduce structural depths. However, a concrete deck option can also be adopted, if preferred.

The bridge link beams can either be fixed to the existing building façade, with attention being paid to the fixing details into the existing listed building envelope, or posts can be introduced to the front of the existing building to avoid interface with the existing building.

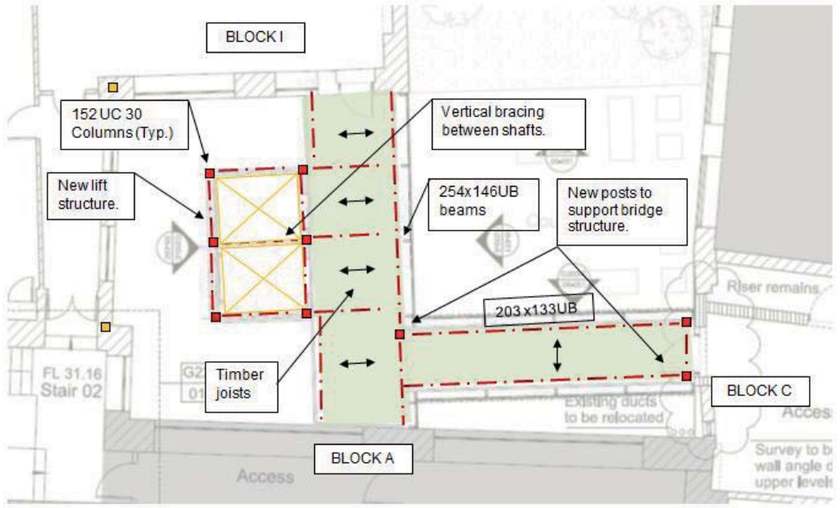

Figure 11. Extract of Sketch SK 011. Rear courtyard – First Floor. Refer to sketches in Appendix A for other floors

2.2.5 New roof cover

There are currently two options for the roof structural arrangement. One involves the creation of a new roof over the whole rear courtyard, with the roof levels varying to suit the existing building levels. This involves having a number of vertical elevations, relatively complex structural arrangements and the introduction of a number of columns to support the roof edges. The roof and vertical elevations will be clad in ETFE material.

The other option involves only a partial roof extent, with steel beams (again CHS sections similar to the internal courtyard area) spanning between Block I to Block A and supporting a glazed roof. The details of the steel supports will be similar to the internal courtyard area.

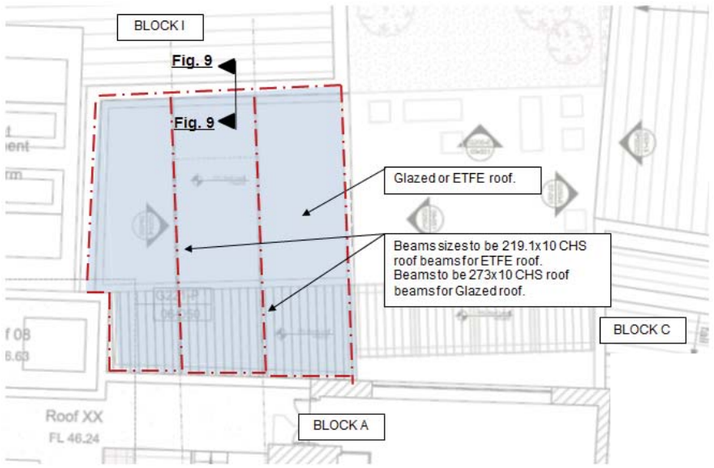

Figure 12. Extract of Sketch SK 014. Rear courtyard – Roof.

To visually separate the two items, the new roof structure will not take support off the lift shaft steel frame. The rear roof and glazed elevation will be by specialist manufacturer's details. The vertical mullions will be horizontally restrained at every floor level by the bridge structure, but at this stage, it is assumed that it will be self-supporting vertically.

2.2.6 New roof plant areas

New plant areas are proposed to be allocated onto the existing roofs. We have inspected the existing roofs and found that, generally, these are of concrete construction. However, it would appear that these roofs may have not been designed for plant loadings as many of them do not have dedicated access ladders. Hence they may have only been designed for snow loads.

Any new plant will therefore need to be placed onto a separate steelwork grillage supported directly on top of the existing columns or external parapet walls to avoid overloading the existing roof slabs.

2.3 Design Loading Requirements

We propose to use the loadings stated in the tables below for the structural design of new retail and office elements.

Where relevant, we will assess elements of the existing structures using codes of practice relevant to the type and date of construction.

Imposed Loads	
Retail Floors	5.0 kN/m^2
Staircases	4.0 kN/m^2
Plant Areas	7.5 kN/m^2 (Maximum Subject to review of proposed plant)
Roof Areas	1.5 kN/m^2 (Access required for maintenance) 0.6 kN/m^2 (No access required for maintenance)
Dead Loads (in addition to slab self-weight within tenant fit-out)	
Finishes	1.5 kN/m^2
Ceiling & Services	0.5 kN/m^2

Table 2 – Retail Loading Requirements.

Imposed Loads	
Office Floors	2.5 kN/m^2 minimum subject to client's requirements (plus 1.0kN/m^2 allowance for partitions).
Staircases	4.0 kN/m^2
Plant Areas	7.5 kN/m^2 (Maximum Subject to review of proposed plant)
Roof Areas	1.5 kN/m^2 (Access required for maintenance) 0.6 kN/m^2 (No access required for maintenance)
Dead Loads (in addition to slab self-weight within tenant fit-out)	
Finishes	1.5 kN/m^2
Ceiling & Services	0.5 kN/m^2

Table 3 – Office Loading Requirements.

The above loadings are in accordance with British Standard BS6399 Part 1, Loadings for Buildings.

The structural British Standards are valid, in accordance with the Building Regulations, until 2013 when Part A of the Building Regulations is changed and the Eurocodes replace them entirely. Eurocodes and their National Annexes came into use on 1st April 2010.

The structural design can equally be to Eurocodes and in this case the structural 'Actions' on the above elements will be equivalent to the above British Standard 'Loads'. The loading values will be similar no matter which approach is followed.

2.4 Sustainability

BREEAM is the environmental rating tool commonly used in the UK to benchmark the design and construction of a variety of building types including offices, schools, hospitals, retail and industrial. A number of credits may require input from the structural engineer and correct specification / documentation in accordance with the BREEAM Assessor Manual compliance requirements. This includes both design specification and contractor's as-built information.

Cundall structural specifications will therefore require that the Contractor provides the required documentation to confirm that the correct materials were supplied and installed by the end of practical completion.

A BREEAM credit could be obtained by specifying and adopting recycled aggregates within the concrete works. However, this will have a cost impact onto the works as the aggregates may be difficult to be obtained by the contractor from a plant in the vicinity of the site. Hence consideration should be given as to whether to plan to obtain a BREEAM credit in this manner or not. Experience has shown that this credit is not usually obtained.

As part of the development of the design through RIBA Stage C and beyond, we will assess the structural materials and systems in terms of their environmental impact across their life cycle - from 'cradle to grave' in accordance with the BRE Green Guide to Specification.

We have arranged materials and components on an elemental basis so that designers and specifiers can compare and select from comparable systems or materials as they compile their specification.

In this project, the main structural work elements to be considered under this guidance are floor infill slabs. For these works, various structural options are available and summarized in the table below:

Type of floor construction:	Rating:
In-situ reinforced concrete slab on metal deck	A+
Hollow precast pre-stressed concrete planks	A+
Decking on timber joists (retail)	A+
50% GGBS, 20% recycled coarse aggregate in situ reinforced concrete floor slab.	A
Power floated concrete slabs with 50% GGBS reinforced floor slab.	B

Table 4 – Construction type rating using BRE Green Guide to Specification.

The data is set out with a ranking system, where A+ represents the best environmental performance / least environmental impact.

Based on the table above and practical considerations with regards to access to site, site handling and cost, in-situ concrete slabs on metal deck and timber decks on timber joists seem to be the preferable options for creating new floor infills. The final choice between the two construction methods will be need to be made taking into account the actual use of the floor and practical construction considerations.

3.0 Conclusions and Recommendations

Within the body of the report and the sketches presented in Appendix A, we have described the structural options available to the delivery of the architectural proposals. From the report and sketches, an outline Cost Plan can be prepared and the preferred options can be chosen to be developed further at Stage D.

Where possible, we have carried out site investigations to ascertain the existing arrangements on site. There are still, however, certain unknown arrangements and project risks that may affect the cost of implementing these works. These are identified in the report.

To minimize these risks, a number of structural investigations are required in the areas of redevelopment as described in Appendix B. These will need to be undertaken during completion of the Stage D design to ensure that the proposed solutions are deliverable and have a cost certainty on the proposed works.