R01

Building Services Scope of Works

UCL Institute of Education – Phase 2 Levels 3 and 4 reception areas for Planning

Issue Register

Ref	Issue	Date	Issued By	Checked by
0	Stage 4 planning issue for levels 3 and 4	18/12/2020	SN/MB/NH/TH	NLB
1	Stage 4 planning issue for levels 3 and 4	14/01/2021	SN/MB/NH/TH	NLB

This document has been checked by:	This document has been checked by:
	
(Senior Associate Director)	(Director)

Contents

1.0 Introduction

The Institute of Education (IoE) at 20 Bedford Way is an existing Grade II* listed Building comprising of a central block and several Wings.

This document provides the design concepts associated with the planning application for levels 3 and 4 in the facility at 20 Bedford Way, Phase 2C works for UCL Institute of Education. The project defines the operating parameters and the scope of works and indicates the full extent of the works and our understanding of design concepts associated with the services to be provided.

A design assessment has been completed under BREEAM 2014 for the Refurbishment and Fit-out of non-domestic buildings, under BREEAM 2014 to achieve a BREEAM Excellent rating.

This document shall also be read in conjunction with the Material and Workmanship document and the CL standard documents published separately.

2.0 Mechanical Services Design

2.1 Design Criteria

2.1.1 External Design Criteria

Summer	30.1°C db	20.5°C wb
Winter	-4°C db -4°C wb	
Heat rejection plant ambient Temperature selection and fresh Air ventilation, the ambient Summer conditions shall be Taken as	35°C db	23°Cwb

Refrigeration plant shall be capable of operating up to a maximum temperature of 40°C at reduced capacity.

2.1.2 Internal Temperature and Humidity

Circulation

Temperature	
Summer	Not controlled
Winter	
Humidity	**Not controlled**
Summer	Not controlled
Winter	Not controlled

Teaching Spaces

Temperature	
Summer	24°Cdb +/- 2°C
Winter	22°Cdb +/- 2°C
Humidity	
Summer	50% RH +/- 10%
Winter	Not controlled

Comms Room/ISD rooms

Temperature	
Sumer	22°Cdb +/- 1°C
Winer	Not controlled
Humidity	
Summer	50% RH +/- 10%
Winter	Not controlled

Social/ Break out/ Learning Spaces

Temperature	
Summer	24°Cdb +/- 2°C
Winter	22°Cdb +/- 2°C
Humidity	
Summer	50% RH +/- 10%
Winter	Not controlled

Café

Temperature	
Summer	Not controlled
Winter	22°Cdb +/- 2°C
Humidity	
Summer	Not Controlled
Winter	Not controlled

Teapoint

Temperature	
Summer	Not controlled
Winter	22°Cdb +/- 2°C
Humidity	
Summer	Not controlled
Winter	Not controlled

Reception/ Entrances/ Exits

Temperature

Summer	Not controlled /Natural ventilation
Winter	20ºCdb +/- 2ºC

Circulation

Temperature

Summer	Not controlled
Winter	Not controlled

2.1.3 Comms Rooms / ISD rooms

Within level 3 core A/B the new comms and IT build areas shall be cooled by Chilled water fan coil units.

The comms room is provided with 2 number wall mounted cooling units.

The ISD Build is provided with 2 number wall mounted cooling units.

IST AV test area is provided with 1 number wall mounted cooling units.

2.1.4 Occupancy

As per furniture layouts on architectural general arrangement layouts.

2.1.5 Fresh Air and Ventilation Rates

Primary fresh air supply ductwork onto the floor plates:

Collaboration / break out space	2ACH (natural vent via entrance areas)
Meeting Rooms	10 l/s per person
Café	2ACH (natural vent via entrance areas)
Toilets	8 ac/h (extract)
Teaching Spaces	10 l/s per person
Circulation Spaces	No fresh air required

2.1.7 Occupancy Period

Plant noise emissions designed not for night time operation as per Buro Happold Engineering Acoustic Specification.

2.1.6 Infiltration Rates

4 ac/hr hour winter 2 ac/hr summer to reception / main entrance hall areas.

Air leakage for the completed building envelope should not exceed 10m^3/hr/m^2 at 50 pascal differential test pressure. Building to be pressure tested in accordance with Building Regulations Part L requirements.

2.1.6.1 Internal Heat Gains (Infrastructure)

(*) Dependent on equipment installed

	Load Allowances	
Areas	Occupants:	90 W/m^2 (sensible) 50 W/m^2 (latent) From CIBSE Guide A
	Lighting	
	Circulation Spaces	15 W/m^2
	Comms Rooms	15 W/m^2
	Social/Breaking Out/Learning	10 W/m^2
	Café	10 W/m^2
	Teaching Spaces	12 W/m^2
	Toilets	5 W/m^2
	Small Power :	
	Circulation Spaces	0 W/m^2
	Comms Rooms	(*) W/m^2
	Social/Breaking Out/Learning	15 W/m^2
	Cafe	5 W/ m^2
	Teaching Spaces	10 W/m^2
	Toilets	0 W/m^2
Server Rooms	Loads	To be confirmed by IT next stage

2.1.8 Filtration Standard

	Specification
▪ Pre – Filters	IAQ2 and EU3 Pre- Filters
▪ Bag Filters	EU6

2.1.9 Noise Criteria – Internal

Refer to Buro Happold Acoustic report.

NR ratings for Building Services

Teaching Spaces	NR *35*
Break out Spaces	NR 40
Cafe	NR 45
Toilet	NR 45
ISD comms room	NR55
ISD Build/ Av test rooms	NR40

Internal noise levels as defined by IS0 R 1996, shall apply at a distance of 1.5m from any grille/diffuser (at an angle of 45°C) or any wall surface.

2.1.10 Noise Criteria – External

Noise criteria as specified at 1.0m outside the nearest openable window.
The proposed scheme does not include for night time operation of main plant

2.1.11 System Operating Parameters

Ventilation Summer Operation

General offices, meeting rooms and teaching spaces served from Air handling plant have the following temperature control to align with the Buro Happold over heating report/ strategy

- Primary Fresh Air temperature from AHU normally 20 ° C

Ventilation Winter Operation

- Primary Fresh Air temperature from AHU's 22 ° C

2.1.12 Fire Rated Ductwork

All ductwork crossing protected escape routes but not serving these areas shall be fire rated throughout from point of entry to point of exit. Areas and extent be determined by fire consultant

2.1.13 Insulation

Insulation type and thicknesses for each service to be provided as standards of Workmanship specifications

2.1.14 Ventilation overview to levels 3 and 4

The entrance areas shall be naturally ventilated visa the revolving doors on both the front and rear receptions together with opening windows/ vents to the front and rear elevations

The teaching spaces are provided with filtered tempered air from the Core B plant

3.0 Cooling Services and Heat Rejection

3.1 Chilled Water System (New and Existing)

The existing system shall be modified and split to cater for the Phase 2 and Phase 3 future loading of the building.

The current cooling systems encompass of the following:

- 2 No. existing 450 kW chilled water chillers

This system shall be supplemented by the following;

- 2 no. new air cooled package chillers rated at 500 kW and 700 kW located in core A serving the core A riser

The existing chilled water circuits with run and standby pumps shall no longer cater for the Wing and Core A chilled water requirements and shall only cater for the Core C and Core B chilled water requirements.

The newly formed chilled water circuit in Core A plant room 2 shall be served by 2no. New chillers and cater for the Wing and Core A chilled water demand.

The temperatures of operation shall stay the same throughout the building to allow for the ongoing service of existing AHU and FCU coil operations.

The primary chilled water temperatures are as follows:

- Flow Temperature: 7ºC
- Return Temperature: 12ºC

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The facility to connect additional circuits to the chilled water central plant is to be future proofed via appropriate isolation valving. The new CHW provisions are shown on the new chilled water schematic.

Where existing pipe system is to be extended, prior to connecting/open the new to the existing section of the pipework, the contractor shall ensure the adequate water quality has been achieved in the new pipework and the existing system's water quality sample has been taken in order to prove that neither the new nor the existing pipework water causes damage/poor water quality issue in the system. Liaison with the building's facility management shall be required.

Main CHW network uses Core B to distribute CHW pipework throughout the building.

4.0 Heating Plant Network and New Heating Systems

Heating is provided by Bloomsbury Heat & Power Network to IoE at 20 Bedford Way. Two main district heating plantroom are located in plantroom PR5/8 & PR3 and serve heating and domestic hot water to the majority of the IOE. These Plantrooms are equipped with plate heat exchangers segregating primary (district) and secondary (building) networks.

The secondary network serving the AHUs, radiators and domestic hot water has had several modifications works in the past.

The existing VT and CT LTHW heating systems are to be adapted and modified as shown on the drawings.

All redundant LTHW pipework shall be decommissioned and removed from the project. Refer to L&P schematics and drawings.
All new heating system pipework will be installed in heavy weight mild steel pipework and fittings.

LTHW circuits serving new FCU's, VAV heater batteries and AHU heating coils shall be provided with sufficiently sized Pressure Independent Control Valves (PICV) to enable a variable volume system and to maintain the differential pressures throughout the heating circuits.

Differential Pressure Control Valves (DPCV) are to be installed on all new radiator heating circuits to keep the pressure differential across Thermostatic Radiator Valves within acceptable control ranges. In addition two port zonal control valves shall be provided on radiator heating circuits to switch off heating in areas when there is no occupancy.

The Heating system operates at the following existing and proposed new temperatures serving levels 3 and 4 :

4.1.1 Plant Room 3 PHX – Phase 2 Change (Secondary System)

Flow Temperature: 74ºC
Return temperature: 54ºC

To future proof plant selections for future district heating system temperatures.

4.1.2 Plant Room 5/8 PHX – Phase 2 Change (Secondary System)

Flow Temperature: 74ºC
Return temperature: 54 ºC

To future proof plant selections for future district heating system temperatures.

4.1.3 Plant Room 6a PHX – Phase 2 Change (Secondary System)

Flow Temperature: 74ºC
Return temperature: 54 ºC

To future proof plant selections for future district heating system temperatures.

4.1.4 Phase 2 LTHW heat emitters- Radiators (Secondary System) serving the level 3 and 4 entrance areas

Flow Temperature: 74ºC
Return temperature: 54 ºC

4.2 Core A - Level 2 to 9 Connection to Secondary Heating

Levels 3 to 9 of Phase 2 Core/Zone A shall be fitted with new radiators, VAV re-heater coils and FCU's to provide the heating requirements for these spaces.

The VAV re-heaters and FCU's shall be connected to the LTHW Core A CT circuit located in the Core A riser.

The VT LTHW North and South circuits within the Core A distribution shall be stripped out and removed from site. The existing Zone A and Zone B radiator circuits shall be reconnected to the Core A VT circuit within the Core A riser complete with isolation and zone control valves.

Energy sub-metering shall be provided to the LTHW branches for both VT and CT circuits at every level and motorised zonal valves shall be provided to the NW and SE radiator circuits.

4.3 Phase 2 Core B - Level 1 to 5 Connection to Secondary Heating

Levels 2-5 of the Phase 2 areas shall be fitted with new radiators, VAV HB's and FCU's to provide the heating requirements for these spaces.

The radiator circuits around Core B shall be fed of VT riser in Core B. A new CT circuit in riser B shall be fed from LTHW Core A CT circuit at Level 4. This shall facilitate serving teaching spaces at Level 3, 4 and 5 of Core B.

The radiator circuits around Core B shall be fed of the existing CT circuit in the Core B mechanical riser.

4.4 Heating/DHW Sub-metering

Energy metering systems shall be installed to enable at least 90% of the estimated annual energy consumption of each fuel to be assigned to the various end-use categories of energy consuming systems.

The CISBE TM39 methodology shall be followed, together with the UCL Sustainable Building Standard.

The end energy consuming uses shall be identifiable to the building users, for example through labelling or data outputs.

The following energy end uses by functional area shall be sub-metered:

- Space heating
- Domestic Hot Water Heating

The following functional areas shall be sub-metered where applicable:

- Data Comms Rooms

- IT work and study rooms, including IT-equipped library space and any space with provision of more than one computer terminal per 5m².
- Individual sub-metering of standard classrooms/seminar rooms is not provided.

4.5 Zonal Valves

Zonal heating valves shall be provided to facilitate shutting off areas on floor plates when not occupied and as detailed on schematics.

4.6 Water Treatment

New and existing pipework systems will be flushed, chemically cleaned and treated in accordance with BSRIA Pre-Commission Cleaning Guide BG 29/2011.

The Contractor shall allow for chemical dosing of the whole heating system (new plus existing) on the final fill, to the water treatment specialist recommendations. The water treatment shall be suitable for different materials used in the system and pipework.

4.7 Mechanical Commissioning

All air, refrigeration, water, plant and control systems will be commissioned in accordance with BSRIA guidelines.
The Contractor will undertake comprehensive testing and commissioning of the entire mechanical services installations within the building.

The works will include off-site testing of equipment and systems, the employment of system specialists to commission dedicated systems, to prove the functionality of each system.
In addition, all service installation will be demonstrated to the approval of the Contract Administrator, Building Control organization and the Client's Representative will be instructed in its correct use and maintenance procedures of each system.

Four comprehensive sets of operating, maintenance and record information will be provided for the building. These sets will include 4 no. CD copies of the same information. Only site-specific information will be included. The binders will clearly state the project, services included and the date of contract completion on the binder front and edge.
The digital format will have a filing structure aligned with the hard copy. An allowance shall be made for the depositing the information onto a web based format of the Client's preference.

5.0 Environmental Control Systems

5.1 Environmental Control System

Environmental control of the various areas shall be based on the use of the following HVAC systems:

Fresh air shall be provided into the building in accordance with the relevant standard for ventilation from Building Bulletin 101 Ventilation of School Buildings, April 2014, with design condition as set out as part of this scope of works document and UCL Guidelines.

Areas of the building subject to large and unpredictable or variable occupancy patterns shall have carbon dioxide (CO2) sensors specified:

- Mechanical ventilated spaces shall be fitted with sensors and inked to the mechanical ventilation systems to provide demand-controlled ventilation to the space.
- Space sensors shall have the ability to alert the building owner or management when CO2 levels exceed the recommended set point, and shall be linked to controls with the ability to adjust the quantity of fresh air into these spaces.
- The ventilation systems for all areas served shall incorporate energy recovery in the form of thermal wheels. Refer to AHU schedule within the schedule of equipment.

5.2 Reception/ entrance hall areas at levels 3 and 4

The reception and café area on Bedford way is heated by low level radiators with local 2 port valve control. The radiators replace the old redundant trench heaters, however the pipework connecting from level 2 is retained

Ventilation to the reception area and entrance hall/ breakout spaces is by natural ventilation

The breakout spaces and circulation spaces at level 4 are provided with heating only fan coil units which shall be temperature controlled by the BMS.

The teaching spaces are provided with heating and cooling Fan coil units that are controlled via local wall function and temperature controllers.

The teaching spaces are provided with filtered and tempered ventilation air from the core B plantroom. Air supplied via VAV boxes linked to temperature/ CO2 sensors to control the ventilation rate based on room occupancy

The new entrance doors on level 3 and 4 shall be provided with electric overdoor air curtain to prevent ingress of un-tempered outside air.

5.3 Toilets

Dedicated extract air from new toilet extract fans located within high and low level plant rooms shall be provided into each WCs. Each cubicle shall be equipped with extract duct connection, with VCD and extract grille at high level.

Make up air, air shall be transferred locally as the drawing from adjoining spaces or by exiting air make up risers and grille connections into the toilet core areas.

6.0 Electrical Services

6.1 Electrical Services

6.1.1 Electrical Design Criteria

The following allowances have been used to calculate the electrical services power distribution:

Offices	Maximum Demand (Based on Nett Office Area)
Small Power	25w/m²
Core Power	5w/m²
Spare capacity	25%

All final sub circuits other than ring sub-circuits shall be sized to accommodate their connected loads. Ring final sub circuits shall be 32A rated to BS 7671 with a minimum allowance of 200 watts per socket outlet.

6.1.2 Artificial illumination criteria

Lighting shall be designed generally in accordance with the requirements of CIBSE code for interior lighting to allow tenants to comply with the CIBSE Lighting Guide LG5 – Lighting for Education and BS:5266 and BS: EN1838 for emergency lighting and UCL Standards TN20 and TN22

Emergency lighting within common parts and net lettable area shall be provided with emergency lighting and escape signage lighting in accordance with BS 5266pt 1 & 7.

The following criteria shall be achieved at the relevant working plane

Teaching Rooms CIBSE LG7 Category (All offices)	-	500lux (at working plane)
Limiting glare factor	-	19
Circulation areas	-	200 lux at finished floor level (min)
Reception	-	Contrasting levels (200 lux min FFL)
Reception desk	-	500 lux (at working Phase)
Stairs	-	150 lux (at tread level)
Cafe	-	200lux (at floor level)
All other areas / BSEN standards	-	In accordance with CIBSE lighting code
Emergency Lighting per UCL Design guide to all other areas	-	BS EN 1838 (BS 5266 Part 7 1999)& as
Defined Escape Route routes)	-	1 lux (minimum on defined escape
Electrical Panels LV, Distribution Boards and MCCP's	-	15 lux (min) on vertical surface

6.2 Scope of Works

The electrical services shall include but not limited to the following systems supplied, off loaded, installed tested and commissioned and set to work to the satisfaction of the services engineers.

For the reception areas the contractor shall be responsible for the co-ordination of the services outlines within this document together with the preparation and submission of working drawings for approval.

- Installation of a new main and sub main distribution and switchgear
- Metering
- Lighting installation
- Lighting control system
- Emergency lighting system
- Small power installation
- External lighting installation
- Fire alarm system
- Mechanical services supplies
- Disabled WC alarms
- Earthing and equipotential bonding
- Data and communication cable containment provisions

6.3 Metering

The metering shall be provided in accordance with the UCL Estate requirement.

The Contractor shall supply and install meters as detailed in the metering strategy schematic and as per UCL specification.

The metering system shall include the following:-

- Networking equipment
- Network Data port (where required)
- All associated wiring, and protection devices.
- All power supplies to meters with local accessible fuse protection.

The system implementation shall meet and exceed the requirements of Part L2 of the Building Regulations and CIBSE TM 39. The system is capable of displaying the energy uses within the building and provide historical and instantaneous data.

The Meters shall be provided as follows:-

- PM5330 and 5110 and NSX breakers used (as per UCL's requirements) on all remaining outgoing circuits.

The contractor to install field communication connections links between panels where necessary.

Meter details to be submitted to UCL prior to ordering and installation.

6.4 Lighting

General
New interior lighting shall be provided, in accordance with the CIBSE Code for Lighting LG5 and all relevant Building Bulletins.

Luminaires shall be of the suspended/recessed LED linear type located to afford best use of daylight control and can be switched or dimmed in conjunction with appropriate sensors within the room.

The luminaires shall be selected to utilise LED lamps to keep energy use to a minimum.

The Contractor shall supply, install and connect light fittings of the type indicated by reference letter and as listed in the schedule of luminaires and as indicated on drawings.

All final circuit wiring shall be as detailed in the circuit schedules and as shown on the drawings. The Contractor shall ensure that the above items, those indicated on the drawings are supplemented by all other items of equipment ensuring that the lighting installation is completed in its entirety. This shall include all glassware, louvres, diffusers and lamps together with all ancillary components.

Circuit cabling for the above shall be multi core LSOH in trunking between the distribution boards and lighting.
Control gear for all areas shall be DALI control gear and connected to a maximum 0.85 power factor.

The Contractor shall coordinate the installation with all other services.

The Contractor shall obtain working samples of all luminaires for approval and present to the Architect / Client's.

All external light fittings shall be IP65 rated (min).

All external final circuits shall be installed using either XLPE/SWA/LSOH or single core in galvanised conduit. Refer to circuit schedules.

The lighting cabling installation shall be as detailed in the distribution board schedules.

All luminaires shall be selected from the UCL Approved List of Manufacturers.

6.5 Emergency Lighting

An addressable emergency lighting testing system shall be provided as from a UCL approved manufacturer's UCL's policies TN20 and TN22.

The Contractor shall provide emergency lighting as shown on the drawings and detailed in the schedule of luminaires.

The emergency lighting shall generally consist of self-contained mains luminaires and separate 'running main' exit light fittings.

The emergency lighting installation shall comply with BS 5266 and emergency luminaires shall comply with BS 4533 Part 101 and 102.22. All equipment used shall be ICEL certified and copies of the certificate shall be provided.

Where emergency battery packs are located remotely from the luminaire, the battery pack shall be supported from the soffit on a purpose made bracket (with exception to non accessible ceiling areas).

Illuminance tests shall be carried out at sufficient points to prove compliance with BS 5266 and UCL requirements. These tests shall be carried out in the last hour of a 3 hour discharge and 24 hours later after the batteries have been recharged.

A completion certificate in accordance with BS 5266 shall be provided as well as a log book within the operating and maintenance manuals. Any battery chargers and invertors mounted more than 500mm away from the luminaire shall be interconnected with wiring complying with BS 5266.

Record drawings are to be provided with each emergency lighting address and cable routing to all associated equipment. Test results at local control panel and at head end PC to be recorded and submitted as per UCL design guide requirement.

The complete emergency lighting control system shall be provided by Zumtobel from Onlite range. Cabling to each fitting shall be mounted with a separate high containment at high level as indicated on drawing.

The Head end PC is to be located within level 3 Core B electrical cupboard or linking back emergency lighting to main head end PC on UCL Main Campus, to be agreed and confirm with UCL EM&I team.

6.6 Lighting Control

The lighting control system shall be provided in accordance with the requirements of Building Regulations Part L2.

The Contractor shall provide and install the lighting control system as included on the layout drawings and detailed in this specification. It shall further be inclusive of wiring, equipment, containment and commissioning.

The Contractor shall fully coordinate with the EX OR Lighting Control Specialist assistance to achieve a fully working system. The lighting control is to be the EXOR MLS system.

Lighting shall be automatically controlled and dimmed through a DALI protocol to regulate the lux levels of the various spaces in line with BS EN 12464 Light and Lighting. The final operation and control matrix shall be determined with Employer during the commissioning stage.

The systems shall provide a pre-set scenario's and have daylight linking throughout the buildings wherever appropriate.

The system shall also interface with the fire alarm, turning the lighting to 100% in all areas in the event of an alarm.

When the building is unoccupied and is beyond the predetermined time, all lighting shall be extinguished.

Lighting control to all areas shall be as follows:-

- Corridors and Lift lobbies – Presence detector
- External lighting – Timeclock, override switch and photocell

Internal lighting shall be zoned asper the BREEAM requirement also allow for occupant control in accordance with the criteria for relevant areas present within the building. Contractor shall produce and submit a lighting control strategy schedule for final approval by UCL Sustainability Team.

External lighting shall be controlled via a photocell/timeclock and override switch.

6.7 Small Power

Small power shall be provided throughout the reception areas for the following services:

- Small power outlets
- Supplies to fixed items of equipment which shall include AV, ISD and Security
- New power outlets in al refurbished areas

Small power to the various areas shall be served as described in the following sections and shall generally comply with BS7671, 18th edition IET Wiring Regulations.

Final user sockets shall be standard BS1363 socket outlets with RCD protection provided within the distribution cupboards or directly within desk arrangements where so specified. Dedicated circuits utilising fused spur outlets shall be provided with MCB protection only or RCD protection as further coordinated under the scheme.

Cleaners/General sockets shall be provided every 15m.

BS 1363 socket outlets or industrial pattern sockets to BS EN 60304 Part 1 shall be employed for connection of specialist equipment.

Small Power generally comprises socket outlets as indicated on the drawings.

Under each reception desk a dado trunking shall be provided of white PVC type and of Schneider Ultimate 62 2 compartment manufacture unless differently stated on the drawings. Final approval shall be provided by UCL and Architect's.

In addition, flush wall mounted socket outlets shall be provided throughout the works, high level sockets and spurs shall be provided surface mounted where feeding equipment.

All wiring shall comprise multi core LSOH insulated cables in cable trays / steel conduit arrangement with final LV Circuit and Data drop down connections or flexible conduit connections from either high level or within the floor areas situated floor screed trunking systems.

All socket outlets to have dual earthing arrangement.

All 13A 30mA RCD protected sockets and non-standard socket outlets shall be compliant socket outlets and all circuit cabling shall fully comply with the necessary requirements of BS7671 IET 18th Edition Wiring Regulations.

All sockets and data outlets within wall shall be provided with putty pads for all areas.

All mounting heights shall be as DDA and UCL guidance requirements and in accordance with part M of Building Regulations.

Supplies to Comms room as per UCL ISD requirement.

6.8 Containment Systems

Primary containment shall be provided throughout the building to accommodate all systems as indicated on the containment drawings.

Containment shall generally comprise of cable trays, cable baskets and trunking.

The horizontal routes shall generally follow the main corridor runs and circulation spaces where possible.

Containment shall be provided as follows for the following distribution networks:

- Telecoms and Data: cable tray
- Fire Alarms, BMS and security: 2 compartment galvanized trunking
- Small Power and Lighting: galvanized trunking
- Mid and Low Level Power inc data: dado trunking and conduits

NOTE: All surface mounted containment shall be fixed to the ceiling using appropriate support every 300mm intervals or as recommended by the manufacturers.

6.9 Induction Loop System

An induction loop systems shall be provided to the following areas:

- Reception Desk

The system shall be designed and installed to conform with BS 7594 BS 6083 IEC 118 Part 4.

6.10 Fire Alarm System

A new fire alarm installation with voice alarm sounders shall be installed in the new refurbished space. The complete system shall be designed by fire alarm specialist, Osborn Associates.

Fire Alarm panels power supplies shall be provided where indicated on drawings.

6.11 Voice Alarm System

A new PAVA system shall be installed in the new refurbished space. The complete system shall be designed by fire alarm specialist, Osborn Associates.

PAVA rack and associated power supplies shall be provided where indicated on drawings.

6.12 Data Transmission and Communication Systems

The data installation shall be provided from the dedicated Comms rooms and shall be distributed horizontally within a dedicated cable containment system. Details of the comms room's requirements, including server room sizes, cooling requirements and electrical loads, shall be provided by UCL ISD.

The system shall comprise a network of outlets located around the refurbished building for the connection of Voice, Ethernet Data, Video Communications and CCTV.

6.13 Access and Security Systems

The system shall be designed to conform to all latest relevant standards and UCL's "Specification for the Installation of turnstiles and their integration with UCL's Cardax access control system"

This shall be designed and installed by incumbent UCL security specialist.

6.14 Earthing& Bonding

Earthing and bonding of systems shall be designed and installed to conform with the recommendation of BS 7671(latest amendment), BS 7430 and BSEN 50310.

The main IT rack shall have an auxiliary dedicated earth bar mounted adjacent and connected directly to the main earth bar.

The IT racks shall be bonded in accordance with the ICT consultants/sub-contractor's requirements.

Supplementary bonding shall be provided in accordance with BS 7671 and BS 7430 to all exposed and extraneous conductive parts of the installation, services and structure.

An earthing system shall be provided as necessary to comply with current regulations

Mechanical services plant on the roof shall be bonded to the existing lightning protection system where necessary and where not protected via air termination rods.

Earthing and bonding shall be provided in accordance with BS7671 (The 18th Edition IET Wiring Regulations).

A clean earth system with dedicated earth bars shall be provided within the Comms Rooms.

The clean earthing system shall be taken along the same routes as the main distribution. It shall start at the main earthing busbar and connect into a multi-outlet busbar at each level. The interconnections between the busbars shall be via insulated, flexible multi-stranded cable to minimise impedance to high frequency leakage currents. The requirements for reference/special earths shall be determined with the user.

Earth bonding shall be provided to protect the building and their integral equipment.

The provision shall include the earth bonding of all metalwork associated with the electrical installations including:

- All metal cable sheaths
- Cable armouring
- Metal conduit
- Trunking and similar equipment

6.15 Wiring to Mechanical Plant

Wiring to new mechanical services shall generally comprise XLPE/SWA cables on galvanised steel tray work.

Controls wiring shall be run via a dedicated tray work system, maintaining minimum segregation distances from power services.

Supplies to mechanical services plant on the floor plates shall be wired from local distribution boards using LSOH single wiring in metal tray work and conduit systems. All supplies shall be fed from a dedicated Mechanical panel.

6.16 Testing and Commissioning

The complete electrical installation shall be tested, inspected and fully commissioned by an NICEIC approved contractor. Specialist systems testing and commissioning shall be carried out by accredited Engineers with the respective governing bodies.

It shall be emphasised that all commission and testing procedures have to meet the Phased approach of the construction work and due allowances shall be made to ensure that the requirement for duplicated commissioning is provided where required. Under all circumstances it is required to provide a complete commissioning package on completion of each Phase. No omissions shall be allowed in this respect.
The complete testing shall complies with BS 7671 18th Edition wiring.

6.17 Labelling

All the labelling and electrical equipment references shall be as per the UCL labelling of electrical services requirement.

7.0 Public Health Services

7.1 New Mains water supply

- A new metered MWS to Plantroom 3: Core A (50ø) to include major leak detection (BREEAM).
- A new metered MWS to Plantroom 5/8Core B and C (50ø:) to include major leak detection (BREEAM)

7.1.1 Cold water storage

- Existing cold water storage tanks located in Plantroom 3 and Plantroom 5/8 to be replaced and to include new internal central divisions fitted. The tanks shall have new pipework connections as required.

7.1.2 Hot water storage

- Existing hot water storage tanks located in Plantroom 3 and Plantroom 5/8 to be replaced and to include new packaged plate heat exchangers and buffer vessels and all interconnecting pipework.

7.1.3 Domestic hot and cold water services pipework design criteria

- Maximum pressure at draw off point 500kPa
- Flow pressure at draw off point: 100kPa minimum
- Supply system via newbooster pump set
- Flow velocity: Risers and plantrooms 2.0 m/s max
- Floor distribution 1.5 m/s max
- Domestic hot water distribution temperature 60/55°C.
- Flow rates based on the Institute of Plumbing Design Guide, utilising the loading unit method.

7.1.4 Sanitary drainage services scope of works

- Design Standard: BS EN 12056 to System 3
  Flow rates based on the Institute of Plumbing Design Guide, utilising the discharge unit method

7.1.5 Rainwater drainage services scope of work

- Replace existing pipework within scope areas only
- Existing outlets to be retained subject to validation
- Replace rainwater goods in accordance to Architectural Specification as required
- Rainwater system is to be separated from the sanitary drainage

7.1.6 Core B Plantroom - Level 1 scope of works

- Provide new circulation pump and 1 spare
- Install new HWS plate heat exchangers and buffer vessel.
- Install a new BCWS, BHWSF and BHWSR pipework installation to include all valving
- Install new cold water storage tank and associated connections including tank overflow pipes
  Install new cold water booster pump set
- New distribution of domestic Hot and Cold Water pipework to Core B & Core C
- Replace and install new drainage pipework
- Provide a new Cat5 break tank and booster pump to serve the cold water supplies to the laboratories and the mechanical plant

7.2 Core A and B Toilet Cores and Tea Stations

- Install new drainage system
- Install new water supply system comprising domestic cold and hot water circulation supply systems
- Install PIR operated solenoid valves to each toilet core, (cold water supplies only).
- Connect to the existing water services pipework feeding the existing sanitary fittings not included in Phase 2 works
- Connect to the existing rain water pipework from the wings not included in Phase 2 works

7.3 Level 3 New Cafe Area

- New drainage system shall be provided connected to new collection stacks as shown on the drawings
- New water supply systems comprising domestic cold and hot water circulation supply systems connected to the café as shown on the drawings

7.4 . New Level 3 Entrance Canopy Drainage

- A new rainwater drainage system shall be provided as shown on the drawings

7.5 Sanitary Pipework Installation

A primary ventilated pipe soil system shall be designed to remove the effluent from the various sanitary appliances throughout the building toilet cores. A cast iron piping system using mechanical joints shall be used for the main soil and ventilating stacks. The branch, waste, soil and ventilating piping shall be installed using UPVC.

The foul drainage above ground system shall be installed to meet the performance requirements stated in BS EN 12056(Part 2), System 3 the Building Regulations and all other technical manuals and guides applicable. The system shall be installed using the minimum pipework, fittings and accessories necessary to carry away all discharges from the sanitary appliances etc quickly, quietly and with freedom from nuisance or risk to health. It is essential that air from the foul drainage system is prevented from entering the building.

A cast iron piping system using mechanical joints shall be used

All pipelines shall be identifiable in accordance with BS 1710.

All drainage pipework shall be installed to convey discharges without cross flow, back fall, leakage or blockage and it is essential that the system is adequately tested, cleaned and maintained at all times and throughout the construction process.

In general, the sanitary pipework system shall carry foul water from all levels via gravity. The foul water discharge shall be conveyed to the Thames Water sewer via an existing combined sewer connection.

Main soil vent pipes shall terminate to atmosphere at roof level. Sanitary fittings and taps shall be selected by the Architect.

7.6 Rainwater Installation

In general, the rainwater pipework system shall carry rainwater from roof levels via gravity. The surface water discharge shall be conveyed to the Thames Water sewer via an existing combined sewer connection.

All internal rainwater pipes shall be designed for installation within designated services ducts or ceiling voids. Removable access panels shall be co-ordinated with drainage access points to enable maintenance to rainwater pipework. Where rainwater pipes are to be exposed, they shall be installed true to a high standard, true to line and level and supported in accordance with BS EN 12056 (Part 3) and the manufacturer's recommendations.

A cast iron piping system using mechanical joints shall be used

All rainwater services in ceiling voids shall be insulated. All pipelines shall be identifiable in accordance with BS 1710.

7.7 Potable Water Installation

New metered incoming mains water services shall supply the new potable cold water storage tanks serving cores A and B/C sited within Level 1 plant areas. The new storage tanks will be complete with a central division within each of the storage tanks.

A major leak detection system shall be installed on each of the new incoming water mains to comply with BREEAM requirements

The systems pressure serving each of A and B/C Cores shall be generated by the use of the new individual packaged variable speed potable cold water pump sets. The pump sets will operate on a duty / assist /standby basis for ease of maintenance and protection in the event of pump failure

The boosted potable cold water supply shall be distributed through dedicated risers to provide water to sanitary fittings within each of the toilet cores and ancillary areas.

The new boosted potable water supply shall connect to existing services feeding the wings that are not part of the Phase 2 works.

The discharge pipework from the potable booster set shall treated with a UV lamp unit to ensure microbiological fouling of the system does not occur providing protection to the entire domestic water system.

The site is within a hard water area therefore water treatment shall be required to protect the entire domestic cold water system. This shall be achieved using an electro-magnetic physical water conditioner installed on the pump discharge.

The cold water supplies to the laboratories and to the mechanical plant in the Level 1 and roof plantrooms are identified as category 5 risk therefore a dedicated break tank and pump set shall be required for each core area.

The cold water systems shall be pressure controlled with the use of pressure reducing valves to ensure excessive pressures are not experienced throughout the building, in particular to the lower floors.

To comply with BREEAM requirements a water supply solenoid valve shall be installed on the cold water supply to each WC area in the cores. Solenoid valves shall be controlled via infra red movement detectors within each toilet facility.

Drain valves shall be provided at all system low points and isolation valves on all appliances connections.

Surge arrestors shall be fitted at the top of each riser

The whole of the new cold water systems after the local authority mains shall be chlorinated, all necessary injection points shall be provided as may be required to facilitate such works.

Insulation shall be provided for frost protection and to guard against the buildup of temperature to all cold water pipes and storage cisterns where exposed to external ambient temperatures pipework and vessels shall be trace heated.

All pipelines shall be identifiable in accordance with BS 1710.

The whole system shall comply with BSEN 806, BS: 6700, HSE ACOPS L8 and the Water Regulations 1999 second edition. All fittings, appliances, valves and materials to be water research council approved. (WRAS).

The contractor will include all WRAS certification and material directory documentation within each contractor Technical Submission. Any of the above found not to be WRAS approved will be required to be removed and replaced.

7.8 Hot Water Installation

Hot water shall be provided for Core A and Core B services from new plate heat exchangers and buffer vessels located with the respective Level 1 plantrooms.

The hot water shall be distributed through the dedicated risers using a two pipe circulation system, providing hot water to each toilet core and ancillary areas. The circulating system shall be controlled by the use of thermostatic balancing valves.

The hot water system shall be pressure controlled with the use of pressure reducing valves, where applicable, to ensure excessive pressures are not experienced throughout the building, in particular to the lower floors.

Insulation shall be provided on all of the pipework installation to minimise the heat loss from the system

The new hot water system shall connect to existing services feeding the wings that are not part of the Phase 2 works.

Drain valves shall be provided at all system low points and isolation valves on all appliances connections.

Surge arrestors shall be fitted at the top of each riser

The whole of the new hot water system shall be chlorinated, all necessary injection points shall be provided as may be required to facilitate such works.

The hot water supplies to the laboratories are identified as **not** being a category 5 risk therefore are fed from the general domestic hot water system.

All pipelines shall be identifiable in accordance with BS 1710.

The whole system shall comply with BS: 6700, HSC ACOPS L8, CIBSE TM13, and Water Regulations 1999 second edition. All fittings, appliances, valves and materials to be Water Research Council listed.

The contractor will include all WRAS certification and material directory documentation within each contractor Technical Submission. Any of the above found not to be WRAS approved will be required to be removed and replaced.

7.9 Fire suppression Systems

The existing dry riser installation in both Cores A and Core B is to be made compliant with the current British Standards.

New landing valves are to be provided to ensure a valve is located at each floor level

All existing landing valves and the inlet breeching pieces are to be inspected for defects and tested.

The dry riser systems will be designed in accordance with BS 9990.