

**PICCADILLY WAREHOUSE
BEECH DESIGN AND BUILD**

**SPECIFICATION
FOR
ENGINEERING SERVICES**

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PICCADILLY WAREHOUSE

**SPECIFICATION
FOR
ENGINEERING SERVICES**

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Revision	Date	Section	Description
T1	16/04/2021	ALL	Tender issue

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PART ONE - PRELIMINARIES AND GENERAL CONDITIONS OF CONTRACT

1.01 SCOPE

The preliminaries describe the general conditions to be observed by the Sub-Contractor in respect of the Engineering Services related to this contract. The "Sub-Contractor" shall herein be referred to as the "Contractor".

The Contractor shall take note of elements of contractor design included within this specification.

1.02 WORKING ARRANGEMENTS

The mechanical and electrical proposals have been prepared by Parker Wilson Consulting in discussion with the Client and Design Team. There are elements of contractor design which are detailed in this specification.

The Contractor will be entirely responsible for the accurate and efficient installation and performance of the works and such responsibility cannot be transferred in part or whole to any other party.

The Contractor shall be deemed to have examined the site of the work and Form of Contract, Specification and General Conditions, with such schedules, drawings, plans and related documents as are annexed thereto or referred to therein.

If all information required cannot be obtained from this examination, application for information shall be made to the Contract Administrator here after referred to as the CA, prior to the submission of the Tender.

Claims by the Contractor arising from any lack of knowledge in this respect will not be considered.

1.03 PROJECT

The site comprises 2No buildings, Bloom Street and Minshull Street. Both buildings formally used for commercial purposes and are being converted to residential apartments.

The works include reconfiguring the internal partitions, removal of existing materials, services and plant and new structural elements. New mechanical and electrical services will be provided to serve the new apartments.

The new accommodation will consist of a number of 1-bed, 2-bed and 3-bed apartments along with communal and circulation spaces.

1.04 LOCATION

Refer to architectural drawings for site plans.

The site is bounded by Bloom Street, Minshull Street and Richmond Street.

1.05 SPECIFICATION AND METHOD OF APPOINTMENT

The contractor will be required to enter into a domestic contract with the main

contractor.

Please refer to the Main Contract Preliminaries for information on terms and conditions.

1.06 NAMES OF PARTIES

Refer to the main contract for full details of all parties. Primary contact details only are provided below.

Employer

Beech Design & Build
58-60 Whitworth Street
Manchester
M1 6JT

Marcus Bunting
Tel: 0161 694 4947

Email: mdb@beechdesignandbuild.co.uk

Architect

Beech Design & Build
58-60 Whitworth Street
Manchester
M1 6JT

Ester Canals
Tel: 0161 694 4947

Email: ec@beechdesignandbuild.co.uk

Below Ground Drainage Expert:

Hydrock
Northern Assurance Buildings
9-21 Princess St
Albert Square
Manchester
M2 4DN

Luke W. Pilsbury
Tel: 0161 804 5550 Ext: 5003

Email: lukepilsbury@hydrock.com

Fire Engineer:

Hydrock
Northern Assurance Buildings
9-21 Princess St
Albert Square
Manchester
M2 4DN

Darren Agnew
Tel: 0161 804 5550

Email: darrenagnew@hydrock.com

Structural Engineer:

GM Structures
199 Monton Rd
Eccles
Manchester
M30 9PN

Matt Pimbley
Tel: 0161 661 6886

Email: mp@gmstructures.co.uk

Building Services Engineer:

Parker Wilson Consulting
Burnham House
373 Bury New Road
Manchester
M25 1AW

Phil Grice
Tel: 0161 773 1177

Email: philip.grice@parker-wilson.co.uk

CDM Coordinator:

As per 'Employer'

Main Contractor:

As per 'Employer'

Unless otherwise stated, reference to contractor shall mean the main contractor who shall be responsible for the installation and coordination of both the building and engineering services on site.

All communications between the CA and domestic sub-contractor shall be via the main contractor.

1.07

CONTRACTOR TO VISIT SITE

The Contractor should visit the Site before tendering and shall be held to have satisfied himself and to have made due allowance in his Tender prices for local conditions, the nature and accessibility of the Site, nature and extent of operations, the supply of and conditions affecting labour, position of services and drains, the nature of the Works generally.

The Contractor shall arrange his delivery of materials so that no congestion occurs and shall include for all additional handling and transporting due to site conditions. No claim will be allowed in the settlement of the account in respect of anything mentioned in this item, neither will lack of knowledge or ignorance of conditions be accepted as justifying such a claim.

Permission to gain access to site to view may be obtained upon application to the contract administrator.

1.08 DRAWINGS

The drawings accompanying this Tender are the Contract drawings and are as scheduled in the Appendices of the Specification.

1.09 SERVICES

Refer to the Main Conditions of Contract for details of services, facilities and attendance to be provided by the Main Contractor.

1.10 LIAISON WITH STATUTORY AUTHORITIES

The contractor shall include all allowances for liaising with statutory authorities with respect to the supply, installation and co-ordination of their services.

This shall include placing of orders, liaising, establishing final cable/pipe entry positions, metering, builderswork, notices, attendances and other requirements.

1.11 SPECIAL CONDITIONS

None.

1.12 RESTRICTION AND SPECIAL REQUIREMENTS

The contractor and his employees shall comply with the following requirements:

- a) Any keys, which shall be loaned to the contractor, shall be kept in the care of the foreman or chargehand, who shall be responsible for their safekeeping. Such keys shall be collected from the client's representative and returned on arrival and departure.

The greatest care shall be taken to ensure that keys are not left accessible to unauthorised persons, mislaid or lost.

- b) They shall not trespass and shall confine themselves to the locality of their work.
- c) They shall erect adequate barriers, warning lights, etc to prevent accidents when trap doors or manhole covers are lifted or excavations made in road, paths etc.
- d) The contractor shall undertake to remove from the site at once, any workman or employees of his found contravening these instructions.

1.13 SAFETY HEALTH AND WELFARE OF WORKS PERSONNEL

Contractors are directed to the requirements of the following:

Health and Safety at Work, etc., Act 1974 and all relevant legislation including the Factories Act 1961, the Offices, Shops and Railway Premises Act 1963, the Asbestos Legislation 1969, the Fire Precautions Act 1971, the Deposit of Poisonous Wastes Act 1972 and the Control of Pollution Act 1974.

The Contractor shall be deemed to have fully inspected the contract documents and shall have satisfied himself on all matters pertaining to the Health and Safety at Work Act 1974 with any subsequent addition and amendments thereto.

Subject to the statutory requirements of the Act, the Contractor shall be solely responsible for ensuring that the whole of the Works or any part of the Works shall comply with the Health and Safety at Work, etc., Act 1974. He shall ensure that all supervisory and installation work, maintenance and operational drawings and instructions, notice and certificates are provided, safe protection for any person and shall indemnify the Main Contractor, building owners, architect and contract administrator against all injuries and damages arising from any deficiency in the Works.

Any matters which in the opinion of the Contractor are liable to be a hazardous deficiency at any time shall be referred by the Contractor to the Contract Administrator, in writing, before proceeding with the work.

The Contractor shall make the allowances for complying in full with latest Health and Safety and CDM regulations 2007. The contractor shall be required to prepare all documentation e.g. method statements, material information, risk assessments/ analysis as required by the regulations. Reference shall be made to the pre tender health and safety plan, which forms part of the main contract documents.

1.14 CONTRACTOR TO INFORM HIMSELF FULLY

The Contractor shall be deemed to have examined the site of the work, if access thereto has been available to him and the Form of Main Contract, Specification and General Conditions, with such schedules, drawings, plans and related documents as are annexed thereto or referred to therein.

If all information required cannot be obtained from this examination, application for information shall be made to the Contract administrator prior to the submission of the Tender.

Claims by the Contractor arising from the lack of knowledge shall not be considered.

1.15 EXISTING SERVICES

The Contractor shall not interfere with nor interrupt in any way the services of statutory authorities or private owners without the prior permission of such authorities or owners.

The Contractor shall be responsible for any damages and consequential costs entailed by non-compliance with the above stipulation and shall make good any damage and pay any such consequential costs at his own expense to the satisfaction of the Employer, Contract Administrator, Authorities or owners as the case may be.

1.16 BREAKING INTO EXISTING SERVICES

The maintenance of continuity of services, i.e. electricity, steam, hot and cold water sprinklers, etc., is of prime importance and interruption of these

services will not be permitted without prior consultation with the Client or his representative and the C.A.

The Contractor shall refer to section one of the relevant particular specification, which provides further details of existing services provisions.

The contractor shall agree a precise time for breaking into these services and shall include for such work to be carried out outside normal working hours whenever possible.

1.17 FIRE PRECAUTIONS

Before any works of maintenance, adaptation or extension to existing buildings are carried out the Contractor shall discuss the proposals with the Contractor Administrator and/or the Safety Officer responsible for fire precautions to ensure that the extent of any fire hazards in the work are known fully to both Contractor and the Client.

The Contractor's workmen shall be required strictly to conform to all "No Smoking" rules applicable in specific areas. Smoking shall not be permitted in roof spaces or service risers etc. Fire escape routes shall be kept unobstructed and, if necessary, illuminated at all times, and when work necessitates the use of naked flames in locations having a high fire risk, portable fire extinguisher shall be readily available.

1.18 SPECIFIED MANUFACTURERS

All specified materials and goods supplied by the Contractor shall comply with current British Specifications and shall be of approved pattern. Specific manufacturers or trade names or figure numbers mentioned in the specification are for the purpose of defining the required class of material, quality, design or workmanship.

For parity of tendering, each Tenderer shall include for such specified plan, equipment and materials.

The Contractor shall be responsible for the correct ordering, handling, storage assembly and the correct arrangement and positioning of all plant and materials. He shall be responsible for incorporating them within the installations of which they form part so that the manufacturer's specified performance can be achieved.

The Contractor should obtain from the manufacturers or suppliers adequate guarantees in respect of such plan, equipment and materials.

In the event of such plant, equipment or materials specified being in any way inferior with respect to the Specification or the manufacturer's stated specification/performance, the Contractor shall be responsible for ensuring compliance at no extra cost to the Contract.

If at any time prior to the installation of any material, equipment or components specified by name a manufacturer, the Contractor finds that they:

(a) do not comply with the specification;

(b) do not comply with the manufacturer's stated specification/performance.

He shall notify the C.A. and seek his instructions. If such instructions are that there shall be substitution of materials, equipment and components, such instructions will be deemed to be at no cost to the contract.

Details of plant, equipment and materials of equal quality, workmanship, design and performance but of alternative manufacture may be submitted for the approval of the Contract Administrator. Each such submission shall be entered in the appropriate Appendix at time of tendering and shall indicate:

- (a) alternative manufacturer;
- (b) type and/or figure number of alternative submitted;
- (c) other relative details as to type, design and performance
- (d) the adjustments, if any, to the tender price if the alternative were approved.

The Contractor shall not order or install alternative plan, equipment and materials prior to the written authority of the Contract Administrator.

1.19 CONTRACT DRAWINGS

The Contractor will receive from the Contract Administrator a CD rom and/or email copy of all drawings and specification. Paper copies or drawings etc, and any subsequent revision thereto can be provided, however will be charged to the Contractor at current commercial rates.

The drawings accompanying the documents show the general arrangement and extent of the Engineering Works but many not cover every detail and are diagrammatic in certain particulars.

The Main Contractor shall be responsible for co-ordinating the engineering services installations and building works on site.

Notwithstanding the provision of the drawings the Contractor shall be held responsible for the work embodied therein and shall take his own particulars and dimensions from site and provide at his own expense all necessary working drawings, paper and electronic copies of which shall be submitted to the Contract Administrator (CA) for comments before the work is executed.

Where plant and equipment is to be installed inside or close to existing buildings or structure, the Contractor shall take his own dimensions of the buildings or structures for the purpose of installing any plant and materials to be supplied and fixed under this Contract and shall be responsible for the accuracy of such dimensions.

In the preparation of installation drawings and in the erection of the Contract Works, the Contractor shall ensure that adequate provision is made for access to, operation and maintenance of the various valves, dampers, components, plant and equipment. He shall ensure that apparatus that needs regular removal for maintenance may be removed with the minimum of disconnections and without interference to other adjacent installations.

Should any portion of the Works which reasonably and obviously would be inferred as necessary for complete, safe and satisfactory operation of the Works as a whole, be not specified or expressly described in the Specification and/or drawings the Contractor notwithstanding such omission shall provide and execute such work as part of the Contract and shall not be entitled to any extra payment on that account.

The Contractor shall, prior to ordering, submit to the CA drawings showing the construction details and dimensions of all plant, equipment and machinery included in the Works.

The Contractor shall submit drawings of panels and specially prepared comprehensive wiring diagrams of all internal wiring required for permanent power and control circuits associated with the plant and equipment included in the Works. Manufacturer's standard leaflets applying to typical installation or to individual components will only be accepted as supplementary information.

1.20 SETTING OUT AND BUILDERS WORK

Before commencing manufacture of any ductwork, trunking etc, check that the shop drawings co-ordinate with all other drawings, ascertain the physical dimensions on site. Set out all holes and chases required for the installation of plant and equipment.

Supply all foundation bolts, nuts, washers, packing pieces, brackets, supports etc. Supply details of all fixing arrangements to the CA for approval. Drill all holes necessary for fixing the works. Mark out and supervise the cutting of all holes and chases, which shall be undertaken as part of these works.

Should holes need to be cut through walls, these must be cleanly cut and no larger than necessary to allow the pipes or cable etc, to pass through with the appropriate sleeve.

Comply with any restrictions on the cutting of holes, chases, notches, etc. and methods of attachment to the building fabric.

1.21 SUBMISSION OF DRAWINGS

All installation, working, and "as installed" diagrams and schedules prepared/supplied by the Contractor and subsequent amendments shall be submitted to the Contract Administrator.

The Contractor shall ensure that these drawings showing specific areas of work are submitted for comment within at least fifteen clear working days of the date that these works are required to commence on site. These dates shall be in accordance with the agreed main programme of works.

The Contract Administrator shall not be responsible for delays to comments on drawings where this is due to amendment to suit the works. The Contractor shall be responsible to ensure that all drawings are submitted in sufficient time to avoid delay to the works.

All drawings shall be commented upon in accordance with the conditions of

contract and shall be stamped and signed by the Contract Administrator before formal issue to other parties.

The Contractor shall be responsible for any discrepancies, errors or omissions on the drawings or other particulars supplied by him or his Contractors, whether they have been commented upon by the Contract Administrator or not, provided that such discrepancies errors or omissions are not due to inaccurate information or particulars given in writing to the contractor by the Contract Administrator.

Drawings not commented upon shall not be used on site or elsewhere for the manufacture or installation of plant and/or equipment unless generally agreed otherwise in writing by the Contract Administrator.

1.22 SITE MEETINGS

Notwithstanding the contractual requirements to provide a competent supervisor for the Works, the Contractor shall provide a representative at any meeting held on site of the Works or in the offices of the CA for which the notice has been given by the CA.

The Contractor's representative shall be deemed to be authorised to represent the Contractor in all respect's relating to the Engineering Works.

1.23 STORAGE AND PROTECTION OF MATERIALS

The Contractor shall allow in his tender for receiving, unloading and safe keeping during and after delivery to the site of all materials and goods for the Works including materials provided under P.C. and Provisional Sums. The Contractor shall provide his own storage accommodation including storage racks bins, tarpaulins, etc., for the complete storage and subsequent distribution of all materials, tools, items or equipment for this Contract.

The Contractor shall cover up and protect all his work liable to damage from frost, weather, traffic or other causes. Any work damaged shall be taken down and re-executed or otherwise made good by and at the cost of the Contractor.

All bright parts of plant, etc., which are liable to rust shall be covered for protection during the progress of the work. Upon completion, the covering shall be removed and the surfaces restored to their original condition.

The Contractor shall remove all rubbish due to his work from the site on completion and as and when required.

1.24 RESPONSIBILITY FOR PLANT

The Contractor shall give supervision, inspection, testing and progress reports during manufacture or fabrication at works or on site, as and when required. He shall also ensure that delivery, assembly and completion of the order and amendments or modifications thereto comply with the programme.

1.25 EXISTING MATERIALS

The Contractor shall not under any circumstances re-use existing plant or materials rendered redundant during the course of the works unless he

receives instructions in writing from the CA to the contrary.

The contractor shall provide free issue any materials/ items of plant that have been rendered redundant by these works to the employer.

All scrap and redundant materials not required by the employer shall become the property of the Contractor and shall be removed from site.

1.26 CONTRACTOR TO PROVIDE EVERYTHING NECESSARY

The Contractor shall be held responsible for the provision of all labour, supervision, tools, tackle, crange staging, gantries, materials, goods, drawings, documents, plant and apparatus necessary for the due performance, execution and completion of the Contract.

1.27 FUEL, WATER AND ELECTRICITY FOR TESTING PURPOSES

Unless otherwise indicated, all fuel, water and electricity required for testing purposes shall be provided by the Main Contractor free of charge to the Contractor.

1.28 DEFECTS LIABILITY PERIOD

All types of equipment, whether put into operation before the completion of the Contract or not, shall be maintained in perfect order by the Contractor until the completed installation or an agreed section of the installation is handed over.

For a period of 12 calendar months, unless otherwise indicated, after the completion of the main building contract, the contractor shall be responsible for any defects which may develop under normal conditions as a consequence of faulty materials, a design element or workmanship in the Works. The Contractor shall forthwith remedy such defects when called upon to do so by the Contract Administrator who shall state in writing in what respect any portion of the installation is faulty.

The Contractor will also be held liable for any costs of dismantling or re-erection and making good of any of the works (whether forming part of his Contract or not) which may have to be undertaken in order to replace defective parts.

1.29 INSTRUCTION OF CLIENT PERSONNEL

After the installations are completed, tested, set to work and handed over, the Contractor shall supervise and be completely responsible for the running of all installations for a period of one week. During this period the Contractor shall instruct the maintenance staff in the running, operating and maintenance of the installations.

This instruction period may not take place immediately upon completion, but when considered desirable, with due regard to the season of the year and external temperatures.

Fuel and power for site tests, setting to work and instruction periods shall be provided at no cost to the Contractor.

1.30 AS INSTALLED DRAWINGS

The Contractor shall provide at the handover of the works "as installed" drawings comprising three prints of each drawing and CD Roms unless otherwise stated.

The drawings should be provided on a DVD/CD Rom/USB Stick in AutoCad Version 2010 / 2014 in DWG / DXF format. File names to consist of project and drawing numbers. Drawing register is to be provided in MS word or PDF format.

During the course of the works the Contractor shall maintain on site a complete set of drawings marked up to identify all changes to the contractors working drawings during the course of the works to facilitate easy and accurate preparation of the "as installed" drawings and to ensure that the drawings are in all respects a true record of the installations.

The "as installed" drawings shall include such detail relevant to the engineering services as follows:-

- a) General arrangement of all services to a scale of not less than 1:100.
- b) Detail drawings of all plant rooms or similar areas to a scale of 1:20.
- c) Diagrams of connections of all control boards or similar apparatus in schematic and diagrammatic forms.
- d) Schematic diagrams of all electrical distribution etc.
- e) Schedules of equipment, valves, luminaires etc.

For all Mechanical Services the "as installed" Drawings shall include all pipe runs and ductwork with sizes, materials and insulation. The drawings shall include positions of all room and duct sensors etc, commissioning valves and reference numbers for equipment, grilles, control panels etc.

All ceiling mounted services including ventilation grilles, sprinkler heads, lighting, PIRs, smoke detectors, sounders, Wi/Fi points etc shall be included on a reflected ceiling plan.

Integrated layout drawings shall be produced by the contractor including pipework and ductwork.

Ductwork manufacturer's drawings shall not be accepted as record drawings.

For Electrical Services "as installed" Drawings shall include all conduit, trunking and cable tray runs with the sizes and numbers of cores contained therein and the positions of all inspection and draw boxes. Cable runs shall be shown with the description of cables and number of cores.

For sprinkler services the sprinkler sub-contractor shall produce 2 sets of drawings. One indicating the position and size of new and existing pipework and the other a reflected ceiling plan indicating existing and new heads.

Specialist drawings from sub-contractor such as medical gases, fire

suppression systems etc.

Where the Works include modifications to existing services the Contractor shall include on the "as installed" drawings all available information regarding the existing services. Where practical the Contractor shall check the accuracy of the existing information and supplement it where necessary from the surveys of the complete installation.

The Contract will not be deemed to be complete until the drawings and or CD Roms are handed to the Contract Administrator.

1.31 OPERATING AND MAINTENANCE MANUALS

The Contractor shall prepare and supply three sets of complete Operating and Maintenance instructions in respect of all installations included in the Works.

These manuals shall be contained in volumes strongly bound in flexible covers and suitable for heavy usage over a long period to be read in conjunction with the "as installed" drawings.

A CD rom of the entire contents of the manual and record drawings shall be included within a plastic sleeve of Volume 1 of the manuals. They shall comprise the following:-

- a. Full contact details of the design/construction team.
- b. A general description of the scope, purpose and manner of working of each system and the apparatus forming the installations.
- c. A detailed description of the scope, purpose and manner of working each system of automatic controls.
- d. Data on general design parameters and associated normal operating temperatures, pressures, etc., based on the commissioning tests.
- e. Clear and comprehensive instructions for the starting up, running and shut down of each system or apparatus.
- f. Clear and comprehensive instructions for dealing with emergency conditions for each system or apparatus.
- g. Instructions in respect of any precautionary measure from time to time necessary (e.g. against corrosion or freezing).
- h. Instructions in respect of the care of apparatus normally subject to seasonal disuse.
- i. Instructions as to the nature, extent and frequency of servicing necessary to properly maintain the Works in good condition as to the materials to be used for this purpose. This information shall be supported by maintenance instructions provided by the suppliers of particular component apparatus.
- j. The names and addresses of suppliers of all major components of the

installations as may potentially be required to obtain spare parts or replacements.

- k. List of recommended spares.
- l. Test and completion certificates.
- m. Commissioning Reports from equipment manufacturers and commissioning specialists.
- n. A set of photo reduced record drawings in A3 format.

Copies of manufacturer's data shall be supplied in respect of the nature, type and method of operation of specific items of equipment. Such data, in the form of individual booklets and the like, shall be indexed and cross referenced to the Operating and Maintenance Instructions and presented suitably protected in stout binders with D shaped rings.

Draft copies of all instruction manuals shall be made available in advance of the completion date in order that the CA has the opportunity to comment and the corrections/amendments recorded, thereby allowing sufficient time for the approved documents to be available at the time of signing of the Certificate of Practical Completion.

Where the Works include modifications to existing installations the Contractor shall include in the Operating and Maintenance Instructions all the above information for the existing installations whether included in the works or not.

1.32 CONTRACT COMPLETION GUARANTEE - ELECTRICAL CONTRACTOR

Where the tenderer is a member of the Electrical Contractors Association and has a current Contract Completion Guarantee of a value exceeding the value of the Electrical Services Installation the tenderer shall enclose with his Tender Documents a copy of this guarantee.

If appointed as the Contractor, he shall maintain the Guarantee during the Contract and Defects Liability periods.

A copy of any renewed Guarantee shall be sent to the Contract Administrator within seven days of renewal.

1.33 HANDOVER

Handover of the works shall generally include:-

- a) Supply of all test certificates for equipment items from manufacturers.
- b) Supply of all test certificates covering the works during the installation, including heat tests, or any special tests certified by an Insurance Company.
- c) Supply of all test certificates on (1) hydraulic systems (2) air flow systems (3) gas systems.
- d) Supply of all applicable test Inspection Certificates for the Electrical

Installation.

- e) Supply of record drawings (including CD rom) wiring diagrams and valve charts.
- f) Supply of operating and maintenance instructions in manual form for all the plant items.
- g) Supply of operating and maintenance instructions for the proper working of the whole installation, service by service.
- h) Supply of instructions of safety precautions under fault conditions.
- i) List of names, addresses and telephone numbers of all contracting firms, and manufacturing firms responsible for the installation or supply of equipment items comprising the works.
- j) Supply of spares as specified.
- k) Completion of all painting including identification, lettering and numbering.
- l) Making sure all plant items clearly show actual manufacturer's nameplate giving plant details, reference number, test pressures and dates of manufacture.
- m) Ensuring all notices and labels are fitted.
- n) General finishing of installation.
- o) Agreeing with the Contract Administrators a list of any outstanding items or defects on the basis that the items so listed shall be dealt with and cleared within 28 days unless otherwise agreed with the above.
- p) Training of Client's staff.
- q) Modification of clients existing valve charts, medical gas schematics and electrical distribution schedules to reflect the changes carried out under the works.

Subject to the satisfactory completion of the foregoing the Contract Administrator will then issue a Certificate of Practical Completion.

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PART TWO

STANDARDS OF INSTALLATION AND MATERIALS

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2.1.5 SUPERVISION

PART TWO - STANDARDS OF INSTALLATION AND MATERIALS

SECTION ONE

2.1.1 GENERAL

This part of the specification deals with the general standard of materials, workmanship, approved methods of installations, testing and commissioning required in connection with the Engineering Services.

2.1.2 WORKMANSHIP

Provide workmanship to the highest standards produced by experienced people and fully in accordance with the requirements of the regulations and codes of practice listed in Clause 2.1.4.

2.1.3 SAMPLES

Inform the contract administrator when each type of installation (e.g. ductwork, pipework, conduit, trunking, insulation, etc.) is to commence and when representative samples of such installations are ready for inspection.

The contract administrator's approval of the sample must be obtained before further work commences.

2.1.4 REGULATIONS AND CODES OF PRACTICE

- 1) Latest relevant BS Standards, Codes of Practice and European directives.
- 2) Health and Safety at Work Act
- 3) Building Regulations
- 4) Local Authority Regulations and Bye-Laws
- 5) Local Authority Fire Officer
- 6) Electricity Supply Regulations 1988 (as amended) and subsequent amendments
- 7) Offices, Shops and Railway Premises Act
- 8) Factories Act
- 9) Local Water Authority Bye-Laws
- 10) Environmental and Public Health Approval
- 11) COSHH Regulations 2002
- 12) Clean Air Act
- 13) The Electricity (Factories Act) Special Regulation 1980 and 1994

- 14) Electricity at Work Regulations 1989
- 15) C.D.M Regulations
- 16) HVCA Ductwork Specification
- 17) CIBSE Guides and Commissioning Codes
- 18) CIBSE Code for Interior Lighting 1994
- 19) Gas Regulations
- 20) BS 7671:2001 Requirements for electrical installations. (IEE Regulations 17th Edition) Including amendment 3 2015.
- 21) Electromagnetic Compatibility Regulations 1992, SI No. 2372, 89/336/EEC.
- 22) Electrical Equipment (Safety) Regulations 1994 SI No. 3260, 73/23/EEC.
- 23) UK Construction Products Regulations 1994, SI No. 3051, 89/103/EEC.
- 24) Any additional requirements covered in the drawings and contract documentation
- 25) Beech Brand Standards

2.1.5 SUPERVISION

The complete mechanical, electrical, automatic controls installations shall be installed under the supervision of a supervisor/foreman to ensure the best workmanship and coordination of all parties. In addition each particular discipline shall be installed under the supervision of an experienced supervisor/ foreman.

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PART THREE

PARTICULAR SPECIFICATION FOR MECHANICAL SERVICES

SECTION ONE

3.1.0 GENERAL

3.1.1 INTRODUCTION

The services design concept has been developed in conjunction with other members of the design team to ensure that engineering solutions balance functional, energy efficiency and sustainability issues. Consideration has also been given to likely requirements for statutory compliance and the impact of the services design on planning considerations.

3.1.2 DESCRIPTION OF BUILDING

The project comprises the refurbishment of a 2No buildings as part of the Piccadilly Warehouse development.

3.1.3 SCOPE OF WORKS

The Contractor shall include for the coordination, supply, delivery to site, installation, setting to work, testing and commissioning of the following works in accordance with the requirements of this specification and the accompanying drawings.

- 1) Stripping out of Existing Services
- 2) New Incoming Services
- 3) Existing Gas Services Disconnection
- 4) Heating
- 5) Domestic Services
- 6) Water Treatment
- 7) Ventilation
- 8) Testing and Commissioning
- 9) Thermal Insulation
- 10) Automatic Controls
- 11) Associated Electrical Services
- 12) Builderswork and Site Management

3.1.4 INSTALLATION REQUIREMENTS

All of the installations shall be in accordance with the requirements of Part

Two of this specification in respect of standards of materials and workmanship.

All pipework and ductwork shall be concealed unless otherwise stated in the specification or noted on the drawings.

3.1.5 EXISTING SERVICES PROVISIONS

Details of the existing services installations are given for general guidance only and may not be complete and accurate in every respect. The contractor is to examine the systems on site and shall be deemed to have done so in order to establish the full extent of the existing installation. Redundant pipework and equipment shall be made safe, stripped out and removed from site.

Redundant fittings shall be offered to the Client prior to the removal.

The contractor shall be responsible for any necessary reinstatement and making good following the removal of redundant equipment.

Should any connections be required into existing services then any necessary shutdown shall be fully coordinated with the works resident engineer. A minimum of 7 days' notice shall be given prior to any shutdown being carried out.

3.1.6 ORDER OF WORKS

The contractor's programme for carrying out the above listed works shall be agreed with the contract administrator and shall be fully coordinated with all other works on site.

The contractor shall allow for a minimum of 1 weeks in his programme for commissioning the engineering services in two parts:

- 1) System balancing and proving (including electrical testing and automatic controls)
- 2) Environmental checks (when part 1 is complete and accepted)

3.1.7 NOISY WORKING

Note that any work of a noisy nature and likely to cause vibration to the structure shall be restricted to normal working hours. All necessary measures shall be taken to avoid nuisance caused to existing staff within the building.

3.1.8 MAINTENANCE CONTRACT

Not applicable.

3.1.9 COMMISSIONING

On completion of the works, the contractor shall commission and test the works, all as described in section nine of this specification.

The contractor shall also note that commissioning valves, dampers etc are generally indicated on the schematic drawings.

In addition to those indicated the contractor shall make all allowances in his tender for the provision of additional commissioning devices as deemed necessary to satisfactory balance each system and to ensure correct operating performance.

3.1.10 PERMIT TO WORK SYSTEM (EXISTING BUILDING)

Not applicable.

3.1.11 ASBESTOS

Asbestos is likely to be present in the existing services installation and is likely to exist within the building. If the Contractor suspects that asbestos is present in any part of the works, he must cease work on that particular aspect of the works and inform the Contract Administrator immediately.

On the instruction from the Contract Administrator, the Contractor will be required to employ a specialist licensed contractor to carry out all necessary survey and asbestos removal prior to works recommencing.

An asbestos survey report will be available upon request from the Employer.

SECTION TWO

3.2.0 HEATING

3.2.1 GENERAL DESCRIPTION

The works under this section shall include for the supply, installation, coordination, testing and commissioning of an electric heating system in accordance with the details given on the drawings and in the specification. The works shall generally comprise the following:

i) Existing

All existing mechanical services have been stripped out prior to works commencing.

ii) New Installation

Heating to the bedrooms, living areas and lobby will be provided by Caldo electric panel heaters, controlled by local electronic thermostat with programmable room temperatures and heating times. The controller shall be Wi-Fi enabled and allow control via mobile phone application.

Heating to the bathrooms will be provided by Caldo electric towel rails. Towel heaters will utilise local controls to be adjusted to suit the requirements of the occupant. All to be chrome finished.

Heating to the communal corridors and circulation space will be provided to by electric panel heaters controlled by local electronic thermostat with programmable temperatures and heating times.

The Contractor shall allow for suitable controllers, interface equipment, software and wiring. Controllers shall have an LED temperature display. The final controller type shall be approved by the CA prior to ordering.

3.2.2 HEAT EMITTERS

Electric Panel Heaters

Where indicated on layout drawings, electric panel heaters shall be provided to the specification in the technical schedules. Electric panel heaters shall be installed to manufacturers recommendations complete with electrical connections, proprietary controls as specified and suitable fixings appropriate for the building fabric. Colour to be confirmed by the CA.

Electric Towel Heaters

Where indicated on layout drawings, electric panel heaters shall be provided to the specification in the technical schedules. Towel rails shall be installed to manufacturers recommendations complete with electrical connections, proprietary controls as specified and suitable fixings appropriate for the building fabric. Colour to be confirmed by the CA.

SECTION THREE

3.3.0 DOMESTIC SERVICES

3.3.1 GENERAL DESCRIPTION

The work under this section shall include for the supply, coordination, installation, testing and commissioning of domestic hot and cold water systems in accordance with the details given on the drawings and in the specification. The works shall generally comprise the following:

3.3.1.1 Cold Water

i) Existing

Each building is served by an incoming 22mm cold water main, which enters the building at basement level and rises up through the building to serve WC areas on each floor.

All existing cold water plant and pipework shall be stripped out and removed from site prior to the new installation.

The existing incoming water service will be removed by United Utilities and a new incoming service provided. The contractor shall allow for all necessary liaison and coordination with United Utilities in this regard.

i) New Installation

Each building will be provided with a new 63mm incoming water main. The new water connection shall be complete with bulk water meter by United Utilities, this shall be through the basement floor plant room as indicated on the drawings. The contractor shall allow for all necessary liaison and coordination with United Utilities in this regard.

Upon completion, the contractor shall install a sectional cold water storage tank and booster set within the basement plant room of each building, which will then pump the water through the floors to provide boosted cold water services to the hot water cylinder, landlord services and the apartments.

Pressure regulators shall be provided at branch connections at each floor level to ensure uniformity of pressure throughout each building.

At the entry of each apartment there is an access hatch within the ceiling which shall house a valve arrangement with double check valve and isolation point for the services. The access panel shall be used for all of the mechanical services, which is to be coordinated with Beech Design & Build.

A valve set arrangement specifically included in the design to allow the installation of individual cold water meters and isolating points under the kitchen sink in each apartment.

The location of the water meter and associated valve arrangement within each apartment are subject to United Utilities approval which

must be obtained by the C.A.

Within each apartment, cold and hot water shall be delivered to each of the outlets, complete with accessible isolating points.

For positions and detailed design information for plant, equipment and services distribution, the drawings and technical schedules shall be consulted.

3.3.1.2 Hot Water

i) Existing

All existing mechanical services shall be stripped out prior to works commencing.

ii) New Installation

Unvented direct electric hot water cylinders shall be installed within the plant room on each floor. These will provide hot water storage and generation for all hot water outlets on their respective floors. These shall be of the type detailed in the technical schedules, located as indicated on the drawings. Hot water shall be stored at 60°C.

The hot water cylinders shall utilise electric immersion heaters as their primary heat source complete with isolation valves as detailed on the drawings and all necessary overflow/vent pipework. The overflow/vent pipework shall all be carried out in copper as clause 3.3.2.

The units shall be supplied with the cylinder manufacturers accessory pack comprising of expansion vessel, pressure relief valve and check valve and connected in accordance with the manufacturers recommendations.

The water cylinders shall utilise a header pipe on the flow and return pipework as detailed in the drawings and heating schematic. These shall include a pump on the hot water return as indicated on the drawings and as specified within the mechanical technical schedules.

The system shall deliver hot water to all outlets on each floor. At the entry of each apartment there is an access hatch within the ceiling which shall house a valve arrangement with individual hot water meter and isolation point for the services. The access panel shall be used for all of the mechanical services, which is to be coordinated with Beech Design & Build.

At this point the hot water will be diverted through the return hot water pipework, with only a hot water flow entering into each apartment.

3.3.2 PIPEWORK AND FITTINGS

All new pipework shall be installed to BSEN1057 (generally as superseded BS 2871 Part 1, Table X) with capillary fittings in copper/copper alloy non-dezincifiable to BS 864 Part 2.

Where indicated on the drawings, pipework shall be Hep20 as manufactured and supplied by Hepworth Building Products. All Hep20 pipework shall be installed in accordance with manufacturer's recommendations. No joints shall be made within floors, voids, partitions or other inaccessible areas.

Exposed pipework and fittings in rooms serving sanitary fittings or equipment shall be chrome plated copper (*or stainless steel with chrome compression fittings)

3.3.3 VALVES

Shall generally be approved for the purpose by the local Water Authority and of the appropriate pressure ratings. Isolation for individual sanitary appliances shall be Ball (screw operated) type valves as manufactured by Ballofix Ref 23140C1 or equal approved.

All other isolation valves shall be Crane D171 or equal approved.

Lockshield gate valves shall be fitted to HWS return mains for regulation purposes.

All valves visible within rooms shall have a chromed plated finish.

3.3.4 STOP VALVES

Stop valves, when required, shall be to (BS 1010) as manufactured by IMI Yorkshire Fittings Ltd or equal approved with capillary connections to BSEN 1254-2 BS 864 Part 2 and unions.

Stop valves shall be provided at low level within each apartment. Refer to schematic details for these. A drain cock and 450mm of clear pipework shall be provided immediately after the stop cock to meet United Utilities' requirements.

3.3.5 DRAIN VALVES

Shall be to BS 2870 Part 1 Table A as manufactured by IMI Yorkshire Fittings Ltd, reference 526DZR or equal and approved where the drain cock is visible.

In plantroom areas Crane D171 HULS.

3.3.6 CHECK VALVES

Shall be to BSEN 12288 (generally as superseded BS 5154) and shall be as manufactured by 'SOCLA' double check valve reference 2231 or equal approved with screwed joints to BSEN 10226 (generally as superseded BS 21).

3.3.7 WATER BYE-LAWS AND BRITISH STANDARDS

All pipework, fittings, appliances, fixings and work shall comply with BSEN806 (generally as superseded BS 6700) specification for the installation inside buildings conveying water for human consumption and Water Bye-Law Regulations. All materials, fittings, appliances etc shall be included in the WRC Water Bye-Laws Advisory Service Director 'Water Fittings and Material

Directory’.

3.3.8 TESTING AND STERILIZATION

The Contractor shall provide all necessary labour and equipment in his tender for testing and sterilizing both the new and the existing water services installations to the requirements and satisfaction of the Contract administrator and all relevant public authorities.

3.3.9 VIBRATION ISOLATION

All pump sets and associated pipework and equipment etc shall be isolated from the building structure to prevent the transfer of noise and vibration to same. All allowance shall be made by the contractor to satisfy this criteria.

Pump sets shall be mounted on inertia bases as detailed in the technical schedules.

3.3.10 WATER TEMPERATURES

The water supply installation shall be insulated where concealed, or within ducts throughout the distribution system to minimise heat gain to the cold water supplies and heat loss to the hot water supplies, complying to the requirements of BSEN 806 (generally as superseded BS6700).

The water storage distribution and delivery temperatures shall comply with the requirements for minimising the risk of Legionella.

3.3.11 INSULATION

The water supply installation shall be insulated where concealed, or within ducts throughout the distribution system to minimise heat gain to the cold water supplies and heat loss to the hot water supplies, complying with the requirements of BSEN 806 (generally as superseded BS 6700).

The insulation for the cold water installation shall be vapour sealed.

3.3.12 QUICK FILL CONNECTION TO NON-POTABLE WATER SYSTEM

Quick fill loops shall not be used unless in a domestic property, where a R24 compliant WRAS approved fitting shall be used.

In any house or non-house applications below 45kW a ‘CA’ devices shall be used as Arrow Valves CA297PRV.

All installations above 45kW or classified as above fluid category 3 shall be installed with a Midi-fill digital model MFD as manufactured by Arrow Valves.

3.3.13 FINAL CONNECTIONS

The sanitary fittings shall be supplied and fixed by the Main Contractor, but the final connections shall be carried out by the Contractor. A ball type isolation valve shall be fitted within 450mm of each sanitary fitting. The use of flexible connections is not permitted.

3.3.14 REDUNDANT LEAD PIPEWORK

Allowance shall be made by the contractor for handling redundant lead water service pipework to the Client when this pipework has been stripped out.

3.3.15 SELF REGULATING TAPE

Self-regulating tape shall be installed on cold water service pipework as indicated on the drawings as manufactured by Raychem Ltd, or equal and approved.

Tapes to be used shall be as follows:

Cold Water Supply - Raychem Wintergard set to min temperature of 4°C.
Hot Water Supply - Raychem Hot Water set to min temperature of 55°C.

The trace heating system shall be a specialist manufactured system complete with power connection, junction boxes tape, tape fixings, insulation entries, junctions, end seals and identification labels.

The trace heating tape shall comprise of a parallel circuit, self-regulating heating tape comprising of two 1.2mm² copper conductors, a self-regulating conductive core material, polyethylene jacket, outer tinned copper braid.

The trace heating supply, tape and control installation shall be installed in complete circuits based on the pipe size, insulation thickness, the required temperature and power rating of the heating tape.

3.3.16 COLD WATER STORAGE TANK

The GRP sectional tanks shall have external flanges and be constructed to meet the requirements of the Water Supply Byelaw 30. Each tank shall have 2 No. independent sections, and each shall be complete with manhole, screened overflow and warning pipe connections.

The ball valve shall be an Aylesbury type to BS 1212 complete with copper ball and overflow, drain and supply outlet connections shall be flanged. Plates shall be 1.0m x 1.0m and 1.0m x 0.5m min size and the tank shall incorporate all internal support rods.

The tanks shall be erected with stainless steel bolts both internally and externally.

The tanks shall be supplied and erected by manufacturer as detailed in the schedules of manufacturers.

3.3.17 HOT WATER SERVICE CIRCULATING PUMPS

A pump shall be supplied and installed in accordance with all details indicated on the drawings and as defined in the technical schedule within the specification.

Each pump shall be of the glandless in-line type of bronze construction complete with inspection glass to check the direction of rotation and allow air release. Pumps shall be as manufactured by the manufacture detailed in the

technical schedules or equal and approved.

A spare identical pump shall be provided. This shall be mounted on the plantroom wall on secure brackets, which shall allow the pump to be easily removed.

3.3.18 COLD WATER BOOSTER SET

A fully packaged cold water booster unit shall be supplied and installed in accordance with the details given on the drawings and in the technical schedules as manufactured and supplied by the manufacturer stated in the technical schedule or equal and approved.

The unit shall be of robust construction, comprising control unit and inverter driven stainless steel pump mounted on a common base frame. The unit shall be quiet in operation with the pump mounted on suitable anti-vibration fixings.

The control unit shall be fitted with flow and pressure sensors to enable fully automatic operation. Lamps indicating control unit alive, pump run, pump trip and reset shall be incorporated. A set of volt free contacts shall be incorporated to enable remote failure indication via the automatic control system.

3.3.19 PRESSURE REGULATING VALVES

Provide pressure regulating valves adjustable for 0 to 5 bar to each floor. All as manufactured by Boss, BSS Industrial, or equal and approved.

SECTION FOUR

3.4.0 WATER TREATMENT– Section Not Used

SECTION FIVE

3.5.0 GAS

The work under this section shall include for the supply, installation, testing and commissioning of a gas supply system.

All works associated with this part of the installation shall comply with the relevant codes of practice and regulations covering the installation of commercial gas pipe work and equipment.

The system shall comprise the following:

i) Existing

Existing gas services enter both buildings at basement level. All gas services shall be removed from the site.

Cadent will be engaged by the client to remove the existing incoming gas service.

ii) New Installation

The gas installations shall be isolated and plugged at site entry points and the meters decommissioned and removed. All of the gas installation and distribution pipe within the building shall be stripped out.

The Contractor shall include for all necessary liaison with statutory authorities relating to the removal of the existing gas services.

SECTION SIX

3.6.0 CHILLED WATER– Section Not Used

SECTION SEVEN

3.7.0 VENTILATION

3.7.1 GENERAL

The works under this section shall include for the supply, installation, testing and commissioning of a ventilation system as indicated on the drawings comprising the following:-

i) Existing

All existing mechanical services shall be stripped out prior to works commencing.

ii) New Installation

A new air handling unit shall be installed on the roof of each building, with a main supply and extract riser dropping down through the building with branch connections at each floor level. The contractor shall provide 150mm support steels for the AHU base and support these via Bigfoot supports.

Ductwork shall run down the main corridor as indicated on the drawings, with supply and extract connections into each apartment.

The contractor shall note the requirement for smoke fire dampers where ductwork leaves the plant room, and where ductwork crosses between the corridor and apartments.

Smoke fire dampers to apartments shall be actuated on signal from the smoke detection within their respective apartments.

Smoke dampers in the plant room shall activate on smoke detection within the corridors or plant room.

The AHU will be required to shut down in the event of fire detection via the communal/landlord fire alarm system. A fire service override switch shall be provided adjacent to the fire alarm panel with auto/on/off switch positions. In "auto" the AHU will shut down on fire activation.

Local extract ventilation shall be provided to the tank room and bin stores. These systems are not currently shown on the drawings. Fan types are listed in the technical schedule. For each fan, the contractor shall assume a 200mm diameter duct is taken from the basement to ground floor level (with smoke damper at the slab penetration) to terminate at the rear of the building via a 300x300mm external louvre.

3.7.2 DUCTWORK

3.7.2.1 General

All ductwork shall be constructed from spiral wound/rectangular steel or modular rectangular/round PVC ductwork and be manufactured and installed in accordance with HVAC Specification DW/144.

All ductwork shall be installed and commissioned in line with the manufacturer's recommendations. All joints shall be sealed and taped and all ductwork thermally insulated.

The ductwork Contractor shall supply and erect ductwork and associated equipment in accordance with the programme of works and working drawings and allow for co-ordination with the ceiling contractor for grille fixing and alignment once the false ceiling has been erected.

Ductwork bends shall have a minimum internal radius of one half the duct width or be fitted with turning vanes, angular bends without turning vane shall not be permitted. Transformation pieces shall be constructed to provide a maximum angle of 15° of any side to the duct axis. All joints and flanges etc. shall be sealed with a suitable compound to render an air tight seal.

Support bracketry shall consist of mild steel components to provide adequate support for the particular size of duct, be height adjustable and either be galvanised or painted with red oxide paint. Brackets for air conditioning ductwork shall incorporate hardwood blocks to the depth of the thermal insulation.

3.7.2.2 Flexible Connections

Where ductwork connects to air handling equipment, heavy duty fire proof connections shall be provided at not less than 200 mm long. Flexible connections shall also be installed to ductwork where ductwork crosses building movement joints.

3.7.2.3 Flexible Ductwork

All terminal fittings shall be connected to the ductwork distribution system by flexible ductwork constructed of a fire resistant material, and approved by the local Fire Officer and the Contract administrator. The flexible ductwork shall be suitable for the system pressure and have a maximum length of 600 mm unless agreed otherwise by the CA. Each end shall be securely fastened with jubilee clips and sealant component to render an air tight seal.

The ductwork shall be insulated with 25 mm thick foil faced insulation to class O fire rating.

3.7.2.4 Volume Control Dampers

Volume control dampers (VCD) shall be located as detailed on the design drawings/schematics, be of the opposed blade type and be manufactured by Actionair Ltd. The operating handle, where fitted to supply ductwork, shall be proud of the damper body to allow thermal insulation behind.

Where dampers are to be motorised the Contractor shall co-ordinate with the controls specialist to ensure compatibility of linkages and actuators.

3.7.2.5 Fire Dampers

Where ducts pass through false ceiling fire barriers, fire walls, plantroom walls, etc., fire dampers shall be installed complete with building-in frame, to

take up expansion of the damper, with at least two hour fire resistant rating.

The fire dampers shall meet with the requirements of BSEN 1366-2, the Local Authority, the Fire Officer and be manufactured by Actionair Ltd or equal and approved.

All fire dampers shall be installed with the blades folded outside of the air stream at the top of the duct in the horizontal plane, allowing the air curtain to drop when activated. The air curtain shall be further assisted by the action of spring loading.

3.7.2.6 Smoke Activated Fire Dampers

Motorised/smoke dampers shall be installed as specified, supplied and installed in accordance with DW/TM3.

Smoke dampers shall be BSB FSD circular type.

They shall be installed complete with building in frame to take up expansion of the damper. The damper shall have at least 2 hour fire resistant rating and shall meet with the requirement of BSEN 1366-2, the local authority and the fire officer.

The dampers shall be operated via an integral electronic pack and shall incorporate a prewired fully tested external closure spring and gear motor package.

The control pack shall be Actionair smoke/shield mode 5 or equal and approved incorporating 24 volt DC opening, fail safe spring instant closure, volt free contacts for provision of external controls interface, visual indication of damper status. The controller shall also incorporate a mechanical fusible link rated at 72°C providing fail safe operation.

All actuators and fire alarm interfaces shall be provided by the mechanical contractor.

3.7.2.7 Access Panels

Access panels shall be installed to provide access to volume control dampers, fire dampers, probes, etc., and where necessary to facilitate internal cleaning of ductwork. The panels shall include rubber seals and quick release fasteners and allow for insulation to be installed. The size of access panel shall be suitably sized according to the duct size.

3.7.2.8 Test Holes

Test holes shall be provided on the discharge of supply fans and suction side of extract fans, and at other positions as agreed with the Contract administrator. Test holes shall also be provided to allow readings to be taken across items of plant, i.e. coils, filters, attenuators and duct mounted heater batteries.

The test holes shall be fitted with an effective removable seal.

3.7.3 GRILLES AND DIFFUSERS

Provide where indicated on the drawings, grilles and diffusers of aluminium construction finished to an approved colour.

No eggcrate grilles shall be installed on the project.

Kitchen extract grilles shall be fitted with removable filters.

The Contractor shall review fire compartmentation drawings and ensure that fire rated grilles and diffusers are provided or fitted with intumescent blocks where necessary.

3.7.4 PLENUM BOXES

Not applicable.

3.7.5 EXTERNAL LOUVRES

Provide external louvres complete with bird screens and concealed secure fixings where indicated on the drawings and as detailed in the technical schedules.

3.7.6 SOUND ATTENUATORS

Not applicable.

3.7.7 CROSSTALK ATTENUATORS

Not applicable.

3.7.8 EXTRACT FANS

Extract fans shall be provided where indicated on drawings and as detailed in the technical schedules they shall be as manufactured by the manufacturer stated in the schedules or equal and approved.

3.7.9 AIR HANDLING UNITS

1. General

The mechanical contractor shall supply and install purpose designed air handling units having air treatment sections and duties as specified in the technical schedules, all as manufactured by one of the manufacturers listed.

Units shall be supplied in modular form for ease of delivery and handling for assembly on site by others. Each module shall be factory mounted on structural steel base for rigidity during lifting and assembly and protected by shrinkwrapped plastic film. 50 mm x 5 mm plain expanded rubber foam gaskets to be provided for insertion between modules.

Air leakage between sections shall be in accordance with Eurovent efficiency standards.

2. Framework

Shall be constructed from zinc coated mild pentapost sections assembled fully welded corners to form a sturdy rigid space frame for acceptance of a minimum of 25 mm thick enclosure panels and air treatment components. The profile to be 14 gauge wall thickness minimum and not less than 50 mm x 50 mm cross section, of closed cell configuration or avoid condensation traps and to provide a smooth easily cleaned external and internal surface. Sections to be primer and painted giving a hard wearing finish resistant to scratching.

3. Base frame

Units shall to be constructed from galvanised folded steel channel suitably stiffened provided under the full length of the AHU.

4. Enclosure Panels

Enclosure panels shall be a minimum of 25 mm double skin construction comprising 18 gauge plastic coated steel outer skin and 20 gauge galvanised mild steel inner skin encapsulating insulation material.

External units shall be finished in chlorinated rubber based waterproof paint over a zinc phosphate primer. Pitched roofs manufactured from 20 gauge zinc coated mild steel shall be supplied on external units.

The insulation material shall be Rockwool mineral fibre(density 60kg/m3) meeting the most stringent fire regulations (Class 1 BS476 Part 7).

Panels shall be fitted to framework recess to provide flush outer surface and fixed internally or externally with plastic sleeved bushes with sealing caps with zinc plated drill screws.

5. Access Panels

Shall be of similar construction to the enclosure panels, having double return edges to prevent edge corrosion or injury.

Panels shall be lift off type and secured with key operated quick release fasteners and lifting handles.

Access panels shall close onto purpose designed "crown strip" ribbed rubber seals to provide air tight enclosure.

6. Inlet and Outlet Flanges

Inlet and outlet flanges shall be 40 mm undrilled either MEZ type.

Weather louvres complete with bird screen shall be provided on external units.

7. Fan Sections

Fans shall be capable of delivery continuously the air volumes

specified in the technical schedules against the specified external system resistance.

Fans shall be double inlet double width type with forward curved blade impellers and capable of running at 10% in excess of selected speed and be statically and dynamically balanced at the factory. Bearings shall be sealed for life type.

Fans shall be "V" belt driven from the drive motor by multiple "V" belt drives conforming to BS1440 capable of transmitting a power at least 75% in excess of the motor rated horse Power.

Single belt drives shall not be allowed. Fan, motor and drive shall be mounted within the fan section casing on a common base, the whole assembly being mounted on spring type anti-vibration mountings and separated from the discharge spigot by a flexible connection which shall be of fire retardant material to BS 476 Part 7 and GLC Standards BS Code of Practice 413, 1973. Provision shall be made for easy adjustment and alignment of the belt drive.

The whole fan section shall be mounted on a spring type anti-vibration mountings.

The drive assembly shall be guarded by a wire mesh guard to BS5304.

8. Drive Motors

Drive motors shall be TEFC continuously rated to BS 4999 with Class F insulation and with ball bearings sealed for life. Drive motors for equipment serving potentially hazardous areas shall be spark/explosion proof.

9. Filter Sections

Panel and bag type filters shall be provided suitable for side withdrawal and mounted in counter frames for easy removal and adequately gasketed to prevent air by-pass, having efficiency as detailed in technical schedule.

An inclined gauge manometer or mini magnahelic gauge shall be factory fitted across each filter bank.

Allowance shall be made for a spare set of filters for all air handling units.

10. Coil Sections

The low pressure hot water heating coils and runaround coils (*) shall be manufactured from 5/8" diameter copper tubes mechanically expanded into aluminium fins to provide a good mechanical and thermal bond. The coils shall have a safe working pressure of 13.5 bar and by hydraulically tested to twice the working pressure.

Coils shall be mounted on slide rails for ease of removal and casing panels over the coil connections shall be of removal type, fixed from

the outside. Baffle plates shall be fitted to the coils to prevent air bypass and coil connections through the panels shall be sealed with tight rubber or neoprene seals.

The heating and DX cooling coil modular casing shall be constructed with an integral drain pan suitably insulated to eliminate water and condensation problems. The drain pan to be provided complete with condense drain connections. The inside surface of the drain pan shall be finished smooth so that it can be easily cleaned.

All coils shall be treated with 'Blygold' anti-corrosion treatment due to the location of the building.

11. Dampers

Dampers shall be provided of the opposed multiblade type to facilitate control and regulation of the air to the unit.

These shall be constructed from galvanised mild steel with damper rods rotating in low friction bearings.

A shaft extension shall be provided on the damper assembly for connection to motorised actuator.

Air leakage in the closed position shall not exceed 5% of maximum unit volume.

13. Heat Recovery

Plate heat exchanger type.

3.7.10 AIR DISPLACEMENT TERMINAL UNITS

Not applicable.

3.7.11 VARIABLE AIR VOLUME CONTROL UNITS

Not applicable.

3.7.12 DRAIN PIPEWORK FROM AIR HANDLING UNITS

Not applicable.

3.7.13 VIBRATION ISOLATION

All air handling units, extract fans, ductwork and associated equipment etc shall be isolated from the building structure to prevent the transfer of noise and vibration to same. All allowance shall be made by the contractor to satisfy this criteria.

SECTION EIGHT

3.8.0 DX TYPE AIR COMFORT COOLING SYSTEMS - Section not used.

SECTION NINE

3.9.0 TESTING AND COMMISSIONING

3.9.1 GENERAL

The contractor shall test/commission the whole of the comfort cooling, ventilation, heating, steam, gas, domestic services, internal drainage and automatic controls. For pressure, weld/connection - soundness, air tightness, performance etc to the satisfaction of the Contract Administrator, Employers building inspector, Clients representative, utilities and all other parties having jurisdiction over these works.

In general, all plant areas and associated rooms, offices, spaces and individual areas shall be cleaned out and cleared of debris. All control panels, airways, ducts and voids shall be blown out and cleared ready for operation. The systems shall then be flushed out, treated, tested, balanced and commissioned by the Contractor who shall satisfy himself that the operation meets the design intent.

The Contractor shall provide all test records for the Contract Administrator's approval and include copies within the maintenance documentation.

Unless otherwise agreed a comprehensive commissioning report shall be provided to the CA for review at least 3 days prior to witnessing being undertaken.

The contractor shall provide a comprehensive report with schematics for all systems. Hand drawing sketches or test sheets shall not be acceptable, the contractor shall include for measuring all grilles and fan coil units/VAV boxes and not just a sample.

The Contractor shall allow for full demonstration to the client, or his representative, of the operation of all systems, new and existing.

3.9.2 EXISTING SERVICES

Not applicable.

3.9.3 HYDRAULIC TESTING

Suitable sections of new installations shall be hydraulically tested and offered to the Contract Administrator for witnessing. This shall include both new installations and extension to existing installations. Systems shall be fully vented prior to testing. Any faults found shall be immediately rectified at the Contractor's cost and the test resumed to the Contract Administrator's satisfaction.

Notice shall be given of at least **48 hours** to the Contract Administrator prior to any test.

Test pressures applicable to services shall be:

- i) Low/medium/high pressure ductwork:

Shall be pressure tested in accordance with defined air leakage and pressures given in HVCA standard specification DW144.
- ii) Chilled water Pipework including ancillaries:

1.5 x working pressure
- iii) Low pressure hot water pipework including ancillaries:

1.5 x working pressure
- iv) Hot and Cold Water Services:

1.5 x working pressure
- v) Gas Pipework:

2 bar (excluding gas governors)
- vi) Steam/Condensate:

1.5 x working pressure

Test certificates shall be forwarded to the Contract administrator including date of test, duration of test and the details of the service and section upon which the test was carried out.

The Contractor shall consider the manufacturer's recommendations regarding heater batteries, cooling coils and auto air vents etc., when carrying out pipework testing and isolate where applicable. The Contractor shall repair or replace, at his own cost, any damage incurred from failing to adhere to these precautions.

3.9.4 COMMISSIONING

A full commissioning programme shall be produced and programmed into the main contract works.

Commissioning of both new and existing services shall be carried out in accordance with the standard documentation as follows:

- i. Water distribution in accordance with the CIBSE Code W.
- ii. Air distribution in accordance with the CIBSE Code A.
- iii. Automatic control equipment in accordance with the CIBSE Code C.
- iv. Boilers in accordance with CIBSE Code B.
- v. Medical compressed air and vacuum installations in accordance with HTMs.

Satisfactory demonstration of each system shall be required and records issued to the Contract administrator.

3.9.5 MATERIALS

Should the Contractor be so called upon he shall, at his own cost, demonstrate and prove the strength, weight, gauge, thermal duty, output of equipment etc., of any plant equipment or component part, either once delivered to site or at the premises of manufacture. Also, the Contractor shall provide a sample of any material proposed for installation, free of charge to the Contract administrator.

3.9.6 TESTS AFTER CLIENT OCCUPATION

Not applicable.

3.9.7 CLEANLINESS OF DUCTWORK INSTALLATION

Ductwork cleanliness shall be in accordance with HVCA DW/TM2 Guide to Good Practice: Cleanliness of new ductwork installations, Intermediate Level.

System shall be tested for bacterial cleanliness prior to handover.

The ductwork installation shall allow for sufficient access doors to facilitate further inspection and cleaning of ductwork installation.

3.9.8 NOISE LEVELS

The Contractor shall record the noise levels achieved in each sample area and demonstrate to the Contract Administrator that the specified noise levels have been achieved.

SECTION TEN

3.10.0 THERMAL INSULATION

3.10.1 GENERAL

The work shall be carried out by a specialist / sub-contractor who are full members of the Thermal Insulation Contractors Association (TICA).

Unless called for in the particular specification, all materials and their insulation shall conform to the following current editions of the noted British Standards, Codes of Practice and Building Regulations.

BS 5422	Method for specifying thermal insulation materials on pipes, ducts and equipment - minus 40°C to plus 700°C
BS 5970	Code of Practice for thermal insulation of pipework and equipment - minus100°C to 870°C
BSEN13166	Thermal insulation products for buildings (factory made phenolic foam/PF products)
BS 3958	Part 4 - Bonded pre formed man made mineral fibre pipe sections
BS 3958	Part 5 - Specification for bended man made mineral fibre slabs
BS 1710	Specification for the identification of pipelines and services
ADL 1 and 2	Building Regulations Part L1 and L2 including second tier documents.

No insulation work shall be started until the pipework or the ductwork systems have been either hydraulically or air leakage tested.

The contractor should note the specified provision for painting of ferrous materials with corrosion resistant paint prior to the application of thermal insulation.

Where two or more pipes run in close proximity, the insulation shall not be bonded but shall have a clear space between each pipe of 25mm over the insulation.

Only new dry insulation materials and finishes are to be installed and the contractor shall ensure that they are protected from damage throughout the contract period.

Insulation materials and finishes shall be inherently proof against rotting, mould and fungal growth and attack by vermin, be non-hygroscopic and in all respects be suitable for continuous use throughout the range of operating temperatures and within the environment indicated.

All insulation materials and finishes shall be installed in accordance with the manufacturers recommendations/application method statements.

No insulation material containing CFC or HCFC components shall be accepted.

3.10.2 FIRE PERFORMANCE

Insulation materials, adhesives, sealants and facings shall be rated class “O” to the UK Building regulations (current edition) when tested to BS 476 parts 6 and 7.

3.10.3 SCOPE OF WORK

Unless otherwise indicated, the following services shall be thermally insulated and also vapour sealed where noted:

- a. chilled water and refrigeration pipework insulated and vapour sealed;
- b. low and medium temperature hot water insulated to suit temperatures;
- c. hot water services (non-domestic) insulated to suit temperatures;
- d. cold water services (non-domestic) insulated and vapour sealed;
- e. steam, condensate and high temperature hot water insulated to suit temperature; and
- f. pipework exposed on roof or other external locations, unless otherwise indicated, insulation shall be as above with weatherproof finish, and in the case of services a and d with electric trace heating.

Heat Exchangers, Cylinders and Buffer Tanks

Unless otherwise indicated, the following vessels shall be thermally insulated and also vapour sealed where noted:

- a. heat exchangers, hot water cylinders and calorifiers insulated to suit temperature; and
- b. chilled water and cold water buffer tanks insulated and vapour sealed.

Internal and External Water Storage Tanks

All tanks shall be provided pre-insulated and vapour sealed.

Valves, Flanges and Unions

Unless otherwise indicated, all fittings shall be insulated to the same thickness and type as insulation on adjacent pipework and also vapour sealed on services operating below ambient temperatures.

Ventilation

All supply and air and air conditioned ductwork, flexible ductwork and plenum boxes.

All extract ductwork with heat recovery, but not WC ductwork.

3.10.4 BREEAM

Not applicable.

3.10.4 PIPEWORK SYSTEMS UP TO 120°C

3.10.4.1 General

Insulation shall comprise 37 kg/m³ minimum density CFC/HCFC-free rigid phenolic insulation sections with zero Ozone Depletion Potential (ODP), one metre in length with a factory applied fully bonded reinforced aluminium foil vapour barrier jacket.

The aged thermal conductivity of the insulant shall not exceed 0.021 W/m.K at 10°C mean.

The insulation shall be Class 0 / Low Risk rated to the Building Regulations / Standards. The bore face of sections shall be de-dusted and coated with a non-odorous passivating solution after manufacture.

The insulation shall be rigid phenolic insulation, Kooltherm® Pipe Insulation, as manufactured by Kingspan or equal and approved.

Insulation thickness is to be determined in accordance with the TIMSA Guide and BS 5422: 2009.

All pipe support inserts on pipework operating up to 120°C shall be rigid phenolic insulation, Kooltherm® Insulated Pipe Support Inserts or equal and approved.

3.10.4.2 External

Pipework shall be insulated generally in accordance with clauses 3.10.4.1 Mechanical protection of the insulation shall comprise Polyisobutylene sheet.

3.10.5 PIPEWORK SYSTEMS ABOVE 120°C

3.10.5.1 General

Insulation shall comprise 130 kg/m³ minimum density mineral fibre pipe sections with factory applied fully bonded reinforced aluminium foil facing. The thermal conductivity of the insulant shall not exceed 0.033 W/m.K at 10°C mean.

In kitchens, food preparation areas, food storage areas or other areas where the use of fibrous materials is restricted, calcium silicate insulation shall be used in place of mineral fibre.

Insulation thickness is to be determined in accordance with the TIMSA Guide and BS 5422: 2009

3.10.5.2 External

Pipework shall be insulated generally in accordance with clauses 3.10.5.1 Mechanical protection of the insulation shall comprise Polyisobutylene sheet.

3.10.5.3 Heating under raised floor.

Copper heating pipework run within the raised floor may be insulated in Class

'O' close cell Armaflex type insulation.

3.10.6 HEAT EXCHANGERS, CYLINDERS AND BUFFER TANKS UP TO 80°C

Insulation shall comprise 40 kg/m³ nominal density, CFC/HCFC-free with zero Ozone Depletion Potential (ODP) rigid phenolic insulation boards with an aluminium foil vapour barrier jacket autohesively bonded to the exposed face and glass fibre autohesively bonded to the inner face during manufacture e.g. Kingspan Kooltherm® Duct Insulation or equivalent. All corner and straight butt joints shall be sealed with 100 mm wide self-adhesive aluminium foil tape.

Insulation thickness is to be determined in accordance with the TIMSA Guide / BS 5422: 2009.

3.10.7 HEAT EXCHANGERS, CYLINDERS AND BUFFER TANKS ABOVE 80°C

Insulation shall comprise 75 mm thick, 33 kg/m³ density lamella mineral fibre slabs with a factory applied reinforced foil facing. All corner and straight butt joints shall be sealed with 100 mm wide self-adhesive aluminium foil tape.

3.10.8 INTERNAL AND EXTERNAL WATER STORAGE TANKS

When supplied to site uninsulated, insulation shall comprise 40 mm thick, 40 kg/m³ nominal density CFC/HCFC-free with zero Ozone Depletion Potential (ODP), rigid phenolic insulation boards reinforced with an aluminium foil vapour barrier jacket e.g. Kingspan Kooltherm® Duct Insulation or equivalent. All corner and straight butt joints shall be sealed with 100 mm wide self-adhesive aluminium foil tape.

The insulation shall be suitably shaped to clear flanges, pipes and any other protrusions from the calorifiers, vessel and tank surfaces.

Where manholes occur the cover shall be insulated and clad such that the cover can be removed when required.

The insulation slabs shall be cut on site to suit equipment dimensions. This insulation shall be bonded to the vessel by means of a suitable adhesive applied in accordance with the manufacturers recommendations. All joins shall be closed butted and together with exposed cut edges sealed with strips self-adhesive foil tape.

3.10.9 INSULATION FINISHES

3.10.9.1 Service Ducts, Ceiling Voids and Floor Voids Pipe insulation shall be supplied with a factory applied reinforced aluminium foil facing, rated as Class 0 / Low Risk to the Building Regulations / Standards.

Longitudinal and circumferential butt joints are to be sealed with 50 mm wide self-adhesive aluminium foil tape. Support to the sections shall comprise two circumferential bands of self-adhesive aluminium foil tape per section or alternatively 12 mm wide aluminium strappings with matching seals applied as two circumferential bands per section.

3.10.9.2 Internal in Plant Rooms or Boiler Houses

i. General

Specification for pipe insulation shall be as detailed in section 3.10.9.1 plus the following mechanical protection:

Insulation to be finished with fabricated sheet aluminium casings 0.6 mm thick on pipework up to and including 150 mm diameter and 0.8 mm thick on pipework over 150 mm diameter. Cladding to pipework operating at temperatures below ambient, to be secured with aluminium bands and matching seals at 450 mm centres and at circumferential joints which shall be overlapped by a minimum of 40 mm.

Cladding to hot pipework to be secured with self-tapping screws or 'pop' rivets.

ii. Valves and Fittings

All flanges and valves in plant rooms shall be fitted with removable boxes, constructed with 0.7 mm thick aluminium sheeting lined with equivalent bonded insulation to the same thickness as adjacent pipe insulation. Boxes shall be secured with 'quick release' clips. On below ambient pipework the vapour barrier shall be maintained by dressing joints with moisture resistant sealant.

Insulated jackets manufactured from grey silicone coated glass cloth with ductwork filter should be utilised for commissioning stations, valves, strainers and no return valves. The quick release fastenings shall be hooks and drawstrip or Velcro.

All as manufactured by Par Group or equal and approved.

3.10.9.3 External (Weather Protection)

Specification for pipe insulation shall be as detailed in section 3.10.9.1 plus the following weather protection:

Insulation shall have a weatherproof coating of minimum 0.8 mm thickness Polyisobutylene sheeting bonded to the insulation with, minimum 30 mm wide circumferential and longitudinal lap joints, which shall be fully solvent welded in accordance with the manufacturer's instructions.

3.10.10 PIPE SUPPORTS

Chilled water, cold water and refrigeration pipework is to be isolated from support clips by the fitting of purpose made heavy density Kooltherm phenolic foam 'K' blocks complete with bonded spreader plate and full wrap around aluminium foil facing.

3.10.11 FAN COIL UNIT /CHILLED BEAMS/ FINAL CONNECTIONS – Section not used

3.10.12 INSULATION OF DUCTWORK

3.10.12.1 General

Duct Insulation shall be faced on both sides with an durable and protective low vapour permeability puncture resistant trilaminate foil autohesively bonded to the insulation core during manufacture.

The insulation shall have the following minimum characteristics -

Thermal conductivity:	0.023 W/mK at 23 °C and 50 % RH.
Fire performance	BS 476-7: 1997: Class 1.
Compressive strength - min:	140 kPa at 10% compression.
Closed cell content:	≥ 90 %.
Nominal density:	32 kg/m ³ .
Water vapour resistance	100 MN·s/g at 23 °C and 50 % RH.
Operating temperature limits	-20 °C to +80 °C.
Specific heat capacity	1.4 kJ/kg°C.

Thickness shall be as defined in the non-domestic building services compliance guide, tested in accordance with BS EN ISO 12241.

Insulation materials should be adequately protected from the weather, humidity, abrasive matter, contaminants and all other foreign matter.

Products shall be stored inside a building. They should be stored in a dry atmosphere, clear of the ground, out of direct sunlight and covered with an opaque and weatherproof material. Products that have been allowed to get wet should not be used.

3.10.13 IDENTIFICATION

All pipework, valves, and ventilation ductwork shall be identified in accordance with BS 1710.

Items of equipment shall be clearly identified with engraved traffolyte labels.

Plant items shall be complete with manufacturers nameplate giving plant details, reference number, test pressures and dates of manufacture.

3.10.14 PAINTING

Unpainted or ungalvanised ferrous metal surfaces of pipework, ductwork and equipment which are to be insulated shall be cleaned and treated with a proprietary corrosion protection paint system, applied in accordance with the manufacturers instruction. Damage to pre-treated surfaces shall be repaired.

All support steelwork and uninsulated pipework, fittings, etc in plantrooms and externally shall be painted to the same standard with a final coat of gloss paint.

3.10.15 ACOUSTIC INSULATION

Provide acoustic insulation to prevent noise breakout from ventilation ductwork where indicated on the drawings and also in the following locations:-

- i) Between air handling units and attenuators, regardless of location
- ii) Attenuators located outside of plantrooms.

The acoustic insulation shall then be over wrapped with thermal insulation as specified in clause 3.10.8

The insulation shall be IAC lag system, as shown on specification sheets, barrier mass 5kg/m² with "Class O" fire resistance as manufactured by IAC Ltd Tel 01925 653423 or equal and approved.

SECTION ELEVEN

3.11.0 BUILDING MANAGEMENT SYSTEM AND AUTOMATIC CONTROLS

3.11.1 GENERAL

The Contractor shall employ a competent specialist to install controls systems as required to provide fully functional mechanical and electrical services.

Services shall generally be supplied and installed with their own stand-alone controls systems, to be provided by the manufacturer and factory fitted where appropriate. The Contractor shall be responsible for the integration of all services installations and their proper control.

3.11.1.1 Scope of Works

Systems shall generally be provided with factory fitted or manufacturer's controls systems, with supplementary sensors and controllers as required, to provide operational mechanical and electrical services installations.

These shall be installed, tested and fully demonstrated to the Client.

The contractor shall allow for all necessary interface equipment to provide the fire alarm links for smoke dampers and air handling plant.

3.11.1.2 Electrical Wiring

General

All wiring to control panels shall be carried out under the Electrical section of the works but any wiring diagrams in connection with the controls systems are to be submitted to the CA for comment and following comment, to the Company carrying out the electrical works. The Controls Specialist shall be responsible for liaison with the other parties responsible for wiring associated with interlocks and connection of the control panels, to ensure that complete connection and termination details are supplied, to eliminate any problems which could arise during the installation and commissioning of the works.

Cabling Provisions

PVC insulated screened cables will be provided to all temperature and humidity sensors. The cables will be run in the low voltage section of a twin compartment trunking with power items operating at up to 415V in a separate section. The Control Specialist should require no special provisions for cabling over and above this. Any minor additional requirements may be identified at Tender Stage.

If the tenderer expects serious problems to result, these should be identified at Tender Stage.

The panel shall be arranged to receive the wiring from each item back to the panel, where all necessary interconnections shall be made, either in hard wiring or via the DDC system. There shall be no requirement for field interconnections to be made.

3.11.1.3 Electricity Supply

The electricity supply available will be 415 volts, 3 phase, 4 wire, 50Hz and 230 volts, single phase, 50Hz.

3.11.1.4 Supervision of Electrical Works

The Controls Specialist shall be responsible for the supervision of the electrical works associated with all equipment supplied by the specialist and details of all equipment shall be provided including all final location details, connection details and cabling requirements of all their valves, sensors, flow switches, damper motors etc, and all remote items of automatic controls equipment supplied under this contract. The Controls Specialist shall allow for all the above supervisory costs in their tender.

3.11.1.5 Wiring diagrams and Panel G.A. Drawings

Three copies of all wiring diagrams of the control panels control equipment, outstation equipment and constructions details are to be submitted to the C.A. for comment prior to modification of the panels or supply of the equipment.

In addition the control panel shall be provided with 'as fitted' wiring diagrams and panel layout enclosed in a drawing holder firmly fixed to the inside of the door.

The Controls Specialist shall prepare a written detailed description of the proposed control strategy for each system, including control and alarm parameters, before application software is commenced for comment by the Contract Administrator. This is required to ensure that the Control Specialist has fully understood the design intent and there is no misunderstanding on interpretation.

3.11.1.6 Interference Generation

The equipment shall be manufactured such that it shall not generate electrical interference beyond the limits given by BS EN 55014-1 1997.

3.11.1.7 Interference Immunity

The controls specialist shall take note of the possibility of electrical interferences on the electrical supplies from sources such as, motors, relays, thyristors, etc., and shall include in the design of the equipment any necessary electrical protection.

3.11.1.8 Service and Guarantee

On completion of the installation, the systems shall be placed in complete operational condition, adjustments to the control instruments shall be made by the Controls Specialist in collaboration with the mechanical contractor who will be responsible for the commissioning and balancing of the air and water systems.

Testing of the controls shall be carried out to the satisfaction of the CA and the carrying out of these tests and calibration of sensors against calibrated

measured values, etc., may render it necessary for the control specialists technicians to be present on different dates. Full allowance without conditions shall be made in this tender for all additional visits to the site that are required to conform with the programme of work. This shall include sectional completion or phasing of the works.

3.11.1.9 Software - Permanent Records

A complete set of all software developed by the control specialist for each control outstation shall be provided on individual CD roms for retention by the operating personnel. Allowance shall be made to up-date the CD Rom as may be necessary during one year guarantee period.

In addition to the operating software, each CD rom shall also contain a complete set of original set points for all conditions.

Three sets of all system documentation, including all programming manuals, detailing how the user can modify the software themselves, shall be provided at contract completion, which shall show locations, details and all settings.

3.11.1.10 Training

The Controls Specialist/Contractor shall include within their tender costs for the training of designated personal from the Client and/or their maintenance/facility companies (assume a minimum of 2 people) in the operation of the BMS, automatic controls and associated network devices. This exercise shall be undertaken at the completion the project each section of work.

3.11.1.11 Testing and Commissioning, Installation, Supervision

Allowances shall be made for re-commissioning as requested at the end of each section of the work.

The Controls Specialist shall visit site at intervals to be agreed during the progress of the mechanical and electrical installation to:-

1. Advise on correct installations of control devices/sensors.
2. Advise on correct wiring of controls.
3. Advise and resolve control interfacing with plant and systems.

The commissioning shall be undertaken strictly in accordance with the requirements of CIBSE Commissioning Code C 'Automatic controls', unless specifically detailed otherwise in this specification. It shall also take account of the recommendations in 'Building Control Systems Start-Up and Commissioning Guide' by the Building Controls Group – April 2001.

All control equipment and control panels shall be thoroughly bench tested at the manufacturer's factory prior to delivery to site. This test shall include demonstration of the complete control sequence and may be witnessed by the Contract Administrator's Representative and the Client's Representative.

3.11.1.12 Demonstrations and Operation Trials

When the Controls Specialist has completed all their commissioning checks,

the operational control strategy and alarm activation shall be offered to the Contract Administrator for witnessing. Before this can commence, the Controls Specialist shall have completed all the written 'proving' documentation for examination by the Contract Administrator. The latter will determine the extent of the witnessing that they require to be proved but the Controls Specialist shall assume that this might be all the BMS points. In addition, the witnessing shall include any interactive control logic functions and hardwired interfaces.

Demonstrate that all systems start up and return to their normal state, following mains power failure.

Provide Method Statement, for the agreement of the Contract Administrator, of the details of each trend log and the parameters to be measured.

Demonstrate the control strategy to the Contract Administrator's representatives using Supervisor graphics and provide trend logs, to the satisfaction of the representatives.

3.11.7 DESCRIPTION OF OPERATION

3.11.7.1 Heating

All panel heaters within the apartments shall be individually controlled on a stand-alone basis with programmable room temperatures and heating times. The controller shall be Wi-Fi enabled and allow control via mobile phone application.

Electric heaters shall be controlled locally with manual on/off controls.

3.11.7.2 Domestic Services

The hot water service generator shall be arranged for 24 hour time clock control operation via the DDC control system to enable the system temperature to be maintained at 60°C at all times. The units shall be provided with facilities for remote monitoring of a common fault at the controls system. The hot water flow temperature from unit shall be monitored via the DDC system.

Two hot water cylinders are to be operated simultaneously. Commissioning sets shall be installed on the flow from each cylinder before the header and set so that water regulated to be drawn off simultaneously from each cylinder.

Hot water secondary return pumps are to be installed on the return pipework. The pumps are to be set at a constant flow rate.

3.11.7.3 Natural Gas Installation

Not applicable.

3.11.7.4 Mechanical Ventilation

Units shall be installed with all manufacturers' factory fitted integral controls, including speed, summer bypass and frost protection controls (where applicable).

Additional controls shall be provided as required to provide fire alarm and fire service override interfaces.

SECTION TWELVE

3.12.0 ELECTRICAL SERVICES

3.12.1 GENERAL DESCRIPTION

All work shall be carried out in accordance with the BS 7671 latest edition and amendments and Parts 2 and 4 of this specification by the Controls Specialist all as detailed in Section Eleven. Local isolators shall be provided as necessary and these shall be fitted with engraved traffolyte identification labels.

Record drawings shall be produced showing final cable routes and positions of equipment and these shall be read in conjunction with the control panels and controls wiring diagrams.

This section shall be read in conjunction with Section Eleven.

Final connections from locally supplied equipment to be made by controls specialist.

3.12.2 MECHANICAL SERVICES WIRING

i) General

The Contractor shall provide all the electrical services associated with the mechanical services plant including all necessary isolators, starters, controls, etc. from main, sub and local control panel.

All wiring shall be installed using XLPE/SWA/LSF multicore cables run on galvanised cable tray or LSF insulated single core cables run in HGSW galvanised conduit and/or galvanised cable trunking supported from the building structure generally routed at high level and on the surface externally. All routes shall be agreed with the Engineer on site and be fully co-ordinated with all other services, prior to putting work in hand.

The panel shall be arranged to receive the wiring from each item directly back to the panel, with all necessary interconnections, either in hard wiring or via the control system.

Unless otherwise indicated on the drawings or in the specification the controls specialist will provide all containment.

All containment within the plantroom shall be supplied and installed by the controls specialist to the specification detail given under clause 3.12.5.

LSF insulated screened cables shall be provided to all temperature sensors and control valves. The cables shall be run in extra low voltage trunking with power items operating at up to 415V in a separate trunking.

All other control devices will be wired in PVC/SWA/LSF cable run on galvanised cable tray.

ii) Control Panels

The main power supply to all control panels shall be installed by the electrical contractor and will terminate directly within the panel.

The final connection to the panel and between the panel, pressure switches and equipment etc shall be by the controls specialist.

iii) Mechanical Plant/Equipment

From the electrical supplies provided by the electrical contractor, provide final connections to control panels, VAV boxes, fan coil units, local extract fans and ventilation units.

iv) Containment

The electrical contractor shall supply and install containment systems, isolators and associated component in accordance with the electrical services specification and where indicated on the drawings generally as follows but not necessarily limited to:-

- Main containment runs in ceiling void areas etc., in all buildings
- Underground services ducts
- Conduit drops from ceiling void to back boxes in partitions/columns etc for room sensors.

3.12.3 TESTING

The whole of the installation shall be tested and certified on completion.

3.12.4 EARTHING AND BONDING

Provide all necessary earthing and bonding to the mechanical services in compliance with the requirements of BS 7671 Requirements for Electrical Installations. (IEE Wiring Regulations 17th Edition).

3.12.5 MECHANICAL SERVICES CONTAINMENT

3.12.5.1 Containment Supports

The containment systems utilised shall be installed in accordance with the manufacturer's instructions, the containment shall generally be suspended from the secondary support steelwork provided by the mechanical contractor by means of 10mm galvanised threaded rod, washers, nuts and locknuts.

3.12.5.2 Cable Tray

All cable trays to be supplied and installed in accordance with manufacturer's recommendations, observing maximum distances between suspensions.

All cable trays shall be medium duty return flange, hot dipped galvanised and manufactured to BS1449/BS729.

Minimum thickness of material 0.8mm up to 150mm wide and 1.0mm above

150mm wide.

All cable tray bends, sets, reducers and couplers shall be of a proprietary nature. No site manufactured sets or bends will be accepted.

All cuts made to finished cable tray shall be painted insitu with galvafruid paint.

3.12.5.3 Cable Trunking

All cable trunking to be supplied and installed in accordance with manufacturer's recommendations, observing maximum distances between suspensions.

All cable trunking to be manufactured to BS 4678, Part 1, 1971, hot dipped coated with minimum coating of 275 gm²/m. Both sides (grade Z2) to BS 2989, 1992 (BSEN 10142, 1992).

The trunking shall be manufactured to a minimum material thickness of 1.0mm for trunking up to 50mmx50mm and 1.2mm above this size.

All cable trunking sets, bends and couplers are to be proprietary type. No site manufactured pieces will be accepted.

All trunking shall be installed fitted with turn buckle covers. Sections of trunking shall be bonded together using copper supplementary bonding conductors.

3.12.5.4 Galvanised Conduit

Where trunking passes through floors, ceilings and walls. The opening shall be sealed in accordance with section 527.02 of BS7671.

All conduit shall be either:

Heavy gauge solid drawn galvanised providing Class 4 protection, manufactured to BS 4568, Part 1, 1970.

Conduits shall be threaded to butt close together in couplings and sockets. Except at running couplings, threads shall not be exposed and these shall be cleaned, primed and painted immediately after installation.

All accessories shall be of the cast type, i.e. No pressed steel accessories will be accepted.

All surface mounted conduit shall be installed utilising the requisite saddles.

All galvanised and PVC conduits shall be arranged on a "loop-in" system so that all draw in points for cables are accessible. No elbows or tees shall be used.

Connections to accessory boxes on a concealed installation shall be with brass bush, metal coupling and serrated washer. For surface installations, flanged couplers with lead washers shall be used.

Conduits on exposed surfaces shall be fixed at intervals not exceeding

1200mm, also within 300mm of floors, ceilings and boxes at each side of every bend.

Fixing of conduits shall be as follows:

<u>Type of Installation</u>	<u>Method of Fixing</u>
Wall chase or floor screed	Crampets or ordinary saddles
Ceiling, roof or floor voids	Spacer bar saddles
Surface mounted on ceiling	Spacer bar saddles
Surface mounted on walls	Distance saddles

The numbers of 600/1000 volt grade cables to be drawn into each conduit shall be as set out in manufacturer's literature, minimum conduit size shall be 20mm diameter.

Where conduit passes through floors, ceilings and walls, the opening shall be sealed in accordance with section 527-02 of BS 7672.

Conduits and boxes installed by casing in concrete slabs shall be painted with Epoxy resin paint prior to the slabs being poured, all boxes to be protected to prevent ingress of concrete/moisture.

3.12.5.5 Flexible Conduit

Where metal conduit is specified, flexible conduit shall be of interlocked steel tape type with a PVC sheath to BS 731.

Terminations shall be by means of compression glands.

Appropriately sized, insulated circuit protective conductor shall be drawn into the tubing and connected to the earth terminals.

For all general wiring, the cable shall be 450/750 volt grade single core, stranded copper with LSF insulation complies with BS 7211.

Heat Resistant

Where heat resistant grades of cables are specified they shall be silicone rubber insulated to BS 6007.

General

During installation the cables shall be combined to facilitate drawing in and future replacement.

Inside trunking cables forming final sub-circuits shall be tied together at 2m intervals to ease identification.

Cables shall be installed without joints.

Cables shall be colour coded in accordance with tables 51A and 51B of BS 7671.

Power Cable

Power cables shall be single or multicore PVC insulated wire armoured to BS 6346 or XLPE insulated wire armoured to BS 5467.

Where low smoke fume cables are specified they shall be in accordance with BS 6724.

General

Cables shall be fixed to tray or direct to a surface using cable cleats. The intervals for fixing shall be in accordance with the manufacturer's recommendations.

At all terminations the sheath and armour shall be secured by brass compression glands and of a type suitable for both cable and its location. The glands shall be complete with both earthing tag and plastic shroud.

3.12.6 ISOLATORS

i. General

Isolators and final connection equipment of a suitable rating will be supplied and installed by the controls specialist / electrical contractor. They shall be fully identified using traffolyte labels.

Final connections to mechanical equipment supplied from main electrical panel or local distribution boards shall be made by the electrical contractor.

In all other cases this shall be the responsibility of the mechanical contractor.

ii. Plantrooms

Final connection of supplies to mechanical plant shall be provided via rotary isolators of a suitable rating. The isolator shall comply with BSEN 60947-3. To AC-22A and be complete with padlockable handles, auxiliary contacts to be provided where necessary. The units to have a protection category of IP65. Final connection via metal flexible conduit.

iii. External

As plantroom, with a IP rating of IP65.

SECTION THIRTEEN

3.13.0 MEDICAL GASES - Section not used.

SECTION FOURTEEN

3.14.0 STEAM AND CONDENSATE - Section not used.

SECTION FIFTEEN

3.15.0 FIRE PROTECTION SYSTEM - Section not used.

SECTION SIXTEEN

3.16.0 FUME CUPBOARDS AND SAFETY CABINET SYSTEMS - Section not used.

SECTION SEVENTEEN

3.17.0 WATER DETECTION SYSTEMS - Section not used.

SECTION EIGHTEEN

3.18.0 SPECIALIST EQUIPMENT - Section not used.

SECTION NINETEEN

3.19.0 BUILDERSWORK AND SITE MANAGEMENT

All builderswork including holes through structure, chases, builderswork ducts, fire cladding, bases, scaffolding, site power and lighting etc shall be provided by the management contractor/main contractor.

The mechanical contractor shall allow for the preparation of all builderswork information and the physical marking of all holes, chases, bases on site.

Reference should also be made to the contract preliminaries.

SECTION TWENTY

3.20.0 TECHNICAL SCHEDULES

Refer to the technical schedules

4087-MSCHED-001 (BLOOM STREET)

4087-MSCHED-002 (MINSHULL STREET)

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PART FOUR - PARTICULAR SPECIFICATION FOR ELECTRICAL SERVICES

SECTION ONE

4.1.0 GENERAL

4.1.1 INTRODUCTION

This part of the specification relates to the Electrical services for the refurbishment of the Bloom building section of Piccadilly Warehouse.

Works are to be undertaken to convert the existing building into a range of 1, 2 and 3 bed apartments.

4.1.2 DESCRIPTION OF BUILDING

The project comprises the refurbishment of an existing 4 storey office building to provide residential accommodations, this includes the installation of a new 5th floor. The proposed development will comprise:

- Basement – 5 No apartments, bin stores and plant space.
- Level 00 – 5 No apartments, plant space, bike store.
- Level 01 – 5 No apartments, plant space.
- Level 02 – 5 No apartments, plant space.
- Level 03 – 5 No apartments, plant space.
- Level 04 – 5 No apartments, plant space.
- Roof – Flat roof with plant.

4.1.3 SCOPE OF WORKS

The contractor shall include for the coordination, supply, delivery to site, installation, setting to work, testing and commissioning, the following works in accordance with the requirements of this specification and the accompanying drawings:

- a) Electrical Supply and Distribution
- b) Lighting Installation
- c) Emergency Lighting
- d) General Purpose Power Installation
- e) Supplies to Fixed Appliances
- f) Supplies to Mechanical Services
- g) Distributed Television
- h) Fire alarm system
- i) Telephone installation
- j) Access control installation
- k) Structured Wiring
- l) CCTV installation
- m) Lightning protection

n) Earthing and bonding

4.1.4 INSTALLATION STANDARDS

All of the installations shall be in accordance with the requirements of Part Two of this specification in respect of standards of materials and workmanship. Cable containment to be concealed unless otherwise stated in specification or noted on the drawings.

All electrical installations shall be in accordance with BS 7671 Latest edition.

4.1.5 EXISTING SERVICES

All redundant electrical services and equipment be made safe, stripped out and removed from site. Redundant fittings shall be offered to the Client prior to removal of the same.

4.1.6 ORDER OF WORKS

The Contractor's programme for carrying out the above listed works shall be agreed with the Contract Administrator and shall be fully coordinated with all other works on site.

4.1.7 BASIS OF DESIGN

The following general design parameters have been employed:

I) Illuminance Levels

Entrance/Lift lobby	- 200 Lux
Stairs	- 150 Lux
Corridor	- 100 Lux
Plant Room	- 200 Lux
Kitchen area	- 300 Lux
Living area	- 200 Lux
Bedroom	- 100 Lux
Bathroom	- 150 Lux

II) Emergency Lighting Levels

Defined Escape Routes:

1 Lux minimum at floor level anywhere along the centre line of the escape route and a uniformity ratio of 40:1 maximum to minimum must not be exceeded, with exception of 24hr unobstructed escape routes where 0.2 Lux minimum (average) at Floor Level is acceptable.

High risk area:

Not less than 10% of the maintained illuminance for the tank and not less than 15 lux.

SECTION TWO

4.2.0 ELECTRICAL SUPPLY AND DISTRIBUTION

4.2.1 GENERAL

The work under this section shall include for the supply, installation, testing and commissioning of an electrical supply and distribution system and shall comprise of the following:

- Strip out of existing distribution equipment
- Liaising with Electricity North West to procure new supply to rear of building withing the ground floor plant room.
- New MCCB panel board
- New sub distribution boards for tenants and landlords services
- New consumer units and check meters to apartments.

4.2.2 MODIFICATIONS TO EXISTING SWITCHGEAR

All existing distribution equipment is to be isolated and stripped out back to the DNO cutout. Existing DNO equipment to be removed. New supply to be in ground floor plantroom.

4.2.3 NEW SUPPLY

The buildings existing electrical supply enters the building plantroom in the basement where the existing cutout is also located. This is to be isolated and stripped out.

A new 300kVA transformer shall be installed in the ground floor plant room by ENWL. The Contractor shall allow for all liaison with ENWL to ensure meter tails and panel boards are ready for final connection.

The Contractor shall allow for the supply, installation, testing and commissioning of two new main panel boards. One essential and one non-essential board. As indicated on the electrical schematic drawing.

The Non-essential board shall provide power to the tenants and landlord distribution boards.

The Essential board shall provide a secondary power source to the fire fighting lift and smoke vent system.

The panel boards shall be manufactured by Hager LTD.

Colin Hughes
M +447979541187
colin.hughes@hager.com

Hager	Ltd
Hortonwood	50
TF1	7FT
United Kingdom	Telford

4.2.4 MAIN SWITCHGEAR

Main switchgear shall fully comply with all relevant sections and clauses of BS EN 60439 constructed to segregation form 3b type 2 complete with all necessary blanks, extension boxes, labels, fixing devices and circuit designation charts etc.

Fuses

Supply and install where indicated cartridge fuses. All fuses shall fully comply with relevant clauses of BS EN 60269 & BS 88.

Miniature Circuit Breakers (MCB's)

Supply and install where indicated MCB's. All MCB's shall fully comply with BS EN 60947 & BS 60898.

Residual Current Devices (RCD's)

Supply and install where RCD's indicated. All RCD's shall fully comply with BS EN 61009 & BS EN 61008 with a sensitivity of 30 mA.

Sub Distribution Boards

Supply and install distribution boards with the number of ways and the rating indicated. All distribution boards shall fully comply with relevant sections of BS EN 60439.

Each sub-distribution board will consist of a lockable cabinet with integral isolator and a full complement of MCB's complying with BSEN60898 (10 kA) or BSEN 60947 (15kA). The Electrical Services Contractor will ensure that each MCB is sized in accordance with the rating of the circuit to which it is connected and that all circuit charts and numbering are clearly labelled. A minimum of 20% spare ways will be available within the equipment upon completion of the project, with a minimum of two number TP&N spare ways. All distribution boards will be equipped with hinged lockable doors with keys suited to fit all doors.

In general lighting circuits will have 6-10A MCB's and small power circuits will have 20A MCB's (radial circuits) or 32A MCB's (ring circuits).

Labels will be provided on each Distribution Board to identify the area or supply that it serves, the phase, function, reference number etc. Spare ways will be provided with blank labels for future use.

Final circuit protection is to be afforded by a system of MCB's having a minimum M10 category of duty and characteristics suitable for each application, i.e.:

- | | | |
|--------|---|--|
| Type B | - | Small Power Circuits (Non-inductive) |
| Type C | - | Lighting and lightly inductive loads |
| Type D | - | Transformers, Motors, X-Ray equipment etc. |

Within each designated area or room and where possible, the small power

circuits will be connected to the same phase.

The Contractor will also provide a clear zone above/below (as applicable), the sub-main termination point to accommodate a future meter extension housing if not already indicated as being provided.

To facilitate circuit identification and testing, each cable core connected to an MCB, earth or neutral bar will be fitted with slide on identification sleeves.

All distribution boards indicated on the drawings will be new of the miniature circuit breaker type.

Upon completion the Contractor will provide each distribution board with an A4 plastic envelope, secured to the inside of the opening lid, containing a laser print quality circuit chart.

The distribution charts will provide the following information for each outgoing way:

1. Key Name.
2. Cable size / cpc size of connected circuits.
3. Miniature circuit breaker rating and type.
4. Equipment/ Area served.
5. Circuit / phase designation
6. Supply Cable type
7. Supply Origin

The manual change over equipment and the switchgear has been detailed and size in accordance with Switchgear and controls

4.2.5 SUB-DISTRIBUTION SERVICES

All sub distribution services shall be supplied, installed and routed on galvanised cable tray as detailed on the drawings. Final routing of cables to be agreed with CA prior to installation.

Cable Tray

All cable trays to be supplied and installed in accordance with manufacturers recommendations, observing maximum distances between suspensions. All cable trays shall be medium duty return flange, hot dipped galvanised and manufactured to BS EN 61537.

Minimum thickness of material 0.8mm up to 150mm wide and 1.0mm above 150mm wide.

All cable tray bends, sets, reducers and couplers shall be of a proprietary nature, NO site manufactured sets or bends will be accepted.

All cuts made to finished cable tray shall be painted in situ with galvafruid paint.

Cable Trunking

All cable trunking to be supplied and installed in accordance with manufacturers recommendations, observing maximum distances between suspensions.

All cable trunking to be manufactured to BS EN 50085 & BS EN 10346.

The trunking shall be manufactured to a minimum material thickness of 1.0mm for trunking up to 50mm x 50mm and 1.2mm above this size.

All cable trunking sets, bends and couplers are to be proprietary type NO site manufactured pieces will be accepted.

All trunking shall be installed fitted with turn buckle covers. Sections of trunking shall be bonded together using copper supplementary bonding conductors.

Galvanised Conduit

Where trunking passes through floors, ceilings and walls. The opening shall be sealed in accordance with section 527.2 of BS7671.

All conduit shall be either:

Heavy gauge solid drawn galvanised providing Class 4 protection, manufactured to BS EN 61386 & BS EN 10346.

or

High impact UPVC meeting the requirements of BS EN 61386, Having minimum wall thickness of 1.5mm.

Conduits shall be threaded to butt close together in couplings and sockets. Except at running couplings, threads shall not be exposed and these shall be cleaned, primed and painted immediately after installation.

All accessories shall be of the cast type, i.e. No pressed steel accessories will be accepted.

All surface mounted conduit shall be installed utilising the requisite saddles.

UPVC Conduit

All UPVC Conduit to be manufactured to BS EN 61386.

Type of conduit used will be dependent upon the location and this will be indicated on the contract drawings.

All UPVC conduit shall utilise the manufactures standard range of accessories, secured using all fixing locations provided.

Care must be taken to ensure all joints are glued correctly.

All saddles must be a sliding fit and expansion joints shall be inserted at 6m intervals on straight runs.

Where conduit is exposed a silicone grease or other suitable compound shall be applied to the expansion joint to prevent ingress of moisture.

In extremely cold weather the PVC conduit shall be slightly warmed before use in accordance with the manufactures recommendations.

Steel insert clips shall be fitted where luminaires are suspended from circular boxes.

All galvanised and PVC conduits shall be arranged on a "loop-in" system so that all draw in points for cables are accessible. No elbows or tees shall be used.

Connections to accessory boxes on a concealed installation shall be with brass bush, metal coupling and serrated washer. For surface installations, flanged couplers with lead washers shall be used.

Conduits on exposed surfaces shall be fixed at intervals not exceeding 1200mm, also within 300mm of floors, ceilings and boxes at each side of every bend.

Fixing of conduits shall be as follows:

<u>Type of Installation</u>	<u>Method of Fixing</u>
Wall chase or floor screed	Crampets or ordinary saddles
Ceiling, roof or floor voids	Spacer bar saddles
Surface mounted on ceiling	Spacer bar saddles
Surface mounted on walls	Distance saddles

The numbers of 600/1000 volt grade cables to be drawn into each conduit shall be as set out in manufacturers literature, minimum conduit size shall be 20mm diameter.

Where conduit passes through floors, ceilings and walls, the opening shall be sealed in accordance with section 527-2 of BS 7671.

Flexible Conduit

Where metal conduit is specified, flexible conduit shall be of interlocked steel tape type with a PVC sheath to BS EN 61386.

Terminations shall be by means of compression glands.

Where PVC conduit is specified, reinforced flexible PVC conduit shall be used, having a double wall and intermediate helical wire reinforcement.

Any appropriately sized, insulated circuit protective conductor shall be drawn into the tubing and connected to the earth terminals.

Wiring Grade Cables For Conduit or Trunking PVC

For general wiring, the cable shall be 600/1000 volt grade, single core, stranded copper with PVC insulation complying with BS 6004 or BS 6346.

LSF

Where low smoke fume cables are specified they shall be 450/750 volt grade single core, stranded copper with LSF insulation complying with BS 7211.

Heat Resistant

Where heat resistant grades of cables are specified they shall be silicone rubber insulated to BS 6007.

General

During installation the cables shall be combined to facilitate drawing in and future replacement.

Inside trunking cables forming final sub-circuits shall be tied together at 2m intervals to ease identification.

Cables shall be installed without joints.

Cables shall be colour coded in accordance with table 51 of BS 7671.

Power Cable

Power cables shall be single or multicore PVC insulated wire armoured to BS 6346 or XLPE insulated wire armoured to BS 5467.

Where low smoke fume cables are specified they shall be in accordance with BS 6724.

General

Cables shall be fixed to tray or direct to a surface using cable cleats. The intervals for fixing shall be in accordance with the manufacturers recommendations.

At all terminations the sheath and armour shall be secured by brass compression glands and of a type suitable for both cable and its location. The glands shall be complete with both earthing tag and plastic shroud.

Any underground cable jointing shall be carried out using proprietary resin type joint kits as manufactured by BICC, AEI or RAYCHEM.

Below the armour clamp or gland of all terminations a non-corrosive identification band shall be fitted giving details of the type and size of cable in 5mm stamped letters and figures.

Mineral Insulated Cable

MICC cables shall be 600 volt grade to BS EN 60702, light or heavy duty and shall generally be sheathed with PVC or LSF material as specified.

Fixing centres shall be in accordance with BS 7671 and manufacturers recommendations.

When sheathed MICC is specified, PVC or LSF gland shrouds shall be fitted.

No through joints will be permitted without the express written permission of the CA.

Where cables pass through walls, floors, ceilings etc they shall be fitted with fibre, PVC or LSF sleeves.

Earthing pots shall be used for terminating all cables connected to the mains supply or otherwise.

When surface run MICC cables shall be pressed to remove all irregularities and to follow the contour of the surface so as to provide a neat and inconspicuous installation. They shall be supported by means of heavy duty copper saddles, single or multi-way as required at the spacings tabled below.

<u>Overall Diameter of Cable (mm)</u>	<u>Max Spacing (mm)</u>	
	<u>Horiz</u>	<u>Vert</u>
Not exceeding 9	450	600
Exceeding 9 and not exceeding 15	600	900
Exceeding 15 and not exceeding 20	1200	1500

SECTION THREE

4.3.0 LIGHTING INSTALLATION

4.3.1 GENERAL

The works under this section shall include for the supply, installation, connection, testing and commissioning of the complete lighting systems as detailed on the drawings and schedules, and shall comprise of the following:

Landlord Communal Corridors

- Surface Mounted LED circular luminaires to landlord corridors and stairwells.
- Surface mounted linear LED IP rated luminaires to Plant Rooms
- Recessed downlights in Laundries.

Apartments:

- Recessed GU10 LED spotlight's to living room and kitchen / dining area.
- Strip lighting for kitchen worktops
- Recessed IP rated GU10 LED spotlights

External

- Emergency bulkheads at fire exits.
- Task lighting at main entrance.

The contractor to provide fire hoods to all recessed light fittings.

4.3.2 SYSTEM OF WIRING

For any final lighting sub-circuit and controls, cable having a minimum cross sectional area of 2.5mm² shall be utilised.

Lighting sub-circuit wiring shall be installed using Twin and Earth LSF cabling, routed within the cable containment system throughout the building, and routed within the building fabric where required. Where necessary switch plates, wall mounted luminaires etc shall be serviced with vertical drops in conduit, as detailed on the accompanying drawings. Conduit and trunking runs shall be independently supported from the structure. Plant room conduits to be surface mounted.

The general system of wiring installation shall be carried out utilising a minimum 2.5 mm² T&E LSF cables routed within the cable tray system and shall be installed in a concealed manner within the building fabric to the positions as shown on the drawings, unless otherwise indicated.

In areas with exposed services all wiring shall be neatly laid and clear cable ties used to secure to the cable tray.

4.3.3 LIGHT CONTROL SYSTEMS

The Electrical Services Contractor shall ensure the lighting control system provides selective and variable switching via manual or automatic means to enable illuminance and luminance levels to be adjusted, to facilitate an energy efficient mode of control and operation and to enable luminaires to be systematically switched off during periods of non-occupancy of the space(s) or during periods outside of the normal core operating hours of the building.

The lighting control system will comprise of ceiling recessed presence detectors to cover the landlord areas with manual override switches as detailed on the accompanying drawings. Presence detectors shall be stand-alone recessed flush mounted and linked to the associated group of luminaires. When movement is detected, the PIR shall switch on a predetermined number of fittings. When the area is no longer occupied the load will automatically switch off after an adjustable time period.

In the plant rooms, the presence detectors (PIR's) will operate in conjunction with a momentary action push to make retractive switch which will operate the lighting to suit absence from the room, hence absence detection. The load will be manually switched on using the retractive switch. When the area is no longer occupied the load will automatically switch off after the adjustable time period has elapsed. Pressing the switch again during occupancy override the lights off (after the detection time period has elapsed it will revert to automatic operation).

4.3.4 ACCESSORIES

Presence detectors with a detection span of 6m diameter shall be provided, ceiling mounted as detailed on the accompanying drawings.

10A rated switch plates shall be provided mounted at 1200mm AFFL. Number of gangs & ways shall as detailed on the accompanying drawings.

Retractive 10A rated switches shall be provided as detailed on the accompanying drawings, mounted at 1200mm AFFL.

Lighting switches throughout (except plant areas and bin/bike stores etc) shall be Brushed Steel 10A rated with screw less flat plate

4.3.5 LUMINAIRES

Where luminaires are mounted on the underside of suspended ceilings, final connection to fitting shall be via plug in ceiling roses and heat resisting flexible cabling as detailed above.

Where luminaires are mounted directly to conduits, the wiring shall be taken directly into the luminaire and fitted with heat resistant sleeving. In suspended ceiling areas generally, luminaires shall be directly supported by the ceiling structure. Ensure that the suspension accessories provided are fully compatible with the ceiling systems employed.

Luminaires to be of Tyson Lighting as per the design requirements of Beech Design and Build.

SECTION FOUR

4.4.0 EMERGENCY LIGHTING

4.4.1 GENERAL

The Electrical Sub-Contractor shall provide, install and connect a complete emergency lighting installation as described in this specification and indicated on the drawings. The system shall comply in full with BS 5266 Part 1 and ICEL 1003.

The emergency lighting systems shall comprise of self-contained maintained/combined and non-maintained emergency luminaires.

Illuminated Emergency exit signs shall be provided as shown on the drawings. Emergency Exit signs shall be legible at all times. The Exit signs shall be non-maintained units made visible by the general lighting in normal circumstances and illuminated from internal lamps on loss of supply/mains failure.

All emergency lighting luminaires shall be complete with fluorescent lamps/LEDs as described in the Schedule of Luminaires.

All emergency lighting both self-contained and converted shall be rated for 3 hour operation on loss of supply. The Electrical Sub-Contractor shall be responsible for ensuring that the LED charging indicator for each luminaire is installed so it is visible from normal viewing angles to provide clear indication that emergency lighting batteries are on charge.

Each self-contained emergency luminaire shall be provided with a 4-wire supply:- phase, neutral, CPC and permanent unswitched live feed. The lighting control plug in socket serving individual luminaires shall be clearly identified as supplying emergency lighting by the installation of labels stating the following "EMERGENCY LIGHTING SUPPLY - DO NOT LEAVE DISCONNECTED". Labels shall incorporate red lettering on a white background of minimum of 3 mm height.

The permanent unswitched live feed to each luminaire shall be taken from the same circuit way at the distribution board as the normal live feed to that luminaire. The permanent unswitched live feed shall be wired through a key test switch for testing purposes.

The works under this section shall include for the supply, installation, testing and commissioning of a complete emergency lighting system as detailed on the drawings and specified below. The installed system shall comply with the requirements of BS5266 and provide 3hr hours emergency lighting duration. The specification of luminaires is indicated within Section 2 of the Electrical Technical Schedule.

4.4.2 CONTROL AND TEST FACILITY.

All emergency lighting key test switches shall be engraved on the switch plate with the words "Emergency Lighting Test".

Operation of the test key facility shall not affect the normal operation of any

other luminaires supplied or controlled from the same general lighting switch position or circuit.

Where emergency luminaires are not part of the lighting control system, i.e. wired in radial loop in circuit, emergency test key switch(s) shall be provided adjacent to the sub-distribution board serving that particular lighting circuit, clearly labelled and identified.

On completion, and after a minimum 24 hour charge period, each emergency unit shall be functionally tested by operation of the test switch with the batteries discharged for the full 3 hour period, after which recharged and again functionally tested, to the manufacturers recommendation. Any luminaire that fails to operate for the full rated standby period shall be replaced by the Contractor at no cost to the project.

4.4.3 SYSTEM OF WIRING

Wiring to the emergency lighting luminaires shall be carried out in single core copper insulated cables contained within galvanised steel conduit and trunking.

SECTION FIVE

4.5.0 GENERAL PURPOSE POWER

4.5.1 GENERAL

The works under this section shall include for the supply, installation, connection, testing and commissioning of a complete general purpose power installation, including outlets and supply connections to fixed appliances. The installation shall be wired as shown on the drawings and as detailed in the accompanying distribution board schedules.

All final coordination of outlet positions is the responsibility of the Contractor who shall consult with the clients latest interior design package to confirm final locations of outlets.

4.5.2 SYSTEM OF WIRING

For any final small power sub-circuit, cable having a minimum cross sectional area of 2.5mm² shall be utilised.

Small power sub-circuit wiring shall be installed using flat Multi-core (Twin & Earth) insulated cables of minimum cross sectional area 4.0 mm², routed on MDRF galvanised steel containment tray and routed within the building fabric. MDRF tray runs shall be independently supported from the building structure.

Small power circuits shall be wired in a ring formation as detailed on the accompanying distribution board schedules, within heavily computed office areas a supplementary separate earth conductor of minimum cross section area 2.5 mm² shall be installed in conjunction with Chapter 54 BS 7671.

All wiring in conduit/trunking shall include a separate circuit protective conductor for each circuit in accordance with the clauses contained within section 54 BS 7671.

All outlet points shall be located as shown on the drawings and described in this specification.

4.5.3 HAND DRYERS – SECTION NOT USED

4.5.4 ACCESSORIES

The Electrical Sub-Contractor shall provide and install all accessories in the locations indicated on the drawings.

All socket outlets shall be switched unless specifically stated otherwise.

All 230V socket outlets shall have standard pin configuration.

Fused connection units and double pole switches shall be complete with switches, indicating lights and integral flex outlets as appropriate to the appliance controlled. Units and switches shall be located adjacent to the equipment served and be labelled as to their purpose.

For water heaters, hand dryers and similar equipment to be provided by the

Mechanical Sub-Contractor, the Electrical Sub-Contractor shall provide and install a fused connection unit or double pole switch as appropriate together with a flush concealed conduit and box for back entry into the equipment. The Electrical Sub-Contractor shall include for fixing and connecting the equipment using heat resistant single core cables.

All wiring accessories to the apartments and communal areas to be brushed stainless steel finish.

Contractor shall review all interior design packages from Beech Design and Build before procuring wiring accessories.

SECTION SIX

4.6.0 SUPPLIES TO MECHANICAL SERVICES

4.6.1 GENERAL

The works under this section shall include for the supply, installation, testing and commissioning of supplies for mechanical services and comprise of the following (but not be limited to):

- Air handling unit on roof.
- Smoke dampers within the ventilation systems and associated motors and controls
- Hot Water Cylinders
- Electric Panel Heaters
- Pumps, additional equipment, etc
- Electric panel heaters within apartments

4.6.2 CONTAINMENT FOR MECHANICAL SERVICES

Power supplies to mechanical services equipment shall be routed along the general cable containment system as indicated on the drawings.

Unless otherwise indicated containment system for control cabling shall be provided by mechanical services contractor.

4.6.3 WIRING TO HOT WATER CYLINDER

The electrical services contractor shall provide a single phase and neutral supply to the hot water cylinder's (heater) within each plant room, in accordance with the drawings.

The supply shall be terminated into a 32A fused connection unit with final connections using flexible cable.

Final termination into the unit by mechanical contractor

4.6.4 WIRING TO AIR HANDLING UNIT

The electrical services contractor shall provide a three phase and neutral supply to the roof mounted air handling unit.

Final termination into the unit by mechanical contractor.

4.6.5 WIRING TO ELECTRIC PANEL HEATER

The electrical services contractor shall provide a single phase and neutral supply to the Electric Panel Heaters within the corridors, in accordance with the drawings.

The supply shall be terminated into a 13A fused connection unit located adjacent to panel heater with final connections using flexible cable.

Final termination into the unit by mechanical contractor.

4.6.6 WIRING TO PUMPSETS

Three phase and single phase supplies to pumps as specified to be routed to an isolator (rating as specified) mounted within 1 metre of pump set.

Final connection to each pump from isolator shall be via liquid resistant covered steel flexible conduit.

4.6.7 WIRING TO TANKING SYSTEM SUMP PUMPS

The supply to each of the basement sump pumps shall be terminated in a 13A unswitched fused connection unit. Each unit shall also be independent supplied in order to maintain functionality of at least one of the units in the event of tripping. Specialist subcontractor to confirm full requirements.

4.6.8 WIRING TO MISTING SYSTEM – NOT USED

4.6.9 WIRING TO SMOKE DAMPER SYSTEMS

The Wiring to the smoke dampers shall be taken from the individual fire alarm circuits within the apartments providing a spur to each damper location with each being provided a fire interface.

Activation of the smoke dampers shall be achieved via the fire interfaces linked to the apartments fire detectors. Each system will be independent to each apartment.

SECTION SEVEN

4.7.0 FIRE ALARM SYSTEM

4.7.1 GENERAL

The works under this section shall include for the supply, installation testing and commissioning of fire alarm system in compliance with BS5839 and the current amendments thereof, together with the particular requirements of the Local Fire Prevention Officer, in addition to the Hydrock Fire Strategy Document and comprise of the following:

Apartments

Fire protection within the apartments will comprise of mains driven fire alarm detectors fed from a dedicated circuit off the local consumer unit using 3c LSF/FP Enhanced cable concealed within the building fabric, in accordance with the requirements of BS 5839-Part 6:2004 to at least Grade D Category LD2 standard system.

The fire detection devices within the apartments shall also interface with the smoke fire dampers.

The following equipment shall be installed in the apartments:

Kitchens	-	Heat detector c/w integral sounder
Apartments	-	Smoke detector c/w integral sounder
Apartments	-	Fire Interfaces for smoke fire dampers

Equipment Details:

Smoke/Heat detector – ceiling mounted to conform with BS 5446 Part 1 [11].

All detectors shall be provided with a standby supply such as a battery, and complete with long life rechargeable lithium batteries.

The equipment indicated on the layout drawings shall be as manufactured by:

Apartments

Manufacturer (or Equivalent)

Company: AICO
Email: enquireies@aico.co.uk
Phone: 01691 664 1000
Website: <https://www.aico.co.uk/>

Landlords

Manufacturer (or Equivalent)

Contact: Martyn Keenan
Company: Honeywell | Security and Fire
Gent by Honeywell
Mobile: 07900 052 953

Email: martyn.keenan@honeywell.com
Website: www.gent.co.uk

Landlord – Residential Common Areas

The common corridors serving the residential apartments are to be provided with a proprietary forced smoke ventilation system, which will be subject to design and installation by a specialist sub-contractor.

As such smoke detection shall be installed within the common areas to activate the AOV which will be positioned on the head of the stairs of the second floor. Automatic detection provided should be designed to the recommendations of BS 5839-1, however the provision of sounders in the common circulation areas is not necessary. In addition, smoke detection shall be installed to activate an AOV at the top of the stair which is likely to be sized at less than 1.0m² located as high as practicable at the head of the stair.

Fire protection along the landlord's core area will be integrated into a Forced Smoke Ventilation system and fed from a central OPV Panel, using 3c LSF/FP Plus soft skinned fire-resistant cable concealed within the building fabric. On activation of the landlord's core smoke detectors, the designated AOV smoke vent shall electrically operate to vent the smoke to the roof and out the building. This works shall be part of the Smoke Ventilation Controls Package (see section 4.7.3).

All cable and management should be in accordance with BS8159.

4.7.3 FORCED SMOKE VENTILATION

This section shall include for the supply, installation, testing and commissioning of a Forced Smoke Ventilation system to provide the landlord areas with automatic smoke extraction via a forced smoke vent. shaft, located as per the drawings.

The Central OS2 Shevtec control panel will be located by the AOV to allow full automatic operation. In addition to the control panel a MCP (manual call point) located by the fire alarm panel in the residential entrance, shall provide, fire service override, test operation and status indication facilities.

The appointed controls specialist shall supply, install and commission all interconnecting wiring between their own equipment, associated controllers, and interfaces to all smoke detectors in the landlord corridors.

The electrical contractor shall liaise with the smoke ventilation controls specialist on locations of AOVs and control panel to co-ordinate any electrical requirements.

The electrical contractor shall be responsible for providing a maintained supply to the Central OS2 control Panel, as per the Electrical Schedule and accompanying drawings. The OS2 Control Panel will be provided with a integral battery pack, mitigation any requirements for a secondary power supply or separate UPS system.

Cables shall be via suitably fire resistant cables to a minimum of 120 minute fire rated cable.

The control specialist for the works shall be:

Contact: Michael Scrimshaw
Company: SE Controls
Mobile: 07825 613 835
Email: Michael.scrimshaw@secontrols.com
Website: <https://www.secontrols.com/en-gb/>

4.7.2 SYSTEM OF WIRING

Wiring of the system shall be carried out using fire resistance cable with LSF red overall sheath, terminations and glands, to comply with BS8519. (All surface glands shall be provided with shrouds) unless detailed otherwise on drawings, schedules etc., power circuits operating at 240V shall be wired using FP/LSF with orange oversheath.

All cabling shall generally be of the following minimum sizes:-

- 1.5mm² for detector circuits
- 2.5mm² for sounder circuits (where applicable)
- 1.5mm² for auxiliary circuits

Wiring shall be concealed wherever practical in ceiling spaces or within the building fabric such that a flush installation is provided to all but unfinished areas such as plant rooms etc. These areas are described in various sections of this Specification.

Cable tray shall be provided within ceiling voids for multiple runs of cable. Single cables shall be clipped neatly using proprietary steel LSF coated "P" clips at regular spacing's, in accordance with manufacturers recommendations.

Detector heads shall be protected where necessary during the progress of the works and following any phased hand-overs.

4.7.3 TESTING & COMMISSIONING

The Electrical Sub-Contractor shall obtain the services of the manufacturers commissioning engineer to test and commission the complete installation, and to make final connections at the enunciator control panel, together with the programming of software and the like.

A functional test shall be applied to all automatic sensors, either smoke and/or heat, and likewise manual call points.

A record shall be kept of each and every individual point with the results duly recorded. In addition to the above, a full audibility test shall be applied throughout the complex, with individual readings recorded for each specific area.

On completion of the testing and commissioning by the manufacturers engineer, the Electrical Sub-Contractor shall provide a record of the results, in duplicate together with the manufacturers certified test report.

In addition to the functional testing of the above, the various mechanical plant and associated control network(s) interfaced with the fire warning network shall be tested simultaneously with the overall operation of this installation.

The system shall be demonstrated to the Building Services Consultant after completion of the commissioning.

The Building Services Consultant via the Main Contractor shall be given 10 days' notice of the demonstration as shall the Local Fire Officer and Building Control Officer who may also wish to witness the demonstration.

Allowance shall be made for the manufacturers engineer to return to site to carry out a user training demonstration after the system is accepted.

SECTION EIGHT

4.8.0 CCTV SYSTEM

4.8.1 GENERAL

The work under this section shall include for the supply, installation, testing and commissioning of an IP based CCTV system providing CCTV coverage to the lift lobbies on each floor, ground floor entrance and external fixed to the building, installed in accordance with BSEN 50132-7 and BS414 if applicable.

The CCTV system shall be supplied, installed, tested and commissioned by the client I.T specialist. The system shall be linked to the central Remote Network Monitoring system, to enable the client to log in to each site remotely and view the CCTV cameras throughout the building. Each camera shall be connected via CAT 5e cable back to the associated comms rack which accommodates the 16 channel NVR and 4TB harddrive, and terminated into a dedicated patch panel.

See Section 14.0 for details of electrical contractor's works.

4.8.2 CCTV COMMISSIONING

The contractor shall produce a CCTV commissioning documentation sheet, each sheet shall be produced for cameras including transmission where applicable, control equipment, recording equipment and configuration.

The contractor shall demonstrate and document that the CCTV control system is configured in accordance with the specification overview.

An example of the commission documentation shall be submitted to the Client's representative and agreed prior to handover.

This shall include and not be limited to camera I.D and camera text additional programming, pre-sets and alarm inputs.

The contractor shall ensure that the digital recording or remote monitoring configuration is in accordance with the specification overview.

The contractor shall demonstrate and record the correct time synchronisation. The contractor shall ensure all commission and configuration is completed prior to witness tests for handover.

Handover

Prior to witness test and handover, the Client's representative will, at his or her discretion, undertake a review of the site installation. If this is found to be incomplete the handover shall be postponed until outstanding works are complete.

The contractor shall demonstrate that the system components are correctly configured and the system as a whole operates in accordance with the specification overview.

The contractor shall produce sample recorded video footage and pass to the client representative prior to handover. The sample shall consist of a daytime and night-time recording from each camera.

4.8.3 DATA PROTECTION

Introduction:

The contractor shall recognise that the use of a CCTV system is for the purpose of surveillance and therefore encompassed by the requirements of the new Data Protection Act. The Act came into force on 1st March 2000.

The contractor, in conjunction with the client, must notify the Data Protection Registrar on the DPA website: www.dataprotection.gov.uk or telephone 01625 545700.

The contractor must log within the operating and technical manuals the Data Protection Notification Reference Number.

Secure Storage Of Recordings:

The contractor shall ensure that that access to recorded images is restricted by password or other security measures to those suitable with training and authority.

Recordings and recording/processing equipment must only be accessible to those directly concerned with achieving the objectives of the system.

Recordings and recording/processing equipment must be either located in a formal secure CCTV control room environment or must be secured in a lockable enclosure accessible only to authorised key holders, a key register must be maintained.

Signage:

The security contractor shall supply and install all necessary CCTV signage in accordance with the CCTV Code of Practice within the Data Protection Act 1998.

Signs shall be placed so that the public are aware that they are entering a zone, which is covered by surveillance equipment. The signs should be clearly visible and legible to members of the public (First Data Protection Principle)

In exceptional and limited cases, if it is assessed that the use of signs would not be appropriate, the user of the scheme must ensure that they have:

- Identified specific criminal activity.
- Identified the need to use surveillance to obtain evidence of that criminal activity.
- Assessed whether the use of signs would prejudice success in obtaining such evidence.
- Assessed how long the covert monitoring should take place to ensure that it is not carried out for longer than is necessary.

In such circumstances the Client will instruct the contractor not to install signage

Privacy:

The contractor shall ensure that where means are available i.e. video masking, the system is configured to ensure and individual rights to privacy were the law requires.

4.8.4

DOCUMENTATION

All documents supplied under this requirement must conform to the following:

All documentation shall be issued to the consultant for inspection 4 weeks prior to handover.

Rectification works on the manuals shall be completed and issued to the principle contractor prior to completion.

The Manual shall be written and compiled specifically for the site and as such, the use and application of its contents is only permitted for works related directly to this system. Its existence will assist the maintenance engineers in familiarising themselves with the systems installed.

The contractor shall supply method statements detailing procedures for servicing and maintenance of the system.

All manuals, instructions, drawings and similar materials shall be submitted in A4 format. Where the size of a drawing requires that it be larger than A4 it shall be neatly folded to A4 size and each shall be presented in a separate wallet in the manual.

Documentation shall be in MS Word for operation and maintenance manuals in the format outlined by the client, Excel for equipment schedules and MS Project for programme of works.

The Manual shall contain the information detailed below:

Introduction

The introduction shall include a brief description of the site

The Installation

This section shall include a brief written description of the systems installed by the contractor during the project. The description will give brief details of the various systems and how if at all they interact with one another.

Commencement of Installations

This shall include a program of the works as proposed and as undertaken

Practical Completion – Handover

Practical completion certificate signed on behalf of the client and on behalf of the contractor.

Data protection reference number.
Expiry of Defects Liability Period
Details of the defects liability expiry

Guarantees and Warranties

Details of any guarantees or warranties.

Contact Names and Numbers

- Installation Contractors and associated sub-contractors
- External services and authorities (if applicable)
- Main Consultants

4.8.5 APPROVED SPECIALIST

As per Client I.T Specialist (See Section 10.0)

SECTION NINE

4.9.0 ACCESS CONTROL SYSTEM

4.9.1 GENERAL

For the complete scheme:

The contractor shall include for the supply, installation, testing and commissioning of an audio and video intercom system to the residential entrance and apartments. The system shall be a Paxton Net2 system, and shall include but not be limited to the following:

- Paxton Net2 Entry Kit
- Net2+ ACU PSU Door Controllers
- 90 x Net2 Entry Monitors VX2200
- Paxton Mag locks & associated lock PSU's
- Push to exit buttons
- Entry Keypads
- Back up Battery's
- 4 way non coaxial video distributor
- All the required Cat5 cabling
- Commissioning of system and testing of each apartment

The system shall provide audio and video handsets within each apartment linked back to a main panel at the front main entrance. Residents will have a separate code which shall be programmed into the intercom panel for access to the residential development. The developer shall be able to set new codes for each tenant.

Plant rooms, bin store and cycle store will be manually lockable which shall be installed by the Main Contractor. Each tenant shall be given a key for the bin store.

The handset finish shall be as per the client's requirements.

This access system shall be linked to the buildings access control system and networked to the remote network monitoring system by the client I.T specialist. The system shall be manufactured by Paxton.

The contractor shall be responsible for the installation of all conduits and boxes together with 230v power supplies and earths. 2 x double 13-amp socket outlets shall be installed at the agreed power supply unit location as per the accompanying drawings, along with any internal containment and core drilling if required. The contractor shall also ensure the system components and installation offer protection from vandalism.

The access control system shall be manufactured by Paxton and supplied and installed by the access control specialist. They shall be responsible for the supply, installation, testing and commissioning of all control equipment, hardware, cabling and ancillary services.

The contractor shall ensure the system installation on all equipment complies with the requirements of the Equality Act 2010.

The electrical contractor shall be responsible for the installation of the audio only handsets.

4.9.2 APPROVED SPECIALIST

Company: LineUP Networks
Contact: Jordan Hall
Number: 0161 806 0805
Email: jordan@lineupnetworks.com
Website: www.lineupnetworks.com

4.9.3 CLIENT I.T SPECIALIST INSTALLATION

The Access control system to the main entrances will be connected to the Remote Network Monitoring system, so the client can remotely programme the codes for new tenants to gain access to the building. This system will also monitor the traffic through the entrances.

See Section 10.0 for details of associated electrical contractor's works.

SECTION TEN

4.10.0 STRUCTURED WIRING INSTALLATION

4.10.1 GENERAL

The work under this section shall include for the supply, installation, testing and commissioning of a structured wiring installation in accordance with:

ISO/IEC 11801: 2002 and also meet the following standards: -
EN 50173-1: 2002
ANSI/TIA/EIA 568B B.2: 2002
Building Regulations Part R

4.10.2 PERFORMANCE CRITERIA

The design of the structured cabling system shall comply with the requirements of ISO 11801 Class D and Building Regulations Part R: Physical infrastructure for high-speed electronic communications networks.

Transmission performance shall meet the requirements for ISO11801 *Class D (Cat 5) link 2002 and ISO11801, OF300, OF500 or OF2000 channel

Installation practices shall be compliant with BS EN 50174-2 and in accordance with manufacturers Installation Guide.

Installation practices shall also meet all applicable local and national codes, standards and ordinances.

Testing shall be carried out in accordance with industry installation guidelines Testing Certification using a Level III tester (or higher) with a current (within 12 months) calibration certificate.

Where a conflict exists between these standards, it is the responsibility of the contractor to detail these conflicts to the client prior to installation commencing.

4.10.3 SCOPE OF WORKS

The work in this section shall include for the supply, installation, testing and commissioning of a telecommunication installation within the building.

The main contractor shall liaise with the approved client I.T system specialist to install, test, commission and manage a new leased line & full wireless and hard wired solution that includes tenant facing support, maintenance & installation.

4.10.3.1 Internet Service Provider

There is an existing BT connection into the building, with the main distribution point assumed to be located on the ground floor. The client I.T system specialist shall be responsible for the co-ordination, installation and provision of a sufficient internet connection to the building. The service connection will be provided via BT OpenReach infrastructure, in which the client I.T system specialist will be responsible for liaising and co-ordinating the installation,

including all excavation works, ducting works and traffic management.

The service connection into the building shall be a leased line service, installed via OpenReach existing underground ducting, and shall be installed by BT Openreach.

The client I.T specialist shall confirm service connection timescales once a pre-site survey has been completed.

Target internet speed is 100Mbps on both wired and wireless systems.

The client I.T system specialist shall enter into a formal agreement regarding service level, to ensure minimum call out and response times are met.

4.10.3.2 I.T. Comms Room/Equipment

An incoming fibre connection shall enter the building in the ground floor plantroom. The incoming fibre cable shall be routed along galvanised cable basket (installed by the contractor) to the Ground Floor Main Comms rack. The client I.T system specialist shall terminate the connection into the dedicated comms rack.

The system shall provide a complete structured cabling system to provide high-speed data transmission to the apartments via wi-fi access points and local data ports.

The installation shall comply with all the relevant British Standards.

Specification of IT equipment will be advised by the client I.T system specialist, including cabinet specifications, patch panel specifications and number of patch panels/ports, which shall be provided by the contractor.

The contractor shall include for providing the following items of equipment (but not be limited to), in accordance with the client I.T system specialist specification:

- 1No. Floor Mounted Comms cabinet (800mm x 800mm) Size TBC by specialist
- Patch Panels with specific number of ports.
- RJ45 data outlets.
- Cabling.
- Containment.

4.10.3.3 Structured Wiring Installation

CAT 5e UTP LSZH cabling, capable of providing Power over Ethernet shall be supplied.

Each data cable length shall not exceed 90m in length from the patch panel to the outlet.

The contractor shall install CAT 5e cables from the comms room patch cabinets to all internal services requiring data connections, routed along the dedicated data cable containment. This shall generally be as per the

following:

- WAPs - Single data outlet for each wireless access point.
- CCTV – Single data outlet to each camera position.
- Access Control – 1No. CAT5e terminated to a Single Data outlet at main door, side door and car park barrier back to the comms cabinet.

The contractor shall also install the following –

- 1No. Cat5e & 1no. double socket outlet to each 'notice board' location at the entrances within the lobby space at high level to allow for a digital screen. (Beech to Confirm)

The positions of the data outlets shall be in accordance with the drawings.

The contractor shall ensure all CAT 5e cables are routed from each data point back to the comms rack, and terminated into the correct Patch Panels. The structured wiring system shall be fully tested and commissioned by the electrical contractor before handover to the client I.T system specialist.

The contractor shall produce cable schedules and test result certificates to produce to the client I.T specialist once complete. All data cables (Cat5e) should run from the specified location to the allocated comms space. If a cable run exceeds 90m, then the cable shall be terminated from one of the sub-comms cabinet on the other floors. There should then be 2no. Cat5e between the comms locations. If this distance exceeds 90m then 1 x multicore single mode fibre shall be installed between cabinets.

The contractor shall also include to supply and install a data point for each CCTV camera, capable of supplying IEEE802.3af Class 3 compliant power and Ethernet (PoE).

4.10.3.4 Wireless Internet Installation

A Wireless Internet system shall be installed throughout the common parts of the building allowing connectivity for tenants. The Wireless Access points (WAPs) shall be specified and installed by the client I.T specialist, in the locations in accordance with the accompanying drawings.

The contractor shall be responsible for the installation of the data cable containment and the routing of all CAT5e cabling from the patch panel location to the WAPs. The contractor shall install a CAT5e cable terminated into a single gang data socket within the ceiling void at all proposed WAP locations.

The client I.T system specialist shall cut a 50mmØ hole through the ceiling directly under the data socket. They shall then terminate a 3m CAT 5e cable from the data socket to the WAP, and surface mount the WAP to the underside of the ceiling. . Where services are exposed, the WAP shall be fixed to the underside of the cable tray.

The client I.T system specialist shall be responsible for carrying out a reception survey following completion of the internal fit out to assess the system coverage, and carry out any adjustments to the infrastructure. They

shall then issue a compliance certificate to the contractor to certify the system provides 100% coverage to the areas required.

A wireless internet system shall be provided from Day 1 of the construction phase, and shall provide internet access throughout the site. The client I.T system specialist shall be responsible for the installation and co-ordination to the necessary temporary WAPs and ensure the system is fully tested and commissioned.

4.10.3.5 Telephony

Dedicated telephone wiring will not be provided. Any requirements shall utilise the hard wired structured wiring system. Tenants who require telephones can make arrangements with Beech IT for an IP Telephone handset which shall be patched and charged through their managed services.

4.10.3.6 CCTV

The client I.T system specialist shall be responsible for the supply, installation and commissioning of an IP based CCTV system providing CCTV coverage to the communal corridors on each floor, main entrance and externally covering the entrances. The client I.T system specialist shall provide and install the CCTV cameras and NVR, in the locations in accordance with the drawings. The CCTV system shall be linked to the central Remote Network Monitoring system, to enable the client to log in to each site and view the CCTV cameras throughout the building.

The contractor shall install a CAT5e cable terminated into a single gang data socket at each CCTV camera location. Each cable shall then route back to the Ground Floor comms rack which accommodates the NVR, and shall be terminated into the dedicated patch panel.

4.10.3.7 Access Control

An access control system shall be installed to each main entrance to the building and the car park barrier system, which shall link back to the Remote Network monitoring system, as stated in Section 14.0 of this specification.

The contractor shall install a CAT5e cable terminated into a single gang data socket at each door controller location, and a CAT5e cable to the intercom panel for the car park barrier, in accordance with the drawings. Each cable shall then route back to the comms rack and terminate into the dedicated patch panel.

The access control system shall be manufactured by Paxton and installed by the access control specialist. The contractor shall ensure the system is fully tested and commissioned, and a commissioning certificate issued to the client I.T specialist on handover.

The client I.T system specialist shall be responsible for connecting the Paxton access control equipment to the remote network monitoring system.

4.10.3.8 Heating System

The heating system shall be integrated into the Remote Monitoring Network

system to enable the client to analyse the use of the heating in each apartment.

The contractor shall install a CAT5e cable terminated into a single gang data socket at each underfloor heating manifold location, in accordance to the drawings. Each cable shall then route back to the comms rack and terminate into the dedicated patch panel.

4.10.4 INSTALLATION REQUIREMENTS

- a) The cabling system must be procured from one manufacturer. The cabling system must be installed according to the manufacturer's instructions.
- b) Planning, quality control, documentation and earthing/bonding must be according to EN 50174 parts 1 and 2. External cables must be installed according to EN50174 part 3, latest draft.
- c) 100% of the installed cables must be tested.
- d) 100% of the test data must be reviewed by the manufacturer and approved by the manufacturer before any warranty certificate is released.
- e) The Permanent Link must be tested to IEC 61935 with a Level III cable tester set to Cat6 or Class E Permanent Link referencing the Permanent Link performance standards detailed in ISO 11801 ed. 2, EN 50173 Amendment 2, TIA/EIA 568B B2 Addendum 1.
- f) The cabling must be covered by a manufacturer's 25 year product and application warranty and installed by an installer accredited and trained by the manufacturer. Proof of training, which must be less than two years old, must accompany the tender.
- g) A labelling and administration system must be designed into the cable system in line with EN 50174 or ISO 14763-2 or TIA/EIA-606.
- h) The cabling system must be earthed according to the manufacturer's instructions and PrEN50303, EN50174-2 and TIA/EIA-607.
- i) Separation of power and data cables must be according to EN 50174 part 2 except where local or national electrical safety regulations require a greater separation.
- j) Fire Stopping: The contractor shall make good any fire barrier which has been penetrated using the appropriate fire stopping material

4.10.5 LABELLING SOLUTION

The electrical contractor shall utilise the following labelling solution throughout the structured wiring installation.

SERVICE CODES:

CODE	CODE DEFINITION	NOTES
A	APARTMENTS	CABLES WITHIN INDIVIDUAL APARTMENTS

C	CCTV	CCTV
D	DOOR ACCESS	PAXTON SYSTEM
H	HVAC	UNDERFLOOR HEATING
W	WIFI	COMMUNAL SPACE WIFI
X	MISCELLANEOUS GENERIC OR UNSPECIFIED	E.G MANAGEMENT OFFICE OR DIGITAL SIGNAGE POINT

LOCATION CODES:

CODE	CODE DEFINITION
SB	SUB BASEMENT
B	BASEMENT
LG	LOWER GROUND
G	GROUND
1,2,3,ETC	FLOOR NUMBER
R	ROOF

NUMBER CODES:

CODE	CODE DEFINITION
1 TO XXXX	CONSECUTIVE NUMBERS FOLLOWING SERVICE & LOCATION

EXAMPLES:

2ND CCTV CAMERA ON 3RD FLOOR = C/3/2

1ST UNDERFLOOR HEATING POINT ON LOWER GROUND = H/LG/1

3RD WIFI POINT ON 1ST FLOOR = W/1/3

4.10.6 EARTHING REQUIREMENTS

The cabling system must be earthed according to the manufacturer's instructions and PrEN50303, EN50174-2 and TIA/EIA-607.

4.10.7 CONSUMABLES

For tender purposes provide unit costs for the supply of the following items:

- a) Data patch leads.
- b) Server patch leads.

Patch Cords

- a) The U/UTP Patch cable shall be a high performance factory crimped 4 pair stranded Enhanced Category 6 assembly. The connector employed should be of extremely high performance to offer a complete Enhanced Category6 performance when used in a channel.
- b) Must be 24 AWG (U/UTP) stranded, with low flammability sheath (HF type) to IEC 60332-1.
- c) Connectors must be RJ45 style IEC 60603-7-2/3.
- d) Electrical performance to be Enhanced Category 6
- e) Standard Boot Patch Cords

4.10.8 TESTING AND ACCEPTANCE

EMC Compliance

The structured cabling system shall comply with cable balance and EMC requirements of EN 50288 and ISO 11801 2nd edition and will not degrade the EMC performance of any electrical device connected to it. The manufacturer shall guarantee this facility.

Any faults shall be remedied and all results shall be fully recorded and incorporated into the Record Documentation.

Full Category 5e compliance certifications will be required and must be backed by a Parent Company Guarantee from the cabling systems designer (AT&T, ITT, etc.)

Certification of compliance with BS EN 50174 shall also be provided. Allow for 10% witness testing on site, or as otherwise required by the EA.

4.10.9 OTHER STRUCTURED WIRING INSTALLATIONS – SECTION NOT USED

4.10.10 CLIENT I.T SPECIALIST

The following are the approved client I.T specialist in which the specification is based:

Company: LineUP Networks Ltd
Address: 404 Barnfield House
1 Salford Approach
Salford
M3 7BX
Contact: Jordan Hall
Email: jordan@lineupsolutions.com
Tel: 07824015718
Website: www.lineupsolutions.com

SECTION ELEVEN

4.11.0 TV DISTRIBUTION SYSTEM

For the complete scheme:

4.11.1 GENERAL

The work in this section shall include for the supply, installation, testing and commissioning of a digital TV distribution system.

The systems shall comply with the current technical conditions of the licensing authorities. It will be the responsibility of the contractor to determine the requirements for any licences and apply for any licence that the building may require.

The contractor shall be a member of the Confederation of Aerial Industries and have the relevant qualifications for television distribution systems.

4.11.2 SYSTEM EQUIPMENT

The works shall include for the supply and installation of a TV system in the lounge of each apartment/studio, as indicated on the layout drawings. The system shall comprise of 10 outlet 5 wire IRS system to receive Freeview digital TV, FM/DAB radio.

Also included will be the installation of the UHF commercial high gain aerial to cover DTT reception, FM and DAB Ariel, and associated bracketry on the roof of the building. The amplifiers, taps, splitters and multiswitches shall be installed in the plantroom and will feed the apartments/studios. The system will be installed in WF100 LSOH coax cable.

The master outlet sockets are to be installed within the living room area and shall be chrome/stainless steel Triax sockets to provide TV, Freeview (Subject to Signals), FM and DAB. Residents will have the option of subscribing to Sky & Sky + and watching digital satellite channels.

4.11.3 CONTRACTOR WORKS

To ensure a successful installation, the following list of builders/electrical work shall be installed by the contractor:

- 2 x double 13-amp sockets outlet at the agreed headend position.
- A 6mm earth bonding facility at the headend position
- A cable route and cable management from the antenna array to the headend location.
- Internal containment will need to be provided if required
- All core drilling to be provided if required
- 1 x Double 40mm depth back box in lounge location if 3 cables to each lounge

4.11.4 CABLING

Cables from splitter to multiswitch shall be CAI benchmark cable 125, cables from multiswitch to TV outlets shall be CAI benchmark 100.

4.11.5 APPROVED SPECIALIST

Company: SCS Technologies Ltd
Contact: Stephen Bushell
DDI: 01925 859111
Mobile: 07980 297838
Email: sbushell@scstechnologies.co.uk
Website: www.scstechnologies.co.uk

SECTION TWELVE

4.12.0 LIGHTNING PROTECTION INSTALLATION

4.12.1 GENERAL

The contractor shall liaise with the lightning protection specialist to conduct a complete site survey of the existing system to confirm if the installation fully complies with BS EN 62305.

If the system does not comply, the Contractor shall allow for the design, installation, testing, and commissioning of a modified lightning protection system to the roof area. The Lightning protection specialist shall carry out a full assessment to confirm coverage requirements of the system.

The contractor shall note that the finished installation shall be as unobtrusive as possible so as not to affect the character of the building. The exact positions of down conductors shall be agreed with the Contract Administrator prior to commencement of the associated works.

The contractor shall allow for installation of bonding to all existing and new items of roof mounted plant installed under the contract.

The installation shall fully comply with BS EN/IEC 62305.

The equipment including, but not limited to the following will need to be bonded:

- 1 No. terrestrial TV aerial
- Smoke fans
- Handrail systems

4.12.2 MATERIALS

Air terminations, roof conductors and down conductors shall be of copper, copper alloy or aluminium, except that aluminium shall not be used below ground level.

Earth electrodes shall be of solid drawn high conductivity copper rods, with steel cores if required.

All bonds shall be of copper or copper alloy and shall be connected to existing network using proprietary bonding connections.

The contractor shall also include for temporary lightning protection during the refurbishment works (scaffold bonding).

4.12.3 SURGE PROTECTION

Surge Protection shall be provided to the main incoming supply into the main LV panel board located within the Ground floor electrical plant room, and the main incoming telecom line, in accordance with BS EN 62305/BS 7671, as per the following specifications:

Services Entry Surge Protection Devices
Risk Element R1 – BS EN 62305-4

- a) 1 No. 3 Phase 415v 10/350 Mains Protector (Integral to main panel)
- b) 1 No. Enclosure for 3 Phase Unit
- c) 1 No. Type 1 - Telecoms Line
- d) 3 No. SPD type 1/11 to each sub-distribution board.
- e) 1 No. Incoming coaxial from external CCTV cameras.

4.12.4 BUILDERS WORK

- All excavations, making good of soil and identification of safe location for deep driven electrodes clear of services is to be carried out by the Main Contractor, at no cost to ourselves and under no circumstances will electrodes be driven in areas of unexcavated ground.
- Installation of our earth electrode inspection housings in each position.
- Cutting out and making good to brickwork/blockwork/timber surfaces to enable conductors to be routed.
- Safe access to all working places.
- Site welfare and first aid facilities.
- We require the use of the builder's scaffolding / mobile mechanical access platforms to facilitate the fixing of the roof conductor and down conductors in safety.
- We have included for Furse standard clips to secure the air termination network to the roof membrane, should specialist clips be required these may be subject to additional cost and in some cases they may need to be supplied and installed by the roofing contractor where warranties are associated.

4.12.5 APPROVED SPECIALIST INSTALLERS

The following are the approved specialist lightning protection system installers:

Company: Best Services Ltd
Address: Brooke House
Morton Street
Middleton
M24 6AN
Tele: 0161 655 3000
Contact: Pete Warwick
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SECTION THIRTEEN

4.13.0 EARTHING AND BONDING

4.13.1 GENERAL

The contractor shall supply and install a new main earth terminal within the electrical switch room connected to the new PME installation, and shall provide all necessary main equipotential bonding, supplementary bonding and other earthing conductors to comply fully with the BS 7671, BS 7430 & BS EN 50310.

The contractor **shall not** bond any temporary equipment or supplies to the new PME main earth terminal.

4.13.2 SYSTEM DESCRIPTION

All sub-circuit wiring shall be provided with circuit protective conductors. All bonding and separate protective conductors shall be LSF insulated, coloured green with a yellow band. Separate earthing conductors may be fixed directly, concealed from view, and shall be sleeved where they pass through the structure. All conductors shall be protected by conduit within 300mm of floor level. Connections to pipework and sink wastes shall be by means of approved clips and clamps, using compression type cable lugs. Where connections are required to mechanical services, plant or ductwork, a cable lug shall be fitted using a suitably sited existing connection bolt. No drilling shall be allowed. Approved labels shall be fitted to all earth connection points.

For tender purposes it may be assumed that the following will not be regarded as extraneous conductive parts:

- i. Radiators
- ii. Window frames
- iii. Door furniture
- iv. Isolated fittings
- v. Metal shelving

SECTION FOURTEEN

4.14.0 TESTING AND COMMISSIONING

The contractor shall include for the complete testing and commissioning of all systems to comply with the requirements of BS 7671 requirements for electrical installations and this Specification.

Full certificates shall be produced and bound as part of the Operating and Maintenance Manuals.

SECTION FIFTEEN

4.15.0	TECHNICAL SCHEDULES
4.15.1	SCHEDULE OF SPECIFIED EQUIPMENT
4.15.2	SCHEDULE OF EQUIPMENT MOUNTING HEIGHTS
4.15.3	DISTRIBUTION BOARDS

SECTION FIFTEEN**4.15.0 TECHNICAL SCHEDULES****4.15.1 SCHEDULE OF SPECIFIED EQUIPMENT**

The electrical contractor shall include the following items of the manufacturers stated in his tender. He may also offer alternative to the manufacturers stated, provided these fully comply with the specification and meet the design concepts. Any alternatives offered should be stated in the schedule provided.

Unless the electrical contractor puts forward such alternatives and they are accepted by the engineer at the acceptance of tender, the contractor will be held to the manufacturers specified without relaxation.

Item	Description	Manufacturer
Cable Trunking and Accessories		
General	Single and twin compartment sheet steel	Mita or equal
Cable Tray and Accessories		
Fire alarm containment	Galvanised steel return flange	Mita
Voice and data system	Galvanised steel return flange	Mita
Support brackets	Galvanised channel c/w accessories and fixings, purpose made.	Unistrut or equal
Conduits and Accessories		
BS4568 steel	HGSW galvanised c/w accessories	Barton Conduits Ltd or equal
Cables		
Pirelli	Fire Alarm General Lighting Pirelli & Power FP200 Emergency Lighting Fire resistant cable	
Cables		
XLPE/SWA/LSF	600/1000 V rating multi core copper conductors	BICC or equal (BASEC)
Accessories		
Plant areas	Surface mounted isolators	Hager
Lighting switches	20A rating, flush mounted	Electrical Showroom BG Nexus
PIRs	Presence Detectors	CP Electronics or equivalent.

General power (weather proof)	13A rating, socket outlets, fused connection units, double pole switches etc.	Electrical Showroom BG Nexus
General Power (not plantrooms)	13A socket outlets fused connection units, double pole switches, USB sockets, etc	Electrical Showroom BG Nexus

4.15.2 SCHEDULE OF EQUIPMENT MOUNTING HEIGHTS

The contractor shall be responsible for confirming heights of accessories with the C.A. prior to installation. All dimensions stated to centre line unless otherwise stated.

Socket outlets	1200mm, or 450mm
Cooker Control	1200mm
Switch Plate	1200mm
T.V Outlet	450mm
Consumer Unit	1350mm-1450mm AFFL (Height of MCBs)
Distribution Board	2250mm (to top of board)
Telephone Outlet	450mm
Fire Alarm Push	1200mm (800 on wheelchair routes)
Fire Alarm Bell	2200mm
Curtain Connection Unit	2100mm
Clock Connector	2200mm

4.15.3 DISTRIBUTION BOARDS

Main Panel and Sub-distribution boards: Hager or Equivalent

Consumer Units: Hager Design 30 or equivalent

Amount of ways and incoming current ratings as per Electrical Technical Schedule (3816-ESCHED-001).

PART FIVE

PARTICULAR SPECIFICATION FOR PUBLIC HEALTH ENGINEERING

SECTION ONE

5.1.0 GENERAL

The work shall include for the supply, installation, coordination, testing and commissioning of the above ground drainage. All work must comply with the Local Authorities Building Control Officers site requirements, Building Regulations and BSEN 12056, BS EN 752.

5.1.1 GENERAL DESCRIPTION

The Contractor shall install a waste water removal system to serve water connections from wash hand basins, kitchen equipment and toilets.

Floor gulleys shall be provided to all plant rooms.

The lower ground floor shall be connected to a separate below ground drainage run and exit the building independently from the upper floors. All lower ground floor service connections to below ground drainage shall be via a stub-stack with high level air admittance device.

All drainage shall be laid to fall and shall not be pumped unless necessary. Where pumps are indicated on the drawings these shall be of the type indicated on the drawings.

Access doors are to be provided on soil and waste pipes and shall be located above flood level of sanitary fittings.

Rodding eyes and cleaning eyes are to be provided on stub waste.

Pipework shall be Terrain Acoustic system.

The Contractor shall generally utilise soil vent pipe locations as indicated on the Architects drawings, terminating through the roof in tile vents. The Contractor shall provide soil and vent pipework as necessary to serve all outlets within the building.

The Contractor shall allow for drain gullies as indicated on the. The final requirements for and locations of these installations shall be agreed with the CA prior to installing.

The Contractor shall liaise with Basement Tanking specialist to allow for drain gullies as required. The final requirements for and locations of these installations shall be agreed with the CA prior to installing.

5.1.2 MATERIALS AND WORKMANSHIP

All materials used are to be to the local authorities requirements and shall be of equal quality to that specified in the appropriate current BS/EN standard specifications, where such exist. Where the British standard quoted in the specification has been superseded the current amendment or new standard

shall apply.

The contractor shall submit full details of all materials intended for use e.g. composition of material strengths and the current British standard or code of practice numbers. Where propriety materials are used they shall be installed in strict accordance with the manufacturer's details and recommendations.

Standard of workmanship shall be of the highest quality and shall conform to current BSEN 12056 and BSEN 752 requirements and be carried out by tradesmen. Jointing materials must not project into the bore of the pipes, or appliances.

The supervising officer may direct the independent tests shall be made on materials to be used on the works. Any such tests shall be carried out at the contractors expense. Any materials condemned as not being of suitable standard shall be removed from site immediately on the instruction of the contract administrator.

5.1.3 PIPEWORK AND FITTINGS

Stub stacks shall be fitted with cleaning on top or with propriety air admittance valves if approved by the building control officers the height of the stub stack shall be taken above the flood level of the fitting. Typically 1m.

Adequate rodding access shall be provided at the lowest level of all soil stacks and change of direction and provided at regular intervals for ease of testing. Connection to drains shall be with suitable proprietary adapters.

All pipework and fittings shall be examined prior to installation, defective materials must be rejected or will be condemned.

All soil waste and ventilating pipework and branch connection to WC pans shall be installed in UPVC to BS 4514 and 5255 as manufactured by Caradon Terrain Ltd or equal and approved system and be provided with solvent welded joints, with adequate allowance for expansion.

Joints shall be of the solvent welded type and fixing centres must not exceed the maximum centres recommended by the manufacturers. Expansion joints and brackets provided with sufficient movement for allowing pipework to expand.

Branch connections to WC's shall be connected with approved type multi-kwik flexible connectors.

All branch waste and ventilating pipework to sanitary fittings shall be installed in white UPVC or polypropylene pipework adequately supported in conjunction with the manufacturers recommendations.

All bends shall be long radius and tee shall be swept in the direction of the flow. Angles on bends and tees shall be 92.5° or 135°.

PVC waste pipework shall be fixed at regular intervals and centres not exceeding 750mm brackets and to manufacturer's recommendations.

Waste branches from macerator machines must be plumbed into the waste

systems strictly in accordance with the manufacturer's instruction requiring separate short runs to soil stack with minimum number of swept bends and a fall of 1-25.

All traps to sanitary fittings will be supplied as part of the sanitaryware package and be tubular type 'P' traps. Connection to UPVC pipework must be made with a suitable adapter.

WC overflows shall integrate with fittings and discharge into WC Pan and shall be as Armitage Shanks or equal and approved.

All pipework and fittings must be protected from damage during the works and to the end of the works until handover. All open ends must be capped off to prevent the ingress of debris at all times during the works, with a proprietary cap. Wood, paper or sticky tape not acceptable on open ends of pipe.

5.1.4 PROTECTION OF THE WORKS

All pipework and fittings must be protected from damage during the works and to the end until handover.

All open ends must be capped off to prevent the ingress of debris at all times.

UPVC pipework must be adequately sleeved through walls and floors to permit movement for expansion.

5.1.5 TESTING

All plumbing and waste pipework must be properly cleaned and flushed out prior to undertaking any testing. Stage testing should be carried out during the works and any leaks corrected.

All pipework is to be air tested at the completion of the works and an air pressure of 100mm water gauge applied which must be maintained for a minimum period of 10 minutes.

The final test must be witnessed by an appropriate person and recorded on a test certificate and copies handed to the client and supervising officer.

5.1.6 RECORD DRAWINGS

A set of drawings shall be kept on site during the installation of the plumbing works and shall be marked up showing pipework testing dates and results during installation and final test at completion.

Record drawings of all installed pipework routes are to be marked up during the installation to enable accurate as installed drawings to be provided and handed to the client at the handover to the client.

SUB CONTRACT WORKS

FINANCIAL SECTION

LIST OF APPENDICES

The following schedules shall be completed in full and returned with this front page to each of the main contractors for inclusion in the main tender price summary. Failure to return completed schedules listed below shall preclude the tender from consideration.

All documentation not included with the services package but referred to in the schedules shall be viewed with copies obtained as deemed necessary. All allowances shall be made for any matters contained therein which may affect your tender. Any wants for additional monies arising from lack of knowledge shall not be entertained.

- A1 Schedule of Tender Drawings - Mechanical
- A2 Schedule of Tender Drawings - Electrical
- A3 Schedule of Architects Drawings
- B Programme of Works
- C1 Daywork, Plant and Material Rates - Mechanical Services
- C2 Daywork, Plant and Material Rates - Electrical Services
- D1 Breakdown of Tender - Mechanical Services
- D2 Breakdown of Tender - Electrical Services
- D3 Value Added Tax
- E Alternative Equipment
- F Unspecified Manufacturers
- G Proposed Sub-let Work
- H Form of Declaration
- J Form of Tender (if applicable)
- K Main Contract Preliminaries

APPENDIX A1

SCHEDULE OF TENDER DRAWINGS - MECHANICAL

Refer to drawing schedule 3816-M-DWGreg

APPENDIX A2

SCHEDULE OF TENDER DRAWINGS - ELECTRICAL

Refer to drawing schedule 3816-E-DWGreg

APPENDIX A3

SCHEDULE OF ARCHITECTURAL DRAWINGS

Refer to Drawing register.

Refer to Main Contract Preliminaries

Drawings shall be viewed by the Sub-Contractor prior to submitting tender.

APPENDIX B

PROGRAMME OF WORKS

Refer to Main Contract

Preliminaries and Particular Specification Clauses

APPENDIX C1

SCHEDULE OF DAYWORK RATES FOR A FIXED PRICE TENDER - MECHANICAL

Percentage additions required on nett cost to cover establishment charges and profit.

Labour%

Fares/Allowances%

Materials%

Specialist Sub-Contracts%

Signed

For and on Behalf of

.....

.....

Date

APPENDIX C2

SCHEDULE OF DAYWORK RATES FOR A FIXED PRICE TENDER - ELECTRICAL

Percentage additions required on nett cost to cover establishment charges and profit.

Labour.....%

Fares/Allowances.....%

Materials.....%

Specialist Sub-Contracts.....%

Signed.....

For and on Behalf of.....

.....

.....

Date.....

APPENDIX D1**BREAKDOWN OF TENDER - MECHANICAL**

This breakdown constitutes the Contract Sum Analysis. Please fully complete and return with your Tender for inclusion in the main contract document price summary

ITEM	DESCRIPTION	SUM
1.	Comply with contract conditions and preliminaries	£
2.	Stripout of existing	£
3.	Heating	£
4.	Domestic services	£
5.	Water treatment	£
6.	Ventilation	
	a. Air handling unit	£
	b. Apartment ventilation	£
	c. Ancillary accommodation ventilation	£
7.	Gas	£
8.	Thermal Insulation	£
9.	Automatic controls	£
10.	Associated electrical services	£
11.	Plumbing and drainage	£
12.	Builderswork and site management	£
13.	Testing and Commissioning	£
14.	Record drawings and O & M manuals	£
15.	Any items not included above (provide details of these)	£
16.	Sub total	£
17.	Contingency @ 5%	£
18.	Provisional sum for unforeseen works	£10,000
19.	FIXED PRICE TENDER	£

IN WORDS.....

Signed.....

For and on Behalf of.....

Date.....

APPENDIX D2**BREAKDOWN OF TENDER ELECTRICAL**

This breakdown constitutes the Contract Sum Analysis. Please fully complete and return with your Tender for inclusion in the main contract document price summary

ITEM	DESCRIPTION	SUM
1.	Compliance with contract conditions	£
2.	Electrical sub mains distribution	£
3.	Lighting installation	£
4.	General purpose power	£
5.	Supplies to mechanical services	£
6.	Fire alarm system	£
7.	Structured Wiring Installation	£
8.	Security installations	
	a: CCTV	£
	b: Access Control	£
9.	TV Distribution	£
10.	Lightning Protection	£
11.	Earthing and bonding	£
12.	Testing and commissioning	£
13.	Record drawings and O&M manuals	£
14.	Any items not included above (Provide details of these)	£
15.	Sub Total	£
16.	Contingency @ 5%	£
17.	Provisional sum for unforeseen works	£10,000
18.	Provisional sum for feature lighting	£5,000
19.	FIXED PRICE TENDER	£

IN WORDS.....

Signed.....

For and on behalf of.....

Date.....

APPENDIX D3

VALUE ADDED TAX

In accordance with Practice Note 17, Clause 8 (2) issued by the Joint contracts Tribunal for the Standard Form of building contract, the Contractor is requested to give below a provisional indication of the amount of tax which the employer will be called upon to pay under the VAT Agreement. This provision indication will not be binding on either party.

The contractor is asked to split up the non-recoverable VAT, if any as far as possible under the various areas involved in order that the Employer can have some reasonable idea of the extent to the work likely to attract the Tax.

APPENDIX E

ALTERNATIVE EQUIPMENT

List below those commodities which have been described as from a specified Manufacturers for which approval is sought to change from the specified Manufacturer. The Tender will be deemed always to include for commodities to be manufactured by the firm specified.

Commodity Manufactured	Specified Manufacturer	Proposed Cost Return	Tender
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Signed

For and on Behalf of

Date.....

APPENDIX F

UNSPECIFIED MANUFACTURERS

List below those commodities for which a Manufacturer has not been specified in the Tender Documentation and state the Proposed Manufacturer. Failure to list all the proposed Manufacturers below will not prevent consideration by the Supervising Officer of proposals at any other time, but the Tender will be deemed always to include for commodities which comply with the Descriptions contained in the Tender Documentation and which are of manufacture which the Supervising Officer will approve.

Commodity	Name of Proposed Product	Name and Address of Proposed Manufacturer
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Signed

For and on Behalf of

Date.....

APPENDIX G

PROPOSED SUB-LET WORK

List below those parts of the works which will be sub-let and state the proposed firm. Failure to list all parts of the works to be sub-let will not prevent consideration by the Supervising Officer of proposals at any other time, but apart from the works listed below, the Tender will be deemed always to include for the work being undertaken by the Contractor.

Part of the Works	Name of the Proposed Firm	Address of the Proposed Firm
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Signed

For and on Behalf of

Date.....

APPENDIX H

FORM OF DECLARATION - SECTION NOT USED

APPENDIX J

FORM OF TENDER - REFER TO MAIN CONTRACT

APPENDIX K

MAIN CONTRACT PRELIMINARIES

The sub-contractor shall view and/or obtain copies of main contract preliminaries and associated documentation prior to returning his tender.

Following inspection of these documents the sub-contractor shall include in any additional requirements or allowances deemed necessary in the formulation of his tender.