



PERFORMANCE SPECIFICATION

82 KING STREET, MANCHESTER

mepdesign.co.uk

DOCUMENT HISTORY

Revision	Date	Purpose	Author	Approved
T01	03/06/2025	Tender Issue	R.D.	B.W.J.



CONTENTS

1	GENERAL PARTICULAR SPECIFICATION.....	5	2.6	HEATING SYSTEMS	16
1.1	INTRODUCTION.....	5	2.7	VENTILATION.....	17
1.2	SUB-CONTRACTOR SELECTION.....	5	2.8	DOMESTIC WATER SERVICES.....	20
1.3	WORKMANSHIP STANDARDS.....	5	2.9	ABOVE GROUND DRAINAGE	22
1.4	DRAWINGS AND SPECIFICATION.....	6	2.10	AUTOMATIC CONTROLS	30
1.5	SAMPLES & SITE MOCK UPS.....	7	2.11	BUILDERSWORK.....	30
1.6	REQUIREMENTS	7	2.12	TESTING & COMMISSIONING	30
1.7	COORDINATION OF SERVICES	8	3	ELECTRICAL SERVICES PERFORMANCE SPECIFICATION	33
1.8	SITE INSPECTION & KNOWLEDGE OF WORKS.....	8	3.1	SCOPE OF WORKS.....	33
1.9	CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS.....	8	3.2	DESIGN CRITERIA.....	34
1.10	METHOD STATEMENTS.....	9	3.3	ENHANCED CAPITAL ALLOWANCE (ECA)	35
1.11	MAINTENANCE.....	9	3.4	SURVEY OF EXISTING SYSTEMS, RELOCATION WORKS & STRIPPING OUT	35
1.12	CALCULATIONS.....	9	3.5	MAIN LV SWITCHBOARD.....	36
1.13	SELECTION AND INSTALLATION OF EQUIPMENT	10	3.6	FINAL CIRCUIT DISTRIBUTION BOARDS	36
1.14	ACOUSTIC CRITERIA	10	3.7	EARTHING SYSTEMS.....	38
1.15	BUILDERSWORK & MAKING GOOD	11	3.8	SYSTEM WIRING	38
1.16	AS INSTALLED DRAWINGS AND OPERATING & MAINTENANCE MANUALS	11	3.9	CONTAINMENT	40
1.17	BUILDING LOG BOOK	11	3.10	SMALL POWER.....	40
1.18	CLIENT DEMONSTRATIONS.....	12	3.11	LIGHTING.....	42
1.19	COMPLETION AND DEFECTS LIABILITY	12	3.12	LIGHTING CONTROLS.....	43
1.20	TECHNICAL QUERIES	12	3.13	EMERGENCY LIGHTING.....	43
2	MECHANICAL SERVICES PERFORMANCE SPECIFICATION.....	13	3.14	FIRE ALARM & DETECTION SYSTEM.....	44
2.1	SCOPE OF WORKS	13	3.15	DATA & TELECOMMUNICATIONS	45
2.2	DESIGN BRIEF.....	14	3.16	ACCESS CONTROL.....	47
2.3	DESIGN CRITERIA	14	3.17	CCTV.....	48
2.4	ENHANCED CAPITAL ALLOWANCE (ECA).....	16	3.18	COMBINED REFUGE CALL & W.C. ALARM SYSTEM	50
2.5	SURVEY OF EXISTING SYSTEMS, RELOCATION WORKS & STRIPPING OUT	16	3.19	ELECTRIC VEHICLE (E.V.) CHARGING	51
			3.20	INTRUDER ALARM	51
			3.21	BOMB ALERT SYSTEM.....	52

3.22 ELECTRONIC SURGE SUPPRESSION 52

3.23 SPEED GATES.....52

3.24 BUILDERSWORK 52

3.25 MOUNTING HEIGHTS.....52

3.26 TESTING & COMMISSIONING 53

4 RETURN TENDER DOCUMENTATION.....59

APPENDIX A – MECHANICAL SERVICES MANUFACTURERS.....64

APPENDIX B – ELECTRICAL SERVICES MANUFACTURERS 65

1 GENERAL PARTICULAR SPECIFICATION

1.1 INTRODUCTION

This document is the RIBA Stage 3 Performance Specification for the design development, coordination and installation works of the mechanical, electrical, and public health (MEP) building services installations for the refurbishment works required to create an updated Ground Floor main entrance and reception area and end of journey facilities within the B2 Basement of 82 King Street, Manchester M2 4WQ.

The contract works shall consist of the development of all aspects of the detailed design, setting out, coordination, supply, installation, testing, commissioning, Client demonstrations and setting to work of the installations described herein.

This Performance Specification shall be read in conjunction with the Main Contract Preliminaries, OBI Property drawings and documents, 3DReid Architects drawings and documents, MEP Design drawings and documents, and all other tender documents.

The Contractor shall examine all specifications, reports, room data sheets, drawings, and all other information and documents submitted by the Client's Design Team and/or sub-trades to ensure that the tender return is based on all relevant information, as required to the provision and location of services.

1.2 SUB-CONTRACTOR SELECTION

In order to provide the Client with the expected level of quality and service, it is imperative that the Main Contractor selects Sub-Contractors who are appropriate to undertake the work specified to the highest standards, with Professional Indemnity provision as required in the Main Contract Preliminaries. The Main Contract Preliminaries may detail a number of Sub-Contractors the Client Team deem suitable for these works. Any Sub-Contractors put forward must be capable of demonstrating, prior to being awarded any contract, their full capabilities to the Client Team. This demonstration shall comprise but not be limited to the following:

Full details of at least three other recent schemes where similar installations, in terms of specification, size and cost, have been successfully completed. This must include

a full description of the installations the Sub-Contractor in question specifically completed.

Details of references that the Client Team could contact if they so wish, relating to the schemes noted in a) above.

Contact details of the Sub-Contractor, including appropriate Contracts Managers, so the Client Team can make direct contact.

The Main Contractor shall not appoint any Sub-Contractors until the Client Team has confirmed in writing that they are satisfied that the information provided gives them sufficient confidence that the Sub-Contractor proposed has the correct level of experience to provide the level of service expected from the Client Team.

The Client Team will accept no responsibility for the delay and/or affect the appointment of acceptable Sub-Contractors by the Main Contractor, has on the contract programme.

1.3 WORKMANSHIP STANDARDS

The standards of workmanship for all building services engineering systems and installations shall, as a minimum, be as detailed in this Performance Specification and must be in accordance with all industry standard guidelines and codes of good practice, including, but not limited to the following:

- All relevant mandatory British and European Standards
- Building Regulations
- CIBSE – Guides; Commissioning Codes; Technical Memoranda; Building Energy Codes; Lighting Guides; Application Manuals
- Health and Safety at Work Acts
- IOP – Plumbing Engineering Services Design Guide
- Construction (Design & Management) Regulations
- Control of Pollution Act
- Factories Acts
- Any special requirements for the Local Electricity or Water
- Undertakings and Fire Fighting Authority
- Crown Fire Standards and Regulations

- Water Authority & WRC Water Supply (Water Fittings) Regulations 1999
- Working at Height Regulations 2005
- HVCA DW144 & HVCA DW172
- British Board of Agreement (for tested products)
- BSRIA – Technical Publications
- British Standards, including Codes of Practice
- EC Directive 85/337/EEC – Environmental Impact Assessment
- EC Directive 89/645/EEC – Minimum Safety and Health Requirements in the Workplace
- EC Directive 90/270/EEC – Minimum Safety and Health Requirements for Work with Display Screen Equipment
- COSHH – The Control of Substances Hazardous to Health Regulations 1988
- The Environmental Protection Act 1990
- HSE Noise at Work Regulation – Guides 1–8, SI1790/1988.
- HSE Document L8 – Control of Legionella Bacteria in Water Systems
- DE Policy Instruction 37/2004 – Control of Legionella Bacteria in Water Systems
- The Statutory Fire Officers and Building Control Requirements.
- CDM Regulations 2015.
- The Working Time Regulations 1998
- All relevant CIBSE publications
- All other Statutory Requirements
- All other Government Requirements
- Regulations under the Electricity Act
- Regulations under the 1975 Building Acts
- The Building Regulations.
- Public Utility Company and/or Statutory Authority regulations, specifications, and requirements.
- British Standards and Codes of Practice.
- Insurance Company Requirements.
- LDSA Fire Safety Code.
- IEC Standards.
- Fire Engineer Report.
- Acoustic Consultant Report.
- British Council for Offices Best Practice Guides.

All workmanship standards will be required to be of the highest level.

All work should conform to the best principles of modern practice and should be carried out by fully competent and qualified tradesperson of appropriate grades, under skilled supervision.

1.4 DRAWINGS AND SPECIFICATION

Prior to commencement on site, the Contractor shall provide fully designed and detailed working drawings, produced using Autodesk AutoCAD, which show the complete building services installation requirements (including, but not limited to mechanical, electrical, public health and utilities engineering systems), fully co-ordinated with architectural, structural, smoke ventilation and pressurisation and other service drawings, for the project. These drawings shall be completed to include the following services (as appropriate) as a minimum:-

- Above ground foul drainage
- Domestic hot and cold water services
- Comfort cooling and heating systems
- Electric heating
- Ventilation systems
- Automatic controls
- Mechanical services details, sections, and schematics
- Electrical services for mechanical systems
- L.V. electrical sub-distribution and final circuit distribution
- Containment
- General and emergency lighting
- Small power
- Data and telecommunications
- Fire alarm, intruder alarm, access control, intercom and CCTV systems
- Disabled refuge and W.C. alarm systems
- Induction loop system
- Earthing and bonding
- Electrical services details, sections, and schematics
- Detailed setting out including elevations, which shall be fully coordinated and agreed with the Contractor and Architect
- Coordinated, set out and dimensioned reflected ceiling plans
- Coordinated, set out and dimensioned elevations of walls where required by Design Team

- Builderswork

A single paper copy and an electronic .pdf copy of working drawings shall be submitted for review and comment by the Client Team. The Contractor shall allow 10 working days for examination of the drawings by the Client Team. In addition to this the Contractor shall issue all drawings in accordance with the drawing issue protocol which will be confirmed following appointment. This provides details of the distribution list and quantities, media and size of drawings required. No installation works are to be carried out without full prior approval of all information by the Client Team.

All drawings shall be fully coordinated with all other trades prior to submitting to the Client Team.

General arrangement drawings shall be produced at 1:100 scale as a minimum. Plantroom, Switchroom and details drawings shall be produced at 1:20 scale.

Fully coordinated reflected ceiling plans shall be provided at the same time as all other drawings for Client Team comment.

All drawings shall be at A1 as a maximum. Legible A3 drawings are to be produced wherever possible.

1.5 SAMPLES & SITE MOCK UPS

The Contractor shall allow to provide samples of all proposed equipment to the Client team for approval prior to procurement.

The Contractor shall allow for installing a mock-up of all installations for review and approval by the Client team prior to full installation works commencing.

1.6 REQUIREMENTS

The contract covers the detailed design, supply, delivery, offloading, installation and services co-ordination, cabling, wiring, connecting, making off, testing, commissioning, handing over on completion in a satisfactory working order, removal

of all packaging, waste etc and replacement of all faulty parts during the defects liability period of all systems, items, parts, and apparatus specified in this Performance Specification.

The Contractor shall include for all works and materials allied and incidental, which are not explicitly specified, but which are necessary to complete the installation as a working whole.

By acceptance of the contract, the successful Contractor shall accept full responsibility for the successful operation of all the works specified herein.

Inclusion shall be made for transport of all materials, plant, and equipment to site, for all necessary off loading, unpacking, storage, and assembly. The Contractor shall pay for all associated charges for labour, freightage, and demurrage.

The Contractor shall, wherever necessary, pay all fees to designers, consultants, manufacturers, suppliers, inspectors etc. for attendance, installation, commissioning, and testing of any part of the building engineering services plant and / or items of equipment, included in this contract.

The Contractor shall allow in his tender for full liaison with and attendance by the Consultant in respect of:

- Inspection of workmanship and material standards
- Witnessing, testing, and commissioning including post fit-out works
- Review as-fitted drawings and operating and maintenance manuals
- Review of Tenant/Operator instruction in the day to day operation of the engineering services installation

Where Client Team approval is required a minimum of 10 working days consideration is to be allowed.

1.7 COORDINATION OF SERVICES

In order that the best use can be made of the space available for the disposition of services, it is of the utmost importance that the Mechanical and Electrical Sub-Contractors shall co-ordinate their work with the work of others carrying out installation works on the site.

The Mechanical and Electrical Sub-Contractors will be required to prepare such detailed construction drawings of the proposed positioning of plant and equipment as may be required to enable his work to be co-ordinated in the general construction of the building and to attend any meetings that may be called for this purpose.

The Main Contractor shall be responsible for final co-ordination of all the services and with other trades and building site constraints.

The Contractor shall ensure that the routing of pipework, ductwork, wiring, containment, and positioning of items of all equipment and building services do not obstruct or prevent the effective operation of any items of equipment installed by others. Claims for extras due to lack of liaison and/or co-ordination between trades will not be entertained.

Where non-accessible ceilings are provided i.e. plasterboard the electrical installation shall be re-wireable i.e. a loop in method of conduit provided or shall ensure sufficient access panels are provided to enable long term maintenance of the installation.

Where services are routed above areas of plasterboard ceilings the Contractor shall ensure sufficient access for maintenance to all mechanical and electrical installations is afforded. Thus, the Contractor shall detail, at an early stage, the provision of access hatches required.

All works shall be programmed and installed so as to cause no delay or hindrance to other trades.

All interfaces with the existing building fabric and steelwork for the support of building services shall be approved by the Structural Engineer prior to installation.

1.8 SITE INSPECTION & KNOWLEDGE OF WORKS

The Contractor shall visit the site during the costing period and shall be deemed to have gained all necessary information relating to the site, access, site conditions, positions and extent of all existing services which affect the contract works.

The Contractor shall be deemed to have examined and obtained an in-depth knowledge of and taken due cognisance (both financial and programming) of this Performance Specification, the drawings, schedules, main contract preliminaries, contract conditions and particulars, etc.

The Contractor shall have no claim because of want of, or lack of knowledge in any respect of this section of the works.

1.9 CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS

The Contractor is advised that the works will be carried out under the Construction (Design & Management) Regulations and shall make all necessary allowances as required under the said regulations.

To comply with Construction Design and Management Regulations the following are required:

- 1) A Certificate of Insurance, Health and Safety Policy and Method Statement.
- 2) Two Copies of the following for comment by the Engineer & Architect.
 - Builders work drawings.
 - Manufacturer's drawings and wiring details.
 - Schedule of Mechanical equipment, indicating types, rating etc.
 - Brackets and Steelwork drawings.
 - Working drawings for all areas of the works.
 - A written description of the proposed Mechanical installation.
 - Detailed schedule of rates.
 - Designers Risk Assessments.
 - All relevant calculations.

1.10 METHOD STATEMENTS

Method statements are considered an essential part of the contract.

On the award of the contract, the Contractor shall produce a schedule of method statements for discussion and agreement with the Design Team, together with a programme for their production. The schedule should include, but not be limited to:

- Delivery of major plant items
- Interface and connection to existing services
- Testing and commissioning of electrical services

Each method statement shall be given an individual number in the schedule and shall be typewritten and issued two weeks prior to commencement of the activity, for the evaluation/comment/approval. The method statement shall identify, in particular, future maintenance and access and shall not be generic.

1.11 MAINTENANCE

The plant shall be laid out in such a manner as to allow reasonable access for all maintenance without involving hoists; access platforms shall be provided in accordance with the manufacturer's recommendations and all current Health and Safety Legislation.

Installation of equipment shall be arranged to give ease of maintenance and subsequent removal of electric motors, thermostats, heat exchanger batteries, replacement of lamps, isolation of electrical circuits, or other equipment and of any other item to which it may be reasonably anticipated that maintenance would apply.

1.12 CALCULATIONS

The Contractor shall provide a single copy of all technical calculations for review and comment by the Consultant. Calculations shall be issued in a properly collated, fully indexed manner in electronic .pdf format and on paper.

Notwithstanding the review of the Contractor's calculations by the Consultant, the Contractor shall remain fully responsible for the calculations used to size equipment and systems.

All calculations shall be carried out using current versions of industry standard recognised computer software programmes e.g. Relux, Dialux, Cymap, IES, TAS, Bentley, Amtech. Interactive software copies of calculations shall be provided. The use of manufacturer's software is not permitted without prior agreement.

The Contractor shall provide all such information before the relevant work proceeds and allowing 10 working days for examination of calculations and drawings by the Consultant. The Contractor shall also allow within his programme for any modifications to the calculations that the Consultant may require as a result of the calculation examination process. The calculations shall demonstrate that the design criteria scheduled in this Performance Specification will be fulfilled.

Failure of the Contractor to submit his calculations in a timely fashion related to the contract programme and the information above shall not relieve him of his contractual responsibilities.

Calculations as below, as applicable but not limited to, shall be submitted for review by the Consultant:-

- Heat loss and gain calculations
- Domestic hot and cold water plant sizing
- Water storage calculations
- Pipework sizing calculations
- Pump / fan sizing calculations
- Ventilation rate calculations
- Ductwork, grille, and diffuser sizing calculations
- Acoustic attenuation

- Control valve sizing
- Expansion vessel sizing
- Estimated maximum demand calculations
- Containment sizing calculations
- Lighting levels for artificial illumination
- Emergency lighting levels for artificial illumination
- Full LV distribution and final circuit calculations
- Discrimination calculations
- Fire alarm audibility calculations

1.13 SELECTION AND INSTALLATION OF EQUIPMENT

The Contractor shall, as part of his contract:-

Ensure that installation and selection of equipment and services are done to the satisfaction of the Client Team.

All meters shall be located in positions that are easily accessed and readable by the Client.

All manufacturer's materials and products shall be supplied as specified. Alternatively, the Contractor may propose an equal and alternative, which must be of equal quality, performance, guarantee, aesthetic appearance etc. and must be approved by the Employer and Consultant prior to acceptance.

The tender must be based on the specified materials and products.

Alternatives must be identified at the time of tender. Once the contract is awarded, alternatives will only be considered where beneficial to the Client.

Technical submittals will be required to be provided by the Contractor for each item of proposed equipment or system, including specific manufacturer's literature and data sheets as well as a cover sheet with a detailed description of exactly what is proposed for approval by the Client Team prior to ordering.

Provide a list of all equipment and ancillaries selected for this contract in the form of schedules.

Schedules shall include:

- Reference
- No. of
- Location
- Equipment composition
- Area to be served
- Equipment make and model
- Physical size (mm x mm x mm)
- Weight (kg)
- Motor output (if appropriate)
- Duty (kW)
- Number of phases (if appropriate)
- Starting method (if appropriate)
- Electrical load (e.g. kW)
- Volume handled (litre/sec or m³/sec)
- Resistance (Pa or KPa or ohm)
- Anticipated time of delivery

Highlight all equipment with delivery periods longer than 3 weeks.

Ensure that the services penetrate structural elements only in those locations agreed with the Structural Engineer.

1.14 ACOUSTIC CRITERIA

The Contractor shall ensure all plant, fans, transfer grilles, attenuators are carefully selected to ensure compliance with the necessary criteria as specified within this Performance Specification and by the Client team.

All air transfer grilles shall be acoustically rated to achieve the specified design criteria.

Air velocities in ductwork shall be considered to limit regenerated noise. Noise control measures, in the form of in-line attenuators shall be included in the design of ducted

mechanical services to reduce the transmission of plant noise, regenerated noise and crosstalk between spaces.

Plant shall be vibration isolated from its supporting structure to control potential structure-borne noise.

Piped services design and pipework routing shall be carefully configured to limit regenerated noise. In sensitive areas this may require piped services systems to be installed within acoustic boxing or enclosures.

The Contractor shall allow for attendance post-completion during normal hours and out of hours to demonstrate different plant operation (all off and all at full capacity etc.) for acoustic testing to satisfy planning conditions.

1.15 BUILDERSWORK & MAKING GOOD

The Contractor shall carry out all items of builderswork in connection with the Building Services Installations.

The Contractor shall precisely locate positions of builderswork on to builderswork drawings and submit to the design team in good time, for acceptance in principle, prior to the builderswork being required.

Provide details and positions of all equipment requiring additional support from the building structure.

Prior to the Contractor making good chases/holes etc., the Contractor shall ensure all associated pipework, ductwork, wiring, containment systems and accessory boxes etc. are complete and satisfy the requirements of this Performance Specification.

Where the building construction necessitates bracket supports, etc., being plugged and screwed to backgrounds such work is to be included in the Tender.

All other builderswork including construction of bases, supports for storage systems and other equipment, the formation of openings and/or recesses, cutting away and making good, formation of trenches and pipe pockets, building in of pipe sleeves, brackets and anchors, etc., shall be carried out by the Main Contractor subject to the

submission of a fully detailed schedule of builders work required and all marking and setting out for building in pipe sleeves, brackets, etc., and for cutting of holes.

The positions of all holes, chases, etc., are to be approved by the Structural Engineer before any work is carried out.

Full builderswork details shall be submitted to the Contract Administrator for approval including drawings showing details of all bases, openings, flue entry positions, etc., throughout the building. Approval in principle of any builder's work drawings shall not exempt responsibility for accuracy or correctness. Any builders work carried out incorrectly due to faulty dimensions, details, setting out etc shall be re-executed by arrangement without any further cost to the Employer.

All interfaces with the existing building fabric and steelwork for the support of building services shall be approved by the Structural Engineer prior to installation.

1.16 AS INSTALLED DRAWINGS AND OPERATING & MAINTENANCE MANUALS

The Contractor shall produce As Installed Drawings and Operating and Maintenance manuals to the satisfaction of the Design Team. All O&M manuals shall be as part of the tender package.

The Manuals shall be prepared in accordance with the BSRIA Application Guide 1/87 "Operating and Maintenance Manuals for Building Services Installations" (Class D). A draft hard copy of the manual shall be issued to the Consulting Engineer for comment, 4 weeks before completion of the project.

1.17 BUILDING LOG BOOK

In order to comply with the requirements of the Technical Standards for Building Regulations Approved Document Part L Conservation of Fuel and Power in Buildings other than Dwellings, the Contractor shall include for a specialist company to undertake the compilation of the Building Log Book.

The specialist shall undertake the compilation for handover of the Log Book at practical completion of the works, which shall include obtaining all the relevant information from interested parties such as the Client and the Design Team.

The testing and commissioning results shall be provided by the relevant Sub-Contractor for inclusion in the document. Details of the design estimates for energy consumption and the meter strategy shall also be included.

1.18 CLIENT DEMONSTRATIONS

Operations of each system shall be demonstrated to the users/occupiers of the building. These demonstrations shall generally take the form of a presentation and answer forum and will take place at locations throughout the building applicable to the relevant systems. These demonstrations shall be supplemented with relevant extracts from the Operation and Maintenance manuals and shall be available at the presentation.

In addition to the demonstrations referred to above and prior to the practical completion date, the Contractor shall allow for a period of full and comprehensive training of maintenance and admin staff as required to familiarise them with the correct operation and the running of the equipment. Training shall be during normal working hours on site and shall be a minimum of, but not necessarily limited to, two days duration, allowance shall be based upon four non-consecutive visits, i.e. a ½ day per visit.

A full commissioning and training strategy is to be issued for Client agreement by the Contractor a minimum of 2No. weeks prior to practical completion.

In the event that approved manuals, As Fitted drawings and commissioning documents are not handed over on the contract completion date, the Contractor shall provide 24 hour maintenance cover for the MEP services until the approved handover documents and staff training is given.

1.19 COMPLETION AND DEFECTS LIABILITY

The Contractor shall be liable for making good defects on the installations for a period of 12 months from the date of issue of the Certificate of Practical Completion for the Installations or until the receipt of the certificate of making good defects is issued, whichever is the latter.

Where this period exceeds the Defects Liability Period stated in the contract documents for the Building Works, the Contractor will be required to indemnify the Employer against defects arising during the further period.

The Contractor shall upon receipt of notification of defects from the Client during the defects liability period carry out the works in the following time scale: -

- Ultra-emergency repairs Within 4 hours (including defects of essential plumbing, heating, electrical, water and drainage services required to maintain service operation)
- Emergency repairs Within 8 hours
- Urgent works Within 24 hours
- Non-emergency works 7 working days

Should the remedial works not be carried out in the stipulated time periods given above, they may be carried out by others and the costs deducted from the retention monies.

1.20 TECHNICAL QUERIES

Any queries from this Performance Specification should be raised with the Consultant during the tender period. Queries shall be issued in a properly collated, fully indexed manner in electronic .pdf and shall include a realistic response required date which shall be a minimum of 7No. days from the date of issue of the query and shall correlate to the contractors installation programme.

2 MECHANICAL SERVICES PERFORMANCE SPECIFICATION

2.1 SCOPE OF WORKS

The sub-contract works comprise the detailed design, supply and installation of the mechanical services listed below including supplying materials and products, delivering to site, off-loading, storing and transporting about the works, installing, testing and commissioning the completed installations, providing installation drawings and builders work drawings, "As Installed" drawings, diagrams and operating manuals, training Employer's personnel and carrying out obligations during the Defects Liability Period.

Prior to commencing work on site, the Contractor is to carry out a survey in order to ascertain the extent of the works required and identify any other services requiring modification to facilitate the proposed works to the building fabric and services outlined within this Performance Specification.

Fully designed, detailed, coordinated, dimensioned, set out, working installation drawings are to be produced by the Mechanical Services Sub-Contractor, coordinated with the Electrical Services Sub-Contractor, and issued for approval with at least 10 working days' notice before the Contractor starts on site.

Technical submittals will be required to be provided by the Mechanical Services Sub-Contractor for each item of proposed equipment or system, including specific manufacturer's literature and data sheets as well as description of exactly what is proposed for approval by the Consultant prior to ordering. In addition, samples will be required to be provided by the Mechanical Services Sub-Contractor for each item of proposed equipment for approval by the Consultant prior to ordering.

The works comprise the design and installation of the following mechanical engineering services as may be required to suit this refurbishment:-

- Survey
- Stripping out and removal of redundant systems, modifications to existing retained systems
- Detailed design
- Heating systems

- Mechanical ventilation systems
- Domestic hot and cold water services
- Above ground foul drainage (gravity and pumped as required to suit these works)
- Thermal and acoustic insulation
- Automatic controls and metering
- Fire and smoke dampers and controls
- Compliance with Building Regulations
- Acoustic treatment in connection with building services.
- Provision of fully designed detailed and co-ordinated working drawings prior to starting work on site.
- Provision of all builderswork information as required by the Main Contractor, including dimensioned drawings, and marking on site.
- Attendance at all necessary progress meetings etc.
- Provision of any necessary samples and / or mock up installations as required by the Client Team prior to the full installation works.
- All necessary secondary steelwork and supports required to support all services throughout.
- Testing and full commissioning of all systems
- Provisions of As Fitted Drawing information and Maintenance and Operating Manuals in accordance with agreed Health and Safety format.

This Performance Specification details the performance and specific requirements of the building services installations which will provide sufficient detail for the design and installation to be completed. The Contractor shall allow to visit site during the Tender period to investigate any site-specific queries they may have. It is imperative that the Contractor makes all necessary allowances within the tender return to fully coordinate the design and installation with all other trades and existing and proposed site constraints.

Any discrepancies between the design brief criteria, specification and any other tender documentation should be identified to the Consultant immediately during the tender period. The final decision regarding any discrepancies found once the Contractor is appointed shall be confirmed by the Client Team. The Contractor will not be entitled to make any additional claims for costs in this regard.

The Mechanical Sub-Contractor shall be responsible for the design and installation of any electrical power and controls cabling work associated with the mechanical services plant and controls system installations as described within the relevant clauses within this Performance Specification.

Details of the requirements for mechanical services power supplies shall be provided by the Mechanical Sub-Contractor during the tender period in sufficient time to allow the relevant costs to be included within the Electrical Sub-Contractor's tender.

All electrical systems will be installed by the Electrical Sub-Contractor including the electrical power works associated with the mechanical services plant. The Mechanical Sub-Contractor shall be responsible for the control wiring of all comfort cooling indoor/outdoor units, electric water heaters, local extract fans/units, heat recovery units, indoor/outdoor units, electric heating, meters, associated controls etc.

2.2 DESIGN BRIEF

The mechanical installations shall be carried out in accordance with the current requirements of the following legislation and guidance (and associated documents thereof):

- a) Local Authority and Building Control requirements.
- b) Building Regulations Approved Documents.
- c) Non Domestic Building Services Compliance Guide.
- d) British European Standard Specifications.
- e) British Standards.
- f) BCO Guidelines.
- g) "Good Practice in the Selection of Construction Materials" (2011: British Council for Offices).
- h) CIBSE Design Guides, Guidance Notes and Technical Memorandums.
- i) BS 7671 Wiring Regulations latest edition including all amendments.
- j) CDM Regulations.
- k) DDA Regulations.
- l) Water Regulations and Local Bylaws.
- m) Gas Regulations.
- n) HVCA guidance documents and specifications.
- o) LPC guidelines and specifications.

p) Electricity at Work Regulations.

In the absence of any specific design criteria values within the following sections, all criteria within CIBSE Guide A shall be adhered to.

2.2.1 SELECTION & INSTALLATION OF EQUIPMENT

The Mechanical Sub-Contractor shall, as part of this contract:-

Ensure that selection and installation of equipment and services fit within the spatial restraints as outlined on relevant drawings and descriptions in this Performance Specification.

Guarantee and ensure satisfactory access for maintenance of the mechanical services installation under this contract and shall not obstruct access for maintenance of other services provided under separate contract(s).

Ensure that installation and selection of equipment and services are done to the satisfaction of the Consultant.

2.3 DESIGN CRITERIA

Whilst designing the systems in compliance with the above documents and criteria therein, the Contractor is to also ensure the following specific design criteria are met:

2.3.1 DESIGN TEMPERATURES

Area	Summer	Winter
External	29°C (external heat rejection plant to be rated at 35°C)	-4°C, 100% Sat
Reception and waiting areas	N/A	21°C ± 2°C
W.C.s	N/A	18°C ± 2°C
Showers	N/A	21°C ± 2°C
Utility areas/Stores	N/A	16°C ± 2°C
Cycle Store	N/A	16°C ± 2°C

Area	Summer	Winter
Corridors	N/A	16°C ± 2°C
Stairwells	N/A	16°C ± 2°C

The following shall also be considered at part of the design process:

Item	Rate
Solar Gain	As calculated via software
Lighting heat gain	As dictated by lighting design or 10W/m ² whichever is the lesser
Small Power heat gain	25w/m ²
Metabolic Rate	CIBSE recommendations

2.3.2 VENTILATION

Area	Rate
W.C.s	6 litres per second per WC pan or urinal
Showers	15 litres per second per shower
Food and drink prep areas	15 litres per second
Changing Rooms	10 air changes per hour
Cleaners Stores	15 air changes per hour

The following shall also be considered at part of the design process:

Item	Rate
Main riser duct velocity	7.5 m/s & NR38
Main branch duct velocity	5.0 m/s & NR38
Secondary supply duct velocity from FCUs	2.5 m/s & NR30
Ductwork pressure drop	1 pa/m

Ductwork classifications shall be as defined in HVCA DW/144 for General Ventilation and HVCA DW/172 for Kitchen Ventilation Systems.

For a room with no openable window, the extract ventilation should operate both:

- while the room is occupied
- for a minimum of 15 minutes after occupants have left the room.

All filters shall be in accordance with ISO 16890 and EU7 standard. Filtration standards shall be:

System	Primary Filter	Secondary Filter
Amenity Facilities/Communal Areas/Retail Units	ISO Coarse 50%	ISO ePM1

2.3.3 NOISE

Noise levels emanating externally from plant located within or on the building will not exceed those levels set down by the Planning Conditions or Environmental Health Officer, based on plant operating 24hrs/day.

Noise criterion listed within the Acoustic Report (if applicable) take precedence over the values listed below. Cross talk attenuation shall be provided in toilets, changing areas, meeting rooms and where required to limit speech intelligibility.

Area	Rate
External	As dictated by planning requirements.
Reception and Waiting Areas	NR40
Stairwells and Circulation Areas	NR40
Toilets	NR45
Showers	NR45

See section 1.14 also.

2.3.4 DOMESTIC WATER SERVICES

The complete domestic water services systems shall be designed in accordance with BS8558:2015 and BS EN 806-3:2006.

Item	Rate
Loading Units	BS EN 806
Up to 54mm pipework velocity	1.25 m/s
54mm and over pipework velocity	1.5 m/s

All thermostatic mixing valves shall be installation in line with BS EN 1111 TMV3. Thermostatic balancing valves (Type A) shall be installed in line with BS 7350.

2.4 ENHANCED CAPITAL ALLOWANCE (ECA)

As part of the plant selection process the Mechanical Sub-Contractor shall wherever appropriate and possible select plant that conforms to the requirements of the ECA scheme. Specific verification and validation schedules shall be provided, to confirm whether ECA credits are available or not.

The use of equipment that is on the ECA list should only be undertaken where this does not detrimentally affect the Part L calculations.

2.5 SURVEY OF EXISTING SYSTEMS, RELOCATION WORKS & STRIPPING OUT

2.5.1 SURVEY

The Mechanical Sub-Contractor shall visit site during the tender period to ascertain the extent of stripping out work required. All costs associated with this shall be included within the tender return. No additional costs claimed by the Mechanical Sub-Contractor will be accepted on the basis that this was not carried out.

2.5.2 STRIPPING OUT

The Mechanical Sub-Contractor shall carefully isolate and remove from site all existing equipment and installations made redundant by the works.

The Mechanical Sub-Contractor shall fully survey the existing mechanical installations that are left to be removed prior to commencing any on site works. The Mechanical Sub-Contractor shall clearly establish the interfaces between the existing systems and the proposed systems, so the full extent of the works is clearly defined.

Any installations requiring stripping out and removal must be done so thoroughly and shall include all fixings and supports associated with the relevant installations.

Where existing services are stripped out, leaving damage to existing building fabrics that are not to be replaced, the Mechanical Sub-Contractor shall allow for making good to match the finish of the adjacent materials.

Refer to the enabling works drawings for indicative details of the stripping out requirements, additional stripping out may be required following removal of ceilings and further existing services tracing.

2.5.3 RELOCATION OF EXISTING

The Mechanical Sub-Contractor shall carefully isolate and relocate those existing services shown on the accompanying drawings as requiring relocation.

Out of hours working shall be allowed for all services isolations which affect other occupied areas of this building.

2.6 HEATING SYSTEMS

2.6.1 GENERAL

The Mechanical Sub-Contractor shall design, supply, install, set to work, test, commission and certify new heating systems to the building as may be required to suit these refurbishment works.

This section covers the areas heated via electric heating only.

2.6.2 ELECTRIC HEATING

Electric panel heaters are to be provided as may be required to suit these refurbishment works.

These shall be decorative type with local timeclock and thermostat control, with the facility to be locked off to prevent end user changes. These shall all be connected to the existing Building Energy Management System (B.E.M.S.) in addition for central control and override.

Data sheets and samples shall be provided of each type of heater for approval prior to placing full orders. Finishes shall be agreed with the Interior Designer.

2.7 VENTILATION

2.7.1 GENERAL

The Mechanical Sub-Contractor shall design, supply, install, set to work, test, commission and certify new and modified existing ventilation systems to suit these works including all connections, plenums, accessories and equipment that may be required to form a complete and fully functional installation to the satisfaction of the Design Team and in accordance with Part F of the Building Regulations.

All ventilation systems shall be installed and tested in accordance with the requirements of DW 144 and commissioned in accordance with the requirements of the CIBSE Commissioning Codes for air systems.

The Mechanical Sub-Contractor shall include all volume control dampers as necessary to satisfactorily balance the system. In all instances dampers shall be provided with access doors adjacent to the maximum size permissible by the ductwork, to afford full unrestricted access.

All plant and equipment shall be located to allow full and easy access from below either via the suspended ceiling, or via appropriately sized access hatches or panels in inaccessible ceilings as appropriate.

All ductwork within suspended ceilings shall, wherever possible, not be run over light fittings and shall be fixed with supports enabling the ductwork to be installed tight up to the underside of the structure over it, where possible. Tico pads and anti-vibration rubber mats/strips shall be installed between all exposed ductwork/fixings and the structure to prevent vibration noise.

The ductwork design and installation shall be galvanised steel to DW 144 throughout and shall fully consider the requirements of TR19 "The Guide for Good Practice for Internal Cleanliness of Ventilation Systems". The ductwork shall be installed to the intermediate standard. Access doors shall be installed either side of all ductwork components and at all changes in direction and at 10m centres on all systems.

For final connections from ductwork to grilles/diffusers the length of flexible connections shall be limited to 450mm. Any flexible ducts shall be secured to circular ductwork and grille spigots using jubilee, or worm screw connectors. No bends shall be formed using flexible ductwork.

All ductwork shall have identification applied in accordance with BS 1710.

All supply and extract primary ductwork, as well as supply ductwork and plenum boxes shall be fully internally thermally insulated. All supply diffusers are to be installed with acoustically lined plenum boxes, each with an internal equalisation plate.

Each indoor unit shall have all the filters replaced within the two days prior to handover. All filters shall be in accordance with ISO 16890 and integral to the air handling units unless stated otherwise. System Primary Filters shall be to ISO Coarse 50%; Secondary Filters shall be to ISO ePM1.

All fans and heat recovery units shall be installed via anti vibration mountings and flexible connections.

The Mechanical Sub-Contractor shall ensure that all services penetrations through construction shall be provided with the requisite installation frame or sleeve to allow the Main Contractor to build up to the respective service.

The Mechanical Sub-Contractor shall ensure that no ductwork is built directly into the structure.

The Mechanical Sub-Contractor is responsible to fully identify all builders work requirements to the Main Contractor, prior to construction including all holes through walls, penetrations, cavity barriers etc.

2.7.2 SUPPLY & EXTRACT VENTILATION

The Mechanical Sub-Contractor shall design and install extract ventilation systems as may be required to suit these refurbishment works. Dedicated extract systems shall provide a constant background ventilation rate with supply or make up air as required.

MVHRs shall have in duct attenuation as required to meet the noise requirements as detailed in the design criteria portion of this report.

MVHR units shall have a minimum heat recovery of 85% and have SFPs within the limits set by Building Regulations. Units shall be provided with adequate access for commissioning, unit removal and filter withdrawal. Condensate pipework shall be provided and shall be gravity fed to a suitable soil and vent pipe via a suitable trap.

The extract systems shall consist of individual extract air valves or grilles connected to a sheet metal ductwork system, run at high level / within ceiling voids, risers, and bulkheads. The ductwork shall be complete with attenuation, dampers, extract fans, controls and shall discharge the vitiated air to atmosphere.

Extract fans are to be controlled by timeclock control via the B.E.M.S.

Where the ductwork passes through fire walls, the integrity of the system needs to be maintained to match the fire separation. This is to be via fire or fire & smoke dampers to match the requirements of the fire strategy document.

Each air valve shall be provided with a separate volume control damper (VCD). VCDs shall be installed throughout as required to properly balance the systems. The location of VCDs shall be coordinated with the Architects ceiling details to allow fully access to them. Any access hatches required shall be limited to the bare minimum

and shall be fully coordinated with all other ceiling devices and details. Where the design of the IPS permits air valves can be installed within a fixed high level section, with the VCD located adjacent, to assist in limiting the number of access hatches required.

2.7.3 CONTROLS

The mechanical supply and extract ventilation installations shall be controlled automatically via the existing central Building and Energy Management System (B.E.M.S.) within the occupied hours.

Upon activation from the B.E.M.S., supply fans shall be enabled to maintain adequate air for occupancy.

Run/trip status shall be indicated on the main BEMS panel for all fans, heater batteries, filtration etc.

Extract ventilators in shower and sanitary accommodation should be capable of continuous operation.

For a room with no openable window, the extract ventilation should operate both:

- a. while the room is occupied
- b. for a minimum of 15 minutes after occupants have left the room.

2.7.4 FINISHES

Exposed fan coil units shall be powder coated prior to delivery to site, Interior Designer to confirm RAL colour. Prior to painting, these shall be appropriately bagged and protected to prevent any damage. All labels shall be covered and protected so these are able to be read during commissioning and so as not to affect the manufacturer's warranty.

All exposed ductwork shall be powder coated prior to delivery to site, Interior Designer to confirm RAL colour.

2.7.5 GRILLES & DIFFUSERS

The Architect / Interior Designer shall approve the style/type and confirm the RAL colours and finishes of all grilles, valves, diffusers, and louvres prior to the Contractor placing any orders. All shall have concealed fixings.

All extract grilles shall be of the adjustable air valve type, also with concealed fixings.

2.7.6 FIRE / SMOKE DAMPERS

Fire Dampers and associated controls systems shall be supplied by Actionair – Swegon Air Management Limited or equal and approved.

Fire (fire/smoke dampers where required) shall be installed wherever ductwork passes through fire compartment walls as determined by the Fire Strategy.

All fire and smoke dampers shall conform to BS EN15650.

Fire Dampers shall have a minimum 'E' Classification of 60 minutes or to match the integrity rating of the fire resisting elements, whichever is higher.

Fire and smoke dampers shall have a minimum 'ES' Classification of 60 minutes or to match the integrity rating of the fire resisting elements, whichever is higher.

Fusible Link Fire dampers shall not be used for extract ductwork passing through the enclosures of protected escape routes in accordance with Approved Document B. In this situation an ES classified fire and smoke damper which is activated by a suitable fire detection system must be used.

2.7.6.1 'E' CLASSIFICATION FIRE DAMPERS

CE Marked 'E' Rated Curtain Bladed Fire Dampers used to prevent the spread of fire maintaining compartmentation in internal normal dry filtered air systems.

FireShield CE Marked 'E' Rated Curtain Fire Dampers comprising of stainless steel folding curtain having unbroken moveable joints, stainless steel constant closure springs for positive closure and stainless steel peripheral gasketing. Housed in a fully welded galvanised spigotted casing suitable for square, rectangular, circular, or flat

oval connections, compliant to Class A & B of Eurovent Document 2/2 and Test Procedures for Class A, B & C of HVCA Ductwork Specification DW144.

The Self Resettable, Latching Removable Release Mechanism Cassette shall ensure closure of the stainless steel curtain under full fire conditions, the 'E' rated thermal fuse tested to ISO 10294-4.

One of the approved type of installation methods, IF (Installation Frame), DWFX-F (Dry Wall Fix Flange and Cleats) or DWFX-C (Dry Wall Fix Cleats) must be supplied factory fitted for inclusion into concrete / masonry walls & floors and dry wall partitions.

An external indicator fitted to the damper casing provides visual indication of blade position.

Dampers fully comply with the product standards: EN 15650:2010, fire tested to EN1366-2, classified to EN 13501-3 and in accordance with HVCA Guide to Good Practice for the Installation of Fire & Smoke Dampers DW145.

FireShield Dampers manufactured and supplied by Actionair – Swegon Air Management Limited.

2.7.6.2 'ES' CLASSIFICATION FIRE DAMPERS

CE Marked 'ES' Rated Opposed Bladed Fire Dampers used to prevent spread of fire and smoke maintaining compartmentation in internal normal dry filtered air systems.

SmokeShield PTC™ Proportional Torque Control, CE Marked 'ES' Rated Fire Dampers, include 75mm stainless steel aerodynamic interlocking opposed blades with synthetic seals with steel blade end bearings and peripheral gasketing. Housed in a fully welded galvanised 1.2mm spigotted casing suitable for square, rectangular, circular, or flat oval connections, compliant to Class A & B of Eurovent Document 2/2 and Test Procedures for Classes A, B & C of HVCA Ductwork Specification DW144.

The totally enclosed precise movement opposed blade drive shall be positioned out of the airstream.

One of the approved type of installation methods, IF (Installation Frame), DWFX-F (Dry Wall Fix Flange and Cleats), DWFX-C (Dry Wall Fix Cleats) or S&A (Sleeve and Angle) must be supplied factory fitted for inclusion into concrete / masonry walls & floors and dry wall partitions.

The Control Mode / Damper connection shall be by means of the snaplock™ drive interface mechanism, which is totally independent of the ductwork.

SmokeShield PTC™ CE Marked 'ES' Rated Fire Dampers with their appropriate Control Mode shall have spring Fail-Safe Closed operation only (with selected Control Mode M5 24V, M6 230V, M5-3P 24V) and associated patented Electrical Thermal Release which operates at 72°C, or if the power supply is off / interrupted). The unique & patented Electrical Thermal Release (ETR) incorporates a safety electrical interlock that only permits control mode operation when correctly fitted.

Dampers fully comply with the product standards: EN 15650:2010, fire tested to EN 1366-2, classified to EN 13501-3 and in accordance with HVCA Guide to Good Practice for the Installation of Fire & Smoke Dampers DW145.

SmokeShield Dampers manufactured and supplied by Actionair – Swegon Air Management Limited.

2.7.6.3 AUTOMATIC FIRE & SMOKE DAMPER CONTROL SYSTEM

Where ES classified fire and smoke dampers are required, the contractor shall install a suitable control system complete with control panel located in reception adjacent to the main fire alarm panel. The mode of operation can be either 24V or 240V as preferred by the Contractor.

Control panel shall be as detailed below or equal and approved. Where an alternative control system/manufacturer is used, the contractor shall submit a technical submittal demonstrating the alternative system is of equal technical capability or better.

2.7.6.4 ACTIONPAC EMS ELECTRO-MECHANICAL CONTROL PANEL (HARD WIRED CONTROL SYSTEM)

Actionpac EMS (Electro Mechanical) Control Panel typically consists of the appropriate number of switches to provide individual or group control, LED indication

for status monitoring and all necessary relays and timers to comply with the customer's needs for fully or semi- automatic damper operation.

Interface with the Fire Alarm panel is via volt-free contacts which are normally closed and open upon alarm, the Actionpac EMS damper control panel will then activate relevant dampers to their alarm status. EMB Damper Control Panels are purposely manufactured suit specific requirements / cause and effects.

Actionpac EMS panels can be utilised and are of a standard construction for the control and monitoring of Mode 5 or Mode 6 PTC damper actuators in groups of 15 or 30 on printed circuit boards. Each group of 15 dampers are controlled and monitored via separated PCB's, these will be numbered PCB 1 for dampers 1 to 15 and where fitted, PCB 2 for dampers 16 to 30.

Actionpac EMS Control System as supplied by Actionair – Swegon Air Management Limited.

2.8 DOMESTIC WATER SERVICES

2.8.1 GENERAL

The Mechanical Sub-Contractor shall design, supply, install, modify, extend, test, commission, chlorinate, flush, and set to work a domestic hot and cold water services installation generally as this Performance Specification and as may be required to suit these refurbishment works.

Pulsed output water meters shall be supplied and installed by the Mechanical Sub-Contractor for each new individual tea point, W.C., and shower block demise cold water service connection.

The Mechanical Sub-Contractor shall fully consider the pressure drop across all new sanitary ware, taps, waste water heat recovery shower trays, fixtures, and fittings etc as part of the design.

Pressure reducing valves shall be provided at every floor level and on branch connections where necessary.

All outlets are to be fitted with service valves. Drain cocks to be installed at all low points.

The Mechanical Sub-Contractor shall ensure that no dead legs are left within the existing and new domestic water services installations following these refurbishment works.

The Mechanical Sub-Contractor shall be responsible for the final connection of the water pipework to all outlets, each with service valves.

All domestic water services internally shall utilise light gauge copper tube to BS 2871: Part 1 Table X with copper ancillary fittings to BS 5864.

All domestic services pipework and fittings visible in areas with applied finishes shall be matt black finish, or painted to match the walls, with matching suitable fixings and cover plates where entering walls and partitions as required by OBI Property Interior Designer.

All concealed pipework passing through walls, ceiling, floors, or boxing in shall be fitted with white plates. All exposed pipework passing through walls and floors shall be fitted with sleeves made from similar material and finish to the pipework, i.e. matt black or finish as required by OBI Property Interior Designer.

2.8.2 METERING & SUB-METERING

New pulsed output water meters shall be installed, linked to the existing Building Energy Management System (B.E.M.S.), on the main incoming water supply and each new demise water supply. This shall include new WCs, showers, kitchenettes, tea points etc.

2.8.3 HOT WATER

Hot water is to be supplied by new electric cylinder. This cylinder shall be sized to fit into an area of reduced head height and through a small doorway, dimensions of which are indicated on the accompanying drawings.

The cylinder shall be complete with all necessary safety devices, expansion vessels, pressure temperature relief valves, pumps etc. The cylinder shall be located so it is as readily accessible in a position to be agreed with the Architect / Interior Designer. The design of the water services pipework serving the heaters shall be installed as the manufacturer's recommendations for thermal expansion and water pressure.

Hot water distribution pipework shall be routed to serve all connected appliances. All hot water services distribution pipework shall be insulated where routed within floor voids, ceiling voids, service risers, exposed within Basements etc. to minimise heat loss for the pipework.

The hot water supply shall be blended to a safe discharge temperature by the electric water heater and local thermostatic mixing valves shall not be required. Each wash basin will be provided with a mixed (43°C) water supply and a cold water supply.

2.8.4 COLD WATER

The Mechanical Sub-Contractor shall allow to design and install modifications and extensions to the existing domestic boosted cold water services installations as may be required to suit these refurbishment works.

All existing and new pipework shall be chlorinated prior to connections for new installations being made.

Trace heating and pipework insulation shall be installed to all pipework within unheated areas as may be required.

A minimum of 1.5 Bar is required at each sanitary appliance to ensure adequate flow. The pressure is at flow conditions NOT static closed head.

New solenoid shut off valves and sub-meters shall be installed to all showers, WCs, tea points, kitchens, water refill stations etc. as part of these works. These shall be linked to the BEMS.

2.9 ABOVE GROUND DRAINAGE

2.9.1 GENERAL

The Mechanical Sub-Contractor shall design, supply, install, modify, extend, test and commission an above ground drainage installation to allow for the installation of all sanitaryware, as indicated on the accompanying drawings, and as required to provide a complete and fully functional above ground drainage system to suit these works. Due allowance shall be made within the tender for the connection of all sanitary ware, as indicated on the Architect's / Interior Designer's drawings and schedules.

Where gravity drainage installations are not possible due to site restrictions, the Mechanical Sub-Contractor shall include within their tender for pumped drainage installations.

The primary foul drainage system shall be sized using the discharge unit method as defined within BS EN 12056-2:2000 for System III (United Kingdom). The soil and waste water flow rates shall be calculated using a suitable frequency factor.

All above ground drainage systems shall be installed in line with the requirements of this Performance Specification.

The above ground disposal system shall be installed to comply with all statutory and local authority regulations with particular reference to the following:

- BS EN 12056-2000 Parts 1 to 5 inclusive for sanitary pipework and rainwater pipework.
- Building Regulations, Approved document H
- The Plumbing Engineering Services Design Guide compiled and published by the Chartered Institute of Plumbing & Heating Engineers
- The requirements of the Environmental Health and Building Control Officers.
- Manufacturers' written instructions for installation and testing.

All reference documents shall be the current editions.

The soil, waste and ventilating systems shall be installed in accordance with the Regulations of the Local Authority and Sewerage Undertaker. Where these are found to be at variance with any clause in this Performance Specification immediate notice must be given to the Engineer.

Main routes for soil, waste and vent stacks shall be located in order to accommodate the provision of toilet facilities and all other items of sanitary ware, sanitary appliances, mechanical plant, and any other items of equipment/appliances which require a connection to the foul and/or waste drainage system.

The foul drainage installations shall include all branch ventilation and waste pipework including all appropriate traps and their water seal. The routing of such pipework shall be within general vertical service ducts and horizontal service voids, although it is accepted that by the nature of the service requirements, separate singular routes may be required located adjacent to structural columns or other surface mounted encasements, and the like in order to maintain gravity discharges.

All discharge and ventilation pipework shall be air tested at agreed stages and on completion of the installation to ensure compliance with the requirements of the Building Regulations and BS EN 12056-5:2000.

All vertical soil stacks shall be acoustically treated to achieve the maximum noise level ratings as stated elsewhere in this Specification and in compliance with the requirements of Building Regulations Document E.

2.9.2 WASTE WATER HEAT RECOVERY (WWHR)

The Mechanical Sub-Contractor shall allow to design, supply, and install new waste water heat recovery from shower systems.

2.9.3 PIPEWORK MATERIALS

The above ground sanitary pipework systems shall be matt black finish where exposed including all pipework supports and brackets, or as listed below where concealed and installed using the following materials, unless otherwise indicated elsewhere.

- Soil and vent stacks (SVPs) shall be uPVC

- Vent pipes (VPs) and anti-siphon pipes (AS) shall be uPVC
- Branch waste pipes (WPs) shall be MuPVC
- Condensate drainage shall be uPVC

MuPVC Pipework

Pipes, fittings, and accessories: MuPVC to BS 4514 and BS EN 1329, Kitemark certified.

Manufacturer and reference: Polypipe Terrain Limited or equal and approved.

Size(s): 32mm -160mm diameter

Colour: White / Black

Method of jointing: All pipework fittings shall be socket and spigot solvent welded joints with the facility of forming expansion joints via seal ring adapters.

Method of fixing: As manufacturers recommendations at centres specified elsewhere in this Specification.

PVCu Pipework

Pipes, fittings, and accessories: PVCu to BS 4514 and BS EN 1329, Kitemark certified.

Manufacturer and reference: Polypipe Terrain Limited or equal and approved

Size(s): 82mm -160mm diameter

Colour: Grey

Method of jointing: All pipework fittings shall be socket and spigot solvent welded joints with the facility of forming expansion joints via seal ring adapters.

Method of fixing: As manufacturer's recommendations at centres specified elsewhere in this Specification.

2.9.4 PIPEWORK INSTALLATION

Systems shall be installed using minimum pipework and fittings necessary to convey all foul discharge, from the building to the below ground drainage system, quickly, quietly and without nuisance or risk to health. It is essential that air from the discharge pipes be prevented from entering the building.

Pipes shall be installed true to line and to a consistent gradient.

Adequate supports shall be provided on all branches and at changes in direction in accordance with the specified manufacturer's requirements or as stated elsewhere or shown on the drawings (the most stringent shall apply).

No offsets shall be included in the wet portion of the vertical stacks, except where indicated on the design drawings, or which may occur within the ventilating section of the stack. Stack offsets shall incorporate pressure relief ventilation as described within BS EN 12056-2:2000 clause ND.3.5.4 and as shown on Figure ND.7. The requirement for any additional offsets shall be agreed with the CA.

Use only swept bends and branches in direction of flow at all connections. Lobster back or mitre joint bends and branches will not be accepted.

Branch connections between vertical soil stacks and suspended horizontal drainage shall be formed using a 450 branch and 450 bend in the direction of flow.

Form junctions using fittings intended for the purpose ensuring that the jointing material does not project into bore of pipes, fittings, and appliances.

All vertical pipework shall be set true to line and carefully aligned before jointing.

Where appropriate, outlets from WC pans shall connect into the WC floats utilising a branch manifold system. These shall be installed in accordance with the requirements of BS EN 12056-2:2000, and the manufacturer's instructions. Telescopic/flexible WC pan connectors shall not be permitted.

All WC soil floats shall be installed to prevent cross flow between appliances.

Upstream ends of WC floats shall turn through 90 degrees and terminate above the spill level of connected WC pans with a removable access cap.

Branch pipework shall be installed in accordance with the requirements of BS EN 12056:2, Table 6 Limitations for unventilated branch-discharge-pipes, system III and Table 9 Limitations for ventilated branch discharge pipes in system III.

Gradients of branch soil and waste pipes shall as be stated on the drawings but in any case, not less than:

- a) 150mm dia – 1 in 80
- b) 100mm dia – 1 in 60
- c) 75mm dia and below – 1 in 50

Discharge is conveyed without cross flow, back fall, leakage, blockage or siphonage.

Exposed pipework shall be installed to a high standard, being true to line, with adequate support brackets and fixings.

The system shall be installed to be adequately tested, cleaned, and maintained.

All components for each type of pipework shall be from the same manufacturer unless specified otherwise.

Cut ends of pipes shall be clean and square with burrs removed.

Lubricant for pipework to be jointed with elastomeric ring joints as recommended by the pipework manufacturers.

Use only the fittings specified and the method of jointing specified by the manufacturer.

Jointing materials must not project or flow into the bore of pipes and fitting. Wipe off surplus material immediately after completion of a joint.

Avoid contact between dissimilar metals and other materials which would result in electrolytic corrosion.

Prevent entry of foreign matter into any part of the system by sealing openings during construction.

Fit all access covers and cleaning eyes as the work proceeds.

2.9.5 VENTILATING PIPEWORK

Ventilating pipework shall be provided to limit the pressure fluctuations within the discharge pipe system.

To ensure the functioning of the drainage system and sewers, ventilation shall be provided.

The top of open stacks shall terminate outside the building structure and be positioned where odours and vapours from the system will not enter the building. Ventilating pipes shall only serve the drainage system. Where air admittance valves are used, they shall be installed in accordance with national and local regulations and practice.

Ventilation and anti-siphon pipework shall be installed with continuous self-draining falls back to the branch discharge pipe system. All ventilation and anti-siphon pipework shall be installed with a minimum gradient of 1 in 200 (5 mm/m).

Main branch ventilating pipes are to run above spill-over level of fitments except where shown. Where connected to main discharge pipe/stack, connect at a joint above spill-over level of the highest fitment connected to the main discharge pipe.

Branch ventilating pipes shall be connected to the discharge pipe within 750mm of the trap and should connect to the ventilating stack or the stack vent above the highest spill over level.

Branch venting back to the wet portion of the stack will not be allowed.

2.9.6 AIR ADMITTANCE VALVES

The installation of AAVs is permitted subject to approval from the Consultant Engineer where isolated items of sanitary ware/appliances are in positions where a dedicated ventilating pipework system is not practical due to pipework routes or if the structure does not permit.

AAVs shall not be the primary method of ventilating the above ground drainage system, a dedicated ventilation system which discharges to atmosphere shall be provided.

In all installations, stacks should not be fitted with the valves when the connecting drain(s) are subject to periodic surcharging or are fitted with intercepting traps. An open-topped discharge stack or ventilating stack should be used in such systems.

Valves shall be installed within the building, preferably in a freely ventilated non-habitable space such as a duct or roof, or externally to the building where they are protected from dust and insects, and easily accessible but not likely to be subject to interference from vandals.

110mm, 82mm, 50mm, 40mm and 32mm air admittance valves may be installed for use in the above ground drainage systems and the selected valve shall be manufactured to meet the performance requirement of BS EN 12380: 2002, Class A1.

110mm and 82mm valves are for use on soil stacks serving buildings up to five storeys high.

50mm, 40mm and 32mm valves are for use on branch discharge pipes.

2.9.7 ACCESS POINTS

Access points shall be provided to facilitate access for inspection, testing, and maintenance.

Access fittings shall be provided on all above ground drainage pipes, in accordance the requirements of BS EN 12056-2:2000 and The Building Regulations and in the following locations:

- a) Soil/Stub stacks - 1200mm above FFL, or 150mm above the highest connected fitting spill-over level, whichever is appropriate.
- b) At critical changes of direction
- c) At the head of all horizontal soil and waste branch pipes.
- d) The upstream end of horizontal pipework
- e) Access points for testing and cleaning purposes

- f) Provide access/inspection door 1200mm above all finished floor levels on all soil and waste stacks and at intermediate floor levels on each ventilating stack.

Locate access points to allow use of cleaning equipment or the insertion of testing apparatus.

Where located in ducts allow adequate clearance for other services accommodated in the duct and to allow safe working space.

Fit all access doors/covers and cleaning eyes as work proceeds.

Access points shall take the form of proprietary bolted or screwed fittings with seals.

Access plates shall have fluid tight gasket seals integral with the cover and shall be proof against leakage. They shall be of sufficient size to allow entry and withdrawal of cleaning rods. They shall be positioned so as to allow sufficient working space for maintenance personnel to open and close them.

Removable access panels (as detailed by others) shall be required and co-ordinated with drainage access points, to enable inspection and maintenance.

2.9.8 TRAPS & CONNECTIONS TO SANITARY APPLIANCES

Provide two-piece tubular or bottle type trap of the appropriate size immediately beneath fitting/appliance.

All traps shall be manufactured to meet the minimum requirements as set out in BS EN 274

All traps other than the WC shall have a 75mm deep water seal unless indicated otherwise.

WCs shall have a 50mm deep water seal.

All traps up to and including 75mm diameter shall have a coupling nut on the inlet and a compression type joint on the outlet to facilitate easy removal of the trap for access.

The joint between the waste outlet and appliance shall be bedded in waterproof jointing compound and fixed with a resilient washer between the appliance and waste outlet back nut.

The joint between WC pans and soil pipe shall be via BS 5627 flexible connector with a minimum 5° angle installed in accordance with the manufacturer's recommendations.

Make the final connections between the sanitary appliances and soil pipe / trap.

Where indicated on the drawings, sanitary schedule or directed by the CA, provide chromium plated traps or finish to be agreed with Interior Designer.

Traps shall be selected based on the above requirement to prevent sewer gases and foul odours from the drainage system entering the building.

2.9.9 WATERLESS TRAPS

All waterless traps shall be manufactured to meet the minimum requirements as set out in BS EN 274

Where it is determined that a conventional waste trap is not suitable for installation due to the possibility of the water seal being broken through evaporation or siphonage, to prevent foul air from the drainage system entering the building a waterless trap shall be installed.

The valve can be fitted vertically or (with an elbow adaptor) horizontally, directly to sinks, basins, shower trays and baths.

Discharge from unvented domestic hot water storage systems using combined temperature and pressure relief valves may discharge through a waterless trap.

Where used for this purpose the discharge arrangement must be in compliance with the requirements of Building Regulations and must discharge via a tundish. The discharge from the tundish must run independently to the stack, without linking to

any sanitary appliance, although up to six discharge pipes may be connected via a single branch pipe. There should be a safe and visible discharge point.

Typically, the waste pipework between the tundish and the vertical stack should be in copper, however plastic pipework can be used. Where plastic pipework is to be installed between the valve and the soil stack it should be piped in polypropylene to BS 5254. The soil stack should be in PVC-U to BS 4514 or BS EN 1329.

Condensate pipework from air-conditioning units discharging to sanitary pipework should be provided with a trap to prevent foul air entering the building. Where this is not provided by the manufacturer, use of a self-sealing valve will prevent the problems associated with water-filled traps drying out during periods of non-use.

2.9.10 ELECTRICAL CONTINUITY

All metallic soil and vent pipe systems shall incorporate jointing couplings which shall automatically provide electrical continuity when assembled.

Tests shall be carried out to ensure that continuity is in accordance with BS 7671, and as stated elsewhere.

2.9.11 FIRE SLEEVES FOR PVC PIPEWORK

Where required pipe sleeves shall be installed on sanitary pipework where it passes through a fire compartment wall or floor. The space between the pipe and the sleeve shall be completely filled and sealed both sides, with a certified fire resisting material having a performance equal to the fire rating of the structure.

Plastic pipes of 40mm and above outside diameter shall be fitted with an intumescent fire collar where they pass through a fire compartment floor or wall. They shall be secured to the building fabric using metallic fixings and screws. They shall be installed strictly in accordance with the manufacturer's written instructions.

All fire sleeves shall be installed strictly in accordance with the manufacturer's instructions.

Materials shall be BBA certified and conform to relevant British Standards.

Fire Collars shall be Selkent Sure Snap range, or equal and approved.

2.9.12 THERMAL EXPANSION

Thermal movement shall be accommodated in pipe runs in accordance with the pipework manufacturer's recommendations using fittings designed to accommodate thermal movement.

The fittings shall be securely anchored to the building structure in accordance with the manufacturer's recommendations. Fixing details and locations shall be approved.

2.9.13 PIPEWORK PROTECTION

During the installation and at all other times during the course of the contract care shall be taken to prevent any foreign matter or general debris entering the system(s). This shall be achieved using purpose made plugs, caps or flanges temporarily fixed in position to avoid unauthorised removal. Makeshift stoppers of paper, wood or other material shall be used for this purpose.

If the installer does not sufficiently satisfy the Engineer that the system has been adequately protected to prevent blockages/obstructions it may be deemed necessary to undertake a CCTV survey to demonstrate unobstructed flow within new and existing pipework at no cost to the contract.

Any remedial work necessary to clear blockages or obstructions shall be undertaken at no additional cost to the contract.

2.9.14 PIPEWORK IDENTIFICATION

The internal above ground foul pipework system shall be identified in compliance with BS 4800 and HSE requirements.

Vertical pipework shall be identified adjacent to access pipes. Horizontal pipework in ceiling voids etc. shall be identified at 3000mm maximum centres and at all changes of direction.

2.9.15 PIPEWORK SUPPORTS

Pipework supports shall be provided and installed in accordance with manufacturer's written instructions.

Multiple pipe supports for pipes of differing sizes shall be spaced at intervals required for the smallest pipe.

Suspended type pipe hangers shall be constructed and assembled in accordance with BS 3974-1.

The type of pipe hanger clip or hoop used shall be selected according to the application. Special provision shall be made in instances where the piping of tubing is subject to axial movement due to thermal expansion and/or contraction.

Where individual fixings require cutting for and building into the building structure, the installer shall arrange for positions to be marked out for approval before cutting out and fixing commences.

Contact between dissimilar metals must be prevented. Cast iron piping shall have steel supporting members actually in contact with the pipe.

Socket-less pipe systems shall be supported adjacent to every joint using brackets supplied by the pipe manufacturer at centres and fixings in accordance with the manufacturer's recommendations. Three metre lengths shall have a minimum of two brackets. Long sections of drains shall be laterally braced to the structure with angle section mild steel, to prevent horizontal movement.

Angle section mild steel thrust brackets shall be fitted at vertical bends to prevent axial movement of suspended pipes.

Pipes in shafts shall be fixed with two-piece ductile iron holderbats, bolted together with sheradised steel bolts and nuts, and secured to shaft walls using expansion anchor fixings and plated bolts and washers.

Exposed pipework fixed to walls in occupied areas shall be supported using the manufacturer's standard fixing system which shall be approved prior to installation.

Fixing screws, nuts, bolts, and support rods shall be steel with a galvanised or sheradised finish.

Brackets for suspended pipework shall be proprietary steel pipe rings supported on threaded rod fixed to the slab above. Alternatively, horizontal channel/angle iron suspended on threaded rod fixed to the slab above may be used, with pipes secured to the channel/angle iron with proprietary pipe bracket.

Pipework systems shall be installed and fixed so as to effectively withstand surcharge to 3 metres above ground floor slab level unless otherwise specified.

2.9.16 SANITARY FITTINGS

For details of all sanitaryware and appliances refer to the Architects / Interior Designers sanitaryware specification and schedules.

2.9.17 SOIL, WASTE & VENT PIPE ROOF TERMINATION

Soil and waste vent pipes shall terminate at roof level not less than 900mm above the top of and 3 metres horizontally from any openable window or air intake. The pipes shall be complete with a proprietary roof connector, complete with weathering apron, and shall be fitted with a plastic coated wire guard or cowl.

2.9.18 TESTING & COMMISSIONING

Carry out all tests and inspections to prove that the installation meets with the requirements of the Building Regulations and British Standards including BS EN 12056 Code of Practice for Sanitary Pipework.

The installer shall carry out all tests required by the District Survey or Building Control Officer giving adequate notice with regard to timing of tests etc.

The installation shall be inspected and tested at agreed stages to ensure that the pipework is properly secured and clear of obstructing debris, and superfluous matter, and that all work which is to be concealed is free from defects before it is finally concealed.

Site Tests and Inspections

Unless otherwise specified the installer shall provide an air test to the sanitary pipework equal to 38mm water gauge upon completion of each section.

Pipes shall be tested in the presence of the Main Contractor or their approved representatives.

All pipework shall be visible at the time of testing.

Testing for Soundness

Testing for soundness shall apply to every individual stack including branches and fittings attached to the associated stack. The top of the stack shall be its uppermost limit i.e. roof outlet or vent, and bottom limit shall be the entry to underground drainage.

Before testing stack pipes, they shall be cleaned thoroughly as follows:

- 1) Traps for all appliances and floor gullies shall be plugged and flushed out thoroughly with clean water
- 2) Main stack pipes and branches shall have duct covers and ceiling tiles removed where necessary
- 3) Access covers, cleaning and rodding eyes shall be removed, and the stacks rodded by means of drain rods or similar flexible springs and plungers for a suitable diameter.
- 4) Obstructions in pipes shall be removed using suitable cleaning tools.

Care should be taken in carrying out the foregoing operations to see that deposits and other extraneous matter are removed and not flushed into the drainage system.

The cleaning operations shall be carried out in presence of the Main Contractor so as to be assured of the cleanliness of the system.

Testing of all stack pipes and branches, including gullies and all fitted appliances, shall be by air to a pressure equal to 38mm water gauge which shall remain constant for three minutes.

Water tests may be requested for but shall only apply to the horizontal runs of plumbing and drainage, and the drainage section including pipework below the lowest sanitary appliance.

This test shall be carried out by inserting a plug in the lowest end of the pipe where it enters the inspection chambers and filling system up to flood level of the lowest sanitary appliance or 6m head, whichever is the lower.

Before commencing air tests all water seals of all sanitary appliances and floor gullies must be fully charged with water and all open ends of pipes, i.e. vents and outfalls must be plugged off.

Remedial works found to be necessary at this stage are to be carried out at no cost to the contract. If the Main Contractor is not satisfied further tests and cleaning, the nature and extent of which shall be specified, shall be undertaken at no cost to the contract.

Testing and Performance

Pressure fluctuations in pipework shall not vary by more than ± 38 mm water gauge and traps retain a water seal of not less than 25mm.

The number of appliances to be tested shall be as detailed in BS EN 12056-2:2000 Table NG.1.

The tests shall be carried out under supervision of the Main Contractor with all necessary facilities being provided.

Upon completion of satisfactory testing to each and every stack pipe, branch and appliance, all duct covers should be re-fixed and ceiling tiles replaced where necessary.

The installer shall include for intermediate testing where work is to be concealed by other installations. Should final tests reveal defects with any concealed pipework the costs of all necessary works to rectify the defects shall be at the installer's expense and at no cost to the contract.

Final tests shall be made upon completion for soundness and performance and shall be witnessed by the Main Contractor or his/her representative.

Test Certificates

A test certificate shall be submitted following successful testing of the pipework.

Test Certificates shall include as a minimum the following information:

- 1) Project name:
- 2) Name of installer
- 3) Section of pipework under test:
- 4) Nature of Test
- 5) Air
- 6) Pressure
- 7) Time duration
- 8) Statement of compliance with the specification with respect materials, installation requirements and standards
- 9) Signatures of installer's representative
- 10) Signature of a witness:
- 11) Date of test
- 12) Comments with respect the testing and installation
- 13) Record Drawings

The installer shall retain on site a marked-up set of drawings showing the "as installed" routes, sizes gradients, invert levels, access locations etc. as a minimum of the foul drainage above ground system. Prior to completion the information shall be used to prepare the record drawings as stated elsewhere in this Specification.

2.10 AUTOMATIC CONTROLS

2.10.1 DOMESTIC WATER

The B.E.M.S. shall control and override local settings of the hot water heating.

New solenoid shut off valves and sub-meters shall be installed to all showers, WCs, tea points, kitchens, water refill stations etc. as part of these works. These shall be linked to the B.E.M.S.

2.10.2 HEATING

The B.E.M.S. shall control and override local settings of the new and existing heating installations.

2.10.3 GENERAL VENTILATION

A fault output shall be provided to assist the facilities management company.

The filters supplied as part of the supply system shall be provided with a differential pressure switch to give remote indication on the local controller of filter dirty condition. The wiring of these sensors is to be by the controls specialist.

If there is a smoke activation a signal will be sent to the Fire Alarm Control Panel by the fire alarm system.

All ventilation plant shall shut down on activation of the fire alarm.

2.10.4 SUB-METERING

The BACnet controller shall be programmed to accept a volt free pulse from all new sub-meters installed to showers, WCs, tea points, kitchens, water refill stations etc. as part of these works.

2.11 BUILDERSWORK

The Mechanical Sub-Contractor shall undertake all builderswork requirements to facilitate the installation of the services described within this Performance Specification as previously described within Section 1, and as shown on the accompanying drawings.

The Mechanical Sub-Contractor shall produce detailed and dimensioned builderswork drawings and accompanying schedules.

The Mechanical Sub-Contractor shall provide all builderswork information associated with his installation to the Main Contractor in a manner and to a timescale to suit the Main Contractors requirements.

Additionally, any openings, holes, penetrations etc below 50mm diameter shall be carried out and made good by the Mechanical Sub-Contractor.

2.12 TESTING & COMMISSIONING

2.12.1 GENERAL

The whole of the installation and systems covered by this Performance Specification shall be fully tested and commissioned prior to completion.

All major items of equipment e.g. condensers, AHU's, etc., shall be commissioned by the equipment manufacturer, or his appointed agent, and set to work in the manner intended.

The entire mechanical installation shall be tested and commissioned in accordance with the requirements of the CIBSE and BSRIA Commissioning Codes, Guides, Technical Notes, and manufacturer's literature.

In unusual cases where such recommendations are at variance with the basic principles of the documents above, the approval of the Consultant must be obtained in writing regarding the procedure to be employed.

In general, however, the manufacturer's literature and recommendations shall be considered complementary and/or supplementary and shall be incorporated into the basic methods set out in the above documentation.

The Mechanical Sub-Contractor shall commission the mechanical services in the following sequence:

- Visual inspection of each service installation (including within service ducts and suspended ceilings) and completion of the appropriate inspection certificates.
- Test all distribution systems in accordance with requirements of CIBSE Commissioning Codes, HVCA Guides, and British Standards applicable to the equipment in question.
- Commission the mechanical equipment and systems, making all necessary adjustments to achieve the design performance requirements. Complete all completion certificates.
- The Mechanical Sub-Contractor shall hand over all inspection, test and completion schedules/certificates to the Consultant who will require the equipment/systems to be re-tested and commissioned in his presence. Once satisfied he will sign the certificates in the witness column. The Mechanical Sub-Contractor shall then send copies immediately to the Consultant for approval/comment.
- Snagging lists should be produced by the Consultant and Employers Agent. Defects should be cleared at the earliest opportunity. Once complete, the Mechanical Sub-Contractor shall send the defects list to the Consultant with the relevant items crossed off and signed.
- As Fitted drawings should be passed to the Consultant for inspection, together with the Maintenance Manuals.
- On completion of the above, the agreed systems and equipment shall be demonstrated to the Client. This will include instruction in accessibility, safe operation and maintenance procedures based on manufacturer's

recommendations. If the Mechanical Sub-Contractor cannot give a satisfactory demonstration, he shall include within his tender for specialists to carry out the demonstration on his behalf.

- The Mechanical Sub-Contractor shall produce a commissioning report detailing the services.

The Mechanical Sub-Contractor shall include and make full allowance for carrying out the balancing, commissioning, and setting to work all the installations as shown on the mechanical services drawings and described in the corresponding specification.

The Mechanical Sub-Contractor shall obtain from the relevant manufacturers prior to commissioning on site all current wiring diagrams for all electrical equipment associated with the plants being commissioned, including motor control circuit details and interlock arrangements.

The design data for items of plant and equipment is summarised in the specification. The Mechanical Sub-Contractor will develop, prior to the commencement of his work, a method statement detailing how he intends to commission the works. This method statement will be submitted to approval to the Consultant.

Equipment and commissioning schedules shall be completed by the Mechanical Sub-Contractor, during commissioning, indicating the design conditions, site test readings and observations.

Upon completion of final balancing and commissioning of the systems the Mechanical Sub-Contractor shall submit his test results in duplicate to the Consultant for approval, prior to witnessing.

The site test measurements shall not be approved by the Consultant until they concur with the design conditions.

Upon arrangement in writing by the Consultant of the test results, and observation that the systems are fully commissioned, the installation can only then be considered for acceptance and as being ready for handover.

The Mechanical Sub-Contractor shall then incorporate the approved equipment and commissioning schedules into the Operating and Maintenance instructions.

Should any of the tests show that the system or its components do not meet the specified requirements, and then these shortcomings shall be reported to the Consultant together with a report on the action that the Mechanical Sub-Contractor has taken to determine the cause of the problem. Reporting any shortcomings shall not relieve the Mechanical Sub-Contractor of the responsibility of determining the source of the problem.

Should the Mechanical Sub-Contractor consider that he cannot obtain repeatability or any test at particular locations due to site constraints, he must inform the Consultant, in writing, prior to the commencement of any commissioning, of these positions. In the absence of any such notice it will be assumed that the Mechanical Sub-Contractor has satisfied himself that the system can be regulated within the tolerances specified.

The Mechanical Sub-Contractor shall include for the complete testing and seasonal commissioning of the installation which must be to the completed in full accordance with all British Standards and CIBSE commissioning codes to the satisfaction of the Architect, Consultant and Employer.

The Mechanical Sub-Contractor shall give the Consultant a minimum of 10 working days' notice of his intention to carry out tests which shall be witnessed by the Consultant or his representative and shall carry out the testing and commissioning of the installation in sections, in advance of the final completion as may be necessary for technical purposes or to suit the construction and handover programme.

The adjusting and balancing of the system shall as far as possible be done without the building being occupied or the systems being subjected to a full climatic cycle. Final adjustment and balancing to meet a full climatic cycle shall take place during the Defects Liability Period.

A full commissioning and training strategy is to be issued by the Mechanical Sub-Contractor a minimum of 10 working days prior to practical completion.

3 ELECTRICAL SERVICES PERFORMANCE SPECIFICATION

3.1 SCOPE OF WORKS

The sub-contract works comprise the detailed design, supply and installation of the electrical services listed below including supplying materials and products, delivering to site, off-loading, storing and transporting about the works, installing, testing and commissioning the completed installations, providing installation drawings and builders work drawings, "As Installed" drawings, diagrams and operating manuals, training Employer's personnel and carrying out obligations during the Defects Liability Period.

Prior to commencing work on site, the Contractor is to carry out a survey in order to ascertain the extent of the works required and identify any other services requiring modification to facilitate the proposed works to the building fabric and services outlined within this Performance Specification.

Fully designed, detailed, coordinated, dimensioned, set out, working installation drawings are to be produced by the Electrical Services Sub-Contractor, coordinated with the Mechanical Services Sub-Contractor, and issued for approval with at least 10 working days' notice before the Contractor starts on site.

Technical submittals will be required to be provided by the Electrical Services Sub-Contractor for each item of proposed equipment or system, including specific manufacturer's literature and data sheets as well as description of exactly what is proposed for approval by the Consultant prior to ordering. In addition, samples will be required to be provided by the Electrical Services Sub-Contractor for each item of proposed equipment for approval by the Consultant prior to ordering.

The works comprise the design and installation of the following electrical engineering services, as may be required to suit these refurbishment works:-

- Surveys
- Detailed design
- Stripping out and removal of redundant systems, modifications to existing retained systems
- L.V. mains distribution

- Final circuit distribution boards
- Metering
- System wiring
- Earthing and bonding
- Containment systems
- Small power
- Mechanical services power supplies
- Internal lighting and controls
- Emergency lighting and testing facilities
- Fire alarm and detection system to BS5839-1:2017
- Cat 6 data system
- Wireless Access Points
- Door access control and intercom system
- PoE CCTV system
- Intruder Alarm System (if required)
- Combined disabled refuge & W.C. alarm system (EVC)
- Induction loop system (if required)
- TV and entertainment systems (if required)
- Electrical vehicle charging points (EV)
- Intruder Alarm/Dorr Monitoring System
- Bomb Alert System
- Electronic surge suppression
- Compliance with Building Regulations
- Acoustic treatment in connection with building services.
- Provision of fully designed detailed and co-ordinated working drawings prior to starting work on site.
- Provision of all builderswork information as required by the Main Contractor, including dimensioned drawings, and marking on site.
- Attendance at all necessary progress meetings etc.
- Provision of any necessary samples and / or mock up installations as required by the Client Team prior to the full installation works.
- All necessary secondary steelwork and supports required to support all services throughout.
- Testing and full commissioning of all systems
- Provisions of As Fitted Drawing information and Maintenance and Operating Manuals in accordance with agreed Health and Safety format.

This Performance Specification details the performance and specific requirements of the building services installations which will provide sufficient detail for the design and installation to be completed. The Contractor shall allow to visit site during the Tender period to investigate any site specific queries they may have. It is imperative that the Contractor makes all necessary allowances within the tender return to fully coordinate the design and installation with all other trades and existing and proposed site constraints.

Any discrepancies between the design brief criteria, specification and any other tender documentation should be identified to the Consultant immediately during the tender period. The final decision regarding any discrepancies found once the Contractor is appointed shall be confirmed by the Client Team. The Contractor will not be entitled to make any additional claims for costs in this regard.

The Electrical Sub-Contractor shall be responsible for the design and installation of any electrical power to mechanical services plant as described within the relevant clauses within this Performance Specification.

Any controls cabling work associated with the mechanical services plant and controls system installations shall be responsibility of Mechanical Sub-contractor.

Details of the requirements for mechanical services power supplies shall be provided by the Mechanical Sub-Contractor during the tender period in sufficient time to allow the relevant costs to be included within the Electrical Sub-Contractor's tender.

All electrical systems will be installed by the Electrical Sub-Contractor including the electrical power works associated with the mechanical services plant. The Mechanical Sub-Contractor shall be responsible for the control wiring of all comfort cooling indoor/outdoor units, electric water heaters, local extract fans/units, heat recovery units, indoor/outdoor units, electric heating, meters, associated controls etc.

3.2 DESIGN CRITERIA

3.2.1 GENERAL

The electrical installations shall be carried out in accordance with the current requirements of the following legislation and guidance (and associated documents thereof):

- a) Local Authority and Building Control requirements.
- b) Building Regulations Approved Documents.
- c) Non-Domestic Building Services Compliance Guide.
- d) British European Standard Specifications & British Standards.
- e) BCO Guidelines.
- f) "Good Practice in the Selection of Construction Materials" (2011: British Council for Offices).
- g) CIBSE and SLL Design Guides, Guidance Notes and Technical Memorandums.
- h) BS7671 Wiring Regulations 17th Edition including all amendments.
- i) CDM Regulations.
- j) DDA Regulations.
- k) Electricity at Work Regulations.

In the event of a contradiction between this Performance Specification and any British Standards or code of practice, the higher standard shall be adopted. Lighting levels will as a minimum comply with the CIBSE/SLL Code for Lighting relevant to the area to be illuminated.

All internal lighting specified will as an absolute minimum achieve 95 luminaire lumens per circuit watt.

3.2.2 SPARE CAPACITY

All design capacity must allow a minimum of 25% spare for future use. This criteria relates to all aspects of the electrical installation including but not limited to the following:-

- All containment systems: ladder rack, cable tray, cable basket and trunking systems.
- Panel board outgoing protective devices.
- Distribution board outgoing ways.
- Lighting circuits.
- Power circuits.
- Fire alarm panel.
- Fire alarm loop capacity

3.2.3 SELECTION & INSTALLATION OF EQUIPMENT

The Electrical Sub-Contractor shall, as part of this contract:-

Ensure that selection and installation of equipment and services fit within the spatial restraints as outlined on relevant drawings and descriptions in this Performance Specification.

Guarantee and ensure satisfactory access for maintenance of the electrical services installation under this contract and shall not obstruct access for maintenance of other services provided under separate contract(s).

Ensure that installation and selection of equipment and services are done to the satisfaction of the Consultant and the Interior Designer.

3.2.4 LIGHTING LEVELS

The recommended maintained illuminance levels are as follows and shall be used as general guidance, in conjunction with the illuminance levels listed within BS EN 12464:

Area	Average Maintained Illuminance	Measuring Plane Height AFFL	Limiting Glare Index
General Areas			
Comms Rooms	300/150	Floor/cabinet face	19
Entrance Lobby/Lounge	200	Floor	22

Area	Average Maintained Illuminance	Measuring Plane Height AFFL	Limiting Glare Index
Plant Rooms	200	Floor	25
Risers	100	Wall at 1000	25
Staircases	100	Tread	25
Corridors	100	Floor	25
Lift Lobbies	200	Floor	25
Store Rooms	100	Floor	25
Tea Point	500	Worktop	22
W.C.s	200	Floor	25
Social Space/Lounge	200	Floor	22
Drying Room	100	Floor	28
Showers	200	Floor	25
Changing Areas	200	Floor	25
Cycle Repair	200	Floor	22

3.3 ENHANCED CAPITAL ALLOWANCE (ECA)

The Contractor shall wherever appropriate and possible select plant that conforms to the requirements of the ECA scheme. Specific verification and validation schedules shall be provided, to confirm whether ECA credits are available or not.

The use of equipment that is on the ECA list should only be undertaken where this does not detrimentally affect the Part L calculations.

3.4 SURVEY OF EXISTING SYSTEMS, RELOCATION WORKS & STRIPPING OUT

3.4.1 SURVEY

The Electrical Sub-Contractor shall visit site during the tender period to ascertain the extent of stripping out work required. All costs associated with this shall be included

within the tender return. No additional costs claimed by the Electrical Sub-Contractor will be accepted on the basis that this was not carried out.

3.4.2 STRIPPING OUT

The Electrical Sub-Contractor shall carefully isolate and remove from site all existing, equipment and installations made redundant by the works.

The Electrical Sub-Contractor shall fully survey the existing electrical installations that are left to be removed prior to commencing any on site works. The Electrical Sub-Contractor shall clearly establish the interfaces between the existing systems and the proposed systems, so the full extent of the works is clearly defined.

Any installations requiring stripping out and removal must be done so thoroughly and shall include all fixings and supports associated with the relevant installations.

Where existing services are stripped out, leaving damage to existing building fabrics that are not to be replaced, the Electrical Sub-Contractor shall allow for making good to match the finish of the adjacent materials.

Refer to the enabling works drawings for indicative details of the stripping out requirements, additional stripping out may be required following removal of ceilings and further existing services tracing.

3.4.3 RELOCATION OF EXISTING

The Electrical Sub-Contractor shall carefully isolate and relocate those existing services shown on the accompanying drawings as requiring relocation.

Out of hours working shall be allowed for all services isolations which affect other occupied areas of this building.

3.5 MAIN LV SWITCHBOARD

3.5.1 GENERAL

The existing main LV switchboard shall be retained and modified as required to provide power to new distribution boards serving ground floor and basement refurbished areas if required (as described below) and indicated on the LV Schematic drawing.

MCCB serving the existing basement LLPB shall be upgraded, so it can supply both the existing basement distribution board and the new distribution board.

Outgoing MCCB protective devices shall be selected from the Schneider Compact NSX range or equal and approved or match the existing devices in the switchboard.

3.6 FINAL CIRCUIT DISTRIBUTION BOARDS

3.6.1 GENERAL

The Electrical Sub-Contractor shall design, supply, install, test, certify and connect new split load for lighting and power final circuit L.V. distribution board, protective devices, final circuit cabling and all cabling and equipment as required to provide a complete new L.V. installation within refurbished area.

It was possible to establish during the site survey space capacity of the existing distribution boards serving ground and basement levels. Contractor shall make an allowance to provide new distribution boards for additional circuits within refurbishment area.

The contractor shall strip out all redundant circuits from the works area all the way to the existing distribution boards. Following strip out of the redundant circuits, the existing distribution boards can be used to serve new circuits if it will have enough spare ways to serve whole refurbished area while still maintaining 25% spare capacity for future use. Otherwise, new distribution boards shall be provided.

New 3-phase final circuit distribution boards shall be Schneider Electric LoadCentre KQ B Type TP&N. All distribution boards shall comply fully with BS EN 61439 and consist of a hinged, lockable cabinet with a full complement of MCBs and RCBOs, integral switch disconnecter and MID approved, half hourly billable multifunction digital meters to Approved Document Part L and CIBSE TM39:2009.

The Electrical Sub-Contractor shall ensure that each protective device is sized in accordance with the rating of the circuit to which it is connected and to provide discrimination with all upstream devices and that all circuit charts and numbering is clearly labelled. A minimum of 25% spare ways shall be available within the equipment upon completion of the project, with a minimum of two number TP&N spare ways (unless indicated otherwise elsewhere). All distribution boards shall be equipped with hinged lockable doors with keys suited to fit all doors.

Where multi-service units are required to house contactors and timers etc., they shall be of the same size, colour and construction as the distribution boards with lockable hinged doors and provided complete with the accessories required including labelling. All multi-service units shall be complete with marshalling terminals for outgoing cabling.

Electrical supplies for mechanical equipment shall be supplied from the final circuit distribution board serving that demise/area, i.e. floor Air Conditioning System external condensers (installed on the roof) shall be supplied from the same DB as the indoor units, so the full AC System is metered and rechargeable.

All new mechanical supplies shall be individually metered to Approved Document Part L and CIBSE TM39:2009.

3.6.2 PROTECTIVE DEVICES

Final circuit protection is to be afforded by a system of MCBs and 30mA RCBOs to BS EN 60898, BS EN 60947-2 and BS EN 61009 having a minimum M10 category of duty, breaking capacity of 10kA and characteristics suitable for each application, i.e.:

- Type B - Small power circuits (non-inductive loads)
- Type C - Lighting and lightly inductive loads
- Type D - Loads with high inrush currents (transformers, motors etc.)

In general lighting circuits shall have 10A RCBOs and small power circuits shall have 20A RCBOs (radial circuits) or 32A RCBOs (ring circuits). Within each designated area or room, the small power circuits shall be connected to the same phase.

Residual current device protection shall be provided individually per circuit and shall not be installed to a group of different circuits or as a final distribution board isolator.

Automatic fault detection devices (AFDDs) shall be provided in accordance with the current guidance provided in the latest edition and/or amendment of BS7671.

3.6.3 METERING

The Electrical Sub-Contractor shall design, supply, install, test and certify electric meters and sub-meters, which shall be fully compliant with the requirements of Approved Document Part L, CIBSE TM39.

Integral to the either modified or new distribution board, MID approved, multifunction digital meters shall be provided to each power and lighting section in accordance with Approved Document Part L and CIBSE TM39:2009.

The above components shall be complete with all current transformers, protection fuses and terminals as required to present a full and complete installation.

All meters will include a communication module (Modbus or similar) to enable connection to the Building and Energy Management System should the client wish to install one.

All new mechanical supplies shall be individually metered to Approved Document Part L and CIBSE TM39:2009.

3.6.4 IDENTIFICATION

To facilitate circuit identification and testing, each cable core connected to an MCB, RCBO, AFDD, earth or neutral bar shall be fitted with slide on identification sleeves. Labels shall be provided on each outgoing way to identify the area or supply that it

serves, the phase, function, reference number etc. Spare ways shall be provided with blank labels for future use.

Each distribution board cover shall have engraved Traffolyte labels signifying reference number, function, phase(s) and where applicable size of cabling and type emanating from and/or serving same. Labels warning of the presence of 400 volts shall be provided in accordance with the IET Wiring Regulations. "Treatment of Electric Shock" notices shall be provided. All labels shall be of the engraved plastic laminate type, generally black on white, with black on yellow for "Danger 400 Volts". They shall be secured with 2No. brass nuts and bolts.

Upon completion the Electrical Sub-Contractor shall provide each distribution board with an A4 plastic envelope, secured to the inside of the opening door, containing a laser print quality circuit chart on headed paper.

The new and updated distribution charts shall provide the following information for each new and existing outgoing way:

- Circuit reference and phase
- Description / service / equipment being supplied.
- Protective device rating and type.
- Supply cable type.
- Cable size / CPC size of connected circuits.
- Supply origin.

3.7 EARTHING SYSTEMS

3.7.1 GENERAL

The Electrical Sub-Contractor shall design, supply, install, test, and certify earthing of the complete new electrical installations in accordance with BS EN 50310, BS7430 and BS7671.

The Electrical Sub-Contractor shall be responsible for ensuring that the complete system of containment, both for new and existing containment installations, together

with all accessories shall have sufficient metallic connection to ensure earth continuity throughout the entire installation.

Earthing and bonding cabling shall be installed on cable tray where run in groups using metal clips. Where installed singly cables shall be fixed using saddles with brass screws and nylon plugs. All terminations are to be via crimped cable lugs, where cables are terminated at a service position it shall be via a commercially manufactured earthing clamp.

All conductors shall be Cu/LSF type, green/yellow in colour with suitable Traffolyte descriptive labels (black lettering on yellow background).

The following, as a minimum, shall be bonded:-

- Mechanical plant
- Domestic water services pipework
- Refrigerant pipework
- Distribution board earth bars
- Containment systems
- Suspended ceiling support systems
- Structural steelwork

3.7.2 SUPPLEMENTARY BONDING

The Electrical Sub-Contractor shall provide supplementary bonding in all kitchens, cleaners' stores, utility rooms, toilets, etc in accordance with the requirements of BS EN 50310, BS7430 and BS7671.

3.8 SYSTEM WIRING

3.8.1 GENERAL

The Electrical Services Sub-Contractor shall allow to design, supply, install, test and certify all new BASEC certified and modified existing cabling and system wiring via floor void and high level carried on cable containment systems in each instance.

Where un-armoured cabling is installed flush within a partition or void at a depth of 50mm or less it shall be installed within galvanised conduit or trunking unless that circuit is protected by an RCBO.

Where cabling passes through any part of the building structure which comprises, a fire compartment the respective openings shall be sealed with a suitable fire resisting barrier after the installations are complete to comply with the required fire separation. Where cabling passes through acoustically rated partitions or building fabrics, the penetration shall be made good to be sealed and achieve the acoustic rating of the building fabric passed through.

All cables shall be supplied and installed in accordance with the particular requirements of the cable manufacturer and to BS EN 50525, BS 6004, and BS 7211. All cables shall be terminated in manufactured glands complete with manufactured earth tag (all as recommended by the cable manufacturer).

Where the Electrical Sub-Contractor supports his conduits, cable, and cable trays from building steelwork, he shall include for patented adapters and fixings. The drilling of steelwork for fixings will not be permitted unless specifically detailed on the drawings or in this Performance Specification.

Where cables are installed onto open containment, i.e. basket or cable tray, the containment shall be installed top up to allow the cables to sit in the containment. Cables installed in this manner, other than sub-main cables, shall be restrained using plastic cable ties or equal.

Where this proves impractical, i.e. where the containment must be installed inverted or on its side, then all cables carried, other than sub-main cables, shall be retained and supported by fire rated retainers (clips or cable ties).

Where cabling is of a fire rated construction, irrespective of the orientation of the containment, all supports, clips and fixings shall be of equal or greater fire rating to the cable.

3.8.2 SUB-MAIN CABLING

Where the existing MCCB devices are upgraded, the existing sub-main distribution cabling shall be stripped out and replaced with new suitably sized cable. The remainder of existing sub-main distribution cabling to the existing distribution board affected by refurbishment works shall be retained, tested and certified.

New sub-main distribution cabling shall generally comprise multi stranded copper conductor XLPE/SWA/LSF Cu cables installed on cable ladder, tray or trunking unless specifically indicated elsewhere.

Fire rated sub main cabling shall generally comprise multi stranded copper conductor FP600 cables installed on cable ladder, tray or trunking unless specifically indicated elsewhere.

All sub-mains cables shall be identified with their cable reference at each end using heat shrink tubing or tie-on cable marker cable identification.

All sub main cables shall be secured to the containment system using either proprietary cable cleats or insulated stainless steel cable bands.

3.8.3 FINAL CIRCUIT CABLING

Final sub-circuit wiring shall be carried out using LSZH insulated and sheathed multi-core (twin and earth) cabling installed on dedicated lighting and power cable trays. All such installations shall be flush installed.

All plant areas and any areas where no voids exist within the building fabric any final wiring shall be contained in galvanised steel trunking and conduit as required, installed to provide a mechanically and electrically continuous containment system from distribution board to point of connection. All such installations shall be surface installed.

For any small power circuit, no cable having a cross sectional area of less than 2.5mm² shall be used. For any lighting circuit, no cable having a cross sectional area of less than 1.5mm² shall be used. For any other circuit, no cable having a cross sectional area of less than 2.5mm² shall be used. Circuit protective conductors shall

be 1.5mm² or half the size of the live conductor, whichever is the greater. Utilising the armour of cabling as the CPC is acceptable where this is half the copper equivalent size of the live conductor as a minimum.

3.9 CONTAINMENT

3.9.1 GENERAL

The Electrical Sub-Contractor shall design, supply and install all primary and secondary containment installations as required by these works, as shown on accompanying drawings and as described within this Performance Specification.

All primary containment installations shall be as indicated on the containment series of drawings, supplemented as required to satisfy the requirements of this Specification by additional primary containment or secondary containment, such that all containment carries cables to within 500mm of the point of connection, other than installations wired in LSF singles where the containment shall be taken to the point of final connection.

All containment shall be installed at right angles to the building structure and carefully set out and co-ordinated with other service installations and the building structure. Diagonal runs of containment in any plane will not be permitted other than local sets to avoid obstacles where necessary to avoid compromising minimum cable bending radii.

All cabling within all containment shall be installed in a neat and tidy manner, clipped or tie wrapped as the cabling installation progresses and in such a way that any heat generated from the cables can be dissipated adequately.

Sub main cables shall be installed in groups of no more than three cables, with space between such groups as required by BS7671 to enable cable grouping factors to be no more than 3.

Where cable containment systems pass through fire barriers the Electrical Sub-Contractor shall provide and install a proprietary fire stopping material within the containment system. The fire stopping material shall be of minimum fire rating equal

to that of the physical fire barrier through which the penetration occurs. Where cable containment systems pass through acoustically rated partitions or building fabrics the penetration shall be made good to be sealed and achieve the acoustic rating of the building fabric passed through.

The Electrical Sub-Contractor shall submit fully co-ordinated containment and services routing drawings for all areas prior to installation.

3.9.2 SUPPORTS

Containment installations shall be supported from the building fabric. The installations, unless specifically stated shall not be supported by or from suspended ceiling systems, mechanical plant, or piped systems.

The Electrical Sub-Contractor shall include for designing fabricating, providing, and fixing brackets and secondary steelwork necessary for supporting electrical services and fittings unless specifically stated to the contrary. The Electrical Sub-Contractor shall be responsible for the design, installation, and inclusion thereof in the Tender Sum of all fixings and secondary steelwork as is necessary to carry out the whole of the Electrical Installation in accordance with this Specification.

Where the Electrical Sub-Contractor supports his conduits, cable baskets and cable trays from building steelwork, he shall include for patented adapters and fixings. The drilling of steelwork for fixings will not be permitted unless specifically detailed on the accompanying drawings or in this Specification.

All interfaces with the existing building fabric and steelwork for the support of building services shall be approved by the Structural Engineer prior to installation.

3.10 SMALL POWER

3.10.1 GENERAL

The Electrical Sub-Contractor shall allow for the design, supply, installation and testing of a complete new small power installation throughout the area of works as

described within this Specification and as generally shown on the accompanying drawings.

Socket outlets and all other electrical accessory setting out shall be coordinated with all other trades and the building structure.

The Electrical Sub-Contractor shall produce dimensioned setting out drawings indicating all accessories for agreement with the Architect and in prior to installation commencing. Should socket outlets be incorrectly installed these will require to be relocated by the Electrical Sub-Contractor at no additional cost to the contract.

Accessory finishes shall be as follows, to be agreed with the Interior Designer:

- | | |
|-------------------------------------|--|
| • Change Rooms | Bespoke – TBC by Interior Designer |
| • Entrance Lobby/Reception | Bespoke – TBC by Interior Designer |
| • Social Space | Bespoke – TBC by Interior Designer |
| • Cleaners Sockets | Bespoke – TBC by Interior Designer |
| • Landlord Areas out of Public View | White (flush) with white inserts |
| • Plantrooms | Metalclad (surface) with white inserts |
| • Bike Store | Metalclad (surface) with white inserts |
| • Drying Room | White (flush) with white inserts |

All accessories shall be provided with a discreet Dymo tape label with the reference of the circuit to which the accessory is connected.

3.10.2 SWITCHED SOCKET OUTLETS

Supply and install switched socket outlets with inboard rockers to BS 1363 Pt. 4: 1995 generally as this Specification and as shown on the accompanying drawings.

3.10.3 ISOLATORS

Supply and install lockable IP65 rotary isolation switches to BS EN 60947 for dedicated supplies to fixed equipment including mechanical plant. External isolators are to be weatherproof and suitable for external use in addition. All isolators shall be fully labelled with circuit reference and description of equipment served.

3.10.4 COMMANDO SOCKET OUTLETS

Supply and install MK Commando Socket Outlets to BS EN 60309 as required.

3.10.5 DOUBLE POLE SWITCHES

Supply and install 20A double pole switches to BS EN 60669-1: 2000 with neon indicators as required.

3.10.6 FUSED CONNECTION UNITS

Supply and install various types of 13A fused connection units, (i.e. unswitched, switched with and without flex outlets with neon indicators, etc.) to BS 1363 Pt. 4: 1995. The fused connection units shall be supplied via dedicated circuits.

The Electrical Sub-Contractor shall allow for connections from the fused connection units to the designated items of fixed equipment unless otherwise indicated. The final connections shall be in the form of further LSF insulated cables enclosed within conduit, terminating immediately behind the item of equipment served in a standard conduit box, with cabling entering the particular equipment from the rear.

Where connections are to portable or semi-portable equipment the final connections shall comprise a multi-core butyl heat resisting flexible cable, which shall be taken from the flex outlet of the spur unit direct to the terminal of the appliance served. Include for making final connection to all equipment indicated or referred to on the drawings.

Power supplies to fire alarm and detection system devices shall be engraved with red lettering to read; 'Fire Alarm Supply – do not switch off'.

3.10.7 HAND DRYERS

The Electrical Sub-Contractor shall allow for supplying and installing power supplies, flex outlets and all necessary final connections and containment to all hand dryers as shown on the Architectural drawings and accompanying drawings.

The installations shall comprise a high level (1800mm AFFL) switched fused connection unit as an isolator, connecting to a low level (height dependent upon the hand dryer selected) flex outlet positioned behind the equipment.

All hand dryers shall be Veltia Vfusion or equal and approved (finish to be agreed with Interior Designer) procured by the Main Contractor for installation and termination by the Electrical Sub-Contractor.

3.10.8 ELECTRICAL SUPPLIES TO MECHANICAL SERVICES EQUIPMENT

The Electrical Sub-Contractor shall allow for co-ordinating, designing, supplying and installing electrical supplies to all mechanical services including, but not limited to automatic doors, roller shutter, lifts, mechanical control centres/panels, heat recovery units, fan coil units, water heaters, heat pumps, extract fans and external condensers, together with any control devices requiring a power supply, as required by the Mechanical Sub-Contractor, whether shown on a tender drawing or not.

The extract fan units together with fan controller units shall be supplied by the mechanical sub-contractor with fans erected by them, the controllers shall be handed to the electrical sub-contractor for erection and connection of the power supplies.

The Electrical Sub-Contractor shall also allow for the supply and installation of flex outlet plates at high level adjacent to mechanical services equipment.

The final connections to fan units shall be in the form of a suitably sized (minimum 1.5mm²) LSF insulated and sheathed butyl flexible cable. Allow for making all necessary connections to the terminals at the fan unit.

The mechanical sub-contractor shall be responsible for the controls wiring between the controllers and the fans.

It shall be the responsibility of the Electrical Sub-Contractor to ascertain mechanical services equipment locations and compliance to the zonal requirements depicted in BS 7671 and the electrical protection thereof.

3.11 LIGHTING

The Electrical Sub-Contractor shall include for the design, supply, installation, connection, testing, commissioning, and demonstration of a new lighting and lighting control installation as described within this Specification and as shown on the accompanying drawings.

The Electrical Sub-Contractor shall provide coordinated with structure, Mechanical Sub-Contractor, and all other trades, reflected ceiling plans for approval by the Interior Designer and Client prior to installation works progressing.

All lighting and switching arrangements are to comply with Approved Document Part L of the Building Regulations.

All lighting installations shall utilise LED source luminaires as detailed in the luminaire schedule included on the lighting drawings. Where the electrical sub-contractor wishes to propose an alternative luminaire, he shall submit his proposal as a technical submission including lighting calculations to demonstrate his alternative selection delivers the lighting levels to the areas in which he wishes to install it, which satisfies the schedule within the design criteria section of this document. For any areas not scheduled, refer to BS EN 12464.

Lighting calculations shall be provided as Relux data files complete with luminaire data, together with a PDF print out of results.

Maintenance factors used in all calculations shall be realistic values including a LED light loss maintenance factor (LLMF) of 0.88 unless confirmed to be different by the LED supplier.

All LED fittings to be complete with minimum 0.9 power factor drivers. All luminaires (other than for decorative feature lighting which shall achieve 80 light source lumens per circuit watt) shall achieve a minimum efficacy of 95 luminaire lumens per circuit watt.

The Electrical Sub-Contractor shall provide a sample of all proposed light fittings (both specified and alternatives) for review by the Client Team prior to ordering. Tender costs shall be based upon the specified luminaires.

Luminaire circuits shall be wired as described above, with final connections to recessed luminaires and luminaires fixed surface to accessible ceilings, by means of a multi-pin Wieland type connector and minimum 1.5mm² multi-core heat resistant flex to BS EN 50525.

Flexible cord lengths shall be limited to one metre and shall be secured to local containment or building structure where practical to present a neat and tidy installation.

All luminaires are to be independently supported from the building construction where mounted in suspended ceilings, unless consent is sought from the ceiling manufacturer confirming the ceiling can support the weight of the proposed luminaires. Intumescent fire hoods shall be provided to all recessed luminaires where they penetrate a fire rated ceiling.

3.12 LIGHTING CONTROLS

Lighting control shall be a combination of automatic and manual control.

Ground floor entrance lobby/social space and reception area lighting control shall be DALI dimmable and addressable providing manual scene control. All luminaires shall be DALI dimmable, DALI addressable PIR detection and all associated controls.

Remaining areas, typically, circulation areas, toilets, changing rooms, showers and store rooms shall be provided with presence detection.

Plant grow lighting shall be automatically controlled based on electronic time schedule fully adjustable by end user post completion.

Presence detectors shall have an adjustable delay off facility ranging from 5 to 30 minutes as a minimum.

When selecting presence sensors, the Electrical Sub-Contractor shall ensure that the devices provide the required coverage to operate correctly in the locations indicated on the drawings.

All manual lighting control switches shall have the same finish as scheduled by area in the small power clause of this specification above.

All accessories shall be provided with a discreet Dymo tape label with the reference of the circuit to which the accessory is connected.

3.13 EMERGENCY LIGHTING

The Electrical Sub-Contractor shall design, supply, install, test and commission a complete emergency lighting installation in accordance with this Specification, the accompanying drawings, the current editions of BS5266, BS EN 1838, Approved Document Part B of the Building Regulations and to the Local Authority, Building Control and Fire Officer's requirements and approval.

The system shall be classified as being a self-contained, maintained system with internally illuminated exit signs, LED light source and remote key switch testing, with 3 hour duration.

Minimum horizontal illuminances at floor level, as defined in BS5266-1:

- Escape Routes up to 2m wide - 1.0 lux at floor level on centre line
- Open Areas - 0.5 lux at floor level

All luminaires within internal plantrooms shall be an emergency luminaire to achieve the increased level of emergency illumination in high risk areas.

Exit signage shall be internally illuminated and shall include directional signage and arrows in accordance with BS5499 current edition. Directional arrows shall be selected to suit their location, ensuring that they direct people towards defined and agreed escape routes.

The Electrical Sub-Contractor shall provide a schedule of proposed legends cross referenced to layout drawings for agreement with the Architect / Interior Designer prior to placing orders.

Emergency lighting shall be by means of self-contained, non-maintained 3 hour duration lithium-Ion charger/inverter packs in selected luminaires, or remote emergency packs of matching type with integral to luminaire LED indicator.

The Electrical Sub-Contractor shall include for supplying and installing multi-gang grid switch 20 amp double pole key switches adjacent the local lighting distribution boards to enable a test/isolation facility to the circuits supplying the emergency luminaires. Grid switch cover plates are to be labelled with each circuit reference.

3.14 FIRE ALARM & DETECTION SYSTEM

3.14.1 GENERAL

The Electrical Sub-Contractor shall employ a specialist to design, supply, modify the existing as required, install, connect, demonstrate, test and re-commission open protocol, addressable fire alarm system with automatic detection to provide LI coverage within the area of works, as may be required to suit these refurbishment works. The new fire alarm system installations shall suit the site evacuation plan and fire strategy. The system shall conform to the latest edition of BS 5839-1 and shall meet with the requirements of the Client and appropriate authorities such as the Fire Officer and Building Control.

The existing main fire alarm panel shall be relocated to new position next to reception desk as indicated on the drawings. The remainder of ground floor and basement B1 installation shall be retained. Basement B2 installation shall be modified to suit new layout.

The contractor shall ensure that after all modifications, the system still has minimum 25% spare capacity within each loop for future expansion. The battery power backup shall also be tested by the specialist to ensure it is capable to provide continuous operation for 24 hours in the event of mains failure with sufficient standby battery power to operate the alarm sounders for a further half an hour at the end of this period. Fire alarm system protocol shall be "open" so as to allow a range of qualified installers to work on or maintain the fire alarm installation.

A new colour zone and device plan mounted within a frame with a glass cover shall be provided adjacent to the main fire alarm panel in accordance with BS 5839-1:2013

Clause 23.2.2 e). In addition, colour zone and device plans mounted within a frame with a glass cover shall be provided adjacent to all repeater panels.

The new fire alarm system within refurbishment works area is to consist of automatic smoke and heat detectors complete with sounder bases and flashing beacons as required, along with ceiling mounted electronic sounders, ceiling mounted flashing beacons and flush mounted manual call points with resettable plastic inserts at all final exits and as required by BS5839.

Where automatic detectors are located on suspended ceilings, the electrical contractor shall supply and install 350 x 600 x 6mm plywood pattresses above the suspended ceiling to provide adequate fixings for the devices.

Zone isolators shall be incorporated within detector bases as required for compliance with BS5839.

Manual call points shall be semi recessed and shall be the resettable type. Call points located at roof level shall be IP55 rated. Care should be taken to ensure that call points are located away from walls or other obstructions such that the test key can easily be inserted, manipulated and removed in order to test the operation of the call point.

Facilities shall be incorporated in the main control/indicator panel, with volt free contact(s) interfaces provided to close down the mechanical ventilation plant (supply and extract), operate door closers, release access controlled doors and automatic doors. Interfaces will also be provided with the BEMS, lifts, CCTV, IRS and all systems as necessary to fulfil the requirements of the Fire Strategy.

The fire alarm system shall be monitored by secure digital communicator, to be supplied, installed and commissioned by the Electrical Sub-Contractor and connected to the fire alarm system using fire rated cable.

All fire alarm devices shall be clearly labelled utilising black on clear or black on white labels created using an electronic labelling machine. Each device label shall show the panel/loop node number, loop number, zone number and device address.

Engraved, unswitched fused connection units with neon indicators supplying fire alarm equipment shall be derived from dedicated circuits in the form of radial circuits. Cabling shall be FP 200 Gold type cable to match the fire alarm installation.

The Electrical Sub-Contractor shall liaise with the Client to agree the off-site monitoring requirements and assist in making such connections as part of the commissioning process.

25% spare capacity shall be provided as a minimum on each loop.

3.14.2 CABLING

The standard type of cabling for wiring the fire alarm system shall be multicore soft skinned FP 200 Gold type cable, complying with the latest editions of BS 5839-1, BS 6387, BS EN 50200, BS 7629, and BS 7846 with LSF red overall sheath.

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

- 1.5mm² for detector circuits
- 1.5mm² for auxiliary circuits
- 1.5mm² for dedicated sounder circuits

All cabling shall be concealed within the building fabric, installed onto cable containment of an equal fire rating to the cabling carried for multiple runs of cable. Single cables shall be clipped neatly using proprietary copper LSF coated "P" clips or saddles at regular spacing's, in accordance with manufacturer's minimum recommendations.

All fire alarm cables shall be tested with a 500-volt insulation resistance tester, prior to final termination of equipment with base fixed.

3.14.3 TESTING & COMMISSIONING

One month prior to the start of commissioning, the Electrical Sub-Contractor shall prepare and submit to the Engineer his proposed text addressing schedule for approval. Text programming shall not be carried out until this schedule has been

commented upon and finally approved by the engineer and returned to the Electrical Sub-Contractor.

The Electrical Sub-Contractor shall ensure that the new fire alarm system is commissioned a minimum of 10 working days prior to handover to ensure sufficient time remains for a soak test of the system, of at least 1 weeks duration, together with a repeat soak test should faults be found during the initial period. Until successful completion of the soak test, the system shall not be regarded as practically complete.

As part of the commissioning the Electrical Sub-Contractor shall take audibility readings of the alarm at the furthest corner of every room and record the results on A3 sized copies of the fire alarm layout drawings. These drawings shall be included in the Operating and Maintenance Manuals.

Should the audibility readings fall below the requirements of BS5839 Part 1, the Electrical Sub-Contractor shall install additional sounders to achieve the required level.

As part of the commissioning of the system, the Electrical Sub-Contractor shall issue installation, commissioning and test, inspection and completion certificates as required by BS5839 and BS7671.

The Electrical Sub-Contractor shall hand all detector protective covers, and manual call point test switches, to the Client's representative for future use.

3.15 DATA & TELECOMMUNICATIONS

3.15.1 GENERAL

The Electrical Sub-Contractor shall appoint a specialist sub-contractor to design, supply, install, 100% fluke testing, commissioning, fully certify and demonstrate a new Cat 6 voice and data system, including connectivity for other IP-Connected systems (IP CCTV and Access Control), generally comprising but not limited to; containment, CAT 6 flood wiring and RJ45 outlets, data cabinets, patch panels, back boxes and face plates.

The sub-contractor shall modify the existing installation by rerouting the existing wiring to the new reception desk position and provide new installation to new data enabled equipment such as but not limited to CCTV, door access control system, electric vehicle chargers. The subcontractor shall connect new installation to the existing network.

All equipment and flood wiring shall be Component Compliant at ISO 11801:Ed2.2, ISO 60603-7-5, ISO 61156-5, EN 50173-1, EN50310 standards operating at frequencies up to 250Mhz, supporting Voice, Data & Video applications at data rates of up to 1Gbit/s to full 100m channel requirements.

The Horizontal Category 6 compliant system must also be backwards compatible with ISO 11801:Ed2.2, ISO 61156-5, EN 50173-1:A2:2011 level, with valid Third Party Certification provided. The structured cabling system shall be CAT 6 cable as manufactured by Excel Networking, Systimax, or of equal quality and performance, provided with a 25 year warranty, supported via proprietary steel cable basket and Velcro tie wrapped, with 90m maximum length, from the labelled outlets to the relevant data cabinet.

RJ45 outlets shall be CAT 6 compliant, full depth with accessory plates as detailed in the small power section of this Performance Specification.

All outlets shall be labelled with their port number.

The system shall comprise suitably sized floor mounted nominally 800x1000 22U data cabinets with 25% spare capacity as a minimum, located within the basement tank room, which shall contain all active equipment and patch panels for the data network, together with rack mounted equipment for other systems requiring rack space, being access control, intruder alarm, TV and entertainment and CCTV. As a guide to space requirements within these cabinets, typically 3U is required per 24 cables terminated.

The Electrical Sub-Contractor shall provide all servers, NVRs and storage devices required by the specialist systems installed onto the data network, including but not limited to CCTV and Access Control systems. All network switches shall be of common manufacture and specification.

The Electrical Sub-Contractor, via his specialist, shall provide detailed cabinet/rack layout drawings for both main and sub-floor cabinets (if required), identifying all equipment provided for the data network and all third party equipment from the other systems. The Electrical Sub-Contractor shall arrange early co-ordination meetings with his specialist sub-contractors to progress this.

3.15.2 POWER SUPPLIES TO COMMS EQUIPMENT

Surge protection shall be provided for the incoming supply to distribution boards supplying Comms Room equipment and shall be a non-isolating type which does not interrupt the electrical supply on operation.

Supplies to cabinets shall be by means of high level mounted BS4343 "commando" type sockets rated at 16A, with two supplies provided for each cabinet.

A PDU bar shall be provided to each cabinet with 12 x 13A BS1363 outlets. These shall be connected to the supply sockets by 3 core 30A rated heat resistant Butyl flex.

Supplies to sub-comms cabinets shall be fed from local studio distribution boards to terminate at a 16A BS4343 "commando" socket adjacent the data cabinet.

A PDU bar shall be provided to each sub-cabinet with 4 x 13A BS1363 outlets. These shall be connected to the supply sockets by 3 core 30A rated heat resistant Butyl flex.

3.15.3 COPPER FLOOD WIRING

All flood wiring shall be Cat6, installed in uninterrupted lengths between patch panel and RJ45 outlet installed either on a 47mm deep single back box (for wall mounted outlets) or in existing floor boxes.

Outlets shall be provided to landlord areas as indicated on the drawings, and also to all IP based systems equipment indicated on the drawings whether shown as a data point or not. (For example, CCTV cameras on the drawings require a data point).

3.15.4 RUNS IN EXCESSSS OF 90 METRES

Areas of the building have a requirement for PoE data points farther than 90m from the comms patch cabinets. Where these outlets are provided, they shall initially be wired by fibre from the comms rooms to a multi-port PoE media convertor, with the final connections to the data point in Cat6 copper.

Local power supplies shall be provided to each of these media convertors.

Media convertors shall be housed within a tamperproof enclosure at high level.

3.15.5 MAIN COMMS ROOM CABINETS

A minimum of one cabinet shall be provided to the specification below for tender purposes.

The cabinet shall as a minimum meet the following specification:

- Size 800mm (width) x 1000mm (depth) x 22u (height)
- Internal mounting rails must be installed with a minimum clearance of 80mm between mounting rails and doors
- Cabinet must be either plinth-mounted or on heavy duty metal castors. For the avoidance of doubt the cabinet must not be left on light duty plastic 'transportation' castors
- Cabinet shall have a lockable and removable door or panel at the front, rear and sides.
- Cabinet shall have a minimum access clearance of 1000mm to the front, 500mm to the sides and 1000mm to the rear

3.15.6 INTEGRATION BETWEEN DATA & OTHER SYSTEMS

The data network can support the specialist systems for CCTV, Access Control and TV/entertainment etc. In order to achieve this integration, early consultation between all parties must be arranged and managed by the Electrical Sub-Contractor.

3.16 ACCESS CONTROL

The Electrical Sub-Contractor shall employ a National Security Inspectorate (NSI) GOLD standard specialist with BS EN ISO 9000:2008 accreditation, membership of the British Security Industry Association (BSIA) and with Security Industry Authority (SIA) Approved Contractor Status (ACS) to design, modify as required, supply, install, test, commission and demonstrate a new fully programmable door access control and audio with colour video intercom system as may be required to suit these refurbishment works.

The access control system shall be operated via hard wired Paxton manufacture electronic proximity reader on the door secure side and push to exit / emergency exit break glass units on the internal side, as shown on the accompanying drawings. The Electrical Sub-Contractor shall allow to coordinate with the ironmongery package to ensure all required fittings are supplied.

The access control system within the refurbished area shall be integrated with the existing access control system serving rest of the building.

Access controlled doors shall be secured by maglocks fitted to the top of the door. The Electrical Sub-Contractor shall procure the maglocks and free issue to the main contractor for installation.

Samples of any visible hardware or accessories to be provided to the interior designer for approval prior ordering.

Access controlled doors shall be linked to the fire alarm system to fail safe open during a fire alarm situation.

A total of 50No. proximity fobs (or other amount to be agreed with Client and end user) are to be provided by the Electrical Sub-Contractor to the Client upon completion. Facilities for programming additional fobs are to be provided within Reception.

The Electrical Sub-Contractor shall be responsible for providing all the necessary power supplies, data outlets, fire alarm interfaces, containment systems etc. as may be required by the specialist sub-contractor.

Unswitched fused connection units with neon indicators supplying access control equipment shall be derived from dedicated circuits in the form of radial circuits.

It shall be the Electrical Sub-Contractors responsibility to provide the specialist sub-contractor with item quantities and also to obtain all necessary information from the specialist to enable him to carry out a complete working installation.

3.17 CCTV

3.17.1 GENERAL

The Electrical Sub-Contractor shall employ a National Security Inspectorate (NSI) GOLD standard specialist with BS EN ISO 9000:2008 accreditation, membership of the British Security Industry Association (BSIA) and with Security Industry Authority (SIA) Approved Contractor Status (ACS) to design, supply, install, test, connect, commission, and demonstrate a colour CCTV system generally as may be required to suit these refurbishment works.

The CCTV system shall be IP PoE based and provide internal coverage to the areas shown on the drawings.

All equipment shall be commercial grade with a minimum expected life of 15 years.

The Electrical Sub-Contractor shall be responsible for providing all necessary power supplies, data network connections, fire alarm interfaces and containment systems as required by the specialist sub-contractor.

It shall be the Electrical Sub-Contractor's responsibility to obtain all necessary information from the specialist to enable him to carry out a complete working installation.

3.17.2 CAMERAS

Cameras shall be fixed focal length minimum 3 megapixel high resolution full colour supporting ONVIF standard, with integral infra-red lighting with a minimum range of

30m. Network and power supply shall be via PoE Cat6 cable and 100M RJ45 ethernet port.

Cameras shall be capable of delivering images at 25 frames per second at 1920x1080 resolution and support ROI codec.

Each camera shall have alarm triggers for:

- Tamper
- Network disconnect
- IP address conflict

Cameras shall be provided to the locations as indicated on the drawings.

3.17.3 HOUSINGS FOR CAMERAS

Internal cameras at ground level and above shall be ceiling mounted dome type in black finish (finish to be confirmed by the Interior Designer).

Colour and type options of dome housings if all cameras shall be offered to the Client and Architect for approval prior to ordering.

3.17.4 RECORDING

Recording shall be to Dedicated Micros or equal and approved network video recorders, rack mounted in the main comms room.

These shall be complete with all interfaces, converters, power supply units, keyboards, wiring and licenses necessary to form a complete working system.

The DVRs shall provide approximately 30 days of storage at a frame rate of 6 fps per camera. It is accepted that recording at 25 fps will consume storage space at a faster rate.

Data redundancy shall be enhanced by configuring the HDDs to RAID5 or better.

CCTV footage shall be stored and managed on a FIFO (first in, first out) principle. A proportion of the DVR HDDs shall be set aside for footage to be stored by users. This shall be retained until manually removed.

All footage shall be watermarked, and security stamped with the time and date.

Two USB C sockets shall be provided to allow exporting of stored footage to suitable media for archiving or use by Police.

The DVR shall be of an extensible design such that further DVR units and CCTV cameras can be added to the existing system without existing equipment becoming redundant. The additional units shall become an integral part of the system. Space within the data cabinet shall be allocated adjacent the NVR for the future addition of one such extension device.

Access to the recording system shall be by password only, all engineering and system configurations shall be protected from unauthorised access and users shall "log on" using individual passwords.

Furthermore, a complete audit trail facility logging all operations on the system will be available for review by the System Administrator. The system shall be suitable for future expansion and be upgradeable in terms of software enhancements and additional cameras.

In addition to the dedicated monitors identified below, the system shall be configured so that CCTV image streams are available over a TCP/IP (transmission control protocol / internet protocol) so that staff can monitor the system from any networked PC or device. Access to these streams shall only be available to registered users via individual passwords.

Provision shall be made for off-site transmission of the CCTV signals and remote control of the cameras from a remote monitoring centre. The Client will be responsible for implementing any such off-site connection.

3.17.5 INTERFACE WITH OTHER SYSTEMS

There will be a degree of integration between the CCTV system, wired Access Control system, Intruder Alarm and Fire Alarm systems.

Trigger inputs from the any of these systems shall cause the local camera footage to be recorded at 25 frames per second for 15 seconds before the trigger and 60 seconds thereafter.

Typical actions causing this trigger will include:

- Operation of manual call point
- Operation of wired access control fob reader
- Operation of wired push to exit button
- Operation of access control break glass override
- Activation of door monitoring alarm

3.17.6 MONITORS

A rack mounted flat-screen monitor shall be provided in the Comms Room to facilitate setup, review, and maintenance of the CCTV images.

3.17.7 WIRING

All wiring shall be completed by the data cable installer as described above. Wiring shall be contained within proprietary suitably sized containment systems i.e. wire baskets/conduits and ducts (where routed underground), which shall all be provided by the Electrical Sub-Contractor.

Where camera positions are greater than 90m from the data cabinet, they shall be connected via local omni-port media converters, with fibre connections back to the data cabinet. Where these are required (typically as indicated on the layout drawings) they shall be enclosed in tamper proof boxes at high level.

3.17.8 ELECTRICAL SUPPLIES

The Electrical Sub-Contractor shall allow to provide all required power supplies for the CCTV System including, but not limited to the recording equipment, monitoring and control equipment and cameras (including integral heaters). Unswitched fused connection units with neon indicators supplying CCTV equipment shall be derived from dedicated circuits in the form of radial circuits.

3.17.9 SIGNAGE

The Electrical Sub-Contractor shall allow for the supply and installation of all mandatory signage around the site in respect of CCTV being in operation.

3.17.10 SAMPLES FOR APPROVAL

Samples of all the proposed equipment shall be provided by the Electrical Sub-Contractor as part of his technical submission for approval/sign-off by the Client Team before ordering.

The Electrical Sub-Contractor shall ensure all samples are provided in good time so as not to affect programme and shall be responsible for organising a meeting with the above parties for the above purposes.

3.18 COMBINED REFUGE CALL & W.C. ALARM SYSTEM

The Electrical Sub-Contractor shall design, supply, install, modify the existing, test and re-commission an Emergency Voice Communication (EVC) system in accordance with BS5839 Part 9:2011, as may be required to suit these refurbishment works.

The subcontractor shall expand the existing system to include addition refuge call points in B1 and B2 basement levels and the disabled toilet in basement level B2. Should the existing system not allow for additional devices, the sub-contractor shall provide new control panel of larger capacity and connect the existing call points and disabled toilet alarms.

The system shall comprise a master control panel, central exchange cabinet and flush mounted fully duplex stainless steel refuge call units.

The existing master control panel shall be relocated to new reception desk position and shall be either integrated into the new reception desk (or wall mounted next to the desk if preferred by interior designer). The control panel shall include a telephone type handset. Also, on the control panel will be indicator lamps for each of the remote call points. The master control panel shall be fully flush with decorative finish. Appearance and to be agreed with the Interior Designer.

Stainless steel flush mounted call points shall be located in the staircase disabled refuge points. Each call point shall register on the master control panel and shall when used illuminate a dedicated lamp at that panel.

This system shall provide two way speech between each slave and master station and will be configured to prevent/minimise feedback from external sound sources such as fire alarm sounders.

The whole system shall be fully monitored for fire and fault.

All wiring shall be carried out in 2 core 1.5mm² enhanced specification soft skinned fire rated cable, concealed within the building fabric and protected by a 20mm dia. PVC conduit to provide a fully rewirable system.

Within the disabled and accessible W.C.s and showers, the electrical sub-contractor shall install pull cord switches with 2m of cord and integral re-assurance light located between the toilet and wash hand basin, adjacent to showers and shall install a wall mounted reset unit adjacent to the door.

The electrical sub-contractor shall install an over-door repeater light/tone generator outside of each accessible and disabled W.C. or shower.

Operation of the pull cord shall cause the integral re-assurance light within the pull cord switch to illuminate. Simultaneously the over-door light shall illuminate as well. This signal shall be repeated on a main panel located in Reception.

Once assistance has arrived, the button on the wall mounted reset unit can be pressed to cancel the alarm and reset the system.

The Disabled Toilet Alarm equipment shall comprise the following equipment:

- Pull Cord Unit with reassurance light
- Reset Unit (Flush)
- Over-door Lamp (Flush)
- Power Supply Unit in ceiling void c/w standby battery and relay
- Main Indicator Panel in Reception (Flush)

The Electrical Sub-Contractor shall obtain full wiring diagrams for the system and shall include for all power supplies, cables, containment and conduit etc., to provide a fully operational system. The installation shall be flush throughout.

Upon completion, the system shall be fully commissioned and demonstrated to the client and end users.

3.19 ELECTRIC VEHICLE (E.V.) CHARGING

The Electrical Sub-Contractor shall supply, install, test, certify and connect new wall mounted 7.4kW electric vehicle charging point, including all required accessories, components, meters, and equipment as may be required to provide a complete and fully functional installation and systems to the satisfaction of the Consultant, generally as shown on the accompanying drawings.

The charging points shall be Rolec Zura or equal and approved.

The charging points shall be equipped with CAT 6 communication module and wired back to comms cabinet.

The charging points shall Type 2 untethered with PME fault detection, dual socket outlets, UV stabilised and rated to minimum IP66/IK10.

The charging points shall contain MID-approved energy metering, RFID readers and app functionality to allow for the consumption to be recharged to a user.

Charging points shall be OCPP1.6 compliant and allow to be integrated with any back-office management systems.

Power to charging points shall originate from the main DB.

3.20 INTRUDER ALARM

The Electrical Sub-Contractor shall employ a National Security Inspectorate (NSI) GOLD standard specialist with BS EN ISO 9000:2008 accreditation, membership of the British Security Industry Association (BSIA) and with Security Industry Authority (SIA) Approved Contractor Status (ACS) to design, supply, modify, install, test, connect, commission and demonstrate an intruder alarm and detection system that shall comply with BS4737 and with DD243, generally as shown on the accompanying drawings and as described within this Performance Specification.

The existing system shall be modified to include remodelling of the reception and entrance area, which will include but not be limited to relocation of reception desk and entrance door changes. Where possible existing reed contacts shall be reused.

The system shall be connected to a central monitoring station by means of a digital communicator.

The all existing detectors shall be tested and the whole system recommissioned.

The system shall provide detection and verification to all areas as indicated on the drawings.

Each device connected to the system shall be a separate zone, and each zone shall be able to be individually programmed, for example to designate access/egress routes.

Magnetic reed door contacts shall be provided to all external doors. Double leaf doors shall be provided with 2 contacts, 1 to each door. Magnetic reed contacts shall also be provided to designated internal doors, as indicated on the drawings where required/applicable. Contacts to external doors shall be flush mounted where the door construction permits, and surface installed elsewhere. Contacts to internal doors shall be flush mounted.

Where doors are also protected by the access control system, double reed contacts shall be provided, to facilitate the additional monitoring of the door by the access control system.

All doors shall register as individual zones at the control panel, except in the case of double doors which shall register as a single zone.

The Electrical Sub-Contractor shall also connect the magnetic reed contact provided by the sliding door supplier into the intruder alarm system.

Alarm signalling shall be by means of an external and internal audio/visual devices, locations to be agreed with Architect and Client.

3.21 BOMB ALERT SYSTEM

The building contains an alert system controlled from the security/reception desk. The Electrical Sub-Contractor shall relocate the existing control switch into new reception desk position, test and re-commission the whole system.

3.22 ELECTRONIC SURGE SUPPRESSION

3.22.1 GENERAL

Surge Protective Devices (SPDs) shall be installed fully in accordance with the latest editions of BS7671 and BSEN62305. The Electrical Sub-Contractor shall include for all necessary protective devices, enclosures, cabling, glands, terminations and any other equipment as necessary to provide a complete, fully functional installation.

3.22.2 TESTING & COMMISSIONING

The installation shall be fully tested, commissioned and certified on completion to the requirements of BSEN 62305 and this Specification. All test certificates are to be included in the O&M Manuals.

3.23 SPEED GATES

Speed gates shall be supplied and installed by the Main Contractor in locations indicated on the Architect's drawings. The speed gates shall be in satin bronze finish to all elements (Finish to be agreed with the architect). Fabrication drawings shall be issued for Client's team review before the order is placed. Door access card readers shall free issued by the electrical subcontractor to the manufacturer for installation.

Electrical Sub-contractor shall include for any power and data connection to speed gates required to integrate them with building access control system.

The speed gates shall be arranged to open on activation of fire alarm system.

3.24 BUILDERSWORK

The Electrical Sub-Contractor shall undertake all builders work requirements to facilitate the installation of the services described within this Specification as previously described within Section 1 and as shown on the accompanying drawings.

The Electrical Sub-Contractor shall produce detailed and dimensioned builderswork drawings and accompanying schedules.

The Electrical Sub-Contractor shall provide all builderswork information associated with his installation to the Main Contractor in a manner and to a timescale to suit the Main Contractors requirements.

Additionally, any openings, holes, penetrations etc below 50mm diameter shall be carried out and made good by the Electrical Sub-Contractor.

3.25 MOUNTING HEIGHTS

For the purpose of tendering allow for the following mounting heights.

The Electrical Sub-Contractor will also take cognizance of the fact that all points and equipment indicated on the attached drawings are approximate only and for guidance in the preparation of his tender.

The Electrical Sub-Contractor will also include for the determination on site of the finalised positions of all points and equipment following coordination with the Architectural / Interior Designer's drawings before any work is commenced.

Unless otherwise indicated all the following mounting heights are taken from the finished floor level to the underside of the equipment/accessory.

Item		Mounting Height (mm) AFFL
Distribution Boards		1200
Socket Outlets	General	450
	High Level	1800
	Above Work Surfaces	150
	External	1350
Fused Connection Units	General	450
	High Level	1800
	Above Work Surfaces	150
	Other	To suit equipment served
Data/Telephone Outlets	General	450
	High Level	1800
	Above Work Surfaces	150
Light Switches		1100
Fire Alarm Call Point	-	1100
Fire Alarm Sounder or Beacon	Ceiling mounted	Or 150 below ceiling (as drawn)
Security Keypad		1100
Security Sounder	Ceilings less than 2400	150 below ceiling
	Ceilings greater than 2400	2200
Intercom		1100
Access Control Reader	General	1100
Request to Exit Button		1100
Emergency Break Glass		1100
Refuge Call Point		900mm AFFL to centre

Item		Mounting Height (mm) AFFL
Toilet Alarm Reset		900

3.26 TESTING & COMMISSIONING

3.26.1 GENERAL

Testing, inspecting, and commissioning shall be carried out in accordance with the requirements of BS7671 and this Specification. The testing, inspecting, and commissioning shall be carried out upon completion of the installation, with witness tests being carried out by the Consultant. In order for these tests to take place, the Electrical Sub-Contractor shall complete the installation and satisfy himself that the installation has been carried out in accordance with the requirements of the specification and drawings, and only when they are satisfied that the installation is fully operational in accordance with these requirements shall he offer the installation to the Consultant for witnessing.

A full commissioning and training strategy is to be issued by the electrical sub-contractor as part of their Contractor's Proposals. Due account shall also be taken of any sectional completions that may form part of the contract programme, so that centralised systems are in operation to serve these areas.

The Electrical Sub-Contractor shall satisfy himself of the full operational requirements of each and every system covered by the electrical services specification, and for each system shall prior to carrying out the testing and commissioning submit to the Consultant a fully detailed method statement indicating in detail the sequence of testing to be undertaken. Each task identified in the method statement shall clearly indicate the required result or results, if more than one operation/output is applicable when the system is operating correctly. The method statements shall clearly indicate all tasks that are to be undertaken to satisfactorily demonstrate the whole system is operating correctly in accordance with the specification and shall include the proving of all interlocks, remote signals, all inputs, outputs, etc.

The testing and commissioning shall include all items of equipment and systems, and any defect found on any item of equipment or system shall be rectified by the Electrical Sub-Contractor at no cost to the contract.

The Electrical Sub-Contractor shall also check the labelling of circuits in the various distribution boards and switchboards, check that there are no crossed circuits and that all protective device sizes are correct.

The Electrical Sub-Contractor shall lead all demonstrations, and shall ensure all required specialist attendances are arranged for the duration of the demonstration

The Electrical Sub-Contractor shall produce a witness sign off sheet for each system.

A register of completed and outstanding witnessing shall be prepared and maintained by the Electrical Sub-Contractor, and issued as part of the Electrical Sub-Contractor's report at each site progress meeting

3.26.2 LOW VOLTAGE INSTALLATION LIVE & DEAD TESTING

The Electrical Sub-Contractor shall carry out all live and dead testing of the electrical installations and record his figures on the appropriate NICEIC documents, which shall be issued to the Engineer at least seven days prior to his being invited to witness the results.

All testing shall be carried out in accordance with BS7671 by appropriately trained and qualified personnel using calibrated Megger or similar meters.

Where testing of ring circuits with RCD protection is part of the works, a test meter with an appropriate non-trip feature shall be employed

The following tests shall be demonstrated to the Engineer, who will usually expect to see approximately 10% of sub main and final circuits, whilst reserving the right to see more than this should problems be identified with the sample circuits.

- Continuity of circuit protective conductors and supplementary bonding conductors
- Continuity of ring circuits

- Insulation resistance
- Polarity
- Earth fault loop impedance
- Operation of all RCD devices

The system shall be deemed to have satisfied the design criteria if:

- All certification is in place
- Calibration certificate is available for the test meter
- Continuity of all circuits and CPCs is demonstrated satisfactorily
- Insulation resistance of all circuits is greater than 2MΩ for nominal Voltage up to 500V (or in line with Table 61A of BS7671 for other voltages)
- All polarity is correct
- All earth fault loop impedances are less than 80% of the maximum values listed in table 41.3 of BS7671
- All RCDs operate within 40ms at x5 rated current and 200ms at x1 rated current

3.26.3 GENERAL LIGHTING LUX LEVELS & CONTROLS

The Electrical Sub-Contractor shall prepare and issue A3 lighting drawings with lighting level spot readings recorded at locations/distances to be agreed with the Engineer.

The levels shall be taken using a calibrated light meter and recorded in Lux on the drawings.

The demonstration of these results to the Engineer will involve working through the layout drawings and spot checking Lux levels using the same calibrated meter used to take the original readings.

A building "walk test" shall also be undertaken to demonstrate the correct operation of the movement sensors. This test shall be undertaken out of working hours when the building is empty and may be combined with the emergency lighting demonstrations listed below.

The system shall be deemed to have satisfied the design criteria if:

- All Certification is in place
- The correct meter for measuring the lighting levels is used
- Calibration certificate is available for the test meter
- Measured lighting levels achieve the minimum and average illuminance required by the specification
- All lighting controls operate correctly

3.26.4 EMERGENCY LIGHTING

The Electrical Sub-Contractor shall prepare and issue installation and commissioning certificates to the Engineer, which shall also include A3 drawings with emergency lighting level commissioning figures at spacings to be agreed with the Engineer prior to production.

The demonstration of the system to the Engineer shall comprise two activities, which shall run concurrently. These tests shall be undertaken in the hours of darkness whilst the building is empty.

- Duration
- Illumination Levels

To demonstrate the design duration has been achieved, the Electrical Sub-Contractor shall fail the main supply to the lighting installation using the installed method for testing (i.e. key switch or lighting control system). A visual check shall be made against the installation drawings to confirm that all emergency luminaires are operating.

At the end of the design duration, a further visual check shall be made to again ensure that all emergency luminaires are still operational.

As soon as is practical after the commencement of the duration test, illumination level readings shall be taken for all areas.

The Electrical Sub-Contractor shall provide a cosine corrected light meter, with calibration certificate, to carry out these checks. The light meter shall have a minimum range of 0.01 to 100 lux, and a sensitivity of 0.01 lux.

Prior to taking any readings, the contractor shall ensure all extraneous light sources (e.g. street lighting, moonlight etc) are masked out.

Readings shall be taken at the same working plane as the design (floor level unless advised otherwise) and in locations as listed below along all escape routes:

- Halfway between luminaires
- Changes in direction
- Door thresholds

In open plan areas, readings shall be taken at regular intervals across all areas at spacings to be agreed with the Engineer.

For further guidance on testing and demonstrating the emergency lighting installation, refer to BS5266:2011 Appendix B.

The system shall be deemed to have satisfied the design criteria if:

- All certification is in place
- The correct meter for measuring the lighting levels is used
- Calibration certificate is available for the test meter
- All emergency luminaires operate when the mains supply is switched off
- All emergency luminaires are still operational at the conclusion of the duration test
- All illumination levels achieve a minimum of 1 lux on the centre line of escape routes and 0.5 lux for a minimum of half the width of the escape route and
- All illumination levels within an open plan area, excluding a 0.5m perimeter band, achieve a minimum of 0.5 lux

3.26.5 FIRE ALARM & DETECTION

The Electrical Sub-Contractor shall obtain the services of the Installer's/Manufacturer's Commissioning Engineer to test and commission the complete installation within the area of works, together with the programming of software.

The Electrical Sub-Contractor shall prepare and issue installation and commissioning certificates and a system cause and effect matrix, to the Engineer, which shall also include A3 drawings with sound pressure level commissioning figures at spacings to be agreed with the Engineer prior to production.

The demonstration of the system to the Engineer shall comprise four main activities, which may run concurrently or consecutively to suit the Main Contractors programme:

- Correct operation of the automatic fire detectors
- Correct operation of the manual call points
- Sound Pressure levels
- Correct operation of all fire alarm interfaces and compliance with the cause and effect matrix

The correct operation of automatic smoke detectors shall be verified using a proprietary aerosol smoke delivered using a Solo 330 tester or equal.

The correct operation of automatic heat detectors shall be verified using a Solo 441 cordless heat detector tester or equal.

The correct operation of the manual call points shall be verified using the approved test key or facility.

Sound pressure levels shall be measured using a calibrated sound level meter set to "A" weighting and capable of averaging a slow response. The meter shall be strictly in accordance with BS EN 60651. A calibration certificate for the meter used shall be provided to the engineer as part of the pre-testing issue of documentation.

Sound pressure levels measured shall be recorded on a layout drawing at spacings agreed with the Engineer and included in the As Installed drawings and O& M manuals.

Each line of the cause and effect matrix shall be checked. The trigger device shall be operated by the approved means as detailed above, and the effects listed in the matrix confirmed

Finally, the Fire Alarm System remote signals and interfaces to other systems shall be checked to ensure all signals have been correctly communicated.

The system shall be deemed to have satisfied the design criteria if:

- All certification is in place
- The correct test instruments are used
- Calibration certificate is available for the sound pressure meter
- Automatic detectors respond to the smoke and heat tests, and the correct zone and/or text addressing is displayed on the fire alarm control panel
- An "evacuate" signal is generated in the zone of the break glass operated within 3 seconds, and the correct zone and/or text address is recorded on the fire alarm control panel within 10 seconds
- Sound pressure levels are minimum of 60dBA or 5dBA above ambient, whichever is the higher
- All aspects of the cause and effect matrix are demonstrated to work correctly

Typically, 10% of these systems shall be demonstrated to the Engineer, who reserves the right to view additional systems should problems occur on the initial 10%.

3.26.6 STRUCTURED CABLING

The Electrical Sub-Contractor shall test and document all fibre and copper network and data cabling using a Fluke Networks cable analyser or equal.

The test results shall clearly indicate whether each test has passed or failed.

Test results shall be provided in advance of witnessing to the Engineer, who shall select a sample number for demonstration by the contractor.

The system shall be deemed to have satisfied the design criteria if:

- Test results/certificates are in place
- Calibration certificate is available for the test meter
- All test results indicate the cable has passed the test
- All witnessed tests achieve a pass
- All numbering of outlets is complete and matches the test result schedules

3.26.7 ACCESS CONTROL SYSTEM

The Electrical Sub-Contractor shall, in conjunction with his specialist sub-contractor, test, demonstrate and document the operation of the Access Control system.

In the case of each hard-wired installation, the electrical sub-contractor shall prove:

- Correct operation on use of proximity device
- Correct operation on fire alarm
- Correct operation on loss of power
- Correct operation of push to exit button
- Correct operation on operation of break glass override

3.26.8 CCTV SYSTEM

The Electrical Sub-Contractor shall, in conjunction with his specialist sub-contractor, test, demonstrate and document the operation of the CCTV system.

The correct operation and function of the following shall be proven to the engineer and client representative:

- Operation of all CCTV cameras
- Automatic recording on operation of access control fob
- Automatic recording on activation of intruder alarm sensor
- Automatic recording on operation of fire alarm manual call point
- Playback of recorded CCTV footage
- Export of recorded CCTV footage to USB drive and playback on an unrelated device

3.26.9 DISABLED WC ALARM SYSTEM

The Electrical Sub-Contractor shall, test, demonstrate and document the correct operation of the Combined Refuge Call and Disabled W.C. Alarm system.

The correct operation and function of the following shall be proven to the engineer and client representative:

- Two way speech from call points
- Silencing local fire alarm sounders when voice call made from either refuge call point
- Reset buttons
- Pull cords
- Sounders and visual notifications

3.26.10 EV CHARGING POINTS

The Electrical Sub-Contractor shall, in conjunction with his specialist sub-contractor, test, demonstrate and document the operation of the electrical vehicles charging system.

In the case of each hard-wired installation, the electrical sub-contractor shall prove:

- Correct operation on use of proximity device
- Correct operation on use of application

3.26.11 AS FITTED DRAWINGS & O&M MANUALS

The Electrical Sub-Contractor shall include within his tender for the provision of As Fitted Drawings and Operating and Maintenance Manuals in addition to the detailed and comprehensive Health and Safety File.

The drawings shall be issued electronically in latest AutoCAD and Revit, where applicable, format to the Engineer and to the Employer.

A complete set of paper prints shall be left within the Basement plantroom in plastic pockets within a stiff backed folder.

Electronic and paper copies of the Operating and Maintenance Manuals and Health and Safety File shall be provided. Paper copies shall be A4 sized and bound in a stiff backed binder. The Manual/File shall be in accordance with BSRIA "BG 1/2007 Handover, O and M Manuals and Project Feedback" document.

Distribution Board Schedules and descriptive elements of the Manuals shall also be issued electronically in Microsoft Word format.

Draft copies of the drawings and manuals shall be submitted electronically for comment a minimum of four working weeks before practical completion. The Electrical Sub-Contractor shall modify the documents and drawings in accordance with the Engineers comments and provide all documentation in its final form at or before the handover meeting.

It should be noted that the As Fitted Drawings and Operating and Maintenance Manuals are required to form part of the Health and Safety File in accordance with CDM Regulations, and as such it is imperative that the information provided by the Electrical Sub-Contractor in this regard is entirely accurate and complete.

4 RETURN TENDER DOCUMENTATION

The following documents should be completed in their entirety and returned to the Main Contractor to accord with their requirements to meet the return tender date.

Any alternative manufacturers will only be considered during the tender assessment. Once the contract is awarded no alternative manufacturers will be acceptable unless written the Consultant Engineer or Contract Administrator gives written authorisation. Alternatives after award of contract will only be acceptable on the basis of financial benefit or improved performance to the Client.

82 KING STREET, MANCHESTER

MECHANICAL SERVICES

TENDER SUMMARY

	Options:	
13	Spares	£
14	12 Months Maintenance	£
	Total	£

1	Survey, Relocation Works and Stripping Out	£
2	Detailed Design	£
3	Heating Systems	£
4	Mechanical Ventilation	£
5	Domestic Water Services	£
6	Above Ground Foul Drainage	£
7	Automatic Controls	£
8	Builderswork	£
9	Testing and Commissioning	£
10	As Installed Documentation	£
11	Any Other Items (Identify)	£
	Sub-Total	£
	<u>Provisional Sums:</u>	
12	Option for new planter automatic irrigation system.	£10,000

Signed.....

For and on behalf of

Date

SUB-CONTRACT**SCHEDULE OF SPECIALIST SUB-CONTRACTORS**

The Tenderer must list the names of the Specialist Sub-Contractors he proposes to employ for the specified works, together with any additional Sub-Contractors, and the nature of the work that they will undertake.

<u>Work or Service</u>	<u>Name and Address</u>
------------------------	-------------------------

SCHEDULE OF BUILDERS WORK REQUIREMENTS – MECHANICAL

The Building Contractor shall itemise individual items below complete with full description and quantities all Builders Work required to be carried out by others in association with the mechanical services installations described in the enquiry documents.

The Main Contractor should note that where possible all services, with the exception of office area exposed services installations, are to be concealed by utilising the rising ducts/ceiling voids/raised floor spaces, as shown on the drawings. Services "boxing in" should only be used with the agreement of the Client's Architect and utilised where there is no other alternative available to conceal the service.

Signed.....

For and on behalf of

Date

82 KING STREET, MANCHESTER
ELECTRICAL SERVICES
TENDER SUMMARY

1	Survey, Relocation Works and Stripping Out	£
2	Detailed Design	£
3	Final Circuit Distribution Boards	£
4	Metering	£
5	Earthing & Bonding	£
6	Containment	£
7	Small Power & Underfloor Power	£
8	Electrical Supplies to Mechanical Services	£
9	Lighting	£
10	Lighting Controls	£
11	Emergency Lighting	£
12	Fire Alarm & Detection System	£
13	Cat 6 Data and Communications System	£
14	Access Control & Intercom Systems	£
15	PoE CCTV System	£
16	Disabled W.C. Alarm System	£
17	Electric Vehicle Charging Points	£
18	Intruder Alarm/Door Monitoring System	£
19	Earthing and Electronic Surge Suppression	£
20	Builderswork	£
21	Testing and Commissioning	£
22	As Installed Documentation	£
23	Any Other Items (Identify)	£

Sub-Total
£
Provisional Sums:

24	Additional unforeseen works related to power new distribution boards.	£9,000
25	Additional unforeseen works related to Bomb Alert System	£5,000
26	Additional unforeseen works related to External Lighting repair.	£3,000
27	Additional unforeseen works related to integration with existing Disabled Refuge and Toilet Alarm	£3,000
<u>Options:</u>		
28	Spares	£
29	12 Months Maintenance	£
Total		£

Signed.....

For and on behalf of

Date

SUB-CONTRACT

SCHEDULE OF SPECIALIST SUB-CONTRACTORS

The Tenderer must list the names of the Specialist Sub-Contractors he proposes to employ for the specified works, together with any additional Sub-Contractors, and the nature of the work that they will undertake.

Work or Service Name and Address

Signed.....

For and on behalf of

Date

SCHEDULE OF BUILDERS WORK REQUIREMENTS - ELECTRICAL

The Building Contractor shall itemise individual items below complete with full description and quantities all Builders Work required to be carried out by others in association with the electrical services installations described in the enquiry documents.

The Main Contractor should note that where possible, with the exception of office area exposed services installations, all services are to be concealed by utilising the rising ducts/ceiling voids/raised floor spaces, as shown on the drawings. Services "boxing in" should only be used with the agreement of the Client's Architect and utilised where there is no other alternative available to conceal the service.

APPENDIX A – MECHANICAL SERVICES MANUFACTURERS

The Tender Return shall be based on the following manufacturers:

Product	Manufacturer
MVHR	Air Handlers / Systemair
Attenuators	Allaway Acoustics
Grilles and Diffusers	Gilberts
Electric Panel Heating	Adax
Electric Towel Rails	Adax
Domestic Hot Water Cylinders	Baxi
Drainage Pumps	Saniflow
B.E.M.S.	Trend

All selected manufacturers and service suppliers shall be named in the Tender Return. The mechanical sub-contractor can put forward equal alternatives to the above for approval in the Schedule of Alternatives with his Tender Return. All alternatives put forward are subject to authorisation by the Client and Consulting Engineer with full associated calculations, data sheets and samples to be provided by the electrical sub-contractor for consideration prior to approval being given.

APPENDIX B – ELECTRICAL SERVICES MANUFACTURERS

The Tender Return shall be based on the following manufacturers:

Product	Manufacturer
Lighting and Luminaires	As accompanying Luminaire Schedule
Lighting Controls	CP Electronics / LDL Lighting / DALI
Fire Alarm & Detection System	Compatible with existing
Access Control System	Compatible with existing
Intercom System	Compatible with existing
Intruder Alarm System	Compatible with existing
Disabled W.C. Alarm System	Compatible with existing
Electrical Accessories	MK Electric / Schneider Lisse (all flush mounted). All visible front of house to be bespoke – finish TBA with the Interior Designer. White plastic where hidden i.e. ceiling voids & risers. Metalclad in plant areas & bin stores.
Data / Communications	Systimax / Excel Networking
Containment	Swift / Legrand / Marco Cable Management / MK / Cablofil
Distribution Boards and Protective Devices	Schneider Electric LoadCentre or to match existing
EV Charging Points	Rolec
Cabling	Prysmian / Nexans / Draka

All selected manufacturers and service suppliers shall be named in the Tender Return. The electrical sub-contractor can put forward equal alternatives to the above for approval in the Schedule of Alternatives with his Tender Return. All alternatives put forward are subject to authorisation by the Client and Consulting Engineer with full associated calculations, data sheets and samples to be provided by the electrical sub-contractor for consideration prior to approval being given.