ARCUS CONSULTING

PROJECT ADMIRAL

PREAMBLES AND SPECIFICATION FOR BUILDING SERVICES

JOB NO. 4795

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PART ONE

PRELIMINARIES AND GENERAL CONDITIONS OF CONTRACT

SECTION ONE

PART ONE - PRELIMINARIES AND GENERAL CONDITIONS OF CONTRACT

1.01 SCOPE

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

1.02 WORKING ARRANGEMENTS

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

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

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

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

For further details see the Main Contract Preliminaries.

1.03 PROJECT

The project comprises the reconfiguration and renovation of accommodation throughout an existing social housing high rise development.

The building consists of eleven floors. At ground floor level, there is a plant room, electric room and a two-flats; from first floor upwards the floor area is used solely for accommodation.

The reconfiguration and renovation works to be undertaken includes all floors, and generally involves a complete replacement of all facilities.

The phasing of the works shall be undertaken as detailed in the main contract.

For further details see the Main Contract Preliminaries.

1.04 LOCATION

Nelson Court, Poole For further details see the Main Contract Preliminaries.

1.05 SPECIFICATION AND METHOD OF APPOINTMENT

The successful tenderer will be required to enter into a Domestic Contract with the Main Contractor upon and subject to the terms and conditions of the main contract between the employer and the Main contractor.

Please refer to the Main Contract Preliminaries with regards to the form of contract together with the specific terms and conditions.

1.06 NAMES OF PARTIES

See Main Contract Preliminaries.

1.07 CONTRACTOR TO VISIT SITE

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

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

Permission to gain access to site to view may be obtained upon application to the building manager. See the Main Contract Preliminaries for details.

1.08 DRAWINGS

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

1.09 SERVICES

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

1.10 LIAISON WITH STATUTORY AUTHORITIES

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

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

1.11 SPECIAL CONDITIONS

Refer to Main Contractor conditions of contract for special conditions.

1.12 RESTRICTION AND SPECIAL REQUIREMENTS

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

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

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

b) They shall not trespass and shall confine themselves to the locality of their work.

c) They shall erect adequate barriers, warning lights, etc. to prevent accidents when trap doors or manhole covers are lifted or excavations made in road, paths etc.

d) The contractor shall undertake to remove from the site at once, any workman or employees of his found contravening these instructions.

1.13 SAFETY HEALTH AND WELFARE OF WORKS PERSONNEL

Contractors are directed to the requirements of the following:

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

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

Subject to the statutory requirements of the Act, the Contractor shall be solely responsible for ensuring that the whole of the Works or any part of the Works shall comply with the Health and Safety at Work, etc., Act 1974.

He shall ensure that all supervisory and installation work, maintenance and operational drawings and instructions, notice and certificates are provided, safe protection for any person and shall indemnify the Main Contractor, building owners, architect and contract administrator against all injuries and damages arising from any deficiency in the Works.

Any matters which in the opinion of the Contractor are liable to be a hazardous deficiency at any time shall be referred by the Contractor to the Contract Administrator, in writing, before proceeding with the work.
The Contractor shall make the allowances for complying in full with latest Health and Safety and CDM regulations 2007. The contractor shall be required to prepare all documentation e.g. method statements, material information, risk assessments/ analysis as required by the regulations. Reference shall be made to the pre tender health and safety plan, which forms part of the main contract documents.

1.14 CONTRACTOR TO INFORM HIMSELF FULLY

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

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

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

1.15 EXISTING SERVICES

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

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

1.16 BREAKING INTO EXISTING SERVICES

The maintenance of continuity of services, i.e. electricity, hot and cold water etc., is of prime importance and interruption of these services will not be permitted without prior consultation with the Client or his representative and the C.A.

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

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

1.17 FIRE PRECAUTIONS

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

The Contractor's workmen shall be required strictly to conform to all "No Smoking" rules applicable in specific areas. Smoking shall not be permitted in roof spaces or service risers etc.

Fire escape routes shall be kept unobstructed and, if necessary, illuminated at all times, and when work necessitates the use of naked flames in locations having a high fire risk, portable fire extinguisher shall be readily available.

1.18 SPECIFIED MANUFACTURERS

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

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

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

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

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

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

(a) do not comply with the specification;

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

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

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

(a) alternative manufacturer;

(b) type and/or figure number of alternative submitted;

(c) other relative details as to type, design and performance

(d) the adjustments, if any, to the tender price if the alternative were approved.

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

1.19 CONTRACT DRAWINGS

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

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

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

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

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

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

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

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

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

1.20 SETTING OUT AND BUILDERS WORK

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

The contractor shall prepare and submit builders work drawings and details for comment by the Contract Administrator and his representatives.

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

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

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

1.21 SUBMISSION OF DRAWINGS

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

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

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

All drawings shall be commented upon in accordance with the conditions of contract and shall be stamped and signed by the Contract Administrator before formal issue to other parties.

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

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

1.22 SITE MEETINGS

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

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

1.23 STORAGE AND PROTECTION OF MATERIALS

The Contractor shall allow in his tender for receiving, unloading and safe keeping during and after delivery to the site of all materials and goods for the Works including materials provided under P.C. and Provisional Sums.

The Contractor shall provide his own storage accommodation including storage racks bins, tarpaulins, etc., for the complete storage and subsequent distribution of all materials, tools, items or equipment for this Contract.

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

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

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

1.24 RESPONSIBILITY FOR PLANT

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

1.25 EXISTING MATERIALS

The Contractor shall not under any circumstances re-use existing plant or materials rendered redundant during the course of the works unless he receives instructions in writing from the CA to the contrary.

The contractor shall provide free issue any materials/ items of plant that have been rendered redundant by these works to the employer. All scrap and redundant materials not required by the employer shall become the property of the Contractor and shall be removed from site.

1.26 CONTRACTOR TO PROVIDE EVERYTHING NECESSARY

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

1.27 FUEL, WATER AND ELECTRICITY FOR TESTING PURPOSES

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

1.28 DEFECTS LIABILITY PERIOD

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

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

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

1.29 INSTRUCTION OF CLIENT PERSONNEL

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

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

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

1.30 AS INSTALLED DRAWINGS

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

The drawings on disks shall be prepared in AutoCAD 2006 or DXF format on CD Roms. These shall be clearly identified with project and drawing number.

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

a) General arrangement of all services to a scale of not less than 1:100.

b) Detail drawings of all plant rooms or similar areas to a scale of 1:20.

c) Diagrams of connections of all control boards or similar apparatus in schematic and diagrammatic forms.

d) Schematic diagrams of all electrical distribution etc.

e) Schedules of equipment, valves, luminaires etc.

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

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

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

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

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

Specialist drawings from sub-contractor such as medical gases, fire suppression systems etc.

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

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

1.31 OPERATING AND MAINTENANCE MANUALS

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

These manuals shall be contained in volumes strongly bound in flexible covers and suitable for heavy usage over a long period to be read in conjunction with the "as installed" drawings and shall comprise the following: - The complete manual including drawings etc. shall be also be provided in CD format.

a) A general description of the scope, purpose and manner of working of each system and the apparatus forming the installations.

b) A detailed description of the scope, purpose and manner of working each system of automatic controls.

c) Data on general design parameters and associated normal operating temperatures, pressures, etc., based on the commissioning tests.

d) Clear and comprehensive instructions for the starting up, running and shut down of each system or apparatus.

e) Clear and comprehensive instructions for dealing with emergency conditions for each system or apparatus.

f) Instructions in respect of any precautionary measure from time to time necessary (e.g. against corrosion or freezing).

g) Instructions in respect of the care of apparatus normally subject to seasonal disuse.

h) Instructions as to the nature, extent and frequency of servicing necessary to properly maintain the Works in good condition as to the materials to be used for this purpose. This information shall be supported by maintenance instructions provided by the suppliers of particular component apparatus.

i) The names and addresses of suppliers of all major components of the installations as may potentially be required to obtain spare parts or replacements.

j) List of recommended spares.

k) Test and completion certificates.

l) Commissioning Reports from equipment manufacturers and commissioning specialists.

m) A set of photo reduced record drawings in A3 format.

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

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

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

1.32 CONTRACT COMPLETION GUARANTEE ELECTRICAL CONTRACTOR

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

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

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

1.33 HANDOVER

Handover of the works shall generally include:-

a) Supply of all test certificates for equipment items from manufacturers.

b) Supply of all test certificates covering the works during the installation, including heat tests, or any special tests certified by an Insurance Company.

c) Supply of all test certificates on (1) hydraulic systems (2) air flow systems (3) gas systems.

d) Supply of all applicable test Inspection Certificates for the Electrical Installation.

e) Supply of record drawings (including CD rom) wiring diagrams and valve charts.

f) Supply of operating and maintenance instructions in manual form for all the plant items.

g) Supply of operating and maintenance instructions for the proper working of the whole installation, service by service.

h) Supply of instructions of safety precautions under fault conditions.

i) List of names, addresses and telephone numbers of all contracting firms, and manufacturing firms responsible for the installation or supply of equipment items comprising the works.

j) Supply of spares as specified.

k) Completion of all painting including identification, lettering and numbering.

l) Making sure all plant items clearly show actual manufacturer's nameplate giving plant details, reference number, test pressures and dates of manufacture.

m) Ensuring all notices and labels are fitted.

n) General finishing of installation.

o) Agreeing with the Contract Administrators a list of any outstanding items or defects on the basis that the items so listed shall be dealt with and cleared within 28 days unless otherwise agreed with the above.

p) Training of Client's staff.

q) Modification of clients existing valve charts, medical gas schematics and electrical distribution schedules to reflect the changes carried out under the works.

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

1.34 VARIATIONS

The layout and detailed arrangements shown on the drawings and specified herein may be modified by the Contract Administrator by instructions issued to the Contractor from time to time during the course of the Contract as necessary, either by alteration, addition or omission, without prejudice to the contractual obligations. No variation shall vitiate the Contract.

All such modifications shall be known as variations and their value, whether in the form of alterations, additions or omissions shall be determined by any one of the following three methods, as directed by the Contract Administrator.

i) MEASUREMENT

The successful tenderer will be required to submit to the Contract Administrator details of his estimate in the form of a fully priced Schedule of Materials. Where the variation involved items the majority of which are included in such schedules, the value of the variation shall be determined by the application of these rates to the quantities involved.

Suggested rates for any item are not included in the schedules shall be submitted to the Contract Administrator for agreement when presenting the variation. The quantities involved in any such variation shall be measured and agreed with the Contract Administrator on completion of the variation.

ii) BY QUOTATION

Where the variation involves items all or the majority of which are not included in the priced schedules, and/or the work involved is not a matter of urgency, the Contractor shall submit within fourteen days for the consideration of the Contract Administrator a quotation or quotations, therefore commencement of the work involved shall be deferred until the Contractor is in receipt of his quotation and instructions to proceed. Where the fluctuating clause applies, material and labour costs shall be based on ruling at date of tender.

iii) DAYWORK

Dayworks shall only be executed after the receipt by the Contractor of written instructions to proceed with the work. Charges and rates for Dayworks shall be submitted by the tender on the form provided.

The charges and rates shall include for the prime cost plus any additional costs of establishment charges, supervisory and administrative staff, profit and any discounts. Charges for statutory taxes in connection with site labour, value added tax and the like shall be met.

Dayworks sheets shall be submitted in triplicate to the Contract Administrator for signature not later than seven days after the day on which work was executed. Dayworks sheet shall indicate the hours actually worked on a particular task.

1.35 OVERTIME

It should be clearly understood that no additional payment will be made to the Contractor for overtime, or increased weekly hours to working necessitated by employing operatives away from home, or for overtime, which the Contractor works to suit his own requirements, or in default of meeting the programme.

No other overtime is to be worked except upon the written instruction of the CA; if such instructions are issued the Contractor must have the time sheets prepared and signed as for Dayworks, and will receive payment for the net difference only between overtime and standard rates.

1.36 PRICED SCHEDULE OF WORKS

In addition to the details to be given at the time of tendering, any tenderer, upon being advised that his Tender is receiving consideration, will prepare and within 7 days of being called upon to do so, submit, in triplicate, detailed priced schedules of quantities, showing the make-up of the total tender price.

These schedules are to be sub-divided in sections as the Summary of Tender, to provide a unit rate for each item to be supplied. It is understood that in no case more than two tenderers will be required to fulfil this condition.

Responsibility for accuracy and completeness of the quantities and description will rest with the tenderer and no adjustment will be made to the tendered price in respect of any alleged inaccuracies. The exclusion of any items in the prices schedule will not relieve the Contractor of any of his obligations under the Contract.

In the event of materials or services being required for which no rates exist, the Contractor is to adopt star rates in respect of such material and services which bear the same percentage "on costs" as the rates in the Priced Schedule of Quantities. The Contractors will be prepared to submit such evidence to the CA as they may be required to substantiate this.

1.37 PROVISIONAL AND PRIME COST SUMS

Where Provisional and Prime Costs Sums are included in the Tender, these are to be expended wholly or in part only as directed by the Contract Administrator and no work to be carried out under any such items, without written instructions to do so.

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PART TWO

STANDARDS OF INSTALLATION AND MATERIALS

PART TWO - STANDARDS OF INSTALLATION AND MATERIALS

SECTION ONE

2.1.1 GENERAL

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

See the Main Contract Preliminaries for further details.

2.1.2 WORKMANSHIP

Unless otherwise stated, all works shall be installed in accordance with the requirements of MOD, Defence Estates Specifications 034, 036 & 037, formally the PSA Standard Engineering Specifications (M&E) No's. 1, 3, 6 & 100.

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

2.1.3 SAMPLES

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

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

2.1.4 REGULATIONS AND CODES OF PRACTICE

- Latest relevant BS Standards, Codes of Practice and European directives.
- Health and Safety at Work Act
- Building Regulations
- Local Authority Regulations and Bye-Laws
- Local Authority Fire Officer
- Electricity Supply Regulations 1988 (as amended) and subsequent amendments
- Offices, Shops and Railway Premises Act
- Factories Act
- Local Water Authority Bye-Laws
- Environmental and Public Health Approval
- COSHH Regulations 1988
- Clean Air Act
- The Electricity (Factories Act) Special Regulation 1980 and 1944

- Electricity at Work Regulations 1989
- C.D.M Regulations
- HVCA Ductwork Specification
- CIBSE Guides and Commissioning Codes
- CIBSE Code for Interior Lighting 1994
- Gas Regulations
- Insurance company inspection requirements
- FOC Rules
- BS 7671:2001 Requirements for electrical installations. (IEE Regulations 17th Edition) Including
- amendment 1 2008.
- Electromagnetic Compatibility Regulations 1992, SI No. 2372, 89/336/EEC.
- Electrical Equipment (Safety) Regulations 1994 SI No. 3260, 73/23/EEC.
- UK Construction Products Regulations 1994, SI No. 3051, 89/103/EEC.
- NHS Health Technical Memorandums, Health Building notes guides and regulations.
- NHS Fire Code Document
- Any additional requirements covered in the drawings and contract documentation
- MOD, Defence Estates Specifications –

034 (formally the PSA Standard Engineering Specifications (M&E) no. 1)
036 (formally the PSA Standard Engineering Specifications (M&E) no. 3)
037 (formally the PSA Standard Engineering Specifications (M&E) no. 100)

2.1.5 SUPERVISION

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

PART THREE

PARTICULAR SPECIFICATION FOR MECHANICAL SERVICES

SECTION ONE

3.1.0 GENERAL

3.1.1 INTRODUCTION

This part of the specification relates to the mechanical services particulars which shall be installed as part of the reconfiguration and renovation works throughout the flats within this social housing high rise development scheme.

3.1.2 DESCRIPTION OF BUILDING

The works are to be undertaken throughout all floors as detailed within the Main Contract documents.

The building is a high rise residential social housing development located in Poole. The approximate date of erection was during the 1960's. There are eleven floors, all of which consist of residential flats with the exception of a bin store, laundry room, o cycle stores and a pump room at ground floor level. External to the building, the grounds includes a large car park area, and lawn area.

The building is currently tenanted and is in need of major overhaul in terms of both architectural and building services.

3.1.3 SCOPE OF WORKS

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

- Modifications, stripping out of existing services in existing building.
- Domestic Services
- Water Treatment
- Ventilation
- Testing and Commissioning
- Thermal Insulation
- Above ground drainage
- Automatic Controls
- Electrical Services
- Builders work and Site Management

3.1.4 INSTALLATION REQUIREMENTS

All of the installations shall be in accordance with the requirements of Part Two of this specification in respect of standards of materials and workmanship.

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

3.1.5 EXISTING SERVICES PROVISIONS

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

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

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

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

3.1.6 ORDER OF WORKS

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

The phasing of works shall be undertaken in accordance with the details of the main contract.

The contractor shall allow for a minimum of 2 weeks in his programme for commissioning the engineering services in two parts:

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

3.1.7 NOISY WORKING

Note that any work of a noisy nature and likely to cause vibration to the structure shall be restricted where possible. When noisy works are necessary, the Contractor shall fully liaise with the Building Manager and accommodate their requirements. All necessary measures shall be taken to avoid nuisance caused to existing staff within the building.

3.1.8 MAINTENANCE CONTRACT

In addition to the requirement relating to defects liability, include in with your tender a separate sum for servicing and maintaining the whole of the Mechanical Services Installations for a period of 12 months from the date of Practical completion, as noted in the Breakdown of Tender.

3.1.9 COMMISSIONING

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

3.1.10 PERMIT TO WORK SYSTEM (EXISTING BUILDING)

A permit to work system is required to be put into place during the works and particularly when connecting into existing services including cold water drainage, dry riser and electric distribution mains.

3.1.11 ASBESTOS

Asbestos is known to be present in the building which is detailed on the clients asbestos records provide as part of this tender. As part of the Contract works the Contractor will be required to employ a specialist licensed contractor to carry out all necessary survey and asbestos removal prior to works commencing. If the Contractor suspects that asbestos is present in any other part of the works he must cease work on that particular aspect of the works and inform the Contract Administrator immediately.

3.1.12 BASIS OF DESIGN

i) External Design Conditions:

a) Winter
b) Summer

ii) Internal Design Conditions

Room	Summer	Winter
Living room	N/A	21 +/-1^{o}C
Dining room	N/A	21 +/-1^{o}C
Bathroom	N/A	21 +/-1^{o}C
Cloakroom	N/A	21 +/-1^{o}C
Hall	N/A	18 +/-1^{o}C
Kitchen	N/A	20 +/-1^{o}C
Bedrooms	N/A	21 +/-1^{o}C

iii) Fresh air Allowance:

Continuous mechanical trickle ventilation

iv) Internal Heat Gains

Lighting: 10-12 W/m^2
Occupants: 90 Watts/person (sen)
10 Watts/person (lat)

v) Noise Criteria (From plant/equipment)

Bedrooms:	NR 25
Kitchen:	NR 40-45
Living Space:	NR 30
Communal Lounge:	NR 30-35
Office Space:	NR 35
Laundrette:	NR 35
Toilets:	NR 40 - 45

vi) Ventilation

Mechanical extract	Bathrooms	8l/s
	Kitchens	13l/s

All mechanical ventilation is to be continuous trickle ventilation.

vii) System Operational Temperatures

1. **LTHW** — **80°C flow, 60°C return**
2. **Domestic** — **HWSInstantaneous at 41°C minimum**

SECTION TWO

3.2.0 HEATING

3.2.1 GENERAL DESCRIPTION

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

i) Existing

The heating system throughout the building is provided via electric storage heaters. There is no low temperature hot water (LTHW) on site.

The electric storage heaters are located in each flat corridor, kitchen, bedroom and living area. Each unit has their own local timer control. Wall mounted warm air heaters are located within the bathrooms. All heating appliances are generally dated and require overhauling.

The Contractor shall allow for stripping out all existing heating throughout the building including electric storage heaters, local power supplies and ancillaries as required to accommodate the new installation.

ii) New Installation

The Contractor shall allow for the supply and installation of new wall-mounted Dimplex Quantum Range Automatic Storage Heater - QM050, QM070, QM100, QM125, QM150 or equal and approved

SECTION THREE

3.3.0 DOMESTIC SERVICES

3.3.1 GENERAL DESCRIPTION

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

3.3.1.1 Cold Water

i) Existing

Mains cold water enters the building from below ground, and enters the ground floor plant room feeding 2 No break tanks. A separate mains cold water feed enters the service riser to feed the kitchen sinks within each flat. Water is boosted from the plant room to 2 No cold water storage tanks located on the roof via the main service risers. The tanked cold water is distributed back down the various service risers to serve the buildings domestic cold water demand in the form of electric hot water storage heaters, domestic cold water outlets and the ground floor laundry room.

The Contractor shall allow for stripping out 2 No break tanks, 2 No cold water storage tanks, 2 No booster sets, all sanitary ware items and all mains and tanked domestic cold water services pipework including all ancillaries. The water main shall be stripped back to the incoming service within the pump room.

ii) New Installation

The existing system shall be replaced in its entirety, the new cold water storage tanks and booster sets shall be sited within the ground floor pump rooms. All boosted cold water distribution pipework shall be thermally insulated, and run within the service risers. Any exposed pipework shall be installed within underdrawn ceiling voids or bulkheads to the Architects approval.

The Contractor shall allow for the supply and installation of 2 No replacement cold water storage tanks, 2 No booster set pumps, all sanitary ware items, all mains and boosted domestic cold water pipework and all associated ancillaries for a fully functional system. All plant and equipment shall be located and installed as indicated on the drawings and technical schedules.

Variable pressure regulating valves shall be provided to branches off the main riser on each floor to ensure maximum system operating pressures are not exceeded.

Local isolation shall be installed on the secondary cold water feeds to all sanitary ware.

New shower mixing valves shall be provided and installed as indicated on the drawings. Final locations shall be agreed on site prior to installing.

3.3.1.2 Hot Water

i) Existing

The Contractor shall allow for stripping out all electric water storage heaters, electric showers, all sanitary ware items, and all domestic hot water services pipework including all ancillaries.

ii) New Installation

The Contractor shall allow for the supply and installation of new HIU's, as detailed within section 3.2.1 and technical schedules. All new domestic hot water services pipework shall be served from the HIU's, be thermally insulated, and run within the service risers. Any exposed pipework shall be installed within underdrawn ceiling voids or bulkheads to the Architects approval.

Local isolation shall be installed on the secondary hot water feeds to all sanitary ware.

New shower mixing valves shall be provided and installed as indicated on the drawings. Final locations shall be agreed on site prior to installing.

3.3.2 PIPEWORK AND FITTINGS

All distribution pipework (including cold feeds, drips, wastes, overflow, warning pipes and final connections) shall be installed in copper tube to BS EN 1057 (generally as BS2871 Part 1, Table X).

All pipework shall be joined by way of brazing.

No push-fit or crimped fittings shall be used throughout the building.

3.3.2.2 External Water Mains - Not Applicable

3.3.3 VALVES

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

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

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

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

3.3.4 STOP VALVES

Stop valves, when required, shall be to BS 1010 as manufactured by IMI Yorkshire Fittings Ltd., Ref. YP508GM, or equal approved with capillary connections to BS 864 Part 2 and unions.

3.3.5 DRAIN VALVES

Shall be to BS 2870 Part 1 Table A as manufactured by IMI Yorkshire Fittings Ltd, reference 526DZR or equal and approved where the drain cock is visible. In plantroom areas Crane D171 HULS.

3.3.6 CHECK VALVES

Shall be to BS 5154 and shall be as manufactured by 'SOCLA' double check valve reference 2231 or equal approved with screwed joints to BS 21.

3.3.7 WATER BYE-LAWS AND BRITISH STANDARDS

All pipework, fittings, appliances, fixings and work shall comply with BS 6700 “Specification for the Design, Installation, Testing and Maintenance of Services Supply and Water for Domestic Use within Buildings and Other Curtilages and The Water Supply/Water Fittings) Regulations 1999"

All materials, fittings, appliances etc. shall be included in the WRC Water Byelaws Advisory Service Director 'Water Fittings and Material Directory'.

3.3.8 TESTING AND STERILIZATION

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

3.3.9 VIBRATION ISOLATION

Shall be as defined under Clause 3.2.10 LPHW Heating Section.

3.3.10 WATER TEMPERATURES

The water supply installation shall be insulated where concealed, or within ducts throughout the distribution system to minimise heat gain to the cold water supplies and heat loss to the hot water supplies, complying with the requirements of BS6700.

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

3.3.11 INSULATION

The water supply installation shall be insulated where concealed, or within ducts throughout the distribution system to minimise heat gain to the cold water supplies and heat loss to the hot water supplies, complying with the requirements of BS 6700. The insulation for the cold water installation shall be vapour sealed.

3.3.12 QUICK FILL CONNECTION TO NON-POTABLE WATER SYSTEM

Quick fill connections shall be provided in the positions indicated on the drawings. Each quick fill connection shall comprise a branch from the mains cold water service incorporating in sequence a stop valve, a double check valve assembly, as stop valve and a flexible hose, which in turn will connect to a branch from the non-potable side of the system incorporating a stop valve. When the system is full the flexible hose will be disconnected from the non-potable side of the system.

3.3.13 FINAL CONNECTIONS

All allowances shall be made for the supply, fixing and final connections to sanitary appliances. A ball type isolation valve shall be fitted within 450mm of each sanitary fitting.

The Contractor shall be responsible for all final mechanical and electrical connections to valves, control modules and sanitary ware.

3.3.14 REDUNDANT LEAD PIPEWORK - SECTION NOT USED

3.3.15 SELF REGULATING TAPE

All external pipework shall be fitted with self-regulating tape to provide frost protection.

3.3.16 COLD WATER STORAGE TANK

Sectional Storage Tanks shall be of the split type comprising 2 individual compartments.

Each tank compartment shall have an externally flanged base, be constructed to meet the requirements of the Water Supply Byelaw 30 and shall be complete with manhole, screened overflow and warning pipe connections. The ball valve shall be a Portsmouth type to BS 1212 complete with copper ball and overflow, drain and supply outlet connections shall be flanged. Plates shall be 1.0m x 1.0m and 1.0m x 0.5m min size and the tank shall incorporate all internal support rods.

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

The complete tank shall be supplied and erected by manufacturer as detailed in technical schedules or equal and approved, sited as indicated on the drawings. The Contractor shall site measure and check all tank sizes prior to ordering.

A bund wall shall be erected by the Contractor to eliminate flood risk in the event of tank failure. All tank supports and bases shall be provided by the Contractor.

3.3.17 THERMOSTATIC SHOWER MIXING VALVES

Provide, where indicated on the drawings, low head shower mixing valves appropriate for the equipment listed in the sanitary ware schedule.

3.3.18 BASIN/BATH THERMOSTATIC MIXING VALVES

All basins and baths shall be fitted with thermostatic mixing valves with flow restriction, fail safe and anti-scald. All thermostatic mixing valves shall be manufactured in DZR brass and be fully compliant with Department of Health Specification “D08” type TMV3.

All thermostatic mixing valves shall be complete with in-line basket strainers, isolating ball valves with swivel ends and check valves designed to meet BS1415 Part 2.

The maximum number of basins served from a single thermostatic mixing valve shall be two and the maximum run of mixed hot water pipework from the valve outlet to the furthest tap shall be 2 metres.

3.3.19 HOT WATER SERVICE CIRCULATING PUMPS - SECTION NOT USED

3.3.20 HOT WATER GENERATORS

Domestic hot water shall be provided by a heat interface unit (HIU) in each flat. Hot water is generated via a heat exchanger within the HIU, linked to the primary LTHW circuit.

See section 3.2.19 for further details of the HIUs.

3.3.21 HOT WATER GENERATOR FLUES - SECTION NOT USED

3.3.22 ELECTRIC WATER HEATERS - SECTION NOT USED

3.3.23 COLD WATER BOOSTER SET

Fully packaged cold water booster units shall be supplied and installed in accordance with the details given on the drawings and in the technical schedules.

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

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

3.3.24 URINAL CONTROL DEVICE - SECTION NOT USED

3.3.25 WC CISTERN RECESSED OVERFLOW BOX - SECTION NOT USED

3.3.26 PRESSURE REGULATING VALVES

Provide pressure regulating valves adjustable for 0 to 5 bar in the positions indicated on the drawings. All as manufactured by BSS Flamco, or equal and approved.

3.3.27 SEALED SYSTEM FILLING DEVICE

A Mikrofill type system filling devices shall be installed, appropriate for the system size and type. This shall be installed in the main plant room.

3.3.28 CIRCULATION PUMP

Circulating pumps shall be provided integral to the heat interface unit in each flat.

3.3.29 SPECIALIST EQUIPMENT/SANITARYWARE

The mechanical contractor shall fully liaise with the Main Contractor to ensure that specialist equipment and sanitary ware is accommodated. The Mechanical Contractor shall provide all final connections.

SECTION FOUR

3.4.0 WATER TREATMENT

3.4.1 GENERAL

On completion of the works to the new installations the systems shall be filled, flushed through, drained, and then refilled and dosed with an inhibitor.

Flushing loops shall be provided as required to prevent damage to items of plant, controls etc. from flushing operations. Manufacturers shall be consulted for their requirements in the respect.

The following clauses detail the normal flushing and dosing procedure for a new/fit out installation. Where the system is an extension to existing or fit out then the contractor shall liaise with the maintenance staff to ensure that the inhibitor is the same specification as that already utilised.

3.4.2 DRAIN DOWN

A 25 mm valved and plugged outlet shall be provided at the lowest part of the system for rapid draining (Flushing Valve). The valve shall be a lever arm ball or butterfly type offering tight shut off and quick action opening.

All other low points in the system are to be fitted with 15 mm full bore drain cocks with hose unions.

3.4.3 FLUSHING PROCEDURE

Flushing will consist of a number of operations:

i) Completely fill the system for final pressure testing with cold water. Empty the system on completion of the test. Remove strainer screens; clean and replace.

ii) Refill system and inject cleansing agent through dosing pot. Pumps to be run to circulate the diluted agent.

iii) Drain out the mixed solution following the recommended period of time. Some manufacturer's requirements are that the system is slightly raised in temperature by the boilers during this period. Empty the system.

iv) Refill the system to complete balance commissioning of the valve and equipment sets. Any neutralising agent should be introduced if necessary, to the filled system. Balancing can be accomplished cold if necessary.

v) By use of the dosing pot, introduce the inhibitor into the system by draining off as much system water as inhibitor injected. The circulating pumps must be running and caution should be taken to ensure that air is not introduced into the system through the dosing pot (injection point).

3.4.4 DOSING POTS

11 litre dosing pots shall be fitted to the heating water pipework systems.

Each pot shall comprise 150mm diameter tube capped at either end with welded caps, provided with the following connections:

1 - 20mm valved fill connection with sealed lid funnel

1 - 15mm valved connection to suction side of pump

1 - 15mm valved connection to discharge side of pump

1 - 15mm valved connection for venting during the full operation.

Proprietary units as manufactured by Houseman Ltd, or equal and approved shall be used.

3.4.5 FLUSHING AGENTS AND INHIBITORS

Suitable flushing agents and limescale inhibitors shall be provided by the following manufacturers:

Liff
Fernox Heating

3.4.6 LIAISON WITH BUILDING MAINTENANCE

The contractor shall liaise closely with the building maintenance engineer during the course of the above operations. The building maintenance engineer will be present during cleaning and water treatment activities.

SECTION FIVE

3.5.0 GAS

The work under this section shall include for the design, supply, installation, testing and commissioning of a gas supply system. The contractor shall allow for all necessary liaison with local and statutory authorities to ensure that the gas supply is provided in accordance with the programme.

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

i. Existing

There is no gas distribution on the site at present, however there is surrounding local gas infrastructure.

ii. Proposed

A new branch shall be made off the existing surrounding local gas infrastructure which shall be routed within an underground trench to serve Matthias Court. A separate gas connection shall be made to serve Adelphi Court. Gas requiring heat generating plant shall be located on the roof. All gas distribution pipework shall be routed within the existing rubbish disposal shaft.

The Main Contractor has been provided with details of the incoming gas services requirements and all initial correspondence with statutory authorities. This includes for the supply and installation of a new metered supply to the site boundary.

The Contractor shall liaise fully with the Main Contractor regarding the responsibilities of all parties relating to new incoming services requirements. The Contractor shall provide new gas services from the site boundary to the building. A rising gas main shall be provided to run within the new cladding system, including suitable ventilation of all enclosed sections of riser.

The final routes and locations of all new services shall be agreed on site with the CA prior to undertaking.

3.5.1 INTERNAL PIPEWORK AND FITTINGS

Internal pipework shall be mild steel heavyweight quality manufactured in accordance with BS1387.

Steel pipework shall have welded joints. Joints shall be in accordance with BS2640 or BS2971.

At valve, equipment position where screwed joints are required the joints shall be made using a jointing material approved by the Engineer prior to any joints being made. PTFE tape will be accepted.

Welded joints shall be made using weldable fittings in accordance with BS1965. The fittings shall be of the same weight grade as the pipework to which they are fitted.

3.5.2 VALVES

All valves shall be as manufactured by Crane Ltd or equal approved. Isolation valves shall be type D171 ball valves.

3.5.3 GAS SHUT-OFF

The automatic controls contractor shall provide a solenoid operated gas shut off valve within the plantroom which shall be operated by fusible links over boilers and a panic push button at the plant room door.

3.5.4 PAINTING

All gas pipework and parts of the gas installation shall be painted as detailed in the Heating installation Section. The pipework final coat shall be Yellow Ochre 08C35 to BS4800.

3.5.6 EXTERNAL GAS MAINS

3.5.6.1 Pipework Fitting and Jointing

All external buried gas pipework and fittings shall be yellow medium density polyethylene conforming to ISO4437 specification manufactured and tested to meet the requirements of BS5750.

Only trained operatives having experience of working on contracts involving the laying, jointing and installation of MDPE gas pipework and fittings shall be used. Written verification of these requirements shall be given to the Supervising Officer.

MDPE Pipework shall be jointed by socket fusion methods possible but according to pipe size and the particular circumstances butt fusion joints may be used when necessary. Fusion machines and equipment shall be used to ensure correct alignment and control of forces due to joint heating and cooling.

All MDPE joints shall be made in accordance with the pipe manufacturer’s instruction.

3.5.6.2 MDPE Pipework Installation

All installations procedures and components used during installation shall be in accordance with the pipe manufacturer published recommendations which for the purpose of this contract shall be interpreted as being mandatory requirements.

3.5.6.3 Excavation and Backfilling of Trenches

Trenches shall be dug to the minimum depth indicated on the drawing and backfilled with selected materials as detailed.

3.5.6.4 Valves and Valve Access Points

Valves shall be of the type recommended in publication "IGE/UP/2". Valves shall be guaranteed suitable for the application by the valve manufacturer with packing and seals suitable for use with natural gas.

3.5.6.5 Gas Main Markers

Valves and purge point marker plates shall be fitted to a convenient adjacent structure or to a marker post as detailed in publication "IGE/UP/2". Gas route markers shall be provided and set in concrete at ground level in sufficient number so as to accurately indicate the route of all buried gas mains.

3.5.6.6 Related Documents

In addition to documents referred to elsewhere in the Specification the whole of the Gas Main Installation including components and installation procedures shall be in accordance with the following:-

Ref No	Document Reference
IGE/UP/1	Soundness Testing and Purging of Industrial and Commercial Gas Installations
IGE/UP/2	Gas Installation Pipework, Boosters and Compressors on Industrial and Commercial Premises
IGE/TD/3	Distribution Mains
IGE/TD/4	Gas Services

All the above documents can be obtained from "The Institution of Gas Engineers" 21 Portland Place, London W1N 3AF

Recommendations in any of the above documents shall for the purpose of this contract, be interpreted as being mandatory requirements.

3.5.6.7 Builders work

All builders work associated with the Gas Mains Installation including excavation, valve chambers, concrete bases, concrete covers, surface boxes, marker posts, and other similar associated builders shall be provided as part of this contract.

The Contractor shall allow for all trenching and pipework protection as required to bring gas pipework from the site boundary to the building, then within the riser to the plant room.

3.5.7 PURGE POINTS INTERNAL AND EXTERNAL INSTALLATIONS

Purge points shall be fitted following the outlet from the meter, at the ends of pipe runs and at other positions necessary to facilitate the correct purging of pipes. Each purge point shall be fitted with a valve and either a plug or cap.

3.5.8 TESTING AND COMMISSIONING OF INTERNAL AND EXTERNAL INSTALLATION

All installations shall be tested for leakage including the provision of all necessary pressure test points, gauges and instruments.

Leakage and testing shall be carried out in accordance with the procedures recommended in the British Gas publication IM/5 "Soundness Testing 3rd Edition 1986 Gas Soundness Testing Procedures for Industrial and Commercial Gas Installations".

All allowances for leakage testing and purging shall be included and shall include the provision of inert gas where applicable.

The testing procedures shall be carried out on a sectional basis as necessary to suit the progress of works on the various sites. A final leakage test on each site shall be conducted and witnessed by the E.A.

Any leaks detected shall be repaired and the affected section subsequently re-tested all to the satisfaction of the E.A.

3.5.9 VENTILATED SERVICES DUCTS

Gas mains running through service risers or voids i.e. ceilings shall be ventilated in accordance with gas board recommendations.

3.5.10 GAS METERS

The main incoming gas meter shall be supplied and installed by the local Gas provider.

Each boiler shall be provided with an Ofgem approved pulsed output gas meter, linked back to the BMS.

SECTION SIX NOT USED

SECTION SEVEN

3.7.0 VENTILATION

3.7.1 GENERAL

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

i) Existing

Local positive input fans are installed within each flat to positively pressurise the space. The air is supplied from outside via a boxed in flexible duct. Air is extracted from the

bathroom through a wall-mounted louvre into a negatively charged riser divides back-to-back flats. The extracted air travel up to roof level where it is discharged to atmosphere.

The ventilation system is uncontrolled, and we assume that the air volume being extracted is constant (even if residents turn off their positive input fans).

The Contractor shall include for stripping out all existing positive input fans, extract fans, associated ductwork and louvres.

ii) New Installation

New centralised supply and extract fans shall be installed on the roof. The existing extract fans shall be replaced in their current positions, and the supply fans will be mounted above the existing service risers above the main corridors as indicated on the drawings.

The existing service riser at either end of the building (adjacent to the firefighting main) shall be used for supplying fresh air into the main corridors of each floor. This will positively pressurise the corridors, which will infiltrate into the flat space through new door transfer grilles or door undercuts to the Architects approval.

All ductwork shall be concealed within the service risers, any exposed ductwork shall run within underdrawn ceiling voids and/or bulkheads to the Architects approval. All supply ductwork shall be thermally insulated.

All external supply and extract fans shall be IP rated as indicated in the technical schedules.

3.7.2 DUCTWORK

3.7.2.1 General

All low, medium and high pressure ductwork shall be constructed from galvanised sheet steel and be manufactured and installed in accordance with HVAC Specification DW/144. For the purposes of testing, all ductwork will be classed as medium pressure.

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

Ductwork bends shall have a minimum internal radius of one half the duct width or be fitted with turning vanes, angular bends without turning vane shall not be permitted.

Transformation pieces shall be constructed to provide a maximum angle of 15 degree of any side to the duct axis. All joints and flanges etc., shall be sealed with a suitable compound to render an air tight seal.

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

3.7.2.2 Flexible Connections

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

3.7.2.3 Flexible Ductwork

All terminal fittings shall be connected to the ductwork distribution system by flexible ductwork constructed of a fire resistant material, and approved by the local Fire Officer and the Contract administrator. The flexible ductwork shall be suitable for the system pressure and have a maximum length of 300 mm unless agreed otherwise by the CA. Each end shall be securely fastened with jubilee clips and sealant component to render an air right seal.

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

3.7.2.4 Volume Control Dampers

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

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

3.7.2.5 Fire Dampers

Fire dampers shall be installed where indicated on the drawings, as manufactured by Actionair Ltd.

Fire dampers shall be installed where ductwork crosses all half-hour rated fire compartmentation. The Contractor shall review the Architect's fire compartmentation drawings and make all necessary allowances.

Fire dampers will be required within the ventilation risers when the ducts break the floor slab. The existing through-risers shall be fire-stopped at each floor.
The dampers shall have at least 2 hour fire resistant rating and shall meet with the requirements of BS476 Part 20, the Local Authority, and the Fire Officer.

They shall be installed complete with building in frame to take up expansion of the damper. Installation frames shall be fitted with dry wall/portion fixing flanges where appropriate and all installations shall be in accordance with the manufacturers' standard details.

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

Fire dampers shall incorporate a self latching removable release mechanism, rated at 72°c and an external visual blade position indicator.

3.7.2.6 Smoke Activated Fire Dampers

Smoke activated smokes and fire dampers shall be installed where required by the fire plan, available upon request from the CA. The Contractor shall review the fire plan and Architect's fire compartmentation drawings and make all necessary allowances.

Where required, a control and status indication panel shall be installed on each floor (location to be confirmed with the CA). All control panels shall be wired back to an over-ride (open/close function) panel at each main entrance door.

The dampers shall have at least 2 hour fire resistant rating and shall meet with the requirement of BS 476, Part 20, the local authority, and the fire officer.

They shall be installed complete with building in frame to take up expansion of the damper. Installation frames shall be fitted with dry wall/partition fixing flanges where appropriate and all installations shall be in accordance with the manufacturers' standard details.

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

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

3.7.2.7 Access Panels

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

3.7.2. Test Holes

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

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

3.7.3 GRILLES AND DIFFUSERS

Provide where indicated on the drawings and detailed in technical schedules. Grilles and diffusers of aluminium construction fitted with volume control. Dampers finished to an approved colour.

3.7.4 PLENUM BOXES

Provide plenum boxes, where indicated on the drawings and detailed in technical schedules. These shall be matched to the supply diffusers, insulated in accordance with the insulation section of the specification and generally supported from the building structure.

These shall be fitted with volume control dampers.

3.7.5 EXTERNAL LOUVRES

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

3.7.6 SOUND ATTENUATORS

Attenuators shall be supplied and installed in the positions indicated on the drawings. The attenuators shall be designed to reduce the airborne fan noise via the ductwork to a noise rating to meet the noise level stated in the design criteria in Section One of this Specification and detailed in the schedule.

Any ductwork between the fan and the attenuator shall be insulated with acoustic insulation to prevent noise breakout. Insulation shall be detailed in section 10 of this specification.

3.7.7 EXTRACT FANS

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

3.7.8 CROSSTALK ATTENUATOR - SECTION NOT USED

3.7.9 HEAT RECOVERY AIR HANDLING UNITS (HRU) - SECTION NOT USED

3.7.10 AIR DISPLACEMENT TERMINAL UNIT- SECTION NOT USED

3.7.11 VARIABLE AIR VOLUME CONTROL UNITS - SECTION NOT USED

3.7.12 DRAIN PIPEWORK FROM AIR HANDLING UNITS - SECTION NOT USED

3.7.13 VIBRATION ISOLATION

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

SECTION EIGHT

3.8.0 DX TYPE AIR CONDITIONING SYSTEMS - SECTION NOT USED SECTION NINE

3.9.0 TESTING AND COMMISSIONING

3.9.1 GENERAL

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

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

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

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

3.9.2 EXISTING SERVICES

i) Draining Down and Refilling

The existing steam, condense, heating, DHWS, MCWS and TCWS pipework where affected by the works shall be isolated and local sections only drained to suit the modifications /strip out works.

ii) Testing and commissioning

All existing air and water systems where affected by the works shall be vented, rebalanced and re commissioned in accordance with the relative clauses of this section.

3.9.3 HYDRAULIC TESTING

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

Notice shall be given of at least 24 hours to the Contract Administrator prior to any test.

Test pressures applicable to services shall be:

i) Low/medium/high pressure ductwork:

Shall be pressure tested in accordance with defined air leakage and pressures given in HVCA standard specification DW144.

ii) Chilled water Pipework including ancillaries:

1.5 x working pressure

iii) Low pressure hot water pipework including ancillaries:

1.5 x working pressure

iv) Hot and Cold Water Services:

1.5 x working pressure

v) Gas Pipework:

2 bar (excluding gas governors)

vi) Steam/Condensate:

1.5 x working pressure

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

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

3.9.4 COMMISSIONING

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

i) Water distribution in accordance with the CIBSE Code W.

ii) Air distribution in accordance with the CIBSE Code A.

iii) Automatic control equipment in accordance with the CIBSE Code C.

iv) Health technical memorandum 2022 for dental (medical) compressed air and vacuum installations.

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

3.9.5 MATERIALS

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

3.9.6 TESTS AFTER CLIENT OCCUPATION

Once the Client has occupied the building and all rooms are in use then the Contractor shall attend site and locate 6 No. thermographs to agreed positions.

A thermograph shall also be located externally to monitor outside temperature conditions at the time of the test.

The thermographs shall be monitored by the Contractor on a daily basis to ensure that there is no malfunction. The building will be monitored for a two week period and all results clearly tabulated with date and location of unit and sent to the CA for comment.

3.9.7 CLEANLINESS OF DUCTWORK INSTALLATION

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

System shall be tested for bacterial cleanliness prior to handover.

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

3.9.8 NOISE LEVELS

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

3.9.9 INSURANCE COMPANY INSPECTIONS

Steam calorifiers, air receivers and other pressure vessels together with their mountings and accessories shall be inspected by a competent person acting for the insurance company appointed by the employer whether or not such equipment is required to be inspected under the provisions of the Factories Act. The equipment shall satisfy the insurance company's requirements in all aspects.

The contractor shall advise the CA, as soon as possible, as to when equipment which is subject to inspection and certification will be ready for any examination. The CA will then place an order with the insurance company for inspection during construction and will advise the contractor of the details and nature of the order so placed.

It will then be the contractors responsibility to provide detailed drawings of the equipment to enable the insurance company to approve the design before manufacture is started, and to arrange for the attendance of the insurance company's engineer surveyor at each stage of manufacture and to give him every facility for inspection and testing the work as required by him.

No plant which is subject to inspection will be accepted contractually or for service until a satisfactory certificate has been received by the CA from the insurance company.

On completion of the installation the authority will arrange for a full inspection by the competent person and during this the contractor shall arrange to be in attendance.

All charges by the insurance company for examination and approval of drawings, inspection of work during construction and inspection and certification of the completed plant, will be met by the employer.

3.9.10 SPRINKLER INSTALLATION - INCLUDED ELSEHWERE WITHIN TENDER

SECTION TEN NOT USED

SECTION ELEVEN NOT USED

SECTION TWELVE

3.12.0 ELECTRICAL SERVICES

3.12.1 GENERAL DESCRIPTION

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

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

This section shall be read in conjunction with Section Eleven.

Final connections from locally supplied equipment to be made by the mechanical contractor. The electrical contractor will generally provide services up to local isolation.

3.12.2 MECHANICAL SERVICES WIRING

i) General

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

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

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

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

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

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

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

ii) Control Panels

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

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

iii) Containment

a) The controls specialist shall supply and install containment systems isolators and associated components in accordance with clause 3.12.5 of the section generally as follows but not necessarily limited to:-

- All plantroom areas
- Final run outs to sensors, valves etc., from primary containment runs in the ceiling void areas etc., of all buildings including tray runs, trunking, conduit, back boxes etc.
- Main containment runs in ceiling void areas
- Supplies to fan coil units, fan convectors, control panels, local supply and extract fans, ventilators etc.
- Serving Monodraft ventilators inc all connected control wiring.

3.12. TESTING

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

3.12.4 EARTHING AND BONDING

Provide all necessary earthing and bonding to the mechanical services in compliance with the requirements of BS7671 Requirements for Electrical Installations. (IEE Wiring Regulations 17th Edition).

3.12.5 MECHANICAL SERVICES CONTAINMENT

3.12.5.1 <u>Containment Supports</u>

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

3. 12.5.2 <u>Cable Tray</u>

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

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

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

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

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

3.12.5 **Cable Trunking**

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

All cable trunking to be manufactured to BS 4678, Part 1, 1971, hot dipped coated with minimum coating of 275 gm/^{2}m. Both sides (grade Z2) to BS 2989, 1992 (BSEN 10142, 1992).

The trunking shall be manufactured to a minimum material thickness of 1.0mm for trunking up to 50mmx50mm and 1.2mm above this size.
All cable trunking sets, bends and couplers are to be proprietary type. No site manufactured pieces will be accepted.

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

3.12.5.4 **Galvanised Conduit**

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

All conduit shall be either:

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

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

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

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

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

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

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

Type of Installation	Method of Fixing

Wall chase or floor screed	Crampets or ordinary saddles
Ceiling, roof or floor voids	Spacer bar saddles
Surface mounted on ceiling	Spacer bar saddles
Surface mounted on walls	Distance saddles

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

Where conduit passes through floors, ceilings and walls, the opening shall be sealed in accordance with section 527-02 of BS 7672.
Conduits and boxes installed by casing in concrete slabs shall be painted with Epoxy resin paint prior to the slabs being poured, all boxes to be protected to prevent ingress of concrete/moisture.

3.12.5. **Flexible Conduit**

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

Terminations shall be by means of compression glands.

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

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

Heat Resistant

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

General

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

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

Cables shall be installed without joints.
Cables shall be colour coded in accordance with tables 51A and 51B of BS 7671.

Power Cable

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

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

General

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

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

3.12.6 ISOLATORS

Isolators and final connection equipment of a suitable rating will be supplied and installed the electrical contractor.

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

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

(Plantroom)

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

SECTION THIRTEEN **NOT USED**

SECTION FOURTEEN **NOT USED**

SECTION FIFTEEN **NOT USED**

SECTION SIXTEEN **NOT USED**

SECTION SEVENTEEN **NOT USED**

SECTION EIGHTEEN **NOT USED**

SECTION NINETEEN

3.19.0 BUILDERSWORK AND SITE MANAGEMENT

All builders work including trenching, holes through structure, chases, boxing in, bulkheads, builders work ducts, fire cladding, bases, scaffolding, site power and lighting etc. shall be provided by the Main Contractor.

The Contractor shall, as part of his tender return, provide the Main Contractor with details of all anticipated builders work.

The Contractor shall be responsible for informing the Main Contractor of the requirements for all Pendock Profile, bulkheads and boxing-in as required to conceal mechanical services, including pipework, ductwork and drainage.

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

Reference should also be made to the Main Contract Preliminaries.

SECTION TWENTY **NOT USED**

3.20.0 TECHNICAL SCHEDULES

Refer to document 3431-MSCHED-001.

PART FOUR - PARTICULAR SPECIFICATION FOR ELECTRICAL SERVICES

SECTION ONE

4.1.0 GENERAL

4.1.1 INTRODUCTION

This part of the specification relates to the Electrical Services that are to be undertaken in association with the complete refurbishment of Nelson Court Poole.

4.1.2 DESCRIPTION OF BUILDING

Nelson Court is located in Poole. The building is thought to have been erected in the 1960s. The building concrete framed construction with brick infill external walls, double glazed PVC framed windows and a flat roof, which is typical of a high-rise block of flats. It was noted that external walls had some cavity wall insulation, although it was generally in poor condition.

The building has 2 No main entrances on opposite sides of the building. On entrance to each side there is a circulation lobby leading to a stair core, lift lobby and residential flats.

Electrical services are fed from the ENW substation located on the ground floor, sub main cables supply splitter boxes which in turn provide a supply into each flat.

Energy supplier metering is provided within each dwelling adjacent to the consumer unit. Cables are routed from the ground floor level via dedicated risers which accommodate the splitter units.

A dedicated landlord supply is provided which is located within the ground floor plantroom.

Mechanical services are fed from the ground floor and roof plant rooms. The majority of services run in service risers directly into flats. These are typically located between pairs of flats and house the main heating, electrical and waste water distribution services.

4.1.3 SCOPE OF WORKS

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

a. Strip out

b. Electrical Supply and Distribution

c. Containment

d. Lighting Installation

e. Emergency Lighting

f. General Purpose Power Installation

g. Supplies to Fixed Appliances

h. Supplies to Mechanical Services

i. Fire alarm system

j. Telecommunications installation

k. Access Control / CCTV Installation

l. Television Integrated Reception System

m. Lightning protection system

n. Photo voltaic array

o. Earthing and bonding

4.1.4 INSTALLATION STANDARDS

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

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

4.1.5 EXISTING SERVICES

All redundant electrical services and equipment be made safe, stripped out and removed from site.

The strip out of the electrical services shall be taken back to the ENW riser. Fuses including the existing tails.

The existing ENW risers and distribution boxes will be retained and adopted by ENW to resupply the flats.

The strip out of the existing communication wiring shall be taken back to the existing 20pair shunts boxes located within riser A at each floor. The existing shunts shall be retained on each floor for reuse.

The existing access control / intercom system shall be stripped out completely.

The existing fire alarm system shall be stripped out.

4.1.6 ORDER OF WORKS

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

4.1.7 BASIS OF DESIGN

The following general design parameters have been employed:

I) **Illuminance Levels**

In accordance with the illumination levels as recommended by CIBSE Society of light and lighting

II) **Emergency Lighting Levels**

Defined Escape Routes:

1 Lux minimum at floor level anywhere along the centre line of the escape route and a uniformity ratio of 40:1 maximum to minimum must not be exceeded, with

exception of 24hr unobstructed escape routes where 0.2 Lux minimum (average) at Floor Level is acceptable.

Open (Anti-Panic) Core Areas:
(Areas larger than 60m^2)

0.5 Lux minimum (average) at floor Level, 0.025 Lux minimum (average). Floor Level (unobstructed)

4.2.0 ELECTRICAL SUPPLY AND DISTRIBUTION

4.2.1 GENERAL

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

4.2.2 ELECTRICAL SUPPLY ARRANGEMENTS

Existing

The building is currently supplied from distribution room/substation at ground floor level within the building footprint.

The supplies to each flat are derived from existing Southern Electricity risers which contain multi-way fuse cabinets, each riser feed is derived from the existing Southern Electricity LV panels within the substation.

A dedicated supply from the Southern Electricity LV panels is provided to the landlord's main electrical panel. The current metering arrangements are provided on the LV output from each transformer, it is understood energy charges where apportioned to each occupant and landlord services.

Proposed

The existing risers and distribution cabinets are to be retained under the ownership of Southern Electricity who will carry out their own inspection of the services.

Any New supplies required into each apartment will be derived from the existing Southern Electricity fuseways which are rated at 100A.

The contractor shall include for 25mm^2 LSF meter tails from Southern Electricity fuses in riser. 25mm^2 LSF taken to DP mains isolator switch plus G/Y LSF earth connection.

A new landlord metered supply will be provided, this shall comprise of MOD156 metering unit installed by Southern Electricity. This equipment will be located in the switchroom at ground floor level.

A new landlord MCCB panel shall be provided and installed adjacent to the landlord metering panel, from there sub-main supplies shall be installed to the landlord services, generally as follows:

- General lighting and power distribution boards
- Lift systems
- Mechanical services
- Surge suppression
- Photovoltaic array

4.2.3 MAIN SWITCHGEAR

Low Voltage MCCB Distribution Panel board

The contractor shall allow for a new 250A rated MCCB panel board to be located within the ground floor switchroom.

<u>Moulded Case Circuit Breakers (MCCB's)</u>

Supply and install where indicated MCCB's. All MCCB's shall fully comply with BS EN 60947-2 & BS 60898.

Miniature Circuit Breakers (MCB's)

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

Residual Current Devices (RCB0's)

Supply and install where indicated RCD's. All RCBO's shall fully comply with BS EN 61009 & BS EN 60898 with a sensitivity of 30mA.

Sub Distribution Boards

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

Each sub-distribution board will consist of a lockable cabinet with integral switch disconnector and a full complement of MCB's / RCBO's complying with BSEN60898 (10 kA) or BSEN 60947 (15kA).

The Electrical Services Contractor will ensure that each MCB is sized in accordance with the rating of the circuit to which it is connected and that all laser printed circuit charts and numbering are clearly labelled. A minimum of 20% spare ways will be available within the equipment upon completion of the project, with a minimum of two number TP&N spare ways. All distribution boards will be equipped with hinged lockable doors with keys suited to fit all doors.

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

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

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

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

Within each designated area or room and where possible, the small power circuits will be connected to the same phase.

The Contractor will also provide a clear zone above / below (as applicable), the sub-main termination point to accommodate a Merlin Gerin Power Logic meter on both the incoming MCCB and all Isobar4 distribution boards.

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

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

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

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

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

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

4.2.4 SUB-DISTRIBUTION SERVICES

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

Cable Tray

All cable trays to be supplied and installed in accordance with manufacturers' recommendations, observing maximum distances between suspensions. All cable trays shall be medium duty return flange, hot dipped galvanised and manufactured to BS EN 61537 & BS EN 10346.

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

All cable tray bends, sets, reducers and couplers shall be of a proprietary nature, NO site manufactured sets or bends will be accepted.
All cuts made to finished cable tray shall be painted in situ with galvafroid paint.

LSF Twin and Earth Cable

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

Heat Resistant

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

General

Cables shall be installed without joints.

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

Power Cable

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

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

General

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

At all terminations the sheath and armour shall be secured by brass compression glands and of a type suitable for both cable and its location. The glands shall be complete with both earthing tag and plastic shroud. Any underground cable jointing shall be carried out using proprietary resin type joint kits as manufactured by BICC, AEI or RAYCHEM.

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

Fire Rated Soft Skin Cable

FP200 Gold – Specification

General

Cables for surface wiring of fire alarm and emergency lighting systems should be of screened construction and sufficiently robust to meet the intended installation condition.

Cables should meet the performance requirements of BS6387 Category CWZ, EN 50200 PH30 & PH60, BS 8434-1 30 minutes, BS EN 60332-1-2, BS EN 50266-2-4, BS EN 61034-2 and produce less than 0.5% acidic gases when tested in accordance with BS EN 50267-2-1.

Voltage rating - The cables shall be rated at 300/500V
Conductors - Conductors shall consist of plain annealed copper and the circuit protective conductor of tinned annealed copper.

Insulation - The insulation shall be of a robust cross-linked mineral filled type complying with BS7655 type EI5.

Core Identification - Cores shall be identified by colours.

Screen - The screen shall consist of a longitudinally applied laminated aluminium tape, of minimum metal thickness 0.075mm, securely bonded to the sheath.

An uninsulated tinned copper circuit protective conductor shall be in contact with the screen.

Sheath - The sheath shall be a robust mineral filled compound complying with BS7655 Type LTS3.

Certification - The fire resistant properties of the cable shall be certified by a recognised approval body.

4.3.0 LIGHTING INSTALLATION

4.3.1 GENERAL

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

4.3.2SYSTEM OF WIRING

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

Communal / Landlord Areas - Lighting sub-circuit wiring shall be installed using LSF insulated singles cables of minimum cross sectional area of 2.5mm² drawn into UPVC conduit and routed within the building fabric.

4.3.3 LIGHTING CONTROL SYSTEMS

The electrical services contractor shall supply and install lighting controls as indicated on the drawings and where appropriate within the luminaire schedule.

The control of luminaires shall generally be as follows:

Flats

Manually switched throughout.

Landlords Communal Areas

All luminaires to be equipped with integral PEC and motion sensors, the luminaires shall be configured during commissioning to provide the following:

- Lift lobby luminaires – lit to 10% of output and 100% output on activation for maximum period of 5 minutes.
- Corridor luminaires – 1 out of every 3rd luminaire to be at 10% output unless activated. After a maxim time out provide of 5 minutes at 100% the luminaires will return to 10% and 0% respectively.
- Stairwell luminaires – off when sufficient daylight is available, if insufficient natural light available then luminaires to be on 10% output, 100% output when activated. Luminaires to return to 10% after maximum of 5 minutes.
- Other areas for example plantrooms, storage etc. shall be provided via integral movement sensors with on/off control with switch off after 5 minutes if no motion is detected.

4.3.4 ACCESSORIES

Presence detectors with a detection span of 7m diameter shall be provided, ceiling mounted as detailed on the accompanying drawings.

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

4.3.5 LUMINAIRES

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

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

4.3.6 EXTERNAL LIGHTING

The electrical contractor shall allow for external lighting to be controlled via the two channel electronic timer. Each channel complete with an override switch.

The two channels shall independently energise lighting contactors, each channel to have a time difference to allow staggered energisation of external luminaires.

The external lighting shall comprise of LED floodlights on 4 metre aluminium columns.

Each column to be complete with backboard and service cut out.

SECTION FOUR

4.4.0 EMERGENCY LIGHTING

4.4. GENERAL

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

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

Emergency Exit signs shall be legible at all times. Emergency Exit signs shall be non-illuminated and supplied by others. Emergency luminaires shall be installed adjacent to emergency exit signage.

All emergency lighting luminaries shall be complete with fluorescent lamps as described in the Schedule of Luminaries.

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

Each self-contained emergency luminaire shall be provided with a 4-wire supply: - phase, neutral, CPC and permanent unswitched live feed.

Integral 3hr emergency battery packs shall be provided within the luminaire as detailed on the accompanying drawings.

Standalone IP65 3hr non-maintained luminaires shall be provided outside fire escape doors as detailed on the accompanying drawings.

4.4.2 CONTROL AND TEST FACILITY

Test key switches shall be located adjacent to or within every landlord riser position and be labelled stating area of coverage for test key.

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

Operation of the test key facility shall not affect the normal operation of any other luminaires supplied or controlled from the same general lighting switch position or circuit.

On completion, and after a minimum 24 hour charge period, each emergency unit shall be functionally tested by operation of the test switch with the batteries discharged for the full 3 hour period, after which recharged and again functionally tested, to the manufacturers recommendation.

Any luminaire that fails to operate for the full rated standby period shall be replaced by the Contractor at no cost to the project.

4.4.3 SYSTEM OF WIRING

Wiring to the emergency lighting luminaires shall be carried out in LSF singles cable drawn within UPVC conduit generally within the ceiling voids or building fabric.

4.5.0 GENERAL PURPOSE POWER

4.5.1 GENERAL

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

4.5.2 SYSTEM OF WIRING

Communal / Landlord Areas - For any final small power sub-circuit, cable having a minimum cross sectional area of 4.0mm² shall be utilised.

Small power sub-circuit wiring shall be installed using LSF insulated singles cables of minimum cross sectional area of 4.0mm² and as detailed on the distribution board schedules, routed within galvanised trunking and UPVC conduit within the building fabric.

Flats – Where news small Power sub-circuit wiring are required these shall be installed using flat Multi-core LSF (Twin & Earth) insulated cables of minimum cross sectional area of 2.5mm² routed within the ceiling void, all drops shall be concealed within the building / fabric to the positions as indicated and protected by uPVC capping.

Ring Mains - 2.5mm² Multi-core LSF (Twin & Earth)

Cooker Circuits – 10.0mm² Multi-core LSF (Twin & Earth)

Shower Circuits - 10.0mm² Multi-core LSF (Twin & Earth)

4.5 ACCESSORIES

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

All socket outlets shall be switched unless specifically stated otherwise. All 230V socket outlets shall have standard pin configuration. All accessories shall come complete with anti-tamper screw fixings.

Cleaner's sockets within communal areas shall be of the 'non-standard' T Pin earth type complete with switch.

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

For water heaters and similar equipment to be provided by the Mechanical Sub-Contractor, the Electrical Sub-Contractor shall provide and install a fused connection unit or double pole switch as appropriate together with a flush concealed conduit and box for back entry into the equipment.

The Electrical Sub-Contractor shall include for fixing and connecting the equipment using heat resistant single core cables.

The contractor shall be responsible for providing all accessories, with the exception of the TV wall plates to match the rest of the installation, in accordance with the schedule of specified equipment.

The TV wall plates shall be supplied by the IRS specialist.

SECTION SIX

4.6.0 SUPPLIES TO MECHANICAL SERVICES

4.6.1 GENERAL

The works under this section shall include for the supply, installation, testing and commissioning of supplies for mechanical services and comprise of the following.

4.6.2 CONTAINMENT FOR MECHANICAL SERVICES

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

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

4.6.3 CONTROL PANELS

The electrical contractor shall provide a supply to the mechanical services control panels located in ground floor and roof plant rooms.

The supplies shall be derived from the landlords main distribution panels with 4c XLPE/SWA/LSF cable in galvanised trunking.

4.6.4 H EAT INTERFACE UNITS

The electrical contractor shall supply and install a switch fused connection unit adjacent to the HV within each flat. Final connection via heat resistant flex. Mechanical contractor shall make final termination connections to each unit.

4.6.5 WIRING TO COOKER HOODS

The electrical contractor shall allow for the wiring to and connecting up of the cooker hoods. The cooker hoods will be provided free issue and installed by the mechanical services contractor, the electrical contractor will allow for connecting each of the cooker hoods to the local 13A fused connection unit.

4.6.6 STAIRCASE VENTILATION

The electrical contractor shall supply and install an electrical supply to the staircase smoke ventilation system. The supply shall be installed using 2C fire resistant cable. Final connection via fused connection unit adjacent to the panel.

SECTION SEVEN

4.7. STAFF ATTACK - SECTION NOT USED SECTION EIGHT

SECTION EIGHT

4.8.0 FIRE ALARM SYSTEM

4.8.1 GENERAL

Works under this section shall include for the supply, installation, testing and commissioning of fire protection within the flats in accordance with the requirements of BS 5839-Part 6:2004.

The devices shall be mains driven from a dedicated circuit off the consumer unit in each flat using 3c LSF insulated cable concealed within the building fabric.

The following equipment shall be installed:

Kitchens	-	Heat detector
Hallways	-	Optical smoke detector
Remote control switch	-	Remote silence unit

The equipment shall be as manufactured by:

AICO Ltd
Mile End Business Park, Maesbury Road, Oswestry, Shropshire, SY10 8NN.

T: 01691 664 100
E: enquiries@aico.co.uk

Equipment Details:

Heat detector (E1164RC) – ceiling mounted in kitchen.
Optical smoke detector (E1166RC) – ceiling mounted in hall.
Remote switch (E11529RC) – wall mounted 1100mm above floor in hallway.

All detectors shall be complete with long life rechargeable lithium batteries.

4.9.0 TELECOMMUNICATIONS INSTALLATION

4.9.1 GENERAL

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

There is an existing 200 pair incoming service located at the base of riser A, from there multi-pair cables are installed to each floor terminating into 20 pair shunts.

The contractor shall supply, install, test and commission new 4 pair wiring from the shunt position on each floor into each flat terminating into an NTE5a master socket.

4.9.2 SYSTEM OF WIRING

The Contractor shall provide and install in the locations as indicated on the drawings and in accordance with this Specification Containment systems for the installation of the telecommunication cabling.

The existing 20 pair cables from main incoming DP shall be provide with 100mm basket from ground to 15th floor. The existing cables shall then be tie wrapped onto the basket as they are currently unsupported.

Each CW1308 cable from 20 pair shunts in riser A shall be installed within 25mm UPVC conduit which shall be installed in void below under drawn corridor soffit. At each riser position cables shall be drawn out to serve each pair of plats via risers B, C and D. The cables shall exit the 25mm conduit via proprietary 25mm conduit Tee with short section of conduit run into each riser.

4.9.3 COMMUNICATIONS OUTLET REQUIREMENTS

The contractor shall include for a NTE5a master socket into each flat, which shall be located adjacent to distribution equipment in cupboard of the hallway.

The contractor shall wire from each master socket to additional sockets within the flat generally as follows:

- Telephone socket located within the lounge.
- Cable and connection into the ‘TRIAX’ socket supplied by IRS specialist.
- Socket located in main bedroom.

The contractor shall also provide a master socket adjacent to the following:

- Lift No.1 South Core
- Lift No.2 North Core
- CCTV controller (final location to be agreed)
- Access control equipment (for remote concierge facility)

SECTION TEN

4.10.0 ACCESS CONTROL

Access control system details pending.

4.11.0 IRS – SKY DISTRIBUTED TV SYSTEM

4.11.1 GENERAL

The Contractor shall supply, install, test and commission a five cable Integrated Reception System, comprising four cables providing individual IF Polarities and one cable providing terrestrial frequencies between 88MHz.and 862MHz through switching devices to a minimum of one position via two cables, in each flat.

The Contractor will confirm the addresses, including postcodes, which have been attached to the given head-end, once the Installation is complete.

The systems shall comply with the current technical conditions of the Licensing Authorities. It will be the responsibility of the Contractor to determine the requirement for any licences and apply for any licence that the building may require. BSkyB will not be responsible for the non-application of any licence.

The Contractor shall be a member of the Confederation of Aerial Industries and have the relevant qualifications for Television Distribution Systems. Where a non-employed sub-contractor is used, then the primary aerial installation Contractor will remain responsible for the sub-contractor's work.

4.11.2 SERVICES

The services to be provided using the proposed system are as follows:

SERVICE	*PROGRAMMES*	*FREQUENCY*
Terrestrial	**M**ultiplex 1	UHF
Digital	Multiplex 2	UHF
	Multiplex 3	UHF
	Multiplex 4	UHF
	Multiplex 5	UHF
	Multiplex 6	UHF
Satellite Digital	All Horizontal and Vertical IF transmissions, both Low Band and High Band in the transmission range from 10,700 MHz – 12,750MHz.	
FM Radio	The national and local services Band II legally transmitted to the general area of the site concerned.	
DAB	The Radio programmes provided Band III by the DAB services.	

It should be noted that, in certain parts of the United Kingdom, some digital terrestrial multiplexes are not available. The Contractor shall indicate which of the above services (if any) will not be available over the proposed system. RSL (Restricted Service License) services do not have a long-term license and cover a small geographical area. Any inclusion of a RSL service should not be seen as permanent.

The Contractor must perform a site test at each location to determine that all the services listed above are available at the levels required for distribution (see below). If any service is, as a result of the site test, found not to be available this must be reported to the Contract administrator immediately so that an agreement may be made as to which services will be provided

4.11.3 SPECIFICATIONS

The systems must conform to the following standards and codes of practice:

- CENELEC BS EN 50083 all relevant parts.
- CENELEC BS EN 50117 for coaxial cables.
- CENELEC BS EN 60966 for connecting cables.
- BS 4662:1970 – Specification for boxes for the enclosure of electrical accessories.
- BS 5773:1995 – Specification for general requirements for electrical accessories.
- The Confederation of Aerials Industries Codes of Practice for Television Aerials, and TV Systems.
- The requirements of the DTG book 3 in respect of the system for the Digital Terrestrial services (except to the extent that technical differences apply, when this Specification will override DTG book 3).
- BS7671 (latest edition).

4.11.4 PERFORMANCE OF SYSTEM

It will be the responsibility of the Contractor to familiarise itself with the site and local conditions prior to tendering. The Contractor must satisfy itself that the services stated are available on each of the sites indicated, and that the quality of the signals will enable him to meet the relevant Specification requirements indicated. If any of the services are not available the Contractor must notify the contract administrator in writing.

Should the Contractor believe that the suggested plans, if supplied, do not meet the performance criteria this must be highlighted at the time of tender, together with alternative proposals.

If, in the course of the installation, the Contractor believes that plans will have to be changed, the contract administrator must be notified immediately and any costs etc. agreed between the Contractor and the contract administrator before installation work continues.

4.11.5 SYSTEM LEVELS

All signal levels must comply with the maximum provided for by the amplifiers to be installed taking into account adequate derating for the number of channels distributed and amplifiers in cascade.

The maximum/minimum levels at each outlet position on the system are as follows.

FREQUENCY BAND	MAXIMUM LEVEL	MINIMUM LEVEL
Band II FM Radio	74 dBuV	54dBuV
Band III DAB	65 dBuV	45 dBuV
Band IV/V Digital	65 dBuV	45 dBuV
Satellite IF Digital	77 dBuV	52dBuV

The terrestrial Digital signals will require a minimum Carrier to Noise at the outlets of 26 dB

The Satellite Digital frequencies will require a minimum Carrier to Noise at the outlets of 9 dB.

Measurement of Carrier to Noise should be made against a 'noise floor' and not between transponders. The recommended frequencies to set the noise floor are 1980MHz. in the low band and 1080MHz. in the high band. Should a transponder signal be present at these

frequencies than the 'noise floor' frequency should be adjusted to avoid conflict. The new frequency should be noted and advised on the completion certification.

4.11.6 MATERIALS

All materials must be new and previously unused. All goods and materials used in providing the system shall conform to EU and national standards, where such standards have been established, and to the Codes of practice issued by the relevant industry bodies.

All amplifiers and distribution equipment shall be sourced from a Sky Homes partnering supplier.

All Equipment must be able to cope with the minimum and maximum signal levels, as approved, in the CAI SMATV Code of Practice and those levels listed above for the given frequencies in use.

No departure from the specified and/or approved materials will be accepted until prior sanction in writing has been given by Sky Homes.

The contractor shall be responsible for the provision of TRIAX wall plates to match the rest of the accessories throughout.

4.11.7 TELEVISION AND AUDIO AERIALS

The aerials will be from an approved supplier and comply with the CAI Code of Practice. The aerial support structure must be connected to the PME.

All UHF antennas must incorporate a Balun to ensure the matching of the dipole to the feeder cables.

The aerial system, mounts, support structures etc. must be capable of withstanding winds of 100mph/160kph.

4.11.8 SATELLITE DISHES

Satellite dishes must be constructed to withstand a wind speed of 60mph/100kph and be of an adequate size for the system concerned and be able to produce a 15dB carrier to noise level at the installations site, for the given transponders being received. All satellite mounts must be connected to the PME.

The Contract administrator must agree the final position for aerials and satellite dishes. If more than two satellite dishes are required, planning permission must be obtained.

4.11.9 DISH ALIGNMENT

Dishes shall be aligned for maximum signal strength and carrier to noise ratios. The LNB shall be aligned so that the horizontal and vertical transponders appear equal and give maximum rejection of the opposite polarity. This is to avoid cross polarisation problems.

4.11.10 TEST OF THE INSTALLATIONS

Before the hand-over of each system and before completion of the contract, the whole system must be tested by the Contractor to ensure that the system complies fully with the Specification. The tests will include the maximum and minimum signals for each of the services, measured at the socket outlets as specified by the Contract administrator. The Contractor shall provide a printed record of all measurements, either in tabulated or spectrum form, to Sky Homes and to the Contract administrator, and shall also keep a set on file.

4.11.11 FINAL COMMISSIONING

The Contractor will have to supply a final commissioning certificate, indicating signals at the inputs and output of the main equipment and levels received at the outlets. The Contractor will have to demonstrate to the Contract administrator that the picture quality on all the services stated is to CCIR grade 4 on the analogue television channels and error free on the Digital channels.

The Contractor will provide all certification forms in a format provided by Sky Homes.

Test equipment must be accurate to within +- 1.5 dB and suitable for all the services indicated. The minimum requirement is a Spectrum Analyser, a simple signal strength indicator is not sufficient.

4.11.12 SPECIALIST SUPPLIER / INSTALLER

Taylor Bros Installations (Bolton) Ltd
Taylor Building
247 Crompton Way
Bolton
BL2 2RY

Tel 01204 380726

SECTION TWELVE

4.12. CCTV INSTALLATION

CCTV specification details pending.

CCTV to be provided to lifts.

SECTION THIRTEEN

4.13.0 PHOTOVOLTAIC PANELS

4.13.1 GENERAL

The contractor shall employ an MCS accredited specialist to carry out the design, installation, testing and commissioning of a photovoltaic panel installation.

Photovoltaic panels, inverters and supports shall be installed where indicated on the drawings. All design work and equipment selections shall be confirmed by the manufacturer and Specialist contractor prior to ordering.

The system shall be sized to achieve a peak output of 13kW and the panels shall be of the poly-crystalline type.

The PV panels shall run back to inverters installed within the roof plant room.

4.13.2 MATERIALS AND FITTINGS

The PV panels shall be constructed in compliance with all IEC standard specification requirements. The panels shall be constructed from antireflective glass as detailed in the general requirements.

Panel frames shall be of high strength tubular frame type with shock absorbing corner fittings and protective polyester backing. Corner fittings shall be complete with factory fitted condensate drainage.

Panels should be manufactured to the following minimum standards:

1. *IEC 61215: extended wind load 2400Pa and 5400Pa snow load in end mounting, hailstone impact test, damp heat test.*
2. *IEC 61730-1 and 61730-2: Safety Class II (IEC 60364) equipment for use in systems up to 1000 V.*
3. *Manufactured in ISO 9001 and ISO 14001 certified facilities.*

The panels shall be provided with the following warranties:

1. Free from defects in materials and workmanship for 5 years
2. 90% power output over 12 years
3. 80% power output over 25 years

4.13.3 SUPPORTS

The array shall be installed complete with IronRidge SGA type supports, constructed from Schedule 40 or Schedule 80 tubular steels. The specialist shall be responsible for the provision and installations of all supports, clamps and attachment components. The supports shall be constructed to the following specification:

Top Cap:	Cast steel ASTM A216
Rail Brackets:	6105-T5 extruded aluminium
Brace Sleeve:	Cast Steel ASTM A216

Diagonal Brace: 6105-T5 extruded aluminium
Hardware: 18-8 Stainless Steel

4.13. ARRAY GENERAL REQUIREMENTS

Panel type	230W Polycrystalline panels and MC connectors
Manufacturer	BP Solar or equal
No. Panels	To be confirmed by specialist
Panel Dims (LxWxD)	To be confirmed by specialist
Panel Weight	To be confirmed by specialist
Module efficiency	To be confirmed by specialist
Accessories	Solar module combiners All cables, isolators and switches Generation meter
Inverter Type	3-phase inverter. (Rating to be confirmed by specialist)
Manufacturer	To be confirmed by specialist.
Model references	To be confirmed by specialist.
No. Inverters	To be confirmed by specialist.
Unit Dims (LxWxD)	To be confirmed by specialist.

Notes:

1. The system shall be fully designed, installed and commissioned by the PV specialists.
2. The installation shall be mounted on Ironridge SGA supports to the PV specialists design.
3. The specialist shall be responsible for all supports, bases and footings.
4. The specialist shall provide all interconnecting wiring from the PV array and inverters.
5. All works associated with the PV array shall be completed in compliance with IEC requirements.
6. Final locations of all panels to be approved by architect prior to installation.

4.13.5 ASSOCIATED ELECTRICAL WORKS

The Specialist shall be responsible for all interconnections between the PV panels, installation of inverters within the plantroom and wiring from the array to the inverters. The Electrical Contractor shall provide a distribution board within the ground floor Electrical Switch Room, which the Specialist shall wire to from the inverters.

All electrical installations shall be completed in accordance with IEC requirements and the general requirements of the electrical section of this specification.

SECTION FOURTEEN

4.14.0 LIGHTNING PROTECTION SYSTEM

The building has an existing lightning protection system in place which is understood appears to be comparable with a Class 2 protection level with respect to BSEN 62305 in terms of the down conductor spacing.

A specialist contractor shall be appointed to carry out the following work with the intention of retaining as much of the existing system as possible.

a. Carry out full testing of the existing system, which shall include high frequency testing of down conductors and existing earth terminations and electrodes. The testing shall be extensive in nature and not that of simply an annual test and inspection.
b. Following testing of the system the specialist shall formulate a scope of works to carry out an upgrade and/or recommissioning of the existing system.
c. The specialist shall include for the replacement of the existing air termination network. This shall include bonding to all roof mounted equipment such as satellite dish, TV aerial, PV array and frames, supply/extract fans and handrail systems.
d. New earth test pits to be installed for each down conductor position, the pits shall be compatible with the new finishes around the building perimeter.

It should be noted that the scope of work for the lighting protection system assumes the existing down conductors can be retained and that they will not be disturbed during the over-cladding operations.

A provisional sum is to be allocated to cover the work associated with the lighting protection system.

The sum shall be expended for lightning protection system works following inspection and recommendations by the specialist.

SECTION FIFTEEN

4.15.0 EARTHING AND BONDING

4.15.1 GENERAL

The contractor shall provide all necessary main equipotential bonding, supplementary bonding and other earthing conductors to comply fully with the BS 7671, BS 7430 & BS EN 50310.

4.15.2 SYSTEM DESCRIPTION

All sub-circuit wiring shall be provided with circuit protective conductors. All bonding and separate protective conductors shall be LSF insulated, coloured green with a yellow band. Separate earthing conductors may be fixed directly, concealed from view, and shall be sleeved where they pass through the structure. All conductors shall be protected by conduit within 300mm of floor level. Connections to pipework and sink wastes shall be by means of approved clips and clamps, using compression type cable lugs. Where connections are required to mechanical services, plant or ductwork, a cable lug shall be fitted using a suitably sited existing connection bolt. No drilling shall be allowed. Approved labels shall be fitted to all earth connection points.

For tender purposes it may be assumed that the following will not be regarded as extraneous conductive parts:

- Radiators
- Window frames
- Door furniture
- Isolated fittings
- Meta shelving

SECTION SIXTEEN

4.16.0 TESTING AND COMMISSIONING

The contractor shall include for the complete testing and commissioning of all systems to comply with the requirements of BS 7671 requirements for electrical installations and this Specification.

Full certificates shall be produced and bound as part of the Operating and Maintenance Manuals.

SECTION SEVENTEEN

4.17.0 TECHNICAL SCHEDULES

4.17.1 SCHEDULE OF SPECIFIED EQUIPMENT

The electrical contractor shall include the following items of the manufacturers stated in his tender. He may also offer alternative to the manufacturers stated, provided these fully comply with the specification and meet the design concepts. Any alternatives offered should be stated in the schedule provided.

Unless the electrical contractor puts forward such alternatives and they are accepted by the engineer at the acceptance of tender, the contractor will be held to the manufacturers specified without relaxation.

Item	Description	Manufacturer
Cable Trunking and Accessories		
General	Single compartment sheet steel	Legrand or equal
Cable Tray and Accessories		
Fire alarm containment	Galvanised steel return flange	Legrand
Communication system	UPVC conduit	Legrand
return flange		
Support brackets	Galvanised channel c/w accessories and fixings, purpose made	Unistrut or equal
Conduits and Accessories		

BS 4568 steel	HGSW galvanised c/w accessories	Legrand or equal
	uPVC Conduit	Legrand or equal
Cables		
LSF Multi cable	General lighting and power - Flats	Pirelli / Eland
LSF singles	General lighting and power - Landlord	Pirelli / Eland
XLPE/SWA/LSF	600 V rating multi-core copper conductors	BICC or equal (BASEC)
Accessories		
Plant areas	Surface mounted isolators	MEM or MK
Lighting switches	20A rating, flush	MK Logic plus range in white
General power Weatherproof	13A socket outlets, fused connection units, double pole switches etc.	MK Masterseal
General power Not plantrooms	13A socket outlets, fused connection units, double pole units, TV plates etc.	MK Logic plus range in white
General power Plantrooms	13A socket outlets, fused connection units, double pole switches.	MK Metalclad range

4.17.2 SCHEDULE OF EQUIPMENT MOUNTING HEIGHTS

The contractor shall be responsible for confirming heights of accessories with the C.A. prior to installation. All dimensions stated to centre line unless otherwise stated.

Socket outlets	1150mm, or 450mm
Cooker Control	1150mm
Switch Plate	1200mm
T.V Outlet	450mm
Distribution Board	2000mm (to top of board)
Telephone Outlet	450mm
Fire Alarm Reset switch	1100mm

4.17.3 SPECIALIST SUPPLIERS

Description	**Supplier**
Communications	BT OpenReach to master socket
IRS – Sky TV system	Taylor Bros Installation, Bolton Ltd Tel:01204 380726

Door access/CCTV system	Mayfair Security – Tel: 01457 701596
Openview Security Solutions Technology Solutions Ltd	Tel: 0845 0719115 Tel: 0114 2752383

4.17.4 SCHEDULE OF DISTRIBUTION BOARDS

New distribution boards shall be as manufactured by;

Description	**Supplier**
Landlord distribution boards	Schneider or equal
Flat consumer units	Wylex or equal

Please refer to schedule of distribution boards and subsequent circuit references on all PWC drawings.

4.17.5 LUMINAIRE SCHEDULE

A1	Surface mounted IP65 circular luminaire. 1x38W 2D high frequency ballast c/w opal diffuser as Apollo Bella. Switched.
A2	Surface mounted 2x36W PLL fitting with dimmable high frequency ballast, integral movement sensor as Apollo 'Orbit' secure to include perforated white gel cover and perforated case with opal polycarbonate diffuser.
A3	Surface mounted IP65 circular luminaire. 1x28W 2D high frequency ballast c/w opal diffuser as Apollo Bella. Switched
B2	2x28W IP66 T5 anticorrosive fluorescent luminaire c/w polycarbonate diffuser and GRP body as Whitecroft 'ACF Duralite'. Switched.
D	Wall mounted dual voltage LED shaver light as Ansell profile LED razor light.
F	Surface wall mounted LED luminaire c/w 30w 4000K LED, integral motion sensor and opal diffuser finished in Grey. Available from Euro Lighting Solutions, Madera LED 480 30W 4000K ref 472336-RCF.

Manufacturers Details:

Apollo Lighting Ltd
Unit D9
Cross Green Approach
Leeds
LS9 0SG
T: 0113 240 5511
E: sales@apollolighting.co.uk

Whitecroft Lighting Ltd
Burlington Street
Ashton Under Lyne
Lancashire
OL7 0AX
T: 08705 087 087

Euro Lighting Solutions
Commerce House
Commerce Park
Road
Wirral
CH41 9HP
T: 0845 8629 800
E: mike@eurolightingsolutions.co.uk

4.17.6 DISTRIBUTION BOARD SCHEDULE.