Electrical Services Specification

Arlington Road, London NW1 7JR

For

LAZARI LIMITED 5 PROPERTIES

Mendick Waring Ltd.

Building Services Consulting Engineers

Edelman House

1238 High Road

Whetstone

London N20 0LH

Job ref: J2372

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Document History

Rev	Date	Description	Author	Approved
T1	04/10/2018	Tender Issue	MA	LM
T2	14.12.18	Sections 3.14 and 3.16 added, Section 3.7 revised.	MA	LM

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1 Preliminaries

1.1 Scope

This specification is for a Supply and Install Subcontract to carry out the complete Electrical Services Installation at Arlington Road, London NW1 7JR for Lazari Limited 5 Properties.

The works set forth in this specification detail the electrical installations required for a housing development comprising of 9no. dwellings over four storeys (ground to third floor).

The scope of the Electrical Contract Works shall include for the supply, install and commissioning for all the Electrical Installations set forth in Part 3 of the Electrical Specification and the Electrical Drawings.

All the electrical services installed shall be new and shall include, though not necessarily limited to just the following systems:

(a) Mains Low Voltage Distribution Network

(b) Small power Installations

(c) Lighting & Controls Installations

(d) Fire Alarm Installations

(e) Video Door Entry Installations

(f) Intruder Alarm Installations

(g) IRS Installations

(h) Broadband & Telephone Installations

(i) PV Installations

(j) SPD Installations

(k) Earthing & Bonding Installations

The installation must comply with the preambles clauses given in part 2 and the system specifications given in part 3 of this specification.

The exact choice of equipment and materials to be used is not always defined, some options being at the subcontractor's choice. The presence of the definition of a specific material and associated workmanship in this specification does not therefore imply that those materials are to be used.

Where equipment or materials are defined by manufacturer, alternative equipment to equal specification will generally be acceptable. However, for preliminary purposes, permission to change from the specified items is to be obtained from the Consulting Engineer.

The Electrical Contractor shall note that this specification refers to the works of Phase 4 only. The fit-out of the 6no. dwellings (apartments) of Phase 4 is to be carried out under another contract.

1.2 Specialist Contractor

All the work described in this specification will be carried out by an Electrical Contractor who will be a member of the National Inspection Council for Electrical Installation Contracting (NICEIC). The wiring installation is to be carried out by skilled, qualified and fully trained electricians.

Where applicable, the Electrical Contractor will be responsible for employing any Specialists required to complete the Electrical Installations set forth in Part 3 of the Electrical Specification, which shall include, though not necessarily limited to just the following systems:

(a) Fire Alarm Installations

(b) Video Door Entry Installations

(c) Intruder Alarm Installations

(d) IRS Installations

(e) PV Installations

(f) SPD Installations

The Specialist shall be responsible for validating the design provided by the Consulting Engineer; which is meant to convey the scope and design intent associated with a particular system. The Specialist shall carry out any additional design necessary to ensure that all required components of the systems have been allowed for to provide a complete and fully functional system and the Electrical Contractor shall allow for this within his price.

1.3 Drawings

The drawings that accompany these preliminary documents are 1:50 indicative drawings which are intended to give the scope of the proposed works and to show the general locations of electrical equipment and plant to a small scale, but do not purport to show the exact nature of the design, or the locations of other services and builders work, or the exact number of bends and fittings required to carry out the installation. Nevertheless, the general arrangement of the equipment shown on the drawings are to be adhered to.

The subcontractor is to include for, and take responsibility for, the preparation of such drawings and schedules of information which are necessary for the proper co-ordination and progression of the works. It is expected that layout drawings will not be necessary, the consulting engineers drawings being used, but drawings will need to be prepared of all purpose made equipment and any prefabricated work.

Subcontractors drawings are to be submitted to the Contract Administrator, together with the necessary supporting documentation, in good time prior to manufacture or installation. The subcontractor should assume that some modifications will be required by the Contract Administrator and is to allow for revising his drawings as required within two weeks.

Separate detailed drawings of builders work in connection with the engineering services will also be required, including builders work such as foundation bases, plinths, sumps and holes required, including overall sizes, weight and number of plant concerned, details of pipe sleeves etc. Detailed plant room layouts and elevations will also be required where appropriate, and drawings will need to be prepared of all purpose made equipment, including supports, brackets, hangers, catwalks, etc. and also of any prefabricated work.

Drawings of all items of plant and equipment must be obtained from the suppliers. These drawings should show builders work, be complete and be fully dimensioned. These should be submitted for checking as though they were the subcontractors own drawings. Additional clean copies of the suppliers drawings are to be kept for inclusion with the operating and maintenance instructions and record drawings.

The approval of the Contract Administrator does not relieve the subcontractor of his obligation to provide a design that meets the performance requirements of this specification.

The co-ordination of services with other trades is to be agreed prior to the commencement of work in any area, and details are to be forwarded to the Contract Administrator.

The subcontractor shall bear all costs arising as a result of him proceeding with any commitment prior to receipt of checked drawings.

1.4 Discrepancies

Any discrepancy between the specification and the drawings or between drawings must be referred immediately in writing.

1.5 Foreman

The subcontractor shall keep a competent foreman in attendance on site at all times when work is being carried out, and at all other such times as may be necessary to check that builder's work in connection with services is being carried out properly. The foreman should not be changed without one month's written notice to the Contract Administrator.

The foreman would be expected to co-ordinate the design drawings with the manufacturer's drawings and installations instructions, and to make detailed checks of the progress of the works on site.

The foreman must keep a set of drawings, this specification, and the subcontractors orders on site in good order.

1.6 The Site

The subcontractor is advised to visit the site and will be deemed to have satisfied himself and have included for any costs incurred by:

(a) The full extent and character of the site, and means of access and delivery of goods.

(b) The availability and times of parking.

(c) Storage room for materials.

(d) Existing services and the availability of gas, water, electricity and drainage.

(e) All local conditions and restrictions.

Any claims on the grounds of want of knowledge of site factors will not be entertained by the Contract Administrator.

1.7 Statutory Undertakers

Liaise directly with the DNO and British Telecom and Virgin Media to ensure that all parts of the installation are to their approval, and that all necessary arrangements for the incoming supplies are made by the Authorities in good time for testing and commissioning.

Generally, copies of any correspondence between the subcontractor and the statutory undertakers should be copied to the Contract Administrator.

1.8 Co-operation and Co-ordination

All works on site shall be carried out in such a manner so as not to obstruct the operation of any other trade on site or the operation of plant.

The subcontractor is to be responsible for liaison with all trades to ensure that all services are sequenced and accommodated satisfactorily, especially in voids, ducts and cavities.

The subcontractor shall check all electrical and mechanical connections to equipment in this specification before the equipment is brought into commission, and shall be responsible for the correctness of the connections.

The subcontractor shall be fully responsible for the general site co-ordination, and for carefully setting out all work in accordance with any co-ordination drawings, particularly in voids, ducts and service cupboards.

1.9 Instructions

All instructions will come from the Contract Administrator. Verbal instructions will not generally be given, but where they are, where expediency is found to be necessary, the subcontractor is responsible for obtaining written confirmation of any instruction from the Contract Administrator.

All queries that arise from time to time during the course of the works should be addressed to the Contract Administrator and should be in the form of a written list.

1.10 Record Drawings

Record Drawings are to be produced by others. However, the subcontractor should include for marking up one set of the installation drawings as the contract proceeds to show any changes from the installation drawings. Not less than three weeks prior to Practical completion, as determined by the contractor's programme, the subcontractor must provide copies of the marked up drawings to the Contract Administrator so that the Record Drawings can be produced.

1.11 Maintenance Manuals and Operating Instructions and Building Manual

The subcontractor is to include for preparing operating and maintenance instructions and all other information required for the Health and Safety File in respect of the installations for which he is responsible. This information is to be supplied to the Contract Administrator for inclusion in ‘The Building Manual’.

This information will be required in both electronic format and paper format. The subcontractor is to liase with the Contract Administrator to ensure that all information is supplied in the same format as that used for the rest of the Building Manual.

The paper copy of the above information must be available for handing over to the Employer at the time of handover. Practical Completion Certificates will not be issued prior to the production of these manuals and certificates.

The subcontractor will be held responsible for the safe-running and maintenance of the installation until the requirements of this section have been satisfactorily completed.

1.12 Tenants' Instructions

Notwithstanding any information he may be called upon to provide under Section 1.10 above, the subcontractor is to prepare a set of operating instructions for each dwelling. These instructions should be suitable for inclusion in a tenant's manual, and shall give adequate instructions and explanations for the tenant to understand the operation of all plant and equipment within his/her dwelling. The instructions are to be in a form that can reasonably be expected to be understood by the tenant.

The tenants' instructions for each dwelling are to be available prior to the period of Client instruction, and handed to the Employer at the time of handover.

In addition a simplified set of basic instructions for the heating is to be put into large print on an A4 plastic laminated card chained to the pipework in the cylinder cupboard.

All costs as incurred under this section are to be priced in the tender as allowed for.

1.13 Handover

When the Contract Administrator is satisfied that the installation is complete, the subcontractor is to instruct the client in the operation of all the systems. It should be anticipated that this will require three visits to site by the subcontractor's foreman, or a senior engineer with a good working knowledge of the systems. Before any meeting is arranged, the subcontractor shall have produced all information as set out in the proceeding sections and had them approved.

1.14 Defects Liability

The defects liability period for the building services shall be for a period of 12 months. During this period, which shall commence on the day named in the certificate of practical completion of the works, the subcontractor shall be responsible for making good with all possible speed any defects arising from defective design (other than a design made, finished or specified by the Contract Administrator and for which the subcontractor has disclaimed responsibility in writing within a reasonable time after the receipt of the Contract Administrator's instructions), materials or workmanship or from any act or omission of the subcontractor, done or omitted during the defects liability period. If any such defect or damage shall occur, the Contract Administrator shall inform the subcontractor in writing the nature of the defect or damage.

The response time to deal with defects must be in line with the Employers requirements as follows:

<u>Priority 1 – Within 24 Hours</u>

For emergencies concerning health or safety

(a) Total loss of electricity supply

(b) Dangerous electrical faults (exposed wires etc)

(c) Loss of heating or hot water between 1st October and 31st March, or anytime for frail elderly.

(d) Total loss of heating and hot water.

In some of the above cases it may only be possible to carry out a temporary repair within 24 hours:

<u>Priority 2 – Within 5 Working Days</u>

(a) Loss of heating or hot water

(b) Loss of security (e.g. repairs to entry phone system)

(c) Lights in flats and communal areas

(d) TV aerials

(e) Electrical repairs (e.g. individual sockets, extractor fans, etc.

If the subcontractor replaces or renews any portion of the works, the provisions of this clause shall apply to the portion of the work so replaced or renewed until expiration of 12 months from the date of such replacement or renewal. If any such defect or damage be not remedied within a reasonable time, the Contract Administrator may proceed to do the work at the subcontractors risk and expense but without prejudice to any other rights which the Contract Administrator may have against the subcontractor in respect of the failure of the subcontractor to remedy such defect or damage.

If the replacements or renewals are of such a character as may affect the efficiency of the works or any portion thereof, the Contract Administrator may within one month of such replacement or renewal give to the subcontractor notice in writing requiring that tests on completion be made, in which case such tests shall be carried out as provided in clauses 'Testing'.

The general conditions shall apply to all inspections, adjustments, replacements and renewals and to all tests occasioned thereby, carried out by the subcontractor during the defects liability period.

1.15 Design Life

All plant and equipment chosen for the works must have a minimum expected working life of 20 Years.

2 Preambles

2.1 General Requirements

Generally, workmanship should be of a high standard throughout particularly with regard to the accuracy of dimension, lines, planes and the quality of all surfaces.

"Approval" means approval by the Contract Administrator.

Materials are to be of the best quality consistent with the character of the works and are to be to the appropriate British Standard.

All equipment used is to be fully year 2000 compliant, similarly all components within equipment used.

Unless specifically stated otherwise, materials and workmanship stated for any section of the specification is to apply to all sections of the specification.

Generally, materials are not specified by manufacturer and the selection is to be made by the specialist subcontractor. Where a manufacturer is stated, the subcontractor is not restricted to the branded materials mentioned, provided that the alternative which he proposes to use is of equal performance and quality, and is declared at the time of tendering.

Branded materials are to be handled, stored and used strictly in accordance with the manufacturer's instructions and recommendations. Branded materials are to be obtained directly from the manufacturers or through their accredited distributors.

All references made in the specification to manufacturers' catalogue or reference numbers for branded materials are to be construed as including all component parts.

2.2 Standards and Regulations

All design, materials and workmanship is to be in accordance with the latest British Standard or British Standards Code of Practice (where this has not yet been replaced by a BS), and in the absence of a BS or BSCP then according to the best principles of the trade to which the particular work belongs.

A certificate of compliance with the relevant BS shall be provided to the Engineer upon request.

The electrical installations are to be carried out in accordance with the latest Edition of the IEE Wiring Regulations and amendments. Duplicate copies of both Test Certificates and Completion Certificates will be required, and should be sent to the Contract Administrator.

The installations shall comply with all relevant statutory instruments and regulations and in particular with the requirements of the Electricity Board and the Health and Safety at Work Act.

The tender shall be based on the regulations current on the date for return of tenders. If these regulations are amended or new regulations enacted after that date, the subcontractor shall bring the relevant amendments to the attention of the Contract Administrator.

The Electricity Board is to be invited to inspect the installation at Practical Completion. Any defects noted by the Electricity Board inspector should be remedied as part of the contract works.

2.3 Cables

2.3.1 Cables Generally

Cables shall be copper conductors unless specified otherwise and comply with the appropriate British Standard specification.

No reduction of strands forming the conductor will be allowed at switch or other terminals and all strands shall be efficiently secured by screws, nuts and washers or other approved means.

The cables and seals shall be intact when delivered on site. No coil of cable or flexible cord manufactured more than one year prior to delivery on site shall be used in the installation.

Running joints in any cable runs shall not be permitted without the express written approval of the Contract Administrator and consulting engineer for each joint.

2.3.2 PVC Insulated Cables in Conduit &Trunking

In general, cables in conduit and trunking are to be general purpose 450/750V to BS 6004 table 1 flexible, copper conductored, PVC insulated single core cables.

No conduit is to contain cables from more than one distribution board. The live and neutral conductors of the same circuit shall always be drawn into the same conduit. Circuits are to be arranged so that no more than three conductors are bunched at any one terminal. PVC cables in trunking shall be laced into circuit groups.

All wiring shall be carried out in the "loop-in" system and there shall be no joint at any point in the cable run. All joints shall be made at main switches, lighting points, light switches, and fixed equipment points only.

Cables shall not be drawn into any conduit, trunking or ducting until such section of the system is complete and the building is weatherproof.

2.3.3 PVC Insulated and Sheathed Cables

Use PVC insulated and sheathed copper cables to BS 6004 table 5. Such cables are to be protected by steel conduit where they are liable to mechanical damage.

All cables shall be dressed flat and shall be free from twists, kinks and mechanical strain.

At the termination of any PVC cable, the sheath shall be taken inside the switchgear, besa box, back box or other accessory or light fitting and protected against abrasion by a bush or grommet. The termination of insulated and sheathed cables containing an integral earth conductor shall be within 200mm of the cable entry to the equipment and the earth conductor securely anchored.

Cables laid within floor spaces should pass through notches in battens. Where chipboard or plywood sheet flooring is used, the subcontractor is to form an access panel from front to rear of the building. Cables should be run directly beneath such a removable panel and branch out to fittings etc.

Where PVC insulated and sheathed cables rise or drop to switches, sockets, etc. mounted on walls, they should be protected with heavy gauge steel conduit laid in chases behind plaster-work, or within studwork partitions walls, unless otherwise stated.

2.3.4 Flexible Cables

Where flexible cords are used, white circular PVC insulated ordinary cords 300/500V to BS 6500 is to be used.

2.3.5 PVC Armoured Cables

Use copper conductored PVC insulated steel wire armoured PVC sheathed cable to BS 6346, 600/1000V, tables 4, 6, 8, 10 or 12.

The minimum installation temperature is 0C. If cables are being installed during sub zero temperature conditions, they should be stored at a temperature above freezing point for at least 24 hours immediately prior to handling.

Cables shall not be bent during installation to a radius smaller than eight times the overall cable diameter.

The ends of all cables shall be terminated by means of compression type glands to BS 6121 complete with earth terminals and PVC shrouds. These glands shall be of the same manufacture as the cable.

2.3.6 MICC Cables

MICC cables are to be 600V light duty to BS 6207 Part 1 table 2.

The ends of all MICC cables shall be terminated by means of compression type glands to BS 6081 type 3 complete with earth terminals and PVC shrouds. The glands shall be of the same manufacture as the cable. The cable manufacturer's special stripping, cutting, bending, straightening and sealing tools are to be used for all workmanship to MICC and sheathed MICV cables.

2.4 Conduit and Trunking

2.4.1 Steel Conduit

Steel conduit is to be to BS 4568 part 1, heavy gauge. Black enamelled conduit is to be used for concealed interior work cast in situ or installed in internal wall cavities. For all surface work and for positions subject to damp, zinc coated heavy gauge screwed steel conduit is to be used, or hot dipped galvanised conduit.

Use malleable iron conduit fittings to the same class and finish as associated conduit system.

Where runners or similar items are essential, and at the discretion of the Contract Administrator, lock nuts with knurled edges shall be fitted. All threads shall be tightened up firmly. At all conduit fittings the conduit

shall be screwed into an integral spout or alternatively fixed with machined based sockets with a hexagon male bush and compression washer. At distribution boards and switchgear, the machined-based socket shall be a flange type and used with a washer.

All exposed threads, vice marks, etc, shall be painted immediately the conduit is erected. Ends of conduits shall be square and the burrs on cut ends shall be removed. The whole of the conduit system shall be swabbed through to remove dirt and loose matter before cables are drawn in.

Conduit work on the surface shall be fixed by distance saddles, galvanised where used with galvanised conduit and black enamelled with black enamelled conduit. Fixings shall be plugged and screwed, or screwed to the background as appropriate. Conduit cast into concrete is to be firmly tied to the reinforcing steel.

Surface work within building cavities shall be supported at intervals not greater than 1.5 metres.

The radius of any bend shall be not less than two and a half times the overall diameter of the conduit. Where bends and sets occur the conduit shall be fixed at a distance of 150mm either side of such diversions. Deformed bends will not be accepted.

Conduit is to be electrically continuous and the resistance between any point of the installation and the earth point on the main distribution board shall not exceed 1 ohm. The subcontractor is to make tests during the erection of conduits and trunking assemblies to check the continuity. Full particulars shall be recorded and submitted to the Contract Administrator.

Where conduits are laid on combination concrete floors, or are cast into in-situ concrete, the subcontractor shall arrange for a competent person to be in attendance while the pouring operation is being carried out in order to minimise the damage which may be caused to the conduits.

Final connections from conduits to all motors shall be made using watertight, rustproof, flexible conduit. The appropriate proprietary adapters shall be used at both ends of all flexible conduits, and shall be connected to rigid conduits or trunking with washers. A separate earth continuity conductor will be installed in the flexible conduit, sized according to the IEE Regulations.

2.4.2 Steel Conduit Fittings

Unless otherwise stated the subcontractor shall include for conduit fittings of maleable iron which shall conform to BS 4568. All fittings shall be of the screwed pattern, and no solid or inspection elbows, tees or bends shall be installed without instructions in writing from the Contract Administrator. Generally, unless otherwise specified, all conduit fittings shall be stove enamelled black inside and out, but where galvanised conduit is installed all fittings including switch boxes, etc. shall be hot dipped galvanised, and all fixing screws shall be brass.

All conduit boxes not carrying lighting or other fittings shall be installed with a suitable cover, fixed in position with brass round headed screws. Where these boxes are flush, the cover shall be of the overlapping rustproof pattern. All adaptable boxes shall be constructed from 16 SWG sheet steel or best quality cast iron. Such boxes shall be of suitable size and a minimum space of 12mm shall be left between conduit and holes.

Draw-in boxes shall be provided to give access to all conduits for the drawing in or out of any cable. These shall be of ample size to enable the cables to be neatly diverted from one conduit to another without undue cramping. No joints will be allowed in draw-in boxes under any circumstances. Generally, where conduit is to be installed from point to point in a straight line, draw-in boxes shall be installed every 13m of conduit run.

Where conduit boxes are external and fed from concealed conduit, the conduit boxes are to be galvanised and in addition, the final socket and bend are to be galvanised.

2.4.3 PVC Conduit

Use heavy duty high impact rigid PVC conduit and fittings to BS 4607 parts 1 and 5.

In general Clauses 2.4.1 and 2.4.2 above shall apply equally to PVC conduit.

Conduits are to be installed strictly in accordance with manufacturers' instructions, with particular reference to provision for expansion and bending. A normal 90-degree bend should have an outside radius not less than four times the outside diameter of the conduit.

2.4.4 Flexible conduit

Use flexible steel conduit to BS 731 part 1, stainless in areas where water is used.

2.4.5 General Trunking

Trunking is to be used where specified and is permissible in other situations subject to the Contract Administrator's approval. Size is to be as detailed, but where the size is not stated a space factor of 33% should not be exceeded.

Use sheet steel trunking to BS 4678 part 1, hot dip galvanised.

Trunking and lids are to be constructed of sheet steel of not less than 20 SWG for sizes up to 50mm x 50mm, 18 SWG for sizes up to 75mm x 75mm, and 16 SWG for larger sizes.

For surface mounting, lids are to be of the lipped type, fixed with quick release cam type fastenings. For flush work, overlapping type lids with similar fasteners are required. Special purpose trunking, where specified, is to be as detailed on the drawings. Lengths of trunking are to be efficiently bonded to each other using strip copper links not less than 13mm x 1.6mm.

Fixings for trunking are generally to be suitable for the background to which the fixing is to be applied. All fixings are to be executed by the subcontractor, including drilling of all holes.

2.5 General Switchgear

Switchgear assemblies other than specialist cubicle boards are to be made up on or off site in accordance with drawings and this specification.

All fuse switches, isolators, etc, shall be hand operated single pole and neutral, double and triple pole and neutral to appropriate BS. All fuses switchgear of 60 amp and above shall be fitted with HRC cartridge fuse.

All fuseways are to be correctly fused and spare ways are to be fitted with fuses and fuse carriers. Spare materials are to be left on site for the repair of 25% of the total number of fuses. The fuses are to be handed over to the client at the same time as the record drawings and operating instructions.

Cables entering any items of metal clad switchgear are to be arranged so that they do not set up any eddy currents. A continuous slot shall be cut between holes to prevent any setting up of eddy currents.

The subcontractor is to ensure that circuit protection suitable for the load conditions of every circuit is provided.

Every final sub-circuit shall be connected to a separate way of fuseboard, a separate switch fuse or circuit breaker.

The wiring of each final sub-circuit shall be electricity separate from every other final sub-circuit.

Neutral conductors shall be connected at the fuseboard in the same order as the live conductors are connected.

The conductor insulation must be removed from a minimum length to facilitate connections and no excess length of exposed conductor shall be left.

2.6 Accessories

All accessories are to be flush mounted on standard metal back boxes unless stated otherwise in part 3. The subcontractor is to ensure that boxes are set out with sufficient accuracy to fit in as required with any tiling or other pattern. Either to the setting out on Contract Administrators drawings, or centered on the pattern or joints.

The mounting heights of electrical accessories shall comply with the latest requirements of the Building Regulations Part M Section 8, that is a mounting height between 450mm and 1200mm from finished floor level.

Within kitchens, sockets and isolator switches are to be a minimum 150mm above the worktop, or above the worktop upstand as appropriate.

In general, lighting fittings are to be positioned in the centre of ceilings but are to be checked with the Architect’s drawings, and are to be suspended from a standard metal BS 4568 conduit box securely fixed to the structure of the floor or ceiling.

Similarly, wall lighting points are to be fixed to a metal back box, securely screwed or plugged and screwed to the wall structure, using the standard fixing holes of the box. Generally, wall lighting points are to be at 2000mm above FFL in communal areas and 1800mm above FFL within flats, heights to centre line.

The subcontractor will be expected to mark up a sample flat for approval before commencing installation.

2.7 Labelling

Every piece of equipment and control gear shall be labelled clearly by means of an engraved 'Traffolite' label screwed to the surface. On every 3 phase switch, piece of equipment and control gear label shall be fixed with the inscription "DANGER 415 VOLTS" in red letters not less than 12mm high.

Labels on switchgear shall denote the identification number/letter of switchgear, current rating, polarity, circuit being fed, outgoing cable size and description of circuits as follows: e.g.

- 63 amp SPN
- Feed DB3 (16mm^2)
- Lighting and Power

The subcontractor shall supply and fix circuit lists in every distribution board. The circuit lists shall be typed on heavy cartridge paper, inserted in a plastic transparent envelope and clipped into position inside the distribution board. Each circuit list shall describe the points fed and the capacity of the fuse for each way. The circuit lists are to be referenced with the number of distribution board and copies included with the as installed drawings.

All cables on tray and in trunking are to be identified at entries and exits, at distribution boards, and at 3m intervals using proprietary cable tie labels.

Twin and earth cables in building voids are similarly to be identified with their circuit reference at all normal access points, and a 3m intervals where notched through timber floor joists.

2.8 Earthing and Bonding

The electrical installation is to be earthed and bonded in accordance with the IEE Regulations and amendments and the supply authority's requirements, including any relating to PME bonding. Baths and sinks are to be bonded to adjacent metal water pipes. These pipes, themselves, must be bonded to the intake.

All metal piped services intakes are to be bonded. The size of the bonding conductor depends on several factors, but in general will be:

- 6 sq mm for 60A intakes
- 16 sq mm for 100A intakes
- 50 sq mm for 200A intakes
- 70 sq mm for larger intakes

The Electricity Board will advise the particular size required in any particular case.

The bonding leads are to be marshalled together with the consumer's earthing lead and one lead of the same minimum size brought back and left ready for the Board's staff to connect to the Board's PME earth terminal.

PME Bonding connections should be made as close as practicable to the point of entry of the pipes, etc. to the premises, but after any insulating insert.

2.9 Testing and Commissioning

All electrical installations are to be tested for safety as described in the IEE regulations and the preliminaries.

In addition, each electrical system is to be brought into full commission and tested to ensure that all equipment functions as intended. In particular, all functions of fire alarm, emergency lighting, door entry, signal distribution, and all other special electrical systems are to have all functions thoroughly tested, calibrated and commissioned, and a testing and commissioning certificate forwarded to the Contract Administrator.

Where a special electrical system is tested and commissioned by a specialist subcontractor or supplier, the specialists testing and commissioning certificate may be used in place of a separate certificate produced by the electrical subcontractor.

For mechanical and other subcontractors installations where the equipment has been supplied by others, and the wiring only carried out by the electrical subcontractor, the electrical subcontractors foreman must be in attendance when the equipment is tested and commissioned to check that:

- all equipment is wired in accordance with the supplied wiring diagrams
- all motors have the correct rotation
- all protective devices are calibrated correctly, especially for electric motor over current devices

It should be anticipated that the presence of the electrical subcontractors foreman will be required continuously during the mechanical subcontractors testing and commissioning period, which is generally a period of six weeks immediately prior to practical completion.

Thoroughly clean all parts of the works on completion.

3 Specification

3.1 Electrical Supply

3.1.1 Scope

The development is to be served by one (1) individual low voltage supply derived off the local LV network located in the adjacent public footway. The supply shall terminate in the electrical plantroom located in the ground floor electrical intake room, and is arranged in the following manner as set forth below:

A new 200A three phase supply will serve Arlington Road, all dwellings and landlord services which shall include site-wide security systems, external lighting and small power installations. Broken down as follows:

- 9 no. 80A single phase metered supplies to serve each dwelling (unit).
- 1no. 100A three phase metered supply for landlords services.

The electrical meters for the dwellings, supplied from the MSDB in the electrical intake room, located in the entrance lobby, are to be located within the intake room itself, their final location is to be confirmed by the electrical service provider upon site visit.

UKPN is the district network operator in the area and they will supply and install the mains supply connections derived off the local LV network via underground ducts provided and installed by the Ground-works Contractor.

Refer to the LV schematics (MWL 2372-SCH-62-00) for details regarding the arrangement of the LV Distribution Network.

Refer to the MEP Site layouts (MWL 2372-40-00) for details regarding the locations of electrical intake positions for the landlord and dwelling supplies.

For the energy supplies and metering to the site, the Main Contractor shall act on the Employer's behalf with respect to obtaining the pre-requisite MPAN references from UKPN; which shall be communicated to the Employer to allow for meter(s) to be obtained and installed in good time to meet completion date(s).

The Electrical Contractor shall allow for liaison, attendance and all works associated with the provision of the energy supply and metering services ordered by the Main Contractor.

3.1.2 UKPN Project References

UKPN Ref: 8500098634 issued on the 04/10/2018. The quote expires by 5pm on 01 January 2019.

3.1.3 DNO Design Standards

The primary mains supply to serve the development shall be designed and installed in accordance with UKPN's standards:

- EDS 08-0136 – LV Network Design Standard
- EDS 06-0017 – Customer Installation Earthing Design
- EDS 08 0118 – Supplies to multi-occupied buildings

3.2 Landlord & Dwelling Supplies

3.2.1 Landlord Supply

The primary mains supply for the landlord installations shall be fed from the main MSDB with ref LV1.The supply is to be metered with a dedicated utility meter for the landlords services.

A provisional sum should be allowed for Tender purposes for the Secondary Supply for the smoke ventilation system in the ground floor Cycle Store lobby. The provision shall allow for a 4 way TPN Type B and fire rated cables terminating in an isolator and ATS local to the lobby extractor fan.

3.2.2 PV Installation

The Electrical Contractor shall be responsible for liaison, attendance and all works associated with the roof mounted photovoltaic installation.

The Electrical Contractor shall employ a specialist to design, supply, install, test and commission a roof mounted photovoltaic installation of 8.06 kWp which will be fed back into the landlord's low voltage network.

The appointed specialist shall install the photovoltaic system in accordance with Microgeneration Certification Scheme requirements and provide full MCS certification upon completion for the purposes of the Code for Sustainable Homes criteria Ene 7 'Low and Zero Carbon Technologies'

The Electrical Contractor shall supply and install the sub-mains cabling from the roof top inverters to the import (FIT) meter to be located in the electrical switch room including all switchgear, circuit protective devices and cable containment as indicated on the electrical schematics.

The Specialist shall carry out all the cabling works associated directly with the roof mounted PV array and the final connection of the PV array to the inverter unit and import (FIT) meter.

The specialist is required to fully co-ordinate works in accordance with Structural Engineer / Architect details and other requirements including man-safe (fall restraint) setting out and location of ballast / photovoltaic panels / mounting systems.

The Specialist shall provide in the form of a technical submission, installation drawings and schematics to the Design Team for review and approval prior to the commencement of any installation work.

The Specialist shall confirm the total weight of the roof top installations and total area required to accommodate the installation of the roof top PV array and associated electrical switchgear.

The appointed specialist shall be required to complete a G59application to UK Power Networks prior to installation in accordance with the Electricity, Safety, Quality and Continuity Regulations 2002.

The specialist shall be required to complete an application for the Feed-in-Tariff (FiT) and work with the design team for any further information required.

3.2.3 Dwelling Supplies

The dwellings are to be directly served from the electrical intake/plant room located in the building entrance lobby of Arlington Road.

Terminate the dwelling supplies onto 80A single phase service cut-out units.

Supply and install meter tails between the service cut-out units and the meters; using single core XLPE/LSOH cables; meter tails to be terminated by the Meter Operator (MOP).

From the meter positions, extend 3 core CU/SWA/XLPE/LSOH cables to the dwelling consumer control unit.

3.3 LV Distribution Network

3.3.1 Scope

The Electrical Contractor shall supply, install, test and commission and set to work a new and complete low voltage distribution system including all switch gear, circuit protective devices, cabling and containment necessary to provide a complete installation for distributing electrical power supplies to all small power and lighting installations, fixed mechanical equipment and other specialist equipment as set forth in this specification and accompanying drawings.

Cables shall be sized in accordance with the IEE Wiring Regulations with total voltage drops being less than 2.5% and with due account taken of deratings for grouping, ambient temperature, and the presence of insulation, etc.

Sizes for cables and circuit protective devices have been given within this specification but these can only be considered as indicative and to assist in pricing the works. The responsibility will remain with the Electrical Contractor to ensure that all connected load details are known and that all cables and circuit protective devices have been properly selected to meet the demand expected.

The earthing of the electrical installation must comply with DNO's requirements for Protective Multiple Earthing (PME) and the IEE Wiring Regulations.

3.3.2 Lighting & Power Distribution Boards

The landlord's lighting and power distribution board is a fully lockable wall mounted 100A rated Type B MCB distribution board complete with 100A 3P switch disconnector incomer installed in the electrical and intake room of Arlington road:

DB Ref	Description
DB1	12 Way TPN Lighting & Power Board - Landlord Services

The distribution boards shall be fully type tested with a conditional short circuit rating of 25kA to BS EN 60439 when fed by MSBD.

The distribution boards shall incorporate high performance MCB's with 10kA rating to BS EN 60898 and 15kA to BS EN 60947-2

The distribution board shall have key locked doors, be surface mounted and of metal construction with a hinged door complying with BS EN 60439-3.

The equipment shall be sourced from the Schneider Electric range of equipment or equal and approved.

All outgoing circuits shall be provided with individual MCB or RCBO protective devices as proscribed in the IEE Wiring Regulations 17th Edition. All protective devices shall be Type B MCB's or RCBO's of the appropriate ratings unless otherwise specified. For external lighting circuits, Type C RCBO's of the appropriate ratings shall be provided.

3.4 Landlord's Small Power Installations

3.4.1 Final Circuit Installation Method

All lighting and power circuits shall be served from MCB, RCBO or RCCD protected fuse ways as necessary to comply with the requirements of BS 7671 17th Edition of the IEE Wiring Regulation; specifically, Regulations 415.1, 411.3.3, 701.411.3.3, 314.1, 314.2, 522.6.6, 522.6.7 and 522.6.8 will apply.

All RCBO's shall be designed to be installed in a single way within the distribution board. Distribution boards shall be fitted with Type B or C MCB's with 6kA rated breaking capacity; appropriately rated to serve the particular circuit.

All 32A ring main circuits serving general purpose socket outlets and all circuits serving lighting and power outlets in WC's and shower rooms shall be individually protected by appropriately rated MCB's collectively protected by a 30mA RCCD unit.

Where a circuit is concealed in a wall or partition at a depth of less than 50mm from the surface, or where cables are concealed in a metal stud partition wall, irrespective of the depth from the surface, and if not provided with earthed mechanical protection e.g. metal trunking or conduit, these circuits must be provided with additional protection by means of a 30mA RCCD or RCBO device.

Electrical circuits are to be wired in single core LSOH or LSOH insulated and sheathed multi-core cables. The wiring installation shall be in accordance with the IEE Wiring Regulations 17th Edition.

All cables shall be run on the loop-in principle with all joints being made at accessory or outlet point locations. Other joints in cables will not be allowed.

Cables shall be sized in accordance with BS 7671 17th Edition of the IEE Wiring Regulation, with voltage drops being less than 3.0% for lighting and 5.0% for power at all points and due account taken of de-ratings for grouping, ambient temperature and the presence of insulation, etc. The size of cables shall in no instances be less than 1.5mm^2 for lighting circuits, 2.5mm^2 for power circuits (in ring formation).

Cables shall be coordinated with other services and the structure and care shall be taken to avoid running close to hot water pipes. Cables shall be installed in a workman like manner and be supported with proprietary fixings to the building fabric.

3.4.2 Concealed Wiring

Considering the requirements set forth in section 3.6.1, horizontal runs of cables are to be routed via the ceiling voids. Vertical cable drops shall be concealed and conduit protected where below wall plaster in galvanized metal sheathing, trunking or high impact PVC or metal conduit. The sheathing and wiring shall be let into the wall surface to ensure at least 5mm of plaster cover.

3.4.3 Electrical Accessories

All electrical accessories shall be flush mounted in all visible locations. Where installed in plant rooms, bike stores, refuse stores or cupboards or otherwise hidden from view behind access panels or suspended ceilings, electrical accessories shall be surface mounted.

All socket outlets shall incorporate child resistant shutter systems. All switches for lighting switch plates and socket outlets shall incorporate double pole rocker action type switches.

The final position for all visible accessories shall be agreed with the Architect before 1st fix commences.

In general, all electrical accessories in shall be selected from the MK Logic range or equal and approved.

Socket outlets installed in the communal areas accessible by residents shall be surface mounted and fully lockable and shall be selected from MK Logic range or equal and approved.

3.5 Landlord's Lighting Installations

3.5.1 Scope

The Electrical Contractor shall supply and install all luminaires, lamps, lighting controls, switches, sensors and accessories to provide a complete lighting installation as set forth on the Electrical Drawings.

The landlord's lighting installation shall include the electrical switch room, external roadways, foot paths and amenity spaces.

In general, the lighting shall be switched from local manual or automatic switches as indicated on the drawings. In general, the electrical switch room shall be controlled by manual switch; the external roadways, foot paths and amenity spaces shall be controlled by dawn/dusk photocells linked to time clocks complete with manual override controls.

3.5.2 Internal Lighting

Illuminance (lux) levels to all internal areas of the development shall be in accordance with CIBSE SLL Code for Lighting, SLL Lighting Guides and the SLL Lighting Handbook.

To comply with Pol 04: Reduction of night time light pollution, the external lighting strategy shall be in accordance with Table 2 (and its accompanying notes) of the ILE Guidance notes for the reduction of obtrusive light, 2011.

3.5.3 External Lighting

Illuminance levels for lighting to all external areas within the development zone shall be in accordance with BS 5489-1:2003+A2:2008 Lighting of roads and public amenity areas.

3.5.4 Luminaires

Luminaires shall be as described in the lighting schedule and on the drawings. The lighting drawings show indicative locations of all light fittings. The exact setting out is to be agreed during the course of the contract, and the Electrical Contractor will be expected to mark out the positions of all light fittings in each area for approval by the Architect's before the cutting of any holes in ceilings or chases in walls.

In general, all luminaires shall utilize energy efficient lamp sources with lamp efficacies greater than 65lm/W and an LOR (Light Output Ratio) of no less than 60%. Exceptions will be made in some instances due to a limited choice of equipment available for the intended application.

All external light fittings for the building, access ways and pathways shall have a luminous efficacy of at least 50 lamps lumens/circuit watt when the lamp has a colour rendering index (Ra) greater than or equal to 60, or 60 lamps lumens/circuit watt when the lamp has a colour rendering index (Ra) of less than 60.

All fittings with fluorescent and/or compact fluorescent lamps shall be fitted with high frequency control gear as standard.

The lighting installation shall comprise of new fittings complete with the lamps specified.

3.5.5 Light Source Colour Properties

All lighting sources shall be carefully selected to avoid distorting the appearance of skin tones and room décor between daytime, when the rooms are daylit, and after dark, when it will be lit with electric light sources.

Unless specified otherwise, all lighting sources shall have a CIE general colour rendering index of 80 or greater and a correlated temperature colour temperature of 3500K or less.

All external fittings, where provided, within the development zone shall meet the lighting requirements as set forth in Table12 - External lighting requirements by location.

	Light fittings measured in lamp lumens/circuit Watt, when:		LED luminaires where the lamp is integral to the fitting measured in luminaire lumens/circuit Watt, when:	
External lighting location	Colour rendering index (Ra) ≥ 60	Colour rendering index (Ra) ≥ <60	Colour rendering index (Ra) ≥ 60	Colour rendering index (Ra) <60
Building, access ways, pathways	50	60	40	50
Car parking, associated roads, floodlighting	70	80	55	60
	Lamp wattage ≥ 25W	Lamp wattage <25W	Lamp wattage ≥ 25W	Lamp wattage <25W
Signs, uplighting	60	50	50	50

Table 12 - External lighting requirements by location

3.5.6 Lighting Switch Plates

All lighting switch plates shall be positioned 1200mm above finished floor level (measured from the underside of lighting switch plate).

Lighting switch plates in all areas are to be arranged in single or multi-gang assemblies as appropriate and positioned adjacent to the door. Where there is more than one exit from a room provide two-way intermediate switching as necessary.

3.5.7 Emergency Lighting

The emergency lighting system shall comply with the requirements of BS 5266-1 and the Building Control Officer.

The emergency lighting system shall be arranged to illuminate all final exits and internal areas as indicated on the drawings and it will provide emergency lighting for 3 hours in the event of a mains power failure.

In general, emergency lighting shall be provided by maintained luminaires with integral or remote emergency battery packs suitable for passing through the ceiling cut-out for the light fitting. All battery packs shall be concealed. All luminaires and battery packs shall be ICEL certified and all luminaire housings, diffusers, and louvres shall be self- extinguishing.

All emergency luminaires shall have a clearly visible green, light emitting diode (LED) to provide visual indication of charger and battery status.

The Electrical Contractor shall install key switches for testing the emergency luminaires.

Where key switches are to be provided to test emergency light, the switches shall be located locally within the room itself. Key switches shall be selected from the MK White Logic Range.

Key switches shall be arranged to test either individual luminaires or groups of luminaires as appropriate. The permanent supply to emergency luminaires shall be taken from the live side of the local lighting switch.

3.5.8 Circuit Wiring

The lighting installation shall be wired from the lighting distribution boards via 6 or 10A MCB's ways using 1.5mm^2 LSOH insulated and sheathed multi-core cables for all circuits.

Where necessary to comply with BS 7671, 17th Edition of the IEE Wiring Regulations, combined MCB/RCD's (RCBO's) shall be provided.

Final circuit wiring to recessed light fittings shall terminate in a plug-in type ceiling rose adjacent to the luminaire within the ceiling void. Final connections to the light fitting shall be in 3 core heat resistant flexible cable.

Where luminaries are surface mounted, the final circuit wiring shall terminate in a terminal block within a conduit box. Final connections to luminaires shall be in 3 core heat resistant flexible cable.

3.5.9 Lighting Controls

Different parts of the development shall be provided with a specific type of lighting control appropriate to the activities being carried out and the functional requirements sought.

Where luminaires are to be controlled by PIR's or dawn/dusk photocells linked to time clocks, circuits shall be arranged to ensure that the lighting shall operate in the manner set forth below. Time clocks shall be fully programmable 7 day DIN rail mounted type and shall provide a minimum of 4 On and 4 Off programs for weekly cycle and summer/winter time change. All time clocks shall be mounted in a dedicated enclosure local to the distribution boards serving the lighting circuits.

3.5.9.1 Cycle Store

The cycle stores shall be controlled by ceiling mounted PIR continuously. Override key switch shall be provided locally to allow for switching off lighting circuits for maintenance and emergency lighting testing purposes.

3.5.9.2 Refuse Store

The refuse stores shall be controlled by ceiling mounted PIR continuously. Override key switch shall be provided locally to allow for switching off lighting circuits for maintenance and emergency lighting testing purposes.

3.5.9.3 Plant Rooms

The plant rooms shall be controlled by ceiling mounted PIR continuously. Override key switch shall be provided locally to allow for switching off lighting circuits for maintenance and emergency lighting testing purposes.

3.5.9.4 External Lighting

All external light fittings for the buildings, access ways, pathways and amenity spaces are to be controlled by dawn/dusk photocells linked to time clocks. Override key switches shall be provided to allow for switching off external lighting circuits for maintenance and emergency lighting testing purposes where applicable. The time clocks shall be programmed to override the photocells between the hours of 07:00hr and 19:00hr every day before switching back to photocell control between 19:00hr and 07:00hr.

3.5.10 External Lighting

All external light fittings for the building, access ways, pathways and amenity spaces are to be controlled by dawn/dusk photocells linked to time clocks. Override key switches shall be provided to allow for switching off external lighting circuits for maintenance and emergency lighting testing purposes where applicable. The time clocks shall be programmed to override the photocells between the hours of 07:00hr and 19:00hr every day before switching back to photocell control between 19:00hr and 07:00hr.

3.6 Fire Detection & Alarm System

3.6.1 Scope

The Electrical Contractor shall employ a Specialist to design, supply, install, test, commission and maintain a fire alarm system for the development.

The Specialist shall be LPS 1014 or BAFE certificated and be approved to BS EN ISO 9002.

All equipment central to the operation of the digital addressable fire alarm system (including control and indicating equipment, ancillary equipment, power supply units, automatic point detection equipment and all other sundry items); shall be approved by the Loss Prevention Council Board (LPCB) and comply with all relevant British Standards.

The Specialist shall include for the production of all wiring diagrams, installation details and commissioning of the fire detection and alarm system and shall supply as part of a Technical Submission details of all the equipment proposed for approval before placement of orders.

The Electrical Contractor shall supply and install all 1st fix items including power supplies, cable containment and back-boxes necessary to provide a complete system.

The Specialist shall supply and install all system cabling and 2nd fix items including all specialist equipment.

3.6.2 System Description

The development shall be provided with a stand-alone digital addressable fire detection and alarm system complete with control and indicating equipment; PSU's; automatic point detectors; manual call points; fire alarm interfaces; audible & visual alarm devices; all other sundry items to make up a complete system.

The fire detection and alarm system shall be arranged in following manner:

(a) BS 5839-1: 2013 Category L3 fire alarm system in common residential circulation zones. All automatic point detectors in these areas shall form part of the SHEV specialist's works. The FA specialist shall allow for volt-free contacts within the Main Fire Alarm CIE Panel to accept signalling inputs from the SHEV system.

(b) BS 5839-1: 2013 Category L3 + M (manual) fire alarm in the ancillary spaces (plant rooms etc.).

Compliance of the development with Part B of the Building Regulations shall be confirmed by Fire Specialist.

Details relating specifically to the fire detection and alarm system for the dwellings is provided under section 3.15.4.

3.6.3 Control & Indicating Equipment

Provide one (1) nr. Main Fire Alarm CIE Panel located in the entrance lobby at ground floor.

Control and indicating equipment shall:

(a) Be modular in construction to allow for future extension of the system.

(b) Incorporate a key switch to prevent unauthorised use of the manual controls (with the exception of the "Silence Buzzer" control).

(c) Be microprocessor based and operate under a multitasking software program. Operating programs and configuration data must be contained in easily up-dateable non-volatile memory (EEPROM). The use of "burnt" EEPROM's will not be permitted.

(d) Incorporate a real-time clock (accurate to within 1 minute per year under normal operating conditions and with daylight saving compensation).

(e) Comprise separate processors, cross-monitoring each other's correct operation, for the major functions of the systems. In particular, different processors must be used for the main control function, the detection input and alarm output functions, and the display and control function.

(f) Have the capability to run up to 500 addressable devices with the address code for each held within the addressable device and programmed via either the control and indicating equipment or a dedicated programming tool.

(g) Be field configurable by PC with configuration data being capable of back up on a central storage system.

(h) Meet the requirements of BS EN 54 Part 2 and BS EN 54 Part 4, shall be capable of being installed to BS 5839 Part 1 and shall be approved, together with associated ancillary equipment, by the Loss Prevention Council Board (LPCB).

(i) Monitor the status of all devices on the addressable loops for fire, short-circuit fault, incorrect addressing, unauthorised device removal or exchange, pre-alarm condition and contaminated detector condition.

(j) Monitor the status of all internal connection and interfaces, including charger, battery and remote signalling functions. Provide discrete visual indications for all key function including at least one yellow LED which can be configured to operate to suit sire specific functions.

(k) Have an integral 16x40 character LCD alphanumeric display with a facility to manually check the LCD display function.

(l) Provide facilities for signalling the following system conditions to a remote monitoring centre: Alarm, Pre-alarm, Fault, Zone Isolated.

(m) Incorporate fire decision algorithms specifically adapted to the response characteristics of the digital addressable detectors employed. Algorithms processing in each detector will not be permissible.

(n) Have as standard, the ability to automatically adjust the alarm and pre-alarm threshold levels to compensate for changes in detector sensitivity due to contamination over a period of time.

(o) Have as standard, the ability to provide automatic warning that a detector has reached a level of contamination which requires that it's to be replaced or serviced.

(p) Monitor all critical system components and interconnections (internal and external). In the event of a failure occurring which prevents correct operation of the alarm functions, a FAULT indicator will light and a message shall be given on the alphanumeric display within 100 seconds of occurrence.

(q) Provide text messages to indicate the precise location of where a fault has occurred in the system.

(r) Be capable of monitoring and indicating the status of auxiliary units, such as a remote signalling transmitter.

(s) Have an event log capable of storing up to the last 3000 events that have occurred. It shall be possible to view the content of the log via the alphanumeric display.

(t) Be capable of providing audible and visual warning when a weekly system test, as defined in BS 5839 Part 1, is required.

(u) Provide short circuit wiring fault isolation to every detector in the loop.

(v) The control and indicating equipment, standard power supply unit and standard repeater unit shall comply with the EMC requirements described in BS EN 54 Part 2 and BS EN 54 Part 4.

3.6.4 Detection Devices & Sounders

Smoke detectors shall comply with BSEN 54 Part 7. Smoke detectors shall be optical type complete with integral flashing beacon for visual alarm indication and where indicated on the electrical drawings, be provided with an integral sounder.

Heat detectors shall comply with BSEN 54 Part 5. Heat detector shall of the fixed temperature type complete with integral flashing beacon for visual alarm indication and where indicated on the electrical drawings, be provided with an integral sounder.

Point type smoke and heat detectors shall have integral LEDs to indicate the status and health of the device. Remote indicator units shall be required for devices installed in positions where detectors are not visible, where installed within building voids and where access to specific locations is restricted.

All point type detectors shall be mounted on common bases and shall be interchangeable.

Fire alarm sounders complying with BSEN 54 Part 3 shall be provided to provide 65 dBA or 5dB above the ambient noise level. All fire alarm sounders shall be integral to the detectors unless otherwise indicated on the electrical drawings.

All field devices to be provided in standard white finishes.

3.6.5 Manual Break Glasses

Break glass call points shall be either surface mounted or semi-recessed type and shall comply with BSEN 54 Part 11.

All break glass call points shall be resettable type and fitted with lift-up covers; single tool for test & reset procedure.

3.6.6 Fire Alarm Interface Units

Fire alarm interface units shall comply with BSEN 54 Part 17 & 18 and provided to interface the following systems with the fire detection and alarm system:

(a) SHEV Installations – To trigger a silent alarm on the Main Fire Alarm System the event of a fire incident being discovered in the common circulation zones within the residential blocks. Refer to section 3.7 for details relating to the SHEV system.

3.6.7 Cabling

Wiring associated with the fire alarm system shall be carried out using multi-core Draka FT120 zero halogen, low smoke fire resistant enhanced cable with red sheath.

Single or twin cable runs shall be clipped directly to the building fabric. Where cables are run in multiples greater than two (2); these shall be shall be installed on dedicated fire alarm cable trays. Where wiring is installed concealed within wall finishes; cables shall be enclosed within steel conduit.

Where cables pass through different fire compartments; all openings shall be sealed so as not to compromise the integrity of the fire compartments.

3.6.8 Cause & Effect Matrix

The Specialist shall be responsible for ensuring the correct operation of all the connected systems and shall produce a Cause & Effect Matrix that clearly sets out the consequential actions arising out of the operation of each and every automatic and/or manual device associated with the fire detection and alarm system.

3.6.9 Commissioning

On completion of the installation, the entire system shall be fully commissioned and set to work and a Certificate of Compliance shall be issued for the O & M Manual.

3.6.10 Maintenance

The Specialist shall provide within his quotation an option for 12 months full maintenance.

3.7 Smoke & Heat Exhaust Ventilation

3.7.1 Scope

The Electrical Contractor shall employ the Specialist Sub-contractor to design, supply, install, test, commission and maintain a smoke and heat exhaust system for the development.

The SHEV installation shall provide smoke and heat exhaust via an AOV coworking with an actuator located above the door on the third floor towards the roof.

Actuation shall be fully automatic via the smoke detectors and manual via Fireman's manual control points.

In the event of any automatic actuation via the smoke detector installation (forming part of the SHEV installation), a signal shall be sent to the fire alarm system via fire alarm interface units installed locally to the SHEV central controller.

The Electrical Contractor shall supply and install all 1st fix items including power supplies, cable containment and back-boxes necessary to provide a complete system.

The Specialist Sub-contractor shall supply and install all system cabling and 2nd fix items including all field devices and head end equipment.

The system shall comprise the following equipment:

(a) Central controller units installed in the 3st floor electrical riser.

(b) Optical smoke detectors located within the communal staircase and lobby.

(c) Fireman's manual control points in communal staircase and lobby comprising open and close operating buttons behind a lift-up cover to prevent nuisance operation.

(d) 24 DC actuators. The actuators must be capable of fully opening the door to achieve a free area of 1.0m^2.

(e) OHLS circuit integrity fire alarm cable as Draka FT30 range.

3.7.2 Residential Lobby Ventilation

The electrical contractor is to include for the design, supply and installation of a complete stand-alone smoke detection and ventilation installation as per shown in the MW Communal Electrics drawing 2372-62-0G. All equipment to include motors, smoke detectors, break glass actuators, control panels, reset facility and battery back up by Colt or equal and approved. Mechanical Smoke fan to be as FRAK50S: 50 CFM, or equal and approved. For details of duct size, refer to MWL Mechanical specification.

The Specialist shall include for the production of all wiring diagrams, installation details and commissioning of the mechanical ventilation system and shall supply as part of a Technical Submission detailed design proposals and equipment details for review and approval by the Client and Consulting Engineer before placement of orders.

The Electrical Contractor shall supply and install all 1st fix items including power supplies, cable containment and back-boxes necessary to provide a complete system.

The Specialist shall supply and install all system cabling and 2nd fix items including all specialist equipment.

Actuation is to be either automatic from smoke detectors or manual using Fireman's override switches. The system should ensure that the automatic vent on the fire floor only opens, all other vents remaining closed.

The installation by the electrical contractor is to comprise:

1. Control panel, to be complete with inbuilt power supply battery charger, emergency battery and 'System Actuated' and 'Battery in Order' indicators. Control panel to be located at ground floor in the electrical intake cupboard. Final position to be confirmed by the specialist in conjunction with the architect and the client.
2. Smoke detectors to be located within corridors and lift lobbies as per MW Communal Electrics layouts.
3. Fireman's 'break glass' override switches in each corridor comprising open and close operating buttons behind glass doors.
4. Actuators to be installed on the AOV. The actuators must be capable of fully opening the AOVs in order to achieve a free area when open of 1.5m^2.
5. All wiring from detectors and fireman's override switches to control panel, and from control panel to actuators on vents, using FP200 cable or equivalent.
6. Interface units for AOV actuators as necessary.

7. Mains supply to control panel from an unswitched fused spur taken from a separate way on the landlord's distribution board.

3.8 Door Entry System and Access Control Installations

3.8.1 Scope

The Electrical Contractor shall employ a Specialist Sub-contractor to design, supply, install, test, commission and maintain a door entry and access control system for the development.

The Specialist Sub-contractor shall include for the production of all wiring diagrams, installation details and commissioning of the door entry and access control system and shall supply as part of a Technical Submission details of all the equipment proposed for approval before placement of orders.

The Electrical Contractor shall supply and install all 1st fix items including power supplies, cable containment and back-boxes necessary to provide a complete system.

The Specialist Sub-contractor shall supply and install all system cabling and 2nd fix items including all field devices and head end equipment.

3.8.2 System Description

The building shall be provided with a stand-alone door entry and access control system. The door entry and access control system shall be complete with video door entry panels, dwelling monitors, push button door releases, emergency door releases, fireman's switches and proximity key fobs and readers to form a complete system.

The system shall be open protocol with PC based software for the BNO to manage key registration, key deletion, system programming, interrogation to produce a log of user access with dates and times.

3.8.3 Head End Equipment

The building head end equipment shall be suitable for mounting in the electrical switchroom at ground floor level.

The system head end equipment shall comprise an integral battery back-up power supply unit with charging facilities to maintain operation of the system in the event of a mains power failure.

The power supply for the head end equipment shall be derived via local 13A fused spur.

3.8.4 External Door Entry Panel

Provide an external high definition colour video door entry panel and adjacent to the main entrances of the development.

The door entry panels shall be anti-vandal, tamperproof, fully weatherproof and flush mounted stainless steel type, equipped with non-rotating, stainless steel call buttons.

The door entry panels shall be provided with a numeric keypad, i.e. buttons 0 – 9 to initiate calls to the dwellings clearly engraved in black lettering complete with Tradesman button.

The entry panels shall be complete with camera, speaker, light, and microphone. The speaker shall give a clear, loud sound and the volume shall be adjustable from within the panel. A reassurance tone shall sound at the entry panel each time a push button is pressed and when the door lock is released.

The panel shall suitable for operation in temperatures between -10°C and +50°C.

3.8.5 Internal Monitor

Within the hallway of each dwelling, supply and install a wall mounted hands-free colour video monitor.

Each monitor shall have lock release and privacy functions. The handset shall be white ABS impact resistant toughened plastic.

A high-quality microphone and speaker shall give clear duplex communications between entrance video intercom panel and internal monitor.

When called from the entrance panel, a distinctive electronic call tone will sound on the internal monitor. When answering the call, the resident can converse with the caller and admit them by pressing the lock release button.

The privacy button is to allow the resident to disconnect the electronic call if they do not want to be disturbed. This is to be programmable to automatically cancel after six hours of privacy, if not cancelled by the resident sooner. While in privacy mode a green LED on the handset is to be illuminated.

The internal monitor shall provide indication of entrance door status, i.e. opened/closed indicator and door open alert.

The internal monitor shall be selected from the BMP Opal range.

3.8.6 Electric Door Release

All secured doors shall be provided with magnetic locks provided by the Main Contractor; which shall be controlled by the door entry and access control system. Each door shall be provided with two magnetic locks which shall be released in the following manner:

(a) Locally by operation of a push to exit button installed internally on the secure side of the doors.

(b) Locally by operation of an emergency door release button installed internally on the secure side of the doors.

(c) Remotely by operation of the lock release function on the internal dwelling monitor.

After operation and once the doors have been detected as being closed, the doors shall automatically lock to prevent unauthorized access.

3.8.7 Proximity Access Control

Access to the supervised premises is to be based upon a non-contact proximity system using individually coded electronic keys used in conjunction with proximity key readers located at the positions indicated on the electrical drawings.

The electronic key access control system must be capable of interfacing with the door entry installation in such a manner that the lock release is operated via the door entry system power supply unit.

The electronic keys shall be capable of attachment to a key ring via a fixed metal eyelet and shall be capable of being read when held amongst mechanical keys. The electronic key shall carry a lifetime manufacturer's guarantee against electronic failure.

Each electronic key shall have a unique random code with sufficient different random combinations to ensure system integrity.

Each key shall be individually coded and capable of being added to or removed from the system by programming via the head end equipment or a portable computer without affecting the access privileges of another user's key.

All lifts shall be fobbed.

The Electrical Contractor shall supply three (3) electronic keys per dwelling with all keys addressed and listed on a permanent record sheet for handover to the Client and shall provide the Client with the necessary training on how to add or remove electronic keys from the roster of authorized key holders.

3.8.8 Fireman's Override Switch

All secured doors shall be provided with Fireman's override switch facilities complying with Fire Brigade requirements and when operated shall activate the lock release for a minimum of 20 seconds. The fascia panel shall be constructed of stainless steel and clearly engraved 'FIRE CONTROL' in red.

3.8.9 Commissioning

On completion of the installation, the entire system shall be fully commissioned and set to work and a Certificate of Compliance shall be issued for the O & M Manual.

3.8.10 Maintenance

The Specialist Sub-contractor shall provide within his quotation an option for 12 months full maintenance.

3.9 CCTV Installations

3.9.1 Scope

The Electrical Contractor shall employ a Specialist Sub-contractor to design, supply, install, test, commission and maintain a CCTV surveillance system for the development.

The Specialist Sub-contractor shall include for the production of all wiring diagrams, installation details and commissioning of the CCTV system and shall supply as part of a Technical Submission details of all the equipment proposed for approval before placement of orders.

The Electrical Contractor shall supply and install all 1st fix items including power supplies, cable containment and back-boxes necessary to provide a complete system.

The Specialist Sub-contractor shall supply and install all system cabling and 2nd fix items including all field devices and head end equipment.

3.9.2 System Description

The development shall be provided with a stand-alone PC LAN based CCTV system, complete with fixed position POE mini-dome cameras; DVR recorder; network equipment; all other sundry items to make up a complete system.

The system shall be compatible with Paxton Net2 protocols with PC based software for BNO operation and management functions.

3.9.3 Head End Equipment

The system shall comprise the following equipment including all sundry items not shown on the electrical drawings; or described within this specification; but required to make a complete system:

(a) 8 channel; DVD R/W embedded digital video recorder; web client operator interface; memory storage for 720 hours of footage.

(b) 17" LCD colour monitor for local monitoring and maintenance purposes; installed in the Concierge.

(c) Open protocol PC based software for BNO to view and manage real-time and recorded camera footage.

The head end equipment shall be suitable for mounting in a free-standing IT cabinet; as described in section 3.12; located in the basement electrical switch room.

The power supply for the head end equipment shall be derived via cabinet mounted 13A switched socket outlets installed within IT cabinet.

3.9.4 Cameras

In general, cameras shall be vandal resistant power over ethernet IP mini-dome type with super high resolution vari-focal lens, IR-cut filters and built-in IR LED illuminators.

Provide super high-resolution CCD day/night varifocal internal vandal resistant Power over Ethernet mini-dome cameras in the following location:

(a) Entrance Lobbies/Lift Lobbies

(b) Bike Store and Cycle Store

Refer to MW Communal Electrics drawings series 2372-62-XX and External Services drawings series for details regarding the location of the cameras.

3.9.5 Commissioning

On completion of the installation, the entire system shall be fully commissioned and set to work and a Certificate of Compliance shall be issued for the O & M Manual.

3.9.6 Maintenance

The Specialist Sub-contractor shall provide within his quotation an option for 12 months full maintenance.

3.10 Communal IRS Installations

3.10.1 Scope

The Electrical Contractor shall employ a Specialist to design, supply, install, test and commission a complete communal digital television, radio, satellite reception and distribution system to provide digital TV and Radio services and Satellite services.

The Specialist shall include for the production of all wiring diagrams, installation details and commissioning of the communal IRS system and shall supply as part of a Technical Submission detailed design proposals and equipment details for review and approval by the Client and Consulting Engineer before placement of orders.

The Electrical Contractor shall supply and install all 1st fix items including power supplies, cable containment and back-boxes necessary to provide a complete system.

The Specialist Sub-contractor shall supply and install all system cabling and 2nd fix items including all field devices and head end equipment.

3.10.2 System Description

The development shall be provided with an IRS system complete with satellite dish and terrestrial aerial arrays to receive and distribute satellite and terrestrial services.

The head end equipment comprising of a satellite and terrestrial launch amplifiers shall be installed on the 2nd floor riser.

All other necessary equipment required to form a complete system, including amplifiers, splitters and multi-switches shall be installed in the electrical service riser cupboards where space for installing this equipment has been allowed for.

The Specialist shall be responsible for all parts of the system outside of the dwellings and for extending the necessary cables to the dwelling service cupboards where the cables are to be terminated in an appropriate TV junction box.

3.10.3 Power Supplies

Power supplies for IRS equipment shall be provided directly from the nearest Landlord's lighting and power distribution board.

The Electrical Contractor shall allow for liaison, attendance and all works associated with Specialist Sub-contractor works. The Electrical Contractor shall obtain confirmation on the number and location for all small power supplies required by the Specialist Sub-contractor.

3.10.4 Services Required

The installation is to be a complete digital integrated reception system (IRS) and it shall receive and distribute the following services:

(a) Digital TV Freeview Services

(b) DAB & FM Radio Services

(c) Full range of Sky Satellite Services (Sky, Sky-Q)

3.10.5 Regulations

The installation shall comply with the requirements of:

(a) The Code of Practice for the installation of Radio and Television Receiving Aerials published by the Confederation of Aerial Industries Ltd.

(b) EMC Directive 89/336/EEC, encompassing BS EN 50083 Parts 1 and 2 and BS 6513.

(c) The requirements of the DTG book three in respect of systems for Digital Terrestrial Services.

(d) BSKYB Codes of Practice and specifications for new systems.

(e) The latest edition of the IET Wiring Regulations.

3.10.6 Quality of Signal, Satellite Dish & Aerials

The Specialist Sub-contractor shall make an appraisal of the quality of signal available, and provide a signal test certificate. Satellite dishes and aerials shall be selected and located for best performance given the prevailing signal conditions. The location of the satellite dishes and aerials is to be agreed with the Contract Administrator before installation commences.

The satellite and aerials shall be designed to resist 100mph gales. The materials shall be resistant to corrosion. All exposed ferrous surfaces shall be painted after the system has been commissioned.

3.10.7 Cables

Cables from the service head and terminating in the main splitter of each block to be Fibre Optic cables. The remaining cables to be coaxial cables to BS EN 50117. The Specialist Sub-contractor is to include for all necessary wiring required under their proposal, however it is assumed that the systems will be wired as follows:

(a) From the satellite head end and terrestrial launch amplifier module positions; install two (2) x fibre optic cables to each multi-switch module installed in the services riser cupboards of each block.

(b) From the services riser cupboard multi-switch position in each block; install four (4) x CAI125 double screened low loss coaxial cables to each dwelling where the cables will be terminated in a TV junction box installed within the dwelling services cupboard or in the Concierge area.

3.10.8 TV Outlets

The internal wiring and outlet accessories within the dwellings shall be carried out by the Electrical Contractor in the manner set forth under section 3.19.9.

3.10.9 Commissioning

On completion of the installation, the entire system shall be fully commissioned and set to work and a Certificate of Compliance shall be issued for the O & M Manual.

3.11 Broadband & Telephone Installations

3.11.1 Scope

BT Openreach is the telecommunications network operator in the area and they will supply and install the fibre optic broadband and telephone services via underground ducts provided and installed by the Ground-works Contractor.

The Electrical Contractor shall supply and install all internal cable containment and back boxes necessary to provide a complete system to distribute fibre optic broadband and telephone services.

The Electrical Contractor shall allow for liaison, attendance and all works associated with the provision of the BT services and for obtaining all BT approved materials to facilitate the fibre optic broadband and telephone services required to serve the dwellings and landlord installations.

The Employer shall be responsible for ordering the telephone lines required for the dwellings and landlord installations directly from BT.

The Electrical Contractor shall seek confirmation from the Employer and the Consulting Engineer on the number of lines required for the development before placing any orders on BT for materials. Details including costs; shall be submitted to the Employer for approval before the commencement of any related works.

3.11.2 Telephone Lines

Telephone lines shall be provided for the following:

(a) 9 no. telephone lines to serve each dwelling.

(b) 1 no. telephone line to serve the Fire Alarm System.

(c) 1 no. telephone line to serve the Door Entry System.

The telephone lines required for the dwellings shall be routed directly to each dwelling from the BT network located in the public foot way. Lines shall be terminated on approved BT NTE (network termination equipment) or onto a BT approved master socket (as directed by BT); installed in the dwelling services cupboard.

For telephone line required for the landlord installations, liaise directly with the relevant specialist responsible to confirm location for terminating telephone lines.

3.11.3 Fibre Optic Broadband

100 MB Fibre Optic broadband connections shall be provided for the following:

(a) 9 no. fibre optic broadband connections to serve each dwelling.

3.11.4 Commissioning

On completion of the installation, the entire system shall be fully commissioned and set to work and a Certificate of Compliance shall be issued for the O & M Manual.

3.12 Landlord's Equipment Cabinet

The Electrical Contractor shall supply and install the head end equipment for all site/communal services to be provided for the development, i.e. CCTV, IHAS, Door Entry and Access Control system in the IT cabinet positioned in the electrical and mechanical riser located in the building entrance lobby of Arlington Road.

Provision of all other equipment required for the CCTV, door entry and access control systems, shall be included within the relevant specialist's package. The Electrical Contractor shall liaise with the specialist to ensure that all necessary power supplies and cabinet mounted equipment is provided to facilitate the installation of the head end equipment for each system specified.

3.13 Automated Swing Gate

3.13.1 Scope

The Electrical Trade contractor shall employ **CAME UK LTD (Tel: 0115 9210 430)** (or an equal and approved specialist) to design, supply, install, test, commission and maintain an automated swing gate system for the development.

The Specialist shall include for the production of all system layout drawings, installation details and commissioning of the automated swing gate system and shall supply as part of a Technical Submission detailed design proposals for review and approval by the Client and Consulting Engineer before placement of orders.

3.13.2 System Description

The development shall be provided with an automated swing gate system complete with:

(a) EN 12445 and EN 12453 compliant 24V DC IP67 underground gate operators c/w galvanized steel foundation cases for residential swing gates up 3.5m per gate leaves; 400kg max weight per gate leaves; Max torque: 320nM; Duty cycle: intensive; Opening time: adjustable; Operating temperature: -20°C to 55°C.

(b) Control panel for 2 gate leaves.

(c) Emergency auxiliary batteries.

(d) Emergency key release.

(e) Radio transmitter for gate opener. NB: Allow for 24 no. hand held devices.

(f) Radio receiver for gate opener.

(g) Proximity fob reader c/w pedestal for gate opener. Provide pedestals for entering and exiting underground car park. Fob reader to be compatible with site-wide access control system. Liaise with Specialist providing access control system.

(h) Obstacle detection.

(i) Automatic gate lock

(j) Flashing warning beacon.

3.13.3 Power Supplies

Power supplies for the automated swing gate system shall be provided directly from the Landlord's lighting and power distribution board.

The Electrical Contractor shall allow for liaison, attendance and all works associated with Specialist Sub-contractor works. The Electrical Contractor shall obtain confirmation on the number and location for all small power supplies required by the Specialist Sub-contractor.

3.13.4 Commissioning

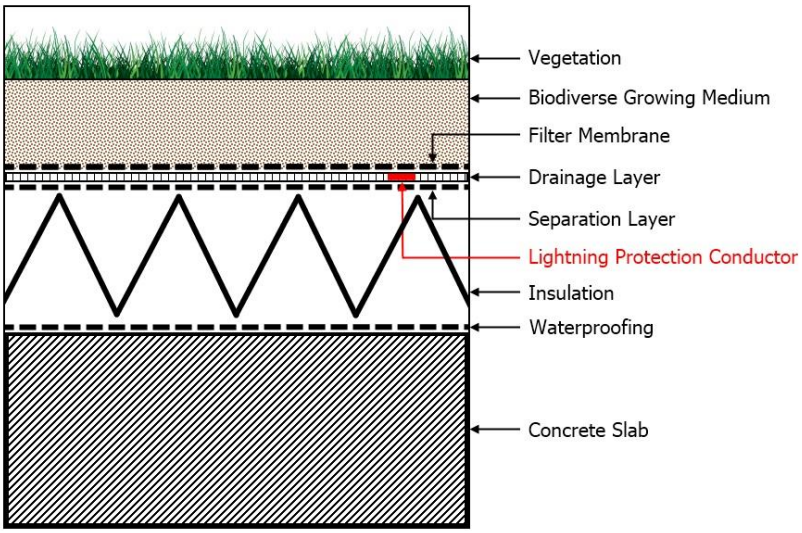
On completion of the installation, the entire system shall be fully commissioned and set to work and a Certificate of Compliance shall be issued for the O & M Manual.

3.14 Lightning Protection

3.14.1 Scope

The Electrical Contractor shall employ **RC Cuttings** (or equal and approved) as the Specialist Lightning Protection System Contractor to design, supply, install, test and commission a complete lightning protection system (LPS), including surge protection devices (SPD's), for all cables entering or leaving the building in accordance with the requirements of the European Lightning Protection Standards BS EN 62305 Parts 1 to 4.

Green Roof Conductor Location



For the cases that the conductor tape crosses green roofs of communal terraces, the Specialist shall provide a design such that the tape runs in the drainage layer.

3.14.2 Lightning protection system (LPS)

A complete risk assessment shall be carried out by the Specialist Lightning Protection System Contractor. Based on a risk assessment produced in line with BS EN 62305, a lightning protection system shall be installed to ensure the level of protection required. The lightning protection system shall consist of the following main components:

(a) An air termination network.

(b) Down conductors.

(c) An earth termination network.

(d) Surge protection devices.

The air termination network shall consist of tapes across the roofs, bonds to metallic items and air termination rods to provide a zone of protection to all roof mounted plant including the mechanical extract fans, IRS equipment, etc.

All down conductors shall be terminated at test points located at ground floor level. Copper tapes shall emanate from the test points and bonded to the designated earth pits, which shall provide the earth termination network. The test points shall allow the resistance to earth termination network to be periodically measured.

3.14.3 SPD's

Surge protection devices shall be installed to protect all cables which enter or leave the building (except for any fibre optic cables), and to all electrical/electronic equipment installed outside the main building envelope to protect the electrical installation from the effects of lightning electromagnetic pulse (LEMP).

Surge protection devices shall be specifically provided to the following circuits:

(a) Incoming power supplies.

(b) Incoming telecommunications cables.

(c) Incoming TV/FM/DAB/Satellite cables.

(d) Power supplies to all automated swing gates and boom barriers.

(e) Power supplies to all external CCTV cameras.

(f) Power supplies to all external lighting columns and bollards.

Surge protection devices shall be properly selected, coordinated and installed to form a system intended to reduce failures of electrical and electronic systems.

3.15 Earthing and Bonding

The Electrical Contractor shall supply and install a complete earthing and bonding installation in accordance with the requirements of BS 7671 2008, The Requirements for Electrical Installations, IEE Wiring Regulations 17th Edition and the DNO's requirements, including any relating to PME bonding.

The earthing and bonding installation shall be complete with all earth bars, circuit protective conductors, equipotential bonding conductors, supplementary bonding conductors and all other ancillary components to provide a completely earthed and bonded system to comply with the relevant sections of BS 7430, BS EN 62305, Electricity at Work Regulations 1989 and for the purpose of regular testing and inspection.

The DNO will provide a PME main earth terminal with their mains supplies to the premises and the Electrical Contractor is to include for supplying and installing all main equipotential bonding conductors from this terminal to all electrical switchgear, metallic services and other extraneous conductive parts of the installation.

Equipotential bonding conductors shall be installed to connect the following installations to the main earth terminal:

(a) Incoming Water Mains.

(b) Incoming Gas Mains.

(c) Mechanical ductwork installations.

(d) Mechanical pipework installations.

(e) Electrical containment installations.

(f) Kitchen sinks, basins and WC's.

All equipotential bonding shall be carried out in single core 6mm^2 LSOH copper earthing conductor cables with green and yellow sheath unless otherwise stated and the cables shall be logically grouped and routed together before connecting onto the nearest earth bar.

3.16 Communal Electrical Under-Floor Heating

The Electrical Contractor shall design, supply, install, test, commission and set to work a complete electric under-floor heating system in communal area as indicated in the heating services layout drawing series 2372-56-0X).

The Electrical Contractor shall supply and install an electrical under-floor heating system in the communal areas with an output of 150W/m². The Main Contractor shall provide the insulation in these areas.

The Electrical Contractor shall provide for the control of each heating zone. All Electric under-floor heating zones shall be controlled via a switched spur unit, thermostat and a time clock.

The Electrical Contractor shall verify the electric under-floor heating zones with the Architect and Consulting Engineer prior to commencing work.

All equipment shall be as manufactured by Schluter Ditra Heat Duo, or equal and approved heating mat system and controller, installed in accordance with the manufacturer's recommendations. Remote control via WIFI and mobile application to be provided by the manufacturer.

3.17 Dwellings

3.17.1 Scope

The Electrical Contractor shall supply, install, commission and set to work a complete electrical installation within each dwelling which shall comprise, but not necessarily limited to the following systems:

(a) Small Power Installations

(b) Lighting & Controls Installations

(c) Fire Detection & Alarm installations

(d) Intruder Alarm Installations

(e) Video Door Entry Installations

(f) IRS Installations

(g) Broadband & Telephone Installations

(h) SPD installations

(i) Earthing & Bonding Installations

3.17.2 Small Power Installations

3.17.2.1 Consumer Control Unit

Each dwelling shall be provided with a consumer control unit located in the service cupboard positioned so that the bottom line of the switches is between 1350mm and 1450mm above finished floor level (measured from topmost switch within consumer control unit), to comply with Approved Document M clause 1.18. When this cannot be achieved (i.e. consumer unit installed below the recommended height), they shall be key operated. In this case, the key shall be kept on a chain and hook close to the unit for emergency access.

For all dwellings, single phase supplies shall be terminated onto 80A SPN consumer control units, surface mounted metal IP30 rated type complying with BSEN 60439-3 and Regulation 421.1.200, as MEM Memera Range or equal and approved.

Consumer control units shall accept MCB's, RCBO's, RCCD's and any other command and control devices required as necessary.

The consumer control unit shall be properly selected to include 20% spare ways (minimum of 2 spare ways). All consumer control unit circuits shall be labelled to indicate the circuits that they serve and be provided with an operating instruction card.

3.17.2.2 Small Power Outlets

The small power installation shall consist of socket outlets in various locations for general purpose use and for permanent power supplies to fixed equipment.

The locations are indicative only and are not intended to represent the exact locations within rooms. The exact setting out is to be agreed during the course of the contract and the Electrical Contractor shall mark out the positions of all electrical accessories in each room for approval by the Architect prior to the cutting out of dry lining and chases. All final setting out shall be agreed with the Architect before work commences.

In general, small power outlets shall be arranged as 32A ring main circuits protected by RCBO's and wired in 2.5mm^2 cables or as 20A, 32A, 45A or 50A radial circuits protected by RCBO's and wired in 2.5, 4.0, 6.0 or 10.0mm^2 cables as applicable.

Where specifically identified on the Electrical Drawings and within the Specification, certain small power outlets shall be served by radial circuits to meet the higher current demand.

3.17.2.3 Final Circuit Installation Method

All lighting and power circuits shall be served from MCB, RCBO or RCCD protected fuse ways as necessary to comply with the requirements of BS 7671 17th Edition of the IEE Wiring Regulation; specifically, Regulations 415.1, 411.3.3, 701.411.3.3, 314.1, 314.2, 522.6.6, 522.6.7 and 522.6.8 will apply.

All RCBO's shall be designed to be installed in a single way within the consumer control unit. Consumer control units shall be fitted with Type B MCB's with 6kA rated breaking capacity; appropriately rated to serve the particular circuit.

All 32A ring main circuits serving general purpose socket outlets and all circuits serving lighting and power outlets in bath and shower rooms shall be individually protected by appropriately rated MCB's collectively protected by a 30mA RCCD unit.

Circuits serving the whole house heat recovery systems, fridge/freezer outlets, fire alarm systems, intruder alarm systems, access control & door entry system shall be arranged as 20A radial circuits and individually protected by MCB's only if the cables are fully protected by an earthed metallic covering, trunking, conduit or other mechanical protection along its entire length between the consumer control unit and final point of utilisation. If earthed mechanical protection cannot be provided or guaranteed for any reason, then additional protection by means of individual 30mA RCBO's shall be provided.

Where a circuit is concealed in a wall or partition at a depth of less than 50mm from the surface, or where cables are concealed in a metal stud partition wall, irrespective of the depth from the surface, and if not provided with earthed mechanical protection e.g. metal trunking or conduit, these circuits must be provided with additional protection by means of a 30mA RCCD or RCBO device.

Power and lighting circuits on each floor shall be wired on separate circuits.

A separate 32A ring main circuit shall be provided within each dwelling for the switched socket outlets serving the kitchen area.

Where applicable, circuits serving cookers shall be arranged as a 45A radial circuit and protected by a 45A MCB device.

Electrical circuits within the dwellings are to be wired in LSOH insulated cables.

Cables shall be run on the loop in principle with all joints being made at accessory or outlet point locations. Other joints in cables will not be allowed.

Cables shall be sized in accordance with BS 7671 17th Edition of the IEE Wiring Regulation, with voltage drops being less than 3.0% for lighting and 5.0% for power at all points and due account taken of de-ratings for grouping, ambient temperature and the presence of insulation, etc. The size of cables shall in no instances be less than 1.5mm^2 for lighting circuits, 2.5mm^2 for power circuits (in ring formation) and 10mm^2 for electric cooker circuits.

Cables shall be coordinated with other services and the structure and care shall be taken to avoid running close to hot water pipes. Cables shall be installed in a workman like manner and be supported with proprietary fixings to the building fabric.

Services for each dwelling must be kept separate at all times and services for one dwelling must under no circumstances enter another dwelling.

3.17.2.4 Concealed Wiring

Taking into account the requirements set forth in section 3.13.2.3, horizontal runs of cables are to be routed via the ceiling voids. Vertical cable drops shall be concealed and conduit protected where below wall plaster in galvanized metal sheathing, trunking or high impact PVC or metal conduit. The sheathing and wiring shall be let into the wall surface to ensure at least 5mm of plaster cover.

3.17.2.5 Electrical Accessories

Electrical accessories in visible locations and habitable rooms shall be flush mounted and have a white finish as MK Logic Plus range or equal and approved.

Electrical accessories hidden from view, i.e. where installed in service cupboards, behind joinery, above ceiling voids, etc., for power supplies to mechanical, fire and security equipment, etc., accessories shall be recessed mounted on walls, and surface mounted on ceilings, and have a white finish as MK Logic Plus range or equal and approved.

The positions of all visible accessories shall be subject to approval by the Architect who will also be responsible for the final setting out of all visible accessories.

3.17.2.6 Switched Socket Outlets

All socket outlets shall be switched and easily accessible to allow the occupant to vary furniture layout and fixed in accordance with Approved Document M and Lifetime Homes requirements. All socket outlets shall incorporate child resistant shutter systems. All switches for socket outlets shall incorporate double pole rocker action type switches.

Socket outlets shall generally be positioned 450mm above finished floor level (measured from underside of socket).

Sockets in kitchen shall be positioned 150mm above worktop (measured from underside of socket).

No power point shall be located above a fridge/freezer space.

3.17.2.7 Domestic Appliances (TBC by client)

Power supplies for domestic appliances shall be provided via un-switched 13A socket outlets or 20A flex outlet plates for low current appliances (i.e. less than 20A) or high current connection units for higher current appliances (i.e. higher than 20A).

For low current appliances, each socket outlet or flex outlet plate shall be controlled via a 20 amp double pole switch module with neon indicator and printed with the name of the appliance served. Switches shall be grouped together in a multi-gang metal plate to match the general electrical accessories and installed above the counter.

For higher current appliances, each high current connection unit shall be controlled via a dedicated 32A, 45A or 50A double pole high current switch with integral neon indicators. Switches shall match the general electrical accessories and installed above the counter.

In general, socket outlets, flex outlet plates or high current connection units shall be installed in a concealed location behind the kitchen cabinets or appliances where possible. Final positions for all accessories to be agreed with the Architect.

Where applicable, power supplies for electric cookers shall be provided by a dedicated 45A or 50A radial circuit protected by an MCB and wired in 10.0mm^2 cables. Final connections to electric cookers shall be via a cooker connection unit as MK K5045WHI.

Where power supplies for appliances are to be arranged as 20A radial circuits protected by an MCB, wire in 2.5mm^2 cables with final connections made via a flex outlet plates as MK Logic range

Where power supplies for appliances are to be arranged as 32A ring main circuits protected by RCBO's, wire in 2.5mm^2 cables with final connections made via unswitched socket outlets as MK Logic range.

To reduce the risk of overloading ring main circuits serving appliances, general purpose socket outlets shall not be connected on the same circuits.

3.17.3 Lighting & Control Installations

3.17.3.1 Scope

The Electrical Contractor shall supply and install all luminaires, lamps, lighting switches, sensors and accessories to provide a complete lighting installation as set forth on the Electrical Drawings.

3.17.3.2 Luminaires

Luminaires shall be as set forth on the Consulting Engineer's luminaire schedule. Any alternatives shall be submitted to the Consulting Engineer and the Architect for technical review and approval before any procurement is carried out. The Electrical Contractor shall submit samples of any alternatives proposed to allow the Consulting Engineer to properly evaluate alternatives before approval can be given.

The Electrical Drawings show indicative locations of all light fittings. The exact setting out is to be agreed during the course of the contract, and the Electrical Contractor will be expected to mark out the positions of all light fittings in each area for approval by the Architect before the cutting of any holes in ceilings or chases in walls.

All fittings with fluorescent and/or compact fluorescent lamps shall be fitted with high frequency control gear as standard.

In general, all luminaires shall utilize energy efficient lamp sources with lamp efficacies greater than 65lm/W and a Light Output Ratio (LOR) of no less than 60%.

The lighting installation shall comprise of new fittings and where applicable, all luminaires shall be supplied complete with lamps and positioned so that they are easily accessible for the replacement of lamps.

3.17.3.3 Light Source Colour Properties

All lighting sources shall be carefully selected to avoid distorting the appearance of skin tones and room décor between daytime, when the rooms are daylit, and after dark, when it will be lit with electric light sources.

Unless specified otherwise, all lighting sources shall have a CIE general colour rendering index of 80 or greater and a correlated temperature colour temperature of 3500K or less.

3.17.3.4 Lighting Switch System

Except for the living room, all lighting switches shall be conventional rocker type selected to control non-dimmable circuits as set forth on the Electrical Drawings. Where several switches are required to control multiple circuits from the same location, the switches shall be grouped together in a multi-gang plate.

All lighting switches within the habitable areas and where visible, shall be flush mounted and have a white finish as MK Logic range or equal and approved.

Lighting switches within "back of house" areas, i.e. utility cupboards etc, shall be recessed mounted and selected from the MK Logic range, or equal and approved.

All wall mounted switches are to be installed flush with wall finishes in galvanised steel mounting boxes of the correct size and depth. The back boxes shall be so mounted such that when the lighting switch plate is fitted, the edges are flush with the wall surface.

In general, all lighting switches in visible locations shall be installed as per the Architect's setting out requirements.

3.17.3.5 Lighting Switch Plates

All lighting switch plates shall be positioned 1200mm above finished floor level (measured from the underside of lighting switch plate) and fixed in accordance with Approved Document M and Lifetime Homes requirements.

Lighting switch plates controlling lighting points within WC's, bathrooms and shower rooms shall be positioned outside the room and adjacent to the doors.

Lighting switch plates controlling lighting points within WC's, bathrooms and shower rooms shall be linked to the whole house heat recovery system to provide fan boost facilities when the lighting switches are operated.

3.17.4 Fire Detection & Alarm Installation

3.17.4.1 Scope

The Electrical Contractor shall employ a Specialist to design, supply, install, test, commission and maintain a fire detection and alarm system for the dwellings.

The Specialist shall be LPS 1014 or BAFE certificated and be approved to BS EN ISO 9002.

All equipment central to the operation of the fire alarm system (including control and indicating equipment, addressable ancillary equipment, power supplies and automatic point detection equipment shall be approved by the Loss Prevention Council Board (LPCB) and comply with all relevant British Standards.

The Electrical Contractor shall supply and install all 1st fix items including power supplies, cable containment and back-boxes necessary to provide a complete system.

The Specialist shall supply and install all system cabling and 2nd fix items including all field devices and head end equipment.

3.17.4.2 System Description

The dwellings shall be provided with a Grade D Category LD1 fire alarm system as defined in BS 5839 Parts 1 & 6.

The dwellings shall be provided with an automatic point smoke and heat detector system to protect the escape route(s) from the dwellings and all bedrooms which shall consist of optical smoke detectors generally located in the entrance hall, lobbies, landings, bedrooms and fixed temperature heat detectors in the kitchen areas as indicated on the Electrical Drawings.

The automatic point detectors shall incorporate an integral sounder base.

3.17.4.3 Cabling

Wiring associated with the fire alarm system shall be carried out using multi-core Draka FT120 zero halogen, low smoke fire resistant enhanced cable with red sheath.

Single or twin cable runs shall be clipped directly to the building fabric. Where cables are run in multiples greater than 2, they shall be shall be installed on dedicated ELV cable trays. Where cables pass through different fire compartments, all openings shall be sealed so as not to compromise the integrity of the fire compartments. Where wiring is installed flush within wall finishes, cables shall be enclosed within steel conduit.

3.17.4.4 Commissioning

On completion of the installation, the entire system shall be fully commissioned and set to work and a Certificate of Compliance shall be issued for the O & M Manual.

3.17.4.5 Maintenance

The Specialist shall provide within their quotation an option for 12 months full maintenance.

3.17.5 Intruder Alarm Installation

Provide 1 no. 13A unswitched fused connection in the service cupboard of each dwelling for future connection of an intruder alarm system. Fused spur for intruder alarm system to be wired to a separate way on the consumer control unit.

3.17.6 Video Door Entry Installations

3.17.6.1 Scope

The Electrical Contractor shall employ a Specialist Sub-contractor to design, supply, install, test, commission and maintain a video door entry system for the dwellings.

The Specialist Sub-contractor shall include for the production of all wiring diagrams, installation details and commissioning of the video door entry system and shall supply as part of a Technical Submission details of all the equipment proposed for approval before placement of orders.

The Electrical Contractor shall supply and install all 1st fix items including power supplies, cable containment and back-boxes necessary to provide a complete system.

The Specialist Sub-contractor shall supply and install all system cabling and 2nd fix items including all field devices and head end equipment.

Final terminations of the specialist cables shall be carried out by the Specialist.

3.17.6.2 System Description

The dwellings shall be provided with a stand-alone video door entry system. The system shall be complete with video door entry panels and dwelling monitors to form a complete system.

3.17.6.3 External Door Entry Panel

Provide an external high definition colour video door entry panel; adjacent to the front entrance to each dwelling.

The video door entry panel shall be anti-vandal, tamperproof, fully weatherproof and flush mounted stainless steel type, equipped with non-rotating, stainless steel call buttons.

The entry panels shall be complete with camera, speaker, light, and microphone. The speaker shall give a clear, loud sound and the volume shall be adjustable from within the panel. A reassurance tone shall sound at the entry panel each time a push button is pressed and when the door lock is released.

The panel shall suitable for operation in temperatures between -10°C and +50°C.

3.17.6.4 Internal Monitor

Within the hallway of each dwelling and the 1st floor landing, supply and install a wall mounted hands-free colour video monitor.

Each monitor shall have lock release and privacy functions. The handset shall be white ABS impact resistant toughened plastic.

A high quality microphone and speaker shall give clear duplex communications between entrance video intercom panel and internal monitor.

When called from the entrance panel, a distinctive electronic call tone will sound on the internal monitor. When answering the call, the resident can converse with the caller and admit them by pressing the lock release button.

The privacy button is to allow the resident to disconnect the electronic call if they do not want to be disturbed. This is to be programmable to automatically cancel after six hours of privacy, if not cancelled by the resident sooner. While in privacy mode a green LED on the handset is to be illuminated.

The internal monitor shall provide indication of entrance door status, i.e. opened/closed indicator and door open alert.

3.17.6.5 Electric Door Release

The front door shall be provided with an electric keep lock provided by the Main Contractor; which shall be controlled by the video door entry system and released remotely by operation of the lock release function on the internal dwelling monitors.

3.17.7 Broadband & Telephone Installations

Refer to sections 3.11 for details regarding the provision of fibre optic broadband and telephone services.

Within the dwellings, provide additional (Virgin Media) BT slave sockets in the locations indicated on the Electrical Drawings, star-wired from the master socket in the services cupboard.

3.17.8 IRS Installations

3.17.8.1 Scope

The Electrical Contractor shall employ a Specialist to design, supply, install, test, commission and maintain an IRS installation for the dwellings.

The Specialist shall include for the production of all wiring diagrams, installation details and commissioning of the IRS system and shall supply as part of a Technical Submission detailed design proposals and equipment details for review and approval by the Consulting Engineer and Architect before placement of orders.

The Electrical Contractor shall supply and install all 1st fix items including power supplies, cable containment and back-boxes necessary to provide a complete system.

The Specialist shall supply and install all system cabling and 2nd fix items including all field devices and head end equipment.

The Electrical Contractor shall terminate the IRS cables in the dwelling service cupboard as indicated on the Electrical Drawings.

3.17.8.2 System Description

The development shall be provided with a stand-alone IRS system complete with satellite dishes and terrestrial aerial arrays to receive and distribute satellite and terrestrial services.

The head end equipment shall be installed within the electrical plantroom, complete with all necessary distribution components to form a complete system.

3.17.8.3 Power Supplies

Power supplies for IRS equipment shall be provided directly from the Landlords distribution board.

The Electrical Contractor shall allow for liaison, attendance and all works associated with providing all power supplies and cable containment required by the Specialist. The Electrical Contractor shall obtain confirmation on the number and location for all small power supplies required by the Specialist.

3.17.8.4 Services Required

The installation shall be a complete digital integrated reception system (IRS) that shall be capable of receiving and distributing the following services:

(a) Digital TV Freeview Services

(b) DAB & FM Radio Services

(c) Sky Q Satellite Services

3.17.8.5 Regulations

The installation shall comply with the requirements of:

(a) The Code of Practice for the installation of Radio and Television Receiving Aerials published by the Confederation of Aerial Industries Ltd.

(b) EMC Directive 89/336/EEC, encompassing BS EN 50083 Parts 1 and 2 and BS 6513.

(c) The requirements of the DTG book three in respect of systems for Digital Terrestrial Services.

(d) BSKYB Codes of Practice and specifications for new systems.

(e) The latest edition of the IET Wiring Regulations.

3.17.8.6 Quality of Signal, Satellite Dish & Aerials

The Specialist shall make an appraisal of the quality of signal available, and provide a signal test certificate. Satellite dishes and aerials shall be selected and located for best performance given the prevailing signal

conditions. The location of the satellite dishes and aerials is to be agreed with the Consulting Engineer and Architect before any works commences.

The satellite and aerials shall be designed to resist 100mph gales. The materials shall be resistant to corrosion. All exposed ferrous surfaces shall be painted after the system has been commissioned.

3.17.8.7 Cables

All cables are to be coaxial cables to BS EN 50117. The Specialist is to include for all necessary wiring required under their proposal, however it is assumed that the systems will be wired as follows:

(c) From the satellite head end and terrestrial launch amplifier module positions; install five (5) x CAI125 double screened low loss coaxial cables to each multi-switch module installed in the electrical and riser.

DWELLINGS: From the electrical riser derive two (2) x CAI125 double screened low loss coaxial cables to each dwelling where the cables will be terminated in a TV junction box installed within the utility cupboard.

(d) Internally within the flats; extend two (2) x CAI100 double screened low loss coaxial cables from the TV junction box to a double gang multi-media plate located within the Living room to provide the full range of Sky and terrestrial services; extend (2) x CAI100 double screened low loss coaxial cable from the TV junction box to a single outlet TV plate located within each and every Bedroom to provide Playback from living room Sky receiver unit.

3.17.8.8 TV Outlets

All outlets are to match other electrical accessories and suitable for mounting on 35mm deep back boxes. In living rooms, outlets are to be multi-media plates complete with SAT1, FM/DAB, TV and master telephone outlet connections. In bedrooms, all outlets are to be single TV outlets.

3.17.9 Earthing & Bonding Installations

3.17.9.1 Scope

The Electrical Contractor shall supply and install a complete earthing and bonding installation in accordance with the requirements of BS 7671 2008, The Requirements for Electrical Installations, IEE Wiring Regulations 17th Edition and the DNO's requirements, including any relating to PME bonding.

The earthing and bonding installation shall be complete with all earth bars, circuit protective conductors, equipotential bonding conductors, supplementary bonding conductors and all other ancillary components to provide a completely earthed and bonded system to comply with the relevant sections of BS 7430, BS EN 62305, Electricity at Work Regulations 1989 and for the purpose of regular testing and inspection.

3.17.9.2 Dwelling Earth Bar

The Electrical Contractor shall supply and install a 6 way, 50x6mm high conductivity, hard drawn copper earth bar with M10 brass stud assemblies and single disconnecting link within the dwelling service cupboard.

Connect all main equipotential bonding conductors from this terminal to all electrical switchgear, metallic services and other extraneous conductive parts of the installation within the dwelling, including but not limited to just the following:

(a) Incoming Water Mains

(b) Mechanical ductwork installations

(c) Mechanical pipework installations

(d) Electrical containment installations

(e) Kitchen sinks, basins and WC's

All equipotential bonding shall be carried out in single core 6mm^2 LSOH copper earthing conductor cables with green and yellow sheath and the cables shall be logically grouped and routed together before connecting onto the dwelling earth bar.

4 Appendices

4.1 Summary of Tender

1.	Electrical Supply & Metering Installations	£_____
2.	Low Voltage Distribution Network Installations	£_____
3.	Landlord's Small Power Installations	£_____
4.	Landlord's Lighting Installations	£_____
5.	Fire Alarm Installations	£_____
6.	SHEV Installations	£_____
7.	Broadband & Telephone Installations	£_____
8.	Communal IRS Installation	£_____
9.	CCTV Installations	£_____
10.	Surge Protection Installations	£_____
11.	Dwellings Small Power Installations	£_____
12.	Dwellings Lighting Installations	£_____
13.	Dwellings Fire Alarm Installations	£_____
14.	Dwellings Intruder Alarm Installations	£_____
15.	Dwellings IRS Installations	£_____
16.	Dwellings Video Door Entry Installations	£_____
17.	Dwellings AV Installations (PS for wiring and containment only)	£_____
18.	Dwellings Surge Protection Installations	£_____
19.	Dwellings Earthing & Bonding Installations	£_____
20.	As Fitted Drawings	£_____
21.	Tenants Instructions and Operating & Maintenance Manuals	£_____

TOTAL CONTRACT PRICE: **£_____**

Signed ……

Date……

For and on behalf of

……

4.2 Schedule of Authorized Extra Work

Should any extra work or variation be required at daywork rates, we undertake to carry out the work at net cost plus the following percentage additions to cover supervision, establishment charges and profit for work performed during normal hours.

Materials..... %

Subcontract work.....….. %

Plant..... %

Labour rates for dayworks are also to be submitted, to be priced as fully inclusive hourly rates for the various standards of labour.

Labour rates:

4.3 Schedule of Rates

Upon the Contract Administrator's request, the Tenderer shall provide within 7 days a 'Quantified Schedule of Rates' covering the entire installation. Lump sum rates of any form will not be acceptable. This schedule shall be based on the same prices as those used to comprise his Tender and shall be used to value any omissions or additions to the Contract.

4.4 Luminaire Schedule

LUMINAIRE SPECIFICATION

MENDICK WARING LIMITED

PROJECT:	Arlington Road
PROJECT NO:	J2372
REVISION:	Tender Issue
DATE:	14.12.18

T2

SCHEDULE OF LUMINAIRES - GENERAL NOTES:

The design of the lighting shall generally be in accordance with the recommendations of the CIBSE Lighting Guides.

The foregoing is for guidance and general information only. The specific clauses detailing the lighting installation are given in the relevant clauses of the Electrical Services Specification and the accompanying drawings.

NOTES:

1 The Trade Contractor may propose alternative luminaires to those specified in the Schedule but must indicate the saving that may be achieved. Note that any proposed alternative must match the performance and quality of the proposed luminaire.

2 All information given in this Schedule must be checked and verified with the manufacturers. Any discrepancies must be reported to the Construction Manager before ordering.

3 All fluorescent luminaires shall be complete with integral fuses, power factor correction to 0.95 and high frequency control gear.

4 Luminaires shall comply with the relevant and current sections of BS 4533 & EN 60598.

5 Generally, all luminaires shall be provided with independent means of support or rest on the ceiling grid. The Contractor shall check suitability of the luminaire for installation on/in the indicated ceiling type. (Also, see Item 8 below).

6 All “lay in” type luminaires shall be complete with retaining clips or other means to ensure that diffusers do not lift on door closing, etc.

7 All colours of luminaires must be verified by the contractor prior to procurement.

8 The Trade Contractor shall ensure that all luminaires are suitable to be mounted on/in the ceiling types that are shown on the Architects drawings prior to procurement.

9 The Trade Contractor shall ensure that all etched glasses are appropriate. The Trade Contractor shall submit samples for approval prior to procurement.

10 Any specials shall be submitted for approval (pre-production sample) and the Contractor shall allow for this approval time in his programme.

11 Luminaires shall not be lamped or tubed until immediately prior to hand-over. If, by agreement, luminaires are used during construction, the luminaires used during this period shall be re-lamped at hand-over.

12 Information shown in the Schedule is for generally for luminaires only. The Trade Contractor shall verify the catalogue numbers/references for any required accessories prior to procurement.

13 All luminaires shall be cleaned and free of dust, dirt, finger prints and other deleterious materials prior to hand-over of the installation. Where dirt, dust, finger prints, corrosion or other conditions have caused imperfections in the luminaire, they shall be replaced at no extra cost.

SIGN OFF APPROVAL:	
ARCHITECT:	**CLIENT:**

Edelman House, 1238 High Road, Whetstone, London N20 0LH Tel: 020 8446 9696 Fax: 020 8446 9900

LUMINAIRE SPECIFICATION

Mendick Waring Limited

PROJECT:	Arlington Road
PROJECT NO:	J2372
REVISION:	Tender Issue
DATE:	24/10/18

T2

REVISION HISTORY:		
REV.	**DATE**	**SUMMARY OF CHANGES:**
T1	04.10.18	Tender Issue
T2	14.12.18	Vivendi Coments Incorporated

SIGN OFF APPROVAL:	
ARCHITECT:	**CLIENT:**

Edelman House, 1238 High Road, Whetstone, London N20 0LH Tel: 020 8446 9696 Fax: 020 8446 9900

LUMINAIRE SPECIFICATION

MENDICK WARING LIMITED

PROJECT:	Arlington Road	**LUMINAIRE REF:**
PROJECT NO:	J2372	A/D
REVISION:	Tender Issue	
DATE:	14.12.18	

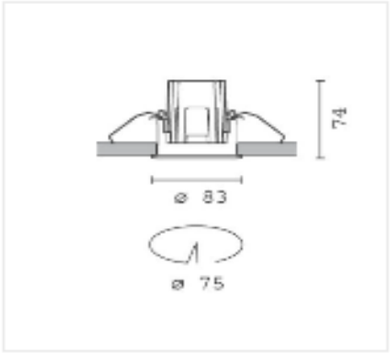
DESCRIPTION:

Ceiling Recessed Downlight

LOCATION:

Flats and Communal Corridors.

ILLUSTRATION, DETAILS, PHOTOMETRIC DATA



MANUFACTURER/CONTACT:	**LUMINAIRE DATA**	
Iguzzini	**LUMINAIRE REF:**	P351
Astolat Business Park	**DIAMETER:**	75mm
Astolat Way	**CUT-OUT:**	74mm
Off Old Portsmouth Road	**DEPTH:**	74mm
GU3 1NE	**FINISH:**	White
Guildford	**ACCESSORIES:**	
Nick Constantine +44(0)7786707427		

ELECTRICAL/LIGHTING DATA:

LAMP TYPE:	10W 930 lum	**COLOUR TEMPERATURE:**	3000K
LAMP REFERENCE:	LED	**SUPPLY:**	240-230V
MANUFACTURER:	Iguzzini	**LUMINAIRE EFFICACY:**	93lum/W
LAMP BASE:	N/A	**L.O.R.**	80.0%
LAMP LIFE:	N/A	**CONTROL GEAR:**	N/A

NOTES / MAINTENANCE REQUIREMENTS

"E" denotes luminaires with remote emergency inverter and battery pack for 3h duration emergency operation.

SIGN OFF APPROVAL:

ARCHITECT:	**CLIENT:**

Edelman House, 1238 High Road, Whetstone, London N20 0LH Tel: 020 8446 9696 Fax: 020 8446 9900

LUMINAIRE SPECIFICATION

MENDICK WARING LIMITED

PROJECT:	Arlington Road	**LUMINAIRE REF:**
PROJECT NO:	J2372	B
REVISION:	Tender Issue	
DATE:	14.12.18	

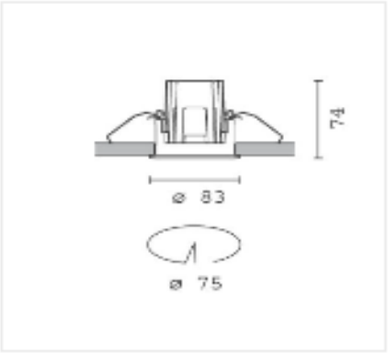
DESCRIPTION:

IP44 Ceiling Recessed Downlight

LOCATION:

Bathrooms

ILLUSTRATION, DETAILS, PHOTOMETRIC DATA



MANUFACTURER/CONTACT:	**LUMINAIRE DATA**	
Iguzzini	**LUMINAIRE REF:**	P351
Astolat Business Park	**DIAMETER:**	75mm
Astolat Way	**CUT-OUT:**	74mm
Off Old Portsmouth Road	**DEPTH:**	74mm
GU3 1NE	**FINISH:**	White
Guildford	**ACCESSORIES:**	
Nick Constantine +44(0)7786707427		

ELECTRICAL/LIGHTING DATA:

LAMP TYPE:	10W 947lum	**COLOUR TEMPERATURE:**	3000K
LAMP REFERENCE:	LED	**SUPPLY:**	240-230V
MANUFACTURER:	Iguzzini	**LUMINAIRE EFFICACY:**	93lum/W
LAMP BASE:	N/A	**L.O.R.**	80.0%
LAMP LIFE:	N/A	**CONTROL GEAR:**	N/A

NOTES / MAINTENANCE REQUIREMENTS

SIGN OFF APPROVAL:

ARCHITECT:	**CLIENT:**

Edelman House, 1238 High Road, Whetstone, London N20 0LH Tel: 020 8446 9696 Fax: 020 8446 9900

LUMINAIRE SPECIFICATION

MENDICK WARING LIMITED

PROJECT:	Arlington Road	**LUMINAIRE REF:**
PROJECT NO:	J2372	C
REVISION:	Tender Issue	
DATE:	14.12.18	

DESCRIPTION:

Wall mounted luminaire

LOCATION:

Staircase

ILLUSTRATION, DETAILS, PHOTOMETRIC DATA

MANUFACTURER/CONTACT:	**LUMINAIRE DATA**	
Whitecroft Lighting Ltd	**LUMINAIRE REF:**	K4H4154KS
Burlington Street	**DIAMETER:**	400 mm
Ashton-under-Lyne	**DEPTH:**	95 mm
Lancashire	**CUT-OUT:**	N/A
OL7 0AX	**FINISH:**	White
United Kingdom	**ACCESSORIES:**	

ELECTRICAL/LIGHTING DATA:

LAMP TYPE:	15W 1700 lum	**COLOUR TEMPERATURE:**	4000 K
LAMP REFERENCE:	LED	**SUPPLY:**	240V/50Hz
MANUFACTURER:	Whitecroft	**LUMINAIRE EFFICACY:**	113 lm/W
LAMP BASE:	N/A	**L.O.R.**	80.0%
LAMP LIFE:	100,000h	**CONTROL GEAR:**	

NOTES / MAINTENANCE REQUIREMENTS

"E" denotes luminaires with remote emergency inverter and battery pack for 3h duration emergency operation.

SIGN OFF APPROVAL:

ARCHITECT:	**CLIENT:**

Edelman House, 1238 High Road, Whetstone, London N20 0LH Tel: 020 8446 9696 Fax: 020 8446 9900

LUMINAIRE SPECIFICATION

MENDICK WARING LIMITED

PROJECT:	Arlington Road	**LUMINAIRE REF:**
PROJECT NO:	J2372	H
REVISION:	Tender Issue	
DATE:	14.12.18	

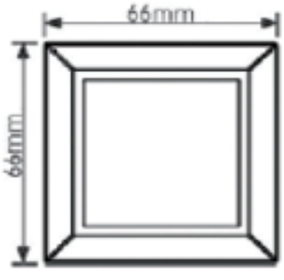
DESCRIPTION:

Under cabinet light.

LOCATION:

Kitchens

ILLUSTRATION, DETAILS, PHOTOMETRIC DATA



Complete with the Sensio cable connect system

MANUFACTURER/CONTACT:	**LUMINAIRE DATA**	
Sensio UK Ltd	**LUMINAIRE REF:**	SE9007HDCW
Unit 7	**LENGTH:**	66mm
Speedwell Road	**WIDTH:**	8.8 mm
Castleford	**HEIGHT:**	
West Yorkshire	**FINISH:**	
WF10 5PY	**ACCESSORIES:**	
United Kingdom		
Tel: 01977 522 020		

ELECTRICAL/LIGHTING DATA:

LAMP TYPE:	LED	**COLOUR TEMPERATURE:**	3000K
LAMP REFERENCE:	SE9007HDWW	**SUPPLY:**	240-230V
MANUFACTURER:	Sensio Ltd	**LUMINAIRE EFFICACY:**	75 lm/W
LAMP BASE:	N/A	**L.O.R.**	80.0%
LAMP LIFE:	5000h	**CONTROL GEAR:**	

NOTES / MAINTENANCE REQUIREMENTS

SIGN OFF APPROVAL:

ARCHITECT:	**CLIENT:**

Edelman House, 1238 High Road, Whetstone, London N20 0LH Tel: 020 8446 9696 Fax: 020 8446 9900

LUMINAIRE SPECIFICATION

MENDICK WARING LIMITED

PROJECT:	Arlington Road	**LUMINAIRE REF:**
PROJECT NO:	J2372	F
REVISION:	Tender Issue	
DATE:	14.12.18	

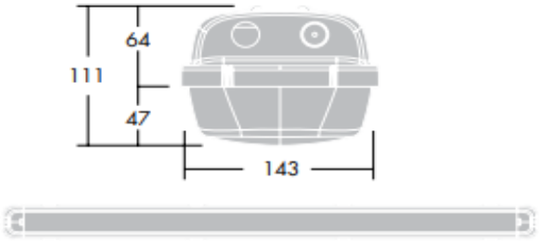
DESCRIPTION:

Surface mounted LED luminaire.

LOCATION:

Bin Store/ Cycle Store

ILLUSTRATION, DETAILS, PHOTOMETRIC DATA



MANUFACTURER/CONTACT:	**LUMINAIRE DATA**	
THORN Lighting	**LUMINAIRE REF:**	AQUAF2 LED 4300 HF L840
Durhamgate Spennymoor	**LENGTH:**	1300mm
Co. Durham DL16 6HL	**WIDTH:**	143mm
Sales Telephone: +44(0)8448554810	**HEIGHT:**	111mm
	FINISH:	White
	ACCESSORIES:	

ELECTRICAL/LIGHTING DATA:

LAMP TYPE:	34W 4300lum	**COLOUR TEMPERATURE:**	4000K
LAMP REFERENCE:	LED	**SUPPLY:**	240V
MANUFACTURER:	Thorn	**LUMINAIRE EFFICACY:**	126lum/W
LAMP BASE:	N/A	**L.O.R.**	70.0%
LAMP LIFE:	50,000h	**CONTROL GEAR:**	

NOTES / MAINTENANCE REQUIREMENTS

"E" denotes luminaires with remote emergency inverter and battery pack for 3h duration emergency operation.

SIGN OFF APPROVAL:

ARCHITECT:	**CLIENT:**

Edelman House, 1238 High Road, Whetstone, London N20 0LH Tel: 020 8446 9696 Fax: 020 8446 9900

LUMINAIRE SPECIFICATION

MENDICK WARING LIMITED

PROJECT:	Arlington Road	**LUMINAIRE REF:**
PROJECT NO:	J2372	X
REVISION:	Tender Issue	
DATE:	14.12.18	

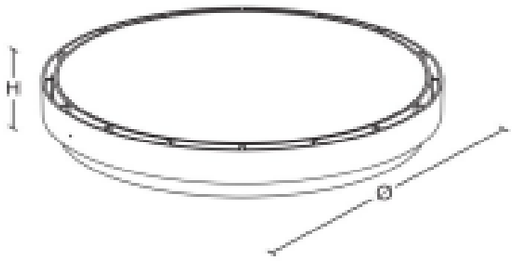
DESCRIPTION:

Wall mounted Luminaire IP65.

LOCATION:

Rear Entrance

ILLUSTRATION, DETAILS, PHOTOMETRIC DATA



MANUFACTURER/CONTACT:	**LUMINAIRE DATA**	
Whitcroft Lighting Ltd	**LUMINAIRE REF:**	K4H4154KSEM
102-108 Clerkenwell Road	**DIAMETER:**	400 mm
London	**DEPTH:**	92 mm
EC1M 5SA	**FINISH:**	Body: RAL Colour: Silver RAL9006
Telephone:+44(0)1613306811	**ACCESSORIES:**	
Email: email@whitecroftlight.com		

ELECTRICAL/LIGHTING DATA:

LAMP TYPE:	15 W 1700lum	**COLOUR TEMPERATURE:**	4000 K
LAMP REFERENCE:	LED	**SUPPLY:**	240V
MANUFACTURER:	Whitecroft	**LUMINAIRE EFFICACY:**	113 lm/W
LAMP BASE:	N/A	**L.O.R.**	80%
LAMP LIFE:	100,000hrs	**CONTROL GEAR:**	

NOTES / MAINTENANCE REQUIREMENTS

"E" denotes luminaires with remote emergency inverter and battery pack for 3h duration emergency operation.

SIGN OFF APPROVAL:	
ARCHITECT:	**CLIENT:**

Edelman House, 1238 High Road, Whetstone, London N20 0LH Tel: 020 8446 9696 Fax: 020 8446 9900

LUMINAIRE SPECIFICATION

MENDICK WARING LIMITED

PROJECT:	Arlington Road	**LUMINAIRE REF:**
PROJECT NO:	J2372	X2
REVISION:	Tender Issue	
DATE:	14.12.18	

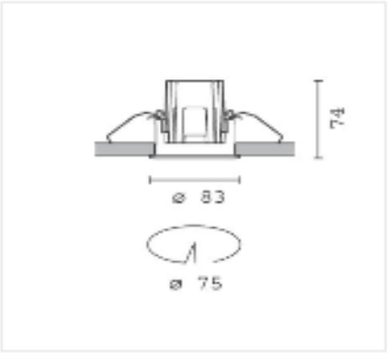
DESCRIPTION:

IP 65 Ceiling Recessed Downlight

LOCATION:

Main Entrance Soffit

ILLUSTRATION, DETAILS, PHOTOMETRIC DATA



MANUFACTURER/CONTACT:	**LUMINAIRE DATA**	
Iguzzini	**LUMINAIRE REF:**	P343
Astolat Business Park	**DIAMETER:**	75mm
Astolat Way	**CUT-OUT:**	74mm
Off Old Portsmouth Road	**DEPTH:**	74mm
GU3 1NE	**FINISH:**	White
Guildford	**ACCESSORIES:**	
Nick Constantine +44(0)7786707427		

ELECTRICAL/LIGHTING DATA:

LAMP TYPE:	10W 947 lum	**COLOUR TEMPERATURE:**	3000K
LAMP REFERENCE:	LED	**SUPPLY:**	240-230V
MANUFACTURER:	Iguzzini	**LUMINAIRE EFFICACY:**	94lum/W
LAMP BASE:	N/A	**L.O.R.**	80.0%
LAMP LIFE:	N/A	**CONTROL GEAR:**	N/A

NOTES / MAINTENANCE REQUIREMENTS

"E" denotes luminaires with remote emergency inverter and battery pack for 3h duration emergency operation.

SIGN OFF APPROVAL:

ARCHITECT:	**CLIENT:**

Edelman House, 1238 High Road, Whetstone, London N20 0LH Tel: 020 8446 9696 Fax: 020 8446 9900

4.5 DB Schedule

Date 14th Dec 2018

Project	ARLINGTON ROAD		*Project no.* 2372
Engineer	-	*Checked by*	*Date checked*
File	Q:\02 Projects\J2372 - Arlington Road\Design File\Work Elements\Electrical Services\Hevacomp\		

Board and way data

Reference	FLAT 1 CU
Served by	LV1
Description	
Location	
Phase	1 L1 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Adjustable MCCB
Incomer size	100/68A
Board device type	Generic, MCB type B (BS EN 60898) 17th (amendment 2)
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.85

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting Circuit 1
2	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting 2
3	22.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 1
4	20.0	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 2
5	24.2	40*	25.0	1 x 1.5	1 x s/core x 6*	-	XLPE single	Fixed power	Kitchen Appliances
6	24.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	Fixed power	Kitchen Appliances
7	14.4	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Kitchen General Power
8	3.4	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	MVHR Supply
9	50.0	50*	25.0	1 x 1.5	1 x s/core x 10*	-	XLPE single	Fixed power	Boiler Supply
10	8.3	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	Heating Power Supply
11	-	-	-	-	-	-	-	Spare	-
12	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Reference	FLAT 2 CU
Served by	LV1
Description	
Location	
Phase	1 L2 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Adjustable MCCB
Incomer size	100/68A
Board device type	Generic, MCB type B (BS EN 60898) 17th (amendment 3)
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.85

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting Circuit 1
2	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting 2
3	22.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 1
4	20.0	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 2
5	24.2	40*	25.0	1 x 1.5	1 x s/core x 6*	-	XLPE single	Fixed power	Kitchen Appliances
6	24.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	Fixed power	Kitchen Appliances
7	14.4	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Kitchen General Power
8	3.4	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	MVHR Supply
9	50.0	50	25.0	1 x 1.5	1 x s/core x 10*	-	XLPE single	Fixed power	Boiler Supply
10	8.3	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	Heating Power Supply
11	-	-	-	-	-	-	-	Spare	-
12	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project ARLINGTON ROAD

Reference	FLAT 3 CU
Served by	LV1
Description	
Location	
Phase	1 L3 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Adjustable MCCB
Incomer size	100/68A
Board device type	Generic, MCB type B (BS EN 60898) 17th (amendment 3)
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.85

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting Circuit 1
2	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting 2
3	22.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 1
4	20.0	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 2
5	24.2	40*	25.0	1 x 1.5	1 x s/core x 6*	-	XLPE single	Fixed power	Kitchen Appliances
6	24.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	Fixed power	Kitchen Appliances
7	14.4	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Kitchen General Power
8	3.4	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	MVHR Supply
9	50.0	50*	25.0	1 x 1.5	1 x s/core x 10*	-	XLPE single	Fixed power	Boiler Supply
10	8.3	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	Heating Power Supply
11	-	-	-	-	-	-	-	Spare	-
12	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project ARLINGTON ROAD

Reference	FLAT 4 CU
Served by	LV1
Description	
Location	
Phase	1 L1 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Adjustable MCCB
Incomer size	100/68A
Board device type	Generic, MCB type B (BS EN 60898) 17th (amendment 3)
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.85

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting Circuit 1
2	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting 2
3	22.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 1
4	20.0	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 2
5	24.2	40*	25.0	1 x 1.5	1 x s/core x 6*	-	XLPE single	Fixed power	Kitchen Appliances
6	24.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	Fixed power	Kitchen Appliances
7	14.4	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Kitchen General Power
8	3.4	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	MVHR Supply
9	50.0	50*	25.0	1 x 1.5	1 x s/core x 10*	-	XLPE single	Fixed power	Boiler Supply
10	8.3	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	Heating Power Supply
11	-	-	-	-	-	-	-	Spare	-
12	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project ARLINGTON ROAD

Reference	FLAT 5 CU
Served by	LV1
Description	
Location	
Phase	1 L2 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Adjustable MCCB
Incomer size	100/68A
Board device type	Generic, MCB type B (BS EN 60898) 17th (amendment 3)
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.85

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting Circuit 1
2	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting 2
3	22.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 1
4	20.0	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 2
5	24.2	40*	25.0	1 x 1.5	1 x s/core x 6*	-	XLPE single	Fixed power	Kitchen Appliances
6	24.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	Fixed power	Kitchen Appliances
7	14.4	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Kitchen General Power
8	3.4	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	MVHR Supply
9	50.0	50*	25.0	1 x 1.5	1 x s/core x 10*	-	XLPE single	Fixed power	Boiler Supply
10	8.3	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	Heating Power Supply
11	-	-	-	-	-	-	-	Spare	-
12	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Reference	FLAT 6 CU
Served by	LV1
Description	
Location	
Phase	1 L3 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Adjustable MCCB
Incomer size	100/68A
Board device type	Generic, MCB type B (BS EN 60898) 17th (amendment 3)
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.85

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting Circuit 1
2	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting 2
3	22.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 1
4	20.0	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 2
5	24.2	40*	25.0	1 x 1.5	1 x s/core x 6*	-	XLPE single	Fixed power	Kitchen Appliances
6	24.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	Fixed power	Kitchen Appliances
7	14.4	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Kitchen General Power
8	3.4	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	MVHR Supply
9	50.0	50*	25.0	1 x 1.5	1 x s/core x 10*	-	XLPE single	Fixed power	Boiler Supply
10	8.3	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	Heating Power Supply
11	-	-	-	-	-	-	-	Spare	-
12	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project ARLINGTON ROAD

Reference	FLAT 7 CU
Served by	LV1
Description	
Location	
Phase	1 L1 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Adjustable MCCB
Incomer size	100/68A
Board device type	Generic, MCB type B (BS EN 60898) 17th (amendment 3)
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.85

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting Circuit 1
2	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting 2
3	22.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 1
4	20.0	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 2
5	24.2	40*	25.0	1 x 1.5	1 x s/core x 6*	-	XLPE single	Fixed power	Kitchen Appliances
6	24.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	Fixed power	Kitchen Appliances
7	14.4	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Kitchen General Power
8	3.4	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	MVHR Supply
9	50.0	50*	25.0	1 x 1.5	1 x s/core x 10*	-	XLPE single	Fixed power	Boiler Supply
10	8.3	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	Heating Power Supply
11	-	-	-	-	-	-	-	Spare	-
12	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Reference	FLAT 8 CU
Served by	LV1
Description	
Location	
Phase	1 L2 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Adjustable MCCB
Incomer size	100/68A
Board device type	Generic, Adjustable MCCB
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.85

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting Circuit 1
2	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting 2
3	22.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 1
4	20.0	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 2
5	24.2	40*	25.0	1 x 1.5	1 x s/core x 6*	-	XLPE single	Fixed power	Kitchen Appliances
6	24.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	Fixed power	Kitchen Appliances
7	14.4	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Kitchen General Power
8	3.4	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	MVHR Supply
9	50.0	50*	25.0	1 x 1.5	1 x s/core x 10*	-	XLPE single	Fixed power	Boiler Supply
10	8.3	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	Heating Power Supply
11	-	-	-	-	-	-	-	Spare	-
12	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Reference	FLAT 9 CU
Served by	LV1
Description	
Location	
Phase	1 L3 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Adjustable MCCB
Incomer size	100/68A
Board device type	Generic, MCB type B (BS EN 60898) 17th (amendment 3)
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.85

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting Circuit 1
2	1.3	10*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Lighting	Lighting 2
3	22.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 1
4	20.0	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Sockets 2
5	24.2	40*	25.0	1 x 1.5	1 x s/core x 6*	-	XLPE single	Fixed power	Kitchen Appliances
6	24.2	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	Fixed power	Kitchen Appliances
7	14.4	32*	25.0	1 x 1.5	1 x s/core x 4*	-	XLPE single	13A ring	Kitchen General Power
8	3.4	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	MVHR Supply
9	50.0	50*	25.0	1 x 1.5	1 x s/core x 10*	-	XLPE single	Fixed power	Boiler Supply
10	8.3	16*	25.0	1 x 1.5	1 x s/core x 2.5*	-	XLPE single	Fixed power	Heating Power Supply
11	-	-	-	-	-	-	-	Spare	-
12	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Reference	LANDLORDS
Served by	LV1
Description	
Location	
Phase	3 (Board is Non-essential)
Number of ways	16
Incomer	Generic, Isolator
Incomer size	160A
Board device type	Generic, Adjustable MCCB
Other device types used	Yes
Spare capacity	0.0%
Average power factor	1.00

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1 L1	32.0	32	10.0	1 x 2.5*	1 x s/core x 4	-	PVC single	Other ring	GROUND FLOOR SMALL POWER
1 L2	32.0	32	17.0	1 x 2.5*	1 x s/core x 4	-	PVC single	Other ring	FIRST FLOOR SOCKETS
1 L3	32.0	32	23.0	1 x 2.5*	1 x s/core x 4	-	PVC single	Other ring	SECOND FLOOR SOCKETS
2 L1	32.0	32	30.0	1 x 2.5*	1 x s/core x 4	-	PVC single	Other ring	THIRD FLOOR SOCKETS
2 L2	0.3	10*	10.0	1	1 x s/core x 1.5	-	PVC single	Lighting	GROUND FLOOR LIGHTING
2 L3	0.3	10*	17.0	1	1 x s/core x 1.5	-	PVC single	Lighting	FIRST FLOOR SOCKETS
3 L1	0.3	10*	24.0	1	1 x s/core x 1.5	-	PVC single	Lighting	SECOND FLOOR LIGHTING
3 L2	13.0	15	10.0	1 x 4*	1 x s/core x 2.5	-	PVC single	Fixed power	CAT 5 PUMP
3 L3	10.0	10	10.0	1	1 x s/core x 1.5	-	PVC single	Fixed power	IRS SYSTEM
4 L1	15.0	20*	10.0	1.5	1 x s/core x 2.5	-	PVC single	Fixed power	DATA EQUIPMENT
4 L2	5.0	16*	10.0	1.5	1 x s/core x 2.5	-	PVC single	Fixed power	AOV SYSTEM
4 L3	0.3	10*	10.0	1	1 x s/core x 1.5	-	PVC single	Lighting	EXTERNAL LIGHTING
5 L1	40.0	50*	15.0	6	1 x s/core x 16	-	PVC single	Fixed power	PEDESTRIAN GATE
5 L2	12.0	20*	15.0	1.5	1 x s/core x 2.5	-	PVC single	Fixed power	SMOKE VENT FAN
5 L3	25.0	32*	35.0	2.5	1 x s/core x 6	-	PVC single	Fixed power	PV
6 L1	15.0	20*	10.0	1 x 1.5	1 x s/core x 25	-	XLPE single	Fixed power	Communal Heating
6 L2	-	-	-	-	-	-	-	Spare	-
6 L3	-	-	-	-	-	-	-	Spare	-
7 L1	-	-	-	-	-	-	-	Spare	-
7 L2	-	-	-	-	-	-	-	Spare	-
7 L3	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project ARLINGTON ROAD

8 L1	-	-	-	-	-	-	-	Spare	-
8 L2	-	-	-	-	-	-	-	Spare	-
8 L3	-	-	-	-	-	-	-	Spare	-
9 L1	-	-	-	-	-	-	-	Spare	-
9 L2	-	-	-	-	-	-	-	Spare	-
9 L3	-	-	-	-	-	-	-	Spare	-
10 L1	-	-	-	-	-	-	-	Spare	-
10 L2	-	-	-	-	-	-	-	Spare	-
10 L3	-	-	-	-	-	-	-	Spare	-
11 L1	-	-	-	-	-	-	-	Spare	-
11 L2	-	-	-	-	-	-	-	Spare	-
11 L3	-	-	-	-	-	-	-	Spare	-
12 L1	-	-	-	-	-	-	-	Spare	-
12 L2	-	-	-	-	-	-	-	Spare	-
12 L3	-	-	-	-	-	-	-	Spare	-
13 L1	-	-	-	-	-	-	-	Spare	-
13 L2	-	-	-	-	-	-	-	Spare	-
13 L3	-	-	-	-	-	-	-	Spare	-
14 L1	-	-	-	-	-	-	-	Spare	-
14 L2	-	-	-	-	-	-	-	Spare	-
14 L3	-	-	-	-	-	-	-	Spare	-
15 L1	-	-	-	-	-	-	-	Spare	-
15 L2	-	-	-	-	-	-	-	Spare	-
15 L3	-	-	-	-	-	-	-	Spare	-
16 L1	-	-	-	-	-	-	-	Spare	-
16 L2	-	-	-	-	-	-	-	Spare	-
16 L3	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project ARLINGTON ROAD

Reference	LV1
Served by	LVO
Description	
Location	
Phase	3 (Board is Non-essential)
Number of ways	10
Incomer	Generic, Generic BS88 fuses
Incomer size	400A
Board device type	Generic, BS88-2 fuses 17th type G (amendment 3)
Other device types used	Yes
Spare capacity	0.0%
Average power factor	0.93

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1 L1	65.0	80	10.0	1 x 2.5	1 x 2 core x 25*	-	XLPE multi	Sub-main	FLAT 1 CU
1 L2	65.0	80	25.0	1 x 4	1 x 2 core x 25*	-	XLPE multi	Sub-main	FLAT 2 CU
1 L3	65.0	80	25.0	1 x 4	1 x 2 core x 25*	-	XLPE multi	Sub-main	FLAT 3 CU
2 L1	65.0	80	25.0	1 x 4	1 x 2 core x 25*	-	XLPE multi	Sub-main	FLAT 4 CU
2 L2	65.0	80	25.0	1 x 4	1 x 2 core x 25*	-	XLPE multi	Sub-main	FLAT 5 CU
2 L3	65.0	80	25.0	1 x 4	1 x 2 core x 25*	-	XLPE multi	Sub-main	FLAT 6 CU
3 L1	65.0	80	25.0	1 x 4	1 x 2 core x 25*	-	XLPE multi	Sub-main	FLAT 7 CU
3 L2	65.0	80	25.0	1 x 4	1 x 2 core x 25*	-	XLPE multi	Sub-main	FLAT 8 CU
3 L3	65.0	80	25.0	1 x 4	1 x 2 core x 25*	-	XLPE multi	Sub-main	FLAT 9 CU
4	-	-	-	-	-	-	-	Spare	-
5 L1	-	-	-	-	-	-	-	Spare	-
5 L2	-	-	-	-	-	-	-	Spare	-
5 L3	-	-	-	-	-	-	-	Spare	-
6	-	-	-	-	-	-	-	Spare	-
7	-	-	-	-	-	-	-	Spare	-
8	-	-	-	-	-	-	-	Spare	-
9	-	-	-	-	-	-	-	Spare	-
10	134.2	125*	10.0	1 x 4	1 x 3 core x 35	-	PVC/swa/pvc	Sub-main	LANDLORDS

* denotes fixed size