Ware Priory Lido

Extension & Refurbishment Project

Electrical Engineering Services Specification

15 OCTOBER 2024

TYSE DESIGN & CONSULTANCY LIMITED

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1. CONTRACT PARTICULARS

1.1. Instructions to Tenderers

Refer to main contract documents issued by:

iCon Building Consultancy Limited
13 Ducketts Wharf
South Street
Bishop's Stortford
Hertfordshire
CM23 3AR

Submit a detailed breakdown of Tender as scheduled in Appendix A. Complete all sections of the tender breakdown and submit as part of the tender submission.

1.2. The Site

Ware Priory Lido
Priory Street
Ware
Hertfordshire
SG12 0DE

1.3. Site Survey

Refer to main contract documents issued by:

iCon Building Consultancy Limited
13 Ducketts Wharf
South Street
Bishop's Stortford
Hertfordshire
CM23 3AR

It is strongly recommended that all contractors visit site prior to submitting their tenders to fully ascertain the extent of the work and the site-specific restrictions.

1.4. Specification Queries

The tenderer shall address any queries, which are related to this specification to the Engineer.

All queries shall be put forward prior to the submission of the tender since the specification shall be deemed to have been understood completely once the tender documents have been returned to the employer.

Any technical queries relating to this project should in the first instance be raised with:

Mr Lee Tysoe
Tyse Design and Consultancy Ltd
☎ 07954 490 970
💻 lee@tysedesign.co.uk

Any queries regarding contract conditions etc. should be raised with:

Stuart Roberts
iCon Building Consultancy Limited
☎ 01279 653 386
💻 stuart.roberts@iconbc.co.uk

1.5. The Project Team

A project directory shall be populated and circulated by the CA upon contract commencement.

1.6. Scope of Works

The project comprises the new electrical services installation required for the proposed extension and refurbishment works at Ware Priory Lido.

The Tendering Contractor shall be responsible for the production of working drawings, co-ordination, procurement, delivery, off-loading, storage, installation, testing, setting to work, commissioning, demonstration of operation and production of record documentation for the works summarised below:

- Co-ordinated working drawings
- Preliminaries and site meeting attendance
- Attendance associated with upgraded incoming LV service.
- Replacement of the existing low voltage distribution network
- General lighting installation
- Emergency lighting installation
- Small power installation
- Electrical works associated with mechanical services.
- New containment systems
- Fire alarm and detection system installation and commissioning.
- Intruder alarm and detection system installation and commissioning
- Modifications to the existing CCTV System
- Modifications to the existing Public Address System
- Roof mounted photovoltaic system.
- Accessible WC alarm system
- Earthing and bonding
- Trace, isolate, make safe, disconnect, and remove from site existing electrical services installation made redundant by these works.
- Associated builder's work.
- Testing and commissioning of all new services
- As installed drawings.
- Operation and maintenance manuals
- 12 months defects warranty

New installations shall be carried in accordance with the relevant British Standard Codes of Practice and Statutory Requirements and comply fully with the IET wiring regulations - BS7671:2018.

Read this Specification in conjunction with the complete set of Tender Documents, including information from any other Employer's team members' including details, specifications, schedules, drawings, and instructions.

The Services Engineer's Drawings and schedules indicate, but are not limited to, the following information:

- Location of switchgear and equipment.
- Indicative routes of containment and sundry distribution services.
- Performance, capacity and physical data of all plant and equipment.
- Recommended suppliers and manufacturers together with equipment references and identification.
- Installation and fixing details (where appropriate).
- Incoming service locations and termination points.

Except for materials or items of equipment which are specified as being supplied and/or fixed for the Works by others, include within the Works for the supply, delivery to site, unloading, storing, distribution around site, installation, erection, connection, finishing and putting into service of all of the materials, fittings, cabling and containment, testing, commissioning, operating & maintenance instructions necessary to complete the Works in accordance with the requirements of the specification, appendices and drawings.

The contractor shall be entirely responsible for the efficient installation and performance of the Works and their guarantee for the duration of the Defect Liability Period.

Install the Works such that they comply with this Specification and conform to the best principles of modern practice.

Conduct the Works employing fully competent tradesmen of the appropriate grades.

Include for fixing all equipment specified together with all necessary primary and secondary fixings and support systems.

Provide fixing details to the EA for approval prior to installation.

Provide all relevant method statements and job safety assessments to the Planning Supervisor as required.

1.7. Definitions

Refer to main contract preliminaries.

1.6. Form of Contract

Refer to main contract preliminaries.

1.7. Tender Submission

This Specification forms part of the Tender documents.

The Tenderer is to apply the following general clauses equally and in every respect to the works described in all sections of this Specification and shown upon the drawings including any additional work subsequently instructed.

Refer to main contract preliminaries.

1.8. Programme

Refer to main contract preliminaries.

The construction works will be undertaken in phases. The building is to remain operational throughout the works.

The contractor shall allow for the temporary connections required to the existing LV distribution, small power, lighting, fire alarm system, PA system, CCTV system and security systems to maintain the services as operational throughout the construction period.

The successful contractor shall produce a detailed program of works subject to the approval of the contract administrator.

The contractor shall identify time periods within their programme for all works requiring power shutdowns. The site foreman shall be identified who is responsible for liaising with the establishment regarding access to each area of the works and shutdown periods.

The contractor shall note shutdowns of existing building services shall take place outside normal occupancy hours. For tendering purposes these shall be assumed to be 08:00 to 17:00. Shutdown shall therefore take place during holiday periods, early mornings, evenings, or weekends.

Provide a 24-hour emergency contact number for use during the contract period by the CA.

The Contractor must include all costs associated with any required out of hours working within their tender submission.

1.9. Quotation References & Named Suppliers

Where quotation references and named suppliers are provided in the particular parts of this Specification, these are provided to assist Tenderers identify the source of equipment, or service supply and the extent of the overall provision and the general standards to be achieved. Quotation References and named suppliers may not take account of the form of contract and other requirements of this Specification such as commissioning and demonstration. It is the responsibility of all Tenderers to ensure that all suppliers' quotations and sub-contracts are fully harmonised with the requirements of this Specification.

The responsibility rests with Tenderers to ensure that all the necessary interfaces and 'on-costs' associated with Quotation References and named suppliers are allowed for within the Tender. This is to ensure that the overall design

intent can be achieved, installed, and brought into effective service by the Tenderer in a fully compliant manner without any claim for additional costs post tender.

1.10. Alternative Suppliers

It is fully incumbent upon the Tenderer to fully assimilate the overall and specific design intent such that the total/specific solution can be provided in accordance with the Tender Documents.

Should alternative suppliers be proposed, identify the specific reasons for any deviation and obtain agreement to any change proposal. In the event that the Contractor does not propose any alternatives or obtain agreement to alternatives the Contractor's offer will be deemed to be a fully considered solution without qualification and no mitigation will be accepted on the basis of lack of knowledge or understanding of named suppliers' roles, responsibilities and suitability for the intended purpose.

Should alternatives to named suppliers be offered, provide full details of such alternatives at the time of Tender. The Tender price, however, must be based on the items stated in the Specification and Tender Drawings and any qualifications provided separately for ease of understanding by the Project Team.

Include with any such submission design and cost details together with a statement that the alternative will have no adverse effect on the overall programme or system performance.

1.11. Warranties

It is a condition of this specification that the commencement date for all component and system supplier warranties will be from the date of project completion to the Employer. In the event that systems are brought into beneficial use prior to project completion, or in the event of phased completion, unless otherwise agreed the warranties will also commence from the date of completion. It is therefore incumbent that all Tenderers ensure that appropriate warranty terms consistent with this requirement are agreed with all suppliers and sub-contractors.

Take out service contracts that are required by the specialist suppliers to validate specialist suppliers 12-month warranties from the date of the contract completion and not from delivery to site.

Claims made by the Employer for any defects occurring during the warranty period will be comprehensive and for the avoidance of doubt will include the costs of gaining access to and removal of other equipment that may be required in order to gain access to the specific component that has failed. No costs will be entertained for access requirements, BWIC, sub-system removals, removal from site associated with the specific equipment failure. Ensure that warranties are fully compliant with this requirement.

1.12. Insurances

Verify that all Contractors and proposed Sub-Contractors have suitable insurance cover in respect of the value of the works which are the subject of this Specification. This should include cover in respect of any materials installed on site but not handed over. Provide upon request evidence of such insurance cover.

1.13. Project Procurement

The Contractor shall complete the form of tender and schedules as prescribed in the tender documents. Refer to main contract preliminaries.

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2. TENDERING DIRECTIONS

2.1. Site Visit

Tenderers are advised to visit the site before submitting their tender to satisfy themselves of the local conditions, accessibility of the areas of work, the full extent and nature of the works and general conditions affecting the execution of the works. Submitted tenders will be deemed to be fully inclusive offers in accordance with the tender documents unless precisely qualified otherwise. No claim for additional payments in respect of lack of knowledge will be considered by the Employer.

2.2. Form of Tender

Tenderers are advised to consider fully the Tender information and clearly qualify in their Tender, any items which require such qualification in order to submit a firm Tender price. In the absence of any specific qualification, the tender will be accepted on the basis of the submitted tender.

Refer to main contract preliminaries.

2.3. Tender Drawings

The Tender Drawings and other drawings issued by the CA show the general arrangement of the Works and the scope of the Tender Documents. The Tender Documents describes the required works with sufficient information to submit a fixed price tender for the works as proposed. The tender information may not cover every detail of the works involved and are diagrammatic in certain particulars.

2.4. Builders Work Drawings

The Contractor shall provide the Contract Administrator, with copies of builders work drawings for approval. Allow for distribution of the drawings or schedules showing details of all builders work required in connection with the services installation. This shall include details of weights of items of equipment, sizes of plinths or bases, chases, holes, supports, hangers, inserts etc and any other items which the Contractor or others are required to execute in connection with the work. All such information shall be incorporated onto the Contractors drawings.

The Contractor shall understand the programme and shall prepare all builders work drawings in such order and at such times to enable them to be checked, altered if necessary and approved and subsequently issued to the Main Contractor not less than two weeks before the actual construction is planned to take place.

The drawings shall indicate builders work information for all services for which the Contractor is responsible at a scale to 1:50 minimum.

2.5. Working Drawings

The Contractor shall be responsible for the preparation of all working detail and fabrication working drawings as necessary for the execution of the works.

The Contractor shall issue drawings for approval, refer to Section 2.4.

The Contractor shall ensure that all plant and equipment offered can be accommodated in the positions indicated and shall include for taking all necessary dimensions on site and preparing working drawings of all plant, equipment chambers service ducts, etc as may be required or directed by, and when instructed by, the Contract Administrator or his representatives.

During the contract the Contractor shall prepare and forward to the contract administrator revised copies of working drawings showing proposed arrangements for approval.

The working drawings for all installation equipment adjacent to other services shall be based on dimensions taken from site and are to be prepared and forwarded to the Contract Administrator and the Design Team via the main Contractor prior to manufacture.

The Contractor shall provide circuit and layout diagrams for the electrical services which shall detail all circuitry.

All installation drawings shall provide full setting out details and shall be co-ordinated with the existing and new services and building fabric.

The Contractor shall make allowance within his price for a full and detailed survey of the existing services and building fabric for him to produce such information.

The working drawings shall include all elements of the installation fully set out and dimensioned and coordinated with each other. The plant area drawings shall include any existing plant.

2.6. Specification Anomalies

In the event of an anomaly being identified during the tender period seek guidance from the CA in order that appropriate direction can be given for tender compliance.

2.7. Provisional Sums

Provisional sums are contained within the main contract preliminaries.

Provisional sums and quantities for works to be carried out are deemed to include all profit, allowances, attendance, overheads etc.

Provisional sums are only to be expended having gained prior written authority from the CA to do so.

2.8. Contractors' Duty of Care

During preparation of the Tender, evaluate the proposed design concepts and scheme arrangements and provide confirmation that the proposed arrangements are practicable, deliverable, and well suited to the proposed application. Allow for all necessary items to provide fully functioning engineering systems.

After appointment, ensure that any variations to the works that may arise as a result of an instruction by the CA, or to encompass site constraints, do not prejudice the overall design of the installation. Advise the CA of such changes and any consequent implications.

Provide the CA with any technical, supporting, or other information in order that the CA may assess the implications of variations to the works. Provide any supporting calculations to the CA for verification.

The Employer reserves the right at his sole discretion to contra charge the Contractor for any instances of:

- Additional and/or wasted site inspections.
- Additional and/or abortive meetings

And for matters arising from

- Poor construction quality
- Ineffective co-ordination
- Inefficient and/or protracted issuing of production and record information
- Inappropriate programming
- Unprofessional practices

2.9. Publicity

Ensure that no information regarding the works or the Employer is divulged to any third party for publication, broadcasting, or other purpose without the prior written approval of the CA.

3. PARTICULAR SPECIFICATION – ELECTRICAL

3.1. General Description of Works

The project comprises the new electrical services installation required for the proposed extension and refurbishment works at Ware Priory Lido.

The Tendering Contractor shall be responsible for the production of working drawings, co-ordination, procurement, delivery, off-loading, storage, installation, testing, setting to work, commissioning, design of specialist systems, demonstration of operation and production of record documentation for the works summarised below:

- Co-ordinated working drawings
- Preliminaries and site meeting attendance
- Attendance associated with upgraded incoming LV service.
- Replacement of the existing low voltage distribution network
- General lighting installation
- Emergency lighting installation
- Small power installation
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- Modifications to the existing CCTV System
- Modifications to the existing Public Address System
- Roof mounted photovoltaic system.
- Accessible WC alarm system
- Earthing and bonding
- Trace, isolate, make safe, disconnect, and remove from site existing electrical services installation made redundant by these works.
- Associated builder's work.
- Testing and commissioning of all new services
- As installed drawings.
- Operation and maintenance manuals
- 12 months defects warranty

New installations shall be carried in accordance with the relevant British Standard Codes of Practice and Statutory Requirements and comply fully with the IET wiring regulations - BS7671:2018.

3.1.1. Scope of Works

The Contractor shall supply and install the entire electrical services associated with this project and carry out all associated works to facilitate the project in accordance with this specification and the contract drawings.

Deviations from the specification shall not be accepted unless prior agreement has been obtained from the Contract Administrator without exception.

The Contractor's works associated with this project entail the following, as applicable:

a) On appointment immediately investigate delivery lead in time for all materials and items of plant/equipment associated with the project. All items that have long lead in time shall be ordered immediately and any problems reported to the CA.
b) Attending a pre-contract site meeting with the CA and establishment representative to agree the details of programme, access, and general issues relating to the project. Attend subsequent site meetings as the project progresses. All meeting minutes may be recorded by the CA.
c) Present the CA with their proposed detail programme of works within the constraints of the contract start, finish and milestone dates and stipulations described within the programme clause for comments, so it can be agreed ahead of the contract commencement.

d) Site measure each location where it is intended to install new plant, equipment, services, etc., before placing orders with suppliers, to ensure fit and report any problems to the CA or his representative.
e) 'Walk the site' with the CA or his representative to agree matters which may be the subject of post tender consideration as described in this specification and to carry out a dilapidation survey where applicable (photographic evidence shall be taken by the contractor and copies distributed). In addition, where requested, produce sketches of agreements/proposals made at this time and throughout the contract so that official CA's instructions can be issued in accordance with these, should they be agreed.
f) Producing installation / working drawings.
g) The removal and disposal of <u>all</u> materials made redundant by the works. The Contractor shall make special note during their pre-tender site inspection.
h) All builders work associated with the above.
i) Producing O & M manuals and as installed drawings. In addition to the content requirement listed later in this specification the manual shall have:
    a. A separate section which details the extent of any asbestos removal works associated with the project, referenced to the asbestos log by block and room number.
    b. A separate section which details energy metering and the contractors proposed energy monitoring strategy in accordance with the Building Regulations.

Practical Completion shall not be given until complete electrical & safety certification has been issued to the CA.

The Contractor shall make allowance in his tender to give a verbal instruction session to the site staff on operating the new systems.

Due to the nature of the site and proposed works, tenderers must make a pre-tender visit, as any extra cost for want of information will not be entertained. Visits shall be arranged via the establishment contact. Special note shall be taken of access, cable routes, 'pinch points' associated with columns, beams, existing services, etc.

Routing of new services shown on the contract drawings are indicative; accurate detailed working drawings for all services shall be provided by the Contractor for the CA's approval – see Contract Drawing clause.

Tools, equipment, and materials shall not be left unattended outside the agreed and secured working area or compound. This shall be taken to include everything associated with the project including redundant materials awaiting removal.

The contractor's operatives shall on every occasion of entering/leaving the site sign an attendance log and produce evidence of identification. This identification shall take the form of a company identification badge. At all times whilst on site the Contractor shall ensure operatives carry their identification badge and are wearing identifying overalls or t-shirts.

Access to the site is via the existing establishment entrance and roadways. This will be shared access between the establishment and the Contractor. There must always be clear access for vehicles and pedestrians visiting the establishment. Contractors' vehicles must not be parked on the establishment roads or car park areas.

Accurate setting out of the works, including the positioning of all services, equipment, plant, and plant bases shall be the contractor's responsibility.

The Contractor shall be fully responsible for taking delivery of materials and apparatus, unloading, and distributing them as necessary on site and the return of all cases and all condemned or surplus goods. Any materials found to be corroded or damaged due to bad storage will be rejected by the CA.

All materials shall be the best of their particular type, and the Contractor may be called upon to submit for approval samples of the various materials intended for use in the execution of the work. All materials are to comply with the appropriate British Standard Specification where such is available.

If, in the opinion of the CA it is decided that any work done or materials used by the Contractor is or are defective or not in accordance with the Specification and as soon as reasonably practicable give the Contractor notice, in writing, of the said decision specifying particulars of the defects alleged and of where the same are alleged to exist or to have occurred, then the Contractor shall at his own expense and with all speed make good the defect specified. If the Contractor shall fail to carry out this work, the CA may take, at the cost of the Contractor, such steps as may in all circumstances be reasonable to make good such defects.

Contractors shall make note of any difficulty associated with fixings due to the buildings structure or asbestos considerations and shall make every allowance for specialist fixing methods accordingly within their tender submission.

The Contractor shall not carry out work which may injure the stability of the structure and no cutting through floors, walls, etc, will be allowed other than where required by the drawings without prior approval of the CA.

3.2. Description of Existing Buildings and Services

The existing building site consists of changing room spaces and associated office, administration and ancillary areas.

The building is currently provided with general and emergency lighting, small power, fire detection and alarm, intruder alarm services.

Floors are generally concrete floors, screeded with either tile, vinyl sheet flooring or carpet finishes.

Walls are blockwork / traditional brickworks with a plastered / painted finish.

Ceilings are of the suspended 600mm x 600mm drop in tile type where provided.

RISKS TO HEALTH AND SAFETY

The nature and condition of the existing services cannot be fully and certainly ascertained before opening.

The following risks are or may be present: -

- The CA does not guarantee the accuracy and sufficiency of the record information indicated.
- The contractor shall undertake responsibility to obtain any information required to ensure the safety of all persons and the Works.
- The contractor shall comply with the requirements of the CDM Regulations by compiling risk assessments for the contract works.

3.3. Method Statements and Risk Assessments

The successful contractor shall allow to provide the CA with risk assessments and method statements for all works prior to starting on site.

3.4. Safeguarding / Data Baring Service

All contractors' operatives shall obtain an Enhanced DBS Data Baring Service (formerly CRB) clearances for any members of the workforce who may encounter children or other vulnerable people during the works. Submit to the Client certification that DBS checks have been made. It is a requirement that the Contractor's permanent representatives on site have Enhanced DBS clearance on commencement of the works.

3.5. Setting Out of Equipment and Accessories

It is the Contractor's responsibility to prepare working drawings and check the position of equipment and accessories. A detailed description of the working drawing requirements can be found in Section 2.6 of this specification. Attention shall be paid to the setting out of wall and ceiling mounted equipment in relation to other adjacent services and furniture layouts.

The Contractor shall obtain the latest Architectural drawings and note the type and extent of suspended ceiling systems, raised floor systems etc.

The installation shall be installed flush in its entirety. All services shall be concealed within risers, ceiling voids, or chased in the building fabric. Disturbance to the existing building fabric shall be kept to a minimum. All cable chase routes shall be agreed with the Architect and Engineer prior to installation.

The Contractor shall ensure all systems remain fully accessible for maintenance.

3.6. Drawings

Tender Drawings

The following drawings form the tender drawings for the electrical services:

240804/E/01	Existing Electrical Services Ground Floor Layout and LV Schematic
240804/E/02	Electrical Services Low Voltage Schematic & Distribution Board Schedules

240804/E/03	Electrical Services Proposed Lighting Layout (Sheet 1 of 2)
240804/E/04	Electrical Services Proposed Lighting Layout (Sheet 2 of 2)
240804/E/05	Electrical Services Proposed Small Power & Ancillary Services Layout (Sheet 1 of 2)
240804/E/06	Electrical Services Proposed Small Power & Ancillary Services Layout (Sheet 2 of 2)
240804/E/07	Electrical Services Proposed Fire alarm Layout
240804/E/08	Electrical Services Proposed Containment Layout
240804/E/09	Electrical Services Proposed Security Layout
240804/E/10	Electrical Services Proposed External Works
240804/E/11	Electrical Services Proposed Roof Layout

Tender drawings are for design intent only and therefore essential that, the contractor visits site to ascertain the full extent of the works, as no additional funding will be made available for a lack of knowledge.

Working Drawings

Following his appointment, the Contractor shall prepare builder's work drawings and working drawings.

Refer to Sections 2.4 – 2.6.

3.7. Builders Work and Fire Stopping

The contractor shall allow for providing all builders work required in connection with the installation. This includes but is not limited to:

- All builders work associated with the new incoming LV supply.
- All fixings and support for new electrical services.
- Removal and reinstatement of ceiling tiles and ceiling grid to allow for new services installation (where applicable).
- Cutting of holes through walls for new containment routes.
- Drilling of all holes through building structure.
- Boxing in, plastered finish and painting of exposed service routes (where applicable).
- Painting of exposed services where required.
- Making good where existing services have been removed.
- Making good where new services routes are routed through walls / ceilings.
- All required fire stopping.

Refer to builders work in connection schedule and Sectio 3.12 for further details.

The contractor shall co-ordinate their requirements for holes, chases, covers, and supports with the existing services installation prior to any work being carried out.

Ensure necessary fire stopping and integrity is provided in and around services that cross between building compartments and sub-compartments as required.

The builders' work information shall be provided on working drawings, showing hole sizes required and dimensioned positions. Refer to Section 2.5.

The Contractor shall obtain the latest Architectural drawings detailing the fire strategy and note the extent of fire compartmentation. Proprietary fire stopping systems shall be installed within service risers, wall, and floor penetrations in order to maintain the fire compartmentation integrity. Intumescent pillows shall be fitted within trunking and cable basket / tray where it passes through fire compartments. Where downlights penetrate fire rated ceilings, intumescent fire hoods shall be fitted. The Contractor shall note the minimum clearances within the fire hood required by the downlight. Where containment passes through a fire compartment structure (wall/floor/partition), the gap shall be sealed with fire resisting material.

CABLE CONTAINMENT

Route cable tray through purpose made metal sleeve frame, built into the fire barrier. Between the sleeve and cables/tray pack with rockwool and non-setting Class 0 rated dense mastic.

Fit a rockwool multi-cable firestop inside Metal trunking, to fill up void between trunking walls and cables.

HOLES, CHASES, COVERS, SUPPORTS

All fire stopping to services to be carried out by the contractor using proprietary fire stopping materials.

3.8. Asbestos

If suspected asbestos is discovered – stop work immediately and notify the Contract Administrator as to the extent and type of asbestos present.

The onsite Asbestos Log must be refereed to at all times and duly signed and completed by the Contractors Site Representative.

The asbestos logbook indicates that asbestos is present in the building. The logbook is held on site.

The Contractor is advised to refer to this logbook at the time of tender and allow for any additional costs which may be incurred.

Refer to section 4.2 for further details.

3.9. Regulations

All new electrical engineering services works shall be designed and installed to all current regulations; these shall include.

- Current British Standards
- BS: 7671 IET Wiring Regulations
- The Electricity at Work Regulations 1989
- BS:5266-1:2016 - Emergency lighting – Part 1: Code of practice for the emergency lighting of premises
- BS:5839-1:2017 - Fire detection and fire alarm systems for buildings Part 1: Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises
- European Standards (EEC Codes)
- Current British Codes of Practice
- The CIBSE standard codes and guides, for design, installation, and commissioning
- BSRIA Commissioning Codes AG 2/89.3 & AG 3/89.3
- CIBSE Commissioning Codes A – W Inclusive
- Current Building Regulations associated with Services Part B, F, H, J, L1 A & B, L2 A & B and M
- Construction Design and Management Regulations (CDM 2015)
- Health and Safety at Work Act 1974-ISBN 0 10 5436645
- Disability Discrimination Act (DDA)
- BS 9999:2017 Code of practice for fire safety in the design, management and use of buildings
- Control of Substances Hazardous to Health Regulations (COSHH)
- Health and Safety (First Aid) Regulations 2013
- Noise at Work Regulations,
- Reporting of Injuries, Disease and Dangerous Occurrences Regulations,
- The Control of Asbestos at Work Regulations

The above are guidelines, and the installation shall comply with other relevant regulations although not stated may be applicable to the services described therein.

3.10. Record Documentation

Provide all information in good time for approval as the CA will not issue the Practical Completion Certificate without it.

The Contractor shall provide two sets of record documents together with electronic record with all documents on electronic format on either CD or DVD two copies are required. These shall include the following:

- Record Drawings, schematics, full description of each system,
- Controls and system diagrams.
- Maintenance Instructions and Maintenance kits.
- Performance and schedule of all mechanical equipment.
- Schedule of applications for PPM (Planned preventive Maintenance)
- Operational instructions
- Manufacturers Technical Information
- Electrical wiring diagrams, including control wiring schematics and control diagrams.
- Test certificates and Energy display charts.
- Commissioning Schedules.
- All certificates of approval in respect to building control, energy
- End user guide manual.

It is a requirement of the contract that all record documentation be available in draft for comment and approval one month before practical completion.

Refer to Section 3.25 & 4.

3.11. Handover and Training

Upon completion of the work, the Contractor shall demonstrate the operation of the new works to the designated site personnel.

Refer to Section 3.25 & Section 4.

3.12. Incoming Services

Electricity Supply

The existing incoming electrical service to the building terminates into the existing electrical switch cupboard. This service does not have the capacity to support the additional electrical load required.

The new service shall be a 195kVA, 400 volts, 3 phase, 50Hz, 4-wire supply complete with a PME earth terminal (TN-C-S) provided by UK Power Networks.

A quotation for this work has been requested from UK Power Networks.

The contractor shall allow for liaising with UK Power Networks / Metering Company regarding the supply connection dates and final connection and termination details.

The new service will terminate into new service fuses and metering equipment located in the new switch room indicated.

From the metering equipment new single core cables shall supply the new low voltage switch panel MP1 (see Section 3.14).

The contractor shall provide the following builders work to allow UK Power Networks to install the new service: -

1. 550mm deep trench from the perimeter of the site boundary to the proposed intake position.
2. 150mmø sealed duct into new LV switch room for the LV supply cable.

The Contractor shall include for liaising with suppliers and providing all required attendances to new electricity supplies to be installed to supply this development.

3.13. Strip Out and Removals

The Contractor shall carry out the isolation; strip-out and removal from site of the existing electrical services elements indicated on the drawings and listed below to allow the safe refurbishment of the building.

- Small power and all associated accessories, switchgear, controls, containment and cabling currently installed to the refurbished areas made redundant by these works.
- All electrical equipment made redundant by these works.

- Luminaires and all associated accessories, controls, containment and cabling currently installed to the refurbished areas made redundant by these works.
- Fire alarm system components and all associated accessories, controls, containment and cabling currently installed to the refurbished areas made redundant by these works.
- Intruder alarm system components and all associated accessories, controls, containment and cabling currently installed to the refurbished areas made redundant by these works.

All equipment scheduled for removal and associated cabling and containment shall be traced, disconnected, made safe, stripped out and removed from the site by the contractor unless noted otherwise.

The contractor shall allow for the temporary connections required to the existing LV distribution, small power, lighting, fire alarm system, PA system, CCTV system and security systems to maintain the services as operational throughout the construction period until systems are replaced with new and commissioned.

The contractor shall keep all areas of work clear of materials, redundant materials and clean to allow for Lido use.

3.14. Main switchgear

The Contractor shall procure, install, test and commission all additions to the existing low voltage distribution for the new supplies indicated. All installed in accordance with this specification and drawings.

Provide new distribution switch gear with a minimum 20% spare capacity.

This system includes but is not limited to:

- Switchboard and distribution boards.
- Cables and associated containment (trays, trunkings, conduits etc.)
- Supports for cable containment and individual cables.
- Electrical and fire alarm systems connections.

The Installation shall comply with:

- All applicable British, European and International Standards.
- DNO Standards, Regulations and Requirements.
- 400V/230V, 50 Hz, 3-Phase and Neutral Supply (TP&N)
- The Electricity Supply Regulations 1988 (as amended)
- BS 7671 IET Wiring Regulations
- BS EN 61439-2:2011 Low-voltage switchgear and control gear assemblies
- Electricity at Work Act
- Health and Safety at Work Act 1972
- The Electricity at Work Regulations 1989
- The Construction, Design and Management Regulations 2015
- Building Regulations

Provide the new wall mounted Moulded Case Circuit Breaker (MCCB) switch panel, (reference MP1) to the new external switch room. Provide the new LV supplies and connect to the existing LV switchgear, metalclad fused switches and distribution equipment to be retained for the building indicated.

Panel to be mounted to the wall using a unistrut frame.

Provide LV energy metering as shown on the LV schematic, consisting of integral energy meters for monitoring of the mechanical plant. Arrange for the main switchboard manufacturer to supply and install all interlinking wiring between current transformers and the check meters installed in the main switchboard, fully in accordance with this specification. Provide metering data logger and provide cabling to BMS system in the new plant room as indicated on the drawings.

A data logger system shall be provided to collate data from the various energy meters. The control box housing the data logger shall be located in the electrical cupboard c/w power supply. Each meter shall be connected via mains rated bus signal cabling linked back to the data logger. The system manufacturer shall be Synapsys or equal.

The minimum requirement to be able to monitor the energy use shall be as follows:

1. Separate meter for the lighting
2. Separate meter for the small power

3. Separate meter for the mechanical services

Items 1 & 2 shall be provided via split load lighting & power distribution boards.

Item 3 shall be provided separately metered mechanical services distribution board.

A transient surge protection device (SPD Type 1&2) shall be provided integrally to panel MP1.

The contractor shall be responsible for the following works:

- support structure for switchboards.
- wall penetrations and watertight seals for cables.
- fire stopping of large cable routes.
- All builders work holes above 50mm².
- Excavation and backfilling of trenches and earthing pits
- Magnetic warning tapes
- Underground cable ducts

Ensure all threaded electrical conductor terminations are tightened to the correct torque in accordance with the equipment manufacturer's recommendations. Provide all torqued connections with a torque mark seal. Provide details of all torque settings in the O&M manual and inside all panels.

The Contractor shall provide all necessary shock notices and precautionary Health & Safety labelling.

The Contractor shall provide an electrical rubber safety mat in front of the panel of equal width and of 500mm depth.

Provide cable calculations for the distribution system as indicated on the drawings and a protective device co-ordination study to ensure that all protective devices are co-ordinated. Base the study on the actual devices and cable lengths installed.

Ensure that discrimination is achieved throughout the network and select protective devices and settings accordingly.

The contractor shall carry out the required load analysis and calculations on the existing LV network to allow the proposed new electrical loads to be suitably distributed in accordance with BS 7671 IET Wiring Regulations.

3.15. Distribution Boards

The Contractor shall supply, install, test and commission the new distribution boards and/or modifications to the existing distribution boards indicated.

Provide all new final circuit wiring and connections from the new distribution boards to the lighting, new socket outlets, connection units and isolators for fixed equipment and mechanical plant.

Provide RCD protection in accordance with BS:7671.

The Installation shall comply with:

- All applicable British, European and International Standards.
- DNO Standards, Regulations and Requirements.
- BS 7671 IET Wiring Regulations
- BS EN 60439-3:1991+A2:2001 Low-voltage switchgear and control gear assemblies
- BS EN 60898 Electrical accessories + Circuit breakers for overcurrent protection
- Electricity at Work Act
- Health and Safety at Work Act 1972
- The Electricity at Work Regulations 1989
- The Construction, Design and Management Regulations 2015
- Building Regulations

The contractor shall supply, install, test and commission the new and modifications / additions to the existing low voltage distribution boards. Include all single-module miniature circuit breaker (MCB/RCDs/RCBOs) protective devices, blanking plates and circuit charts. All new RCD's and/or RCBOs to be 30mA to BS EN 61008-1 or BS EN 61009-1.

Arc fault detection devices shall be provided to the circuits supplying the hair dryers in the changing village.

New distribution boards shall be labelled indicating the unique reference and service e.g., **DB/1 (GENERAL POWER & Lighting).**

An extension box shall also be provided to house contactors and digital timeclocks for control of external lighting/mechanical plant where required.

Distribution board circuit charts shall be typed in an approved format and as described in Clause 514.9 of the IEE Regulations. The chart shall be fitted in a clear plastic wallet fixed inside or adjacent to the relevant distribution board.

Provide a 100mm x 100mm galvanised steel trunking drop to contain new cabling from the high-level tray to all new distribution boards. Provide slotted connection and paxolin (SRBP) insulated sheet between trunking and distribution board casing.

The contractor shall ensure that each protective device is clearly labelled indicating its circuit designation and way number.

All new distribution boards shall be: -

- Fully shrouded and metal cased appropriate for surface mounting.
- Complete with hinged lockable lids, integral isolator and an integral earth bar.
- Fitted with suitably sized MCB's with a minimum of 20% spare ways filled with blanking modules.
- Provided with enough ways to accommodate RCD/MCB devices where protection is required on outgoing ways.
- Provided with permanent labelling of circuits and rating, plus distribution board references.

3.16. Systems of Wiring

General

The contractor shall provide all new containment required for all new wired systems. This includes final conduit runs from main containment routes to the final accessory positions. Indicative main containment routes are indicated on the drawings.

New containment shall be installed to support the following services: -

- LV distribution and final circuit cabling
- Fire alarm system cabling.
- Security / CCTV cabling
- PA Speaker cabling
- Accessible WC alarm system

Final circuit cables shall be either single core or multi-core low smoke zero halogen, double insulated flexible low smoke zero halogen, or cross-linked polyethylene insulated, steel wire armoured, and low smoke zero halogen sheathed cables with copper conductors.

LV final circuit wiring shall be installed to new containment and surface clipped within ceiling voids. Recessed cable drops shall be provided to all wall accessory points within conduit.

New sub-main cables shall be provided as indicated on the drawing**.**

Armouring shall be used as the principal earth path, supplemented with additional conductors as indicated.

Sub-main cabling will be installed to the new galvanised steel cable tray. Where cable ties are used, these shall pass through the back of the tray and not around the flange.

Termination of all sub-main cables shall be carried out, using the correct size and type of gland and lugs as recommended by the manufacturer. Cable glands shall be complete with gland shrouds and brass earth tags, earth tags being bolted to switchgear.

All cable penetrations through fire compartments are to be sufficiently sealed with intumescent material to maintain the integrity under fire conditions.

All cable penetrations through walls are to be sufficiently sleeved to protect the cable from mechanical damage.

New cable containment systems shall be installed within ceiling voids and at high level and be boxed in where exposed.

Cable tray shall extend to within 150mm of the item of equipment served.

Metal ties, clips or cable banding shall be provided at regular intervals to all cable runs.

New cable containment systems shall be supported on rods from proprietary hangers, fixed to unistrut brackets, wall brackets or fixed direct to the building fabric where appropriate.

All cable containment and surface clipped cables within ceiling voids shall be supported by fire rated steel supports to alleviate the risk of premature collapse in the event of a fire.

The electrical contractor shall ensure electrical earth continuity throughout all the cable containment installations by means of 16mm^2 1c LSF earth bond to a local distribution board. Earth continuity between sections of containment to be provided by manufacturer supplied bolted connection plates.

The Contractor shall be responsible for co-ordinating the new cable routes with the existing building structure, existing and new mechanical services installation, ceiling supports, luminaires, etc.

Cable trunking shall be galvanised steel with a lid providing a minimum degree of protection as IPXXD or IP4X and the cover can only be removed by means of a tool or deliberate action.

All containment system angles, joiners, tees etc. shall be proprietary type, as provided by the containment system manufacturer. Site manufactured bends shall not be allowed without the written permission of the CA.

The containment systems shall be fully interconnected and continuous throughout. The electrical contractor shall install earth links as the containment systems are installed.

The Contractor shall develop, supply, and install the cable containment provisions required.

The Contractor shall be responsible for co-ordinating the new cable routes within the new and existing building structure, new and existing mechanical services installation, ceiling supports, luminaires, etc.

The electrical services wiring systems shall be as follows: -

SERVICE	CABLES AND CONTAINMENT	COMMENTS
Lighting / Small Power	Cu LSZH insulated and sheathed cables installed to new containment and/or clipped within the ceiling void using approved fire rated cable clips and fixings. Surface mounted galvanised steel conduit drops required down to all wall mounted accessories where not recessed into the structure.	Fire rated cable clips to conform with BS 7671 to be provided where installed surface clipped within ceiling voids.
Intruder Alarm / CCTV / Security / PA system cabling	Cables installed to new containment and/or clipped within the ceiling void using approved fire rated cable clips and fixings.	
Fire Alarm	Red sheathed fire rated cable installed within surface mounted, white, heavy gauge PVCu conduit or surface clipped within ceiling voids and roof spaces. Cables shall be clipped using coated fire rated copper P-clips or approved 'firefix' clips.	-

EXTERNAL CABLING.

External service cables are to be BS 6724 LSH/SWA/PVC cables with the appropriate IP rated glands. They shall be neatly cleated where run surface.

Underground cables or ducts shall be installed at a minimum depth of 550mm within soft dig and 600mm below hard-standing, on a bed, and with a cover of sifted soil or sand. A continuous length of proprietary yellow magnetic marker tape labelled "CAUTION ELECTRIC CABLE BELOW" shall be installed over the complete length of the cable at 200mm below ground level.

Where ducts are specified, they shall be from the 'Rigiduct' twin walled, high-density polyethylene.

Where underground cables surface, they shall be in an area where damage is unlikely, or they shall be enclosed or covered with capping for a height of 1.8m.

All new cable ducts shall be sealed at ground floor level to prevent entry of vermin etc.

Underground cables shall be installed segregated by a minimum horizontal distance of 400mm from other services.

Where cables cross other services they shall be installed within ducts.

Reinstatement shall be equal to the existing surrounds and shall include re-tarmacking or re-turfing.

In ground cables are to be pulled into ducts where routed under hardstanding or paths/roadways or buried to a depth of 600mm minimum and over laid with warning tape where run in soft dig/landscaped areas.

Underground ducting shall be in accordance with the National Colour Coding System for buried services as follows:

Colour Service

Colour	Service
Black	LV Electricity
Purple	Communications / ELV Cabling

REFERENCE DOCUMENTS

Comply fully with the edition (including amendments) of each of the following, current at the time of tender.

Where a standard referred to in this section conflicts with a standard referred to in an associated 'engineering system' section of this specification, the standard referred to in the engineering system section prevails.

BS 4568	Specification for steel conduit and fittings with metric threads of ISO forms for electrical installations
BS 4678	Cable trunking
BS 4678-2	Part 2: Steel underfloor (duct) trunking
BS 7671	Requirements for electrical installations. IEE Wiring Regulations
BS EN 1366	Fire resistance tests for service installations
BS EN 10143	Continuously hot dip coated steel sheet and strip. Tolerances on dimensions and shape
BS EN 50085	Cable trunking systems and cable ducting systems for electrical installations
BS EN 50086	Specification for conduit systems for cable management
BS EN 60423	Conduit systems for cable management. Outside diameters of conduits for electrical installations and threads for conduits and fittings
BS EN 60529	Specification for degrees of protection provided by enclosures (IP code)
BS EN 61386	Conduit systems for cable management

Plant and Switch Rooms

Wiring shall be with single core LSZH insulated cables drawn through galvanised surface steel conduit and galvanised trunking.

Extra-low voltage (ELV) Screened Cables

Wiring between detectors and electronic controls shall be with multi-core screened cables as detailed on the drawings, installed within ceilings and conduits to wall points. Particular attention shall be paid to the earthing of the screen and the separation from mains voltage cables. The screen shall be earthed at the supply point only.

Fire Alarm Systems and Power Supplies to Fire Alarm Equipment

Fire alarm cabling shall be with silicone rubber insulated fire resisting cables. Cables shall be installed to the containment provided and clipped within ceiling voids and in steel conduits to wall points.

Cabling shall be fixed and terminated using manufacturers recommended accessories. Cable clips shall be the copper type, LSZH coated coloured red and shall have the same fire resisting properties as that of the cable. They shall be installed at distances equal to or less than those guidelines given in the IET Regulations and to Manufacturer's recommendations. Where cabling is surfaced mounted to the fair-faced block the cable clips shall be installed at a maximum distance of 400mm apart. Fire Resistant clips shall be used to secure the Fire Alarm Cabling on Vertical runs or where tray/cable rack does not support the cable from underneath on horizontal runs. Cabling fixed to the cable trays shall be dressed using black PVC steel type cable ties installed at equal distances of no more than 300mm.

Terminations shall use the manufacturers recommended glands. The terminals used to terminate cable shall be constructed of similar materials that will withstand a similar temperature and duration to that of the cable.

Fire alarm cabling shall be red sheathed.

Fire Alarm Cable manufactured to both British Standards BS5839 and BS7629. The cable to include plain annealed copper conductor, silicon rubber insulated aluminium/polyester tape screen, tinned annealed copper earth wire, low smoke zero halogen (LSZH) outer sheath. Fire resistant to IEC 331 and BS6387. Flame retardant to BS5839-1:2003 and IEC 60332-3 CAT CWZ, BS7629-1 1997. Acid gas emission to BS EN 50267 (IEC60754), smoke emission to BSEN50268 (IEC 61034) and flame propagation to BS EN 50265, BS EN 50266 (IEC 60332)

3.17. Wiring Accessories

Wiring accessories shall be provided of the type indicated. Wiring accessories shall generally be installed recessed into the building fabric.

Lighting switches shall be grid switch type.

Switches and socket outlets for lighting and other equipment are to be positioned at a height of between 450mm and 1200mm from the finished floor level, where several outlets are grouped together, they should be aligned with one another.

Table of finishes

The contractor shall provide all electrical accessories as indicated. Types shall be as detailed in the table indicated on the drawing.

3.18. Small Power Installation

The contractor shall be responsible for the procurement, installation, testing, commissioning and setting to work of the small power installation, as described within this specification and indicated on the layout drawings.

Provide new small power systems fully in accordance with BS 7671.

Refer to the approved equipment schedules contained within the drawing, and mounting height details given in section 4 of this Specification.

The contractor shall all provide power supplies, final circuits and accessories required in accordance with the layout drawings and this specification.

Dedicated small power supplies and outlets shall be installed for various miscellaneous appliances including, general purpose use, appliances, as generally indicated on the layout drawings. Fused connection units are to be provided to control items of equipment such as security systems, fire alarm equipment, fans etc., to provide a complete working installation.

All accessories, isolators and fused connection outlets of the patterns detailed shall be installed connected to ring or radial final circuits.

The contractor shall provide a switched connection unit installed directly above the hand dryer positions with flush conduit drop to the rear of the electric hand dryer to the positions indicated. Electric hand dryers shall be provided and installed by the contractor. Include a separate cost line for the supply only of hand dryers in the tender summary page in Appendix 1.

Final connection to all fixed items of equipment shall be provided by the contractor under this contract.

Dedicated power supplies shall be installed for the new mechanical plant, as generally indicated on the layout drawings.

Field wiring for mechanical plant control will be carried out by the appointed mechanical controls specialist contractor.

The contractor shall install all containment external to control panels and mechanical services plant and equipment as indicated on the associated layouts.

The appointed controls specialist shall commission all new mechanical systems.

All accessories, isolators and fused connection outlets of the patterns detailed shall be installed connected to ring or radial final circuits.

Final connection to all fixed items of equipment shall be provided by the contractor under this contract.

Dedicated power supplies shall be installed for the new mechanical plant, as generally indicated on the layout drawings.

Final layout of socket outlets and accessories to be confirmed during design period and agreed with the contractor administrator.

Provide an external in-ground socket outlet to the position indicated. Include for all builders work including drainage and reinstatement to existing ground to the manufacturers recommendations.

Three-compartment dado trunking shall be provided to the positions indicated. Where 3-compartment PVCu dado trunking is installed, it shall be arranged so that continuous access to all compartments is available.

Unless indicated otherwise, all dado trunking shall be of a typical white PVC finish with dedicated enclosures for accessories. Where socket outlets are shown located on dado trunking, the socket outlet shall be installed in a flush back-box within the trunking. All dado trunking shall be installed with the necessary manufactured angles, T-pieces, end caps, lid etc. to form a complete installation. DDA compliant frames shall be provided to accessories installed to dado trunking.

The mounting heights of socket outlets, switches and controls shall be to DDA requirements. Final connection to all items of equipment shall be complete with accessories, accessory mounting boxes and compatible accessory plates.

Where penetrations through walls and flooring for power and data distribution are required the fire and acoustic integrity of the walls and partitions affected by the penetrations shall be made good upon completion.

All junction boxes, isolators and fused spurs shall be fitted with labels detailing their function. The labels shall be black characters engraved on white traffolyte securely fixed to the equipment.

3.19. General Lighting Installation

System Parameters

To provide general illumination throughout the refurbished areas of the building to achieve a functional, energy efficient, easily maintainable and aesthetically pleasing lighting installation utilising modern lighting methods and equipment, in accordance with the relevant Standards and CIBSE Guides listed below.

- CIBSE Code for Interior Lighting
- CIBSE Lighting Guide 5: Lighting for Education
- Building Regulations Part L
- BS 7671 IEE Wiring Regulations
- BS 5266: Part 1:2016 Emergency lighting
- BS EN 1838 Lighting applications. Emergency lighting
- BS EN 12464-1:2011 Light and lighting. Lighting of workplaces. Indoor workplaces

The lighting installation shall comprise the type of luminaires and lighting levels indicated on the drawings and detailed in the schedule complete with the number and types of lamps / light sources detailed.

The light source colour temperature of new luminaires shall be 4000°k (white) from the standard colour rendering range.

All luminaires shall be installed in accordance with the manufacturer's instructions and using proprietary approved fixings.

Final connections to luminaires installed within accessible ceilings shall be carried out using plug-in ceiling roses and flexible cables.

Lighting in new areas shall be provided with energy saving controls. The lighting installation shall be provided with automatic controls for absence detection (manual on/auto off), presence detection, manual dimming and scene setting dimming. Refer to the layout drawings for details.

All automatically controlled areas shall switch off after an inactive period of 20 minutes.

All luminaires shall be installed in accordance with the manufacturer's instructions and using proprietary approved fixings.

All lighting circuits shall be wired and controlled to the arrangement details indicated on the drawings.

3.20. Emergency Lighting Installation

System Parameters

The contractor shall supply, install, test and commission the emergency illumination of the building required to provide safe egress from the building in the event of total or local failure of the general lighting systems.

The emergency escape lighting system shall be provided and function in accordance with the requirements of:

- BS5266: Code of practice for Emergency Lighting (latest Edition and Amendments)
- All relevant ICEL Publications
- The Local Building Control / Fire Office and Licensing Authority
- BS 7671 IET Wiring Regulations
- BS 5266: Part 1:2016 Emergency lighting
- BS EN 1838 Lighting applications. Emergency lighting
- BS EN 60598-2-22. Luminaires. Particular requirements. Luminaires for emergency lighting
- European Sign Directive (latest Edition and Amendments)

The emergency lighting system shall comprise of non-maintained battery packs fitted integrally to general lighting luminaires and/or non-maintained, self–contained, miniature luminaires utilising white high efficiency LED lamps.

The battery packs shall be fully automatic type to give 3-hour duration to the emergency lamp in the event of mains or local circuit failure.

Test key switches shall be provided to provide manual isolation of the circuit live supply.

All emergency lighting to conform to BS: 5266.

3.21. Fire Alarm Installation

General

The electrical contractor shall employ the current fire alarm maintenance contractor to supply, install and test the additions and modifications to the existing fire alarm system.

The modifications include: -

- Providing new networked analogue addressable control and indication equipment.
- Providing a new analogue addressable fire alarm system to the entire building.
- Maintaining as operational the existing fire alarm and detection system whilst works progress.

The existing fire alarm system is a conventional type system. The fire alarm control panel is located in the in the entrance to the building.

The specialist contractor is: -

Chubb Fire & Security
Unit 13/14 Ashton Gate
Ashton Road, Harold Hill
Romford
RM3 8UF
☎ 03448791770

uk_sales@chubbfs.com

System Parameters

The new Fire detection and alarm system shall be installed in accordance with all the appropriate standards, including but not limited to the following:

- The requirements of BS 5839 Part 1 2017 'Code of Practice for Design, Installation and Servicing of Automatic Fire Detection and Alarm Systems in compliance with L2 classification throughout the refurbished areas.
- The requirements of EN 54 (all parts) for Automatic Fire Detection and Alarm Systems.
- The requirements of BS 5588-8 Fire Precautions in the Design, Construction and use of Buildings - Means of Escape for Disabled People.
- BS 7671 - Requirements for electrical installation
- The requirements of BS 9999:2008 - Code of practice for fire safety in the design, management and use of buildings
- All applicable British, European and International Standards.
- Building Control and Fire Officer Requirements.

The Contractor shall employ a specialist contractor to supply and commission the fire alarm and detection system as indicated.

Provide dedicated power supplies to fire detection and alarm system control panels, and, where required, ancillary and field devices.

Undertake all testing and commissioning of the system in accordance with standard and regulatory criteria, and specialised manufacturers' standard procedures, and to the satisfaction of the Contract Administrator, employer's representative, and local fire authority, as required. Undertake all testing and commissioning to an integrated programme with other systems to ensure that all necessary power supplies are available, and that the correct operation of all interfaces with ancillary systems can be proved.

Provide full record information, including testing results, operational and maintenance manuals, record drawings, zonal and address designations, and certification.

Provide all system components from a single manufacturer's standard product range. Ensure that all components of the fire detection and alarm system are compatible and connectable to BS EN 54-13, and fully capable of delivering the requirements of this specification.

Do not use any equipment or components identified as end-of-line or otherwise not expected to have manufacturer continuing support and spares availability.

Ensure all control and indicating equipment, standard power supply units and standard repeater units comply with the EMC requirements described in BS EN 54 part 2 and BS EN 54 part 4.

Ensure all systems, components and equipment complies with EMC Regulations.

Provide audible alarms and combined audible/visual alarms of the nature and type indicated, to achieve the required sound levels and intelligibility specified, and the remote information criteria, in compliance with all relevant British Standards.

The new fire detection system shall consist of the main control and indication panel as indicated on the drawings.

The fire alarm system shall consist of manual call points to all exits from the buildings, automatic smoke and heat detection devices, interfaces units, electronic sounders, and visual indicators.

Areas subject to cooking fumes, steam or dust will be protected by automatic combined heat / smoke detectors.

Visual indication will be provided to toilet areas and any other area where hearing impaired persons may be alone.

Wire the systems as indicated in Section 3.15.

Provide dedicated LV power supplies to the new control panel. Circuit shall be wired as indicated in Section 3.15.

The new fire alarm system devices to the building shall consist of manual call points, automatic smoke and heat detection devices, electronic sounders, interface units and visual alert devices.

The new detection devices to shall be wired as on new loop circuits.

Automatic smoke detection will be provided by optical type smoke detectors.

The fire alarm system additions shall be installed, tested and commissioned to meet the Standards and Guidance detailed within this document and include the specific requirements of Approved Inspector, the Fire Authority, BS 7671 and BS 5839 “Fire detection and alarm systems for buildings”.

System Operation

On operation of any detector or call point the entire fire alarm system shall go into alarm conditions.

Addressable System

Install and configure an addressable system in which all individual automatic detectors, manual call points, alarm devices and other field and interface devices have unique address identifications.

Use devices of the two-state type providing a ‘fire’ or ‘normal’ condition status.

Loop all detectors back to the main control and indicating panel. Ensure the control and indicating panel is microprocessor-based and pre-programmed with software which allows identification of both the condition and location of all devices in the system.

Provide operating programs and configuration data capable of being updated.

Wiring Arrangement

Provide the fire alarm system installation with an independent, separated, and segregated wiring system in accordance with BS 5839-1 and BS 7671.

Ensure all system equipment is connected in circuit loop formation, in conjunction with the specialist fire alarm system manufacturer’s recommendations.

Ensure that the maximum number of addresses allowed to be connected on each loop is not exceeded and allows a minimum of 30% spare capacity.

Do not use four-core loop cables.

Analogue Addressable Loop Circuits

The contractor shall install the new devices to the fire alarm system evenly across two loop circuits.

Each loop circuit shall comprise manual call points for manual activation of the fire alarm system and automatic combined smoke/heat detectors, heat detectors, interface units to linear heat detection cable, visual indicators, and interface units. Each loop shall be installed in a continuous ring configuration to provide a secure/closed network.

For wiring type and method refer to section 3.15.

Installation

Ensure all cables are mechanically protected in accordance with BS:5839.

Install all cables strictly in accordance with the manufacturer’s instructions and recommendations and terminate using proprietary zero halogen low smoke polymeric red coloured glands. Use only zero halogen low smoke coated steel ‘P’ clips coloured red for direct fixing of cables.

Use only fire-resistant cable ties for fastening to the underside of cable trays or similar structures where support is required.

Ensure all cable support is non-combustible and capable of withstanding an exposure to temperature at least equal to that of the supported cable. Fix cable supports and terminate cables in accordance with the recommendations of the cable manufacturer and in accordance with BS 7671.

Adhere to the installation standards set down in the Section 3.15 of this specification for the installation of the wiring system.

Earth all fire alarm system cabling in accordance with the requirements of BS 7671 and the recommendations of the manufacturer. Ensure that the electrical continuity of all electromagnetic screens is maintained throughout the system.

Install the wiring system surface mounted, including the final positioning and installation coordination of all system cabling and components together with the marking out of all associated builder's works.

Install all cables in a manner such that they are physically continuous throughout the length of each circuit other than where connection is made at the terminations of a system component. Do not use any other cable connections or joints.

In all areas provide the final connections to all the system components via suitable mounting boxes to the underside of the ceiling or surface mounted to the wall.

Provide all necessary cabling and terminations from the main fire alarm panels to the appropriate MCCs, ventilation control panels, etc, and liaise fully with the maintainers of those systems to affect satisfactory connections and operation.

Wire these services either directly from the fire alarm panels, or utilise the appropriate detector/alarm circuit loops, via suitable interface units, if required.

Size cabling appropriate to the switching system's operation requirements.

Make good all penetrations through walls, floors, partitions, or ceilings with fire-stopping material.

Analogue Addressable Control and Indicating Panels

The specialist contractor shall provide a new analogue addressable control panel to the location indicated.

The new control panel shall comply with the following standards: -

- BS 5839 Part 1 and BS EN 54-4
- BS EN 54-2
- BS EN 50130-4

Provide a microprocessor-based multi-zone, multi-loop main control panel of the analogue addressable/addressable type, housing all items of control and indication equipment and located and mounted as indicated on the drawings.

Provide a panel with a fascia layout generally as set out in the selected manufacturer's standard arrangement and of tamper-proof construction. Mount the components on the front panel, or internally on a chassis.

Arrange the equipment mounting such that the enclosure can be fixed in position, and outgoing cables terminated, prior to the equipment being installed. Ensure the enclosure incorporates suitable internal cable management such that modular components can be easily replaced.

Arrange the internal layout to provide adequate free space for cable termination. Ensure access to all outgoing terminals is possible with the panel in an operational state. Provide access to terminals at the back of the enclosure by use of a hinged chassis, if necessary. Include a series of 20 mm knockouts or gland plates at the top and bottom of the enclosure for the termination of cables.

Provide a zone plan, identifying the building fire alarm zones, at the main indicating panel and any repeat indicating panels. Mount the zone plan in a glass-fronted hardwood frame and fix adjacent to the panel.

Control Function

Where applicable, provide the control panel with the following equipment as a minimum:

- Liquid crystal display, backlit, providing up to 80 characters per alarm condition, to enable all alarm and fault conditions to be reported.
- display messages in English, with all information stored in the display memory to enable messages to be scrolled and reviewed prior to system re-setting.
- integral keypad for interrogation, programming, device labelling and device/zone isolation including facilities to display index, display log and review/scroll.
- all necessary control cards for the number of loops required, including spare capacity.
- lamp/LED indications.
- lamp/LED test key switches for fire, fire zone and zone fault/isolated.
- integral battery/charger power supply unit
- an integral 24-column dot matrix printer to provide a hard copy of all information shown on the display, and stored information to provide history, full or selective, of system events.

- enough terminals to receive all incoming and outgoing circuit wiring, including provision for future spare capacity.
- at the main fire alarm system control panel, a key operated selector switch / software operated controls to inhibit shutdown of systems when carrying out routine sounder tests, or alternatively use a discreet code number entered via the control panel keypad for this function.
- output port to allow communication with a suitable computer, using either RS-232 or RS-485 data interchange system.
- all necessary volt free contacts to achieve operation of ancillary systems.

Provide the panel with the following control functionality:

- start sounders.
- test “Evacuate” alarm.
- stop sounders (alarm mute)
- control clock and date setting.
- cancel fault buzzer.
- disable links to other systems for test purposes.
- panel test/enter.
- address isolate.
- change device type, add / remove devices, edit cause and effect.
- zone identification.
- two-stage alarm facilities
- fault monitoring and fault indication for all internal connections and interfaces, including all detection circuits, to monitor and indicate short circuit and earth fault conditions, with a separate alarm output provided for each of these conditions.
- fault monitoring and fault indication for battery status, remote signalling status and top cover open, with a separate alarm output provided for each of these conditions.
- supervisory buzzer
- real-time clock accurate to one minute per year and incorporating automatic daylight-saving time adjustment.
- all necessary operating relay/switch devices and auxiliary devices to control remote ancillary devices.
- facilities for automatic remote dialling to a registered alarm centre network
- alarm sounder circuits, of sufficient number as outlined elsewhere, complete with continuous circuit fault monitoring facilities.
- instructions for user operation

Controls and Indication

Equip the panel with all necessary controls and indication to monitor, interrogate, programme, silence, test and re-set the system.

Incorporate zone/address designation LED indicator boards, complete with full operating instructions and the facility to enter all zone and address allocations. Ensure that the panel is capable of indicating the exact source of the alarm condition on the display. Provide a non-volatile memory to record all system events, up to a maximum of 5000 events, and hold these available for printing out or displaying on screen. Record the time and date of each event with sufficient data to identify the device, zone, and loop. Ensure that the earliest event is automatically discarded on memory overrun.

Provide power supply equipment that satisfies the requirements of BS EN 54-4 and BS 5839, with fault monitoring and fault indication for failure of main power supply, standby power supply, battery charger, and reduction of battery voltage.

Automatic Detectors - General

Provide automatic detectors of the type and in the locations as indicated on the drawings and in accordance with BS 5839-1. Ensure each detector is of the analogue type and capable of being individually addressed.

Incorporate the following facilities in each detector:

- common mounting base for different types, allowing detector heads to be fully interchangeable integral LED alarm indication of operation where directly visible, with remote indication where concealed, i.e., duct sensors, lift shafts etc, and label suitably.
- capability of automatic or manual disablement for maintenance purposes
- appropriate indication on Main Control and Repeat Panel when the sensor is removed from its base.
- ensure removal of detector head does not render any part of system inoperative.

Ensure all automatic detectors produce an analogue output which changes with smoke density or temperature, and that detectors change this to digital data for transmission to the processor.

Ensure all automatic detection devices are individually compensated, at the master control panel, for any degradation in performance due to ageing, dust accumulation, component characteristic change etc.

Ensure that detectors installed anywhere on any loop are capable of being assigned to any zone.

Optical smoke detectors

Provide detectors of the obscuration or scatter light type, with sensitivity adjustment via the system control panel.

Ensure that point detectors comply with BS EN 54-7.

Automatic heat detectors – Fixed temperature/rate of rise type

Provide detectors of the electronic type and specifically designed for analogue operation, with sensitivity adjustment via the system control panel. Ensure that heat detectors respond to either fixed temperature heat detection or fixed temperature heat detection combined with rate-of-rise of temperature. Do not use heat detectors that respond only to rate-of-rise of temperature.

Ensure that detectors comply with the sensitivity performance of BS EN 54-5.

Manual Call Points

Provide manual call points of the addressable type complying fully with BS EN 54-11, made of polycarbonate/moulded ABS material, and finished in red. Ensure all manual call points are of the same type. Install call points complete with suitable inscription of operation and provided with suitable proprietary enclosures for surface mounting within internal/external locations.

Incorporate the following facilities within each manual call point:

- external test facility to operate contacts without opening manual call point.
- an LED to indicate operation of manual call point.
- transparent safety covers to ensure that they are not operated inadvertently.
- Test keys shall be provided for each unit.

Interface Units

Provide interface units of the addressable type connected to the local loop circuit and which provide the required inputs and outputs for control or indication functions.

Ensure each input/output way is fully programmable from the control panel and fully monitored for open and short circuit conditions.

Ensure that the fire detection and alarm system provide the signals and interfaces with the operation of other systems and equipment including:

- Access Controlled Gates – Door to release upon evacuation signal.
- Ventilation Plant (MVHRs) – Ventilation plant to shut down upon evacuation signal.

All interface units shall be provided within proprietary enclosures. Interface enclosures shall be provided within ceiling voids, storerooms or at high level. All enclosures shall be labelled stating their use.

Audible alarm devices

Ensure all audible fire alarm devices conform to BS EN 54-3 and have similar and distinctive sound characteristics.

Provide sufficient fire alarm sounders to ensure that sound pressure levels throughout all accessible levels of the building are in accordance with the recommendations of BS 5839-1.

Ensure all audible alarm devices and flashing beacons are loop powered and addressable.

Provide sounders with an output frequency of 500 to 1000 Hz, providing a sound level of not less than 104 dBA at 1 metre and having an adjustable volume control. Ensure that the number of sounders on any one circuit does not exceed the manufacturer's recommended maximum.

Ensure sounders are electronic two-tone and red coloured. Ensure that sounders are polarised and suppressed as a standard.

Flashing Beacons

Provide flashing beacons to operate at all times whilst sounder circuits are activated. Do not incorporate mute or isolation switches.

Ensure flashing beacon units are electronic *LED* and sensor-base mounted, wall mounted and where necessary combined with audible alarm devices.

Alarm Receiving Centre

The existing alarm receiving centre line shall be retained and used for the new control panel. The signal path from the new fire alarm control panel to the ARC is to be maintained the new panel.

Software Labels

The Contractor shall complete the manufacturer's room labels form with details of the device location for fire annunciation purposes to the control panel.

The labelling shall be agreed with the Contract Administrator / End User prior to submission for commissioning purposes.

Soak Test

The Fire Alarm Specialist shall provide a soak test to BS 5839.

The soak test is to be carried out once the commissioning of the fire alarm system has been completed.

Allow attendance as necessary during the soak test period. During the soak test period each manual call point should bear an indication that it is not to be used.

Allow for retaining the existing fire alarm and detection system in working order during this period.

The Contractor shall perform a false alarm monitoring test for 7 days, complete with 24-hour monitoring of all detection equipment to establish the system does not produce unwanted false alarms.

Should this test fail for any reason at any period during the 7-day test without the false alarms being rectified, the soak test will be repeated from the start again, until the systems function accurately and correctly.

Practical completion will not be awarded until the soak test has been completed successfully.

Testing and commissioning

The approved specialist sub-contractor shall also carry out all the commissioning, audibility tests and issue all the test certificates.

The installation and commissioning, testing and inspection certificates shall be modelled on those in BS 5839: Part1.

During the installation, arrangements shall be made for the inspection and tests and upon completion; the final commissioning tests shall be carried out in the presence of the CA. The site agent and staff shall be fully trained to operate the fire alarm system, and this training must be included as part of the commissioning of the system by approved specialist sub-contractor.

Audibility tests throughout the new areas of the building shall be fully demonstrated to the CA.

Two copies of all test data shall be submitted for acceptance within five working days of completion.

Fire Alarm Maintenance

The system shall be maintained by the specialist contractor for 12 months following the date of acceptance. Include for these costs within the Tender.

Testing and commissioning

The approved specialist sub-contractor shall also carry out all the commissioning, audibility tests and issue all the test certificates.

The installation and commissioning, testing and inspection certificates shall be modelled on those in BS 5839: Part1.

During the installation, arrangements shall be made for the inspection and tests and upon completion; the final commissioning tests shall be carried out in the presence of the CA. The site agent and staff shall be fully trained to operate the fire alarm system, and this training must be included as part of the commissioning of the system by approved specialist sub-contractor.

Audibility tests throughout the new areas of the building shall be fully demonstrated to the CA.

Two copies of all test data shall be submitted for acceptance within five working days of completion.

3.22. Intruder Alarm System

System Objectives

The contractor shall employ the client's current intruder alarm maintenance contractor to design, supply, install and commission a new intruder alarm system to the building, installed as an extension of the existing security system installed to the workshop area.

Provide new zoned detection devices and keypads to allow the Lido and Workshop areas to be set / unset independently of each other.

Provide detection devices installed to give complete coverage to all areas to provide a system to meet a security Grade 2 system as defined in BS EN 50131.

Devices and panels will be installed to provide sequential confirmation signalling.

Provide new internal and external warning devices.

A powered expander shall be provided to the electrical switch room and networked to the workshop area system.

Intruder Alarm Warning Devices

Install the internal and external warning devices to the positions indicated.

The current specialist contractor is: -

Eurotech Security Systems Ltd
24 High Street
Stanstead Abbotts
Hertfordshire
SG12 8AE
☎ 01603 722920
💻 sales@eurotechsecurity.com

System Parameters

- BS EN 50131 (All Parts) Intruder Alarm Systems
- PD6662:2017
- BS8243:2010+A1:2014
- ACPO Security Systems Policy
- NACOSS Code of Practice for Intruder Detection and Alarm Systems to BS4737 and NACP 30.
- All applicable British, European and International Standards.
- IET Wiring Regulations (BS7671)
- Health and Safety Acts.
- Requirements and/or Regulations of the Fire Officer and Local Authority

The system shall be commissioned upon completion of the works.

3.23. Public Address System

The contractor shall employ a specialist contractor to design, supply, install and commission the modifications to the existing Public Address System. currently installed to the building as indicated.

The existing amplifier, console microphone and external speakers shall be retained and rewired to the new console position as indicated. A new floor standing steel cabinet shall be provided to house the existing rack mountable amplifier.

New speakers shall be provided throughout the changing village and externally pool side. Refer to the layout drawings.

The main objective of the Public Address System is to convey clear and audible instructions to customers in the swimming pool and changing village areas. The sound output should not be so loud that people nearest to the speakers feel uncomfortable, nor so weak that people away cannot discern what is being broadcast. This can be achieved by setting the speaker tap at 50% power input and distributing speakers across the building.

The PA System shall cater for broadcasting messages. The same speakers may be used for music for the selected area if required.

The Public Address System shall be suitable for continuous duty. The system will comprise of a microphone suitable for voice communication / announcements through speakers. The system shall consist of the following.

- Existing control console with microphone to be retained.
- Existing amplifiers to be retained.
- New and existing speakers

The contactor shall wire to the new and existing speakers using Monacor 2.5mm² 2-core LSZH speaker cable to match the existing installation.

The P.A. System shall be capable of generating messages to 'ALL' or selected speaker zones located within the building. It shall also be able to play music 'ALL' or selected speaker zone.

The specialist contractor shall specifically confirm that communication shall be clear and audible even in areas with high ambient noise. If any adjustments in amplifier system etc. required in this connection at site during and after commissioning the same shall be done without any extra cost to the contract.

3.24. CCTV System

System Objectives

The contractor shall employ the client's current CCTV maintenance contractor to design, supply, install and commission the additions and modifications to the existing CCTV system currently installed in the building.

Provide video surveillance system that is fully compliant with the requirements for a Grade 2 system as specified in BS EN 62676-1-1, except where these requirements are exceeded or modified in this specification.

The additions and modifications include: -

- Relocating the existing CCTV NVR and control cabinet to the switch room to allow for refurbishment.
- Relocating / removing existing CCTV cameras to allow for refurbishment.
- Rewiring existing CCTV cameras back to the new CCTV NVR and control cabinet position in the switch room.
- Providing additional CCTV cameras to the existing system.
- Relocation of the existing monitor to the new control position in the switch room.
- Provision of new monitor to the reception office.

The current specialist contractor is: -

Eurotech Security Systems Ltd
24 High Street
Stanstead Abbotts
Hertfordshire
SG12 8AE
☎ 01603 722920
💻 sales@eurotechsecurity.com

The Contractor will provide:

- all power outlets, cable and containment from the distribution boards to the outlets
- all primary and secondary containment

The Contractor will provide a power outlet, including all cables and containment at the following locations:

- At each external camera (where required)
- At the network video recorder
- At the Operator workstation
- At each monitor position.

The Contractor will provide a new power supply from the local distribution board.

The Contractor will provide the following to provide a complete IT network solution:

- the local area network (LAN)
- all required new and relocated network switches (PoE and non-PoE)
- all required data outlets
- all network cables from network switches to the data outlets (structured cabling)
- all network equipment cabinets complete with power distribution and cable management.

The Contractor will provide an RJ45 socket outlet, including all cabling and associated containment:

- At each external camera
- At each internal camera
- At each network video recorder
- At each Operator workstation

The Contractor will retain and expand all network switches as required.

The Contractor will provide all standard 19" equipment racks.

The Contractor shall develop the design in accordance with the principles shown or detailed on the Tender specifications, drawings, and plans. Include in the Tender all costs for developing the design into working solutions.

The Contractor shall provide all camera, camera movement, signal transmission, recording, display, monitoring and control hardware and software complete with licences.

The Contractor shall provide all enclosures, mounts, brackets and supports for all camera equipment.

The Contractor shall ensure that all current and recurrent software licence fees are included within the tender return related to the Client's use of any software supplied by the video surveillance system Installer. Transfer the licences to the Client at the end of the defect's liability period.

The Contractor shall provide all cable and final containment from data outlets to all camera equipment.

Provide all statutory warning signage.

Camera types and Mounting

Where possible all cameras are to be dome-type cameras for all proposed locations.

All internal and external cameras mount and enclosures to be vandal resistant.

In areas where temperatures are well maintained, use internal cameras or enclosures designed for normal operation in environmental conditions between 0°C and 40°C and between 20% and 80% relative humidity.

In areas where temperatures are not well maintained or where areas are unheated, use internal cameras or enclosures designed for normal operation in environmental conditions of between -10°C and 40°C and between 20% and 80% relative humidity.

In external areas, use weatherproof external cameras or enclosures designed for normal operation in environmental conditions of between -25°C and 60°C and between 20% and 95% relative humidity with a minimum IP65 rating, Semi-

recess static dome cameras into ceilings or wall cladding, or surface-mount cameras where no suitable ceiling or wall cladding exists.

Use brackets where cameras are wall mounted.

Where possible use the camera manufacturer's propriety surface mounting or wall mounting brackets and mounting kits.

Monitoring and Control

System

Provide all monitoring and control equipment as specified or shown on the drawings, complete with all hardware and software, and designed for 24/7/365 operation in a professional security environment.

Operator Stations

Provide one operator station with a personal computer (PC) with integral high-speed CD/DVD writer, LCD colour monitors, a keyboard and a mouse. All new monitors be supplied as 22-inch HD 4K colour monitor.

Provide a PC capable of supporting two monitors simultaneously. Use monitors having a widescreen (16:9) aspect ratio, minimum brightness rating of 300 cd/m² and a contrast ratio of 1,000:1.

Provide fully adjustable, stable support brackets to allow each monitor to be adjusted for height, swivel and tilt, and to be mounted horizontally or vertically.

Provide client software on all operator stations to allow remote monitoring, control and management of the security system via the graphic user interface.

Time and date

Provide a time and date generator to ensure that the time and date are accurate and identical on all parts of the system at all times.

Provide an automatic accuracy check and correction function to ensure the time and date remains accurate at all times, and that it automatically adjusts for official seasonal time adjustments and leap years.

Provide a means of easily checking and verifying the clock accuracy, suitable for use in legal proceedings in a court of law.

Testing and commissioning

The approved specialist sub-contractor shall also carry out all the commissioning, issue all the completion certificates.

3.25. Accessible WC Alarm System

An addressable accessible WC alarm system shall be provided by the contractor as indicated.

The accessible WC alarm shall comprise the following:

1. Control panel.
2. Power Supply Unit
2. Red Pull Cord to cover the WC and Wash Basin
3. Reset push / Reassurance Light within the Room
4. Lamp / Buzzer unit external to the room, over the head of the door.

In the event of the accessible WC alarm being activated, then the reassurance light shall illuminate, and the lamp and buzzer shall operate to provide audible and a visible alarm condition and alert to the control panel in the reception office.

Provide commissioning certificate upon completion.

3.26. Photovoltaic System

The Contractor shall employ a Photovoltaics Specialist to undertake the installation, testing and commissioning of the systems indicated on the drawings.

A complete roof mounted PV system is to be installed to the building.

The annual energy yield required from the system to meet SBEM requirements is 43,150 kWh/yr or 50kWp system.

The photovoltaic systems shall be installed in accordance with BS EN 61194 and BS7671.

The PV installation shall comprise the provision of PV panels and associated equipment and cabling provided to the roof of the building as indicated.

The contractor shall: -

- Provide photovoltaic array of panels, mounting frames and roof fixings.
- Provide interconnecting wiring from PV panels to isolating switch.
- Provide frequency inverter, meters, switchgear, distribution board, data logger, weather sensor and display panel sufficient to connect the installation into the building electrical power distribution and to monitor generation and usage.
- Provide all inverters and DC switch disconnectors.
- Provide all AC cabling.
- Provide all communications cabling.
- Allow for the supply, installation and connection of all G99 protective relays.
- Allow for the supply and installation of all necessary warning signs and labels.
- Provide instructions and demonstration as necessary to the building user on the operation of the installation.
- Provide twelve months maintenance, servicing and defects period, operating and maintenance manuals and "as fitted" drawings.
- Comply with all Health and Safety measures, Health and Safety Plan, etc. as called for in the Main Contract Particulars.
- Undertake all necessary liaison, transfer of information and co-operation with statutory bodies and associated trades.
- Allow for the liaison with the Regional Electricity Company (REC) in order to seek approval for grid connection of the PV system.
- Provide the Client with information/assistance in securing any Government grants that may be available now or in the near future.
- Allow for the submission of all required G99 applications to the District Network Operator (DNO) 28 days prior to commissioning of the PV system.
- The supply, installation and interconnection of an array of mono-crystalline PV modules.
- Provide for full and effective co-ordination of the photovoltaic installation with the Main Contractor and all other contractors. To include liaison, production of AutoCAD installation drawings, provision of all necessary Electrical information.

The PV systems shall be connected directly into the buildings electrical system allowing the building user to benefit from free electricity generated. Any excess energy shall be exported back into the DNO network via an export meter, where appropriate.

Income generated from 'Export Tariffs' shall be payable to the owner of the PV system.

Photovoltaic panels and installers are to be accredited with the Microgeneration Certification Scheme (MCS) to ensure the system is eligible for 'Export Tariffs' and to assist with the registration process.

The PV sub-contractor shall also provide all necessary assistance in-relation to the ENA EREC G99 application process.

Photovoltaic system isolators shall be provided at the inverter locations and at the point where the cabling exits the building onto the roof. This is required to provide complete system isolation without having to access the roof.

Photovoltaic system cabling shall be run in separate metallic containment with designation and warning labels provided along the length of the cabling. DC cabling containment to be provided by specialist contractor.

A quotation for this system is available from 'Environmental Energies'. Contact sarah@environmentalenergies.co.uk

3.27. Commissioning

Complete commissioning shall be carried out of the entire new installation in accordance with manufacturer's recommendations and to the satisfaction of the CA. This shall include producing and working to a commissioning plan of fixed building services in accordance with the Building Regulations. It is the contractor's responsibility to notify the local Building Control Body in a timely manner, as required by regulation.

General Wiring

The general wiring and fixed electrical appliances shall be tested in accordance with BS 7671 and the Inspection and Testing Completion Certificates submitted 48 hours before handover. Any departures from the British Standard shall be rectified by the Contractor before handover.

Emergency Lighting

The emergency lighting installation shall be tested in accordance with BS 7671 and BS:5266 and Test / Completion Certificates submitted 48 hours before handover. Any departures from the British Standard shall be rectified by the Contractor before handover.

Fire Alarm System

The fire alarm shall be commissioned and tested by the specialist contractor in accordance with BS 5839 and a certificate completed and submitted 48 hours before handover, complete with logbook. The specialist contractor shall demonstrate the system to the site staff and instruct them in the usage of the system.

3.28. Earthing and Bonding

The contractor shall supply, installation, inspection and testing and commissioning of an earthing and bonding system for the modifications to the low voltage electrical installation in accordance with Electricity, Safety, Quality and Continuity Regulations, Electricity at Work Regulations, BS 7671, BS 7430 and local Distribution Network Operator (DNO) requirements.

Provide individual earthing conductors and main equipotential bonding conductors marshalled at a new customer's main earthing terminal.

Provide and maintain arrangements for earthing the customer's installation.

A new earthing termination shall be provided by the electricity utility.

Where required, install new copper earthing conductors and circuit protective conductors sized to the requirements of BS 7671.

All bonding connections shall be accessible but shall be concealed wherever possible.

Earth clamps shall be in accordance with BS 951.

3.29. CDM Health & Safety File and O&M Manuals

The Contractor shall provide one set of record documents in hard copy format together with an electronic record copy with all documents on either CD or DVD. These shall include the following:

- Record Drawings, schematics, full description of each system,
- Controls and system diagrams.
- All information required by the current CDM regulations.
- Procedures for fault finding.
- Emergency procedures, including telephone numbers from emergency services.
- Maintenance Instructions and Maintenance kits.
- Performance and schedule of all mechanical equipment.
- Schedule of applications for PPM (Planned preventive Maintenance)
- Operational instructions
- Manufacturers Technical Information
- Electrical wiring diagrams, including control wiring schematics and control diagrams.
- Test certificates

- Commissioning Schedules.
- All certificates of approval in respect to building control
- End user guide manual

All documentation shall be supplied in PDF electronic format suitably indexed.

A draft copy of the documents must be completed and delivered to the CA not less than one week before practical completion of the works. After addressing comments, the contractor shall issue the finalised documentation directly to the site manager.

The manual must include:

A full description of each of the systems installed, written to ensure that the Employer's staff fully understand the scope and facilities provided.

A photo-reduction of all record drawings to A3 size together with an index.

Manufacturers' technical literature for all items of plant and equipment, assembled specifically for the project, excluding irrelevant matter, and including detailed drawings, electrical circuit details and operating and maintenance instructions.

The manual shall have a separate section, which details the extent of any asbestos removal works associated with the project, referenced to the asbestos log by block and room number.

The Contractor shall make allowance in his tender to give a verbal instruction session to the staff on operating the new plant. This shall include instruction in relation to energy and the contractor's proposed energy strategy.

A copy of all Certificates, including but not limited to the following:

- Electrical Installation Test Certificate
- Asbestos Clearance Certificates, if appropriate
- Certificate signed by a staff member confirming on site instruction has been completed.
- Certificate signed by a staff member confirming the O & M manual has been received.

A copy of all manufacturers' guarantees, warranties and maintenance agreements offered by sub-contractors and manufacturers.

The Contractor shall provide full size printed copies of "as-built drawings" showing the layout of plant and services.

Practical Completion shall not be given until full mechanical and electrical safety certification has been issued to the CA.

Refer to Section 4.

4. Electrical Services Specification for Materials and Workmanship

4.1. Standards

The work is to be carried out in a competent manner by experienced tradesmen and specialist workers in accordance with best trade practice.

The works associated with this contract shall be carried out in strict accordance with all relevant legal requirements, good practice guidelines and current versions of all standards, local regulations, bylaws, British Standards and Codes of Practice, some of which are listed as follows:

- The “Chartered Institute of Building Services Engineers” standard codes and guides, for design, installation, and commissioning,
- Local Authority Codes and Statutory Requirements,
- The Building Regulations,
- All British Standards and Codes of Practice,
- Institution of Electrical Engineers, Wiring Regulations,
- Health and Safety at Work Act,
- Management of Health and Safety at Work Regulations,
- Office, Shops and Railway Premises Act,
- Construction (Lifting Operations) Regulations,
- Construction (Head Protection) Regulations,
- Personal Protective Equipment at Work Regulations,
- Provision and Use of Work Equipment Work Regulations,
- Manual Handling Operations Regulations,
- Abrasive Wheels Regulations,
- Control of Substances Hazardous to Health Regulations (COSHH),
- Electricity at Work Regulations,
- Health and Safety (First Aid) Regulations,
- Noise at Work Regulations,
- Reporting of Injuries, Disease and Dangerous Occurrences Regulations,
- Construction (Design and Management) Regulations,
- Environmental Protection Act,
- Environmental Protection (Duty of Care) Regulations,
- Environmental Protection (Prescribed Processes and Substances) Regulations,
- Waste Management Licensing Regulations,
- Highly Flammable Liquids and Liquefied Petroleum Gases Regulations,
- Construction (Health, Safety and Welfare) Regulations,
- Lifting Operations and Lifting Equipment Regulations,
- Workplace (Health, Safety and Welfare) Regulations,
- Pressure Systems and Transportable Gas Containers Regulations,
- The Control of Asbestos at Work Regulations,
- Water Supply (Water Fittings) Regulations.

Specific attention is drawn to the Contractor's responsibilities with regard to:

1. Where the execution of the contract requires the movement of operatives, equipment or material in or around occupied premises, clear demarcations of working areas are to be established with an appropriate representative of the C.A. and barriers and notices erected as necessary to warn occupants and protect them from potential hazards.

   Where CDM requirements indicate a method, statement is to be submitted to the Contract Administrator prior to the commencement of such works, to demonstrate that a full assessment has been made and due allowance made in the tender for carrying out the works with due regard to safety of persons and protection of property.

Any part of the works, or manner of working constituting a potential risk to health or safety, may be stopped or amended by the Contract Administrator under the Health and Safety at Work Act, and any costs arising from such an action will be borne by the Contractor.

2. The requirement to provide evidence to the employer, in the event of disposal from site of scrap materials, that the Contractor is properly licensed to carry out such removal and disposal.

4.2. Asbestos

The attention of the Contractor is drawn to the hazards of working with any materials having an asbestos content.

Works associated with asbestos material shall be carried out by an approved specialist accredited Contractor. No new materials and no manner of working with material containing asbestos shall contravene the Asbestos Regulations.

Any new material used shall not contain asbestos.

The contractor's responsibility shall include but not be limited to the following:

1 Check the area in which work is to be carried out for the presence of asbestos.
2 If asbestos is discovered immediately notify the Contract Administrator as to the extent and type of asbestos present. A specialist testing laboratory may need to be employed and if so, the cost of testing will be borne by the Client. Ensure that the area involved is isolated from the rest of the building and that warning signs are placed.
3 If work is already in progress and asbestos is discovered, suspend all work, and carry out the procedures as in 2.
4 Where Asbestos is to be removed the Contractor is also to be responsible for giving the Health & Safety Executive the required notice of commencement of work.
5 Before work is commenced/recommenced ensure that you are aware of the correct procedures and are in possession of the correct specification relating to the work to be carried out. In some cases, it will be a requirement of the Health & Safety Executive that an approved and registered specialist Contractor must be used to carry out the work.
6 If possible do not carry out work to asbestos material when the building is occupied.
7 Check that adequate protection as required in the specification is provided.
8 During the progress of the work ensure that the correct working procedures are maintained.
9 Upon completion of the works check that the cleaning of the works has been carried out and that the waste has been removed in the approved manner.
10 Arrange for an air test as directed by the Contract Administrator.
11 Receive a satisfactory air test report on completion of the works before allowing the area to be occupied.

4.3. Handover Documentation

Operating & Maintenance Manuals are to be handed to the Contract Administrator prior to handover.

4.4. Drawings

Positions of all equipment and containment are to be approximately as detailed on drawings but where particularly dimensioned the positions are to be exact. All positions are to be confirmed with the Contract Administrator before installation.

The Contractor must consult with the other contractors, where applicable, and agree exact positions of equipment and pipework where fittings, furniture and construction of the building may affect the layout, and where space may be required for proper access for amenity or maintenance.

The Contractor's attention is also drawn to varying floor levels and ceiling heights.

The Contractor is to provide the C.A. with detailed drawings where necessary.

Examples of drawings which may be required are:

1. Dimensioned setting out details of all 'cast in' sleeves required for risers through floor slabs and horizontal containment runs through concrete beams.
2. Detailed drawings of all electrical services.
3. Wiring diagrams of all new and modified control panels. One copy of each final drawing is to be fixed inside the respective panel by the Contractor.
4. Wiring diagrams for all controls.

Copies of all drawings are to be made available to the Contract Administrator for comment before installation or manufacture.

4.5. Commissioning and Handover

The Contractor is to carry out the commissioning and procedures in accordance with C.I.B.S.E. recommendations.

The whole of new and related existing installations shall be set in operation under normal working conditions in sections as site progress demands. Each section shall be demonstrated to the satisfaction of the Contract Administrator as fulfilling the desired requirements.

When the contract works, or parts thereof are ready for testing and commissioning notify the CA in writing.

All necessary facilities shall be provided to enable tests to be witnessed, and inspections carried out including all necessary instruments and recorders to monitor systems during commissioning system proving and environmental testing.

Provide information where access is required into ceiling voids, service risers etc and ensure these points are not closed until the commissioning and testing is complete.

Where commissioning, testing, balancing, adjustment, is undertaken in an area of the building taken over and occupied by the Employer, then take all necessary precautions against and be responsible for any damage caused whilst working in such areas for that purpose.

Prior to witnessing and inspection by the CA the contract works shall be fully tested, commissioned and be fully operational.

Where portions of the work are required to be commissioned and tested separately, then upon completion, demonstrate to the CA that all the several portions are capable of proper simultaneous operation in accordance with the requirements of the specification.

If testing demonstrates that the plant and equipment is not correctly installed and/or not functioning correctly carry out such remedial measures and adjustments as may be necessary and repeat the commissioning and testing procedure to the satisfaction of the CA.

Complete all tests before any paint, cladding or similar materials are applied or before services are concealed.

Ensure all requirements such as cleanliness, protection from harmful external and internal elements are provided prior to commencement of commissioning.

Undertake to:

- Commission, test, regulate and set to work the installations that form the contract works.
- Prepare comprehensive programmes, commissioning plans, schedules and method statements and procedures supported by risk assessments for the pre-commissioning checks, setting to work, commissioning, system proving, and environmental testing of the contract works.
- Comply with the requirements of the Building Regulations (Approved Document Part L2) for the inspection and commissioning of the building services systems. Prepare all necessary submittals including commissioning plans and reports. Obtain all compliance approvals from the building control bodies.
- Provide all specialist personnel including manufacturer's representatives and coordinate their activities, together with providing any attendance required.
- Prior to commencement of the works submit to the CA for approval sample pro-forma for the various

commissioning record and certification documentation.
- Provide reports detailing progress of testing and commissioning activities at intervals agreed with CA.
- Maintain a diary/log of significant commissioning and testing activities.
- Submit to the CA all certification documents prior to any system being offered for final acceptance.
- Confirm in writing to the CA that each installation has been correctly tested and commissioned and that the performance requirements can be achieved.
- Ensure all certification is attained and witnessed as necessary for inclusion in the record documentation.
- Submit a report for every test, demonstration, balance, or commissioning activity witnessed, together with an engineering appraisal on the performance, either on or off-site.
- Co-ordinate and liaise with the Employer's representative.

Maintain on site full records of all testing, commissioning, and performance testing.

The extent and proportion of results to be witnessed by the CA will be at the discretion of the CA.

The CA will: -

- examine subsequent to setting to work and regulation of the contract works the results of the commissioning and the documentary records thereof.
- only witness test proceedings to establish a level of confidence in the commissioning results being presented.
- confirm recorded results.
- determine if the specified requirements have been satisfied.

Two days' notice of any test is to be given in writing to the Contract Administrator and all tests are to be carried out in the presence and to the satisfaction of his/her representative.

Ensure that test certificates include:

- project title
- details and date of test
- instruments used, serial numbers, calibration dates.
- signature of those witnessing test
- installers name.
- specific location of the item in the contract works.

The number of copies of each test certificate to be issued to the CA

- (No) 2
- Time scale
- within working days of the test (No) 5

The accuracy of the Contractor's instruments is to be demonstrated, if required.

Operating and Maintenance Manuals:

The operating and maintenance manuals must include:

- A full description of each of the systems installed, written to ensure that the Employer's staff fully understand the scope and facilities provided.
- A description of the mode of operation of all systems including services capacity and restrictions.
- Diagrammatic drawings of each system indicating principal items of plant, equipment, valves etc.
- A photo-reduction of all record drawings together with an index. Reduced size of drawings to be A3
- Legend of all colour-coded services.
- Schedules (system by system) of plant, equipment, valves, etc., stating their locations, duties, and performance figures. Each item must have a unique number cross-referenced to the record and diagrammatic drawings and schedules.

- The name, address, and telephone number of the manufacturer of every item of plant and equipment together with catalogue list numbers.
- Manufacturer's technical literature for all items of plant and equipment, assembled specifically for the project, excluding irrelevant matter, and including detailed drawings, electrical circuit details and operating and maintenance instructions.
- A copy of all test certificates, inspection and test Records, commissioning and performance test records including, but not limited to, electrical circuit tests, corrosion tests, type tests, start and commissioning tests, for the installations and plant, equipment, valves, etc., used in the installations.
- A copy of all manufacturer's guarantees or warranties, together with maintenance agreements offered by subcontractors and manufacturers.
- Copies of insurance and inspecting Authority certificates and reports.
- Starting up, operating, and shutting down instructions for all equipment and systems installed.
- Control sequences for all systems installed.
- Schedules of all fixed and variable equipment settings established during commissioning.
- Procedures for seasonal changeovers and/or precautions necessary for the care of apparatus subject to seasonal disuse.
- Detailed recommendations for the preventative maintenance frequency and procedures which should be adopted by the Employer to ensure the most efficient operation of the systems.
- Details of lubrication for lubricated items including schedules of lubricant type, frequency, etc.
- Details of regular tests to be carried out (e.g., water analysis for pseudomonas.)
- Details of procedures to maintain plant in safe working conditions.
- Details of the disposal requirements for all items in the works.
- A list of normal consumable items.
- A list of recommended spares to be kept in stock by the Employer, being those items subject to wear or deterioration and which may involve the Employer in extended deliveries when replacements are required at some future date.
- A list of any special tools needed for maintenance cross-referenced to the particular item for which required.
- Procedures for fault finding.
- Emergency procedures, including telephone numbers for emergency services.
- Back-up copies of any system software.
- Documentation of the procedures for updating and/or modifying software operating systems and control programmes.
- Instructions for the creation of control procedure routines and graphic diagrams.
- Details of the software revision for all programs provided.
- Copies of relevant HSE/CIBSE/IET Guidance notes etc.

Contractual and legal information including but not limited to

- details of local and public authority consents
- details of design team, consultants, installation contractors and associated subcontractors
- start date for installation, date of practical completion and expiry date for the defect's liability period.
- details of warranties for plant and systems including expiry dates, addresses and telephone numbers.
- A provision for update and modification.

4.6. Materials and Workmanship

All materials used shall be new and unused, and shall both before installation and on completion, be free from corrosion, rust, scale, deformation, or discoloration and be of the type and manufacture specified. They shall conform to the requirements of any appropriate British Standard Specification and be CE marked.

All materials shall be selected to withstand the external influences they will be subjected to, be compatible with their surroundings and be capable of being maintained.

No materials known to be deleterious shall be used. Any materials which show deterioration due to neglect in storage or installation will not be accepted.

The specific instructions of original equipment manufacturers shall be adhered to in every respect.

Equipment shall be erected plumb and true with fixings capable of sustaining a minimum weight of 40kg or three times the weight of the item, whichever is the greater. No item shall rely on one fixing only.

The work area shall be kept clean and tidy with all rubbish etc. removed upon completion of the task.

4.7. Mounting Heights

Unless noted elsewhere in this specification or on the project drawings, the mounting heights of equipment and accessories shall be in accordance with the following:

Mounting Heights of Electrical Equipment and Accessories		
Item	***Mounting Height above FFL (mm)***	***Notes***
Distribution boards	1500	Secure areas
Distribution boards	2200	Non - secure areas
Fire alarm panels and Intruder alarm panels	1500	
Disabled refuge - main panels	1450	To centre of panel
Disabled Refuge - remote panels	1100	
Disabled alarm pull cords	900 and 100	
Fire telephones	1350	
Socket outlets	450	General
Socket outlets	150	(#) Above worktops.
Light switches	1100	
Data/Telephone outlets	500	
Fire alarm call points	1100	
Fire alarm sounders	2350	
Dado trunking	As drawings	
Connection units – hand dryers	2200	Switched
Connection units – fire alarm panels	2200	Unswitched

Unless noted otherwise (#) the dimensions stated shall be to the bottom of the accessory, board, or panel. Where new accessories are being installed adjacent existing accessories and the mounting heights of the existing accessories differ from the above, the project Architect shall be informed, and advice sought before setting out is commenced.

4.8. Earthing Arrangements

Unless otherwise detailed the provision of an earthing terminal will be by the Regional Electricity Company and connected to a Protective Multiple Earthed (PME) network. The earthing arrangements shall comprise the TN-C-S

system, and protection against indirect contact shall be by earthed equipotential bonding and automatic disconnection of supply unless an alternative system is detailed.

Circuit protective conductors (CPC) shall comprise those contained within (or the sheath of) composite cables unless otherwise detailed. Where separate or supplementary protective conductors are required, these will be detailed in the particular documents.

Where required by the Wiring Regulations main equipotential bonding conductors shall be installed connecting the main earthing terminal to extraneous conductive parts. These parts include gas, water or any other service or part that may be specified in the Particular Specification or on the drawings. Where main equipotential bonding conductors are connected to a main earthing terminal, they shall be fitted with a label designating their function. Equipotential bonding conductors shall be connected to localised extraneous conductive parts. Such parts shall be deemed to include the peripheral grids of suspended ceilings.

Local supplementary bonding connections shall be installed where required by the Wiring Regulations.

4.9. Identification Labels and Notices

Each item of switchgear (including MCCBs), control gear, distribution equipment and joints shall be labelled or engraved unless there is no confusion over its purpose.

Where specialist labelling or engraving is required, this will be detailed in the particular documents.

Unless otherwise detailed labels shall be traffolyte with black lettering on a white ground, of a size appropriate and proportional to their application. Labels shall be screw fixed unless adhesive fixing is agreed with the Contract Administrator.

Every item of equipment or enclosure within which 400V exists shall have a black on yellow label (to BS 5378) label reading "DANGER - 400 volts". Where separate enclosures (within 2m of each other) house terminations having 400V between them, each item shall have a black on yellow label affixed internally reading "DANGER - 400 volts between adjacent equipment".

Each distribution board shall have its protective devices sequentially numbered. Single phase boards shall be numbered commencing at 1. Three phase boards shall be numbered using the notation L1, L2, L3, etc.

Distribution equipment shall be equipped with a typewritten distribution schedule installed within a clear PVC pocket fitted to the inside of the hinged lid. Where there is insufficient space inside the equipment, or where there is no hinged lid, then the schedule shall be mounted within a glazed frame screw fixed adjacent to the equipment. The schedule shall identify the utilisation, area served, current rating, and size of conductors for each protective device. (Note that copies of these schedules are required for the O&M Manuals).

At the origin of every installation, a periodic inspection and test notice as prescribed in the Wiring Regulations shall be affixed.

Note shall be taken that it may not be deemed safe to authorise Practical Completion without the proper identification notices and labels.

4.10. Main Switchgear

Main switchgear shall comprise moulded case circuit breaker panels mounted directly on to brick or block walls and interconnected with steel cable trunking.

All switchgear shall be installed complete with locking-off facilities to enable secure isolation.

An installation drawing of the switchgear shall be submitted to the CA, or alternatively the equipment shall be laid out on site for approval before erection commences.

A suitable chart giving instructions for dealing with electric shock shall be installed adjacent to each switchboard. The chart shall be a waterproof type as provided by Electrical Review, the British Safety Council or similar.

Products / Materials

Wall Mounted

- Enclosure standard - BS EN 62208.
- Material of enclosure - Manufacturer's standard.
- Terminals for external conductors, main power circuits
- Accommodate cross-sectional area of copper cables in accordance with BS EN 60439-1.
- Terminals for external conductor, control and auxiliary circuits
- Terminal block. Mounting as manufacturer's standard.
- Size of neutrals on three phase supplies - Full sized.
- Degree of protection to BS EN 60529, IP31 for assembly.
- Protection against direct and indirect contact - Manufacturer's standard.

Accessibility for inspection

- Arrange for following operations to be performed when assembly is in service and under voltage.
- Visual inspection of switching devices and other apparatus; settings and indicators of relays and releases; conductor connections and markings.
- Adjusting and re-setting of relays, releases and electronic devices.
- Replacement of fuse links and indicating lamps.
- Fault location by voltage and current measuring.

Accessibility for maintenance

- Provide space between functional unit or group and adjacent functional units or groups. Provide retainable fastening means for parts likely to be removed for maintenance.

Removable parts and withdrawable parts as manufacturer's standard.

Internal separation - Form 4.

Input voltage variations for electronic equipment supply - BS EN 60439.

Supply frequency deviation - BS EN 60439.

Switch Disconnectors

Supply switch disconnectors in accordance with BS EN 60947.

Standard - BS EN 60947-3

Details of equipment - Switch-disconnector.

- a.c. Interrupting medium - Air.

Rated and limiting values for the main circuit.

- Rated voltage (Volts) 230/400.
- Rated frequency 50 Hertz.
- Utilisation category - AC 23A.
- Enclosure degree of protection IP 65.
- Fit each switch with facility to padlock in OFF position.
- Provide switches with auxiliary contacts as indicated. Where switches isolate final connections between a starter and its motor, fit one set of contacts to open starter coil circuit when switch is opened.

Framework

Construct framework for supporting electrical equipment from mild steel plate and strip, cold and hot rolled steel sections or slotted angles, in accordance with BS EN 10210 and BS 4345 respectively. Comply with BS EN 1011-2 for metal arc welding.

Finish

Frameworks mounted inside building manufacturer's standard finish.

Frameworks mounted outside building hot dip galvanized to BS EN ISO 1461.

Supply cadmium or zinc electroplated bolts, nuts, washers and screws.

Surge protection devices (SPD)

Install all SPDs in accordance with manufacturers' recommendations at appropriate locations suited to the application and equipment being protected.

Provide all SPDs to BS EN 61643 with the correct current surge rating, voltage protection levels and connection method suitable for the particular application and the structure's electrical system. Ensure all SPDs are installed to BS EN 62305-4 and operate with 'line to earth', 'line to neutral', 'neutral to earth', or 'line to line' mode of protection, according to the application.

Provide all SPDs with visual indication that they are operational, and mount where readily accessible and visible.

Protect all internal electrical and electronic systems at the LPZ 1/2 boundary with a coordinated set of standard Type 2 SPDs. Install Type 2 SPDs at the main distribution boards, or other appropriate location.

Obtain the approval of the Contract Administrator for any additional protection required to meet the requirements of BS EN 62305; provide details of additional requirements at the time of submission of working drawings and prior to commencement of the Works.

4.11. Distribution Equipment

Distribution boards shall be installed at heights detailed within this specification or as agreed on site and connected to suitable steel cable trunking to house outgoing cables.

The distribution boards shall be fitted with the rating and types of protective devices detailed, blank covers or fuse bridges for spare ways, adequate earthing terminals, and hinged lids and locking off facilities. Where RCBOs or RCDs are specified, these shall be 30mA unless otherwise detailed.

1 No dolly locking device shall be provided with each MCB distribution board.

Distribution schedules shall be fitted as previously detailed in the Particular Specification.

Refer to Particular Specification for further details.

Products / Materials

Distribution Boards

Comply with BS EN 60439-3 as appropriate. Make internal separation Form 1 unless otherwise indicated. Make fuse boards fully shrouded. Fit each distribution board with an isolating switch.

Install busbars in same position relative to their fuse carriers or miniature circuit-breakers (MCBs) for each pole. In TPN distribution boards supply neutral busbars with one outgoing terminal for each outgoing circuit.

Provide a multi-terminal earthing bar for circuit protective conductors for both insulated and metal-cased boards, with one terminal for each outgoing circuit. Connect directly to earthing terminal without dependence on exposed conductive parts of enclosure.

Identify each fuse way and MCB way by numbering. Identify each terminal on neutral busbar and earthing bar with its respective fuse way or MCB way.

Where specific ratings are indicated incorporate fuses or MCBs, otherwise leave ways blank for future additions.

Enclosures finish.

Finish - Manufacturer's standard.

Colour - Manufacturer's standard colour.

Miniature Circuit Breakers

Standard - BS EN 60898-1.

Supply miniature circuit-breakers with voltage and current ratings, type according to instantaneous tripping current, energy limiting class, category of duty and frequency in accordance with BS EN 60898-1.

Residual Current Device

Comply with BS EN 61008. Supply residual current devices (RCCDs) with rated voltage, rated current, rated tripping current, rated tripping time, and rated breaking capacity as indicated.
DC component
Ensure dc component does not affect operation.
Overcurrent protection
Fit RCDs with integral overcurrent protection.

Combined Residual Current / Overcurrent Operated Circuit Breakers

Supply combined residual current/over current operated circuit breakers (RCBOs) in accordance with BS EN 61009.

Cable Terminations

Ensure that switchgear and distribution boards are provided with facilities to terminate size, number and type of cable indicated. Where necessary use fabricated steel extension boxes for glanding large and multiple cables.
Provide non-ferrous metal glanding plates for single core cable terminations.

4.12. Cables

The types of cables to be installed shall be detailed in the particular specification documents. Cables shall not be installed under tension, they shall be installed parallel or at right angles to walls and floors, under no circumstances shall diagonal runs be permitted. The fixing centres, bending radii and identification of conductors shall accord with the Wiring Regulations. Proprietary fixing clips shall be used.

Cables with reduced neutrals shall not be installed unless detailed elsewhere.

Cables shall not be installed when the ambient temperature is below 0oC. Joints shall not be permitted unless by prior agreement with the CA.

Unless otherwise stated the minimum size of cable used shall be 1.5mm².

In all cases cables shall have BASEC approval unless an approval system is not in force for the particular cable type.

Cables and their enclosures passing through fire barriers (i.e. Walls and floors) shall be internally and externally sealed against the propagation of fire.

4.13. Conduit, Cable Trunking and Cable Tray Systems

General

Provide conduit and cable trunking in accordance with the relevant British Standards and in the requirements of BS 7671 Requirements for Electrical Installations (The IET Wiring Regulations).

The types of conduit or cable trunking to be installed shall be detailed in the documents, installed surface, or recessed as specified. Conduit and trunking shall be installed vertical or horizontal and parallel to walls. Diagonal runs may be permitted in floors, ceilings and in some special circumstances such as a cooker final connection, subject to the approval of the CA and where steel conduit is used. Recessed conduit shall not be installed in walls less than 100mm thick without prior instructions from the CA.

The fixing centres for conduits and cable trunking shall not exceed half the distances tabulated in the Wiring Regulations. Each conduit/accessory box shall be fixed independently of the conduit system. Bending radii of conduit shall be not less than the values stipulated in the Wiring Regulations.

Conduit and trunking systems shall be either continuous, for the installation of unsheathed cables, or isolated sections for the protection and enclosure of sheathed or armoured cables. In both instances, metallic conduit/trunking shall be bonded to the earthing terminal but shall not in itself be used as a protective conductor, a separate CPC shall be installed. This requirement shall not apply to isolated lengths of conduit used as communication and data wireways etc.

The use of inspection pattern conduit fittings shall not be permitted, all fittings shall comprise circular, square, or rectangular boxes.

Where groups of cables enter distribution boards, or to alleviate multiple conduit runs, trunking shall be installed, steel or PVC, to be compatible with the wiring system in use.

Where surface conduit or trunking is installed all the installation components shall be suitable for the type of wiring, including the provision of surface pattresses where these are required.

Circular Steel Conduit

Steel conduit shall be of metric dimensions to BS 4568. The sizes used shall be 20, 25 and 32mm. For all applications, conduit shall be hot dipped galvanised (Class 4). For flameproof applications solid, drawn conduit shall be installed. All conduit accessories shall match the type of conduit used.

Where steel conduit is installed surface mounted, screwed accessories shall be used, any exposed thread lengths shall be treated with a compatible paint. Where steel conduit is recessed, 'pinch-grip' accessories may be used.

Fixing of surface steel conduit shall be with distance saddles, and recessed conduit with pipe hooks (crumpets). No other methods shall be used unless with the prior consent of the CA.

The terminations of steel conduit into enclosures and boxes not fitted with spouts shall be with a coupler and male bush.

Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.

- Material - Metal, steel.
- Method of connection - Thread able.
- Suitability for bending - Rigid, BS EN 61386-21.
- Electrical characteristics - with electrical continuity.
- Resistance against corrosive or polluting substances
- Conduits with same protection outside and inside BS EN 61386-1 Table 10 Class 2
- Medium protection e.g., stove enamel or air-drying paint.
- High protection - Hot dip zinc coating. BS EN 61386-1 Table 10 Class 4.

Circular PVC Conduit

PVC conduit shall be to BS 4607 and BS 6099. The size used shall be 20mm and 25mm, and the conduit shall be of the super high impact heavy gauge grade. The colour shall be white, unless black is specified, and all accessories shall match the conduit.

The fixing of surface PVC conduit shall generally be by spacer bar saddles, recessed conduit shall be secured with pipe hooks (crumpets), and connections made with proprietary solvent cement. Where bends are required proprietary bending, springs shall be used. In straight runs exceeding 6m an expansion coupling shall be installed.

Provide rigid conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.

Material - Insulating, PVC, or equivalent material.
Method of connection - non-threadable.
Suitability for bending - Rigid, BS EN 61386-21.
Electrical characteristics
Without electrical insulating characteristics.

Provide flexible conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.
Material - Insulating, PVC.
Method of connection - Threadable or non-threadable.
Suitability for bending - Flexible, BS EN 61386-23.
Electrical characteristics
Without electrical insulating characteristics.

Steel Cable Trunking

Comply with BS EN 50085. Use trunking of each type from one manufacturer.

It may comprise square, rectangular, floor, skirting or bench trunking as specified.

For each change of direction, and at every joint or 'T', the trunking manufacturers accessories shall be used unless by prior arrangement with the CA. Unless otherwise detailed bends and 'T's shall be radius pattern, and any reducers bell mouth pattern.

Material

- Steel trunking to BS EN 50085. Supply partitions and covers same material as trunking.
- Gauge of metal - BS EN 50085.

Style

- Use trunking manufactured with inward return edge flanges and fitted with flange couplers which ensure that when the cover is removed a minimum of 80% of the nominal trunking or compartment width is available for access.

Protection to BS EN 50085.

- Electroplated zinc having a minimum thickness of zinc coating of 0.0012mm inside and outside with additional coating of stoved or air-drying paint, applied at least to the external surface.

Finish - Manufacturer's standard, all surfaces.

Colour

- Manufacturer's standard or to BS 4800 Shade as approved.

Fixings

- Use purpose made brackets to fix to structural steel or suspension rods.
- Provide external fixing lugs where specified protection for the installation is IP44 or greater.

Fittings

- Use bends, tees and angles of similar gauge, type and finish as trunking body and supplied by same manufacturer.
- Partitions and Covers
- Ensure partitions are electrically continuous with the body of the trunking or provide a connector for a circuit protective conductor.
- Ensure gap between partitions and lids maintains segregation of circuits.
- Material - Same material as trunking.

Joints

- Use purpose made jointing pieces fixed with screws into captive nuts. Ensure screws do not protrude through the nuts.

- Ensure rigidity of trunking is maintained across joint.
- Ensure external dimensions of trunking are maintained and not reduced by more than 4% across joints between trunking lengths and/or fittings.
- Use purpose made fittings of the same manufacture where trunking connects to switchgear and distribution boards.
- Provide flanges for connection of flush floor trunking to vertical trunking to maintain the cross-sectional area of compartments with 50 mm minimum radius.
- Maintain electrical continuity at each joint by a copper link, (tinned copper for galvanized trunking), fixed on outside of trunking, secured by screws, nuts and shake proof washers. Screws must not project through the nut. Make provision for continuity to be achieved without need to remove paint from ferrous metal where trunking has a painted finish.

Screws, Nuts, Washers

- Do not use self-tapping screws. Use cheese or round head screws except where provision is made for the use of counter-sunk heads.
- Material - Use steel zinc coated to BS 7371-3.

Cable supports.

- Provide horizontal trunking with removable cable retainers or bridges to retain cables in situ.
- Provide vertical trunking with pin racks to support cables at 3000 mm maximum spacing.
- Use insulated pins or insulation sleeved pins on pin racks.

PVCu or GRP Trunking

It may comprise square, rectangular, mini, cornice, architrave, dado, skirting, and floor or bench trunking as specified. The finish shall generally be white.

For each change of direction and at each joint or 'T' the respective trunking manufacturer's accessories shall be installed. Where situations require butt, or mitre joints the prior approval of the CA shall be obtained.

Trunking to BS 4678-4

- Mechanical properties, trunking for medium mechanical stress.
- Temperature tolerances - BS 4678-4, Table 1.

Electrical characteristics

- Without electrical insulating characteristics.

Resistance against ingress of solid objects

- Protected against solid objects greater than 1.0mm (IP4X).

Resistance to ingress of water

- Protected against dripping water (IPX2).

Resistance against corrosive or polluting substances

- Medium protection.

Fittings

- Use fittings from same manufacturer as trunking. Use `snap-on' covers. Use trunking fittings and accessories suitable for jointing by solvent welding.
- Use proprietary cable retaining clips at 500 mm maximum intervals on trunking that exceeds 1.8 m in length. Where junctions occur ensure first clip is not more than 300 mm from junctions.

Cable Tray and Basket

Unless detailed otherwise, internal cable tray shall be heavy duty return flange pattern of 1.5mm gauge minimum. It shall be hot dip galvanised steel to BS EN ISO 1461:1999 and installed complete with the manufacturer's accessories.

Cable basket shall be installed complete with the manufacturer's accessories and installed exactly in accordance with the manufacturer's requirements.

Cable supports.

- Support all cables throughout their length using conduit; or trunking and enclosures; or cable tray; or cable racking; or special support systems; or cleat or clip fixing direct to building fabric as indicated on the drawings/schedules.
- Ensure tray, racking and special support systems are continuous and firmly fixed to building fabric. Allow space for additional cables as indicated on the drawings/schedules.
- Ensure cable support system allows for spacing in accordance with BS 7671 for the design current of the cable.
- Fixings finishes.
- Ensure finish for all support components, fixings, hangers and accessories is as cable support system or manufacturer's standard.

Type - Flanged or return flanged.

Perforations
- Admiralty pattern for light or medium duty; GDCD pattern standard 23; or manufacturer's standard pattern.
- Thickness - Manufacturer's standard thickness for type.

Fittings
- Use factory made fittings throughout of same material, type, pattern, finish and thickness as cable tray.
- Use reducers, inside angles and outside angles as manufacturer's standard.
- Use flat bends, equal tees, unequal tees and crosses with corners gusseted.
- Join lengths of tray and fittings using manufacturer's standard shouldered ends, fish plates, or couplers, with galvanized or zinc plated slotted domed head `roofing' bolts, nuts, washers and shake proof washers.
- Material
- Hot rolled steel galvanized after manufacture to BS EN 10327 or BS EN 10143.

Finish - Self colour galvanized.

Support from building fabric with minimum clearance behind of 20mm. Install fixings at regular intervals to prevent visible sagging when loaded, with maximum spacing 1.2m and 230mm from fittings.

Keep cutting of cable tray to a minimum. Cut along a line of unperforated metal. Make good finish with zinc rich paint, primer and topcoat, or two pack epoxy paste, as appropriate to tray material and finish.

Fit holes cut in tray for passage of cables with grommets, bushes or other lining.

Install all bolts, fixings, and hangers with threaded portion away from cables. Cable routes to cross at right angles or spacing to BS EN 50374.

Cable Cleats, Ties, Saddles and Clips

For cables on horizontal tray use ties for each circuit. Use tie manufacturer's special tensioning tool where available. Crop off tie ends.

For cables on vertical tray use cleats bolted to tray for paper, plastic or elastomeric insulated cables and saddles or clips for mineral insulated cables. Use cleats sized to grip cables firmly without undue pressure or strain on cable but preventing slipping.

For cables on vertical or horizontal rack use proprietary fixings to rack for paper, plastic or elastomeric insulated cables and saddles or clips for mineral insulated cables. On continuous flat surfaces of wood, plaster, brick etc.

Use polypropylene surface fixing clips with prefixed hardened steel pin for PVC insulated and sheathed cables and sheathed or bright mineral insulated cables. Use round or flat or flat twin pattern as appropriate, manufactured specifically for cable being fixed.

Use one hole coated 'P' clips or steel ‘U’-type clips to meet BS7671 and BS5839-1 requirements for FP200 cables.

Cable Ladder
This shall be alloy, complete with the manufacturer’s accessories and installed exactly in accordance with manufacturers requirements.

Proprietary system of channel sections with return lip and compatible jointing and fixing accessories.

Fittings

- Use factory made fittings throughout of same material finish and section as rack, for risers, bends, reducers, tees, crosses and dropouts.

Material

- Hot rolled steel galvanized after manufacture to BS EN 10327 or BS EN 10143.

Finish - Self colour galvanized.

Supports and Fixings

All fixings to be compliant with BS7671 and BS5839-1 requirements.

Provide proprietary suspension systems comprising channel sections with return lips and compatible fixing accessories made of material to BS EN 10162, BS EN 10210 and/or slotted angles to BS 4345.

Ensure support components for Class 4 conduit have the same finishing method as the conduit conducted after manufacture. Ensure components in direct contact with conduit match profile of conduit.

Ensure all steel components such as studding, bolts and steel screws, bolts, nuts, and washers are either cadmium plated and passivated, or zinc electroplated to BS 7371 after manufacture. Do not use metal fixing components likely to deteriorate and/or cause damage through electrolytic action.

Workmanship

Ensure entire system is electrically and/or mechanically continuous, to BS 7671.

Fire barriers

- Comply with the requirements of BS 7671 wherever the conduit or trunking passes through the perimeter of a fire compartment (wall, floor, or ceiling).

Appearance

- Arrange conduit, trunking and ducting to present neat appearance, parallel with other service runs and lines of building construction, except where in screed or in-situ concrete. Ensure plumb vertical runs.

Cable installation

- Install cable in conduit, trunking, or equipment enclosures only when completely erected throughout its length.
- Do not use framework of partitions or similar unless indicated.

Building expansion and settlement

- Make provision in conduit and trunking at expansion and settlement joints to allow for movement of building structure. Provide circular through or adaptable boxes no more than 300 mm either side of expansion or settlement joints for conduit crossing.
- Join boxes with flexible steel conduit type C or conduits arranged to form a telescopic joint and cover overall with PVC sleeve to provide minimum degree of protection of IP44 or purpose made telescopic joint protected by a PVC sleeve to at least IP44.

Cut conduit clean and square with axis. Remove any burrs prior to erection.

Site form 90° bend in conduit wherever practical or use circular or adaptable boxes.

Construct bends and sets cold with a bending machine. Do not apply heat when forming sets or bends.

Use bending tools complying with British Standards appropriate to conduit material.

Ensure no indentation or reduction in cross sectional area occurs during installation.

Use correct tools to assemble conduit. Ensure no tool marks or damage to components occurs.

Where surface mounted equipment is installed in conjunction with concealed conduit work, terminate concealed conduit at flush mounted conduit or adaptable box. Drill back of equipment, bush for back entry and mount equipment to conceal back box.

Connect to fixed equipment via conduit box located adjacent to termination point, using either solid or flexible conduit as indicated for final connection to equipment terminations.

Use conduit box as cable change point to facilitate changed wiring locally to adjacent equipment.

Connect trunking to equipment by specially fabricated connectors or by couplers and externally screwed brass bushes.

4.14. Lighting Installation

The Electrical Sub-Contractor shall include for the supply, installation, connection, testing, commissioning and demonstration of a new lighting and lighting control installation as described within this Specification and as shown on the accompanying drawings. All lighting and switching arrangements are to comply with Approved Document Part L of the Building Regulations. Lighting and illuminance levels will as a minimum comply with BS EN 12464-1, the current CIBSE/SLL Code for Lighting relevant to the area to be illuminated. Specific lighting levels to be achieved over and above the guidance in these documents are listed in the specification.

The lighting installation shall comprise low energy LED source decorative and amenity light fittings to suit the various types of accommodation within the building. Refer to the Luminaire Schedule contained within the Appendices of this Specification for details of proposed light fittings. A sample of each different light fitting shall be provided to the Client for approval prior to ordering.

The Electrical Sub-Contractor shall be responsible for confirming with the Architect and Consulting Engineer the exact details of the specified light fittings before ordering and no fittings shall be placed on order until permission has been given in writing. It shall be the Electrical Sub-Contractor's responsibility to ensure that this information is obtained in ample time to ensure light fittings are delivered to suit the Main Contractor's building programme.

All LED fittings to be complete with minimum 0.9 power factor drivers. All luminaires (other than for decorative feature lighting which shall achieve 22 lamp lumens per circuit watt) shall achieve a minimum efficacy of 60 luminaire lumens per circuit watt to ensure compliance with the SBEM calculation and Building Regulations.

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

Unless otherwise specified lamps and lighting control gear shall be rated at 230V.

Lamps installed within discharge luminaires shall be of the same manufacturer as the control gear.

Ceiling-mounted pull cord switches shall have a minimum clearance of 150mm from any door swing, and the associated cord shall be adjusted to finish at 1.4m above the finished floor level.

The system is designed to achieve an average initial circuit of at least 65 lumens/watt for fixed lighting equipment within the building.

Luminaires General

Standards

- Supply luminaires with photometric data in accordance with BS EN 13032-1.
- Supply luminaires in accordance with BS EN 60598).
- Classification - To BS EN 60598-1.

Safety Support for Components

- Provide secondary support for translucent covers, diffusers and gear trays so they are prevented from falling when their primary fixing is released.

Photometric performance

- Ensure luminaires of similar type have same photometric performance as published data within the tolerances defined by BS EN 13032-1.

Electromagnetic compatibility

- Ensure luminaires comply with BS EN 61547 for EMC immunity.

Emergency Lighting Luminaires

Comply with BS EN 60598-2-22.

Comply with ICEL:1001. Ensure emergency lighting luminaires are marked with ICEL certification label.

Workmanship

Ensure classification of luminaires is appropriate. Do not mount luminaires on readily flammable surfaces.

Ensure support is adequate for weight of luminaires.

Number

- Provide the following minimum number of supports for each luminaire longer than 600mm.

Luminaire Width (mm)	Minimum No of Supports
Up to and including 300	2
Over 300	4

Where luminaire is supported from conduit provide a conduit box forming an integral part of the conduit system at each point of suspension. Ensure suspensions are vertical.

Where conduit enters luminaire use back-nuts and washers to secure luminaire body to conduit support. Provide tube with corrosion resistance equal to conduit system.

Do not support luminaires directly from conduit boxes made from non-metal or heat sensitive materials, where the temperature of the material may exceed 60oC or the mass suspended exceeds 3kg.

Where luminaire is supported from trunking use proprietary clamps or brackets appropriate to the luminaire and trunking.

Do not support luminaires directly from trunking made from non-metal or heat sensitive materials, where the temperature of the material may exceed 60oC or the mass suspended exceeds 3kg.

Where luminaire is supported from trunking use proprietary clamps or brackets appropriate to the luminaire and trunking.

Do not support luminaires directly from trunking made from non-metal or heat sensitive materials, where the temperature of the material may exceed 60oC or the mass suspended exceeds 3kg

4.15. Small Power Installation

Supply fixed electrical wiring accessories for use with fixed and portable peripheral equipment using either power or signaling cables.

Accessories Common Requirements – White Plastic, Flush Installation

Area of installation - Interior.
Enclosure pattern - Flush.
Accessory mounting
Adjustable steel grid for grid switches or direct to enclosure for all other accessories.
Enclosure material- Pressed steel.
Enclosure finish - Galvanized.
Cover plate finish, all accessories to match
Moulded plastic, colour - white.
Cover plate pattern - Overlapping; with architrave where indicated.
Ancillaries
Earthing terminal integral within switch box.
Neon indicator with red lens, illuminated in "ON" position, for connection units.
Switch rocker bar colour - white.
Operating keys for key operated switches, minimum number 2.
Fuses to BS 1362.
Blank inserts for spare ways on grid switches.
Marking
Method - engraving. Mark front plate to indicate equipment served on connection units.
Conduit and cable entries
Knockouts side, top and rear.

Cable termination - Manufacturer's standard.

Accessories Common Requirements – Chrome Finish Metal Plates, Flush Installation

Area of installation - Interior.
Enclosure pattern - Flush.
Accessory mounting
Adjustable steel grid for grid switches or direct to enclosure for all other accessories.
Enclosure material - Pressed steel.
Enclosure finish - Galvanized.
Cover plate finish, all accessories to match
Brass with matt chrome surface.
Cover plate pattern - Overlapping; with architrave where indicated.
Ancillaries
Earthing terminal integral within switch box.
Neon indicator with red lens, illuminated in "ON" position, for connection units.
Switch rocker bar colour as indicated.
Operating keys for key operated switches, minimum number 2.
Fuses to BS 1362.
Blank inserts for spare ways on grid switches.
Marking
Method - engraving. Mark front plate to indicate equipment served on connection units.
Conduit and cable entries
Knockouts side, top and rear.
Cable termination - Manufacturer's standard.

Accessories Common Requirements – Metalclad Plates, Surface Installation

Area of installation - Interior.
Enclosure pattern - Surface.
Accessory mounting - Direct to enclosure.
Enclosure material
Pressed steel or cast iron.
Enclosure finish
As conduit system or galvanized.
Coverplate finish, all accessories to match
Metal clad.
Coverplate pattern - Surface type.
Ancillaries
Earthing terminal integral within switch box.
Neon indicator with red lens, illuminated in "ON" position, for connection units.
Switch rocker bar colour as indicated.
Operating keys for key operated switches, minimum number 2.
Fuses to BS 1362.
Marking
Method - engraving. Mark the front plate to indicate equipment served on connection units.
Conduit and cable entries
Threaded entries, top, bottom or side to suit conduit system.
Cable termination - Manufacturer's standard.

Workmanship

Earthing

Ensure metal framework of equipment is bonded to main earth point. Ensure that cable CPC's are connected to earth bar.

Provide earth CPC between earth lug on metal box and accessory casing except where accessory is encased in plastic.

Protection

Ensure there is no physical or electrical damage to accessories when they are removed from their packaging and during installation.

Provide masking covers for surface mounted accessories to protect surfaces from paint.

Where accessories are flush mounted install front plate after painting is finished.

Fixing

Align accessories horizontally and vertically. Where accessories are grouped, mount horizontally in line and parallel to each other and equidistant. Fix cover plates to boxes with brass fixing screws.

APPENDIX 1 – ELECTRICAL SERVICES SUMMARY OF TENDER

ELECTRICAL SERVICES SUMMARY OF TENDER

		£	p
1.00	Preliminaries & Working Drawings.		
2.00	Attendance allowance for incoming LV electrical service.		
3.00	Main LV Distribution works including distribution boards, switchgear and cabling.		
4.00	Strip out, isolation and removal of existing electrical services.		
5.00	Containment Systems		
6.00	Lighting installation, including luminaires, controls and wiring.		
7.00	Small power installation, including power supplies to hand dryers		
7.01	Supply and installation of hand dryers		
7.02	Supply and installation of external in-ground retractable socket outlet		
8.00	Fire alarm installation (Specialist Contractor)		
9.00	Intruder alarm installation (Specialist Contractor)		
9.01	1-Year Lido System Maintenance Contract (Specialist Contractor)		
10.00	Public Address System		
11.00	CCTV System (Specialist Contractor)		
12.00	Accessible WC Alarm System		
13.00	Photovoltaic System (Specialist Contractor)		
14.00	Builders Work in Connection.		
15.00	CDM and O & M Manuals (including record drawings).		
16.00	Testing & Commissioning		
17.00	Any Other Items		

ELECTRICAL SERVICES SUMMARY OF TENDER

	£	p
TOTAL TO FORM OF TENDER		

N.B. All figures exclude VAT & fees.

Tenderer …….

Address ……...

……...

Signed…….....

Position ……

Date …….....

APPENDIX 2 – BUILDERSWORK IN CONNECTION SCHEDULE

TYSE DESIGN &
CONSULTANCY LTD

SCHEDULE OF BUILDERS WORK FOR ELECTRICAL ENGINEERING SERVICES

PROJECT: **Ware Priory Lido**
Extension & Refurbishment Project

DATE: **15th October 2024**

Description of Installation:

Provide new cable routes through existing building, external cable routes; surface mounted to existing ceilings, within roof spaces and existing ceiling voids for new electrical services installation.

Attendance Items

Provide a lockable storage for tools and materials for duration of contract for electrical contractor and associated sub-contractors.

Allow for temporary lighting for working purposes required during any power shutdowns.

Provide safe working platforms suitable for the installation of engineering services to all parts of the construction including the roof.

Builders Work

Provide 18No 1414mm x 67mm ceiling apertures and appropriate ceiling metal frame support and setting out for Type M luminaires.

Allow for the excavation of trenching, provision of buried cable ducts into buildings and reinstatement of ground to allow for new cabling routes to be installed. Incoming LV service, power supply to ASHP and to external socket outlet, as indicated on the drawings.

Allow for the excavation of approximately 920mm x 550mm x 550 (d) for the installation of the external inground retractable socket outlet. Allow for the base and drainage in accordance with the manufacturer's instructions.

Provide recessed ceiling access hatch to changing village for access to lighting control equipment, as indicated on the drawings.

Provide plywood lining to switch room for switchgear fixings.

Provide 3No weatherproof roof apertures through roof for containment routes to access the roof mounted plant.