KERNOW SERVICES DESIGN Ltd

BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM TRURO

BUILDING SERVICES ENGINEERING

ELECTRICAL SPECIFICATION

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

*ROYAL CORNWALL MUSEUM TRURO*

# BUILDING SERVICES ENGINEERING

# ELECTRICAL SPECIFICATION

**Project:** 1107

**Current revision:** T2

**Date of issue:** 28/08/2023

**Prepared by:** Electrical – Mike Ainger - Electrical Director

| Revision | Date | Reason for Issue | Author | Checked |
|---|---|---|---|---|
| T1 | 25/08/2023 | Tender Issue | M. Ainger | M. Ainger |
| T2 | 18/09/2023 | Builderswork and Lighting sections ammended | M.Ainger | M. Ainger |
| | | | | |

## Contents

**APPENDICES:**

# PART 1

## Preliminaries

## 1.0 PRELIMINARIES

### 1.1 GENERAL

This brief description of contract conditions is issued for the guidance of the Services Contractor only. It is not intended to give full details of the contract preliminaries and conditions of contract; these shall be established from the main Contract Documents.

All Electrical work shall be carried out by the Services Contractor the Services Contractor shall be responsible for employing a reputable Building Contractor who shall carry out the builderswork under the control of the Services Contractor. The appointed Contractors shall be fully registered and insured to carry out the works involved in this project.

The Services Contractor shall be deemed to have included for all materials and workmanship (including commissioning) to complete and set working the whole of the works in accordance with the requirements of the specification and drawings, and to the reasonable satisfaction of the Principal Designer/Consulting Engineer.

Builderswork associated with the Services installation work and included in this project the onsite trenching and excavation/making good associated with the National Grid works. The extent of the work shall be to include all works excluded by National Grid in their quotation (copy available as part of the Tender documentation). The builderswork element shall also include the creation of a 1 hour fire rated service cupboard on the First Floor complete with fire rated door set.

The standard builderswork associated with the Electrical installations shall also be deemed to have been included i.e., cutting of holes and chases, making good etc.

The Museum is a live public building, careful consideration and constant communication shall be maintained throughout the Contract to ensure the safe running of the Museum and protection of the building, artifacts and personnel is maintained at all times.

No works shall be carried out without consultation with the Museum. It is expected that the Museum will remove or protect any exhibits or stored items. Works in stores will be supervised at all times by Museum staff if areas can't be cleared.

All planned power outages must be coordinated and clearly communicated with the Museum.

Electricity for small power tools will be made available on site.

The words 'Services Contractor' hereinafter shall mean " Electrical Contractor", the "Building Contractor" shall be a sub contractor to the services contractor.

The successful Contractor shall be appointed by the Employer under the terms and conditions of the Conditions of Contract.

## 1.2 VISIT TO SITE

The Services Contractor shall visit site to ensure that he is fully conversant with the site and its conditions and in quoting will be deemed to have done so. This shall be by prior appointment only.

The Services Contractor shall be deemed to have satisfied himself of all site conditions, failure to do so will not be considered the basis of a claim.

## 1.3 PROGRAMME/PHASING

The Services Contractor shall work to a program agreed with the Employer and must be prepared to carry out the installation of the electrical services when requested.

In the case of a phased program of works, the Contractor shall include within his costs for the commissioning of services at each handover.

## 1.4 MATERIALS

Any goods or materials which may be on extended delivery and thus affect the above program shall be noted by the Services Contractor when returning his Tender.

## 1.5 DISCREPANCIES

If the Services Contractor notes any discrepancies, omissions, or items regarded as at variance with good practice, then he shall refer to this before returning his Tender.

Any discrepancies between, or within the drawings and specifications shall be brought to the attention of the Consulting Engineer at the time of quoting or shall be deemed to have been included in the Tender.

No claim for extra costs will be considered in respect of any item shown on the drawings only or in the specifications only.

## 1.6 EQUAL & APPROVED

All items of plant, equipment and materials named in this specification by manufacturer, distributor and or by figure number or index number etc., are intended to impart the design criteria and the implied standard of plant and materials construction and performance to be used for the building of the systems as specified and drawn.
Where an alternative is being offered as an equal for approval, the Services Contractor shall in all respects provide tabulated data for the specified item and the offered alternative selection, detailing at minimum component part construction and materials used, the British Standards and Codes of Practice covering the manufacture, materials and grades, construction and tests where applicable, this shall also include motors and drives.

The Services Contractor is to provide tabulated proof of equal performance, rating and efficiency, all measured against the same base criteria. Manufacturers catalogue data sheets shall be provided highlighted where necessary to show equality.

Unless all of the above information is freely and efficiently provided, alternatives will not be considered. In short, the Services Contractor shall prove equality.

The Consulting Engineer shall only approve the offered alternative thereafter.

Only after approval from the Consulting Engineer can the Services Contractor install the offered alternative.

## 1.7 CO-ORDINATION

The Services Contractor shall liaise closely with all other trades to ensure that work progresses smoothly and that there is full co-ordination of all services.
It shall be the responsibility of the main contractor to ensure that all sub-contracted works are coordinated with all other trades involved in the project.

In the event of work having to be taken down and re-done due to lack of foresight/communication between the Services Contractor and any other trades, then this will be at the Services Contractors' own expense, together with the cost of correcting these errors.

## 1.8 CONTRACT DRAWINGS

This specification shall be read in conjunction with the following drawings as appropriate:

- Architectural
- Structural
- Civils
- Mechanical
- Electrical

Drawings shall only be used for their intended purposes i.e., Services drawings shall not be used for Architectural or other matters.

Layouts of rooms, doors, equipment etc. shall be assumed correct for Tender purposes, but it shall be the Services Contractors' responsibility to check final positions with the latest Architect's drawings.

The Services Contractor will be responsible for setting out the installation and shall check the positions of all apparatus and service routing relative to other equipment, furniture, door swings, fixtures, fitments, building structures and fabrics, window heights, widths and sill heights, etc., before installation, and against the latest Architect's drawings.

## 1.9 WORKING DRAWINGS

The Services Contractor shall include in his Tender for the preparation of working drawings. These shall be detailed to show all major elements, the scale and detail of which shall be to the satisfaction of the Consulting Engineer.

Four copies of all drawings are to be submitted for comment and re-submitted as necessary to include such comments prior to any works being commenced.

The precise requirement for working drawings will be at the discretion of the Consulting Engineer.

## 1.10 SCHEDULE OF RATES

The Services Contractor shall provide a fully itemised and quantified Schedule of Rates. This shall be within seven days of receiving the request from the Client/Consulting Engineer.

The schedule shall detail the rates of all components used. The rate of each item shall be inclusive of all associated costs including labour, materials, overheads, profit and attendance, but exclusive of VAT.

The schedule shall summate individually and totally to the values given in the Tender Summary form submitted.

## 1.11 SUB LETTING

The Services Contractor will not be permitted to sub-let any part of the work unless specifically permitted by the specification or unless he has received written consent from the Client/Consulting Engineer.

## 1.12 QUOTATIONS

Some preferred manufacturers/suppliers may have submitted preliminary quotations however quantities and prices may have changed since submitting quotations. It will be the Services Contractors responsibility to check that the system and the quantities still comply with the contract drawings and specification, before submitting his Tender.

## 1.13 DEFECTS LIABILITY & MAINTENANCE

The Services Contractor will be totally responsible for maintaining and servicing the installation during the whole of the Defects Liability Period of twelve months from date of handover, or any other period detailed elsewhere within the Contract documents. Such maintenance shall be in accordance with any relevant the manufacturer's recommendations.

A report shall be provided following each visit detailing any comments/action taken. A copy of the report shall be forwarded to the Consulting Engineer.

## 1.14 SITE MANAGEMENT

The Services Contractor shall appoint the following key personnel for the duration of the works.

An on-site foreman who shall co-ordinate all the proposed works and supervise all specialist sub-contractors. The on-site foreman shall also liaise closely with the Employer, particularly in respect of modifications to existing services.

A senior project manager, who shall deal with all other matters pertaining to the works and who shall visit site on a regular basis.

## 1.15 SITE ACCOMODATION

The Services Contractor is to provide all accommodation and storage facilities necessary for the proper protection and progress of works or to agree otherwise with the Client/Consulting Engineer.

## 1.16 HEALTH AND SAFETY, AND SUSTAINABILITY

Refer to the Main Contract Preliminaries for the requirements of safety, health and welfare.
Conform to all safety rules, regulations and codes of practice.
Check that facilities provided by others fulfil the obligations and advise accordingly.
Provide all necessary first aid facilities.
Appoint a "competent person" on the site to manage health and safety during construction.
Ensure, so far as is reasonably practicable, that all persons employed on, or visiting, the site are adequately informed, instructed, trained, supervised and equipped such that they are able to carry out their duties safely.
Ensure that safety helmets and other necessary protective clothing are available to site visitors.
All safety helmets and protective clothing must comply with the latest British Standards.
Ensure that only authorised persons are allowed into any construction area.
Ascertain the accuracy and sufficiency of information provided by the Employer or the Consulting Engineer to ensure the safety of all persons and the Works.
Wherever possible labour-saving lifting devices shall be used and materials sized to allow easy manual lifting.
Comply with Social/Economic and environmental sustainability standards BS EN 15643-3 and BS EN 15643-4.

## 1.17 CDM REGULATIONS:

The management of health and safety is to be undertaken in conformity with the requirements of The Construction (Design and Management) Regulations, and the corresponding Approved Code of Practice.
Comply with the requirements of the CDM Regulations by:

- Compiling risk assessments
- Preparing method statements
- Providing information on the contract works that might affect the health and safety of any person
- Providing all necessary input to the Pre-Construction Information and Construction Phase Plan
- Providing all necessary input to the health and safety file

Supply any method statements and comply with all CDM procedures required by the CDM co-ordinator and the Principal Designer the Services Contractor is the Principal Contractor.

## 1.18 COSHH REGULATIONS:

Comply with The Control of Substances Hazardous to Health Regulations and The Control of Substances Hazardous to Health (Amendment) Regulations.
Provide with the tender an assessment of the risks in undertaking the contract works

Provide with the tender a method statement on the steps proposed to meet the requirements of the Regulations
Undertake COSHH assessments for all activities and substances provided or used on site to assess their potential health hazards.
Copies of all relevant COSHH assessments must be issued to the operatives concerned and strictly monitored. Particular attention must be given to the use of glues and sealant.
Where the use of substances falling within the scope of the Regulations forms part of the contract works notify the Consulting Engineer in writing, together with the additional costs, if any, of use of non-hazardous alternative.
Ensure during the course of the contract works, and under all circumstances, that all substances falling within the scope of the Regulations are positively so identified at all times and that they are transported, handled, stored, used and disposed of in strict accordance with their manufacturer's/supplier's recommendations.
Where use of substances falling within the scope of the Regulations are required for the operation and maintenance of the completed contract works, ensure that suitable facilities are available for the onsite storage of such substances and that all necessary warning/instruction notices are provided at the point of their storage and use.
Provide any special protective clothing, eye protection and similar safety equipment for the operation and maintenance of the Works and in sufficient quantity for 1 year operation.
Employer's staff have been fully trained in the use, handling, storage, transport and disposal of the substances concerned prior to handover.
The type, use and control of the substances have been fully and correctly identified in the operating and maintenance manuals/health and safety file.

## 1.19 BUILDING REGULATIONS APPROVALS:

Make full and formal submissions to Building Control/District Surveyor/Approved Inspector at the earliest opportunity to ensure the approval of the relevant Authorities for the proposed installation works.
Notify the District Surveyor, Building Control Officer and Fire Officer directly in respect of all tests and demonstrations relevant to life safety installations, and include for all necessary attendance, documentation, etc., to ensure full relevant Authority approval of the installation.
Include for all fees and charges legally required under the Building Regulations in respect of the Works.

## 1.20 RECORD DRAWINGS

The Services Contractor shall provide "as installed" record drawings showing the full extent and accurate details of the installed positions of engineering services.

The record drawings shall show positions, runs, sizes and types of equipment, ductwork, pipework etc.

Complete record drawings shall be provided as follows:

- 2 sets of prints on paper.
- 1 CAD set in Autocad .dwg and Adobe PDF format on CD.
- The Services Contractor shall hand over the record drawings to the Employer at time of completion. Failure to do so will prohibit the issue of a Practical Completion Certificate for the works.
- A draft set of the drawings is to be provided to the Consulting Engineer for approval before completion.

## 1.21 OPERATION & MAINTENANCE MANUALS

The Services Contractor shall provide operating and maintenance manuals for all the equipment provided.

The manuals shall contain manufacturers literature, method of operation, extent of maintenance and servicing required, list of spares, test certificates, commissioning reports, etc.

The format of the manuals shall be agreed before submitting for approval.
The manuals shall include the following:

- General and technical description giving function and manner of operation of each system.
- Instructions for starting up, operating and shutting down of each system, including any emergency/safety routines.
- Schedule of equipment supplied showing details of make model type.
- List of manufacturer's names, addresses, telephone and fax numbers for all major items of equipment.
- Manufacturer's general catalogue and installation/maintenance instructions for all items of equipment.
- Schedule of recommended spares and lubricants for all equipment.
- Schedule of maintenance requirements on a daily/weekly/monthly/annual basis.
- Data on general setting of controls and monitoring instruments of each system.
- Fault finding routines.
- Information relating to Health and Safety.
- Copies of valve charts, schematics, wiring and control diagrams, copies of commissioning/test records and certificates.
- Record "As Installed" drawings

The complete manuals shall be provided in 2 copies bound into A4 ring binders.

The Services Contractor shall hand over the manuals to the Employer at time of completion. Failure to do so will prohibit the issue of a Practical Completion Certificate for the works. A draft copy of the manuals is to be provided to the Consulting Engineer for approval before completion.

The Services Contractor shall also provide a Building Logbook in accordance with Building Regulations Part L2.

The Building Logbook shall be to CIBSE guidance and be in addition to the operating and maintenance manuals.

## 1.22 THE CONSTRUCTION DESIGN & MANAGEMENT REGULATIONS 2015

Unless otherwise specified it shall be assumed that the project is notifiable under The Construction (Design & Management) Regulations and a CDM Coordinator will be appointed by the Client.

Notwithstanding the above, the Services Contractor shall allow for the production of all such Risk Assessments and Method Statements as may be required by the CDMC to demonstrate safe working methods for any operations that could be deemed hazardous.

## 1.23 MANUFACTURERS INSTALLATION INSTRUCTIONS

All plant and equipment specified shall be installed in accordance with the relevant Manufacturers recommendations, unless specifically stated otherwise.

## 1.24 OPERATIONAL INSTRUCTIONS AND DEMONSTRATIONS

The Services Contractor shall, at a time to be agreed before completion, instruct the Employer or his representative, on site, in the use and operation of the electrical services installations.

## 1.25 EMC COMPLIANCE

The Services Contractor shall ensure that all products and installations shall fully comply with the Electro Magnetic Compatibility European & other standards including:

EN 50081-2 EMC - Generic Emission Standard Part 2
EN 50082-2 EMC - Generic Immunity Standard Part 2

The Contractor shall inform the Consulting Engineer / Employer of any areas of non-compliance of specified items / installations.

## 1.26 THE TENDER

The form of contract or Purchase Order will be advised within the Tender documentation provided by the employer to the contractor and other interested parties.

## 1.27 BUILDERSWORK

The Services Contractor employ a Building Contractor who shall include for all Builders Work and Making Good associated with the Services Installation with the Contract and shall liaise with any Specialist Sub-contractor to ensure that all requirements have been taken into account. Note that this also applies to the painting of Service equipment and bracketry, which also required painting if not delivered with a final coat finish.

The Services Contractor will be responsible for accurately drawing and clearly marking out the holes and chases required for the installation and for passing information to the Building sub Contractor giving full details of the associated building work including the painting of services.

## 1.28 DIMENSIONS:

Where installations are dependent upon site dimensions ensure that these are available before proceeding with the Works.

Dimensions should not be scaled from drawings.

Where dimensions are indicated on drawings check these on site, as appropriate, to ensure building construction tolerances and manufacturing tolerances can be accommodated. Equipment should not be ordered or manufactured using dimensions indicated on the Tender drawings.

## 1.29 TESTING & COMMISSIONING

Commissioning shall be carried out in accordance with manufacturer's instructions, CIBSE guidelines and Part L Building Regulations 2006, with reports of final results being submitted to the Consulting Engineer at least three days prior to the agreed date for the Engineer to witness said results on site.

The design conditions to be maintained throughout the buildings and design duty of plant, equipment shall be documented in the O & M manuals together with test results.

## 1.30 REGULATIONS & STANDARDS

The complete Electrical services installation shall comply with the following but not limited to the regulations, standards and statutory regulations current at time of the order for the works is placed:

- Building Regulations
- All relevant Health and Safety Executive (HSE) guidance
- Construction (Design and Management) Regulations
- All relevant British Standards and Codes of Practice
- All Chartered Institution of Building Services Engineers (CIBSE), Guides, Commissioning Codes, Applications Manuals & Technical Memoranda
- All Building Services Research and Information Association (BSRIA), Guides, Application Guides & Technical Memoranda
- All Building & Engineering Services Association (B&ES) Guides and Specifications
- Electricity at Work Regulations
- BS 7671: "Requirements for Electrical Installations – IET Wiring Regulations" incorporating all amendments by Institution of Engineering and Technology (IET)
- Guidance Notes to IET Wiring Regulations, published by the IET
- "On-Site Guide" to IET Wiring Regulations, published by the IET
- Electrical Safety Council "The Essential Guide to the Wiring Regulations"
- HVCA "TR3 – Jointing of copper and its Alloys", published by the Building & Engineering Services Association - B&ES
- HVCA "TR5 – Welding of Carbon Steel Pipework", published by the Building & Engineering Services Association - B&ES
- HVCA "TR20 - Installation and Testing of Pipework Systems", published by the Building & Engineering Services Association - B&ES
- Plumbing Engineering Services Design Guide, published by the Institute of Plumbing
- Water Supply Regulations
- Water Regulations Guide, published by Water Regulations Advisory Scheme (WRAS)
- HSE "ACOP L8 – Legionnaires' Disease the Control of Legionella Bacteria in Water Systems"
- CIBSE, "TM13 - "Minimising the Risk of Legionnaires' Disease"
- HSG274 Part 2: The control of legionella bacteria in hot and cold-water systems
- HSG274 Part 3: The control of legionella bacteria in other risk systems
- The Gas Safety (Installation and Use) Regulations
- Institution of Gas Engineers & Managers (IGEM), Utilisation UP Series Standards
- Council for Registered Gas Installers (CORGI) publications
- Gas Safe Technical Bulletins, published by Gas Safe
- Gas Technical Handbooks, published by Viper Gas
- HVCA "DW144 – Specification for Sheet Metal Ductwork", published by the Building &

Engineering Services Association – B&ES

- HVCA DW154 – Specification for Plastic Ductwork, published by the Building & Engineering Services Association – B&ES
- Department for Communities and Local Government (DCLG) “Non-domestic Building Services Compliance Guide”
- “TIMSA Guidance for Achieving Compliance with Part L Building Regulations”, published by Thermal Insulation Manufacturers & Suppliers Association (TIMSA)
- Requirements issued by the local Statutory Authorities
- Client Insurance Company requirements
- Manufacturer’s recommendations
- Room Data Schedules
- EU fluorinated greenhouse gas (F gas) regulations

# PART 2: PARTICULAR SPECIFICATION

**ADDRESS OF SITE**

Royal Cornwall Museum
25 River Street
Truro
Cornwall
TR1 2SJ

## 2.0 PARTICULAR SPECIFICATION

## 2.1 GENERAL

Supply, deliver, off-load, place in position, install, test, commission and leave in first class working order the whole of the Services installations in accordance with this Specification, the latest CIBSE Guidelines, Building Regulations.

The Services Contractor shall liaise with all necessary regulatory bodies including all notices, applications and permissions from all utility companies where applicable.

The Services Contractor shall submit builders work drawings, working drawings, schedules of equipment and materials prior to any work on site and ensure all proposed plant and equipment are fit and adequate for purpose.

Any discrepancies between specifications/ submittals shall be brought to the attention of the Consulting Engineer.

The Services Contractor will be responsible for setting out the installation and shall check, from the Contractor's detail drawings, the position of all apparatus and service routing relative to other equipment, furniture, fixtures, fitments, building structure and fabrics before installation.

The Services Contractor is expected to work in harmony with other trades so that all services progress together and to liaise with other trades, statutory undertakings etc in an endeavour to avoid mismatch of services equipment with other fitments / building fabric etc.

The Services Contractor is to be totally responsible for maintaining the new installation during the whole of the building Services Defects Liability Period of twelve months from handover of each completed installation, in accordance with each manufacturer's recommendations, and shall provide certification of same in suitable logbook.

The Services Contractor will not be permitted to sub-let part of the work without consent from the Consulting Engineer.

The Specification details the salient requirements of the installation and the standard on which the work shall be carried out. All drawings are to be read in conjunction with the Specification.

The Services Contractor shall be deemed to have included for all equipment, materials and workmanship to complete and set working the whole installation to meet the requirements of the Specification, according to the true intent and meaning thereof and to the reasonable satisfaction of the Consulting Engineer.

Any accompanying drawings to this specification are diagrammatic and are intended to indicate the scope and the approximate layout of the required installation only. The Services Contractor shall produce and submit detail working drawings with all necessary layouts, sections, details and schematics as necessary to demonstrate compliance with all relevant regulations, standards, codes of practice and design guides, and are to be coordinated with the other disciplines.

Where prefabricated equipment is to be manufactured for the works, the Services Contractor shall be responsible for the accuracy of all measurements and dimensions.

The Building Sub Contractor will form or cut holes in the building fabric, form or cut chases for concealing pipes and flush fitments and accessories, remove and replace service duct covers, floorboards and fascia panels and make good the building work.

The Building Sub Contractor shall also excavate and backfill service trenches, provide pipe ducts for the entry of services into buildings and carry out any relevant activities.

The Services Contractor shall handle all items of material and equipment from stores into position and allow, where necessary, for the assembly of such equipment whether supplies under the sub-contract or forming a part of the sub-contract but supplied by others.

The Electrical Installation must be carried out by approved engineers. Electricians shall be NICEIC approved.

## 2.2 SCOPE OF WORKS

This section details the extent and scope of the works for the Electrical elements of the project: The extent of the Works is as follows:

Builderswork:

- Holes
- Chases
- Trenching and reinstatement for National Grid
- Blocking up the redundant doorway and making good
- Creation of a new 1 hour fire rated enclosure on the first floor as detailed
- Making good, fire stopping and decoration

Electrical services**:**

- Liaison with National Grid
- Incoming electrical supplies
- Low voltage distribution and switchgear
- Sub-mains distribution
- Power installation
- Earthing and bonding
- Spares and tools
- Testing and commissioning
- Record documentation

## 3.0 ELECTRICAL SERVICES

## 3.1 INCOMING SERVICES

The Services Contractor shall manage, co-ordinate, supply, offload, store, install, protect, test and commission all necessary components to provide a complete, safe and fully operational new National Grid (NG) metered 400A three phase electricity supply.
The new electricity supply will be procured by the Client but shall be managed and coordinated by the Services Contractor. The Services Contractor shall also coordinate the works of their Building sub Contractor to carry out all necessary builderswork associated with new supply to suit the agreed program. A copy of the National Grids agreed scope of works is available as part of the Tender package. The new supply shall replace the existing installation which is fed from the front of the building to under the stairs.

The Services Contractor shall be responsible for liaising with NG and their Building sub Contractor to prepare a new service trench and pits from the rear of the building under the spiral stairs and to block in the existing doorway as shown on the drawings to allow a secure fixing for the new cable up to the new LV switchroom. The representative for NG involved in the project is Ellie Millings 01209 616616, they shall be contacted at the earliest opportunity to ensure the works are prepared and completed to meet the requirements of the project programme.

The current electrical distribution system enters the building from the front and runs under the building to a confined space under the stairs near the centre of the building. The current location is non-compliant and with the requirement to increase the supply capacity the option has been taken to relocate the supply and main switchgear.

The Services Contractor shall liaise with the Client to coordinate with the current meter supplier to provide a new meter to enable both supplies to be energised to enable a programmed changeover of supplies.

A safe method of operation must be put into place to ensure both supplies are isolated in emergency.

The original supply shall be kept live until the last load has been transferred onto the new system at this point the Services Contractor shall with liaison with the Client arrange for the isolation of the supply by NG and removal of the meter by the meter operator. The Contract for the meter shall also be terminated to ensure the billing ceases.

The new cutout and metering cubicle shall be installed in the new LV switchroom, appropriately sized containment shall be provided and installed as may be required by the Supply Authority and meter provider.

Cable tails shall be installed from the meter to the isolator within appropriately sized galvanised cable containment.

All mains and authority distribution equipment shall be clearly labelled by means of 3mm white/black/white plastic engineering material with 6mm characters.

Completion and issuing of test certificates and the arrangement of the final metering connections shall also be the responsibility of the Services Contractor.

## 3.2 ELECTRICAL DISTRIBUTION

The Services Contractor shall manage, co-ordinate, supply, offload, store, install, protect, test and commission all necessary components to provide a complete, safe and fully operational low voltage distribution system comprising of all necessary switching devices, isolators, distribution boards, circuit breakers, cables and wiring as described in this specification, equipment schedules and accompanying drawings to meet the design parameters stated above.
The complete works shall be undertaken by a National Inspection Council for Electrical Installation Contracting (NICEIC) approved and registered contractor.
The electrical low voltage (LV) distribution installation shall include main intake switchgear, sub-main, sub-circuit and final circuit distribution and wiring and equipment for lighting, power and environmental plant.
All equipment shall be mounted at a height which gives easy access from a standing position. Switchgear shall be lockable in the 'off' position.

All switchgear, distribution boards, fixed control/isolation units shall be labelled by means of 3mm white/black/white plastic engineering material with 5mm characters to indicated associated service. All labels to be fixed by means of strong adhesive, brass screw and bolt or brass rivets. Non-durable 'stick-on' self-adhesive labels will not be acceptable.

Outgoing circuit ways shall be fully labelled on printed labels with ratings and function/item served. The individual cable cores shall be provided with circuit identification at terminations in the form of PAZ-type LSOH overwire alpha-numeric sleeve type cable markers.

**Low Voltage Moulded Case Circuit Breaker (MCCB) Panelboard**

A 400A Low Voltage Moulded Case Circuit Breaker (MCCB) form 4 type 6 switchboard complete with metering to the requirements of part L Building Regulations shall be provided in the new LV switchroom to provide sub-main distribution to final circuit distribution boards and fixed equipment loads.

The MCCB switchboard shall be manufactured by Schneider or equal and approved.

Each of the panel devices shall be labelled with their rating and function/item served. The labels shall be traffolyte with black letters on a white background.

The switchboard shall be complete with the following to form a complete system:

- Suitably sized non-auto incoming device.
- Transient Voltage Surge Suppression Device to ANSI/EEE C62.41-1991 "Recommended Practice on Surge Voltages, in Low Voltage AC Power Circuits".
- Outgoing devices as identified on the mains schematic to serve ways for general power, lighting, mechanical services and general loads including transient voltage surge suppression device. Devices should be selected to achieve full discrimination on the distribution network.
- Digital meter on the incoming supply including kW/hr, phase amps, phase volts, phase pf, kW per Phase, 3-phase kW, frequency and maximum demand. Meter protection fuses shall be accessible from the front of the panel by removal of a panel that exposes only these components.
- KWh meter on all significant final loads in accordance with part L2 Building Regulations with connection to, monitoring and display to the Building Management System. This

shall be in the form of numeric display meters (to accuracy class 2 minimum complete with all necessary CTs, voltage connections and interconnecting cabling. Meter protection fuses shall be accessible from the front of the panel by removal of a panel that exposes only these components.
- Side extension boxes and chambers to ensure adequate cabling space and termination without introducing unnecessary strain on cable terminations.
- Insulators and blanking modules for all unused ways.
- Panel door locks with key.

The switchboard shall be sized to provide for possible future expansion of the electrical load not less than 25% above the designed load and include 25% spare outgoing ways.
A dedicated supply shall be provided to the fire alarm panel from the main switchboard protected by a mccb coloured red way with a locking device and labelled "FIRE ALARM - DO NOT SWITCH OFF". In addition, the main panel shall be labelled "WARNING: THIS PANEL ALSO CONTROLS THE SUPPLY TO THE FIRE ALARM SYSTEM."

A supplementary main earth bar with removal link for testing purposes shall be provided adjacent to the switchboard for the connection of all main protective bonds for the site.
A framed sealed drawing of the Mains Schematic arrangement of the site shall be provided adjacent the switchboard detailing each outgoing device, its rating and settings, the outgoing cable sizes and details of the load served.

In addition, a typed circuit chart shall be provided to permit easy identification of outgoing ways. Information shall include circuit reference, description, C.P.D. rating and type, load current, cable size and type, along with Health & Safety posters, as required by H.S.E, fitted to the wall.
A continuous length of 1,000-volt grade 900mm wide insulating rubber matting to BS921 shall be provided immediately in front of all distribution equipment located in the Main Switchroom.

**Low Voltage Final Circuit Miniature Circuit Breaker (MCB) Distribution Boards**

Final circuit distribution boards shall be installed throughout the building to serve the small power and lighting throughout.

The new distribution boards (DB) shall be connected to the outgoing MCCB ways on the main MCCB panel in the switchroom

The new DB's shall have the following features:

- Switch disconnector incomer
- Protective device types to suit load types (Type C: lighting & socket outlets; Type D: motors/fans)
- Protective device breaking capacity to be selected to give protection from upstream let-through energy of upstream protective device, minimum rating 10kA.
- 30mA RCD protection for each circuit.
- Live busbar shrouding.
- Neutral busbar
- Insulators and blanking modules for all unused ways.
- Earth bar
- Suited to the environment of installation.

- Complete with a hinged metal door fitted with barrel lock (complete with 2 keys).
- Transient Voltage Surge Suppression Device to ANSI/EEE C62.41-1991 "Recommended Practice on Surge Voltages, in Low Voltage AC Power Circuits" on distribution boards serving ICT equipment.
- Lighting and small power boards shall be served via split load DB's complete with digital split sub-metering.

Each individual MCB distribution board shall be sized to provide for possible future expansion of the electrical load not less than 25% above the designed load and include 25% spare outgoing ways.

Final circuit distribution boards shall be manufactured by Schneider or equal and approved, of the same manufacturer throughout
.
Distribution boards shall be labelled to include:

- Warning notice 'Danger 230V'
- Reference and load served e.g., 'DB Kitchen, etc.

At each distribution board location, a fully typed circuit chart in durable cover shall be provided to permit easy identification of circuits. Information shall include circuit reference, description, C.P.D. rating and type, load current, cable size and type. These shall be installed adjacent to each distribution board, along with Health & Safety posters, as required by H.S.E, fitted to the wall.

The Services Contractor shall be responsible for carrying out a risk assessment in accordance with BS7671 to determine the requirements of installing arc fault detection devices (AFDD) and to agree with the Client if their inclusion is required.

The distribution board requirements, circuit breaker types, quantities and ratings have been captured in the Distribution Board schedules included in this Tender package these shall be used for pricing purposes. During installation all distribution board sizes and circuit protection requirements shall be verified by the Services Contractor.

**Arc Fault Detection Devices (AFDD)**

The Services Contractor shall include a costed option to add the addition of AFDD devices to all circuits required by BS 7671:2018+A2:2022 Regulation 421.1.7.

## 3.3 LIGHTING AND EMERGENCY LIGHTING

The Services Contractor shall supply, install test and commission the complete installation in accordance with the standards referenced in relevant third-party documents scheduled in this specification.

- BS EN 12464 Light and lighting - Lighting of indoor workplaces
- BS ISO 16817 2012 Design for Visual Environment
- CIBSE Code for Lighting
- CIBSE (SLL) Lighting Guides
- BS 5266-1 Code of practice for the emergency lighting
- BS EN 1838/BS 5266 Code of practice for the emergency lighting of premises
- BS EN 50172 Emergency escape lighting systems
- CIBSE Lighting Guide 12: Emergency Lighting Design Guide
- Building Control requirements

The Services Contractor shall manage, co-ordinate, supply, offload, store, install, protect, test and commission all necessary components to provide a complete, safe and fully operational lighting, lighting control and emergency lighting system including all necessary switching, wiring, and lamps as described in this specification and accompanying drawings to meet the design parameters stated above.

The complete works shall be undertaken by a National Inspection Council for Electrical Installation Contracting (NICEIC) approved and registered contractor.

Lighting shall be provided by the use of efficient LED luminaires or equivalent LED lamps in pendant or as replacements in existing retained fixtures and fittings.

The common areas and functional spaces within the building shall be fitted with luminaires with a colour temperature of not less than 4000K.

The luminaires shall be as shown on the drawings or equal. Where alternatives are to be considered they shall be of an equivalent standard or greater and meet the requirements of the environment they are being installed in.

Luminaire data sheets and non-returnable samples shall be issued of each luminaire type to be ordered and written approval obtained prior to procurement. This shall be done immediately on award of contract, along with confirmation of availability. Orders shall be placed to ensure delivery within the Contract programme.

The setting out of the final locations of all luminaires and other accessories whether in a ceiling or on walls, shall, be agreed with the Electrical Consultant. The arrangement of all luminaires shall be fully co-ordinated taking into account structural elements, drainage, mechanical pipework, grilles, smoke detectors, sensors and other ancillary services.

Allowance shall be included for independent supporting luminaires where dictated by the ceiling type. All fixings and support details, particularly above entrance doors, shall be detailed and submitted to the Electrical Consultant for comment and acceptance. All wiring shall be fully concealed within the building fabric.

If any of the selected luminaires break through the fire integrity of the building structure, suitable fire protection shall be provided over the luminaire. Should the luminaire be located within thermal insulation, boxing shall be provided to ensure adequate free air around the luminaire in accordance with the manufacturer's recommendations.

Final luminaire connection shall be taken in flexible multi-core copper cable not to exceed 3m in length connected to a plug-in ceiling rose via an industry standard GST plug. Where ceiling roses also feed charging circuits of integrated emergency luminaire control gear, the plug shall be fitted with an additional permanently live feed derived from the same circuit as the general lighting but not affected by the local switching. The plugs used in these connectors shall be red in colour to distinguish them from the standard units.

Wall mounted luminaires or in areas with inaccessible ceilings the circuit cabling shall be connected directly to the circuit cabling.

Lighting cabling shall be installed in accordance with the Circuit Cabling section and the requirements of BS7671.

All luminaires, wiring, containment and controls made redundant by these works shall be removed as far as practical. Where existing legacy control equipment still exists, these shall be investigated and removed. All damage left by the removal shall be made good to provide a easier to operate and maintain installation.

### 3.3.0 Control

All general areas shall be wired as circuits to provide connection to a maximum of 10 luminaires per circuit.

Control of lighting shall be in accordance with Building Regulations Part L and as shown on the drawings.

In the w.c.'s and store areas, the lighting shall be controlled by passive infra-red detectors (PIR's) to minimise energy use. The detection shall be provided to switch the lighting off after the sensors fail to detect movement for 20 minutes complete with daylight switching to inhibit lighting where there are adequate levels of natural daylight.

The lighting controls system shall be subject to final selection and placement based on manufacturers selections with beam coverage, and sensor detection angles to suit the area under control. A detection diagram shall be provided to demonstrate full coverage. All sensors shall have adjustable switch off delay time from 15 seconds to 30 minutes, set to suit luminaire type and controls application.

Manual switches shall be of the 20-amp type as manufactured by MK, Crabtree, or MEM, with moulded plates of a colour to suit the requirements of Building Control, Building regulations Part M and to the approval of the Client.

In the plant areas switches shall be of the metal clad version and any externally mounted switches shall be of the IP56 sealed waterproof type, every accessory shall be labelled or engraved to indicate the circuit of the local distribution board feeding it.

Undertake a final clean of all luminaire lenses, covers and diffusers prior to final handover of the building.

### 3.3.1 SmartScan

The new luminaires and emergency lighting shall be provided as detailed on the drawings and in the Luminaire Schedule to include the Thorlux Smartscan system. The fittings controlled by inbuilt presence detection shall have all existing light switches removed and cabling suitably terminated to allow the correct operation of the system. All new lighting shall be connected to the existing lighting circuits. All wiring shall be tested and inspected before reuse. Any wiring failing the testing and inspection shall be brought to the attention of the Services Consultant for instruction.

Additionally illuminated emergency exit luminaires complete with legends to suit current BS and European standards shall be provided over the final exit doors and IP65 emergency lighting shall be provided outside all final exits to match the external scheme suitable for the environment in which they are situated.

The Smartscan system shall be complete with all necessary equipment, software and control equipment to provide a fully functional and maintainable system.

The manufacturer shall allow two separate training visits to suitably train all necessary staff.

### 3.3.2 Casamby Lighting Control

The existing gallery areas have are currently mainly manually switched with the majority of the areas controlled by a large bank of switches in a cupboard in the ground floor main gallery area. It is the intention of this project to remove the distribution equipment from this area and it is also the intention to remove the manual switches.

The project shall modify all gallery lighting control from the manual switching to replace it with an open protocol lighting control system such as the Casambi system. The intention is to provide a master override switch near the reception desk to enable all gallery lighting to be manually overridden to either on/off or a minimum of four preset scenes for control when a function is being held. The system should also be able to be controlled and adjusted/monitored by smart phones authorised by the Museum management.

Normal operation of each gallery however shall be by a suitable number of presence detectors in each space to allow the galleries to be illuminated only when occupied.

The majority of gallery lighting at present is to remain and is only manually switched with any dimming controlled at individual luminaires.

The new lighting being provided to the upper level of the main gallery to replace the existing four floodlights and the new track lighting in the De Pass gallery shall be complete with the ability to dim all new fittings.

The Casamby system shall be complete with all necessary equipment, software and control equipment to provide a fully functional and maintainable system.

The manufacturer shall allow two separate training visits to suitably train all necessary staff.

## 3.4 CABLING

All cabling and shall be carried out in BASEC approved low smoke zero halogen (LSZH) copper cabling fully concealed within the building fabric (unless otherwise agreed).

Sub-main cables shall be provided using LSZH/SWA/LSZH/PVC copper armoured cables sized as detailed on the drawings and where required installed with a supplementary LSZH copper earth conductor.

Single runs of cable shall be clipped direct using preparatory cable fixings in accordance with BS7671 and the manufacturers requirements.

Multiple cable runs shall be fixed to and supported by medium duty return flange galvanised cable tray, basket or cable ladder using proprietary LSZH cable cleats.

Armored cables shall be terminated using the Manufacturers recommended brass cable gland with earthing ring, lock nut and low smoke zero halogen (LSZH) shroud assembly. Each end of the cable shall be fitted with alpha-numeric circuit identification labels either raised bridge or oval section for threading on to a labelling strip which should be cable tied to the cable.

Where sub-main cabling is LSZH single core copper cables all conductors shall be of equal cross-sectional area and contained within galvanised trunking.

The existing circuits being extended or reconnected to the new distribution boards shall be fully inspected and tested prior to reuse. Any cabling or circuits that fail shall be identified to the Consulting Engineer for instruction before work is carried out.

Any final circuit distribution cabling that needs to be added or replaced shall generally be carried out in LSZH/XLPE insulated copper twin & earth cables reference 6242B concealed within the building fabric, fixed and clipped in accordance with the requirements of BS 7671.

The minimum size cabling shall be:

16A radial circuits – 2.5mm$^2$
32A ring circuits – 4.0mm$^2$
Lighting circuits – 1.5mm$^2$

The use of cable ties or P clips of any description shall not be used for the distribution of final circuits. All cable drops to be carried out in pvc conduit flushed into the building fabric.

All low voltage (LV) cabling shall be spaced a minimum of 150mm apart from any other cabled service.

Extra-low voltage (ELV) services shall be run individually and maintain a minimum separation distance of 50mm from each other. All cables shall be fully clipped and not rely on the building structure for support. Cables shall run parallel to the building structure only.

No cabling shall be installed within thermal or acoustic insulation.

Should it be deemed necessary to run through insulation the cable size shall be adjusted accordingly, and reference should be made to the designer to ensure adequate sized cables are provided accordingly. Cables shall run parallel to the building structure and not be grouped in bunches of more than five circuits, without full separation between bunches.

Plastic fixings or tie-wraps shall not be acceptable.

All mains, final circuit and controls wiring cable cores shall be provided with circuit identification at terminations within the distribution board, control panels and within equipment in the form of PAZ-type LSOH overwire alpha-numeric sleeve type cable markers.

All cable containment systems shall be installed fully in accordance with the manufacturer's recommendations using a system of manufacturer’s proprietary components to form a complete installation of the same manufacturer throughout. Site manufactured components shall not be acceptable unless otherwise agreed.

All containment shall be sized to provide for future extension with a spare capacity of not less than 25% over the design capacity on the basis that all cables are laid flat and not bunched.

Cable tray and ladder shall be as manufactured by Legrand Swifts or equal and approved including all necessary components; bends, tees, flanges and reducers produced by the manufacturer to form a complete installation.  Earthing straps shall be fitted with to ensure earth continuity.

Cable trunking shall be galvanised to Class 4 finish as manufactured by Legrand Salamadre 4X or equal and approved, including all necessary components; pin racks, cable retainers, bends, tees, flanges and end caps produced by the manufacturer to form a complete installation. All trunking shall be installed with the lid upwards unless otherwise dictated by the installation; all joints shall be fitted with earth continuity straps.

Where flexible conduits are used for final connection of equipment or appliances this shall not exceed 1m in length, shall be IP56 rated, steel LSXH covered and as manufactured by Kopex and Adaptaflex or equal and approved.

Where any cables or containment systems break through fire compartments proprietary cable fire barriers shall be provided with a minimum resistance to match the compartment being penetrated in order to maintain the fire integrity of the building structure.

## 3.5 EARTHING AND BONDING

The Services Contractor shall appoint specialists, manage, co-ordinate, supply, offload, store, install, protect, test and commission all necessary components to provide a complete, safe and fully operational earthing network.

The complete works shall be undertaken by a National Inspection Council for Electrical Installation Contracting (NICEIC) approved and registered contractor.

All exposed conductive parts all extraneous conductive parts shall be bonded and connected to the earth of the electrical installation to prevent danger in the event of a fault.

Conductors shall be connected to the appropriate earth termination point in the main or local distribution boards or at the main earth bar.

All services entering the building shall be bonded as close to the entry point as possible in accordance with BS7671.

Main protective bonding includes:

- Main water pipes.
- Main gas pipes.
- Ventilation ductwork.
- Lightning Protection.
- Exposed metallic parts of building structure.
- Metallic cable sheaths of all cables.
- Refrigeration pipework
- Patch Panel

Additional bonding to the requirements BS 7671 will be provided in the following areas:

- Toilets.
- Plant rooms.
- Wet and damp areas.
- Kitchens and WC areas.

In addition to the above, supplementary protective bonding conductors shall be installed to any and all items of equipment liable to carry a potential and which do not achieve the earth loop impedance value.
Protective Conductors that are connected to earth bar of distribution boards shall be connected in the same sequence as phase and neutral conductors.
At the switchboard and building earth bar, each protective, bonding and earthing conductor shall be identified.
Circuits supplying equipment with high protective conductor currents shall meet the requirements of BS7671 regarding High Integrity Earthing Installations.

## 3.6 TESTING AND COMMISSIONING

Prior to completion of all services and installations the Services Contractor and associated specialist shall undertake complete testing and commission of the system and provide all necessary testing and commissioning certificates.

The certificates shall all be checked and approved by the Electrical Consultant prior to inclusion in the O&M manual. The manual shall be completed prior to handover and practical completion, to demonstrate compliance with all statutory requirements as defined in this specification and to achieve acceptance by Building Control and the buildings insurers.

The commissioning procedure shall include the provision of all warning notices, safety signage, logbooks, typed distribution board schedules within each distribution board. Frame mounted CAD drafted zone charts shall be installed adjacent to the main fire alarm panel and schematic diagrams shall be installed within the plantrooms

Full use and operational instructions shall be given to the Client after practical completion of the works. This shall include training in the regular testing of the systems and use of the logbooks.

The first year's maintenance and monitoring of all systems shall be included, with a 24- hour response, remote reset access, and planned preventative maintenance visits.

## APPENDIX A: Distribution Board Schedules

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

## DBA SCHEDULE

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1L1 | Blank | | | | | | | |
| 1L2 | Blank | | | | | | | |
| 1L3 | 1st Floor Lobby Skts | 16 | B | 30 | | | | |
| 2L1 | Lighting Picture Store & Roof Space | 6 | B | 30 | | | | |
| 2L2 | Link Corridor 1st Floor Sockets | 16 | C | 30 | | | | |
| 2L3 | Unknown | 10 | B | 30 | | | | |
| 3L1 | Gallery Stairs Lighting | 6 | B | 30 | | | | |
| 3L2 | 1st Floor Sockets | 32 | B | 30 | | | | |
| 3L3 | Blank | | | | | | | |
| 4L1 | Ground & first Floor Sockets | 32 | C | 30 | | | | |
| 4L2 | Stores 1st Floor Lighting | 6 | B | 30 | | | | |
| 4L3 | Back Stairs Lighting | 6 | B | 30 | | | | |
| 5L1 | 1st Floor Track Lighting | 20 | 2 | | | | | |
| 5L2 | Upper Chapel Gallery Floor Sockets | 32 | C | 30 | | | | |
| 5L3 | Blank | | | | | | | |
| 6L1 | 1st Floor Track Lighting | 20 | B | 30 | | | | |
| 6L2 | 1st Floor Gallery Ringmain | 32 | C | 30 | | | | |
| 6L3 | Blank | | | | | | | |
| 7L1 | 1st Floor Gallery Floor Sockets | 32 | B | 30 | | | | |
| 7L2 | Blank | | | | | | | |
| 7L3 | Blank | | | | | | | |
| 8L1 | 2nd Floor Store Lights | 6 | B | 30 | | | | |
| 8L2 | 2nd & 3rd Floor Ringmain | 32 | C | 30 | | | | |
| 8L3 | Ground Store Lights | 6 | B | 30 | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

**DBB SCHEDULE**

**Existing DB5 8 Way TP&N DB**

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1L1 | Lights Ground Floor Store & 2nd Floor Disabled WC | 6 | C | 30 | | | | |
| 1L2 | Dehumidifier 1st Floor above kitchen | 16 | C | 30 | | | | |
| 1L3 | Lights First Floor Store, Exit & Goods Entrance | 6 | C | 30 | | | | |
| 2L1 | Dehumidifier 2nd & 3rd Floor at rear | 20 | C | 30 | | | | |
| 2L2 | Lights 3rd Floor Stairs to Archive Store | 6 | C | 30 | | | | |
| 2L3 | Heater 3rd Floor | 32 | C | 30 | | | | |
| 3L1 | Dehumidifier 2nd Floor | 16 | C | 30 | | | | |
| 3L2 | 2,3,4 Stores 7 Stairs Disabled WC Water Heater | 32 | C | 30 | | | | |
| 3L3 | Blank | | | | | | | |
| 4L1 | Blank | | | | | | | |
| 4L2 | Depass Aircon No 2 | 32 | C | 30 | | | | |
| 4L3 | Depass Aircon No 1 | 32 | C | 30 | | | | |
| 5L1 | Goods Lift | 20 | C | | | | | |
| 5L2 | Goods Lift | 20 | C | | | | | |
| 5L3 | Goods Lift | 20 | C | | | | | |
| 6L1 | Blank | | | | | | | |
| 6L2 | Blank | | | | | | | |
| 6L3 | Blank | | | | | | | |
| 7L1 | Blank | | | | | | | |
| 7L2 | Blank | | | | | | | |
| 7L3 | Blank | | | | | | | |
| 8L1 | Blank | | | | | | | |
| 8L2 | Blank | | | | | | | |
| 8L3 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

## DBC SCHEDULE

**Existing DB2, DB3, DB4, DB11, DB12 & DB13 2 x 18 Way TP&N DB**

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1L1 | Lights Stairs WC & Mains Room | 6 | B | 30 | | | | |
| 1L2 | Blank | | | | | | | |
| 1L3 | Intruder Alarm Panel Telephone Exchange and Power in Mains Room | 16 | B | | | | | |
| 2L1 | Shop Lighting | 6 | B | 30 | | | | |
| 2L2 | Outside Lights | 10 | B | 30 | | | | |
| 2L3 | Hand Dryer Disabled WC | 16 | B | 30 | | | | |
| 3L1 | Shop Lighting | 6 | C | 30 | | | | |
| 3L2 | Blank | | | | | | | |
| 3L3 | Toilet & Link Lighting | 6 | B | 30 | | | | |
| 4L1 | Shop Ringmain | 32 | B | 30 | | | | |
| 4L2 | Blank | | | | | | | |
| 4L3 | Art Shop Ringmain | 32 | C | 30 | | | | |
| 5L1 | Shop Lighting | 6 | B | 30 | | | | |
| 5L2 | Automatic Doors | 6 | C | 30 | | | | |
| 5L3 | Blank | | | | | | | |
| 6L1 | Shop Lighting | 6 | B | 30 | | | | |
| 6L2 | Fire Doors Temp Supply | 20 | B | 30 | | | | |
| 6L3 | Hand Drier Art Shop Toilets | 16 | B | 30 | | | | |
| 7L1 | Shop Lighting | 6 | B | 30 | | | | |
| 7L2 | Blank | | | | | | | |
| 7L3 | Water Heater & Hand Dryer Gents WC | 20 | C | 30 | | | | |
| 8L1 | Shop Power | 32 | B | 30 | | | | |
| 8L2 | Office Ringmain | 32 | C | 30 | | | | |
| 8L3 | Ground Floor Offices Ringmain | 32 | C | 30 | | | | |
| 9L1 | Water Heater For Toilets | 16 | B | 30 | | | | |
| 9L2 | Downlight Behind Glass Screen | 6 | C | 30 | | | | |
| 9L3 | Ground Floor Offices Ringmain Link Trunking | 16 | C | 30 | | | | |
| 10L1 | Lighting Ground Floor Kitchen | 6 | C | 30 | | | | |
| 10L2 | Lights Shop Track | 6 | C | 30 | | | | |
| 10L3 | Lights Directors Office & Education Room | 6 | C | 30 | | | | |
| 11L1 | Lights Toilets & IT Room | 6 | C | 30 | | | | |
| 11L2 | Lights Shop Track | 6 | C | 30 | | | | |
| 11L3 | Power First Floor Textile Gallery, Directors Office & Education Room | 32 | C | 30 | | | | |
| 12L1 | Hand Dryer Staff WC 1st Floor | 16 | C | 30 | | | | |
| 12L2 | Lights Textile Gallery | 16 | C | 30 | | | | |
| 12L3 | 5Amp Power Link | 6 | C | 30 | | | | |
| 13L1 | Power 2nd Floor Office Long Powerlink Trunking | 16 | C | 30 | | | | |
| 13L2 | 2nd Floor Office Short Powerlink Trunking | 16 | C | 30 | | | | |
| 13L3 | Toilet Hand Dryers | 32 | C | 30 | | | | |
| 14L1 | New Staff Rm Water Heater & Dishwasher | 40 | B | 30 | | | | |
| 14L2 | Blank | | | | | | | |
| 14L3 | Blank | | | | | | | |
| 15L1 | Main Hall Lights Entrance End | 10 | B | 30 | | | | |
| 15L2 | Centre Lights | 10 | B | 30 | | | | |
| 15L3 | Basement Stores Lights | 10 | B | 30 | | | | |
| 16L1 | Main Hall Lights Far End | 10 | B | 30 | | | | |
| 16L2 | Centre Lights | 10 | B | 30 | | | | |
| 16L3 | 2nd Floor Stairwell Office Lights | 10 | B | 30 | | | | |
| 17L1 | Rashleigh Lights | 10 | B | 30 | | | | |
| 17L2 | Lights Main Side Hall | 10 | B | 30 | | | | |
| 17L3 | Philbrick Lights | 10 | B | 30 | | | | |
| 18L1 | Workshop / Strong Room Lights | 10 | B | 30 | | | | |
| 18L2 | Depass Lights | 20 | B | 30 | | | | |
| 18L3 | Showcase Stair Lights | 10 | B | 30 | | | | |
| 19L1 | Rashleigh Lights | 10 | B | 30 | | | | |
| 19L2 | Rashleigh Lights | 20 | B | 30 | | | | |
| 19L3 | Showcase Stair Lights | 10 | B | 30 | | | | |
| 20L1 | Main Hall Uplighters and Fan | 16 | B | 30 | | | | |
| 20L2 | Lights Main Side Hall | 16 | B | 30 | | | | |
| 20L3 | Philbrick Lights | 10 | B | 30 | | | | |
| 21L1 | Main Hall Lights | 20 | B | 30 | | | | |
| 21L2 | Mineral Lights | 16 | B | 30 | | | | |
| 21L3 | Bonython Ringmain | 16 | B | 30 | | | | |
| 22L1 | Rashleigh Wall Lights | 10 | C | 30 | | | | |
| 22L2 | Camera Spur | 16 | B | | | | | |
| 22L3 | Centre Lights | 16 | B | 30 | | | | |
| 23L1 | Philbrick Ringmain | 16 | B | 30 | | | | |
| 23L2 | Education Room Ringmain | 32 | B | 30 | | | | |
| 23L3 | Depass Ringmain | 16 | B | 30 | | | | |
| 24L1 | Bonython Ringmain | 32 | B | 30 | | | | |
| 24L2 | Rashleigh Ringmain | 32 | B | 30 | | | | |
| 24L3 | Blank | | | | | | | |
| 25L1 | Blank | | | | | | | |
| 25L2 | Blank | | | | | | | |
| 25L3 | Blank | | | | | | | |
| 26L1 | Blank | | | | | | | |
| 26L2 | Blank | | | | | | | |
| 26L3 | Blank | | | | | | | |
| 27L1 | Blank | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27L2 | Blank | | | | | | | |
| 27L3 | Blank | | | | | | | |
| 28L1 | Blank | | | | | | | |
| 28L2 | Blank | | | | | | | |
| 28L3 | Blank | | | | | | | |
| 29L1 | Blank | | | | | | | |
| 29L2 | Blank | | | | | | | |
| 29L3 | Blank | | | | | | | |
| 30L1 | Blank | | | | | | | |
| 30L2 | Blank | | | | | | | |
| 30L3 | Blank | | | | | | | |
| 31L1 | Blank | | | | | | | |
| 31L2 | Blank | | | | | | | |
| 31L3 | Blank | | | | | | | |
| 32L1 | Blank | | | | | | | |
| 32L2 | Blank | | | | | | | |
| 32L3 | Blank | | | | | | | |
| 33L1 | Blank | | | | | | | |
| 33L2 | Blank | | | | | | | |
| 33L3 | Blank | | | | | | | |
| 34L1 | Blank | | | | | | | |
| 34L2 | Blank | | | | | | | |
| 34L3 | Blank | | | | | | | |
| 35L1 | Blank | | | | | | | |
| 35L2 | Blank | | | | | | | |
| 35L3 | Blank | | | | | | | |
| 36L1 | Blank | | | | | | | |
| 36L2 | Blank | | | | | | | |
| 36L3 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

**DBD SCHEDULE**

**Existing DB8 8 Way TP&N DB**

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1L1 | Soup Kettle Socket | 32 | C | 30 | | | | |
| 1L2 | Cooker | 32 | B | 30 | | | | |
| 1L3 | Dishwasher | 16 | B | 30 | | | | |
| 2L1 | Kitchen Water Heater | 16 | B | 30 | | | | |
| 2L2 | Hand Wash Heater | 16 | B | 30 | | | | |
| 2L3 | Kitchen Sockets | 32 | C | 30 | | | | |
| 3L1 | Seating Area Sockets | 20 | C | 30 | | | | |
| 3L2 | Merry Chef Oven | 40 | B | 30 | | | | |
| 3L3 | Food Prep Ringmain | 32 | B | 30 | | | | |
| 4L1 | Coffee Machine | 32 | B | 30 | | | | |
| 4L2 | Counter Ringmain | 32 | B | 30 | | | | |
| 4L3 | Counter & Kitchen Lights | 6 | C | 30 | | | | |
| 5L1 | Seating Area Window Lights | 6 | B | 30 | | | | |
| 5L2 | Seating Area Centre Lights | 6 | C | 30 | | | | |
| 5L3 | Seating Area Spare Feed | 6 | C | 30 | | | | |
| 6L1 | Blank | | | | | | | |
| 6L2 | Blank | | | | | | | |
| 6L3 | Blank | | | | | | | |
| 7L1 | Blank | | | | | | | |
| 7L2 | Blank | | | | | | | |
| 7L3 | Blank | | | | | | | |
| 8L1 | Blank | | | | | | | |
| 8L2 | Blank | | | | | | | |
| 8L3 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

## DBE SCHEDULE

### Existing DB9 12 Way SP&N DB

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1 | Water Heater | 16 | B | 30 | | | | |
| 2 | Lighting | 6 | B | 30 | | | | |
| 3 | Lighting | 6 | B | 30 | | | | |
| 4 | Ringmain | 32 | B | 30 | | | | |
| 5 | Ringmain | 32 | B | 30 | | | | |
| 6 | Blank | | | | | | | |
| 7 | Blank | | | | | | | |
| 8 | Blank | | | | | | | |
| 9 | Blank | | | | | | | |
| 10 | Blank | | | | | | | |
| 11 | Blank | | | | | | | |
| 12 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

**DBF SCHEDULE**

**Existing DB15 4 Way TP&N DB**

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1L1 | Ringmain | 16 | C | 30 | | | | |
| 1L2 | Lighting | 6 | B | 30 | | | | |
| 1L3 | Boiler Panel | 16 | C | 30 | | | | |
| 2L1 | Sump Pump | 16 | C | 30 | | | | |
| 2L2 | Blank | | | | | | | |
| 2L3 | Blank | | | | | | | |
| 3L1 | Blank | | | | | | | |
| 3L2 | Blank | | | | | | | |
| 3L3 | Blank | | | | | | | |
| 4L1 | Blank | | | | | | | |
| 4L2 | Blank | | | | | | | |
| 4L3 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

## DBG SCHEDULE

### Existing DB9 12 Way SP&N DB

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1 | Water Heater | 16 | B | 30 | | | | |
| 2 | Lighting | 6 | B | 30 | | | | |
| 3 | Lighting | 6 | B | 30 | | | | |
| 4 | Ringmain | 32 | B | 30 | | | | |
| 5 | Ringmain | 32 | B | 30 | | | | |
| 6 | Blank | | | | | | | |
| 7 | Blank | | | | | | | |
| 8 | Blank | | | | | | | |
| 9 | Blank | | | | | | | |
| 10 | Blank | | | | | | | |
| 11 | Blank | | | | | | | |
| 12 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

## DBH SCHEDULE

### Existing DB7 8 Way SP&N DB

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1 | Motor Room Power | 16 | B | 30 | | | | |
| 2 | Lighting | 10 | B | 30 | | | | |
| 3 | Link Corridor Lighting | 10 | B | 30 | | | | |
| 4 | Blank | | | | | | | |
| 5 | Blank | | | | | | | |
| 6 | Blank | | | | | | | |
| 7 | Blank | | | | | | | |
| 8 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

## DBI SCHEDULE

### Existing DB14 12 Way SP&N DB

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1 | Ringmain | 32 | C | 30 | | | | |
| 2 | Radial | 16 | B | 30 | | | | |
| 3 | Lighting | 6 | B | 30 | | | | |
| 4 | Blank | 32 | B | 30 | | | | |
| 5 | Blank | 32 | B | 30 | | | | |
| 6 | Blank | | | | | | | |
| 7 | Blank | | | | | | | |
| 8 | Blank | | | | | | | |
| 9 | Blank | | | | | | | |
| 10 | Blank | | | | | | | |
| 11 | Blank | | | | | | | |
| 12 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

**DBJ SCHEDULE**

**Existing DB10 12 Way TP&N DB**

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1L1 | Vent Fan in Chapel Roofspace | 16 | C | 30 | | | | |
| 1L2 | Office & Curators Office Ringmain | 32 | C | 30 | | | | |
| 1L3 | Archive Room Ringmain | 32 | C | 30 | | | | |
| 2L1 | Air Con No 1 | 20 | B | 30 | | | | |
| 2L2 | Air Con No 2 | 20 | B | 30 | | | | |
| 2L3 | Air Con No 3 | 20 | B | 30 | | | | |
| 3L1 | Air Con No 4 | 20 | B | 30 | | | | |
| 3L2 | Air Con No 5 | 20 | B | 30 | | | | |
| 3L3 | Vent Fan in Chapel Roofspace | 16 | C | 30 | | | | |
| 4L1 | Coffee Machine | 32 | B | 30 | | | | |
| 4L2 | Counter Ringmain | 32 | B | 30 | | | | |
| 4L3 | Counter & Kitchen Lights | 6 | C | 30 | | | | |
| 5L1 | Seating Area Window Lights | 6 | B | 30 | | | | |
| 5L2 | Seating Area Centre Lights | 6 | C | 30 | | | | |
| 5L3 | Seating Area Spare Feed | 6 | C | 30 | | | | |
| 6L1 | Office Lights | 6 | C | 30 | | | | |
| 6L2 | Archive Store Cooler | 32 | C | 30 | | | | |
| 6L3 | Boiler Archive End | 16 | C | | | | | |
| 7L1 | Study and Office Uplights | 6 | C | 30 | | | | |
| 7L2 | Archive Store Lights | 6 | C | 30 | | | | |
| 7L3 | Boiler Office End | 16 | C | | | | | |
| 8L1 | Blank | | | | | | | |
| 8L2 | Archive Store and Top of Stairs Lights | 6 | C | 30 | | | | |
| 8L3 | De Humidifiers Archive Store | 20 | C | 30 | | | | |
| 9L1 | Blank | | | | | | | |
| 9L2 | Blank | | | | | | | |
| 9L3 | Blank | | | | | | | |
| 10L1 | Blank | | | | | | | |
| 10L2 | Blank | | | | | | | |
| 10L3 | Blank | | | | | | | |
| 11L1 | Blank | | | | | | | |
| 11L2 | Blank | | | | | | | |
| 11L3 | Blank | | | | | | | |
| 12L1 | Blank | | | | | | | |
| 12L2 | Blank | | | | | | | |
| 12L3 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

## DBCAFE SCHEDULE

### Existing DB CAFE 12 Way TP&N DB

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1L1 | Unknown | | | | | | | |
| 1L2 | Unknown | | | | | | | |
| 1L3 | Lights on No 1 Umbrella | 6 | C | 30 | | | | |
| 2L1 | Unknown | 20 | B | 30 | | | | |
| 2L2 | Pillar Lights 1,4,8 | 10 | B | 30 | | | | |
| 2L3 | Unknown | 32 | B | 30 | | | | |
| 3L1 | Track | 10 | B | 30 | | | | |
| 3L2 | Dishwasher | 16 | B | 30 | | | | |
| 3L3 | Unknown | | | | | | | |
| 4L1 | Unknown | 32 | B | 30 | | | | |
| 4L2 | Water Heater | 16 | B | 30 | | | | |
| 4L3 | Entrance Lights | 6 | C | 30 | | | | |
| 5L1 | Track 2 | 6 | C | 30 | | | | |
| 5L2 | Unknown | 32 | C | 30 | | | | |
| 5L3 | Heaters on No 1 Umbrella | 32 | C | 30 | | | | |
| 6L1 | Unknown | 6 | C | 30 | | | | |
| 6L2 | Outside Lights | 10 | C | 30 | | | | |
| 6L3 | Track Right Lights | 6 | C | 30 | | | | |
| 7L1 | Mezzanine Lights | 6 | C | 30 | | | | |
| 7L2 | Mezzanine Sockets | 20 | C | 30 | | | | |
| 7L3 | Track Lights | 6 | C | 30 | | | | |
| 8L1 | Slat Lights | 6 | C | 30 | | | | |
| 8L2 | Raised Area Ringmain | 32 | C | 30 | | | | |
| 8L3 | Blank | | | | | | | |
| 9L1 | Blank | | | | | | | |
| 9L2 | Blank | | | | | | | |
| 9L3 | Blank | | | | | | | |
| 10L1 | Blank | | | | | | | |
| 10L2 | Blank | | | | | | | |
| 10L3 | Blank | | | | | | | |
| 11L1 | Blank | | | | | | | |
| 11L2 | Blank | | | | | | | |
| 11L3 | Blank | | | | | | | |
| 12L1 | Blank | | | | | | | |
| 12L2 | Blank | | | | | | | |
| 12L3 | Blank | | | | | | | |

KERNOW SERVICES DESIGN Ltd
BUILDING SERVICES CONSULTANTS

# ROYAL CORNWALL MUSEUM
# DISTRIBUTION BOARD SCHEDULE

**DBCAFE SCHEDULE**

**Existing DB CAFE 12 Way TP&N DB**

| CIRCUIT | LOAD REFERENCE | MCB RATING (A) | MCB TYPE | RCD | CABLE TYPE | No of Cores | PHASE SIZE mm² | CPC SIZE mm² |
|---|---|---|---|---|---|---|---|---|
| 1L1 | Shop Lights | 6 | B | 30 | | | | |
| 1L2 | Shop Ringmain | 32 | C | 30 | | | | |
| 1L3 | Oven | 20 | B | 30 | | | | |
| 2L1 | Unknown 3 Ph | 20 | C | 30 | | | | |
| 2L2 | | | | | | | | |
| 2L3 | | | | | | | | |
| 3L1 | Unknown 3 Ph | 16 | B | 30 | | | | |
| 3L2 | | | | | | | | |
| 3L3 | | | | | | | | |
| 4L1 | Unknown 3 Ph | 16 | C | 30 | | | | |
| 4L2 | | | | | | | | |
| 4L3 | | | | | | | | |
| 5L1 | Water Heater | 40 | C | 30 | | | | |
| 5L2 | Radial Right and Fan | 16 | C | 30 | | | | |
| 5L3 | Ring Left | 32 | C | 30 | | | | |
| 6L1 | Unknown | 10 | B | 30 | | | | |
| 6L2 | Unknown | 6 | C | 30 | | | | |
| 6L3 | Unknown | 32 | C | 30 | | | | |
| 7L1 | Socket and Spur for Hob | 32 | B | 30 | | | | |
| 7L2 | Radial Hob | 16 | B | 30 | | | | |
| 7L3 | Prep Room Ringmain | 32 | C | 30 | | | | |
| 8L1 | Unknown 3 Ph | 10 | C | 30 | | | | |
| 8L2 | | | | | | | | |
| 8L3 | | | | | | | | |
| 9L1 | Blank | | | | | | | |
| 9L2 | Blank | | | | | | | |
| 9L3 | Blank | | | | | | | |
| 10L1 | Blank | | | | | | | |
| 10L2 | Blank | | | | | | | |
| 10L3 | Blank | | | | | | | |
| 11L1 | Blank | | | | | | | |
| 11L2 | Blank | | | | | | | |
| 11L3 | Blank | | | | | | | |
| 12L1 | Blank | | | | | | | |
| 12L2 | Blank | | | | | | | |
| 12L3 | Blank | | | | | | | |

## APPENDIX B: Tender Summary

## TENDER SUMMARY

**** Indicates Contractor Design Portion with design responsibility by specialist contractor***

| | £ |
|---|---|
| **BUILDERSWORK** | |
| **ELECTRICAL SERVICES** | |
| General Conditions / Preliminaries | |
| LV Supply/Public Utility Supply | |
| Lighting and Emergency Lighting | |
| Earthing and Bonding | |
| Fully Co-ordinated Working & Installation Drawings | |
| Testing & Commissioning | |
| Operating & Maintenance Manual | |
| Defects Liability Period | |
| Optional Costs | |
| Addition of AFDD devices | |
| Provisional Sums (Not including items to be chosen by Client) | 20,000.00 |
| Contingency | 10,000.00 |
| **Electrical Sub-Total** | |

| COST SUMMARY | (£) |
|---|---|
| Electrical Sub-Total | |
| TOTAL | |

**DAYWORK RATES**

Identify below the percentage additions to the HVCA/RICS and ECA/RICS rates for work carried out under Daywork:

Labour

Materials

Plant

**VALUE ENGINEERING ITEMS**

Contractor to List Proposals. Items identified below are to be alternative proposals only which are subject to acceptance by the Client. All items in the main tender summary are to be as specified equipment / suppliers.

| **ITEM** | **Cost Saving** |
|---|---|
| 1. | |
| 2. | |

**Non – Compliant Total**