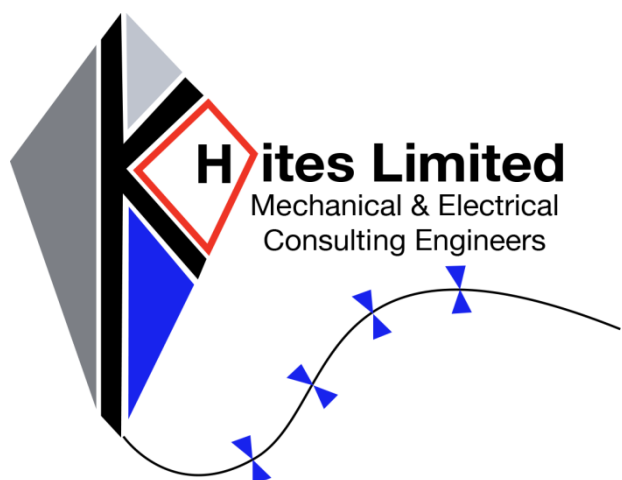


Electrical Services Specification

Brunel University Lecture Centre Coffee Shop

Provision of Mechanical, Electrical, Public Health Engineering
Energy and Sustainability Consultancy
Project No. 136 Rev T0



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Contents

1.0	THE SITE	1
1.1	Site Location.....	1
1.2	The Scheme	1
1.3	Existing Mains / Services	1
1.4	Risks to Health and Safety	1
1.5	Survey	2
2.0	DESCRIPTION OF THE WORKS.....	3
2.1	Extent of the Electrical Services Works	3
2.2	Work by Others and Co-ordination of Trades	3
2.3	Plant Operating Conditions	3
2.4	Working Drawings	4
2.5	Programme.....	5
3.0	GENERAL SCOPE & CONDITIONS OF CONTRACT	6
4.0	TESTING AND COMMISSIONING	18
5.0	ELECTRICAL INSTALLATIONS DESCRIPTION	23
5.1	Infrastructure	23
5.2	Low Voltage (LV) Distribution & Switchgear	23
5.3	Small Power	25
5.4	Communications / Data.....	29
5.5	General and Emergency Lighting.....	27
5.6	External Lighting	28
5.7	Lift.....	28
5.8	Fire Alarm.....	29
5.9	Disabled Alarm System.....	Error! Bookmark not defined.
5.10	Intruder Alarm System	32
5.11	CCTV System.....	32
5.12	Sound System.....	33
5.13	Televisions	33
5.14	Projector System.....	33
5.15	General Earthing and Bonding.....	33
5.16	Electromagnetic Compatibility.....	34
6.0	APPENDIX A - DRAWING SCHEDULE	35
7.0	APPENDIX B – ELECTRICAL EQUIPMENT SCHEDULES.....	36Error! Bookmark not defined.
8.0	APPENDIX C - ELECTRICAL SCHEDULE OF PREFERRED MANUFACTURERS	37
9.0	Tender Return Summary.....	38

1.0 THE SITE

The existing building is a multi-storey concrete built Educational/Lecture Centre, with glazed front facia, on a large University site. The existing office area and tea making area is to be converted into a new coffee shop. There is to be no main cooking facilities within the new coffee shop.

We are advised that due care and attention is required as it is a listed building, and that service alterations/additions are to be kept to a minimum.

We are also advised by the client that certain areas, risers etc, have restricted access due to the possible presence of asbestos.

1.1 Site Location

The proposed development is situated at the ground floor Lecture Centre, Brunel University, Kingston Lane, Uxbridge, London. UB8 3PH.

1.2 The Scheme

The project consists of supply, installation and fit-out of a ground floor coffee shop area in the form of a single floor with new counter facilities, and includes the strip out/modification required within the existing office space, and tea making facility area.

The brand is to be developed which is proposed to be of a University fit out with particular emphasis from the CDS Wilman Interior designers.

This document should be read in conjunction with all CDS Wilman documents relevant to this project. In addition, to the supporting documentation provided by the design team, including but not limited to the following:-

- Brunel University – Client
- CDS Wilman – Developer/Main Contractor
- CDS Wilman – PM / Cost Consultants
- CDS Wilman Interior Designers

The contractor shall comply with requirements of the University's full M&E design brief V2 (Dec 15) and Standards and all the current relevant British Standards and Regulations.

1.3 Existing Mains / Services

It is proposed to re-use the existing incoming services to the site, including the existing LV Electricity.

It should be noted that the contractor must confirm with the University that the existing supply is suitable for re-use. (Note we were shown the point of connection by the University's head of electrical engineering from estates) and requested that a separate 100amp 3 phase RCD unit be installed adjacent to the existing DB1.

The incoming electricity supply within the adjacent riser shall remain and be re-used.

The new Coffee Shop will be fed via a new 18 way TP&N distribution board from the existing DB1 as shown on the layout drawings.

CDS Wilman are to install a temporary 'Squirrel' energy data logger to monitor the existing loads over the period of 1 week to ensure there is enough spare capacity to connect the new anticipated load.

1.4 Risks to Health and Safety

The nature and condition of the site and its associated electrical & mechanical services cannot be fully and certainly ascertained before the work commences on site.

The accuracy and sufficiency of information provided to CDS Wilman to date cannot be guaranteed.

It is the responsibility of the electrical services contractor to ascertain for themselves any information he may require to ensure the safety of all persons whether associated with the works or not.

The electrical services contractor must comply with the requirements of the CDM Regulations by compiling and issuing designers risk assessments and method statements as their works progress. Conditions 7 and 13 of the CDM Regulations shall apply throughout the duration of this contract.

The mechanical services contractor must provide such information with respect to any portion of their works which might affect the health or safety of any person.

The electrical services contractor must provide appropriate input into the Pre-Construction Information (Construction Phase Plan) together with the development Health and Safety File.

1.5 Survey

As part of the tender requirements each prospective electrical services contractor will be expected to visit site to assess the nature of the site and all local conditions and restrictions which are likely to affect the execution of the works.

2.0 DESCRIPTION OF THE WORKS

2.1 Extent of the Electrical Services Works

The electrical services contractor will be responsible for undertaking the detailed design, coordination, supply, installation, testing, commissioning and setting to work of the electrical and electrical services installation.

The electrical services contractor will be responsible for adopting and adapting the design principles as provided by CDS Wilman through the remaining design stages to completion together with such post completion works as is necessary. The successful electrical services contractor will be fully responsible for the design and installation of the following electrical services:-

Lecture Centre Coffee Shop

- Identification of location and routes associated with any existing or proposed MEP services serving and passing through all areas affected by the works.
- Clarify Suitability of Existing Service(s)
- Provision of new General and Emergency Lighting System(s).
- Provision of new LV Distribution Service(s)
- Provision of new Small Power & Data Service(s)
- Provision of new Fire Alarm System(s)
- Provision of new Containment System(s)
- Provision of new Earthing and Bonding System(s)

In addition, the electrical services contractor will be responsible for undertaking and issuing such builders work drawings as may be required by other trades to provide such modifications to the building structure as may be necessary to facilitate the installation of the electrical services works.

The Contractor shall provide all such electrical services and equipment as required to create a suitable environment within the Lecture Centre Coffee Shop.

Other Relevant Documents

Additional documents the Electrical Contractor shall refer to are as follows:-

- Mechanical Services Specification & Drawings
- CDS Wilman Layout Drawings
- CDS Wilman Section Drawings
- University's full M&E design brief V2 (Dec 15)
- University's Site Handbook

2.2 Work by Others and Co-ordination of Trades

The electrical services contractor shall allow for co-ordinating the works with other trades and installations which may be on site during the period of the contract.

The Electrical contractor shall ensure that all parts of the electrical services installation are fully co-ordinated in respect of providing the necessary labour and materials as and when required by the Main Contractor's programme. The electrical contractor shall further ensure that the location of all items such as conduits, luminaries, trunking, switch and accessory drops are fully co-ordinated with the fabric structure of the building and all other services installed, as advised by the client and developer/main contractor, and in full co-ordination with other services including, mechanical, structural, civil, public health, and interior design.

2.3 Plant Operating Conditions

The electrical services contractor shall ensure all plant items are suitable for operation in the environment in which they are to be located.

2.4 Working Drawings

The scope of the Electrical services sub-contract works shall be as Section 5 – and also as follows:

- (a) The production of installation drawings to be submitted for comment prior to Commencement of the site works. Floor layout drawings shall be provided at a scale of 1:100 and typical sections at 1:50, plantroom layouts at 1:20.
- (b) The production of builderswork drawings associated with the electrical contract services installation.
- (c) The supply and installation of all materials and equipment necessary to provide full working systems in accordance with this specification and the finalised installation drawings.
- (d) The Electrical services contractor shall also include for all secondary steelwork and brackets required to support his services installations from the building structure and fabric.
- (e) The testing and commissioning of the completed installations in accordance with the agreed programme.
- (f) The production of operating and maintenance manuals and record drawings of the installations; draft copies are required 14 days prior to the completion date. However, changes to the design occurring 6 weeks prior to the documents being produced are to be included in the final copy only. The operating and maintenance manuals shall be provided in accordance with guidance document BISRIA 87/1.

Also, all drawings shall be supplied on cd in AutoCAD format Auto CAD 2007. Manufacturers information should be issued on CD-ROM or pen drive.

All distribution board schedules shall be provided on cd in Microsoft (Office 2007) Word format.

- (g) Twelve months parts and labour warranty from the date of main contract practical completion.

The Electrical services contractor shall ensure that all parts of the contract/sub-contract installations are fully co-ordinated in respect of providing the necessary labour and materials as and when required by the contract programme. The Electrical services contractor shall further ensure that all parts of his installation are fully co-ordinated with the fabric and structure of the building and all other services installed. It shall be the Electrical services contractor's responsibility to obtain and interpret the necessary information to co-ordinate the works. No costs will be accepted for any claims resulting from lack of performance in this respect.

The electrical services contractor will be required to provide a fully competent site team, able to control the contract works and co-operate, co-ordinate and liaise fully with the Main Contractor's site management and the Engineer, attend site meetings and generally ensure the smooth running of the contract works in accordance with the programme.

The electrical services contractor shall check all current issue drawings and available information prior to installation. Any change required through lack of compliance with this item shall be at the expense of the electrical services contractor.

2.5 Programme

The close co-ordination and monitoring of the sequence and progress of all activities is paramount to the success of the project as a whole.

The electrical services contractor shall liaise closely with the Main Contractor/Developer/Client to ensure that all the requirements of the programme are included and fully understood.

The sequence of operations on site will need to be co-ordinated with essential programme constraints.

The electrical services contractor shall also be responsible for preparing a programme of works for his own installation, to be agreed and incorporated into the Main Contractors programme so that all site trades are co-ordinated.

The contractor should allow for all costs associated with phased works. It is likely that the project will have to be programmed in phases, including the separate disconnections and reconnections to the 1st floor, and adjacent amusement arcade.

It is anticipated that the date of:

- Commencement will be : Refer to main programme
- Completion will be : Refer to main programme

Throughout the contract the preparation and submission for approval of the Contractors drawings, the placing of orders for materials and their subsequent progressing and the retention on site of an adequate labour force, shall all be done in sufficient time to comply with the requirements of the programme.

The Contractor's attention is drawn to the fact that in order to comply with the programme it may be necessary to work in buildings, ducts, trenches, external areas or wherever, which may not at the time be covered in and weatherproof. The Contractor should allow in his tender for such sums he considers necessary to compensate for any additional expense that may be incurred due to any such compliance.

3.0 GENERAL SCOPE & CONDITIONS OF CONTRACT

The general scope of the works is as indicated below and as contained in any other drawing or document as may be issued with the ITT (Invitation to Tender).

The electrical services contractor will fully comply with all statutory and regulatory requirements as well as all associated British, European, International standards together with those which form the University's requirements.

The contract will be in the form (TBC).

The systems described in this document form the outline scope of the electrical services.

The electrical services contractor will undertake the on site design development, coordination, detailed design, installation, testing, commissioning and setting to work of the systems described in this document.

In addition the electrical services contractor will provide such on-site training as may be required to fully acquaint the Clients representatives of the nature, operation, performance and control functions associated with the completed works.

The electrical services contractor shall ensure that all equipment and materials utilised within the works are fit for purpose and suitable for the environments in which they will operate.

The electrical services contractor and/or his specialists shall provide all necessary services to the site and shall allow for all interface points with existing services whether they are identified within the tender documentation or not.

The electrical services contractor shall note that all quantities, lengths, capacities, electrical and electrical ratings stated in the tender documentation are indicative and subject to amendment by the electrical services contractors that may be necessary to comply with their design.

The works shall be undertaken at such times as may be agreed with the Client to suit the planned site construction sequencing works and all other works carried out by other disciplines.

3.1 Employers Requirements, Obligations and Restrictions

In the event of the successful Contractor being a wholly owned subsidiary of a parent company or being dependent on another body to continue trading, an indemnity will be required from the parent company or body prior to the Contract being entered into. The indemnity being that as part of the consideration for the contract in the event of any lawful claim being founded by the Employer against the subsidiary not being honoured, the parent company or body will honour that claim in full.

3.2 Return of Tender

The Contractor shall return confirmed costs for the works described within this specification and on the associated drawings.

3.3 Visits to Site

The Contractor shall visit the site before completing his tender and will be deemed to have satisfied himself on the full nature of local conditions as regards accessibility, transport and

storage of materials, the supply of and conditions affecting labour, and to have obtained all necessary information on all matters affecting the execution of the works and the prices tendered for it.

The Contractor is advised to acquaint himself with any traffic regulations and restrictions and shall include for any costs associated with this element.

Claims on the grounds of want of knowledge in such respect will not be accepted.

3.4 Collusion between Tenderers

Should, in the opinion of the Engineer, collusion between tenderers have taken place in the preparation of tender, prices submitted by parties to such action shall be disregarded when tenders are being considered.

3.5 Royalties and Patent Rights

The prices quoted by the Contractor shall include any patent royalties, which may be legally expendable in respect of any articles, systems, processors or inventions included in his Tender.

3.6 Value Added Tax

Unless otherwise stated in the tender the Contract Price is deemed to exclude Value Added Tax. To the extent that the Tax is properly chargeable on the supply to the Purchaser of any goods or services provided by the Contractor under the Contract, the Purchaser of any goods or services provided by the Contractor under the Contract, the Purchaser shall pay such Tax as an addition to payments otherwise due to the Contractor.

The Contractor shall however allow for all incidental costs and expenses he may incur consequent upon the administration of this tax.

3.7 Labour on Costs

The Contractor shall allow in his tender for all disbursements arising from the employment of labour, with due regard to the current editions of the appropriate Working Rule Agreement.

No bonus or payments by result incentive system shall constitute a claim for extra payment or be reason to diminish the quality or quantity of the works required or implied by the Contract Documents.

The Contractor shall be deemed to have included in his tender for all costs for complying with the Health and Safety at Work Acts, current edition.

3.8 Holidays with Pay

The Contractor shall include in the Tender for all payments to be made in connection with the "Holidays with Pay" scheme of the trade or industry concerned.

3.9 Lack of Continuity

The Contractor's attention is drawn to the fact that no claims whatsoever on the grounds of any actual or apparent lack of continuity will be considered other than where any such lack of continuity may arise out of events or happenings provided for under the specific provisions of the Main Contract conditions.

3.10 Sub Letting

Should the Contractor sub-let or assign any part of the works written confirmation of the sub-contractor shall be given to the Engineer/Client. Where approval is given, the Contractor shall remain responsible for the portion of work that is sub-let, and its completion to the satisfaction of the Engineer.

3.11 Control of Works

The works detailed in this Specification will be under the control of the Engineer/Main contractor/Developer.

Regular supervision of the works from the office of the Contractor will be made to the Engineers requirements.

The contractor shall maintain on site during all working hours for each trade, a competent agent, supervisor or foreman who shall be a fully accredited representative with authority to take instructions and to carry them out, and shall not remove him at any time except with the permission of the Engineer /Main contractor/Developer.

3.12 Site Meetings

Meetings of the Engineer or his representative and the Main Contractor/Developer will be held on site at regular intervals and a responsible representative of the Contractor shall attend, unless notified to the contrary.

3.13 Incompetent Workmen

The Contractor will, at the request of the Main contractor/Developer when advised by the Engineer, immediately dismiss from the site any person employed there on by him who may, in the opinion of the Engineer be incompetent or commit an act of misconduct. Such persons will not be employed again on site without the written permission of the Engineer/Main contractor/Developer.

3.14 Trespass by Workmen

The workmen employed on site shall not trespass on any part of the grounds or buildings where their services are not required or in any way interfere with any of the property, staff of personnel working in these areas.

3.15 Local Agreements

The Contractor and his employees shall comply with all rules, practices and/or local agreements which shall be in force in the area of the site in which these works are to be carried out and shall avoid any complications which might cause strikes or trade disputes amongst his own or other workmen.

All work shall be carried out by the appropriate tradesmen.

3.16 Damage

Any damage caused by or attributed to the negligence of the Contractor or by his work people will be made good to the satisfaction of the Engineer or Architect.

The Contractor shall keep free from damage due to work in connection with this Contract, all property, including existing installations, furniture, fittings etc

The cutting and screwing of conduit or pipework will not be allowed on any of the finished off areas.

3.17 Damage to Public and Private Services

The Contractor must ascertain from the appropriate Statutory Authorities the actual location of the individual services and pay all costs associated with the protection and maintenance of these.

Any damage resulting from the execution of the works shall be notified to the Engineer and appropriate Service Authority and shall be made good to their satisfaction at the Contractors own expense.

3.18 Contractors Responsibilities

The Contractor shall be deemed to have carefully examined the Conditions, Specification and Tender Drawings.

Notwithstanding the provisions of these drawings, the Contractor will be held responsible for the works embodied therein and shall take his own particulars and provide at his own expense all necessary working and detail drawings, including where required plant foundation drawings and any other drawings of Builder's work associated with this Contract or as specified in the Schedule of Drawings, copies of which must be submitted for approval to the Engineer to make proper provision for incorporation of same into the main contract works to suit the contract programme.

The Contractor shall at all times co-operate in the co-ordination of his works with those of other Contractors and claims in respect of lack of such co-ordination will not be admissible for payment or justification for a claim for delay to the contract.

The Contractor shall notify the engineer of any inconsistency in drawn, described or implied information issued to the Contractor prior to installation.

3.19 Drawings and Specifications

The Engineers shall supply the Contractor (free of charge) with two copies of the signed Contract Drawings, including C.A.D. disks, electronic copies of the Specification and electronic copies of all further drawings issued during the progress of the works.

The Contractor shall prepare at his own expense all extra copies of the drawings he requires. A copy of all drawings and specification shall be kept on the site in the charge of the Foreman or Supervisor to which the Engineer shall have access at all reasonable times. All drawings and specifications remain the property of the Employers and upon final payment to the Contractor; he shall return them to the engineers.

The Specification shall be read in conjunction with the drawings and any additional or specific instructions contained on the drawings shall be deemed to be part of the Specification.

The drawings issued by the Engineer show generally the arrangement of the work as a guide only to the Contractor. They may not cover in every detail the whole of the work involved and are diagrammatic in certain particulars.

The position of plant and equipment shown on the drawings shall be assumed to be correct for the purposes of tendering but may be reasonably varied by agreement with the Engineer without any extra cost to the contract unless such alterations involves the removal of works already executed.

3.20 Additional Drawings

The Contractor shall prepare and co-ordinate working drawings showing the details of the installations, and particulars of builders work required and in a suitable scale of 1:50 for general layout, 1:20 for Plant Room, co-ordination details, and for containment details, and shall submit these drawings to the Engineer for approval at such a time to suit the requirements of the contract programme. The Engineers approval is only general and is not intended to serve as a check and does not relieve the Contractor from furnishing the materials and performing the works as required by the Engineers drawings and Specification.

The Contractor shall satisfy himself as to the fitness of the surfaces or structures to which he is to secure or mount his materials or components and his act of proceeding with this work shall be deemed to indicate such satisfaction.

3.21 Checking the Works

The Contractor shall satisfy himself as to the correctness of all connections between equipment or equipment supplied under any other contract before any of the former is put into operation, and reasonable notice shall be given by the Contractor to the Main contractor/Developer before any such connection is made.

It is the Contractor's responsibility to ensure that no damage is caused to any equipment or installation due to negligence on his part.

3.22 Contractors Plant and Equipment

The Contractor shall provide all plant and equipment necessary for the completion of the works including hand tools, power tools, gas and oxygen welding equipment, also any scaffolding trestles, ladders, podium steps etc required for the prompt and proper execution of the works.

3.33 Fire Precautions

The Contractor shall ensure safe methods of working are followed when using equipment, liquids and gases, which create a fire or explosion hazard. Petroleum products and other inflammable or vaporising liquids shall be used and stored in accordance with the regulations applicable to those products and also the manufacturer's instructions for use.

3.34 Noise Abatement

The Contractor will be required to carry out the works without excessive noise and to employ mufflers, screens etc., on all plant where in the opinion of the Main Contractor/Developer this is necessary by reason of excessive noise, which is likely to cause a nuisance or inconvenience to others. The Contractors tender shall be deemed to include any costs necessary for compliance with the above requirement.

3.35 Materials - General

The Contractor shall provide all materials and everything that may be necessary for the due and proper completion of the work to the entire satisfaction of the engineer. The materials are to be new, as specified, and must not be varied in any way without the permission, in writing, of the Engineer.

The Contractor shall remove any materials which do not meet the requirements of the Specification and drawings and replace them with approved materials at his own expense and shall meet the costs of any additional builder's work which may be involved in so doing.

The fact that a particular manufacturer's equipment shall be specified will not relieve the Contractor of the liability of reinsuring that such articles are in sound condition and in accordance with the proper clause of the Specification. The Contractor must ensure that at the time of tender, the quotation by the specified manufacturer complies with the appropriate clause of the specification. No extra cost will be granted for discrepancies found during the progress of the contract.

The Contractor may not substitute materials of alternative types or origin to the materials specified for these works, without obtaining written approval from the engineer before the works are started.

The Contractor shall, if required to do so by the Engineer, submit drawings or samples of materials and cost variations for approval.

The Contractor will be expected to place order for materials and equipment required for these works immediately he to proceed has received instructions. Delay in delivery, therefore, will not be acceptable as the basis of a request for an extension of time to complete the contract works. Upon request by the Engineer, the Contractor shall make all orders available for inspection.

No materials known to be deleterious at the time of specification or use, or which are prohibited in the Agreement for lease, shall be used in the Works. In particular the use of the following is expressly forbidden for use in the Works:

- (i) High alumina cement or concrete tricolor cement containing calcium chloride or susceptible to alkali/silica reaction.
- (ii) Woodwool slabs woodcrete, chipcrete, or conchchip.

- (iii) Asbestos materials containing asbestos including asbestos cement and other asbestos based materials.
- (iv) Crocidolite
- (v) Mundic calcium silicate bricks or tiles glass fibre bricks.
- (vi) Sea washed aggregates or sea dredged aggregates save where the same comply with BS 882 and BS 8110.
- (vii) Materials containing fibres of less than 3 microns diameter and between five and one hundred microns in length where not sealed within other construction.
- (viii) Urea formaldehyde; polyurethane or polyisocyanate foams.
- (ix) Lead or lead products except where used as lead flashings.
- (x) Lindane, tributyltin oxide, pentachlorophenolate, or pentachlorophenol.
- (xi) Hardwoods from non-sustainable sources.
- (xii) Any substances or materials which are not in accordance with any relevant British Standards Institution Standards and current Codes of Practice or which have been declared deleterious in a publication of the Building Research Establishment.

3.36 Materials to be of E.E.C. Manufacture

All materials used in the execution of the works shall be manufactured by a member country of the E.E.C. unless otherwise definitely specified under the respective sections of the Specifications.

In cases where the Contractor is obliged to include for any articles or materials not of such manufacture, notwithstanding the terms of the Specification, he shall give details of such and of the country or origin. The onus of ensuring that this stipulation is observed by any Sub-Contractors who may be employed by the Contractor rests entirely with the latter.

3.37 Materials to Comply with British Standard Specification

All materials used in the execution of the works shall comply in all respects with the requirements of the current appropriate British Standard Specifications or Code of Practices, unless otherwise definitely specified under the respective sections of the Specification where no such Specification exists, goods materials and workmanship shall conform to the standards of British engineering practice.

Materials shall also comply with the requirements laid down in the Building Regulations 1985, and the Factories Act 1961, or/and any such later revision.

3.38 Samples

After the order has been placed with him, the successful Contractor may be required to provide, free of charge, and without delay, to the extent stated in the Specification, or as may be required by the Engineer, such samples of materials or workmanship proposed to be used by him in the execution of the works included in the contract or in such additional works as may be ordered.

3.39 Clearing of Rubbish

The Contractor shall be responsible for the clearing of all rubbish caused by the carrying out of his work.

All such rubbish shall be cleared away on the completion of each working day to the point designated by the Main Contractor and shall not be allowed to accumulate.

Upon completion of the works, the Contractor shall clear away all his tools, scaffolding, tackle, materials and rubbish to the Main Contractors and Engineers satisfaction.

3.40 Main Contractors Attendance

Refer to main contract preliminaries

3.41 Progress on Site

The contractor will be required to agree a programme for his works with the Client/Developer/Engineer.

The contractor should allow for all costs associated with phased works. It is likely that the project will have to be programmed in phases, including the separate disconnections and reconnections to the 1st floor, and adjacent amusement arcade.

It is anticipated that the date of:

- Commencement will be : Refer to main programme
- Completion will be : Refer to main programme

Throughout the contract the preparation and submission for approval of the Contractors drawings, the placing of orders for materials and their subsequent progressing and the retention on site of an adequate labour force, shall all be done in sufficient time to comply with the requirements of the programme.

The Contractor's attention is drawn to the fact that in order to comply with the programme it may be necessary to work in buildings, ducts, trenches, external areas or wherever, which may not at the time be covered in and weatherproof. The Contractor should allow in his tender for such sums he considers necessary to compensate for any additional expense that may be incurred due to any such compliance.

3.42 Testing

On completion of each installation or service or sections of such installations or services, the necessary tests later described must be carried out and test certificates prepared and recorded.

3.43 Notice of Testing

At least seven days' notice must be given by the Contractor of any test to be carried out on site, to enable the Engineer or their authorised representative to be present if they so desire.

3.44 Test Apparatus

The Contractor shall provide, free of charge, on the site and at his own and the manufacturer's works, such labour materials, apparatus and instruments as the engineer may consider requisite to test efficiently the plant, materials or works as far as completed, until the plant is accepted as a whole by the Engineer. The Contractor shall at all times give facilities to the engineer to accomplish such testing.

Instruments provided by the Contractor for such testing shall remain his property.

3.45 Failure under Test

Should the works on testing not conform to the Specification the Contractor must make them so conform at his own expense, and if he fails to do so within a reasonable period, not exceeding fourteen days, the Engineer shall be at liberty to call upon him to remove the defective part and reinstate the same without cost to the Employer.

3.46 Certificates of Test

Certificate of all tests must be furnished by the Contractor to the Engineer for all plant or materials specified to be tested at maker's works.

The tests on site specified are to be carried out in the presence of the Engineer and the accuracy of all tests will be to the satisfaction of the Engineer, whose decision will be final.

The tests carried out are to be properly recorded in a manner agreed with the Engineer at least fourteen days prior to the commencement of tests.

3.47 Instruction in Operation of Plant

The Contractor is to allow for instruction of the Employer's representatives in the full operation of the plant. All attendance costs associated with this instruction period are to be included in the tender price.

3.48 Trade Name Plates

These shall not be erected in any part of the installation without the approval of the Architect or Engineer.

3.49 Publicity

Information contained in drawings or in the Specification or photographs concerning this project shall not be copied or supplied by the Contractor to the Press, Radio, Television and other social media for either private or public publication, or to any other unauthorised person with the prior approval, in writing, of the Main Contractor/Developer or Engineer.

3.50 Access to Plant

Plant arrangement shall be located and selected in such a manner that components may be installed, accessed, maintained, removed and replaced without difficulty and without compromising the safety of personnel. The installation shall, as a minimum, satisfy the following requirements:-

- 17th Edition of the IEE Wiring Regulations.
- Manufacturers recommendations.
- BS 8313 (Accommodation of Building Services in Ducts).
- BSRIA Application Guides - Design for Maintainability.
- BSRIA Technical Notes - Space Requirements for Building Services Distribution Systems.
- CDM Regulations.

All maintainable items of plant shall be accessible from floor level or via permanent access walkways, as necessary.

All items of plant which are likely to be replaced within the life of the building shall be arranged such that they can be removed without dismantling any elements of permanent structure and without comprising normal access and escape routes. For the purposes of this requirement permanent structure shall be defined as any building components which cannot be removed or reassembled within a time limit of two hours.

3.51 Methods of Wiring

The methods of wiring employed on this project shall be as follows :

1. Sub-main distribution cables XLPE/SWA/LSF on cable tray.

2. Lighting and general power wiring shall be LSOH single cables on galvanised trunking. High impact PVC conduit is acceptable. Where cables drop to accessories they shall be protected by capping. Within the plant room / boiler house they shall be enclosed within galvanised conduit and trunking installed surface as required.
3. Fire alarm installation wiring shall be FP200/LSF (fire resistance Cat C.W.2) type cable sheathed (red) on cable basket for the main runs and in propriety cable straps clipped to the building fabric across to cable drops. Within the plant room / boiler house they shall be enclosed within galvanised conduit and installed surface as required.

Note:- Use of this type of cable shall be confirmed with building control/fire officer prior to installation.

4. Data / Comms wiring shall be Cat 5e UTP on cable basket with inlaid flat strip to suit for the main runs and in propriety cable straps clipped to the building fabric across to cable drops. Where cables drop to accessories they shall be protected by high impact PVC conduit.

3.52 Flush/Surface Areas

The electrical contractor shall install the electrical services flush or surface as required in the various areas detailed below.

Flush areas shall be:- All areas with the exception the plant room and electrical intake room.

Surface areas shall be:- The plant and electrical intake room, including all basement areas (except new office)

3.53 Fixing Heights

Except where particular items are expressly mentioned elsewhere in the specification or shown on the drawings the following fixing heights above finished floor level to the underside of equipment shall be taken as a general guide.

The latest DDA requirements are listed below but may not be relevant in many rooms. The room loaded plans and 1:20 wall elevations will take precedence.

<u>Item of Equipment</u>	<u>Height of Centre</u>
Lighting Switch	1200 - 1250mm (see CDS Wilman sections)
Switch Socket (Standard)	450 - 600mm (see CDS Wilman sections)
Switch Socket (Worktops)	150mm above worktop (see CDS Wilman sections)
Fire Alarm Push	1200 - 1250mm

Fire Alarm Sounders	150mm below ceiling level
Distribution Board	2000mm to top of board
Isolator	1400mm or 150mm below ceiling level or adjacent equipment they supply

3.54 Environmental Aims

The general policy is to provide a building, which is environmentally friendly from the global, local external and internal aspects and which minimises the impact on the local community. The building is designed to address the following:

- . Minimise any negative impact on the local environment and where possible improve it
- . Minimise the effect of ozone depletion.
- . Minimise the effect on global warming.
- . Minimise air pollution.
- . Minimise water pollution.
- . Minimise rainforest depletion.
- . Minimise non-renewable resource depletion.
- . Avoid radon contamination.
- . Minimise the risk of Legionnaires disease and the spread of Legionella.
- . Minimise the effects of ionising and electro-magnetic radiation.
- . Avoid the use of potential irritants and/or toxic substances.
- . Avoid design features associated with Sick Building Syndrome.
- . Maximise the opportunity for recycling.
- . Enable planned preventative maintenance regimes to be used to maintain optimum performance.

4.0 TESTING AND COMMISSIONING

All electrical works and specialist systems shall be thoroughly tested and inspected, set to work and commissioned in accordance with the relevant IEE Regulations, British Standard Specifications, Codes of Practice, CIBSE Commissioning Codes, BSRIA Commissioning Guides together with any other related documentation.

Fully certified and calibrated instruments shall be provided to carry out all testing and commissioning. The electrical services contractor shall provide such certification as may be necessary as to the accuracy of all instrumentation employed during the testing and commissioning phases of the works.

Test certificates shall be provided as part of the Operation and Maintenance Information provided by the electrical services contractor as part of the works.

A UK based NIC EIC registered electrical contractor shall undertake the installation of the following systems, within the coffee shop building:-

- Mains Distribution
- Small Power Installation
- Lighting Systems
- Earthing

They shall be responsible for the following:-

- The electrical works installations
- 'Dead' testing
- 'Continuity' testing
- 'Live' testing
- Earthing

Upon completion of the works and testing, the UK based NIC EIC registered electrical contractor shall issue completion certificates for the testing they have undertaken, 'typically' as follows:-

- ICN2 certificate(s)
- Test/commission certificates for all electrical and specialist installations (eg. Data etc)
- Emergency Lighting installation and commissioning certificate
- Fire alarm installation and commissioning certificate

4.1 OPERATING & MAINTENANCE INSTRUCTIONS

Before the Date of Practical Completion the Contractor shall provide two sets of Operating and Maintenance Instructions for all the installations included in the Contract.

These sets shall be adequately bound with board covers to withstand continual usage using a binder system which permits information to be removed for upgrading and allows new information to be added. The manuals shall contain an index and be divided into appropriately titled logical sections to the Client Representatives approval.

Each set shall incorporate a detailed description of the operating procedures for each installation and item of equipment, together with details of the regular maintenance routines recommended by the Manufacturer of each item of equipment, together with typical fault finding routes and a description of emergency action which should be taken in the event of breakdown of equipment. In addition, for each item of equipment, a list of spare parts shall be given which the manufacturers recommended should be kept in store.

The manuals and instructions shall contain, though not be limited by the following information:-

- ❑ Index.
- ❑ Set of reduced A3 size prints from the "As Fitted" record drawings.
- ❑ General description of the systems, equipment used and method of control systems.
- ❑ Schematic diagrams and control diagrams.
- ❑ Schedule of routine maintenance.
- ❑ Schedule of period maintenance for specialised equipment.
- ❑ Schedules of method of adjustments, typical fault finding routine.
- ❑ Wiring diagrams of plant etc.
- ❑ Service manual for all specialised plant giving details as listed above.
- ❑ Separate from the service manual shall be duplicate sets of manufacturer's catalogues relating to specialised plant.
- ❑ Schedule of equipment giving name, address and telephone number of manufacturer, serial number of plant, horsepower electrical supply.
- ❑ Description of emergency action which should be undertaken in the event of breakdown of equipment. Telephone numbers of essential contacts to include.
- ❑ Test and Performance Data.
- ❑ Test Certificates.
- ❑ Recommended spares part list giving item description, part number and replacement time scale.
- ❑ Health and Safety notes, advice and declaration.
- ❑ Marked up record drawing of all emergency lighting test results.
- ❑ Marked up record drawing of all fire alarm sounder test results

All issues of the electronic Operation and Maintenance Manuals shall be supplied in the following formats:-

Documents - Word (*.doc) and Acrobat (*.pdf) formats.

Technical Data Sheets - Acrobat (*.pdf) format.

Drawings - Autocad (*.dwg), Autodesk (*.dwf) and Acrobat (*.pdf) formats.

4.2 RECORD DRAWINGS

The Contractor shall provide, before the Date of Practical Completion, two paper prints. In addition the contractor shall provide disks containing the drawings fully compatible with the latest version of Autocad to BS 1192.

The "As Installed" drawings shall show the following:

- ❑ 1:100 or 1:50 scale drawings and a system diagram of the complete installation showing all switchgear and distribution with the appropriate code letters and identification marks.
- ❑ The system diagram shall record the values of prospective short circuit current and earth fault loop impedance at the origin of the installation.
- ❑ The location of the Supply Authority connection provided within the Sub-Contract whether carried out by the Contractor or by the appropriate Authority, together with the points of origin and termination, size and type of cables.
- ❑ The layout, location and extent of all luminaries showing the type in accordance with the schedule of luminaries, all electrical outlets, telephones, alarm circuits, isolators, starters, motors, appliances, distribution boards and any other outlet, or system installed under the Sub-Contract.

- ❑ The detailed layout of the switchrooms, meter rooms, generator and motor rooms showing where appropriate all existing as well as those items installed under this Sub-Contract. The "As Installed" schematic diagrams of all circuits including control circuits showing switchgear cable, fuse type, size and reference.
- ❑ Complete cable schedules and distribution board schedules.
- ❑ Manufacturer drawings showing the arrangement and assembly of component parts of all machines and any piece of equipment which may need servicing.
- ❑ Diagrams illustrating the principles of operation of automatic controls and of instrumentation, present in combination with any foregoing item.
- ❑ Manufacturers internal wiring diagrams for each piece of electrical equipment supplied under the Sub-Contract, together with physical arrangement drawings where necessary to locate and identify the component parts.
- ❑ The nature and position of all component parts of the earthing system shall be submitted by the Sub-Contractor. The positions of drains, water pipes, structural steelwork, etc., within 4500mm of the location of earth electrodes shall be indicated on the plans.
- ❑ Layouts giving circuit details including circuit reference loading, origin, route, distribution and where buried for each cable, conduit, tray and trunking. The circuit reference shall relate to the appropriate cable schedule and distribution board schedule.
- ❑ Interface details with existing equipment or equipment installed separately from these works.

Two prints of each "As Installed" drawing shall be issued to the Client's Representative for approval prior to final issue.

The Contractor shall also supply and fix in the main switchroom:

- ❑ Notices regarding the electrical installation.
- ❑ Instructions in the form prescribed by HM Stationery Office as to the treatment of persons suffering from electric shock.
- ❑ HMSO Form F954 Electricity.
- ❑ Poster 117 First Aid in Emergency.
- ❑ Health and Safety Poster.
- ❑ Schematic Wiring Diagram of Mains Distribution

The Contractor shall also provide and fix typewritten circuit lists for every distribution board. These shall be enclosed in folders of sheets of transparent non-flammable material, and fixed inside the distribution board.

The Contractor shall also provide reproduced "A3" size copies of all Record Drawings, perforated and incorporated in rigid loose leaf type bindings with protective coverings, for inclusion in the Operating and Maintenance Manuals.

4.3 EMPLOYER'S REPRESENTATIVE TRAINING

The Contractor shall include for training the client's designated personnel in the function, use and maintenance requirements of the systems. The training for each system must be carried out by persons having an in depth knowledge of their function, operation and maintenance.

The training shall be provided in two parts as follows:

- ❑ Outline demonstration of the key functions and operation of each system prior to handover.
- ❑ Detailed training and instruction on each system within three months of handover. The contractor should allow for a minimum of one half day's training for **each** system as defined in the headings of Section 5 of this specification. Additional time should be allowed for complex or large systems.

The training should demonstrate all aspects of the installations to the satisfaction of the client's designated personnel.

The contractor shall be responsible for scheduling and programming the pre and post-handover training to suit the client's designated personnel.

4.4 MAINTENANCE EQUIPMENT AND SPECIAL TOOLS

One complete set of all special spanners, tools, necessary for maintaining in good order the whole of the Contract Plant and equipment shall be supplied by the Contractor together with one suitably fitted container for the Client's maintenance staff. The container shall be provided with a strong lock, for which four keys shall be supplied.

The spanners, tools, etc., supplied under this clause shall not be used during the erection of the plant, otherwise they will be rejected.

All heavy parts of plant shall be provided with some convenient means of slinging or handling during erection or overhaul, and items requiring extraordinary arrangements for removal for maintenance purposes shall be clearly identifiable, and the Client's maintenance staff instructed on the procedures required to carry out such works.

The Contractor shall allow in his tender for ensuring that all equipment which may require dismantling for normal routine maintenance purposes can be readily so done and the Contractor may be required to prove to the Client Representative that dismantling and re-assembling can be carried out with a minimum amount of external work.

4.2 WARRANTY & MAINTENANCE

4.2.1 Warranty

It shall be deemed that Warranty on the plant equipment and installation shall commence at the date of Practical Completion of the Contract Works (Building Works and Services Installations) unless specifically otherwise agreed by the Client's Representative in writing.

The contractor shall warrant all materials, plant, equipment and systems installed against fault, failure and incorrect or inadequate performance for a period of twelve calendar months from the date of practical completion.

The warranty shall include all replacement parts, equipment and labour. The contractor shall allow for carrying out warranty work outside normal working hours as necessary to suit the clients operation of the building. The contractor shall provide a single point of contact for reporting faults and problems which occur on all systems.

The contract shall provide attendance to faults reported within the following periods.

<u>System</u>	<u>Maximum Response Time</u>
LV Main Switchgear	4 hours
Power Distribution (Non-Essential)	1 day
Lighting Systems	1 day
Fire Alarm Systems	4 hours
Security CCTV Systems	4 hours

The contractor shall use his best endeavours to clear faults as quickly as possible. Where faults in essential systems cannot be cleared immediately the contractor shall make appropriate temporary arrangements to restore services.

All faults must be cleared within a maximum of three working days.

The contractor shall prepare and submit to the client a brief report on the circumstances of each fault and what action has been taken.

4.2.2 Maintenance

The contractor shall include for full co-operation and handover of all engineers codes, passwords, software etc with regard to maintenance of the following systems during the first twelve months:

- ☐ Fire alarm

5.0 ELECTRICAL INSTALLATIONS DESCRIPTION

Strip Out - The Electrical contractor shall make himself fully aware of the strip out items/ and or revised locations of the existing electrical services within the existing office and tea making area. Please see CDS Wilman drawings for full details.

5.1 Infrastructure

Electrical

An existing 400v/3ph/50hz electricity supply is present within the existing adjacent electrical switchgear room. It is our intention to re-use this supply.

It should be noted that the contractor must confirm with the University that the existing supply is suitable for re-use. (Note we were shown the point of connection by the University's head of electrical engineering from estates, and requested a separate 100amp 3 phase RCD unit mounted adjacent to existing DB1)

The incoming electricity supply within the adjacent riser shall remain and be re-used.

The new Coffee Shop will be fed via a new 18 way TP&N distribution board from the existing DB1 as shown on the layout drawings.

CDS Wilman are to install a temporary 'Squirrel' energy data logger to monitor the existing loads over the period of 1 week to ensure there is enough spare capacity to connect the new anticipated load.

Telecomms

As existing.

5.2 Low Voltage (LV) Distribution & Switchgear

Low Voltage Distribution & Supply

- Not required (existing utilities LV supply present)

Switchgear

The contractor shall include for all necessary isolations and renewal of the mains distribution and switchgear, as shown on the contract schematic drawings.

The contractor shall comply with requirements of the following regulations which include but are not limited to:-

- BS7671 – IEE Wiring Regulations for Electrical Installations 17th Edition
- Electricity at Work Regulations
- Factories Act including electricity (Factories Act) Special Regulations, 1981
- Requirements of the Health & Safety Executive under the requirements of Health & Safety at Work Act.
- Requirements of the electricity board
- Electricity Supply Regulations 1988

Switches and Switch Fuses

Switch and switch fuses shall be of the rating and number of poles specified. They shall be 500volt rating and shall comply with BS EN 60947. All shall be lockable in the "off" position.

Fuse Switches

Fuse switches shall be used for all units above 100 amps and shall comply with BS EN 60947. Enclosures shall be of metal and shall be surface or flush mounting as Billed. Units shall be complete with all necessary interlocks and retractable handles. All shall be lockable in the "off" position.

Isolators

All local isolators / switches shall be rated for their particular environment, ie external kit and kitchen/wet area isolators shall have the correct ingress protection rating ie, IP65.

Distribution Boards

All distribution boards shall be contained in sheet steel cases suitable for surface or flush mounting as specified. They shall be 500 volt rating.

Busbars shall be copper and shrouded to enable circuits to be wired while the board is live.

The number of ways, current rating and number of phases shall be as indicated on the Schedules.

Distribution boards front door shall be lockable.

Incoming cable terminals shall be shrouded, pressure clamp or socket type.

The neutral and earth terminal connector blocks of TP&N distribution boards shall have a separate way for each way of the board, e.g. 4 way TP&N shall have 12 outgoing neutral, and 12 earth terminals.

Each distribution board shall be provided with an integral isolating switch unless otherwise detailed. The isolator shall be capable of carrying for three seconds the through fault current of the system, modified only by the limiting effect of the feeder circuit fuse, and be lockable in the "off" position.

Where distribution boards have miniature circuit breakers, they shall comply with BS.5486, Parts 1 & 12. The handles of the switches shall be protected, and be lockable in the "off" position. TP&N boards must be capable of taking single pole or triple pole breakers. TP breakers shall have linked handles. A cover shall be provided on the front which can be locked.

Consumer units shall not be used as single phase distribution boards.

Moulded case and miniature circuit breakers shall be of the thermal or magnetic hydraulic type. All standard current ratings shall have 440 volt, 3 phase (0.75 - 0.8 p.f) breaking capacity as required to suit the system fault level but generally miniature circuit breakers shall be 9,000 A rating, type 2 or 3 unless otherwise specified. For prospective fault levels above 9000 A, MCCB's of appropriate rating, shall be provided.

All miniature circuit breakers shall have hammer action trip mechanisms for rapid operation and limitation of let through energies.

All units shall be fully rated for use in any standard listed enclosures. They shall not be subject to de-rating when mounted in standard distribution boards.

The wiring to all M.C.B.'s or fuse banks, neutral bars and earth bars in distribution boards shall be so arranged that all the connections for the same circuit are in the same position on each bank or bar relative to the other circuits.

Basic protection for main circuits to be provided by correctly sized and configured Miniature Circuit Breakers (MCB) having additional protection provided by the application of correctly sized and configured Residual Current Devices (RCD) or Residual Current Breakers with Overcurrent protection (RCBOs).

Generally, MCBs shall be used to protect lighting and power circuits and all other loads.

Where RCD's are provided on outgoing circuits, the RCD shall either be a single module combined RCBO or located in a matching enclosure adjacent the respective distribution board and shall have a rated tripping current of 30mA and give protection to both sinusoidal AC and pulsating DC types of fault.

Where contactors / time switches are provided to control outgoing circuits, the units shall be located in a matching separate enclosure mounted adjacent the respective distribution board.

All distribution boards shall be complete with electricity meters, (split between the lighting and small power) These pulse meters shall be an integral part of the distribution board and be of the same manufacturer. The wiring/monitoring of these meters shall be carried out by others and wired back to the main system within the plant room. (should the client desire)

Rating of M.C.B.'s and Fuses

The correct ratings of M.C.B.'s, H.R.C. fuses corresponding to the sizes of the sub-circuit conductors shall be fitted.

All fuses unless otherwise specified shall be H.R.C. cartridge type to BS.88 category G. (G.E.C. Alsthom or equal), but in all cases shall operate within the parameters shown in Appendix 3 of BS 7671.

Type 2 Co-ordination to IEC 947-4 shall be achieved between protective devices and contactors and overload relays.

5.3 Small Power

Provide small power systems in accordance with current British Standards to suit the development and which minimise the consumption of energy and associated carbon emissions.

Note that the till units will require a separate 'clean' dedicated circuit.

The contractor shall comply with requirements of the following regulations which include but are not limited to:-

- BS7671 – IEE Wiring Regulations for Electrical Installations 17th Edition
- Electricity at Work Regulations
- Factories Act including electricity (Factories Act) Special Regulations, 1981
- Requirements of the Health & Safety Executive under the requirements of Health & Safety at Work Act.
- Requirements of the electricity board
- Electricity Supply Regulations 1988.

The ring main circuit supplying the cleaners/maintenance sockets shall be supplied via a separate dedicated 30mA protected circuit.

The contractor shall ensure meters are provided which have a pulsed output with full integration onto the Clients system (if client deems necessary).

The contractor shall undertake site surveys to ascertain the following design parameters:

- EFLI (Contractor to undertake site measurement)
- PSC (Contractor to undertake site measurement)
- Length of Run (Contractor to undertake site measurement)

All sub main cables shall be supported on a cable tray system throughout their length. The contractor shall be responsible for sizing and routing of the cable containment systems.

A separate single core CPC shall be run parallel with all multi core cables runs.

A complete new small power system will be provided within the coffee shop to generally consist of:-

- Split metering for lighting & power MCB consumer units
- 230V 13A Twin/Single switched socket outlets for general use
- 230V 13A single switched socket outlets for cleaning and maintenance
- 230V 13A switched fused connection units for all fixed counter equipment
- 230V 13A switched fused connection units for ventilation equipment
- 230V 13A switched fused connection units and data points tills

Generally all general use socket outlets circuits will be protected with 30mA RCD units in accordance with BS7671.

Power and control supplies will be installed to all ventilation equipment. All items of mechanical plant/equipment requiring an electrical supply will be provided with a means of local isolation.

The contractor shall be responsible for the design, supply, installation, testing, commissioning and setting to work of general and small power supplies to the following systems:

- Cleaners sockets (Mixture of 32 Amp ring and 20 Amp radial circuits)
- Fixed furniture (Mixture of 32 Amp ring and 20 Amp radial circuits)
- Mechanical Plant (Mixture of 32 Amp ring and 20 Amp radial circuits)
- Data and communication system (Dedicated 20 amp radial circuits)
- General power (Mixture of 32 Amp rings and 20 Amp radial circuits)

The contractor shall be responsible for the co-ordination of the final power requirements and location with all sub-contractors and end users.

The supplies shall be derived directly from the new LV distribution board, via suitably rated and sized protective devices.

Generally, all final sub-circuits for lighting and power systems shall be wired using LSOH (halogen free low smoke and fume) type cables, within a dedicated galvanised conduit and trunking containment system and multi-core XLPE/LSOH/SWA cables.

The minimum power cables cross sectional area that is acceptable shall be 2.5mm². A separate circuit protection conductor (CPC) shall be provided within the cable containment system for each sub-circuit shall be having the same cross sectional area as the associated phase conductor. A separate single core CPC shall be run parallel with all multi core cables runs.

All lighting switches and socket outlets shall be installed in accordance with BS 8300.

All electrical accessories shall be white PVC with the exception of the plantrooms/risers where all electrical accessories shall be metal clad.

Manufacturers of electrical equipment and accessories shall be:-

- Schneider
 - Legrand
 - MK
- or equal and approved.

13 Amp 3 Pin Switch Sockets

Sockets shall comply with BS.1363 and shall be supplied with boxes complying with BS.4662. The boxes shall be pressed steel or cast iron for flush or surface mounting. The boxes of all socket outlets shall have an earth terminal which shall be connected to the earth terminal of the socket with 1.5 sq. mm. P.V.C. sheathed (Green/Yellow) conductor. Deep steel boxes shall be used for flush installations. Each outlet shall have a self-adhesive label, with circuit designation

13 Amp Fused Spur Units

13 amp fused spur unit shall each consist of a sheet steel box or brushed chrome with single pole fuse unit. The fuse unit shall be suitable for accommodating fuses to BS.12362 in a retractable use carrier. The overlapping cover plate shall have corners and edges neatly rounded and bevelled with a fuse carrier finished white.

Where called for, these units shall incorporate a suitably bushed hole in the cover plate for a flex outlet.

Where the above units are required with indicator lights, the indicator shall be of the neon type - coloured RED. Each outlet shall have a self-adhesive label, with circuit designation.

Labelling

Labelling of all switches, etc., shall be neat and symmetrical with standard spacing between letters. All marking shall be labelled in full, no abbreviations will be allowed. All lettering shall be in black except where stated otherwise. The Contractor shall include the cost of labelling in the price entered for the switch, etc

Cable Containment system

The contractor shall be responsible for the design, supply, installation, testing, commissioning and setting to work of cable routes and wire ways to facilitate the installation of the following services:-

- LV Sub mains
- General Power and lighting circuits
- Emergency Lighting Circuits
- Data and communication cables
- Controls cables
- Fire Alarm System

It shall be the responsibility of the contractor to liaise and co-ordinate with the mechanical sub-contractor, prior to commencing the installation of cable containment in all areas.

The co-ordination shall take the form of fully detailed installation drawings prepared by the contractor at an early stage in the contract programme which shall be approved by the engineer.

Full allowance shall be made for structural beams, heating pipe work and ventilation ductwork in respect of bends, off-sets and additional suspensions required.

The contractor shall be responsible for detailing all builders work openings and penetrations associated with the cable containment system internally and externally.

The contractor shall ensure cable support systems are in accordance with BS 7671 and manufactures guidelines and are capable of carrying without undue deflection, the total weight of cables that can be accommodated on the cable containment system.

The containment systems shall be installed complete with all the necessary manufacturers' accessories to provide a complete installation. Where these accessories do not exist, the contractor shall manufacture a site made alternative being free of all protrusions and sharp edges.

Where the containment is cut, all cuts are to be coated in a protective paint. All containment shall be suitably earthed in accordance with current regulations.

The sizing and installation of the cable containment shall be in line with the manufacturer's requirements and Guidance Note 1 Selection and Erection published by the IET.

The Primary and Main secondary cable containments system shall be all be sized with a 25% future capacity allowances.

The size and quantity of cables installed in any trunking shall be such that having taken into account the necessary cable grouping/rating factors an overall space factor of 25% is not exceed

Minimum cable containment sizes

- Light Duty Tray 50mm Wide
- Medium Duty return Flange 100mm Wide
- Heavy Duty return flange 150mm Wide
- The minimum trunking size shall be 50mm x 50mm (Class 3 Pre galvanised)
- The Minimum Conduits diameter shall be 20mm
- All Conduits shall be hot dipped galvanised Class 4

All Dado trunking shall be provided with an EMC screening insert and associated accessories to comply with BS EN 50174, BS EN 50085-1: 2005 and BS 4662: 2006.

The trunking shall be minimum 3 compartment and be sized to accommodate all cabling allowing for space factors and a future spare capacity allowance of 20%.

All dado trunkings shall be complete with all manufacturer's bends, dividers, couplers and end caps and drops. All trunkings shall be mounted horizontally with vertical risers to the main containment installation at high level or in the ceiling voids final connection between the Vertical dado trunking and ceiling mounted routes shall be via a flexible conduit solution

Where appropriate light switches shall be located the vertical section of the dado trunkings

All dado trunkings and back boxes shall be suitable for the installation of Cat 5e cables. The electrical accessories shall match the power within the respective area.

The accessories shall utilise modular front plates for use with module data socket outlets.

The distance between data baskets and power trays shall be spaced in accordance with BS EN 50174 to maintain a minimum of 200mm on parallel runs, and 30mm minimum between trunkings.

Each length of containment shall be bonded to the next by means of the manufacturer's earth link and cross bonded in line with BS7671.

Fire compartments

The contractor shall comply with the requirements of BS 7671 and buildings fire strategy wherever the cable containments and services pass through the perimeter of a fire compartment (wall, floor or ceiling).

Where cables, conduit, trunking and cable trays pass through the fire resistant structural elements such as floors and walls designated as fire barriers, the opening made shall be sealed to the appropriate degree of fire resistance.

Where cables or conductors are installed in channel, ducts, trunking, basket etc. which pass through fire resisting elements, internal fire resistant barriers shall be provided by the contractor to prevent the spread of fire.

Where trunking, ducting and other enclosed electrical services (other than conduit) pass through walls, floors and ceilings proprietary integral fire barriers shall be installed. Fire barriers shall have a rating not less than that of the surrounding materials fire rating.

Where a lidded section of trunking, ducting etc passes through a wall or floor, a fixed section of lid shall be installed extending 100mm either side of the solid construction.

Either side of a solid construction, a traffolyte label shall be fixed to the trunking lid "Fire Barrier" (white on red).

5.4 Communications / Data

The electrical contractor shall liaise and fully co-ordinate with the University's IT department.

The electrical contractor shall supply and install the Cat 5e infrastructure (to match existing installation) and any associated power requirements to support a new communication / data system for the coffee shop, which is to be integrated into the existing patch panel within the upper floors.

The contractors communication / data specialist shall be responsible for the design, commissioning and setting to work of the communications / data system Cat 5e including new connections to the coffee shop. They will advise on any required internal / external containment and cabling, as required.

The following standards are applicable to the design and installation:-

- European Committee for Electro technical Standardisation (CENELEC) – European
- Telecommunications Industry Association (TIA/EIA) – American
- International Organisation for Standardisation (ISO) – International
- BS EN 50173-1:2002 Information technology. Generic cabling systems. General requirements and office areas
- BS EN 50173-2:2007 Information technology. Generic cabling systems. Office premise
- BS EN 50173-5:2007 Information technology. Generic cabling systems. Data centres
- BS EN 50174-1 - Information Technology - Cabling Installation. Specification and quality assurance.
- BS EN 50174-2 - Information Technology - Cabling Installation. Installation planning and practices inside buildings.
- BS EN 50174-3 - Information Technology - Cabling Installation. Installation planning and practices outside buildings.
- BS 6701 - Telecommunications equipment and telecommunications cabling.

- Specification for installation, operation and maintenance.
- BS 7671 - Requirements for Electrical Installations - IEE Wiring Regulations Seventieth Edition

This location is existing and ensuring the 'rule of thumb' of 90 metres, as a maximum length of data cabling, is adhered to.

The **existing University's WiFi** unit shall be carefully protected during the works within the coffee shop and be retained, although shown on the existing layout drawing this is not shown on the proposed layout drawings, as this is to remain as existing.

5.5 General and Emergency Lighting

The contractor shall be responsible for the supply, installation, testing, commissioning and setting to work of a general and emergency lighting scheme, as described and shown on the layout drawings and below.

The following standards are applicable to the supply and installation:-

- CIBSE Code for Interior Lighting
- EN 12464-1 Lighting of indoor work spaces
- BS 5266-1:2005 Emergency Lighting
- BS 5266-7:2005 Emergency Lighting
- BS EN 50172 (BS 5266-8).
- BS 5266-2.
- BS 5266-4.
- BS 5266-5.
- BS 5266-6.
- BS EN 1838, BS 5266-7
- BS EN 50171.
- CIBSE LG12.

General Lighting

A new general lighting scheme will be installed to provide artificial illuminance to enable general travel through the building & maintenance tasks to be carried out easily, safely and effectively. The lamp types chosen shall be high energy efficient with long life expectancy and low maintenance.

LED lamp types shall be provided where possible.

Lighting levels & uniformities shall be in accordance with CIBSE Lighting Guides, and Society of Lighting guidance.

Lighting shall be selected to compliment the aesthetics of the surroundings in which they are installed. (please refer to luminaire schedule, layout drawings and CDS Wilman's interior designers proposals).

Control of the lighting shall be by presence detection and daylight linked whereby lighting will not switch on when sufficient daylight is available.

Lighting in existing stores shall be switched manually. (as existing)

Emergency Lighting (3NM)

Emergency lighting provision will be included internally and externally, which will cover all areas of the building. The emergency lighting shall be incorporated within the normal lighting luminaires utilising integral battery (self-contained). The emergency lighting will be operated by either a total power failure or local circuit failure ensuring emergency lighting provision wherever the power to the normal lighting has failed.

The system will have a standard back up time of 3 hours.

The system shall be self-contained and non-maintained.

Additionally internally illuminated exit signs will be provided at various internal locations e.g. final exits and corridors to guide people to the nearest exits in the event of power failure or other evacuation.

External emergency bulkhead type water resistant luminaires will be installed above all normal final exit doors.

The emergency lighting shall comprise of manual testing of the emergency lighting via test key switches located in a suitable location, to be adjacent to the client's distribution board(s).

The emergency lighting shall be in accordance with BS 5266 which states:-

- Emergency light levels must reach 50 percent output within five seconds and 100 percent output within 60 seconds.
- Mandatory lighting must achieve a minimum illumination level of 1 lux at the floor (centre) for the following locations: stairs, landings, change of levels, change of direction, intersections, at emergency stairwell doors (corridor side), at emergency exit doors from areas of risk such as kitchens and public assembly spaces and at emergency exit doors from back of house spaces (plant rooms, plumbing/sprinkler rooms, switchgear/transformer rooms, etc.)
- Mandatory lighting must achieve a minimum illumination level of 0.5 ft-candle/5.4 lux at the floor directly in front of all firefighting equipment/appliances, fire panels and pull stations, throughout the entire property.
- Infill lighting between mandatory lighting along the means of egress, must achieve an average minimum illumination level of 1 lux at the floor (centre) and, not less than 0.2 lux at any point, along the entire means of egress at floor level and at the public way.

5.6 External Lighting

Utilise existing external lighting.

5.7 Lift

The lift installation is not part of this scheme.

5.8 Fire Alarm

The electrical contractor shall be responsible for the design development, supply, installation, testing, commissioning and setting to work of the fire alarm system, as described below.

An L1 category fire alarm system shall be provided in accordance with the Local Fire Officer and BS5839.

An L1 fire alarm system shall be supplied, installed, commissioned & set to work so as to cover all the internal areas, it shall be designed so as to give the maximum fire detection whilst minimising the potential for malicious and false activation.

Smoke detection shall be located in all areas, in accordance with this system, including within any ceiling or floor voids greater than 800mm deep. Heat detection shall be installed in all counter type areas.

Security fixings shall be provided on all fire alarm detection equipment.

Conventional electronic bell sounder circuits shall be run separately from the detection circuits, as shown on the drawings.

Plastic protective covers shall be installed on call points on the final exits, to hopefully help eradicate nuisance alarms.

A new fire alarm mimic diagram shall be provided next to the fire alarm panel to indicate the fire alarm zones. The diagram shall be a colour A3 zonal representation of the building housed in a protective frame.

Fire Alarm Cause and Effect

Single Knock – (ie one out – all out)

Fire Alarm Cable and Wiring

The system will be wired in enhanced grade fire rated cable with red LSF sheath either clipped to the building fabric or tied to containment using proprietary fire rated cable ties.

All Fire alarm cables shall be tested and approved by LPCB and BASEC

The commissioning of the system will be carried out in accordance with BS 5839-1:2013, Section 5, Clause 39.

The contractor shall make arrangements with the fire alarm specialist, to coordinate the installation/commissioning.

On completion of commissioning, a Commissioning Certificate in accordance with BS 5839-1:2013, Clause 39 will be provided by the fire alarm specialist.

5.9 Disabled Alarm System

Not part of this scheme

5.10 Intruder Alarm System

Not part of this scheme – University's responsibility.

5.11 CCTV System

Not part of this scheme – University's responsibility.

5.12 Sound System

Not part of this scheme – University's responsibility.

5.13 Televisions

Not part of this scheme – University's responsibility.

University to remove existing TV screen.

5.14 Projectors

Not part of this scheme – University's responsibility.

University to remove existing projector.

5.15 General Earthing and Bonding

The electrical contractor is responsible for the supply, install, testing, commissioning and setting to work of a complete general earthing and bonding system for the coffee shop.

The following standards are applicable to the design, installation and commissioning of the earthing and bonding systems:-

- BS 7671
- BS 7430
- Electricity Supply Regulations (17th Edition)
- Local Electricity Supply Authority Requirements

All non-current carrying metalwork associated with the electrical power distribution network equipment and ancillaries, and all extraneous metalwork of and in the building structure shall be effectively bonded and connected to earth at a common potential earth continuity system.

Sub Circuit Distribution Earthing

All sub-circuit armoured and single core supply cables emanating from the sub- distribution switchboards, starter panels, and control panels shall be terminated on the gland plates and bonded at both ends to the earthing bars with individual circuit protective conductors from their gland tags.

In addition to this armouring bonding separate green / yellow PVC insulated stranded copper circuit protective conductor shall be provided.

A circuit protective conductor shall be run within every circuit and shall be terminated on the main earth bar of each sub-distribution switchboard, starter panel or control panel.

The separate green/yellow PVC insulated stranded copper circuit protective conductor shall be connected to the earthing terminal of each of the terminal switchgear/equipment earth.

Earthing for Final Circuits in Trunking and Conduits

A completely separate circuit protective conductor shall be provided for each circuit. The circuit protective conductors shall distribute radially from the earthing bars of the sub-distribution switchboards from which the trunking and conduit systems emanate.

Each circuit protective conductor shall have its own termination point within the distribution switchgear and where these are multiple in numbers they shall be arranged and labelled in the circuit orientation so that identification can be readily understood.

Under no circumstances shall copper tape be used in conjunction with galvanised screws, nuts or washers: all such screws, nuts or washers shall be brass or electro tinned.

Earthing of Distribution Boards

All circuit protective conductors shall terminate within distribution boards with an earthing terminal block.

Every circuit protective conductor shall have its own individual termination point within the distribution switchgear.

The terminal block shall be arranged and labelled in the circuit orientation so that identification can be readily understood.

Supplementary Bonding

Supplementary bonding shall be carried required by BS7671.

Minimum conductor size shall be 6mm²

In addition to the rubber mat, statutory warning and resuscitation notices shall be placed in the switchroom along with a frame diagram of the mains distribution system. All A1 size.

5.16 Electromagnetic Compatibility

All items of electrical plant and equipment should fully comply with the EMC Directive 89/336/EEC and subsequent amendments.

The EMC Directive will be mandatory throughout Europe from 1st January 1996 and any services installation completion that is beyond this date should comply with the EMC Directive.

In brief all electrical plant and equipment must be designed in such a way that: Electromagnetic disturbances generated by any electrical plant and equipment do not cause interference to any other systems.

The performance of the product is not affected by electromagnetic disturbances within the environment in which the product is intended to operate.

The Contactor shall ensure that all items of electrical plant and equipment have the required EMC Directive Declaration of Conformity.

If the manufacturers proposed products do not comply with the EMC Directive the engineer must be informed before purchase and installation.

6.0 Appendix A - DRAWING SCHEDULE

Refer to the drawing issue sheet issued under separate cover.

7.0 Appendix B – ELECTRICAL EQUIPMENT SCHEDULES

All shown on the layout drawings

8.0 Appendix C – SCHEDULE OF PREFERRED MANUFACTURERS

The following schedule lists preferred electrical manufacturers to be considered for the scheme and used as a quality benchmark:-

Equipment	Manufacture/Supplier
Luminaires	Phillips, Thorn, Thorlux
Small Power Accessories	MK, Legrand, Delta, Crabtree
~~MCCB Section Board~~	~~Schneider, ABB~~
Distribution Board	Schneider, ABB
Fire Alarms	Open Protocol
~~CCTV~~	~~Belkin/Netgear/Samsung~~
Steel Conduit	Walsall, Barton
Basket Tray	Wiremold, Mita, Swifts
Galvanised Cable Trunking	Salamander, Wiremold, Trunk Line, Legrand
Cables (all)	BICC/AEI/Draka
~~Intruder Alarm~~	~~Advance Fire & Security Systems, Open protocol~~
Data	Connectix/Krone/D-Link/3M/Netgear (to match existing)
Sound/Audio System	(client)
TV Specialist	(client)
Projector Specialist	(client)

9.0 TENDER RETURN SUMMARY

TENDER SUMMARY

1.0	PRELIMINARIES (INC CDM)	£.....
2.0	ELECTRICITY SUPPLY	£.....
2.1	ATTENDANCES	£.....
3.0	MAIN & SUB-MAIN LV DISTRIBUTION	£.....
4.0	SMALL POWER	£.....
5.0	MECHANICAL SERVICES WIRING	£.....
6.0	GENERAL AND EMERGENCY LIGHTING	£.....
7.0	~~EXTERNAL LIGHTING~~ (not required)	£.....N/A.....
8.0	FIRE ALARM & DETECTION SYSTEM	£.....
9.0	I.T/COMMS/DATA SYSTEM	£.....
10.0	INTRUDER DETECTION (BY CLIENT)	£.....N/A.....
11.0	CCTV SYSTEM (BY CLIENT)	£.....N/A.....
12.0	STRIPPING OUT (EXISTING OFFICE)	£.....
13.0	EARTH BONDING	£.....
14.0	TESTING /COMMISSIONING/STAFF TRAINING	£.....
15.0	O & M MANUALS AND DRAWINGS	£.....
16.0	MISCELLANEOUS	£.....

Sub Total

£

Other

£.....

Grand Total

£.....

Signed

Date.....

On behalf of (Company).....