REPUBLIC OF KENYA

KISII COUNTY GOVERNMENT

ARAB BANK FOR ECONOMIC DEVELOPMENT IN AFRICA

SAUDI FUND FOR DEVELOPMENT

M I N I S T R Y O F H E A L T H

BIDDING DOCUMENTS

For Procurement of

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

ELECTRICAL INSTALLATIONS

TENDER NO.: MOH/NCCP/ICB/003-1/2021-2022

(1 of 3)

CLOSING DATE: 1st JULY 2022 AT 10.00 A.M. LOCAL TIME

SCHON ASSOCIATES

NARCO ENGINEERING CONSULTANTS

Issued on: 1st June 2022

PROPOSED KISII CANCER CENTER – AT KISII COUNTY

TECHNICAL SPECIFICATION AND BILLS OF QUANTITIES

FOR

ELECTRICAL INSTALLATIONS

TABLE OF CONTENTS

SECTION 1

Evaluation Criteria

SUB-CONTRACTOR QUALIFICATION INFORMATION

BID ELIGIBILITY AND QUALIFICATION CRITERIA

The following criteria will be used in the evaluation of all bids. The submission of the required documents will be used in the determination of the Completeness and Suitability of the Bid. Bids that do not contain all the information required will be declared non-responsive and shall not be evaluated further.

MANDATORY EVALUATION

ITEM	MANDATORY REQUIREMENT	YES	NO
1	Copy of Certificate of Registration/Incorporation		
2	Copy of Valid Tax Compliance Certificate from Country of Residence		
3	Manufacturer's Original Brochure for specific items offered		
4	Copy of valid business permit or International equivalent		
5	Copy of Valid Registration with National Construction Authority (NCA) for Electrical (Class 1) or equivalent International standard, include relevant licenses, registration, and certifications		
6	Attach copies of Recommendation letters from three of your major clients having undertaken similar assignment		
7	Show proof of Local/Regional presence		
8	Certified copy of valid contractor's annual NCA practicing license for Electrical works or equivalent International Standard		
9	Certified copy of Company Record showing shareholders (CR12 or Equivalent)		
10	Audited Accounts for the last three years		
11	Prove of having completed at least one relevant project valued at Kshs 100 million and above for Electrical Installation sub-contract, completed in the last 10 years. Attach award letter and completion certificate.		
12	Technical specifications of all the equipment proposed as laid out in the Specifications and Drawings. Include Brochures and Catalogues.		
13	The Bidder shall provide details of line(s) of credit available to the bidder, including amount(s) and name of bank(s) making available such line(s) of credit		
14	The Bidder shall provide letter(s) authorizing the Employer to seek references from the bidder's bankers		
	PASSED (RESPONSIVE)		
	FAILED (NON-RESPONSIVE)		

NOTE: **Failure to comply with Mandatory requirements will lead to automatic disqualification.**

Only bidders who are successful at this stage will proceed to the next stage of evaluation.

SECTION 1:
SIGNATURE PAGE & SPECIAL NOTES
KISII CANCER CENTRE - KISII COUNTY, KENYA

PROPOSED KISII CANCER CENTER – AT KISII COUNTY

TECHNICAL SPECIFICATION AND BILLS OF QUANTITIES

FOR

ELECTRICAL INSTALLATIONS

Preamble

Supplied as part of the Main Tender for the Electrical Installations at PROPOSED KISII CANCER CENTER – AT KISII COUNTY

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ISSUED BY:

The Principle Secretary
Ministry of Health
P.O. Box 30016 - 00100,
Nairobi, Kenya.

PREPARED BY:

Schon and Associates,
P.O. BOX 38601-00100,
Nairobi, Kenya.

The Tender for the above-mentioned works dated this_____ day of _____ 2022 by the undersigned parties refers to the Bills of Quantities consisting of the pages numbered on contents page.

.....	.....
SUB-CONTRACTOR	MAIN CONTRACTOR
Date 2022	Date 2022

SIGNATURE PAGE

PROPOSED KISII CANCER CENTER – AT KISII COUNTY

TENDER FOR ELECTRICAL INSTALLATIONS

SPECIAL NOTES

1. The Tenderer shall tender for the above Works in accordance with the appended drawings, Technical Specification and Bills of Quantities.

2. The Tenderer is required to check the numbers of the pages of these Bills of Quantities against the contents stated on Page 1-i and should he find any missing, in duplicate or illegible he must inform the Engineer at once and have the same rectified.

3. Should the Tenderer be in doubt about the precise meaning of any item or figure, for any reason whatsoever, he must inform the Engineer in order that the correct meaning may be decided before the date for submission of the tenders.

4. No liability will be admitted or claim allowed in respect of errors in the Tenderer's tender due to mistakes in the Bills of Quantities that should have been rectified in the manner described above.

5. The annexed Bills of Quantities must be fully priced in ink. The Tenderer shall not alter or otherwise qualify the text of these Bills of Quantities. Any alteration or qualification made without authority will be ignored and the text of the Bills of Quantities as printed will be adhered to.

6. **Fully priced Bills of Quantities must be accompanied by brochures and technical literature for the major mechanical and electrical items.**

7. The Tenderer shall be deemed to have made allowance in his prices generally to cover items of Preliminaries or additions to Prime Cost Sums or other items, if the Tenderer has not priced these where appropriate.

8. All items of measured work shall be priced in detail and tenders containing lump sums to cover trades or groups of work must be broken down to show prices of each item before they will be accepted. Lump sums to cover items of Preliminaries shall be likewise broken down if so required.

9. This tender shall be exempted from **all taxes and duties** as imposed by Kenya Revenue Authority or any other Statutory Authority in Kenya having jurisdiction over the works.

10. Under no circumstances will any expense incurred by Tenderers in preparation of this tender be allowed.

11. The copyright of these Bills of Quantities is vested in the Engineer and no part thereof may be reproduced without express permission given in writing by the Engineer.

12. The Tenderer is solely responsible for the accurate ordering of materials in accordance with the Drawings and Engineer's instructions and no claim for any loss or expense will be entertained for orders for materials based upon the Bills of Quantities.

13. The successful tenderer shall be appointed as a **NOMINATED SUB – CONTRACTOR under the FIDIC Conditions of sub-contract for construction for building and engineering works designed by the employer**

PROPOSED KISII CANCER CENTER – AT KISII COUNTY

TENDER FOR ELECTRICAL INSTALLATIONS

CONDITIONS OF TENDERING

1.01 Each Tenderer must submit, enclosed in a plain sealed envelope clearly marked, "TENDER FOR ELECTRICAL INSTALLATIONS FOR THE PROPOSED KISII CANCER CENTRE – KISII COUNTY". The Tenderer shall enter his tender sum on the prescribed Tender Form.

1.03 Each Tenderer must submit the name of a Surety who shall be an established Bank, willing to be bound to the Tenderer in the sum equal to ten per cent (10%) of the tender sum for due performance of the Contract and must submit together with his tender the form attached thereto duly filled in and signed by the proposed Surety agreeing to sign a Bond to that effect when and if called upon to do so. **A Surety from an insurance company will not be accepted**.

1.04 Tenders and all the Documents in connection therewith as specified above must reach the Address as advised and on the date stated in the covering letter accompanying these documents.

1.05 In the case of a tender not being delivered by hand, the Tenderer must arrange for his tender and other documents to be posted in time to reach the above office not later than the stipulated time.

1.06 Any tender delivered after the stipulated time, from whatever cause arising, will be disqualified.

1.07 In no case will any expense incurred by the Tenderer in the preparation of his tender be allowed.

1.08 Tenders shall remain valid for One Hundred and Twenty (120) days from the final date of submission of tenders stipulated in Paragraph 2.01 above, and no Tenderer may withdraw his tender after that period.

1.09 The Employer shall not be bound to accept the lowest or any tender and shall not be bound to give reasons for his decision.

1.10 The Engineer shall notify the accepted approved Tenderer (if any) of such acceptance by letter within One Hundred and Twenty (120) days during which, by Paragraph 3.01 thereof, the tender is to remain valid and the said Tenderer shall then within the time stated in the Form of Tender first execute the formal Contract Agreement and then on the same day his approved Surety shall sign the Bond. The Engineer however, reserves the right to extend the period for executing the formal Contract Agreement if satisfied that adequate reasons exist for so doing.

1.11 Every notice to be given to a Tenderer may be posted to the Tenderer's address as given in his tender and such posting shall be deemed to be good service of such notice.

1.12 The term "Electrical and Mechanical Engineer" wherever used in these Conditions and in all Contract, Documents shall be such person or persons as may be duly authorized to represent M/s Schon Associates.

1.12 The words "Approved Tenderer" in these Conditions shall mean that the Tenderer shall be approved by the Employer as having complied with these Conditions in every respect.

1.13 The word "Tenderer" in these Conditions shall be deemed where applicable to include two or more persons. The word "his" may also mean "their" and the word "he" may also mean "they".

1.14 If it is found on the examination of a tender that there is a discrepancy between the Total Amount of the tender and the amount arrived at by valuing the quantities set out in the Bills of Quantities at the rates or prices set against them by the Tenderer, then the figures shall be corrected arithmetically and the differences between the tender and the corrected total shall be applied as a percentage adjustment or addition or omission on all the rates, so that the original tender amount remains unaltered. When calculating the percentage adjustment, the total cost of the Preliminaries, Provisional and P.C. Sums, Contingencies and any other items of a similar nature shall be excluded.

1.15 If it is found on examination, that any rates for the work appear to be unreasonable then the attention of the Tenderer shall be drawn to any such items. If as a result of this, the Tenderer asks for any rates to be changed, then the arithmetical effect of any change will be adjusted in accordance with sub-paragraph 8.01 above.

1.16 Non-compliance with the above Conditions in any respect shall render the tender liable to rejection.

FORM OF TENDER

To:

Principle Secretary
Ministry of Health,
P.O. Box 30016- 00100
Nairobi, Kenya.

Sirs,

PROPOSED KISII CANCER CENTER – AT KISII COUNTY

TENDER FOR ELECTRICAL INSTALLATIONS

1.01 Having visited the site and examined the tender documents for the execution for the above works I/We

……

(Names) under and subject to the Conditions of Tendering annexed hereto, hereby tender and offer to execute and perform the works and provisions and supply all labour and materials and everything of every kind respectively named, shown, described and alluded to in, or to be inferred from the **FIDIC Conditions of sub-contract for construction for building and engineering works designed by the employer**, the General Conditions of Sub-Contract, Specification and Bills of Quantities, Drawings and conditions of contract to be executed and supplied on the part of the Sub-Contractor, for the Works above described for the Sum of:-

Fixed /Non Fluctuating Price Tender (Adjusted fluctuating price to allow for future price changes). Tender figure, Prime Cost & Provisional sums and Contingencies.

Amount in figures (USD): . . . .

Amount in words (USD): . …… . . . . . .

. . . . ……

1.02 I/We agree to phase the sub-contract work in accordance with the building programme to be agreed with the main Contractor at the time of letting the Main and Sub-Contracts.

1.03 I/We further agree to be bound by and submit to the said General Conditions of Sub-Contract and priced Specification and Bills of Quantities which shall form a basis for valuation of interim Certificates and any extra or omitted work which may from time to time be ordered by the Architect.

1.04 We have examined all the documents, which will form part of this contract and have no further questions relating to them.

2.01 I /We submit the name of ……

Address ……

as a Surety who is willing to be bound to the Main Contractor in an amount equal to 10% of the Sub-Contract amount for the due performance for the Sub-Contract up to the date of completion of the Works as certified by you, and who will, when and if called upon, sign a Bond to that effect without limitations on the same day as the Sub-Contract Agreement is signed, but thereafter, and in the event of the Surety named herein not being approved by you, the undersigned agree(s) to furnish

within seven (7) days another Surety to your approval.

3.01 Whereas it is understood that you reserve to yourself the right to accept or to refuse this tender whether it be lower or higher than any other tender, or of the same amount, the undersigned agree(s) that this tender shall remain valid and shall not be withdrawn within One Hundred and Twenty (120) days from the final date for the submission of Tenders stipulated in the Conditions of Tendering.

4.01 And further, the undersigned agree(s), in the event of your acceptance of this tender, to execute the formal Sub-Contract Agreement within seven (7) days from posting, or delivery if by hand, of notification of acceptance.

Signature of Tenderers: ……

Name of Tenderer: ……..

Address: ……..

Date: ……

Signature of Witness: ……...

Name of Witness: ……

Address: ……..

Date: ……..

NOTE: Tenderers are not required to attach the Surety Undertaking, duly signed by the Surety, to this Form of Tender. However, a performance bond will be executed on being successful before contract signature.

DECLARATION ON AVAILABILITY OF MATERIALS, PLANT, SUPERVISION AND SKILLED LABOUR

To: The Principle Secretary
Ministry of Works
P. O. Box 30016 – 00100
Nairobi, Kenya

Sirs,

PROPOSED KISII CANCER CENTER – AT KISII COUNTY

TENDER FOR ELECTRICAL INSTALLATIONS

In connection with the attached tender for the above Sub-Contract, I/We have made full enquiries with manufacturers and/or distributors of the relevant materials and plant required to be incorporated or used in the Works and I/We hereby declare that I/We will have available: -

*(a) all the necessary
or *(b) a proportion of the necessary

Materials, plant, tools and equipment, supervision and skilled labour

*(a) from stocks in hand
or *(b) from sources of supply available to me/us
for use as and when they are required for the Works.

Signature of Tenderer …….

Name of Tenderer ……...…….

Address ……...……...

Date…….

NOTES: -

1. *Delete whichever is not applicable.
2. *The Tenderer may be required before approval

(a) To disclose the (i) actual quantities of the various materials and (ii) plant available for immediate use and, (iii) To submit names and CV's and academic certificates of available supervision personnel and team leader being a mechanical engineer with over 10 years' experience, (iv) Skilled labour.

b) To give details of the arrangements which have been made by the Tenderer for the obtaining and delivery to the site of the further materials and plant and employment of supervision and skilled labour required to complete the works.

3. Failure to satisfy the Engineer that adequate arrangements have been made to provide or obtain the whole of the materials, plant, tools and equipment necessary to complete the Works within the contract period or such extended period as may be authorized, may render the Tenderer liable to be considered in default.

SURETY UNDERTAKING

PROPOSED KISII CANCER CENTER – AT KISII COUNTY
TENDER FOR ELECTRICAL INSTALLATIONS

We …… (Surety)

of P.O. Box ……

hereby undertake to provide a guarantee in the form of Performance Bond supplied with these tender documents, under seal if so required, for the due performance of the contract to the extent to ten percent (10%) of the awarded contract sum in the event of

……(tenderer)

of (address) ……..

being awarded the tender for construction and completion of the project including twelve (12) months maintenance.

We further agree to execute a Performance Bond under the forgoing terms within FOURTEEN (14) DAYS of being called upon to do so.

Should the said tenderer not be awarded the contract, it is understood that this offer shall become null and void.

Signed for and on behalf of surety …….. (Authorised signatory)

Name & address of surety (official rubber stamp)

……

Date signed ……..

CONFIRMATION OF SUFFICIENCY OF INFORMATION PROVIDED / SITE VISIT

This is to certify that we _____
(Name of Tenderer)

of the firm of _____

(Name of firm tendering)

Having studied the contract documents, have made our selves familiar with all local conditions likely to influence the works and cost thereof.

We undertake to treat all provided information with strict confidentiality.

We further certify that we are satisfied with the description of the works and explanations given and confirm as follows:

We visited the site on _____and confirmed all necessary information.

We did not visit the site but confirm sufficiency of provided information:

_____ _____

Signed (Name & Signature of Tenderer)

PERFORMANCE BANK GUARANTEE

PROPOSED KISII CANCER CENTER – AT KISII COUNTY
TENDER FOR ELECTRICAL INSTALLATIONS

To:

Principle Secretary
Ministry of Health,
P.O. Box 30016- 00100
Nairobi, Kenya.

(Date)

Dear Sir,

WHEREAS…… (Hereinafter called "the Contractor") has undertaken, in pursuance of Contract for …… to execute (herein after called the “works”)

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for a sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of USD…….

(Amount of Guarantee in figures) USD…… ……

(amount of Guarantee in words), and we undertake to pay you, up to your first written demand and without cavil or argument, any sum or sums within the limits of USD …… …….. (Amount of Guarantee in words) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change, addition or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this Guarantee, and we hereby waive notice of any change, addition, or modification.

This guarantee shall be valid until the date of issue of the Certificate of Completion.

SECTION 2:

PRELIMINARIES

KISII CANCER CENTRE - KISII COUNTY, KENYA

PROPOSED KISII CANCER CENTER – AT KISII COUNTY

TENDER FOR ELECTRICAL INSTALLATIONS

PRELIMINARIES

PRELIMINARIES

A ABBREVIATIONS

Throughout these Bills, units of measurements and terms are abbreviated and shall be interpreted as follows: -

"m^3"	Shall mean Cubic Metre
"m^2"	Shall mean Square Metre
"Lm or m"	Shall mean Linear Metre
"Lbs."	Shall mean Pounds Weight Avoirdupois.
"kg"	Shall mean Kilogram.
"No."	Shall mean Number.
“P.Sum”	Shall mean Provisional Sum
“Sum”	Shall mean Lump Sum
"Prs."	Shall mean Pairs.
“LV”	Shall mean Low Voltage

"Do." or “ Ditto” Shall mean the whole of the preceding description except as qualified in the description in which it occurs. Where it occurs in descriptions of succeeding items it shall mean the same as in the first description concerned. Where it occurs in brackets it shall mean the whole of the preceding description which is contained within the appropriate brackets. Where it is underlined it shall mean the whole of that part of the preceding description which is underlined.

The full titles of the Standards referred to in this document are as follows:

BS	- British Standards
IEC	- International Electrotechnical Commission
IEE	- Institution of Electrical Engineers
ISO	- International for Standardization Organization
CIE	- International Standard on Illumination
EN	- European Committees for Standardization
CECC	- European Committee for Electrotechnical Standardization
DIN	- Deutsches Instut fur Norming
KEBS	- Kenya Bureau of Standards

A ALTERATIONS TO TEXT ETC.

Any unauthorised alteration or qualification made to the text of this document may cause the tender to be disqualified and will, in any case, be ignored.

Each item in the Bills of Quantities must be priced and tenders containing Lump Sums to cover groups of work must be broken down to show the price of each item before they are accepted. Lump Sums to cover any items of Preliminaries shall be broken down if so required by the Engineer.

B DEFINITION OF TERMS

(i) "SELECTED, DIRECTED, APPROVED", ETC

Wherever the words "Selected", "as directed", "as required" or words of similar meanings are used in the Bills of Quantities, it is to be understood that the selections, direction or requirements of the Engineer are intended. Similarly, the words "approved" "satisfactory" or other synonymous words shall mean "approved by" or "satisfactory to" the Architect and the Engineer's approval must first be obtained before the materials are ordered or the works to which the words refer are put in hand.

(ii) "NECESSARY, PROPER" ETC.

Wherever the words "necessary", "proper" or words of similar meaning are used in these Bills of Quantities with respect to the extent, conduct, character or works described, it is to be understood that they shall mean that the said works shall be executed to the extent, must be conducted in a manner or be of a character which is "necessary" or "proper" in the opinion of the Engineer.

(iii) SINGULAR AND PLURAL

Words importing the singular only wherever used hereinafter and in all contract Documents shall also include the plural and vice versa where the context requires.

(iv) EMPLOYER

The Employer is Ministry of Health P.O. Box P.O Box 30016-00100, Nairobi, Kenya. The terms "Employer" and "Client" wherever used in these Contract document shall be synonymous.

(v) ARCHITECT

The term "Architect" shall be deemed to mean the firm of Messrs Schon and Associates P.O Box 38601 - 00100 Nairobi, Kenya

(vi) CIVIL / STRUCTRUAL ENGINEER

The term "The Engineer" shall be deemed to mean the firm of Messrs. Schon and Associates P.O.Box 38601 - 00100, Nairobi, Kenya.

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(vii) ELECTRICAL & MECHANICAL ENGINEER

The term "The Engineer" shall be deemed to mean the firm of Messrs. Schon and Associates P. O. Box 38601 -00100,Nairobi, Kenya.

(viii) QUANTITY SURVEYOR

The term "The Quantity Surveyor" shall be deemed to mean the firm of Messrs Schon and Associates, P.O. Box 38601 - 00100, Nairobi, Kenya.

(ix) MAIN CONTRACTOR

The term "Main Contractor" shall be deemed to mean the person or persons, partnership, firm or company whose tender for the Main Contract works has been accepted, and who has or have signed the Main Contract and shall include his or their heirs, executors, administrator, assignees, successors and duly appointed representatives.

(x) SUB-CONTRACTOR

The term “Subcontractor” shall be deemed to mean the person or persons, partnership firm or company who’s tender for this work has been accepted and who has or have signed this Sub-Contract and shall include his or their heirs, executors, administrator, assignees, successors and duly appointed representatives.

A SITE

The site of the Proposed Kisii cancer centre is in Kisii County, Kenya On plot LR No. ……..

The Tenderer is recommended to visit the site and if unable to locate he shall apply to the Engineer for directions. The Tenderer shall be deemed to have examined and fully acquainted himself with the site and its nature and position, means of access, existing water and electricity supplies, etc. and make all necessary allowances and provisions for overcoming any difficulties which may arise therefrom as no claim for lack of knowledge in this or any other respect will be allowed.

No claims will be allowed for travelling or any other expenses which may have been incurred by the Sub-Contractor in visiting the site or preparing the tender for the Works.

B PRICING OF PRELIMINARIES AND BILLS OF QUANTITIES

Wherever in the Tenderer's priced Preliminaries and Bills of Quantities no price appears against an item, the value of such item shall be deemed to be included in his rates for the other items which have been priced by him.

C FORM OF SUB-CONTRACT

(i) The successful Tenderer will be appointed as nominated Sub-Contractor to the Main Contract under **Clause No. 5.2 of the conditions of Contract for Building and Engineering Works Designed by the Employer (Second Edition (2017) published by International Federation of Consulting Engineers (FIDIC).**

(ii) He will be required to enter into a Sub-Contract with the Contractor indemnifying him against the same liabilities in respect of the Sub-Contract as those for which the Contractor is liable to indemnify the Employer under this contract.

(iii) The Nominated Sub-Contractor will be required to enter into a written Sub-Contract Agreement with the Main Contractor on the latest edition of the ***FIDIC Conditions of sub-contract for construction for building and engineering works designed by the employer***, a signed copy of which must be deposited with the Engineer.

(iv) Copies of the Main Contract Agreement, Conditions of Contract, Bills of Quantities for the Main Contract, Form of Bond, Drawings and the General Specification are available for inspection at the offices of the Engineer on any working day until the time appointed for the submission of the tenders.

(v) If the Tenderer considers that compliance with any of the Condition of Sub-Contract of which the headings are set out hereunder involves him in expense which is not included elsewhere in his prices he shall set down opposite any such condition the value he attaches thereto. The Clause headings of the Schedule of Conditions are set out hereunder but do not in any way affect or restrict the full meaning of the Conditions as printed.

Clauses

1. Sub-Contract Sum
2. Notice of the Main Contract to the Sub-Contractor
3. Execution of the Sub-Contract Works
4. Sub-Contractor's liability under incorporated provisions of the Main Contract
5. Insurance against injury to persons and property
6. Damage by Fire
7. Policies of Insurance
8. Variations, etc
9. Completion
10. Defects, shrinkages, etc
11. Sub-Contract Sum - Valuation of Variations
12. Certificate and Payments
13. Interim Payments to the Sub-Contractor
14. Retention Money
15. Dispute as to Certificate
16. Right of Sub-Contractor to suspend execution of Sub-Contract Works
17. Special Interim Payment
18. Final Payment to the Sub-Contractor
19. Sub-Contractor's claim to Rights and Benefits under the Main Contract
20. Contractor's right to deduction or set off
21. Right of Access of Contractor and Architect
22. Subletting of Sub-Contract Works
23. Provisions of Water etc for Sub-Contract Works
24. Temporary workshops etc
25. Sub-Contractor's use of scaffolding
26. Contractor and Sub-Contractor not to make wrongful use of or interference with the property of the other
27. Plant, tools etc of Sub-Contractor
28. Determination of this Sub-Contract by the Contractor
29. Determination of this Main Contract
30. Wages and Conditions
31. Bond
32. Fluctuations in Duties and Exchange Rates
33. Arbitration

Carried to Collection USD.

A PARTICULARS OF INSERTIONS TO BE MADE IN APPENDIX TO THE SUB – CONTRACT AGREEMENT.

The following are the insertions to be made in the Appendix to the Sub-Contract Agreement:-

Clause 4.2	Sub contract performance security	10% of Contract Sum
Clause 8.1	Commencement of sub-contract works	To be advised
Clause 8.2	Sub – contract time for completion	To be advised
Clause 11.2	Sub contract defects notification period	Twelve (12) months
Clause 14.2	Sub – contract advance payment	To be advised
Clause 14.6	Sub – contract payments	To be advised

B COMPLETION PERIOD

The Date of Completion for the Sub-Contract will be the same as the Date of Completion for the Main Contract.

Carried to Collection USD.

A BOND & STAMP CHARGES

All tenderers will submit the name of an approved Surety who will be willing to be bound to the Main Contractor in an amount as required in the Main Contract Conditions. The Sub-Contractor shall allow for payment of all stamp charges in connection with Surety Bond and Sub-Contract Agreement.

B LICENSING & SUBLETTING

The tenderers for this Sub-Contract must be fully licensed Contractors under the Ministry of Public Works Regulations and must be currently registered as approved Mechanical Contractors Category A with the Contract and Quantities Branch of the Ministry. They must also be registered under the Ministry of Energy as Electrical Contractors as Class A licence. No sub-letting or assignment by non-registered firms will be authorised by the Architect.

C PROGRAMME

All Sub-Contract Works must be programmed and co-ordinated with the approval of the Main Contractor and the Architect. The successful tenderer will be required to submit a programme within two (2) weeks of the acceptance of his tender to Main Contract and to the Architect for approval.

The works are associated with supply and installation of electrical systems, transport to site, offloading, labour installation, fixing, connecting, commissioning and delivering up clean and in working order in every detail.

D SANITATION OF THE WORKS

The sanitation of the Sub-Contract Works shall be maintained by the Sub-Contractor to the satisfaction of the Government and/or Local Authorities, Labour Department and the Architect.

Carried to Collection USD.

A ATTENDANCE BY MAIN CONTRACTOR

The Main Contractor shall be responsible for Nominated Subcontractors in every respect and in particular it shall be the Main Contractor's responsibility to ensure that each Sub-Contractor commences and completes the work in such a manner and is ready on the site with his materials, labour and special plant at such time so as to conform with the completion programme, as previously specified, and to ensure satisfactory progress.

The Main Contractor shall accept liability for and bear the cost of General and Specific Attendance on Nominated Sub-Contractors which shall be deemed to include for:

- Allowing the use of standing scaffolding, retention of all scaffolding until such time as all relevant Sub-Contract works are complete and removal of all scaffolding on completion.

- Providing of space for office accommodation, and for storage of plant and materials; use of sanitary accommodation; the supply of all necessary water, and lighting; and clearing away all rubbish with reasonable assistance from the Nominated Sub-Contractor.

The Main Contractor shall also accept liability for and bear the cost of Special Attendance of Nominated Sub-Contractors which shall include for one or more of the following:

- Unloading, storing, hoisting, and placing in position, providing power, provision of special scaffolding.

- Cutting away for and making good after the work as may be required will be measured and valued separately by the Quantity Surveyor.

Carried to Collection USD.

B PAYMENTS

The Nominated Sub-Contractor will be entitled to payment from time to time for materials and/or any work carried out under this Sub-Contract, the value of which shall be determined by the Consultant Engineer and included in Payment Certificate to the Main Contractor under the Main Contract. The Nominated Sub-Contractor will be informed by the Quantity Surveyor when such payments are certified and should he not receive from the Main Contractor the payment due within the period stipulated in the Conditions of Sub-Contract he should immediately report to the Architect and the Engineer.

C MATERIALS ON SITE

Unless otherwise agreed by the Architect all materials relating to this Sub-Contract must be delivered to the site before payment for such items may be certified.

Carried to Collection USD.

A RETENTION

Ten Percent (10%) of the value of work done will be held as retention in the valuation for each Interim Payment for this Sub-Contract. The first moiety of five percent (5%) retention money will be released on practical completion of the Sub-Contract works and the second moiety will be released on satisfactory completion of the maintenance works at the end of the six months Defects Liability Period.

B LIQUIDATED & ASCERTAINED DAMAGES

If the Nominated Sub-Contractor fails to complete the works tendered for or any section of it within the agreed period of completion or within any extension period granted by the Architect, he will be required to allow or pay to the Main Contractor a sum equivalent to any loss or damages suffered or incurred to the Main Contractor caused by or resulting from such failure.

C DEFECTS

The Nominated Sub-Contractor shall be liable to make good at his own cost all defects or other faults occurring in the Sub-Contract works within a period of six months from date completion as defined herein and shall bear any expenses reasonably incurred by the Main Contractor as a direct consequence of such defects. Provided that such defects have not been caused as a result of defective workmanship or material for which the Main Contractor is responsible. Any work or section of the Sub-Contract works which are badly affected by such defects, etc and in the opinion of the Architect cannot be satisfactorily made good by repairs, etc shall be carried out again by the Nominated Sub-Contractor at his own cost within a reasonable time of being required to do so in writing by the Architect or the Main Contractor.

Carried to Collection USD.

A **UNAVOIDABLE DELAYS IN IMPORTED MATERIALS**

During the progress of the works where delays are anticipated in obtaining imported materials or locally manufactured materials requiring imported components, the Architect should be informed in writing as early as possible. An application for extension(s) of time must also be made in writing at the same time. Where the accepted Sub-Contractor can fully substantiate with documentary evidence that every effort has been made and the correct procedures followed for obtaining the materials or where applicable the import licences and the delays are unavoidable, the Architect will, if satisfied, grant such extension(s) of time. Liquidated and ascertained Damages shall then not be imposed for such delays. The successful Sub-Contractor shall, however be expected to place appropriate orders for all imported and locally manufactured materials immediately after the signing of the Sub-Contract Agreement in order to minimise the risk of delays caused through shortages of materials. The Tenderer should state below in the space provided any materials which in his opinion it is anticipated may be in short supply and likely to cause such delays.

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Carried to Collection USD.

A PURCHASE OF BUILDING MATERIALS IN ADVANCE

The Sub-Contractor will be required, immediately after the signing of the Sub-Contract to purchase in advance as much as possible of the building material requirements of the Sub-Contract in order to avoid possible future price increase and shortages. To qualify for inclusion in interim payment certificates all such materials shall be suitably stored on site or in an approved bonded warehouse adequately insured against theft and damage for the period of the storage, all to the approval of the Architect. Where any material is not immediately available the appropriate orders must be placed as soon as possible after the signing of the Sub-Contract and all appropriate measures must be taken to secure early delivery of such materials.

B SITE MEETINGS

The Nominated Sub-Contractor or his authorised representative shall attend site meetings whenever the Architect requires and the Tender Price will be deemed to include for all expenses in connection with such visits.

C DAMAGE TO SUB-CONTRACT WORKS, ETC.

The Nominated Sub-Contractor shall take every precaution to prevent damage to all existing property on site including the Main Contract Works and will be responsible for and shall pay for the making good of any such damage to the satisfaction of the Architect.

D SECURITY

Maximum precautions must be exercised to uphold existing security in the vicinity of the Works. The Sub-Contractor shall comply with all instructions issued by the Employer, Architect or the Main Contractor with regard to the upholding of security arrangements and will be held responsible for any breach of security by his own, his suppliers' or others' employees engaged directly or indirectly on the Sub-Contract Works.

Carried to Collection USD.

A "OUT OF BOUNDS" AREAS

The movement of the Sub-Contractor's men must be confined strictly to the works and the Sub-Contractor's working and Storage Areas. Certain areas within and adjacent to the site and to be identified later, will be designated "Out of Bounds" areas for the Sub-Contractor's employees and the Sub-Contractor will be required to comply strictly with this rule.

B WORKING AND STORAGE SPACE

The Sub-Contractor shall provide at his own risk and cost safe storage and custody of materials for the Works. Working and storage space for the Sub-Contractor's materials plant and workmen will be allotted by the Main Contractor within the limits of the area made available to him for this purpose. All activities pertaining to the works will be confined as far as is possible to the specified area or areas. No such activities will be carried out outside the area(s) without the specific authority of the Architect. The allotted area is located within an existing building and the Sub-Contractor will be required to erect temporary barricades to the approval of the Architect and clear them away when no longer required. No materials shall be stored or stacked on suspended slabs without prior approval of the Architect.

Carried to Collection USD.

A GOVERNMENT ACTS REGARDING WORK PEOPLE, ETC.

Allow for complying with all Government Acts, Orders and Regulations in connection with the employment of labour and other matters related to the execution of the works. In particular, the Sub-Contractor's attention is drawn to the provisions of the Factories Act Revised Edition 1972, and his tender must include for all costs arising or resulting from compliance with any Act, Order or Regulation relating to Insurance's, Pensions and Holidays for work people or to the safety, health or welfare of work people. The Sub-Contractor must make himself fully acquainted with current Acts and Regulations, including Police Regulations regarding the movement, housing, security and control of labour camps, passes for transport, etc. It is most essential that the Sub-Contractor, before tendering, shall obtain from the relevant Authority the fullest information regarding all such regulations and/or restrictions which may affect the organisation of the works, supply and control of labour, etc. and allow accordingly in his tender. No claim in respect of want of knowledge in this connection will be entertained.

Particular attention is drawn to the Rules published in Legal Notice 179, dated 2nd June 1979. (Building Operations and Works of Architecting Construction).

B SAMPLES

The Sub-Contractor shall furnish at his own cost any sample of materials or workmanship required by the Architect / the Engineer for his approval or rejection and any further samples in the case of rejection until such samples are approved by the Architect / Engineer. The Architect / Engineer may reject any materials or workmanship not in his opinion up to approved samples. The Architect / Engineer shall arrange for the testing of such materials as he may at his discretion deem desirable. The testing shall be made at the expense of the Sub-Contractor. The procedure for submitting samples of materials for testing and the method of marking for identification shall be as laid down by the Architect. The Sub-Contractor shall allow in his tender for all such samples and tests.

Carried to Collection USD.

A INSURANCE

The Sub-Contractor shall during the execution of the works insure himself and keep himself insured against all liability arising under the Workmen's Compensation Act or any amendment thereto for accidents to workmen employed by him on the said Works and shall indemnify the Employer in respect of any such accident to any such workmen. The Sub-Contractor shall further insure himself and keep himself insured against all liability arising from all Third Party Claims arising from accidents and he shall indemnify the Employer in respect of all claims, which may be made against him in respect of any such accidents. No payment on account of the work executed will be made to the Sub-Contractor until he has satisfied the Architect either by the production of an Insurance Policy or an Insurance Certificate that the foregoing provisions have been complied with in all respects. Thereafter the Architect shall from time to time ascertain that premiums are duly paid up by the Sub-Contractor who shall if called upon to do so, produce receipted premium renewals for the Architect's inspection.

B METHOD OF MEASUREMENT

These Bills of Quantities have been prepared in accordance with the principles of the "Standard Method of Measurement of Building Works for East Africa", unless otherwise expressly stated.

A MANUFACTURERS' OR PROPRIETARY NAMES

Where Manufacturer's or Proprietary names or catalogues number are mentioned in these Bills of Quantities the reference is intended as a guide to the type of article or quality of material required. The Sub-Contractor may use any article or material equal in type or quality to those herein described subject to the prior approval of the Engineer and at his absolute discretion. The onus of proof as to equivalent quality will rest with the Sub-Contractor, whose tender will be deemed to include for the makes described in the Bills of Quantities.

Carried to Collection USD.

A CLAIMS FOR EXTRAS

The Sub-Contractor shall submit to the Architect and Contractor claims for any work or circumstances on account of which he may consider that he is entitled to extra payment within seven days from the time of the commencement of such work or occurrence of such circumstances. Any such claim must be in writing and accompanied by full particulars and must state under which provision of the Sub-Contract it is claimed so that payment shall be made.

B PRIME COST AND PROVISIONAL SUMS

The terms "Provisional Sum" and "Prime Cost Sum" or "P.C. Sum" wherever used in these Bills of Quantities shall be deemed to have the same meaning as defined in the General Preliminaries to the Main Contract Bills. The adjustment of these Sums shall similarly be dealt as described in the above General Preliminaries.

C LABOUR CAMPS

The Sub-Contractor will be permitted to house labour on the site and must make his own arrangements to construct the houses. Cooking and eating facilities for workers will be permitted on the site.

D WORKING AND RECORD DRAWINGS

The Sub-Contractor shall prepare all necessary sets of schematic diagrams, working drawings, etc required by the Engineer and shall also prepare and provide sets of Records Drawings together with instruction charts, maintenance manuals, etc all as specified in the attached General Specification.

Carried to Collection USD.

A FIRM PRICE SUB-CONTRACT

Unless otherwise specifically stated in the Preliminaries, this is a Firm Price Sub-Contract and the Sub-Contractor must allow in his tender for any increase in cost of labour and/or materials during the currency of the Sub-Contract. No claim for increased costs will be entertained except for increased costs, which may arise from fluctuations in Duties, and Exchange Rates defined in Clause 32 of the Sub-Contract Agreement.

B WATER AND ELECTRICITY FOR THE WORKS

These will be made available by the Main Contractor but the Sub-Contractor will be liable for the cost of any water or electric current used and any installations provided especially for his use.

C PROVISIONAL WORK

Quantities given as "Provisional" in these Bills of Quantities shall not be held to gauge or limit the amount or description of the work to be executed by the Sub-Contractor. However, the value thereof shall be deducted from the Sub-Contract Sum and the value of the work ordered by the Architect and executed thereunder shall be ascertained as provided by the relevant Clause of the Conditions of Sub-Contract. All "Provisional" and other work liable to adjustment under this Sub-Contract shall be left uncovered for a reasonable time to allow measurements needed for such adjustment to be taken by the Engineer and Quantity Surveyor. Immediately the work is ready for measuring, the Sub-Contractor shall give notice to the Architect. If the Sub-Contractor makes default in these respects, he shall, if the Architect so directs, uncover the work to enable measurements to be taken and afterwards reinstate all at his own expense.

D CASING UP, PROTECTING AND HOARDING

The Sub-Contractor shall be responsible for casing up, protecting or otherwise to the satisfaction of the Architect all parts of the Sub-Contract Works liable to damage or to cause injury and for removing such protection and making good at completion of the Works. The Sub-Contractor shall take into account that the works shall be carried out concurrently with other trade works and the safety of staff shall remain the responsibility of the Sub-Contractor during the course of the Sub-Contract.

E WORKS TO BE DELIVERED UP CLEAN

On completion of the Works, the Site and the Works shall be cleared of all plant, scaffolding, rubbish and unused materials and shall be delivered up in a clean and perfect condition in every respect to the satisfaction of the Architect.

Carried to Collection USD.

B ADDITIONAL ITEMS

Any additional item(s) which the Tenderer may wish to price separately and which he considers has not been included in the foregoing Conditions, Specification and/or Bills of Quantities.

Description_____

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C EXISTING INSTALLATIONS

All items, which have been disconnected and removed from the existing installations in accordance with the Technical Specifications, shall remain the property of the Employer. These items shall be packaged in waterproof boxes and kept in storage as directed by the Employer. The Employer may however opt to surrender the same to the Sub-Contractor at a salvage value, which shall mutually be agreed between the Employer and The Sub-Contractor.

Carried to Collection USD.

SECTION 2

PRELIMINARIES COLLECTION

ITEM	AMOUNT (USD)
Brought Forward from Page No. 2-2 Brought Forward from Page No. 2-3 Brought Forward from Page No. 2-4 Brought Forward from Page No. 2-5 Brought Forward from Page No. 2-6 Brought Forward from Page No. 2-7 Brought Forward from Page No. 2-8 Brought Forward from Page No. 2-9 Brought Forward from Page No. 2-10 Brought Forward from Page No. 2-11 Brought Forward from Page No. 2-12 Brought Forward from Page No. 2-13 Brought Forward from Page No. 2-14 Brought Forward from Page No. 2-15 Brought Forward from Page No. 2-16 Brought Forward from Page No. 2-17 .. Brought Forward from Page No. 2-18 Brought Forward from Page No. 2-19	
TOTAL OF SECTION NO. 2 (Carried to Summary Page)	

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

PART I

GENERAL SPECIFICATION

CONTENTS

3 PART I - GENERAL SPECIFICATION

3.1 Extent of Electrical Installations

The Tenderer shall include in his tender, prices for the design of new installations, manufacture, inspection, testing, packing, shipment, insurance, shipping, delivery to site, unloading and all other charges. The Tenderer shall also include for complete erection, tests on completion, setting to work, finishing and painting and maintenance of all items of plant and equipment described or implied within these Technical Specifications and shown on the relevant drawings to the satisfaction of the Engineer and the Architect. **The sub-contract – works will be exempt from all taxes and duties as imposed by the Kenya Revenue Authority.**

The electrical services within the buildings shall be complete in all respects as specified herein, and shall include all items of equipment, materials, accessories, fittings, supports, etc. necessary whether such items are specifically referred to in the Contract or not. The Tenderer shall be deemed to have included in his tender price all items necessary such that the installations are complete in all respects and left in good working order.

If awarded the Contract, the Contractor shall be expected to provide fully detailed drawings of the entire installation together with layouts of all civil and building works etc. required to accommodate/house the plant and equipment, these layout drawings and details being related to the existing layouts as may be necessary. The drawings shall be submitted for approval within three weeks of the award of the Contract such that the Architect and the Engineer can be made aware of all requirements. It shall be deemed to be the responsibility of the Contractor to ensure all civil and builder's works required for this Contract are prepared and/or provided to suit the programme of this Contract. No claims will be entertained.

All proposed new layouts and structures shall be subject to the full approval of the Engineer and the Employer.

3.2 Programme for Electrical Engineering Installations

The Tenderer shall provide within a stipulated period of acceptance of his tender and award of Contract, a complete programme for the electrical engineering installations to be executed indicating the anticipated commencement and completion dates of the following activities:

(i) Submission of working drawings for approval;
(ii) Placing of orders with other specialists for plant and equipment to be incorporated in the works;
(iii) Receipt by the Contractor from other specialists of plant to be incorporated in the works;
(iv) Manufacture by the Contractor of plant to be incorporated in the works;
(v) Inspection and testing by the Engineer;
(vi) Shipment of the plant from country of manufacture;
(vii) Delivery of the plant and equipment to site;
(viii) Erection on site, details for all activities;
(ix) Telkom Kenya installations;
(x) Kenya Power & Lighting Company installations;
(xi) Tests on Completion.

Operations shall be commenced when instructed and shall be carried forward to completion with the greatest possible expediency, to the satisfaction of the Architect and the Engineer, in accordance with the Programme. The Contractor’s programmes shall be agreed with the Engineer and shall adhere fully to the requirements and timing of the agreed Main Contractor’s programme.

3.3 Drawings accompanying the Tender Documents

The Electrical Drawings indicate generally the arrangement of the installations and are for assistance in tendering only. The position of equipment and apparatus shown thereon are approximate only, the exact positions, together with the actual runs of ductwork, trunking and conduit etc., will be agreed upon with the Engineer and the Employer prior to commencement of work. It shall be deemed that the prices entered by the Contractor include for the repositioning, of the various services, to meet the above requirements. No claims will be entertained.

The Contractor shall satisfy himself as to the correctness of all Drawings and measurements particularly the dimensions of the electrical installations. If the Contractor finds any discrepancy in the Drawings or between the Drawings and the Technical Specifications or between the electrical installations and the Drawings, he shall immediately refer the same to the Engineer who will make a ruling on the discrepancy. Figured dimensions shall be taken in preference to the scale mentioned on or attached to any Drawings. Details shown on Drawings shall be read in conjunction with items included in the Technical Specifications.

The Engineer will furnish the Contractor within a reasonable time after the receipt by the Engineer of a written request for the same, any details of which, in the opinion of the Engineer are necessary for the execution of any part of the works. Such a request to be made only within a reasonable time prior to the execution of such work in order to fulfil the Contract. One copy of the Drawings, details and Technical Specifications shall be kept on the site until the completion of the Contract and the Engineer shall at all reasonable times have access to the same. The Contractor shall return all copies of Drawings and other relevant details to the Engineer on the completion of the Contract.

Additional Drawings will be issued by the Contractor to the Engineer to suit the design requirements of the works. These Drawings being issued either during or after the tender period as may be required or necessary. These Drawings will supplement the details contained within the Technical Specifications and Bills of Quantities and the Tenderer shall be deemed to have taken these into account in his pricing. Where the Contractor can demonstrate that the Drawings relate to new approved or additional items these new or additional items shall be priced to approval in accordance with the Contract rates and prices.

3.4 Contract Working Drawings

The Contractor shall prepare fully detailed Working Drawings for all items of plant, equipment and accessories required for installation under this section of the Contract. Two copies of each Drawing shall be forwarded to the Engineer for approval and or comments. One copy will be returned stamped "approved" or "not-approved". Where Drawings require further information and/or modifications to meet the comments made by the Engineer they shall be re-submitted, again in duplicate, for approval.

When Drawings have been approved two further copies shall be forwarded to the Engineer, together with copies to the Architect, Site and the Employer.

Drawings, and, where relevant, calculations in respect of the following shall be prepared by the Contractor and submitted to the Engineer for his approval commencing within ten (10) days from acceptance of the tender.

(a) Cabling and external cable routes;
(b) Details of all conduit and trunking runs in respect of different service;
(c) Details of lighting and power circuits, routes etc;
(d) Details of sub-main switchgear and distribution boards;

(e) Fire alarm layouts and all circuit diagrams;
(f) Lightning and surge protection details;
(g) Technical literature for all the services;
(h) Layouts of all ducts, chases, holes, trenches and all other services throughout the whole of the building and associated external work.

All drawings shall be to scale and fully detailed with all the important dimensions shown and the construction of key components indicated.

During progress of the building works, the Contractor shall make all necessary checks on site to ascertain that the various services can be installed as specified and shown on the approved Drawings.

Where such works cannot be so installed, this must be immediately brought to the notice of the Engineer and Architect prior to the progress of such works.

The Engineer, in conjunction with the Architect and the Employer, will check and return the Drawings submitted for approval within a reasonable period, but in any case, not exceeding fourteen (14) days from receipt of the Drawings.

The layouts of plant and equipment are for general guidance only. The Contractor shall assess the requirements and prepare a plant layout for approval within twenty-one (21) days, the required liaison being maintained with other specialists, such that an agreed layout is submitted for approval.

3.5 Record Drawings

As soon as the works are complete and all tests satisfactorily carried out, the Contractor shall hand to the Engineer two sets of Record Drawings, AUTOCAD soft copy drawings in CD, together with one set of negatives of the same, showing the works as finally installed. These Drawings shall be prepared on approved transparent plastic material in black ink or as approved by the Engineer. The certificate, of making good defects, will not be issued until this condition has been complied with. Record Drawings are in addition to detailed Working Drawings and shall show all cable routes, circuits, trunking, conduits, plant, trenches, ductwork and ducts etc., together with the entire plumbing, drainage and fire fighting installation, as finally installed.

The Engineer will provide the Contractor with a set of Contract Drawings (in addition to the two sets provided for the Contractor's site and office use), which shall be maintained by the Contractor's representative on site and which shall be used for recording of Contract variations as they occur. This set of Drawings shall be available for the Engineer's inspection on site, and shall be kept up to date.

The cost of the preparation and submission of the above Contract and Record Drawings shall be deemed to be included within the Contractor's prices.

3.6 Maintenance Manuals

At the start of the defects liability period, the Contractor shall hand over to the Engineer, four sets of maintenance and operations manuals for each plant and equipment installed. These manuals shall be in English and shall be fully illustrated.

3.7 Builder's Work and Civil Works

Builder's Work and Civil Works that are incidental to this section of the Contract such as cutting of holes in walls and floors, provisions of foundations for the plant and machinery, shall be the responsibility of the Main Contractor. The Contractor shall be fully responsible for the preparation of all such details that relate to such works, the details being subject to approval by the Architect and Engineer prior to submission to the Main Contractor for action. Other items such as fixing of brackets, cables and ductwork and trenching, making good etc. shall be carried out by the Contractor to suit the installation of all the services.

It is the Contractor's sole responsibility to ensure that all holes and chases are in the required position and that any additional ducts, holes and chases necessary for erection of the installations in situ concrete walls, floor slabs etc., are included in the early stages of construction as appropriate.

The Contractor shall furnish the Engineer, Architect and Main Contractor with all the necessary information including position of foundations, brackets and fixings and shall ensure that such works are performed in accordance with available information.

The Contractor shall include in his tender all supports, fixings, plugging of holes in walls, ceilings and floors to facilitate the fixing of the pipework, accessories, and all other portions of the plumbing, drainage and fire fighting installations. Any purpose-made fixing brackets shall also be provided and installed by the Contractor, including escutcheon plates and the like.

The Contractor shall supply and install approved pipework support brackets and hangers. It shall be deemed that prices include for any special requirements and that the Contractor has visited the site during the tender period to ascertain all details.

The Contractor shall pay particular attention to the fixing and alignment of items. All items shall be installed square, true and perpendicular to floors i.e. as shown on Drawings and as may be required at site to the Engineers approval.

3.8 Commissioning of the Electrical Installation

The Contractor shall instruct the Employer’s Maintenance Engineer or his representative on the operation and maintenance of the various components forming the electrical installation and shall provide drawings, diagrams and manuals to ensure the Maintenance Engineer or his representative is completely conversant with such installations.

The Contractor shall ensure that the services installations are left in complete safe working order and operating to the satisfaction of the Engineer.

3.9 Regulations and Standards

The Installations must be carried out strictly in accordance with the following documents: -

Electrical Services

(i) The current edition of the IEE Wiring Regulations , BS 7671;
(ii) Relevant International Standards;
(iii) Current Regulations and by-laws of KPLC;
(iv) Regulations and by-laws of the Ministry of Energy;

(v) Nairobi City Council By-Laws;
(vi) Current Regulations of Telkom Kenya;
(vii) By-laws of the Electricity Regulatory Commission (ERC);
(viii) Any other duly constituted authorities' regulations having jurisdiction over the Works;
(ix) Water Supply and Sewerage Authority's Regulations;
(x) The Specification and accompanying documentation and Drawings;
(xi) The Working Drawings produced by the Contractor and approved by the Engineer.

The Contractor shall undertake all modifications demanded by the authorities in order to comply with the regulations, and produce all certificates, if any, for the authorities at no extra charge.

3.10 Quality of Materials

All materials, fittings and accessories are to be new and in accordance with the requirements of the current rules and regulations where such exist, and with the relevant international standards.

Uniformity of type and manufacture of fittings and accessories is to be as far as practicable preserved throughout the whole Works.

Wherever the term 'similar to' is used in these Technical Specifications in reference to any item, the word will be understood to mean type and quality of the equipment and not preference.

Where particular manufacturers only are specified herein no alternative makes will be considered without good reasons.

All materials shall be of good quality, suitable for the purpose specified, and to the approval of the Engineer.

3.11 Workmanship

The Tenderer shall take into consideration, when pricing his tender, that there will be other specialists working alongside him. Any disruptions to the existing services must therefore be kept to a minimum, and in this respect the Contractor shall include in his prices for carrying out Works outside normal working hours as may be directed by the Engineer. No claim will be entertained where abnormal working hours are required to meet this requirement and completion of the works within the specified Contract period.

The Contractor shall be fully responsible for co-ordination of installation of all services. For all services involving ducted wiring, such wiring shall be capable of future addition or maintenance.

The Contractor shall be deemed to have included in his tender prices for relocating switches, terminal points, ductwork, outlets and fixtures in positions and/or locations at least one metre in any direction from the positions indicated on the Drawings. Within these limits no variations in the Contract sum will be made unless the work has already been executed in accordance with previously approved Working Drawings.

Only qualified and certified persons shall be allowed to carry out installation work. The Works shall be performed in a neat and workmanlike manner.

The Contractor shall take every precaution to avoid damage to the existing property including roads, paved walkways, grassed areas, landscaping, cables, drains and other services, and he will be held responsible for and shall make good all such damage at his own expense to the satisfaction of the Engineer.

The Contractor will be responsible for the exact runs and placing of pipework, conduit, boxes, ductwork and accessories that are to be cast in concrete, ceilings, floors, walls, columns and beams, and for the proper fixing of the pipework and accessories to the shuttering and the steel reinforcement work.

Where ductwork is to concealed, the pipes etc shall be in an exact position relative to the finished plaster or such other finishes as may be applied to enable adequate cover to be applied.

Where services are run above the false ceilings the Contractor shall ensure that access to all services is readily available such that future maintenance can be carried out without difficulty. Full details shall be included on the Working Drawings such that the Engineer can give consideration to the Contractor's proposals.

3.12 Setting out of work

The Contractor will be responsible for laying out his work and shall obtain all the necessary information as may be required to carry out the work. Such information shall be obtained sufficiently in advance to avoid any possibility of delay to the Works as a whole.

The Contractor shall be fully responsible, and shall seek, the details of all work being carried out by the various trades on Site, particularly where such trades may interfere with each other, or where co-ordination is necessary. No claims for extra costs will be entertained arising from omissions, oversight, or neglect in this regard.

In advance of the delivery of the plant and equipment, the Contractor shall arrange for the supply of all-necessary foundation bolts, templates, nuts, plates, sleeves, anchorages, etc., as required and as may be directed by the Engineer.

3.13 Erection and checking of work

The Contractor shall provide, and be solely responsible for, all skilled and unskilled labour, tools, lifting tackle and other equipment required for handling of plant and equipment when transporting to Site, within the Site and during erection.

All erection works shall be subject to approval by the Engineer.

All parts shall pass such tests as required by the Engineer to prove compliance with the Contract irrespective of any tests which may already have been carried out at the Manufacturer's Works. In particular all electrical pressure tests made at the Manufacturer's Works shall be repeated at voltages approved by the Engineer.

The Contractor shall supply and install all supports, fixings, brackets and similar items as may be necessary for the completion of the installation of the services as specified and as shown on the Drawings.

3.14 Site performance and acceptance tests

The Contractor shall give notice of the date of the specified tests to be performed on completion of installation. The notice shall be made in writing to the Engineer at least five days to the date of the specified tests. Unless otherwise agreed the tests shall take place within seven days of the stated date or on such day or days as the Engineer shall in writing notify the Contractor in writing. The tests shall be carried out under normal working conditions to the satisfaction of the Engineer and shall extend over such continuous periods as he may direct.

All skilled labour, supervision, apparatus, fuel and instruments required for carrying out the tests will be the responsibility and at the expense of the Contractor. The accuracy of the instruments shall be demonstrated if required. The Contractor shall ensure that test instruments are in good working condition and have been calibrated by an authorised agent.

If any part of the plant or equipment fails to pass the specified tests, further tests of the said part shall, if required by the Engineer, be repeated. The Contractor shall, without delay, put in hand such modifications as found necessary so as to meet the requirements of the Contract and any expense which the Client may have incurred by reason of such further tests shall be deducted from the Contractor's Contract price.

Each completed system within the installation shall be tested as a whole under operating conditions to ensure that each component functions correctly in conjunction with the rest of the system.

3.15 Test records

The Contractor shall make the necessary records of all the tests carried out, and when the tests have been successfully completed, he shall provide the Engineer with test records and reports in a format to be agreed.

3.16 Dust, insect and vermin proofing

All equipment, likely to be affected by ingress of dust, shall be effectively dust proofed and vermin proofed where no protection is afforded in its normal manufactured form. All materials used shall be in general resistant to attack by insects, micro-organisms or other fauna or flora. Materials used for such protection shall be to the approval of the Architect and Engineer.

3.17 Painting and finishing

All mechanical and electrical plant and equipment installed under this Contract shall be painted or otherwise finished to approval in accordance with appropriate international code for standard colours to be furnished by the Contractor prior to the shipment or manufacture of the plant or equipment including all pipework, ductwork, etc. Such finish shall be entirely compatible with the conditions of heat, humidity, exposure to the weather, and other relevant factors arising from the materials, location and condition of operation of the equipment.

Paintwork will be measured in the builder's work in connection with the Engineering Element. Any additional work will be measured in accordance with the conditions of the Contract.

The Engineer may request samples of paint finishes, the cost of which shall be deemed to have been included within the tendered prices for all works.

All final painting of equipment, fixtures, and accessories shall be carried out by the Contractor, except where it is the usual practice of the manufacturer of items of plant and equipment to apply a high standard of protective finishing paintwork in the shop before despatch. This will be acceptable provided the Contractor at his own costs makes good any damage to paintwork, occurring in shipment, transportation and installation.

The interiors of electrical switchboards control panels, and similar items, shall be finished in an approved enamel colour and shall comply with the appropriate international standards for enamel finish which shall be furnished by the Contractor prior to shipment or manufacture of the plant or

equipment. The exteriors of such panels and enclosures shall be of international standards specification colour as specified by the Engineer.

3.18 Labels

All items of electrical plant, Sub-main distribution boards, etc. shall be neatly and clearly labelled externally with identification marks corresponding with those on Drawings or in Technical Specifications. Final details shall be agreed upon by the Contractor and the Engineer.

Identification labels shall be of laminated plastic material engraved, black on white, with no less than 6mm "Lino" style letters and shall be fixed on or adjacent to all items by means of at least two brass screws or to the approval of the Engineer. Self-adhesive labels shall not be permitted.

All main switches, circuit breakers, isolators, valves, motors, switch-fuse, consumer service units, and distribution boards etc. shall be neatly and clearly labelled externally with identification marks corresponding with those on the Drawings or Technical Specifications. Final details shall be agreed upon by the Contractor and the Engineer.

All labels/plates shall be in English.

3.19 Specialist manufacturers

Where specialists are not nominated by the Employer, the Contractor shall appoint specialist manufacturers and suitable specialists for any sections of the Works described herein in which he is not himself an experienced, recognized and approved specialist.

The Tenderer shall, on submission of his tender, indicate the names of all proposed specialist manufacturers and specialists, together with the precise sections of the Works for which each will be responsible. The Contractor may be required to seek alternative manufacturers or Contractors or to accept specialists nominated by the Employer; it shall be deemed that the prices entered in the tender include for this requirement. For plant and equipment supplied by suppliers other than the Contractor, the Contractor will be required to furnish an agreement between himself and the supplier stating that he is authorised by the supplier to deal in the plant and equipment and that he is authorised to stock the necessary spare parts or that the Employer will be authorised to revert to the supplier in the event of breakdown of the plant or equipment.

The Contractor shall allow in his prices for phasing his work to meet the requirements of the other specialists, and for varying his programme or otherwise, to comply with the erection programme of such specialist. No additional costs will be allowed to the Contractor for any disruptions to his programme, or otherwise, in his compliance with the above requirements.

3.20 Interference with the existing Works

The Contractor shall not interfere in any way with any existing works whether the property of the Employer or of a third party and whether the position of such works is indicated to the Contractor by the Engineer or not. The exception being where such interference is specifically described as part of the Works either in the Contract or in any instruction from the Engineer.

3.21 Protection of Works

The Contractor shall carefully protect from injury by weather all Work and materials which may be affected thereby and allow in his prices for all dams, pumping, shoring, temporary drains, sumps etc. necessary for the purpose. The Contractor shall clear away and make good at his own cost to the satisfaction of the Engineer all damage caused thereby.

3.22 Sundries

The necessary holding down bolts, supporting brackets and templates, guards and screens, locks, piping, conduits, lamps and other requisite sundries whether specified in detail or not shall be provided, under the Contract and it shall be deemed that the Contractor's prices, rates and the like include for all such items.

3.23 Schedules of technical data

Where included in the Tender Documents, all Tenderers shall complete Schedules of technical data; otherwise the Tender may not receive full consideration, and will be liable to rejection.

3.24 Copies of orders

Copies of all orders for major items of plant, equipment and materials places with suppliers shall be provided in triplicate to the Engineer.

3.25 Inspection and tests at Manufacturer's Works

The Engineer, and his duly authorised representative, shall have at all reasonable times access to the Contractor's premises to inspect and examine the materials and workmanship of the mechanical and electrical plant and equipment during its manufacture there. If part of the plant and equipment is being manufactured on other premises, the Contractor shall obtain for the Engineer and for his duly authorised representative permission to inspect as if the plant and equipment was manufactured on the Contractor's own premises. Such inspection, examination or testing, if made, shall not relieve the Contractor from any obligation under the Contract.

Where the plant and equipment is a composite unit of several individual pieces manufactured in different places, it shall be assembled and tested as one complete working unit, at the Maker's works, to the relevant International Standards where applicable.

SECTION 4

Part II – Particular Specification

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

PARTICULAR SPECIFICATIONS FOR ELECTRICAL INSTALLATIONS

TABLE OF CONTENTS

4 PART 2 - PARTICULAR SPECIFICATION

4.1 Extent of installation

The Contractor shall carry out all the necessary works for successful installation of the electrical services as described and set out in this section of the Technical Specification, Bills of Quantities, other sections of the electrical documents and accompanying Drawings in accordance with the General Electrical Specification herewith.

Where there is a conflict on requirements between the general electrical specifications and this particular technical specification, this particular technical specification shall take precedence and such conflict should be brought to the attention of the electrical engineer for further clarification.

The Works, the major elements of which are scheduled below, includes the supply of all labour, material, equipment, plant and components necessary for complete installation and setting out work in respect of the entire electrical services requirements within the proposed development and rendering it in complete working condition in respect of but not limited to the following installations:

New Installations: Supply, Installation, testing and commissioning of the following installations:

- Incoming Kenya Power supply;
- Medium Voltage Switchboards;
- Low Voltage Switchboards;
- Sub mains and distribution;
- Standby generator power distribution;
- Trunking and cable trays;
- Lighting and power installations;
- Raw power installations;
- Addressable Fire detection and alarm system pathways;
- Conduit for IT structured cabling system;
- Conduit for Security systems, CCTV etc;
- Telephone conduit and outlet points only;
- Access control system conduit with outlet points only;
- Earthing and grounding systems;
- Lightning protection and transient over-voltage protection, etc.

In general, the installations shall be concealed in conduits except in areas where surface installation is necessary. In such cases, installation will be carried out in trunking, conduit or cable tray as indicated on the Drawings.

4.2 Incoming Electricity Supply

The incoming power supply to The Proposed Kisii Teaching and Referral Hospital – Cancer will be teed off from the KPLC's 11kV overhead line through underground HV cable and terminated to 11kV, 3 phase, 50Hz medium voltage metering substation located in the Kenya Power Utility room at the new development.

The Contractor shall be responsible for application to Kenya Power for new supply and liaison with Kenya Power personnel in respect of organising for timely supply of electricity to new development and carry out final connections of the new supply cable to the new switchboard to be installed in the substation room.

4.3 Transformer and 11KV Switchgear and Cables

Transformers

The electrical contractor shall supply, install, test and commission 1No. new cast resin 1600kVA, 415V/11kV, 3 phase, 50 Hz, with output settings between 95% and 105% in steps of 2.5% as approved by Kenya Power complete including fixing, metal-grill enclosure and all cabling and control switchgear, DYN 11 indoor transformer substation, air cooled and associated 11kV switchgear.

The transformers and 11kV switchgear shall be supplied by the Contractor for indoor equipment but type approved by Kenya Power.

The transformers shall be cast resin type, class F insulation system with natural cooling for indoor installation, destined for use in three-phase HV/LV distribution systems. The transformers will be in compliance to IEC 76-1 to 76-5 and IEC 726. They shall be manufactured in accordance with ISO 9001.

The magnetic core shall be made of grain-oriented silicon steel, insulated with mineral oxide and will be protected against corrosion with a coat of varnish.

The LV windings will be made from copper foil with insulation.

The HV winding will be independent of LV winding and shall be made of copper wire or foil with class F insulation. The HV winding will be vacuum cast in a class F fireproof epoxy resin casting system.

The HV connection bars will be drilled with hole(s) ready for connection of cable lugs to terminal plates. The HV connections bars will be in rigid copper bars protected by heat shrinkable tubing.

The LV connections will be on the opposite side of the HV connections. The LV connection bars will be in copper.

HV tapping will be off-circuit bolted links attached to the HV coils.

The transformers will be equipped with:

- Lifting lugs,
- Haulage holes on the underside,
- Earthing terminals,
- Rating plate,
- “Danger Electricity” warning label,
- Instruction manual in English for installation, commissioning and maintenance.

The transformers will be in metal enclosures for indoor installation with anti-corrosion protection.

The manufacturer shall supply test official certificates of the transformers.

The transformers shall be as approved by Kenya Power (KPLC)

Tenderers shall submit manufacturer’s technical data of the transformers with their submission.

Voltage Stabilizer

This shall not be installed in the present contract. However, adequate provisions must be provided in the current contract for the future installation of the voltage stabilizer. As a guide, the voltage stabilizers shall be rated at 1600kVA and shall have the following specifications:

Input Line voltage: 415V ± 20% (304-456)

Output voltage: Line voltage: 415V ± 2-5% adjustable

Frequency: 48 - 52Hz

Efficiency: ≥95%

Response time: ≤1.5S (against 10% input voltage deviation).

Ambient temperature:-10--+40

Insulation resistance: ≥2MΩ

Waveform distortion: Non additional waveform distortion

Protection functions and controls: Over/ under-voltage trip, over-current trip, single phasing prevention

Over-load capacity: 1min. at the rated current of 2 times.

11kV Switchgear

The transformer and 11 kV switchgear shall be vacuum circuit breaker type for in indoor equipment as type approved by KPLC.

The high-tension compartment shall be a completely separate, mechanically interlocked, pad lockable compartment and shall house ring main unit as SF6 with an integral earthing device. Facility for the termination of up to a 120sq mm 3 core XLPE SWA 11kV cable shall be provided including stress shields.

The Contractor shall submit with his tender the technical brochures of the equipment they propose to supply for the approval of Engineer.

4.4 Main Low Voltage Switchboard

A new main L.V. Switchboard shall be supplied, installed, tested and commissioned by a specialist switchboard manufacturer complete with the automatic change over switches, ACBs, MCCB (moulded case circuit breakers), instruments etc and all relays, metering and items necessary for the complete installation and setting to work.

The main Synchronizing L.V. Switchboard shall be of the industrial/enclosed cubicle type, constructed and installed as described below.

The main Synchronizing L.V. switchboard, suitable for floor mounting, comprising of a sheet steel cubicle with front access, complete with busbars, incoming switch ACB, MCCB's etc. The switchgear shall be heavy duty, cast metal, enclosed type, dust proof, and capable of operating on load at the rated current. Contacts shall be heavy duty silver surfaced type.

The cubicles shall be rigidly constructed and shall be provided with an angle iron or heavy gauge folded steel framework, panelled in zinc anneal or galvanneal of not less than 3 mm gauge.

The doors shall be of similar rigid construction free from twists and warps. The hinges and locks or latches shall be brass, and attached by brass screws. The locks shall be spring types, provided with two keys, and unless otherwise specified, all locks on the one installation shall have identical keys.

The exposed unpainted metal shall be chrome plated, and removable panels where used, shall be attached by chrome plated captive milled headed brass screws and felt washers.

The Contractor should ensure that entry of cables, ducts, and conduits shall be neatly made and head boxes provided as required. All entries and openings shall be vermin-proof.

The floor mounted panel shall be erected on a 150 mm raised built-in base treated to be impervious to corrosion by rust.

All mounting brackets and additional items shall be supplied and installed to suitably support the switchboard in the position in which it is to be erected. In general mounting height to the top shall be 2.0 m.

Adequate ventilation shall be provided as necessary, and bronze mesh and suitable trim fitted to prevent entry of insects.

Dust tight enclosures shall have ample volume to dissipate heat, which may be generated in service, and doors shall be provided with a neoprene seal fitted with a channel and closing against a suitable folded edge or ridge. Moulded sealing strips may be submitted as alternative.

All bolts, nuts, screws, hinges, handles, etc. shall be corrosion resistant.

Enclosures shall comply with IEC publication 144 IP 23 for indoor equipment and IP 54 for outdoor equipment and be **FORM 4 Fully Type – Tested Assemblies** (TTA) or equal but approved by the Engineer and manufactured in accordance with standards ICE 439-1 or BS 5486. The bus-bars and connections shall be completely screened within the switchboard. Technical brochures and sample test certificates from switchboard manufacturers to be submitted the tender.

All cables and piping entries shall be made through glands in a plate covering the base and top of the cubicle.

Cases shall be rubbed down, undercoat with suitable primer and finished in not less than 2 coats of hard enamel, oven baked where practicable. The internal colour shall be white and external powder coated grey unless otherwise specified or approved.

The MCCB units in the main LV switchboard shall compact with thermal magnetic trip for MCCB upto 250Amps. For MCCBs upto 630 Amps, these shall have electronic trip unit. MCCBs upto 1600Amps shall have micrologic 2.0 trip unit. The MCCBs shall be fitted with sealable terminal shields and phase barriers.

All MCCB units rated 150A and above shall be adjustable type.

General Requirements

Each assembly shall be of the enclosed type and be of Form 4 type 2 TTA (type tested assemblies) as specified.

Where specified as internal separation shall be carried out using rigid barriers or partitions

All functional unit handles shall be accessible via the front plate of the assemblies. Dead front assemblies will not be acceptable.

Ferrous, non-ferrous or insulated removable gland plates shall be provided forming part of the cable box, as appropriate for the cable to be connected.

Form 4 Assemblies

Assemblies shall have all busbars separated from the functional units all of which shall be separated from each other and their load terminals.

All horizontal and vertical busbars and risers including those providing final connectors between the busbars and functional units shall be insulated and located within separate rigid compartments.

Each functional unit shall be installed in a separate compartment.

Separate compartment shall be provided as specified in the schedule and/or drawings.

A main incoming unit shall be provided in a separate compartment, which shall be arranged such that all incoming supplies, including control circuits, are isolated within the compartment.

The gaseous products of arc extinction shall not be allowed to impair the operation of switchgear devices in adjacent compartments. In addition, arcing within any compartments shall be confined to that compartment and shall not affect the operation of circuits in adjacent compartments, including faults on outgoing terminals.

Outgoing phase conductors to the load cable compartment shall pass through the enclosure via close fitting moulded insulation.

Supply and load connections within each compartment shall be arranged such that each phase is separated and shrouded by insulated plates.

Cable terminals for power and auxiliary shall be of the fixed type, separately mounted in cable boxes with a dividing barrier between phases.

Cable boxes shall be clearly labelled both on the cover and internally with circuit and functional device reference.

Where specified in the schedules, earthing facilities shall be provided to earth the circuit and busbars in the service test and isolated positions.

Vent holes with louvered openings and insect screening shall be fitted near the top of the gable ends of the main switchboard.

Earthing

A triangular earth grid shall be for the main LV switchboard consisting of 3x2400mm earth rods, earth chambers and a 70mm² green earth. The rods are to be spaced 3000m from each other.

All joints shall be riveted and braced to give an effective electrical connection.

Should the tested resistance of the electrode system exceed 5 Ohms, additional spike/trench electrodes and/or earth mat shall be installed in order to achieve 5 Ohms maximum.

Earth chambers

An earth chamber shall be a cast valve chamber and shall be installed at each earth rod as detailed.

4.4.1 Moulded Case Circuit Breakers

(a) General

Moulded Case Circuit Breakers (MCCB's) shall as a minimum requirement comply with IEC 157-1: 1973 and BS 4752:pt. 1:1977or any other approved equivalent Standard. Technical brochures to be submitted the tender.

The breaking capacities of the circuit breakers shall be at least equal to the prospective fault level at the point of the distribution system where the breakers are installed.

All MCCB's shall be designed for horizontal or upright mounting without any adverse effect on electrical performance.

(b) Construction

Operating mechanism shall be of the quick make quick break type, with the speed of operation independent of the operator, and mechanically trip free from the operating handle so as to prevent the contacts from being held closed against short-circuit and overload conditions. The operating mechanisms shall be constructed to operate all poles in a multi-pole breaker simultaneously during opening, closing and tripped conditions.

The breakers shall be operated by a toggle, which shall clearly indicate the three fundamental positions ON, OFF and TRIPPED. If required, rotary handles shall be supplied.

The breaking and extinction of the electrical arc shall be achieved by means of non-welding contacts and an arc chute surrounding these contacts.

The current limiting MCCB's with very high capacity shall be made of two parts: -

- A standard circuit breaker for small and medium fault current;

- A current limiter block to break and limit large short-circuit current.

The current limiter blocks shall be of fuse free type and the one opening mechanism type and factory fitted to the standard breakers.

All accessories and electrical auxiliaries such as shunt trip or under-voltage release auxiliary contact or motor mechanism shall be manufactured in such a way that they can be easily adapted on the installation premises.

(c) Operation

Each pole of the MCCB are provided with bimetallic thermal element for inverse time delay protection and magnetic element short-circuit protection. The thermal releases shall be of the adjustable type and could be equipped with sealing facility. Above 250 Amps the trip unit could be of the solid state energised by internally mounted current transformer.

It shall not require any external power supply to operate the tripping mechanism. All MCCB's shall be provided with interchangeable trip unit.
Current discrimination tables showing overload and short-circuit discrimination shall be provided for each rating.

4.4.2 Bus-bar

The bus-bars shall be copper on insulated supports rated as shown on the drawings and capable of withstanding the fault level on the system at that point.

The bus-bar shall not be exposed when any access doors or plates other than those provided for bus-bar access of the panel shall be removed for maintenance or other work.

4.4.3 Under Voltage and Over Voltage Protection

To safeguard against voltage spikes suitable under voltage and over voltage protection relays shall be supplied and installed under this quotation. The relay units shall be of adjustable type and are suitable for operation under all voltage conditions anticipated. The unit shall be housed in the L.V. switchboard in the switch room.

The Contractor shall include for one under-voltage protection relay unit of -15% and over voltage protection relay unit +15%. Details shall be submitted with the tender and are fully discussed and agreed by all parties prior to placing the order.

4.4.4 Phase Failure Relays

An alarm system, to indicate when there has been a loss of one or more phases on the incoming supply and the automatic tripping of the main circuit breaker, under these fault conditions shall be supplied and installed under this contract.

4.4.5 L.V. Switchboard Wiring

Ample wiring space shall be provided within the L.V. switchboard.

Internal power connections shall be by means of copper bus bars of ample current rating and not less than 3.0mm thick, and incoming and outgoing cables are attached to terminals by means of

approved cable lugs. All live copper parts shall be insulated by PVC tape except at terminals, which may need to be disconnected.

No live metal shall be exposed except by removal of normally fixed panels.

Internal control wiring shall be through PVC insulated stranded conductors not smaller than 10 amp rating. Conductors shall be neatly laid and fixed in cable trays, or bunched to approval. No loose wiring shall be accepted.

All wiring shall be terminated using approved cable lugs. The ends of each wire shall be labelled with engraved numbered or lettered plastic ferrules, matching the identification used in the wiring diagrams.

Colour coding of the separate phases, neutral and earth, shall be provided and maintained throughout the installation. Where necessary, further identification of wiring shall be provided to the extent necessary to permit any conductor to be located and traced. All colour coding of the control and local control wiring shall be provided. Voltages of control system shall be clearly stated.

4.4.6 Instruments and Relays

All wiring, space and connections and other items shall be provided for ammeters, voltmeters, selector switches and the like as applicable. Meters shall be supplied and installed and shall be of the appropriate range, and complete with C.T's where required. Voltage selector switches shall give phase to phase, phase to neutral readings. Ammeter selector switches shall provide readings in all three phases and an off position. The accuracy of all meters V.T.'s and C.T.'s shall be class 1 or class 0.5.

Ammeters and voltmeters shall be moving iron, self-contained instruments complying with BS 89 and IEC 51 to Class 1 or better.

Instruments and relays shall be removed from the switchboard for delivery and shall be packed in cases and delivered with the associated switchboard.

All current operated instruments and relays shall be suitable for operating on 5 amp secondary windings of current transformers.

4.4.7 Labels

All switchgear shall be individually labelled showing the circuits controlled by means of laminated Formica labels and showing white letters on a black background. Wiring diagram of the L.V. switchboard hall be printed on the approved type of paper, size A3 and shall be folded and inserted in a suitably designed slot inside the switchgear door.

4.4.8 Earthing

The Contractor shall provide Earthing of the L.V. switchboard in accordance with the KPLC/IEE Regulations all as per section 4.26 of these specifications.

4.4.9 Interlocks

Provision shall be made in the L.V. Switchboard to make it possible in future for inter-locking the incoming supply from a diesel generator such that paralleling cannot take place under any circumstances.

Interlocks of a substantial mechanical type shall be provided on each cubicle between the door and the circuit breaker such that the door cannot be opened unless the circuit breaker is in the `OFF' position, and all live parts, which can be accidentally touched, have been disconnected.

When the door is open it shall not be possible to readily turn the circuit breaker to the `ON' position.

4.4.10 Switchboard Equipment Rupturing Capacity

All switchboard equipment shall be entirely suited to the application and adequate space shall be provided for all items as required.

Switchboards shall be capable of withstanding the maximum fault level which may occur in the installation and shall have a short circuit rating of not less than 65 kA and capable of sustaining the maximum short circuit for a period of three seconds.

4.4.11 Layout of L.V. Switchboard

The general layout of the L. V. Switchboard is to be submitted by the contractor to the Engineer before commencing the manufacture of the new L.V. Switchboard. The final layout of the switchboard is to suit the proposed loads and mode of operation.

4.4.12 Automatic Change-over Contactor Unit

(a) General

The Contractor shall supply and install complete, an automatic changeover Contactor to operate in conjunction with the KPLC supply and the standby diesel plant. The automatic changeover Contactor shall be housed within a cubicle type L.V. switchboard.

(b) Contactor Unit

The automatic changeover Contactor Unit shall consist of contactors feeding a common bus-bar system to which the loads are directly connected. One contactor shall control the normal mains supply and the other controls the standby diesel supply. Substantial mechanical and electrical interlocks shall be provided so that both supplies cannot be operated at the same time and shall be suitable for continuous rating and robust construction.

(c) Manual Change-Over Switches

Manual changeover switches shall be provided so that the supply can be maintained from source, normal or standby in the event of a Contactor failure. These shall be suitable for continuous rating and of robust construction. They shall be installed in a separate compartment in the L.V. Switchboard, or elsewhere to be agreed with the Engineer.

(d) Operation

The Contractor shall ensure that in the event of a KPLC mains power supply failure, the automatic changeover contactor break the connections of the Mains Supply and make the connections to the standby diesel generator set supply. When the normal supply is restored the reverse action should take place. The standby generator also operates if there is loss of one or more phase on the incoming KPLC mains supply cable.

The automatic changeover unit shall come into operation in the event of one or more of the following occurring: -

- Loss of KPLC mains supply
- Loss of one or more phases;
- Under-voltage, within prescribed limits;
- Over-voltage, within prescribed limits;
- Any other additional feature offered by the specialist manufacturers.

With the restoration of the KPLC mains supply to the normal voltage, frequency and regulation, the automatic changeover unit shall again, automatically connect the loads back onto the main supply. This taking place after a prescribed time to prevent the continual starting and stopping of the diesel generating plant, in the event of there being intermittent KPLC mains supply

interruptions. Suitable timers shall be provided so that the change-back period can be adjusted and agreed with the Client. The protection relays and monitoring device shall be suitably mounted and located on the incoming supply with signal cables extended to the Diesel Generator Control Panel.

The Diesel Generator shall continue to run for a pre-determined period after the restoration of the mains supply, and then stop and revert automatically to a standby power unit ready to start-up in the event of future loss of KPLC main supply. Full operational details shall be agreed with the Engineer.

4.5 Electrical Distribution System

4.5.0 Scope of Work

The Contractor shall supply and install, test and commission new distribution cables as indicated on the drawings to complete the electrical distribution system, all in accordance with the IEE Wiring Regulations BS 7671. Aluminium cables shall not be permitted in any part of the installation.

4.5.1 Sub-main Cables

The Contractor shall supply new PVC insulated or armoured cables with stranded copper conductors as shown on the drawings. All low voltage cables shall be rated at 600/1000 Volts and shall comply with the relevant British Standard or other approved international standards. The Contractor shall supply, install, test, and commission the entire sub-main cable system.

All the sub-main cables to consumer units for lighting and power shall be drawn in conduit/ducts concealed in walls, floors and ceilings slabs of the buildings.

4.5.2 Distribution Boards

The Contractor shall supply new distribution boards of the surface/flush mounted metal enclosure type complete with MCBs. The Contractor shall ensure that each distribution board is complete with hinged lid and is so constructed that the circuit breaker toggles are concealed when the lid is closed. The distribution boards shall be controlled by an isolating switch integral with the board.

The Contractor shall ensure that all circuit breakers are provided with thermal overload and magnetic short-circuit tripping and a quick trip-free mechanism. The Contractor shall ensure that the necessary discrimination between each main panel and final sub-circuit is provided. The Contractor shall ensure that circuit breaker and distribution boards used throughout the installation are of the same pattern, range and manufacture and all MCBs have short circuit capacity not less than 10 kA.

A spare capacity space equivalent to at least 30% of the provided MCBs must be provided in the distribution boards for future installations/ alterations.

The switchgear used in the distribution boards shall, as far as possible, be from one manufacturer. The technical details of the proposed switchgear shall be approved by the engineer prior to confirming orders.

The final fixing and mounting height of each board and other associated switchgear, shall be agreed on site to suit the plant, benches, trunking, services, cupboards etc. The rating of all distribution boards breakers shall not be less than 100 Amp.

Where surface boards are installed sub-circuit conduits shall be suitably terminated within adaptable conduit boxes, flush mounted behind the surface mounted distribution board. The Contractor shall ensure that this is correctly done.

All circuit breakers on distribution boards must be numbered with suitable engraved printed black on white plastic or ivorene plates indicating the circuits controlled. All equipment to be individually labelled, indicating the function. Engraved plates shall be fixed on the panel by means of screws or channelling. Glued on plates and embossed plastic tape labels are not acceptable. Self-tapping screws are not acceptable.

A legend card covered by a removable glass or 1.5mm “Perspex” sheet shall be installed on the inside of the door of the distribution boards and the circuits shall be designated in detail on this card. The terms “LIGHTS”, “PLUGS”, “WATER HEATER”, etc are not acceptable.

The wiring within the boards shall have sufficient slack tidily laced in the board. The loading on three phase boards must be balanced between phases.
The distribution boards shall have an epoxy/polyester powder coated baked enamel finish to an approved colour finish.

A skull and crossbones notice shall be attached to all 3 phase boards.

Drawings showing the layout and physical sizes of the distribution boards, consumer units and meter boxes shall be submitted to the engineer for written approval prior to being manufactured. The contractor must fully satisfy himself that the proposed boards meet the specifications and will adequately fit in the spaces provided prior to forwarding the shop drawings to the engineer

4.5.3 Consumer Units

The Contractor shall supply new as appropriate the consumer units of the flush mounted metal enclosure type complete with MCBs and isolating switches, similar to those described under Clause 4.5.2.

4.5.4 Contactors

The Contractor shall ensure that contactors where required are suitable for continuous heavy duty and fitted with 240 voltage coils. They shall be of robust construction to BS 775 or approved equivalent standard where applicable, and rated at not less than the current carrying capacity of the outgoing circuits.

4.5.5 Armoured Cables

The Contractor shall ensure that underground cables (XLPE/SWA/PVC) are made of stranded copper conductors. The cables shall be rated at 600/1000 volts grade to BS. 6346 or approved equivalent international standard. The cables shall be terminated in brass compression type glands of the correct size to secure the cable inner sheath and ensure effective electrical continuity between the cable armouring wires and the metal enclosure on which the cable is terminated. A copper earth link shall be provided at the cable termination point for earthing of the cable armour and cable gland to the sub-boards earthing point.

4.5.6 Electrical Distribution System

The Contractor shall be fully responsible for the necessary liaison and co-ordination of all works on site.

The final cable routes and layouts are to suit pipework, drainage, cables foundations and the like. The Contractor shall produce Drawings for approval indicating the alternative proposed routes of cables. These shall in general follow an agreed service reserve decided by the Engineer, in conjunction with the Employer.

4.6 Lighting Installation

4.6.1 Scope of the Work

The Contractor shall supply, install connect, test and commission the lighting fittings as shown on site and set out in the Schedule.

4.6.2 General

All lighting fittings shown on the drawings or set out in the various schedules are to be supplied and installed complete under this quotation.

The lighting installation shall be generally concealed throughout, the conduits being run above the false ceilings, casted within the concrete slabs or chased into the walls. The various positions for all lighting fittings are as indicated on the drawings. These however, are subject to minor changes and adjustment to suit the false ceiling details and the locations of services and facilities. All supports, fixings and the like to be supplied under this contract, the Contractor being responsible for the final ceiling arrangement. Where false ceilings are provided, all openings, services access, trims, suspensions and connections to suit the fittings supplied, are to the approval of the Engineer and the Employer.

4.6.3 Method of Wiring to Fittings

The circuit wiring shall be continuous throughout on a loop-in loop-out system and there shall be no joints other than at the lighting fitting positions/boxes. The final connections to lighting fittings shall be from a conduit box complete with domed lid and cord grip. The circuit wiring terminating within the box at a suitably rated terminal block and wiring (via the cord grip) to the fitting carried out in heat resisting 3-core PVC/PVC cable.

The lighting fittings shall be wired, in general, with 2.5mm^2 single core PVC cables, the final connections to all fittings being carried out in heat resisting cable. The Contractor shall inspect to ensure that this is correctly done on site.

4.6.4 Fluorescent Fittings

Fluorescent fittings are the type as indicated on the schedules and specified herein. They are complete with tubes, wiring auxiliaries and all other items as specified or required for the complete installation and setting to work.

Each tube is provided with a low loss ballast and starting devices. Each fitting is power factor corrected to 0.90 and fused. The Contractor shall inspect and ensure that the spacing between ballasts is not less than 50mm and between condenser and other auxiliaries 75mm.

The Contractor shall ensure that internal connections are made with heat resistant wiring of ample rating, and all the wiring is bunched and neatly secured in a manner to ensure minimum heating from auxiliary components. A three ways connection unit should be properly secured and shall provide for all circuit connections.

Colour temperature of tubes shall match throughout, except where otherwise specified. In general, they shall be 4000K.

The Contractor shall inspect and ensure that all fluorescent fittings are approved by the Kenya Bureau of Standards (KEBS) and comply with local safety standards and if required, the Contractor shall be ready to submit written evidence of such approval.

It shall be the responsibility of the Contractor to determine all details relating to the fixing of the fittings and auxiliaries with particular attention being paid to the false ceiling areas etc. The

locations of all fittings are subject to the Engineers approval, final positioning shall therefore be agreed upon in the course of the Contract.

The recessed fittings, within any false ceilings shall be finally installed subject to the Engineers approval. The Contractor shall ensure that all fittings, trims and supports details are provided and agreed prior to the installation. The Contractor shall liaise with the Engineer to complete the works.

4.6.5 LED Fittings

LED fittings shall be of the types shown in the schedules. Enclosing metal-ware shall be of robust construction, complete with mounting holes, openings for cable or conduit entry, earthing terminal, and space for cable connections shall be as required. Where wiring is carried out within a stem or suspension tube, it should be of ample size to facilitate easy insertion of wires. No mountings shall be so arranged that complete rotation is possible, i.e., that wiring can be twisted. Suspension chains shall be utilised so that the wiring shall not be allowed to take the weight of the fittings.

Lamp-holders in totally enclosed fittings shall be of heat resistant type made of porcelain or brass, and connected with heat resistant cable. Generally, lamp-holders and lamps shall comply with Key safety standards including: IEC 62031 for LED modules, IEC 61347-2-13 for LED drivers, IEC 62471 for photo-biological safety, IEC 60598 for aspects similar to general luminaire, IEC 62560 for self-ballasted LED lamps (>50V), IEC 60838-2-2 for particular requirements on connectors for LED modules. EC Directive 2002/95/EC and related Commission Regulations specify restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment including lighting. All LED lamps/ LED chipset shall come with a warranty of minimum five years

4.6.6 Lighting Switches

The Contractor shall inspect and ensure that light switches are rated at 16 amperes as a minimum. All switches shall generally be flush mounted and fitted with the approved flush conduit boxes. Surface switches of the metal clad type and approved range and pattern, are provided within plant rooms, service ducts and similar areas.

Circuit switches shall be one-way or two-way where more than one switch is denoted at any position; multiple gang units shall be used.

The light switches shall be assembled in single or multiple units, in boxes of galvanised steel and fixed with brass screws. Screw heads used to secure switch cover plates to be finished to match the cover plates.

The switches shall be of the same manufacture and type throughout the installation. The Contractor shall submit to the Engineer, for approval, a sample of the switches and cover plates he proposes to use. Switch plates and plug socket plates shall match in colour throughout.

The mounting height is 1.375m but will finally be subject to adjustment to suit architectural building details. The Contractor shall check all door swings to ensure that the switches are on the lock side. These will be entirely the responsibility of the Contractor.

4.7 Power Installation

4.7.1 Scope of the Work

The Contractor shall supply, install, test and commission the power installation as shown on the Drawings.

4.7.2 13 Ampere Switched Socket Outlets

The socket outlets shall be positioned and of the type as indicated on the site or on drawings. Every 13 Amp socket outlet shall be complete with a fused plug top.

Unless otherwise stated, 13 Amp socket outlets and spur boxes shall be wired to ring main circuits.

The socket outlets shall be assembled in single or multiple units as required. Except where mounted and fixed to trunking the sockets shall be mounted/fixed to boxes of galvanised steel and fixed with brass screws. The Contractor shall submit to the Engineer, a sample of each outlet and cover plate proposed for use in the works. This applies equally to all the power and switch plates specified throughout this document. The socket outlets shall match those of the lighting switch plates.

In the Kitchen room the socket outlets are mounted on walls at high level. The final mounting height will be to suit the levels of the equipment and shall be agreed on site. In general, all areas shall include outlets mounted at 350mm above the finished floor level. A uniform level, for all sockets and power outlets, shall be agreed to suit the requirements of the Engineer and the Employer. Locations shall be subject to change to suit the layouts within the various areas. The Contractor shall take this into consideration when pricing his tender. Where outlets are to be installed in pairs they are to be installed under the one cover plate.

Except where installed using surface wiring, all outlets shall be surface or flush mounted and fitted into approved surface conduit boxes, earthing terminals, etc. as previously described.

The circuit wiring are rated/sized to IEE Regulations and shall not be less than 2.5mm^2 PVC. The wiring shall be inside conduits and/or trunkings to suit the requirements of the particular area, a concealed installation being provided throughout.

The phasing and circuit wiring for all socket outlets, power outlets and lighting circuits shall be agreed. Details shown on the Drawings are, at this stage, for information only. The Contractor shall finally provide details for approval to suit the final layout throughout the site as required by the Employer.

All socket and power outlets shall be fully earthed and bonded-up complete, especially where located and mounted close to sinks, taps, etc. All sinks, taps and water pipework and appliances shall also be fully bonded up as required by the relevant IEE Wiring Regulations BS 7671 to ensure equi-potential between all items.

4.7.3 13 Ampere Switched Fused Connection Units

13 ampere switched fused connection units are to be supplied installed for termination on the various circuits as indicated on the Drawings. The connection units are of the range specified on the drawings and every socket outlet shall be complete with plug top.

4.7.4 Isolators

Isolators of the indicated ampere ratings shall be supplied and installed for connection to the various items as indicated on the drawing.

4.7.5 Connections to Hand Dryers

Hand dryers are controlled from 20 Amp. DP switches with neon indicator, flush mounted in the position indicated on the drawings. Connections to the hand dryers shall be done by means of flexible PVC insulated cable.

4.7.6 Motor Control Cubicle

The motor control cubicle shall be supplied and erected as required for the installation. It shall be complete with switchgear, starters with all types of protections, facility for remote control, instruments, relays, lights for start/trip and items necessary for the complete installation and setting to work.

The control cubicle is of the industrial enclosed cubicle type, constructed and installed as described for the LV switchboard. The Contractor shall submit the details to the Engineer for discussion and approval prior to the manufacture.

4.8 Telephone and Data Points

4.8.1 Scope of Work

Flush telephone and data outlets point only shall be provided where shown on the drawings and complete with white finish plate with PVC sleeve cord with internal diameter of 5mm complete with steel clamp to retain sleeve cord on underside.

4.9 System of Wiring

Unless otherwise specified or indicated on the Drawings, all wires and cables for power and lighting enclosed in conduit and trunking shall be of single core type, PVC insulated 600-volt grade, copper to BSEN 50086. The installation is or shall be carried out on the looping-in system with continuous mains throughout each circuit. All connections to fittings and the like are or shall be of a solid nature and small connectors (other than porcelain enclosed heavy brass sleeves) shall not be allowed. Porcelain connectors enclosing heavy brass sleeves shall be provided for heat resisting tails for enclosed fittings and for the drops for pendant type fittings.

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All connections to flexible cords or cables shall be such that any strain on the cord or cables is not transmitted to the connection.

Draw wires shall be left in all conduits provided under this contract where these conduits are for future services.

Joints in PVC cables shall not be allowed in any part of the system.

The number of cables run in conduits shall be in accordance with the IEE wiring regulations BS 7671. With the exception of 3-phase power points or sub-main supply circuits to 3-phase boards, the circuits grouped in any one conduit shall be connected to one phase of the system only. This does not apply to wiring run in trunking. All switch wires for lighting circuits shall be on the phase or "live" side.

An insulated earth wire shall be provided in all conduit and trunking systems, terminating at all outlets where an earth is required. This earth wire shall comply with BS 7430 but in no case less than 1.5mm^2 for lighting circuits and 2.5mm^2 for power circuits.

When drawing the wires and cables into the conduits or trunking, the Contractor must ensure that proper appliances are used so that the wires and cables suffer no damage whatever in the process. All joints and kinks shall be scrupulously avoided and care must be taken to ensure that the insulation of the cables receive no damage or abrasion. Low voltage cables and medium voltage cables shall be enclosed in entirely separate conduits.

All cables shall be drawn-in after the installation of the entire conduit system, and after plaster has dried out. Draw wires shall not be threaded in at the time the conduits are being installed.

4.10 Cables, Wiring and Accessories

This section of the Specification includes the inspection, delivery to site, unloading, complete installation, putting into commission and handing over in the approved working order, the whole of the main and auxiliary power cables and other cables and wiring as detailed herein and in the tender.

The work includes the supply, delivery and erection of all cable racks, cable cleats, conduits, trunking, pipes, Unistrut and fittings required for the support and accommodation of the cables and wiring, grouting of rag bolts for the fixing of cable racks, supports, and all required trenching. The work also includes the installation of cables and wiring within the trenches, conduit, trunking and the proper protection, marking and terminations of all such cables.

Jointing of cables shall not be permitted under this contract, as the distances are short and therefore continuous cable lengths can be used. However, where joints are permitted by the Engineer for any reason they shall be of an approved type and manufacture and of the cast resin type. Where joints are required for control cables they shall be housed within a purpose made concrete pit with lid and jointed/terminated such that testing can easily and readily be carried out. The cables shall be as manufactured and tested in accordance with the appropriate International Standards as applicable, and the following Standards in particular shall apply: -

Copper conductors shall be provided throughout and shall comply with BS 6360/IEC 228 or BS 4109 or approved equivalent.

PVC (Polyvinyl Chloride) insulation and PVC sheath shall comply with BS 6746/IEC 227 and BS 6346 or approved equivalent.

Non-armoured PVC insulated cables shall comply with BS 6004/IEC 227 or approved equivalent.

Armoured cables with XLPE insulated copper conductors (25 mm^2 cross sectional area or higher) where used shall comply with BS 5467/IEC 502, IEC 811 or approved equivalent.

The tenderer should submit a fully detailed technical description and manufacturing data of the cables offered together with full test certificates of all cables and wiring provided.

All cables shall be delivered to site in the same coils as despatched from the manufacturer and the labels showing size, type and length and shall be removed only in the presence of the Engineer or his representative and handed to him.
All cables and wiring shall be of adequate rating in accordance with the relevant IEE Wiring Regulations BS 7671:2001(2004), 16^{th} Edition, protected in conduits or trunkings, placed on cable trays, in underground pipe ducts or trenches, or when cleated to Unistrut inserts etc. safe-guarded so as to prevent danger.

The Contractor shall agree with the Engineer and the Employer route of all cables, conduit and cable trunking and shall not install such trunking or conduits until agreement and approval has been given.

The main supply cables shall be extended from the LV switchboard position in the service areas. It will be necessary for the Contractor to liaise with the Engineer when finalising the cable routes.

4.11 Trenching

All underground cables where not installed within pre-formed service trenches or service duct, shall be laid in pipes, ducts or buried directly in the ground, as specified for the particular case or as indicated on the Drawings.

The Contractor shall carry out all excavation, back filling, sanding, consolidation and making good, and shall remove all spoil and waste on completion. The Contractor shall include for the re-instatement of the grass and other areas such as roads and pathways where excavation has been necessary to accommodate the installation of the various controls, alarm, power and external lighting cables.

The depth of trenches shall be such as to provide the cover set out hereunder. Trenches shall be free of large stones and similar material likely to cause damage to cables, and the bottom shall be level and smooth, consolidated if necessary, to provide a firm bed for cables or pipes.
Pipes or cables shall be bedded in 0.08m of sand or approved equivalent material which has been sifted through a No. 36 BS sieve, care being taken to ensure than cinders, breeze, or any other chemically active material does not come in contact with the cables at any point. After the laying of the cables or pipes, back-fill material initially consisting of a further layer of sand to provide a cover of approximately 0.08m, which shall be consolidated as necessary before final back filling and consolidation. All cables which are laid directly in the ground shall be protected by concrete or earthenware tiles.

(I) In open ground and under pavements, the minimum cover shall be 0.6 metres.

(ii) Under roadways subject to vehicular traffic, the minimum cover shall be 0.9 metres.

(iii) Minimum horizontal spacing between LV cables laid in common trench shall be 0.03 metres, and between LV cables and other services laid in common trench or run adjacent, the minimum spacing shall be 0.3 metres.

Where cables are laid under roads, pathways exceeding 0.90m width, and paved areas, they shall be installed in continuous runs of approved asbestos cement or glazed earthenware pressure piping, the pipes extending 600 mm on either side of the roads etc.

The routes of the cables buried underground shall be clearly and permanently marked by concrete cable markers, as detailed on the Drawings. These shall be positioned 100 mm to the right of each cable and installed such that the distance between markers is approximately 20m and one at every change to direction. The final details to be agreed at site during the construction works to suit final external cable distribution.

Cables shall be snaked between all terminations and junction boxes to allow movement and settlement of soil.

4.12 Laying of Cables in the Ground

Where installation involves laying of cables directly in the ground, the cables shall be protected with pre-cast concrete cover blocks, and shall be buried at least 1.0m below ground surface. The locations of such cables shall be made evident by means of mass concrete marker posts inscribed with cast-in lettering of the word "CABLE" which shall be of dimensions and painted in colours approved by the Engineer. The marker posts shall be installed at all changes in straight horizontal alignment or at 50 m interval, whichever is the lesser; the marker posts shall be installed 1.0 m away from the cable with the lettered face parallel to and facing away from the cable.

4.13 Other Cable installation Methods

Where cables are not laid directly in the ground or in prepared concrete trenches or ducts, they shall be supported in reinforced Industrial nylon or aluminium alloy cable cleats bolted directly on the building walls or to vertical or horizontal mild steel channel supports embedded in the floor or walls. Fixing centres for supports shall not exceed 600 mm.

Where several control cables are run in a common route, they may be supported on galvanised, perforated steal trays in preference to individual supports detailed above. Cable tray supports shall be suspended from secure overhead fixtures at intervals not greater than 1000 mm, and groups of cables fixed to the cable tray by PVC or other approved saddles at intervals not greater than 500 mm. In sections where cables are laid directly in the ground, power and control cables shall not run together but shall take different routes. Where cables are installed inside cable trenches, they shall be run on separate galvanised steel hooks fixed on the sides of the cable trenches at intervals of not more than 500 mm, Power and control cables shall run on opposite walls inside the cable trenches.

4.14 Depth and Separation of Cables

Cable trenches shall be excavated or ducts laid at such a depth that the minimum distance to the top of the cable trench or duct shall comply with the following:

Minimum Clearance

Type of Service	Vehicular Roadways	Open Ground or Foot Path
HV	1000 mm	750 mm
Others	750 mm	500 mm

Where possible, electric cables and associated ducts shall be installed such that subsequent excavations to expose another service will not disturb the electric cables and associated ducts. Where it is not possible to separate two cables by installing them along different routes, the following clearances shall be observed along parallel routes:

Type of Cable	To HV Cable	To LV Cable	To Other lower voltages	To Gas/water etc
HV	150 mm	300 mm	300 mm	300 mm
LV	300 mm	150 mm	250 mm	300 mm
Others	300 mm	250 mm	150 mm	300 mm

The spacing of cables installed at the same time shall be generally in accordance with the above table, but the Engineer may specify where circumstances permit a more economical arrangement.

As far as possible electric cables shall not be installed alongside other services except where otherwise directed. Where such segregation is not possible, then 50 mm thick concrete slabs may be constructed with the Engineers approval, to separate the services. Adequate slack shall be left at each bend of the cable laid directly in the ground.
Instrument and control cables shall as far as possible be routed separately from power cables and shall not be run on long distances on parallel routes or range to cross one another. A minimum separation of 250 mm shall be maintained between them. Power cables shall not be installed in the same ducts as instrument or control cables.

Separation between the three categories of cables shall be maintained as follows

Separation In mm

	Category 1	Category 2	Category 3
Category 1			
Instrument, Power and Control (over 50 V under I 0 A dc or ac)	-	200	300
Category 2			
High level signals (6 to 50 V dc)	200	-	300
Category 3			
Low level signals (less than 5 V dc)	300	200	-

Only conductors carrying signals of the same category shall be contained within any one rnultl-core cable.

4.15 Types of Cables, Conditions and Wiring

4.15.1 Power Cables

In general, these shall be multi-core cables, insulated with PVC single wire armoured and PVC outer sheath. These cables are 600/1000-volt class to BS 6346, the conductors being copper. The numbers of cores are as indicated on the drawings and these cables shall be used for all LV distribution requirements where indicated.

For XLPE/SWA/PVC cables, 600/1000-volt class to BS 5467 for cable sizes of 25 mm^2 or higher shall be used where indicated.

4.15.2 Control/Alarm Cables

Multi-core control cables are PVC/SWA and PVC sheathed overall where run in the ground with every core colour coded. Conductor sizes are to suit and details of cores and cable lengths are set out in the Drawings. Details of cables offered are to be forwarded with tender.

4.15.3 Domestic, Lighting and Small Power

In general, these shall be PVC insulated single core cables with stranded copper conductors, to meet the general requirements of the installation.

4.16 Terminations of Cables

The ends of each PVC, SWA, PVC cable shall be terminated in brass compression-type cable-glands of the correct size which shall secure the cable inner sheath and ensure effective electrical continuity between the armour wires and the cubicle metal enclosure in which the cable is terminated.

Where cables are required to be terminated in terminal boxes or other items of Plant which have not been supplied by the Contractor, the Contractor shall be responsible for completing the terminations in accordance with the requirements specified above, including testing and verifying of the correct phase sequence of the cores.

Cables shall be identified inside all manholes at the cubicle terminations by tags made of brass, PVC or other types of insulating materials on 'which circuit identification marks shall be indelibly

inscribed. Power cables shall have phase identification on each core done on tags made of crimped or sweated sockets of the correct size. Control and protection cables shall have each core identified by an insulated numbered ferrule.

All instrumentation cables shall have their armours or screens earthed at only one end preferably at the control cubicle end.

4.17 Cable and Wiring Tests

On completion of the installation, the cables shall, in the presence of the Engineer or his representative, be subjected to the following tests as laid down in the IEE Wiring Regulations BS 76711:2001(2004), 16th Edition, and the Electric Power Act (1997).

(a) Insulation level
(b) Polarity

4.18 Voltage Drop

The Contractor shall inspect, test and ensure that the size of every cable conductor is such that the drop in voltage from the main LV switchboard to any point in the respective installations shall not exceed 4% of the normal declared voltage.

The Contractor shall inspect, test and ensure that the final circuit wiring for small power and lighting circuits shall not be less than 4.0 and 2.5 mm^2 respectively as stated on the Drawings.

4.19 Conduits

Unless otherwise installed on site all concealed conduits used shall be black rigid super high impact heavy gauge Class A PVC in accordance with BS 2782. Where steel conduits are required these shall be deemed to be included in the Contractor's price.

Where surface conduits are to be installed, or conduits other than PVC specified for the various services, these shall be of the heavy gauge Class 'B' welded and screwed steel and shall comply with BS 4568.

In general the installation shall be concealed throughout and shall be fixed by distance type saddles spaced at not more than 900mm apart.

Conduits installed on surface shall be supported with saddles every 60mm. Conduit runs in chases shall be firmly held in position by means of substantial pipe hooks driven into wooden plugs.

Conduit PVC connections shall either be by a demountable (screwed up) or adhesive fixed and made watertight. The tube and fittings must be clean and free of all grease before applying the adhesive. When connections are made between conduit and switch boxes, care shall be taken that no rough edges or conduit stick out into the boxes.

Conduit accessories and fittings for the heavy-duty PVC conduit shall match fully the requirements of the conduit used and shall be agreed. Conduit fittings for the steel conduits shall be malleable cast iron galvanised to BS 4568 with extended spouts, internally treated and cover fixing lugs.

The drawings with these specifications indicate the approximate positions only of points and switches, and it shall be the Contractor's responsibility to mark out and centre on site the accurate positions where necessary in consultation with the Engineer and the Employer. The Contractor shall be responsible for the accuracy of the final positions.

Conduit outlets and junction boxes, where used in conjunction with PVC conduit, are to be PVC manufactured to BS 4607: Part1, 1970.

Outlet boxes for lighting fittings are to be of the loop-in type where conduit installation is concealed and the Contractor shall allow one such box per fitting, except where fluorescent fittings are specified when two such boxes per fittings are used.

Flexible conduit are manufactured to BS 731 (Part 1) galvanised and with PVC outer sheath.

It shall be entirely the Contractor's responsibility to ensure that conduits and other equipment, are installed at the appropriate stage of building progress, and no extra payment shall be made for chasing, boring, cutting or any other work arising from failure to meet this requirement.

Conduits are installed in such a manner that all cables can be drawn-in after erection by means of a draw-in tape.

Where a steel conduit system is required and specified the exposed outlet boxes shall be cast metal type and flush boxes shall be cast or sheet metal. No knockouts shall be removed unless used. Where conduits enter sheet metal boxes, they shall be lock-nutted back and front. Burrs and obstructions shall be removed before installation of boxes and conduits.

No conduit shall be smaller than 20mm nor shall accommodate more than 75% of the conductors permitted under the IEE wiring regulations.

Conduits to be concealed in structures cast-insitu are or shall be secured to the steel reinforcement work with heavy binding wire, spaced not more than 900mm to prevent movement of conduit boxes during the pouring and vibrating of the concrete. Outlet boxes shall be filled with paper to prevent ingress or concrete, and all boxes shall securely fixed to the shuttering with nails or other measures, which must not be visible after removal of the shuttering unless they later can be concealed e.g. by plaster. Conduits shall be installed after the chasing work has been completed. Couplings plugged with a suitable non-metallic stopping plug shall protect all open ends of conduit.

Conduit run in chases in walls or the like shall be fixed by means of mild steel pipe hooks or saddles spaced at not more than 900 mm. Where the conduit is concealed behind the plaster it shall be sunk 20 mm below finished plaster level before application of the plaster.

Surface conduit shall also be fixed 200 mm from boxes, the boxes themselves being securely fixed. Where such an arrangement of boxes and saddles would prove to be both unsightly and unnecessary, short lengths of conduit not exceeding 900mm between boxes need not be secured further than by connection to the adjacent boxes. In such cases the Engineer reserves his right to insist upon having additional fixings provided should he for any reason whatsoever consider additional fixings necessary.

Special care should be taken to prevent dirt and plaster to enter any section of conduit system.

All bends in conduits shall be formed without any decrease or increase of the cross section diameter of the conduits. The radius of the bend shall not to be less than indicated by British Standard. For concealed work this radius should be increased. No manufactured tees, elbows, and bends will be permitted. All conduits shall be thoroughly cleaned for sharp edges.

The conduits shall be installed avoiding unnecessary bends or changes in directions. Conduits shall be laid in straight lines. Where straight rows of conduits are installed, inspection boxes shall be placed at not more than 15 metre intervals. There shall not be more than 4 easy bends or 2 right-angle bends between boxes.

Sub-mains conductors shall not be bunched in the same conduit as other circuits.

Lighting sub-circuits shall not be enclosed in the same conduit as general-purpose power sub-circuits.

Single-phase sub-circuits shall not be enclosed in the same conduit as three-phase sub-circuit.

4.20 Cable Trunking

The Contractor shall supply new install, test all single, two and three compartments cable trunking installed on the site to ensure that they are electrically and mechanically sound. All trunking are or shall be provided with removable covers of an agreed and appropriate length for handling, removal and servicing. The colour of the trunking shall be agreed to suit the Employer, the Contractor including in his prices for factory painting in a colour agreed with the Architect.

In general, all trunking shall be manufactured by a renowned company. The cable trunking shall be made from hot galvanised sheet metal and approved to CEI 23-31 standards. It shall be factory painted externally where normally visible to match the finish of the walls as approved by the Architect and to suit the requirements of the other areas as agreed. A continuous cover of the same material is provided and fitted, for all areas except as for the laboratory trunking and cover screws so arranged that no sharp protrusions occur within the wiring space.

The mounting height of the trunking shall be agreed in general and shall be skirting in all working areas.

The trunking shall be complete with all supports, tee-pieces, angles, fixings, fillets, couplings, bends etc. as required and as necessary to complete the installation.

The trunking shall be sized in compliance with the capacity Table issued by the B.E.S.A.; the Contractor shall therefore inspect and ensure that the size all trunkings comply with this requirement.

Each conduit take-off from the cable trunk shall be lock-nutted on both sides, with no excess conduit protruding into the cable trunk unless it is properly bushed.

The Contractor shall inspect and ensure that the maximum number of cables in the trunkings shall be that in aggregate would occupy 50% of the cross-sectional area of the trunking.

UPVC trunking shall, unless otherwise specified be manufactured to BS 5750 part 2. All sections shall be rigidly fixed together and fixed to building structure at intervals of not more than 1200mm.

4.21 Cable Tray

The Contractor shall inspect and test to ensure that cable trays are manufactured of perforated enamelled steel plate with returned flanges and with suspensions at intervals of not more than 1000mm. The final sizes shall be determined by the Contractor to suit the requirements of the installations.

4.22 Continuity

The Contractor shall inspect, test all conduits, cable trunking and cable tray to ensure that they are mechanically and electrically continuous throughout. Where steel conduits cross expansion

joints, flexible steel conduit sections, PVC sheathed are inserted, or other approved means used to provide the necessary continuity and flexibility.

4.23 Load Balancing

The Contractor shall test and ensure that the electrical load in respect of the entire installation is balanced to the satisfaction of KPLC and the Engineer. The Contractor shall carry out such alterations to the power offtakes at the switchboard and at the distribution/control cubicle connections as may be required to balance the electrical load of the installation.

4.24 Labels

All items of equipment, apparatus and the like should be clearly labelled, labels being as previously specified. Starters controlling motors shall be labelled identically such that the motor and starting are readily identified.

4.25 Earthing

The Contractor shall install, test and commission the entire earthing installation in accordance with the IEE Wiring regulations BS 7671. The entire system of metallic conduits and trunking, metallic sheaths of cables, cases and enclosures of switch-gear and electrical apparatus shall be connected to the earth point, according to the current rules and regulations. The Contractor is reminded that the resistance of the earth conductor from the earth-electrode to any point in the earthing system shall not exceed 0.5 ohms.

The Contractor shall supply and install all additional conductors, cables, tapes, earthing rods, inspection pits and all associated items for the installation of the complete earthing system.

The Contractor shall carry out earth resistivity tests to determine the best location for the main earth electrode. The results of such tests shall be clearly indicated on a site plan and submitted to the Engineer for approval 21 days prior to locating of the main earth electrodes.

The earth tape or cable between the main earth terminal and the earth electrodes shall be of high conductivity copper.

The earthing shall be carried out to an externally positioned inspection/earthing rod pits by means of copper tape (25 x 3.5mm) or the equivalent stranded copper conductor. The pits shall be complete with an inspection lid such that access to the rods shall be readily available. The number of pits or rods will be dependent upon the values recorded during the testing and it shall be deemed that the Contractor has included in his tender for all necessary materials to meet the requirements.

The earthing requirements, while being in accordance with the power supply authority regulations, shall also be fully in accordance with the requirements of the Institution of Electrical Engineers, Wiring Regulations BS 7671: 1992, requirements for electrical installations, together with the British Standard Code of Practice BS 7430: 1991.

The Contractor shall include for the bonding up complete of all sinks, taps, pipework, metal branches and other similar items as required by the IEE Wiring Regulations, all details shall be agreed, this being particularly important in kitchen areas, pump houses and toilets.

4.26 Lightning and Transient Overvoltage Protection

4.26.1 Scope of the Work for Lightning and Transient Overvoltage Protection

All lightning and transient overvoltage protection system shall be in accordance with British Standard BS 6651: 1991. The Contractor shall supply, install, inspect, test and commission the system to ensure that the lightning and overvoltage protection system is electrically and mechanically sound and shall carry out any further improvement measures deemed necessary as directed by the Engineer.

4.26.2 Lightning Conductor

This shall consist of 25mm x 3mm (1" x $^1/_8$") bare copper tape exposed, securely fixed and extending from the air terminates at the roof structure to the earth rods at the grounding point. Several test clamp points shall be installed at intervals of 10 m and at points as instructed by the Engineer.

The lightning protection system shall consist of conductors installed in guides fixed to the roof structure with down leads or connected to the building steel columns as shown on the relevant drawings and bonded to copper weld earth spikes.

The down leads and steel columns shall be bonded to earth as detailed on the drawings.

Earth electrodes shall be 16mm diameter copper clad steel rods 2400mm long driven vertically into the ground. If necessary, a 50mm diameter hole shall be drilled into the ground and the hole filled with conductive slurry.

Test points shall be installed at each down lead 300mm above finished ground level.

Where it is necessary to bond the conductors to any other dissimilar metallic surface, care must be taken to prevent electrolytic corrosion taking place.

On completion the whole installation shall be tested and a table showing the earth resistance at each earth spike Submitted to the engineers for approval. Subject to satisfactory test results the engineers will require to witness a test of the installation. A combined resistance not exceeding 10 ohms is required.

The Contractor shall inspect, test and commission to ensure that the whole lightning system is electrically and mechanically sound and will carry out any improvement measures deemed necessary as directed by the Engineer.

4.26.3 Air Terminals

These shall consist of copper flat saddle. The saddle shall support a rod of length 800 mm and 15 mm diameter. At the top of the rod a triple pointed discharge rod of maximum 200 mm and 15mm diameter. The Contractor shall supply, install, inspect, test and commission to ensure that they are electrically and mechanically sound and carry out any improvement measures deemed necessary as directed by the Engineer.

4.26.4 Test Clamps

These shall be provided for each down conductor and fixed at 1800mm (6' 0") from finish ground level and at intervals of 10 m to the air terminal. No connection should be made to earth tape below the test clamps, except to the earth rod.

4.26.5 Earth Rods

These shall consist of 15mm diameter hard drawn copper rods. Approximately 1.2 m long and shall be installed or driven into the ground at the position as directed on site by the Engineer. Each earth rod shall not be installed less than 3 metres from the column of the buildings. The head of the earth rods shall be installed in a concrete inspection pit with cover.

4.26.6 Connections

Connections between the various members of the termination network and to the down conductors shall be either, riveted and/or soldered, welded or made with mechanical clamps specifically designed for that purpose. Clamped joints shall be first cleaned, then inhibited from oxidation with a suitable non-corrosive compound.

The resistance of the earth system shall comply with the Regulation i.e. 10.0 ohms maximum. If the earth resistance with one earth rod is not satisfactory, then additional earth rods or an earth - matt shall be provided as directed by the Engineer.

4.26.7 Transient over voltage protectors

The Contractor shall supply, install, test and commission appropriate transient overvoltage protectors on all power, telephone, data and structured cables entering or leaving the building, in order to protect equipment connected to power distribution system against transient overvoltage coming into the building from outside all as per the requirements of BS 6651.

The entire lightning system shall be tested to BS 7430 recommendations.

4.26.8 Additional Earthing

The Contractor shall be responsible for effectively earthing and bonding the complete installation in accordance with the rules and regulations issued by the Institute of Electrical Engineers and in accordance with the General Specification.

4.26.9 Items Used in the Installation Works

All switchgear used in the proposed development shall be of the same brand to ensure cascading and discrimination. Mixing and changing of switchgear shall not be allowed.

Similarly, the accessories used in the project shall be from one manufacturer.

4.27 Testing and Commissioning

In addition to the requirements given under previous clauses of the Specification, the requirements given in this clause shall also apply to the inspection, testing and re-commissioning of the complete electrical installation.

After inspection, testing and commissioning the installations, each part of the system shall be subjected to tests in accordance with the relevant international standards and the requirements of the power supply authority. In addition to these tests, the whole of the installation shall be subjected to complete functional tests to the satisfaction of the Engineer.

Any defects, faults or omissions made apparent by such tests shall be corrected and re-tested to the satisfaction of the Engineer.

The Contractor shall be responsible for testing and commissioning the electrical installation to ensure that it is in proper working order to the satisfaction of the Engineer.

During the course of and on completion of the work, the whole of the installation shall be tested in accordance with the IEE regulations. The Sub-Contractor will be required to test the installation in the presence of the electrical engineer and give all assistance required and provide such tools, materials, implements and instruments as are necessary for the tests. The engineer reserves the right to be present at such tests and the onus will be on the Sub-Contractor to inform him at least fourteen days prior to the time set for the tests to commence. The Sub-Contractor will be required to replace, re-wire and/or renew at no extra cost any portion of the installation, which fails to pass the prescribed tests. Test equipment necessary for the complete testing includes:

Earth Resistance Tester

Voltmeter

500/100-Volt Insulation Resistance Tester

Low Resistance Range Continuity Tester

RCD Tester

Earth Fault Loop Impedance Tester

All cables shall be tested for insulation resistance before installation and after termination (before connection to apparatus) using a 1000-volt DC insulation resistance tester. Insulation resistance values of less than 100 mega ohms shall not be acceptable.

4.28 Samples

The Contractor shall allow in his tender price for supplying the engineer with samples for the electrical equipment. The samples to be provided shall include: One unit of each type of light fitting complete with lamps, each type of socket outlet, switch, telephone outlet, data outlet, MCB, fire alarm accessories (excluding panel).

Other equipment to be provided as samples will be one meter fully fitted length of trunking, various sizes of cable trays and ladders, one meter length of each type of cable and wires.

The contractor shall provide full technical specifications for the large equipment including transformers, diesel generators, UPS, Cables, LV switchboard, distribution boards, fire alarm panel.

The above samples shall be provided and maintained in the sample room for the entire duration of the project and the samples shall be retained by the client on completion of the works. The costs of such samples must be allowed for in the tender price.

4.29 Commissioning

The Contractor shall advise the engineer, in writing, at least seven days in advance of his readiness to commence commissioning to enable the engineer to make the necessary arrangements for their representative to attend, if they so desire.

The commissioning shall be done in the presence of the engineer and shall start with a repeat of the operational tests.

The Contractor shall have sufficient staff available to remedy any defects, which occur during the commissioning process.

4.30 Temporary Electricity and Telephone Supplies

During certain elements of the works, it may be necessary to use the KPLC mains supplies and therefore the Main Contractor will be expected to provide temporary electricity and telephone supplies which shall be metered and paid for by him.

4.31 PART 3 -PLANT AND EQUIPMENT

4.32 Extent of Work

The work is to be executed at the site of The Proposed Kisii Teaching and Referral Hospital – Cancer It includes but not limited to the following:

1. Take delivery, install, test and commission 2 Nos. 850 kVA new diesel generator sets, continuously rated and capable of each supplying 850 kVA Prime when all the necessary de-rating has been applied complete with sound attenuation canopies capable to reducing noise output to 65 dB at 3 metres to meet the requirements of National Environmental Management Authority (NEMA).

4.33 Main Diesel Generating Plant

4.33.1 General

The Contractor shall take delivery, install, test and commission the generator sets.

The Contractor shall during inspection, ensure that the plant and equipment offered meets all relevant international standards and is such that spares parts are readily available for immediate and long term maintenance and are held in stock by a local agent in or in any of the East African member Country and within the Global world as well.

The diesel plant while providing the main power source shall be rated for continuous operation. When operating on prime mode, in the event of failure of the mains power supply, the AMF unit should start the generator unit and automatically put it on load. The generator set shall be rated for duty specified together with the starting currents, surges and the like. It shall be capable of meeting the entire rated electrical load as soon as it is automatically started by the AMF unit and should also be capable of shedding the load when the AMF unit gives a stop command following resumption of mains supply. In this case the fuel governor should be capable of automatically loading and de-loading the generator set.

4.33.2 Type of Plant

The Contractor shall install the generating plant complete with all switchgear, control gear, synchronising panel unit, sound attenuation canopy, auxiliary, ancillary equipment, and all other items of equipment necessary to render the prime features of the unit fully functional as specified. The AMF unit shall be supplied together with the L.V. Switchboard by the electrical sub-contractor.

The generators shall be capable of being automatically and manually controlled. There is no requirement for parallel operation of the generating unit and the Kenya Power & Lighting Company Ltd mains supply. The two power systems must be mutually operationally differentiated and in the event of any one of them being in operation, it should not in any way affect the other or have any feedback effect on the other.

4.33.3 Location of Plant

The generator will be installed inside the new generator room as indicated on the attached tender Drawings. Particular attention is drawn to generator room dimensions, doors opening and ventilation provisions. Any inadequacies in respects to these must be stated at the time of tendering.

4.33.4 Builder's Works

The Builder's and Civil Works associated with this project, such as cutting of holes in walls and floors, the provision of foundations for plant and trenching, making good, etc, shall be carried out by the Electrical works Contractor. The Contractor shall produce full details and construction drawings of the type of equipment base required for his plant. The Contractor shall be responsible for supply and fitting of holding down bolts, templates and for the entire setting out of his plant, all the items supplied sufficiently in advance to avoid delays to the construction of the floor plinth and any wall openings as may be required.

4.33.5 Operation of Plant

The Automatic Mains Failure (AMF) also referred to as Mains Failure Unit (MFU), will incorporate changeover contactors for the generator, supplied and installed in a control cubicle. In this respect the Tenderers shall allow in the control cubicle design, for all the necessary sensing relays and controls, necessary, to provide fully automatic mains failure operation. The change-over contactors should be designed to automatically break the connection from the KPLC mains supply and make connection for supply from the prime generator sets in the event of a loss of mains supply. When the mains supply is restored, the reverse action should automatically take place.

In the event of mains failure, the prime generator sets shall be capable of automatically starting and operating at the required load within the shortest time possible but not in less than 10 seconds all as described under item 4.1(2) above.

Manual override selector switch shall be provided on the control panel to facilitate routine generator testing and to override the AMF start / stop feature during maintenance.

Heavy-duty batteries shall be supplied and installed for automatic starting of the diesel generator sets. Battery chargers shall be supplied and installed for maintaining the batteries in full charge condition. The battery chargers shall be designed to stop charging as soon as the batteries are fully-charged to avoid over-charging.

4.33.6 Sets Arrangement

Unless otherwise indicated, the sets shall be designed and supplied for operation bolted to the floor on robust skid frames, anti-vibration and shock absorbing devices. It shall have adjusting screws for optimum setting and levelling and be so designed and installed that no appreciable engine vibration shall be transmitted to the floor and / or to the surrounding.

4.33.7 Fuel Tanks

The bulk fuel tanks rated at 1No. 15000 litres and piping to provide fuel supply for generator shall be supplied and installed for the 2No. 850kVA generators. The tank shall be of an approved construction suitable for indoor mounting complete with supports, fixtures, saddles, stand, tray and level indicator.
The entire fuel system shall be installed complete with feed pipes, return pipes, drain, vent and overflow as may be necessary to suit the plant and system offered together with stop valves, non-return valves, suitable electrically controlled float switch, emergency stop cocks, and any other items necessary to render the whole system fully operational.

The tenderer shall submit, with his tender, full details of all pipe work and tank arrangement such that consideration could be made on the details during the assessment of tender.

A site glass or other suitable level indicator shall be incorporated for the purpose of measuring the fuel level in the day tank.

4.33.8 Alternators

The deviation of the waveform of the voltage output from a pure sine wave shall not exceed the limits specified in BS 2613. Radiated interference shall be suppressed to the limits specified in BS 1000 and BS 833.

The alternators and associated equipment shall be designed to operate in conjunction with the diesel engines described in Clause 4.33.1. The alternators shall be directly coupled and capable of delivering the rated output continuously at 415 volts and 0.8 lagging power factor through the full range of electrical loading. The alternator shall be of direct self-excitation type.

The alternators shall be constructed to BS 2613 or other approved international standard, and rated for operation under the climatic conditions of the climate, elevation and electrical loading specified earlier in this document. Insulation shall be Class F throughout.

The alternators shall be screen protected, of drip proof construction, and shall be radio suppressed to BS 1000 and BS 833. The alternator shall be provided with automatic voltage regulation of an approved type with 3-phase sensing, such that generated voltage shall be held within $\pm$ 1% over the full range of load. Maximum divergence of voltage waveform shall be BS 2613, and the no-load phase to neutral voltage distortion must be less than 1.5%. The core shall be carefully selected to eliminate slot ripple, with a two third pitch factor and permanent magnet exciter. The resulting alternator sub-transient reactance, X_d, shall not exceed 10%.

The alternators shall be capable of sustaining a 10% overload for one hour without damage, and the degree of out of balance load, which may be carried, shall be stated in the Data Schedules.

The alternators shall be three-phase, star connected, and a diagram showing terminal markings and phase rotation shall be provided in the terminal box. Cables connecting the machine windings and machine terminals shall not have a higher de-rating factor for temperature than the windings.

The connection to the control cubicle shall be made through approved cable end boxes.

A non-ferrous metal rating plate shall be fixed on the front of the alternator giving the following information: -

- Continuous output 850 kVA at 0.8 p.f.
- Voltage V – phase-phase
- Frequency Hz
- Speed rev/min
- Control supply VDC
- Makers Name
- Serial No.
- Year of Manufacture or any other relevant standard information

4.33.9 Control Cubicle

A control cubicle shall be provided by the generator sub-contractor in liaison with the electrical sub-contractor and shall accommodate the following equipment, in addition to all other items necessary to the installation and operation of the plant.

(a) A 1250Amp motorised breakers respectively for the individual gensets with overload and under-voltage protection, control for the 2No. 850kVA generator's load and spare for the 3rd genset. The breakers shall be completed with adjustable thermal load (60% to 100%).
(b) Start and stop push buttons
(c) Automatic manual switch
(d) Audible alarm with mute and reset push buttons
(e) Earth bar and neutral link
(f) Mains and control cable terminal boxes for incoming and outgoing supplies

(g) Several single-phase and one three-phase outputs for powering of external auxiliary equipment

(h) Mains sensing relays and automatic selection of power source by remote signalling to the changeover contactors housed in the Generator AMF Panel

(i) Instruments as follows:-

One Voltmeter
Voltmeter selection switches with R-Y, Y-B, B-R, R-N, Y-N, B-N positions.
One ammeter.
Ammeter selector switch with R-Y-B-N position.
Polyphase Maximum demand indicator meter
Hours- run meter
Frequency indicator of the vibrating type
Alarm pilot, lamp indicators as follows: -

Oil Pressure	-	Low
Oil Temperature	-	High
Water Temperature	-	High
Fuel Level	-	Low
Load	-	Overload
Speed	-	Over speed

All the alarm pilot lights shall be red.

The other lamps as required for the correct operation of the generating set together with alarms and switches. Automatic shutdown shall occur with the operation of any of the above six alarms, protection and indicating circuits.

All the instruments installed on cubicle (moving iron, moving coil or otherwise) shall have a maximum of 72mm square face. The pointer should have a full deflection of 240^0 at rated value.

4.33.10 Wiring

All cables and small wiring shall be coded and terminated with lugs or eyes or be soldered; the terminations shall be clearly marked with the numbers and letters of terminations to which they are connected. Terminals shall be numbered or lettered, easily accessible and fitted with individual insulating barriers or be adequately spaced. Barriers shall be fitted to separate control terminals from power wiring terminals.

4.33.11 Earthing

All metalwork housing electrical equipment shall be bonded to suitable earthing terminals and be generally in accordance with BSCP1013. These works will carried out by the electrical subcontractor.

4.33.12 Enclosures for Electrical and Control Equipment

Enclosures for electrical and control equipment shall be drip proof and dust protected with adequate front and rear access as necessary for maintenance and repair. Special attention shall be given to the method effect of vibration where it is intended to mount the control cubicle as an integral part of the generator. Where a remote mounted panel is to be provided full consideration shall be given to the fixing / supports and the running / connection of all cables. Full details shall be submitted for Engineer’s approval.

4.33.13 Guarding

All live and moving parts shall be adequately guarded to prevent injury to personnel.

4.33.14 Works Tests

The set shall undergo works tests for output and performance in accordance with BS 649, BS 2613.

4.33.15 Commissioning

The following tests and checks as applicable shall be carried out by the Contractor in the presence of the Engineer or his representative followed by 2-days of continuous operation as required by Clause 3.13 of these Specifications.

(a) Check that the main frame is level at all points, engine and generator shafts are in proper alignment and the vibration absorbing devices are properly installed and located.
(b) Check all consumables are as recommended by the manufacturer and in sufficient quantity.
(c) Check that all radiator and engine block water drain points are free from sludge and other blockage and are in open positive.
(d) Check engine bolts, main drive coupling, valve clearances, fuel pump settings, governor settings, pipe line connections, water hose, exhaust couplings, flexible pipework and the like are proper.
(e) Check all electrical outgoing connections on the generator and the control cubicle. All lugs for principal connections shall have clean and bright contact surfaces. A suitable abrasive material shall be used where necessary.
(f) Check access panels and doors for proper opening and closing and for the functioning of any interlock fitted.
(g) With the set isolated from the system, start the engine by means of the 'Start' push button and allow it to run up to normal speed. Check that the battery-charging dynamo is in operation with the engine running.
(h) Check instruments and gauges for normal operation and response and that the generator voltage is being maintained within the prescribed limits. Compare the reading of the frequency meter with that of the engine tachometer, where both are fitted.
(i) Stop engine and verify that generator contactor opens at between 95% and 85% of nominal voltage. Recheck water and oil levels.

Note: Running of the engine for any length of time under no-load conditions is undesirable and tests calling for such operation should be carried out in as short a time as possible consistent with the necessary thoroughness.

(j) Run the set at various electrical loads for periods totalling at least 30 minutes. Check the voltage and current in each phase in turn and that the voltage and frequency are being maintained within the required limits with large changes in load. Note the rate of charge on the dynamo ammeter with the engine running and the rate of charge on the battery-charging ammeter with the engine stopped. Check against manufacturer's recommendations and adjust charging rates if necessary.
(k) Check that the various engine safeguards operate satisfactorily.
(l) Check the vibration absorbing devices for proper operation and that the performance of all flexible connections, both mechanical and electrical, is satisfactory.
(m) Run the generator set on full load continuously for 48 hours while recording the readings of all the instruments at 30-minute intervals.
(n) When all tests are satisfactorily completed and results are agreed with the Engineer or his representative, the lubricating oil and water levels shall be finally checked and fuel-day tank replenished and the set left in normal operating condition.
(o) The Contractor shall provide an initial supply of all-lubricating oils and greases.
(p) Additional lubricating oil shall be provided for recharging the engine sump once together with a supply of lubricating oil and grease to cover the normal use and servicing of the set during the one-year maintenance period and as required under Clause 4.2.22.

4.33.16 Spare Parts

Tenderers shall recommended spare parts for engine, alternator, and control panel, taking into account the anticipated engine listed and priced separately so that the client can decide.

4.33.17 Tools

A complete set of tools as specified in this document shall be provided, including grease and oil guns, necessary for the normal maintenance of the set and its controls. The tools shall be of the best quality, the spanners being a chrome-vanadium steel, and shall be contained in a suitable robust steel box with lid fitted with a padlock and a two key.

The tenderer shall submit with his tender recommended list of special tools for all Plants supplied under this Contract. This list shall be priced individually in the Data Schedules. A Provisional sum has been included for the tools, which may be expended in whole, in part or completely deleted from the Contract.

4.33.18 Drawings

The Contractor shall submit to the Engineer specialised sets of the following drawings: -

(a) Building drawing showing details of cable entries, pipe entries and ducts required
(b) General arrangement drawings showing the principal dimensions and weight of the sets
(c) General arrangement of the diesel engine, pipework, tanks and supports
(d) Details, supports and general requirements associated with the exhaust systems
(e) General arrangement of the alternator and exciter showing terminal markings, polarity and phase rotation
(f) General arrangement of the electrical control cubicle
(g) Schematic and wiring diagram of the electrical control cubicle
(h) Any other relevant details relating to the installation and operation of diesel generator

4.33.19 Exhaust System

The contractor shall allow a maximum of 20m exhaust pipework and 5m of ducting system for each individual generator. The Contractor shall provide exact details of his proposals. These shall include domestic "residential" type silencers. The Contractor shall supply silencers to meet the requirements of the installation and to reduce the exhaust noise to a level comparable to a domestic installation. The Contractor shall ensure that the system proposed does not create unacceptable back- pressures. The exhaust system shall be terminated in a manhole as shown on the schematic drawings.

The exhaust system shall be fully lagged and clad with rolled aluminium sheet gauge 22 within the building and shall be provided with sleeving where it passes through the building structure. The exhaust shall be suitably fixed and supported such that no undue strain is imposed upon the exhaust system and/or the building structure. Full details of the Contractor's proposals for running, supporting and installation of the exhaust system shall be submitted for approval. Adequate flanged joints shall be provided to make it possible to dismantle the exhaust pipe without the need to cut.

4.33.20 Ducting

Ducting shall be extended from the radiator to the external wall such that the exhaust of the hot air is controlled and directed outside the generator room. The final arrangement is to suit the plant and the supplier's recommendations. The setting of the diesel generator in the generator room and other structural details will be to suit the supplier's Drawing details.

4.33.21 Cables and Accessories

The electrical Contractor shall be responsible for the supply and complete installation of all cables and accessories as required meeting fully the requirements of the diesel generator set. The necessary power armoured and relevant sensing cable from the main LV Switchboard to the generator control panel will be supplied, installed and connected by the electrical Sub-Contractor. The connections for the sensing and communication cable at the change-over contactors in the main L.V. Switchboard and the generator control panel are covered under this Contract.

The cables shall be in accordance with the appropriate international standards, as applicable and as a minimum; the following standards shall apply. Copper conductors shall be provided throughout. The AC power cables shall comply with BS 6360 with insulation to BS 5467 and IEC 502 or approved equivalent. All cables shall be sized / rated to suit the plant and equipment offered and such that the voltage drops between any two points does not exceed 2.5%.

4.33.22 Equipment Earthing and Earth Field

The entire installation shall be fully earthed in accordance with the IEE Regulations and the electrical Sub-Contractor shall provide earth field for the generator set. For tender purposes the Tender shall allow in his prices for bonding to the main earth bar in the generator by means of copper conductor sized to accommodate fault currents, from the generator frame.

4.33.23 System Earthing

All metallic structures, equipment, plant, services, cable sheaths and the like within the power station shall be connected to the main earth. The grounding system shall comprise of a network of continuous copper bars connecting together the various items of the electrical plant at the site. No copper less than 75 sq mm cross-sectional area shall be utilised. The Contractor shall install copper earth rods, earth nests, copper strips and the like to render the grounding system effective. The grounding system shall be installed and tested to IEC 364-5-54 or approved equivalent.

4.33.24 Tests on the Earthing system

Earth resistant values shall be measured at different parts of the grounding system. In the event that the resistance at any point of the grounding system exceeds the expected values, additional grounding shall be supplied and installed, at the Contractor's cost.
The Contractor shall record the test results in Test Certificates signed by him and submitted to the Engineer prior to acceptance of the works as completed.

4.33.25 Danger Plates

The danger warning plates shall be fixed by means of screws in a prominent position on each side of the set. The description in the danger warning plate shall be as follows: -

DANGER
THIS MACHINE IS AUTOMATICALLY CONTROLLED. DO NOT WORK ON IT UNTIL STARTING MECHANISM IS ISOLATED

4.33.26 Ministry of Works Specification

The diesel generation shall be provided to suit the requirements of the Specifications on and the schedules attached. In addition to the foregoing, the Standard Ministry of Works Specification for the supply, delivery, installation, setting to work and commissioning of diesel generation plant being supplied and installed under this contract, with particular reference being made to the following:

(a) Diesel engine
(b) Alternator and exciter
(c) Excitation
(d) Voltage regulation

(e) All other relevant and related requirements

The Contractor shall include for all requirements specified in these Specifications and the Ministry of Works (MoW) Specifications. No claims will be entertained for lack of knowledge as copies of the MoW specifications can be viewed at the Ministry's Offices in Nairobi.

Other Relevant Regulations: -

- Current regulations of KPLC
- Current regulations of CCK(Communication Commission of Kenya)
- Current Bye-Laws of NCC (Nairobi City Council).
- Current regulations by NEMA.

4.34 Testing and Commissioning

In addition to the requirements given under previous clauses of the Specification, the requirements given in this clause shall also apply to the inspection, testing and re-commissioning of the complete generator installation.

The Contractor shall be responsible for testing and commissioning the generator installation to ensure that it is in proper working order to the satisfaction of the Engineer.

After inspection, testing and commissioning the installations, each part of the system shall be subjected to tests in accordance with the relevant international standards and the requirements of the power supply authority. In addition to these tests, the whole of the installation shall be subjected to complete functional tests to the satisfaction of the Engineer.

Any defects, faults or omissions made apparent by such tests shall be corrected and re-tested to the satisfaction of the Engineer.

SECTION 5

BILL OF QUANTITIES

5 BILLS OF QUANTITIES

5.1 General Directions

(a) The Bills of Quantities are to be read in conjunction with the Conditions of Contract, the Technical Specification, the Data Schedules and the Drawings for details of the description, quality, tests and strengths of materials to be used and the workmanship, conditions, obligations, liabilities described in the Conditions of Contract, the Specification, the Data Schedules and the Bills of Quantities including all overhead charges and profit and carrying out of the Works shall be deemed to be spread over and included in the prices and sums in this Bill of Quantities.

(b) Each item which the Tenderer proposes to supply shall be priced by Tenderer with the exception of the item for which Provisional Sums have been allowed. The Tenderer shall insert in the appropriate column against each item allocated in Kenya Shillings (KShs.) as required by him and payments shall be made according to this allocation in the event of a contract.

If the Tenderer omits to price any item in the Bills of Quantities then the cost of such items will be held to be spread over and included in the prices given for other items of work.

(c) The rate entered against each item **shall be exclusive** of all duties, customs and excise charges, since the sub-contract works are tax exempted.

(d) The Total of Tender for the electrical services shall be carried to the Main Summary section 6.

The Total of Tender for the electrical services shall include for the design, manufacture, inspection and testing, packing for shipment, insurance, customs, duties, delivery to site, unloading, and all other charges, complete erection, testing, setting to work, finishing, painting, maintenance for a period of Twelve calendar months and the instruction period all to the satisfaction of the Engineer, of the items of Plant described or implied within the Specification and shown on the Drawings.

(e) Provisional Sums may be expended in part, in whole or totally deleted from the Contract. The Tenderer shall take this into consideration when pricing the tender as no claims for loss of profit, etc will not be entertained.

It shall be deemed that the contractor has included for all requirements contained within the Specification, Drawings, Data Schedules and Bills of Quantities.

(f) For information and to assist the contractor in pricing the Bills of Quantities and the Schedule of Rates, the following Scope of Contract have been included, these details having formed part of the Main Tender Documents.

(g) Irrespective of the requirements contained within the East African Standard method of Measurement it shall be deemed that the contractor has included all requirements contained within the Specification, Drawings, Schedules and Bills of Quantities.

5.2 Particular Instructions for Pricing of Items in the Bills of Quantities

1. Cables

(a) Cables shall be measured, the net length between termination points and the rates entered shall be deemed to include for all snaking, tails and the like.

(b) The rates entered shall include as necessary, for all trenching, sanding, tiling, backfilling, consolidation, lugs, compound, insulating and identifying tails/wiring, earth bonds, route markers, supports, fixings, cable tray and any necessary drilling and packing to boards, panels and the like, all as required to complete the cable/wiring installation to meet the requirements of the Specification and details included on the drawings. The trenching rates shall be for excavation in any material to depth of 1000mm.

2. Switchgear, Distribution Boards and Equipment

The rates entered shall include for all switchgear, distribution boards and similar items necessary for the complete operation of the plant as specified and indicated on the Drawings, together with circuit breakers, isolating switches, switch fuses, cable gland plates, clamps, conduit adaptors, internal wiring and interconnections, supports for cable tails, earthing, labels and the like and as necessary for the complete installation.

3. Conduit, Trunking and Tray

Conduit, trunking and tray shall be provided as specified and indicated on the Drawings and shall be measured over all fittings and cable runs as necessary. The rates entered shall be deemed to include for all fittings, fixings, supports, brackets, hangers, earthing strips, accessories and the like as necessary to meet fully the requirements of the installation.

4. Earthing

The rates entered for all the equipment, lighting, fittings, switches, socket outlets and the like shall include for an insulated earth wire as required and described in the specification together with all other services as necessary including sinks, taps, etc.

5. General

It shall be the responsibility of the Tenderer to ensure that his prices include for all items necessary to complete the installation whether or not the items have been specifically identified within the Bills of Quantities. The Tenderer's prices shall include for all nuts, bolts, washers, fixings, supports and the like as necessary.

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
A	**GENERAL ITEMS AND CONTINGENCY**				
A/1	Allow for contingent works, the quantities of which are not detailed, to be executed if and when instructed by the Engineer. (PROVISIONAL SUM)	**P.C. Sum**	1	**30,000**	**30,000**
A/2	Allow for TRAINNING of Client O & M Personnel on the operation and Maintenance of specialist electrical equipment supplied under this contract	Sum	1		
A/3	Allow for providing all attendance necessary to the Bio-medical equipment specialist during installation of the Equipment and associated switchgear.	Sum	1		
A/4	Allow for the preparation of all working drawings as specified (Minimum No. of drawings per set - 50 No)	Set	3		
A/5	Allow for the preparation of all "As Built" drawings after testing and commissioning as specified; (Minimum No. of drawings required - 50 No.) Drawings to include: (a) Hard copy prints - 4 sets of each. (b) AutoCAD on CD – 4 No.	Set	4		
A/6	Allow for supply of spare parts as detailed in the data schedules and the specifications.	Sum	1		
A/7	Allow for supply of special tools as detailed in the data schedules and in the specifications	Sum	1		
A/8	The Tenderer is to describe hereunder inserting any relevant clause number, any other works, obligations or items that may be referred to in the Conditions of Contract, Specification, Drawings or Data Schedule in respect of the works for which he desires to enter a separate charge(this charge is to be entered in the Amount column). If no charge is entered hereunder, rates and amounts elsewhere in the schedule of prices shall be deemed to cover all expenses for such works, obligations or items.	Sum	1		
	Total carried forward to Main Summary Page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
B	**INCOMING UTILITY POWER SUPPLIES**				
B/1	Allow a P.C. Sum of **USD.200,000.00** for the capital contribution towards Kenya Power Co. Ltd.'s supply line, H.T. switchgear, metering panel and connection charges.	**P.C. Sum**	1	**200,000**	**200,000**
B/2	Allow for providing attendance as may be necessary to Kenya Power connecting up of their incoming underground cables to MV Switchgear including liaison works such as filing necessary applications, submission of forms to the authorities, depositing the fees/ other amounts as required to get the premises / installations, inspected and approved and all other formalities required till the electrical connection is obtained..	Sum	1		
B/3	Any other items to complete the installations in this section.	Sum	1		
	Total carried forward to Main Summary Page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
C	**MEDIUM VOLTAGE (MV) RETICULATION**				
	Medium Voltage switchgear				
C/1	**MV switchgear shall be installed on prepared foundations including all supports, fixings and inter panel connections where relevant. Including main and multi-core cabling and heat shrink cable termination.** Supply, install, test and commission 11 KV MV switchgear consisting of 1 No. incoming and 2 No. outgoing 630 Amps 26 kA for 1 sec. Vacuum circuit breaker as per the drawings & specifications. Feeders include ammeter with selector switch, VIP relays, current transformers; incomers include 3 phase VT, voltmeter and phase selector switch; IDMT overcurrent and earth fault relays/CTs. The contractor shall engage for these works a Specialist firm that shall offer the client after sales technical maintenance Support	No.	1		
	Sted-Down Distribution Transformer				
C/2	Supply, store, install, test & commission 1600 kVA capacity 11/0.433, KV, Z= 5 %, 50Hz, 3ph, DYN-11 step down, dry type cast resin indoor transformers (ONAN) in ventilated steel enclosure suitable for an attitude of 1700m including winding temperature indicator with 2 N/O contacts, Copper wound complete with LT and HT cable termination boxes, lifting lugs, mounting skids, provisions for wheels, undrilled gland plates to air-filled cable boxes, off load tapping facility and including positioning in transformer room as per approved layout and detailed specifications	No.	1		
	11 KV HT cables				
C/3	Supply, lay, install and test 11 KV grade XLPE Copper conductor armoured cables laid over MS supports in existing trenches, 3 C x 95 sq.mm 11 KV Copper XLPE cable between MV switchgear and transformers including terminations, all necessary accessories and ancillary works and materials required for complete installation as specified and as indicated on the drawings.	m.	30		
C/4	Supplying and making cable end terminations for the above 11 KV HT cable, XLPE Copper conductor armoured cable including termination kit, complete heat shrinkable sleeves, Lugs etc.	No.	2		
	Earthing for for Sub-station Equipment				
C/5	Supply and install 25 mm x 3 mm thick Copper tapes including all necessary fixing accessories and effecting connections.	m.	25		
	Sub-total carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	Brought forward from previous page				
C/6	**EARTH MAT**: Supply, install, test and commission copper earthing matt constructed of 25mm x 3mm copper tape measuring 1000mm x 1000mm with tapes at 150mm intervals laid 800mm deep in ground, Earth inspection concrete pit 1000 x 1000 mm with concrete base, CI chequered plate manhole cover with frame and bitumastic paint and with Marconite fill, excavation and reinstatement of soil.	No.	2		
C/7	**EARTH BAR:** Supply, install, test and commission 90mm x 90mm x 400mm long station earth bar mounted on polymer insulators and base; including connections installed within transformer room	No.	1		
C/8	Supply and install a 70mm copper earth conductor with the MV cable.	m	25		
C/9	Supply and fixing in position the approved 'As Built' single line diagram framed in 1000 x 800 mm size glass frame in the sub station.	No.	1		
C/10	Supply and install an approved tool cabinet for housing tools, operating handels, spare fuses, 1 pair 11 KV rubber hand gloves of approved make and earthing equipment..	No.	1		
C/11	Earthing and bonding to the Supply Authority requirements and the Specification	Sum	1		
C/12	Test and commission the MV installation	Sum	1		
	Total Carried forward to the Summary Page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
D	**LOW VOLTAGE (LV) RETICULATION**				
	Automatic Voltage Stabilizer & By-pass Panel				
D/1	Supply, install, test and commission 1600 kVA, 50 Hz, 3 phase dry type static voltage stabilizer having voltage Input range of -20/+20%, frequency range as 45Hz-60 Hz, Output voltage variation as +/-1% Permissable over load 110% for 10 minutes at every 8 Hrs of operation, complete with inbuilt smart LED network analyzer compatible with BMS, under voltage / over voltage releases all in accordance with General technical specification	No.	1		
D/2	Voltage stabiliser maintenance bypass panel IP-44 free standing fully front access fabricated in 16SWG steel sheet and frames finished consisting of 3 Nos. 2500 amp 4P ACB's of 65 kA (Ics) breaking capacity circuit breaker each (switch disconnectors) mechanically interlocked, 3 Phase IN and Out indication lamps, Load manager with Communucation portControl module for comminucating various parameters such as input/output voltage, AVR status ON/OFF/Trip. Temperature of the Unit etc	No.	1		
	Low Voltage Boards				
	Fabricate, assemble, supply, install, test and commission the following Switchboards, Sub Distribution Boards and Final Distribution Boards suitable for 415 V, 3 phase, 50 Hz, 4 wire power supply system. The boards shall be complete with all circuit breakers, switches, surge protective devices, digital multimeters, relays, electrical and mechanical interlocks, auxiliary equipment, instruments, accessories, coordination with other trades to provide a complete installation and fully operational system as shown on the drawings and as specified to the satisfaction of the engineer				
	The switchboards shall be fabricated out of 2 mm thick powder coated steel sheet metal in cubical formation, compartmentalized in form-4, type-2 Construction, floor mounted, free standing and shall be dust and vermin proof. 3 mm thick cable gland plate, shall be provided both at the top and the bottom of the panel.				
	Final distribution Boards shall be fabricated out of 1.6 mm thick powder coated steel sheet metal and suitable for either surface mounted or wall recessed installation				
	Refer to the schematic drawings, distribution boards schedules and the technical specifications for details				
	Main low voltage switchboard				
D/3	Free-standing main switchboard (Fully Type-Tested Assemblies – TTA **form 4 type 2**), modular, metal clad, manufactured in 3 mm galvanised mild steel sheet and finished in cream (or appropriate colour) powder coating as shown on the schematic complete with the following:-	Item	1		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Section 1				
(a)	**Incoming Air Circuit Breakers**				
	Manually operated fully drawout type air circuit breaker with built in microprocessor based release unit for protection and measurement as per specification and with following accessories :				
	Breaker ON / OFF / TRIP indicating lights with control MCB's.				
	Under voltage release				
	24 V DC Shunt trip coil				
	Under voltage relay with timer				
	Over voltage relay with timer				
	Load Manager				
	Breaker control switch				
	0-2500/ 5 amps CT digital ammeter with 2500/ 5 amps, Class1 CT's.				
	0-500 Volt digital voltmeter with selector switch through VT's,				
	Class 1 – Type B surge protective device (Lines to Neutral) & (Neutral to Earth) suitable for 3 phases for utility incomer.				
i	2500 amps 4 pole (65 kA) Incoming Air Circuit Breaker `A' (For Generator supply - 1)				
ii	2500 amps 4 pole (65 kA) Incoming Air Circuit Breaker `B' (For Transformer -1 supply through Voltage stablizer 1)				
	Bus Bars				
	3000 amps 4 pole (65 kA) copper bus bars with colour coded heat shrinkable insulating sleeves				
	Power Factor correction				
	The section to have a 300 KVAr's automatic Power Factor Correction Capacitor Bank. The bank to be made from low-loss bio-degradable capacitive unit and to include the necessary fuse bases and fuses for each capacitor protection, Step automatic control regulator, contactors, controls and indicator lamps, digital read-out screen, comprising the following steps:-				
	i) 3 x 50 KVAr's 415 V,50Hz, 3-Phase				
	ii) 2 x 40 KVAr's 415 V,50Hz, 3-Phase				
	iii) 2 x 20 KVAr's 415 V,50Hz, 3-Phase				
	iv) 2 x 10 KVAr's 415 V,50Hz, 3-Phase				
	v) 2 x 5 KVAr's 415 V,50Hz, 3-Phase				
	Outgoing				
	1000 amps 4 pole MCCB				
	630 amps 4 pole MCCB				
	400 amps 4 pole MCCB				
	300 amps 4 pole MCCB				
	2 X 250 amps 4 pole MCCB				
	1 X 125 amps 4 pole Spare MCCB				
	2 X 100 amps 4 pole Spare MCCB				
	4 X 63 amps 4 pole Spare MCCB				
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Bus Coupler : Breaker `C'				
	2500 amps, 4 pole, 65kA manually operated fully drawout type air circuit breaker with ON / OFF / TRIP indicating lamps with control MCB's, shunt trip, breaker control switch etc.				
	Section 2				
(a)	**Incoming Air Circuit Breakers**				
	Manually operated fully drawout type air circuit breaker with built in microprocessor based release unit for protection and measurment as per specification and with following accessories :				
	Breaker ON / OFF / TRIP indicating lights with control MCB's.				
	Under voltage release				
	24 V DC Shunt trip coil				
	Under voltage relay with timer				
	Over voltage relay with timer				
	Load Manager				
	Breaker control switch				
	0-2500/ 5 amps CT digital ammeter with 2500/ 5 amps, Class I CT's.				
	0-500 Volt digital voltmeter with selector switch through VT's,				
	Class 1 – Type B surge protective device (Lines to Neutral) & (Neutral to Earth) suitable for 3 phases for utility incomer.				
i	2500 amps 4 pole (65 kA) Incoming Air Circuit Breaker `A' (For Generator supply - 1)				
ii	2500 amps 4 pole (65 kA) Incoming Air Circuit Breaker `B' (For Transformer -1 supply through Voltage stablizer 1)				
	Bus Bars				
	3000 amps 4 pole (65 kA) copper bus bars with colour coded heat shrinkable insulating sleeves				
	Power Factor correction				
	The section to have a 300 KVAr's automatic Power Factor Correction Capacitor Bank. The bank to be made from low-loss bio-degradable capacitive unit and to include the necessary fuse bases and fuses for each capacitor protection, Step automatic control regulator, contactors, controls and indicator lamps, digital read-out screen, comprising the following steps:-				
	i) 3 x 50 KVAr's 415 V,50Hz, 3-Phase				
	ii) 2 x 40 KVAr's 415 V,50Hz, 3-Phase				
	iii) 2 x 20 KVAr's 415 V,50Hz, 3-Phase				
	iv) 2 x 10 KVAr's 415 V,50Hz, 3-Phase				
	v) 2 x 5 KVAr's 415 V,50Hz, 3-Phase				
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Outgoing				
	800 amps 4 pole MCCB				
	400 amps 4 pole MCCB				
	250 amps 4 pole MCCB				
	200 amps 4 pole MCCB				
	160 amps 4 pole MCCB				
	125 amps 4 pole MCCB				
	4 X 100 amps 4 pole MCCB				
	4 X 63 amps 4 pole MCCB				
	Notes :				
	CT's shall be provided for APFCR				
	Generator and transformer supply ACBs shall be electrically/ mechanically interlocked as per schematic diagram.				
	All MCCB's shall be suitable for 50 kA (Icu=Ics) breaking capacity.				
	All ACB's shall be suitable for 65 kA(Icu=Ics=Icw for 1 sec.)				
	All outgoing MCCB's feeders shall be provided with built-in microprocessor release unit with earth fault protection and time delay.				
	6mm perspex viewing window				
	Heavy duty rubber lining for all the perspex viewing windows				
	415V three-phase surge diverter as Furse ESP 415, wired as shown, complete with enclosure with viewing window.				
D/4	Carry out comprehensive labelling of all the bus bars. CT chambers, circuit breakers etc. of item No. C/3 above, indicating the areas served, outgoing cable sizes etc.	Item	1		
D/5	Carry out earthing in copper earth mats with rods and earth continuity conductors for the above switchboard with necessary soil treatment methods to achieve impedance not exceeding 1.0 ohms.	item	1		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	MAINS LV CABLES				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation all in accordance with the specification and drawings to the satisfaction of the Engineer. **All single core cables have to be installed in trefoil arrangement.** **All electrical cables on cable trays, ladders and in shafts have to be spaced by atleast one diameter of the biggest size.** **Allow for the laying, supporting and termination of the LV cables from transformers to main switchgear.**				
	SINGLE CORE				
	Single core, (0.6/1KV) grade, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 laid in trench/duct including marker tape (Trench and duct measured elsewhere)				
D/6	[3x(4x1Cx630mm^2)+1x(1Cx630mm^2)],CU,XLPE/SWA/PVC (rate for parallel runs per meter)	m.	65		
D/7	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	26		
D/8	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	26		
	Rising Mains Busbar BD-EQ				
	Supply, install, connect test and commission compact Low impedance rising mains copper busbar trunking; including: insulated supports, earth continuity, bar couplers; fixings and connections/jointing to equipment; fixing and mounting accessories; end feed units; end cap units, including any other fittings required for a complete system. All in accordance with schematic drawings, load schedules, and technical specifications.				
D/9	1000A TPN+E Copper Busbar, 50kA for Equipment Branch	m	30		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Tap-Off Units				
	Supply, Install, Test, Connect and commision the following Tap-Off units, each complete with all accessories and components, all in strict compliance with ratings indicated in the schematic drawings, load schedules and technical specifications .				
D/10	400A TPN MCCB 36kA	No.	1		
D/11	160A TPN MCCB 36kA	No.	2		
D/12	100A TPN MCCB 36kA	No.	2		
D/13	63A TPN MCCB 36kA	No.	1		
	Multicore Cable (0.6/1KV) to Item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/14	3x(4C x 240mm^2)Cu/XLPE/SWA/PVC + 1x(1C x 240mm^2) Cu/PVC G/Y ECC (rate for parallel runs per meter)	m.	60		
D/15	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	6		
D/16	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	25		
	Rising Mains Busbar BD-N				
D/17	630A TPN+E Copper Busbar, 36kA for Normal Branch	m	23		
	Tap-Off Units				
	Supply, Install, Test, Connect and commision the following Tap-Off units, each complete with all accessories and components, all in strict compliance with ratings indicated in the schematic drawings, load schedules and technical specifications .				
D/18	100A TP MCCB 36kA	No.	18		
D/19	63A TP MCCB 36kA	No.	2		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Multicore Cable (0.6/1KV) to Item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/20	2x(4C x 150mm^2)Cu/XLPE/SWA/PVC + 1x(1C x 150mm^2) Cu/PVC G/Y ECC	m.	70		
D/21	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	4		
D/22	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	18		
	Rising Mains Busbar- BD-E				
D/23	400A TPN+E Copper Busbar, 36kA for Critical (UPS) Branch	m	25		
	Tap-Off Units				
	Supply, Install, Test, Connect and commision the following Tap-Off units, each complete with all accessories and components, all in strict compliance with ratings indicated in the schematic drawings, load schedules and technical specifications .				
D/24	100A TP MCCB 36kA	No.	1		
D/25	63A TP MCCB 36kA	No.	8		
	Multicore Cable (0.6/1KV) to Item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/23	1x(4C x 185mm^2)Cu/XLPE/SWA/PVC + 1x(1C x 95mm^2) Cu/PVC G/Y ECC	m.	70		
D/24	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/25	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	Sub-distribution boards				
	Supply, Install, Connect, Test and commision the following Sub-boards, Free-standing/ Wall mounted (Type-Tested Assemblies – TTA form 3 type 2), modular, metal clad, manufactured in 3 mm galvanised mild steel sheet and powder coated complete with all necessary fittings and accessories including the following:				
	(a) Set of neon phase presence indicator lamps				
	(b) All incoming MCCBs to have electronics trip unit, under voltage release and adjustable over current settings and having a short-circuit breaking capacity of 36kA at 415Vac, 50Hz.				
	(c) Digital multimeter with CTs and fuse protection capable of measuring voltage in the range 0 – 500V, 3- phase, current in the range 0-1000A, 3-phase, and all power system parameters (KW, KVA, KWHr, KVArs, Frequency, P.F., harmonics and all the parameters).				
	(d) Carry out comprehensive labelling of all the bus bars, circuit breakers etc. indicating the areas served, outgoing cable sizes etc. or the following boards:-				
D/26	**Main L.V. Sub-Board for Imaging Equipment 'SDB-IMG'**	No.	1		
	Incoming				
	1 X 800 amps MCCB Adjustable − 36 kA fault rated; fitted with electronic trip unit and mechanical and electrical interlock.				
	Bus Bars:				
	1000 amps TPN 50 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	1 X 250 amps MCCB TPN; 3 X 200 amps MCCB TPN; 2 x 160 amps MCCB TPN; 2 x 32 amps MCCB TPN; Spare MCCB TPN: 1 x 100 amps, 2 x 63 amps, 1 x 40 amps; Type 2 ESP 415 electronic surge Protective device.				
	Multicore Cable (0.6/1KV) to Item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
	Sub-Total Carried forward to next page				

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Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/27	2x(4C x 240 mm^2)Cu/XLPE/SWA/PVC + 1x(1C x 240 mm^2) Cu/PVC G/Y ECC	m.	100		
D/28	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	4		
D/29	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	18		
D/30	**LINAC L.V. Sub-Board 'SDB-LINAC'**	No.	1		
	Incoming				
	1 X 400 amps MCCB Adjustable − 36 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	500 amps TPN 36 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	2 X 100 amps MCCB TPN; 2 x 80 amps MCCB TPN; 2 x 63 amps MCCB TPN; 2 x 40 amps MCCB TPN; Spare MCCB TPN: 2 x 63 amps, 3 x 32 amps; Type 2 ESP 415 electronic surge Protective device.				
	Multicore cable (0.6/1KV) from 'MLVB' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/31	1x(4C x 185mm^2)Cu/XLPE/SWA/PVC + 1x(1C x95 mm^2) Cu/PVC G/Y ECC	m.	100		
D/32	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/33	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/34	**Medical Gases Plant L.V. Sub-Board 'SDB-GAS'**	No.	1		
	Incoming				
	1 X 300 amps MCCB Adjustable − 36 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	400 amps TPN 36 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	2 X 125 amps MCCB TPN; 2 x 63 amps MCCB TPN; 5 x 40 amps MCCB TPN; 2 x 32 amps MCCB TPN; Spare 2 x 32 amps; Type 2 ESP 415 electronic surge Protective device.				
	Multicore cable (0.6/1KV) from 'MLVB' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/35	1x(4C x 120mm^2) Cu/XLPE/SWA/PVC + 1x(1C x70 mm^2) Cu/PVC G/Y ECC	m.	50		
D/36	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/37	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
D/38	**OR & ICU L.V. Sub-Board 'SDB-OR'**	No.	1		
	Incoming				
	1 X 200 amps MCCB Adjustable − 36 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	250 amps TPN 36 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	12 x 63 amps MCCB TPN; Spare 3 x 63 amps; Type 2 ESP 415 electronic surge Protective device.				
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Multicore cable (0.6/1KV) from 'MLVB' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/39	1x(4C x 95mm^2)Cu/XLPE/SWA/PVC + 1x(1C x50 mm^2) Cu/PVC G/Y ECC	m.	55		
D/40	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/41	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
D/42	**HVAC L.V. Sub-Board 'SDB-MV'**	No.	1		
	Incoming				
	1 X 160 amps MCCB Adjustable − 36 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	200 amps TPN 36 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	5 X 40 amps MCCB TPN; 2 x 32 amps MCCB TPN; Spare 2 x 40 amps; 3 x 32 amps; Type 2 ESP 415 electronic surge Protective device.				
	Multicore cable (0.6/1KV) from 'BD-EQ' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/43	1x(4C x 50mm^2)Cu/XLPE/SWA/PVC + 1x(1C x25 mm^2) Cu/PVC G/Y ECC	m.	70		
D/44	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/45	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
D/46	**CSSD L.V. Sub-Board 'SDB-CSSD'**	No.	1		
	Incoming				
	1 X 160 amps MCCB Adjustable − 36 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	200 amps TPN 36 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	4 X 63 amps MCCB TPN; 3 x 32 amps MCCB TPN; Spare 2 x 40 amps; 3 x 32 amps; Type 2 ESP 415 electronic surge Protective device.				
	Multicore cable (0.6/1KV) from 'BD-EQ' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/47	1x(4C x 50mm^2)Cu/XLPE/SWA/PVC + 1x(1C x25 mm^2) Cu/PVC G/Y ECC	m.	45		
D/48	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/49	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
D/50	**FIRE PUMP L.V. Sub-Board 'SDB-FIRE'**	No.	1		
	Incoming				
	1 X 160 amps MCCB Adjustable − 36 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	200 amps TPN 36 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	2 X 100 amps MCCB TPN; 1 x 32 amps MCCB TPN; Spare 1 x 40 amps; 1 x 32 amps; Type 2 ESP 415 electronic surge Protective device.				
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Multicore cable (0.6/1KV) from 'MLVB' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/51	1x(4C x 50mm^2)Cu/XLPE/SWA/PVC + 1x(1C x25 mm^2) Cu/PVC G/Y ECC	m.	50		
D/52	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/53	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
D/54	**Boiler Plant L.V. Sub-Board 'SDB-BP'**	No.	1		
	Incoming				
	1 X 100 amps MCCB Adjustable − 26 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	125 amps TPN 26 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	1 X 32 amps MCCB TPN; 13 x 20 amps MCCB TPN;Spare MCCB TPN: 1 x 40 amps, 1 x 32amps, 3 x 20 amps; Type 2 ESP 415 electronic surge Protective device.				
	Multicore cable (0.6/1KV) from 'BD-EQ' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/55	1x(4C x 25mm^2)Cu/XLPE/SWA/PVC + 1x(1C x16 mm^2) Cu/PVC G/Y ECC	m.	65		
D/56	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/57	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
D/58	**Waste Water Treatment Plant & Water Pumps L.V. Sub-Board 'SDB-PUMP'**	No.	1		
	Incoming				
	1 X 125 amps MCCB Adjustable − 26 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	160 amps TPN 26 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	1 X 63amps MCCB TPN; 4 x 32 amps MCCB TPN; 2 x20 amps MCCB TPN; 6x 16 amps MCCB TPN; Spare MCCB TPN: 1 x 40 amps, 2 x 32amps, 2 x 20 amps; Type 2 ESP 415 electronic surge Protective device.				
	Multicore cable (0.6/1KV) from 'MLVB' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/57	1x(4C x 35mm^2)Cu/XLPE/SWA/PVC + 1x(1C x25 mm^2) Cu/PVC G/Y ECC	m.	50		
D/58	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/59	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
D/60	**Airconditioning Plant L.V. Sub-Board 'SDB-AHU'**	No.	1		
	Incoming				
	1 X 100 amps MCCB Adjustable − 26 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	125 amps TPN 26 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	1 X 40amps MCCB TPN; 2 x 32 amps MCCB TPN; 4 x 16 amps MCCB TPN; Spare MCCB TPN: 1 x 63 amps, 2 x 32amps, 2 x 20 amps; Type 2 ESP 415 electronic surge Protective device.				
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Multicore cable (0.6/1KV) from 'BD-EQ' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/61	1x(4C x 25mm^2)Cu/XLPE/SWA/PVC + 1x(1C x25 mm^2) Cu/PVC G/Y ECC	m.	50		
D/62	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/63	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
D/64	**Airconditioning Plant L.V. Sub-Board 'SDB-VRV'**	No.	1		
	Incoming				
	1 X 100 amps MCCB Adjustable − 26 kA fault rated; fitted with electronic trip unit.				
	Bus Bars:				
	125 amps TPN 26 kA copper busbars with fully-rated neutral and colour coded heat shrinkable insulating sleeves.				
	Outgoing:				
	2 X 32amps MCCB TPN; 6 x 20 amps MCCB TPN; Spare MCCB TPN: 2 x 32 amps, 2 x 20amps, 1 x 16 amps; Type 2 ESP 415 electronic surge Protective device.				
	Multicore cable (0.6/1KV) from 'BD-EQ' to item above				
	Supply, install, connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/65	1x(4C x 25mm^2)Cu/XLPE/SWA/PVC + 1x(1C x25 mm^2) Cu/PVC G/Y ECC	m.	50		
D/66	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
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D/67	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	Final Distribution Boards				
	Supply, install, test and commission the following final distribution boards (DB's) fabricated out of 1.6 mm thick steel sheet metal, powder coated with approved shade and partitions to segregate phases, approved lockable covers, recessed in wall or surface mounted of the following description:				
	DB-LIFT- (Fourth Floor)				
D/68	4 way TPN DB, 1 Nos. 100 amps TPN RCCB of 30 mA leakage current with 3 nos. 63A D curve TPN MCB as outgoing and 1 no. 100A 4 pole MCB and 1 no. withdrawable type surge arrester of 415V maximum discharge current of 10 kA at 8/20 micro seconds with operation indicator as incomer, separate neutral link for each phase.	No.	1		
	Multicore cable (0.6/1KV) from 'BD-EQ' to item above				
	Supply, install, connect and test 1x(4C x 25mm2) Cu XLPE/SWA/PVC + 1x(1C x 16 mm2) Cu/PVC G/Y ECC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	35		
D/69	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/70	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	Physical Medicine (DB-PHY)				
D/71	12 way TPN DB, 10 Nos. 16/20 amps SP MCB's per phase with 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no. 100 amps 4 pole MCB as incomer with separate neutral link for each phase.	No.	1		
	Multicore cable (0.6/1KV) from MLVB' to item above				
	Supply, install, connect and test 1x(4C x 25mm2) Cu XLPE/SWA/PVC + 1x(1C x 16 mm2) Cu/PVC G/Y ECC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	150		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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D/72	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/73	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	Type X (DB for UPS)				
D/74	12way TPN DB, 9 Nos. 40 amps DP RCCB of 30 mA leakage current with 36 nos. 16/20A D curve SP MCB as outgoing and 1 no. 63A 4 pole MCB and 1 no. withdrawable type surge arrester of 415V maximum discharge current of 10 kA at 8/20 micro seconds with operation indicator as incomer, separate neutral link for each phase.	No.	1		
	Multicore cable (0.6/1KV) from MLVB' to item above				
	Supply, install, connect and test 1x(4C x 16 mm2) Cu XLPE/SWA/PVC + 1x(1C x 16 mm2) Cu/PVC G/Y ECC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	200		
D/75	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/76	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	Ground Floor Final Distribution Boards				
	DB-GAL				
D/77	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		-
D/78	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	15		
	(b) Blanking plates for unused spare ways	No.	5		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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	Multicore cable (0.6/1KV) from 'BD-N' to item above				
	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	40		
D/79	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/80	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-GAP				
D/81	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/82	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	7		
	(b) 32 amp SP&N 10kA MCB	No.	17		
	(c) 32 amp TP&N 10kA MCB	No.	1		
	(d) Blanking plates for unused spare ways	No.	5		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/84	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	40		
D/85	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/86	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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	DB-GAE				
D/87	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/88	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 32 amp SP&N 10kA MCB	No.	18		
	(b) Blanking plates for unused spare ways	No.	6		
	Multicore cable (0.6/1KV) from 'BD-E' to item above				
D/89	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	40		
D/90	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/91	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	CU-LSG				
D/92	Supply, install, connect-up complete 18 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/93	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(b) 10 amp SP&N 10kA MCB	No.	15		
	(d) Blanking plates for unused spare ways	No.	3		
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	Multicore cable (0.6/1KV) from 'DB-LS' to item above				
D/94	Supply, install, connect and test 16 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	20		
D/95	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/96	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
	DB-GBL				
D/97	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/98	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	21		
	(b) Blanking plates for unused spare ways	No.	3		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/99	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/100	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-GBP				
D/101	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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D/102	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	6		
	(b) 32 amp SP&N 10kA MCB	No.	19		
	(d) Blanking plates for unused spare ways	No.	11		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/103	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/104	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-GBE				
D/105	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/106	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 32 amp SP&N 10kA MCB	No.	18		
	(b) 32 amp TP&N 10kA MCB	No.	1		
	(c) Blanking plates for unused spare ways	No.	5		
	Multicore cable (0.6/1KV) from 'BD-E' to item above				
D/107	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/108	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/109	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	First Floor Final Distribution Boards				
	DB-1AL				
D/110	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/111	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	18		
	(b) Blanking plates for unused spare ways	No.	6		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	40		
D/112	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/113	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-1AP				
D/114	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
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D/115	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	11		
	(b) 32 amp SP&N 10kA MCB	No.	12		
	(c) 63 amp SP&N 10kA MCB	No.	3		
	(d) Blanking plates for unused spare ways	No.	10		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/116	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	40		
D/117	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/118	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-1AE				
D/119	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/120	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 32 amp SP&N 10kA MCB	No.	15		
	(b) 63 amp SP&N 10kA MCB	No.	3		
	(c) Blanking plates for unused spare ways	No.	6		
	Multicore cable (0.6/1KV) from 'BD-E' to item above				
D/121	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	40		
	Sub-Total Carried forward to next page				

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D/122	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/123	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	CU-W1				
D/124	Supply, install, connect-up complete 12 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/125	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(b) 10 amp SP&N 10kA MCB	No.	1		
	(b) 32 amp SP&N 10kA MCB	No.	10		
	(d) Blanking plates for unused spare ways	No.	1		
	Multicore cable (0.6/1KV) from 'DB-1AP' to item above				
D/126	Supply, install, connect and test 10 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	20		
D/127	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/128	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
	CU-W2				
D/129	Supply, install, connect-up complete 12 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
	Sub-Total Carried forward to next page				

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D/130	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	1		
	(b) 32 amp SP&N 10kA MCB	No.	10		
	(c) Blanking plates for unused spare ways	No.	1		
	Multicore cable (0.6/1KV) from 'DB-1AP' to item above				
D/131	Supply, install, connect and test 10 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	25		
D/132	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/133	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
D/134	Supply, install, connect-up complete 12 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/135	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	1		
	(b) 32 amp SP&N 10kA MCB	No.	10		
	(c) Blanking plates for unused spare ways	No.	1		
	Multicore cable (0.6/1KV) from 'DB-1AP' to item above				
D/136	Supply, install, connect and test 10 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	25		
D/137	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/138	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
	CU-LS1				
D/139	Supply, install, connect-up complete 18 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/140	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	14		
	(b) Blanking plates for unused spare ways	No.	4		
	Multicore cable (0.6/1KV) from 'DB-LS' to item above				
D/141	Supply, install, connect and test 16 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	20		
D/142	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/143	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
	DB-1BL				
D/144	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/145	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	18		
	(b) Blanking plates for unused spare ways	No.	6		
	Sub-Total Carried forward to next page				

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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/146	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/147	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/148	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-1BP				
D/149	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/150	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	3		
	(b) 32 amp SP&N 10kA MCB	No.	19		
	(c) Blanking plates for unused spare ways	No.	11		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/151	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/152	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/153	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-1BE				
D/154	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/155	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	3		
	(b) 32 amp SP&N 10kA MCB	No.	16		
	(c) 32 amp TP&N 10kA MCB	No.	1		
	(d) Blanking plates for unused spare ways	No.	2		
	Multicore cable (0.6/1KV) from 'BD-E' to item above				
D/156	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/157	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/158	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	Second Floor Final Distribution Boards				
	DB-2AL				
D/159	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/160	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	18		
	(b) Blanking plates for unused spare ways	No.	6		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/161	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	40		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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D/162	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/163	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-2AP				
D/164	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/165	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	11		
	(b) 32 amp SP&N 10kA MCB	No.	12		
	(c) 63 amp SP&N 10kA MCB	No.	3		
	(d) Blanking plates for unused spare ways	No.	10		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/166	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	40		
D/167	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/168	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-2AE				
D/169	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/170	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 32 amp SP&N 10kA MCB	No.	15		
	(b) 63 amp SP&N 10kA MCB	No.	3		
	(c) Blanking plates for unused spare ways	No.	6		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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	Multicore cable (0.6/1KV) from 'BD-E' to item above				
D/171	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	40		
D/172	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/173	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	CU-W4				
D/174	Supply, install, connect-up complete 12 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	1		
	(b) 32 amp SP&N 10kA MCB	No.	10		
	(c) Blanking plates for unused spare ways	No.	1		
	Multicore cable (0.6/1KV) from 'DB-2AP' to item above				
D/175	Supply, install, connect and test 10 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	20		
D/176	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/177	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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	CU-W5				
D/178	Supply, install, connect-up complete 12 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/179	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	1		
	(b) 32 amp SP&N 10kA MCB	No.	10		
	(c) Blanking plates for unused spare ways	No.	1		
	Multicore cable (0.6/1KV) from 'DB-2AP' to item above				
D/180	Supply, install, connect and test 10 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	25		
D/181	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/182	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
	CU-W6				
D/183	Supply, install, connect-up complete 12 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/184	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	1		
	(b) 32 amp SP&N 10kA MCB	No.	10		
	(c) Blanking plates for unused spare ways	No.	1		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Multicore cable (0.6/1KV) from 'DB-2AP' to item above				
D/185	Supply, install, connect and test 10 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	25		
D/186	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/187	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
	CU-LS2				
D/188	Supply, install, connect-up complete 18 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/189	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	16		
	(b) Blanking plates for unused spare ways	No.	2		
	Multicore cable (0.6/1KV) from 'DB-LS' to item above				
D/190	Supply, install, connect and test 16 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	25		
D/191	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/192	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
	DB-2BL				
D/193	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
	Sub-Total Carried forward to next page				

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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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D/194	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	24		
	(b) Blanking plates for unused spare ways	No.	12		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/195	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/196	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/197	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-2BP				
D/198	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/199	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	7		
	(b) 32 amp SP&N 10kA MCB	No.	17		
	(c) Blanking plates for unused spare ways	No.	12		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/200	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/201	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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D/202	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-2BE				
D/203	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/204	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 32 amp SP&N 10kA MCB	No.	16		
	(b) Blanking plates for unused spare ways	No.	8		
	Multicore cable (0.6/1KV) from 'BD-E' to item above				
D/205	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/206	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/207	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	Third Floor Final Distribution Boards				
	DB-3BL				
D/208	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/209	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	26		
	(b) Blanking plates for unused spare ways	No.	10		
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	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/210	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	55		
D/211	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/212	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-3BP1				
D/213	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/214	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	6		
	(b) 32 amp SP&N 10kA MCB	No.	15		
	(c) Blanking plates for unused spare ways	No.	15		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/215	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/216	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/217	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-3BP2				
D/218	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/219	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	4		
	(b) 32 amp SP&N 10kA MCB	No.	12		
	(c) Blanking plates for unused spare ways	No.	8		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/220	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	65		
D/221	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/222	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-3BE				
D/223	Supply, install, connect-up complete 6 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/224	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 32 amp SP&N 10kA MCB	No.	12		
	(b) Blanking plates for unused spare ways	No.	6		
	Multicore cable (0.6/1KV) from 'BD-E' to item above				
D/225	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/226	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/227	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
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	Medical IT Isolation Panel - OR and ICU				
D/228	Supply, install, Test and Commission of 10kVA Single Phase Isolation panel comprising both the IT and TNS Earthing system complete with Isolation Transformer for IT Medical wiring system; 63A SPN Automatic Static Transfer Switch (Make before Break), earth reference bars, Local Isolation Monitor, CTs, Relays, RCBOs, Spareways housed in IP54 cabinet and complete with local and remote alarm panels as specified andschematic diagram	No.	9		
	Incoming: SPN Switch Isolator 63A				
	TNS System: 63 amp 240 volt SP&N; earth and neutral bars; outgoing 6 x 16A SP&N RCBO 30mA				
	IT System: 63 amp 240 volt SP&N bars; outgoing 12 x 16A SP&N MCB; 3 x 20 A SP&N MCB, 2 x 32 A SP&N MCB				
	Multicore cable (0.6/1KV) from 'DB-OR' to item above				
D/229	Supply, install, connect and test 10 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	300		
D/230	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	14		
D/231	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	42		
	CU-LS3				
D/232	Supply, install, connect-up complete 18 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/233	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	14		
	(b) Blanking plates for unused spare ways	No.	4		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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	Multicore cable (0.6/1KV) from 'DB-LS' to item above				
D/234	Supply, install, connect and test 16 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	35		
D/235	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/236	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
	Fourth Floor Final Distribution Boards				
	DB-4BL				
D/237	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/238	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	21		
	(b) Blanking plates for unused spare ways	No.	3		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/239	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	55		
D/240	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/241	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-4BP				
D/242	Supply, install, connect-up complete 12 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
	Sub-Total Carried forward to next page				

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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/243	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 20 amp SP&N 10kA MCB	No.	4		
	(b) 32 amp SP&N 10kA MCB	No.	17		
	(c) Blanking plates for unused spare ways	No.	15		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/244	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/245	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/246	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-4BK				
D/247	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 4 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/248	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	6		
	(b) 20 amp SP&N 10kA MCB	No.	5		
	(c) 32 amp SP&N 10kA MCB	No.	9		
	(d) Blanking plates for unused spare ways	No.	4		
	Multicore cable (0.6/1KV) from 'BD-N' to item above				
D/249	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	65		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/250	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/251	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	DB-4BE				
D/252	Supply, install, connect-up complete 8 way TP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/253	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 32 amp SP&N 10kA MCB	No.	18		
	(b) 63 amp TP&N 10kA MCB	No.	1		
	(c) Blanking plates for unused spare ways	No.	6		
	Multicore cable (0.6/1KV) from 'BD-E' to item above				
D/254	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	50		
D/255	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/256	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	10		
	CU-LS4				
D/257	Supply, install, connect-up complete 18 way SP/N MCB Distribution board for normal power supply, IP 32 protection enclosure; removable earth link with separate neutral bars for each phase. and DIN rail; 3 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no.100 amp integral isolator incomer	No.	1		
D/258	Supply, install, connect-up the following Miniature circuit breakers (MCBs) for above distribution board; BS EN 60 898; DIN rail mounting; including connecting to circuit				
	(a) 10 amp SP&N 10kA MCB	No.	14		
	(b) Blanking plates for unused spare ways	No.	4		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Multicore cable (0.6/1KV) from 'DB-LS' to item above				
D/259	Supply, install, connect and test 16 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	35		
D/260	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	2		
D/261	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	6		
	CU-W1E- CU-W6E				
D/262	18 way SPN CU, Outgoing MCBs: 14 Nos.32 amps SP MCB's with 1 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no. 63 amps SPN MCB as incomer.	No.	6		
	Multicore cable (0.6/1KV) from 'DB-LS' to item above				
D/263	Supply, install, connect and test 16 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	200		
D/264	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	12		
D/265	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	36		
	DB-Plant room				
D/266	6way TPN DB, Outgoing MCBs: 3 Nos. 10 amps SP MCB's, 3 Nos.32 amps SP MCB's; with 2 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no. 63 amps 4 pole MCB as incomer with separate neutral link for each phase.	No.	3		
	DB-Gate House				
D/267	6way TPN DB, Outgoing MCBs: 3 Nos. 10 amps SP MCB's, 3 Nos.32 amps SP MCB's; with 2 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no. 63 amps 4 pole MCB as incomer with separate neutral link for each phase.	No.	1		
D/268	12way TPN DB, 9 Nos. 40 amps DP RCCB of 30 mA leakage current with 36 nos. 16/20A D curve SP MCB as outgoing and 1 no. 63A 4 pole MCB and 1 no. withdrawable type surge arrester of 415V maximum discharge current of 10 kA at 8/20 micro seconds with operation indicator as incomer, separate neutral link for each phase.	No.	1		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	Multicore cable (0.6/1KV) from 'MLVB' to item above				
D/269	Supply, install, connect and test 16 mm2 5C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	250		
D/270	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	12		
D/271	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	36		
	CU-Common Areas				
D/272	18 way SPN CU, Outgoing MCBs: 14 Nos.32 amps SP MCB's with 1 Nos. 63 amps DP RCCB's of 30 mA leakage current and 1 no. 63 amps SPN MCB as incomer.	No.	2		
	Multicore cable (0.6/1KV) from 'MLVB' to item above				
D/273	Supply, install, connect and test 16 mm2 3C Cu XLPE/SWA/PVC 600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder (cable tray, ladder and duct measured elsewhere)	m.	100		
D/274	Supply and install cable brass compression glands complete with nut and shrouds for the above cable	No.	12		
D/275	Supply and install cable lugs for the above cable complete with hydraulic crimping	No.	36		
	ISOLATORS				
	Supply, install, connect and test isolator switches including all necessary accessories and ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
D/276	250 Amps 3 phase Isolators IP 54 Splashproof type	No.	1		
D/277	200 Amps 3 phase Isolators IP 54 Splashproof type	No.	2		
D/278	160 Amps 3 phase Isolators IP 54 Splashproof type	No.	1		
D/279	125 Amps 3 phase Isolators IP 54 Splashproof type	No.	1		
	Sub-Total Carried forward to next page				

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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/280	100 Amps 3 phase Isolators IP 54 Splashproof type	No.	4		
D/281	80 Amps 3 phase Isolators IP 54 Splashproof type	No.	2		
D/282	63 Amps 3 phase Isolators IP 54 Splashproof type	No.	9		
D/283	40 Amps 3 phase Isolators IP 54 Splashproof type	No.	5		
D/284	32 Amps 3 phase Isolators IP 54 Splashproof type	No.	16		
D/285	20 Amps 3 phase Isolators IP 54 Splashproof type	No.	22		
D/286	20 Amps 1 phase SPN Isolators IP 54 Splashproof type	No.	30		
	LV Cables to the isolators above				
	Supply, install,connect and test the following cables including termination, glands, fixing materials, accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system all in accordance with the specification and drawings and to the satisfaction of the Engineer.				
	600/1000 volt grade, multicore, armoured, XLPE insulated, PVC sheathed, copper stranded conductors to BS 5467 installed on cable tray, ladder or laid in duct including marker tape (cable tray, ladder and duct measured elsewhere)				
D/287	4C x 95mm^2 Cu/XLPE/SWA/PVC + 1C x 50mm^2 Cu/PVC G/Y ECC	m.	60		
D/288	4C x 70mm^2 Cu/XLPE/SWA/PVC + 1C x 35mm^2 Cu/PVC G/Y ECC	m.	50		
D/289	4C x 50mm^2 Cu/XLPE/SWA/PVC + 1C x 25mm^2 Cu/PVC G/Y ECC	m.	130		
D/290	4C x 35mm^2 Cu/XLPE/SWA/PVC + 1C x 25mm^2 Cu/PVC G/Y ECC	m.	50		
D/291	4C x 25mm^2 Cu/XLPE/SWA/PVC + 1C x 16mm^2 Cu/PVC G/Y ECC	m.	180		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/292	5C x 16mm^2 Cu/XLPE/SWA/PVC	m.	380		
D/293	5C x 10mm^2 Cu/XLPE/SWA/PVC	m.	150		
D/294	5C x 6mm^2 Cu/XLPE/SWA/PVC	m.	350		
D/295	5C x 4mm^2 Cu/XLPE/SWA/PVC	m.	825		
D/296	3C x 16mm^2 Cu/XLPE/SWA/PVC	m.	30		
D/297	3C x 10mm^2 Cu/XLPE/SWA/PVC	m.	110		
D/298	3C x 6mm^2 Cu/XLPE/SWA/PVC	m.	30		
D/299	3C x 4mm^2 Cu/XLPE/SWA/PVC	m.	300		
	Cable Ladder, Cable Tray, Wire Baskets				
	Supply, install & connect the following heavy duty galvanized steel ladder rack/ tray/ wire basket suspended on hangers below slab soffit, roof structure, or fixed to wall (inclusive of bends, tee pieces, cross overs, distribution board connections, end caps, splicers, factory made supports, hanging brackets, fixings, earthcontinuity straps etc) coordination with all other trades and all other incidentals required to provide a complete installation, as shown on the drawings and as specified up to the satisfaction of the engineer.				
	Cable Ladder				
D/300	600mm wide ladder	m.	100		
D/301	450mm wide ladder	m.	100		
	Perforated type factory fabricated GI cable trays				
D/302	600 x 75 mm cable tray	m.	25		
D/303	600 x 50 mm cable tray	m.	60		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
D/304	450 x 50 mm cable tray	m.	620		
D/305	300 x 50 mm cable tray	m.	25		
D/306	250 x 50 mm cable tray	m.	300		
D/307	150 x 50 mm cable tray	m.	450		
D/308	100 x 50 mm cable tray	m.	50		
	Cable Basket zinc plated				
D/309	600 x 50 mm Cable Basket	m.	50		
D/310	450 x 50 mm Cable Basket	m.	1000		
D/311	200 x 50 mm Cable Basket	m.	250		
	Cable Trunking				
	Supply, install & connect the following heavy duty PVC skirting modular trunking; white 3 compartments (inclusive of SNAP ON trunking 45mm cover, cutting and jointing trunking to fittings and backplates for fixing to walls etc) coordination with all other trades and all other incidentals required to provide a complete installation, as shown on the drawings and as specified up to the satisfaction of the engineer.				
D/312	250 x 50 mm Cable Trunking	m.	500		
	Adaptable Boxes				
	Supply, install & connect the following heavy duty Sheet steel adaptable boxes, knockout sides, fixed to backgrounds; including supports and fixings (cutting and connecting conduit to boxes is included) coordination with all other trades and all other incidentals required to provide a complete installation, as shown on the drawings and as specified up to the satisfaction of the engineer.				
D/313	200 × 200 × 75mm	No.	50		
D/314	150 × 150 × 75mm	No.	50		
D/315	100 × 100 × 50mm	No.	50		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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	Emergency lighting AC static inverter system central power system; CPS BS EN 50171 compliant; one-hour standby				
D/316	supply, install, test and commission Central system supplying AC power on mains failure to mains luminaires; metal cubicle with changeover device, battery charger, battery & static inverter; LED indication and LCD display; pure sinewave output; 10 year design life regulated lead acid battery; 12 hour recharge to 80% duty specified; unverter rated for 120% of load for 100% of duty; battery sized for 'end of life' @ 20°C test push button; includes on-site commissioning **One hour 20 KW, 17 KW 3 phase input & 3 phase output**	No.	1		
D/318	Additonal Supply, install, test and commission 1250 kVA, 50 Hz, 3 phase dry type static voltage stabilizer having voltage Input range of -20/+20%, frequency range as 45Hz-60 Hz, (Ditto D1 above)	No.	1	Not required in this phase	
D/319	Additioanl Voltage stabiliser maintenance bypass panel IP-44 free standing fully. (Ditto D2 above)	No.	1	Not required in this phase	
	Total Carried forward to Summary page				

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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
E	**UNINTERRUPTIBLE POWER SUPPLY (UPS)**				
	Supply, Install, Connect, Test and commision the following complete UPS System with sealed lead acid batteries including, DC circuit breakers, temperature sensors for batteries, cabinet ventilation fans, external bypass..etc. coordination with all other trades and all other incidentals required to provide a fully operational system as shown on the drawings and as specified up to the satisfaction of the Engineer.				
E/1	Uninterruptible Power Supply (UPS) System complete with maintenance-free batteries sealed lead acid batteries (10 years Warranty) including items mentioned in the technical specifications and drawings. UPS System to support sensitive hospital Equipment shall include modular UPS; 1 No. 120 kVA, 415/ 50 Hz, 3 phase input & 3 phase output, true online, double conversion UPS, with IGBT RECTIFIER & INVERTER, External central by-pass panel and batteries, 15-minute autonomy battery storage, cabinet/Rack to house all items with suitable ventilators.	No.	1		
E/2	Uninterruptible Power Supply (UPS) System complete with maintenance-free batteries sealed lead acid batteries (10 years Warranty) including items mentioned in the technical specifications and drawings. UPS System to support sensitive hospital Equipment shall include modular UPS; 1 No. 60 kVA, 415/ 50 Hz, 3 phase input & 3 phase output, true online, double conversion UPS, with IGBT RECTIFIER & INVERTER, External central by-pass panel and batteries, 30-minute autonomy battery storage, cabinet/Rack to house all items with suitable ventilators.	No.	1		
E/3	Uninterruptible Power Supply (UPS) System complete with maintenance-free batteries sealed lead acid batteries (10 years Warranty) including items mentioned in the technical specifications and drawings. UPS System to support sensitive hospital Equipment shall include modular UPS; 1 No. 60 kVA, 415/ 50 Hz, 3 phase input & 3 phase output, true online, double conversion UPS, with IGBT RECTIFIER & INVERTER, External central by-pass panel and batteries, 30-minute autonomy battery storage, cabinet/Rack to house all items with suitable ventilators.	No.	1		
E/4	**Allow for a PC SUM of USD 5,000 for additoanl cabling to the above UPS**	**P.C. SUM**	1	**5,000**	**5,000**
E/5	Allow for Testing & Commissiong of the Uninterruptible Power Supply (UPS) System as per specifications and manufacturer's recommendations up to the satisfaction of the engineer.	Sum	1		
E/6	Allow for any other item not detailed but required for the satisfactory operation and completion of the Uninterruptible Power Supply (UPS) installations. Specify	Sum	1		
	SubTotal Carried forward to Summary page				**5,000**

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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
F	**DIESEL GENERATOR POWER BACK UP & RETICULATION**				
F/1	Supply, install, test and commission diesel generator set 850kVA (prime rated) with sound attenuated canopy, cranking battery and battery charger,auto start capability, parallelizing equipment, measuring and protection panel, auxiliary equipment, connection testing and commisioning for delivery in full and normal operation. The equipment will be "ready for BMS connection through Modbus Protocol".	No.	1		
F/2	Take delivery, insure, install, test and commission above sound attenuated 850 kVA, 415V 50Hz prime rated diesel engine generator set	No.	1		
F/3	Supply diesel generator set 850kVA (prime rated) with sound attenuated canopy, cranking battery and battery charger,auto start capability, parallelizing equipment, measuring and protection panel, auxiliary equipment, connection testing and commisioning for delivery in full and normal operation. The equipment will be "ready for BMS connection through Modbus Protocol"..	No.		Not in this scope	
F/4	Take delivery, insure, install, test and commission above sound attenuated 850 kVA, 415V 50Hz prime rated diesel engine generator set	No.		Not in this scope	
F/5	Supply & Installation of Diesel Generators' Synchronization panel for parallel operation, for two (2) diesel generator set with three (3) incoming Air Circuit Breakers 4 poles, motorized 3x1250A one (2) outgoing 4pole Air Circuit breaker motorized 1x2500A,all equipment protection and control, according to design drawings, equipment for parallel operation, synchronsization of generators, control equipment, the required synchronsization software etc, connection testing and commisioning for delivery in full and normal operation. The equipment will be "ready for BMS connection through Modbus Protocol"..	No.	1	Not in this scope	
F/6	Supply, install, test & commission Bulk Diesel Storage Tank 15000L capacity (6 mm thick shell & 8 mm thick dished shell) as per BS Code and approved for construction as per shop drawings duly approved by the Engineer and suitable for under ground installation including all required accessories, with pressure operated level indication system and with following: Inlet and outlet connections, Vent pipe, Dip pipe assembly with calibration chart, 600 mm dia manhole with cover, Lifting lugs, Mild Steel ladder and Providing Anti corrosive Pypcoat (AW4) treatment.	No.	1		
F/7	Supply, install, test & commission electrical driven fuel transfer pumps suitable for pumping of diesel fuel from under ground tank to Genset and feeding the overflow back to under ground tank complete with following : flame proof motor of suitable HP for the pump(s), flame proof ON/ OFF push button station, coupling and coupling guard for direct coupling of pump and motor, pressure gauge with valve on the delivery side etc	No.	1		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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F/8	Supply, install, test and commission of 1000 litres secondary Buffer fuel storage tank for collecting ,storing fuel at height near diesel generator in order to feed the genset day tanks through gravity. Fabricated from 4 mm thick MS plates.Tank shall include 450 mm ID manhole cover, flanged connection for inlet, outlet, drain outlet, overflow drain outlet, vent and probe provision for level controller to return automatically diesel to over flow tank. Tank shall be mounted on suitably high structure support (painted with 2 coats of red oxide primer and there after 2 coats of approved paint shade).	No.	1		
F/9	Allow for diesel fuel for testing and commissioning	No.	110		
F/10	Supply, install, test and commission mild steel class 'C' (heavy duty) pipe & fittings like tees, elbows, junctions, unions, bends, plugs etc. RCC pipe sleeves of larger diameter to be provided wherever the pipes are crossing the wall / slab and sleeves as per Consultant's requirement, including clamps hangers, nuts, bolts etc for pipe supports from wall / ceiling including cutting and making hole in wall / slab and making good the same, non return valves, solenoid valves including a coat of Synthetic enamel paint over two coats of primer complete as required and excavation of required depth and back filling where required	Item	1		
F/11	Supply, install, test and commission oil flow meter for pipe line. The flow meter shall have communication port with communication protocol for integration with BMS.	No	1		
F/12	Supply, install, test and commission Mild steel class-B exhaust pipe and all fixing accessories and hardwares. The exhaust pipes shall be insulated with 75 mm thick mineral wool (density 150 kg/m3) insulation wrapped in chicken mesh and clad with 26 gauge aluminium sheet including all MS epoxy painted support structural as required	Item	1		
F/13	Supply, install, test and commission Radiator extract system ducting, piping, insulation, jackets complete with support structure and fixings.	Item	1		
F/14	Supply, install, test and commission Residential type environmentally friendly silencers with support structure and fixings	Item	1		
F/15	Supply, install, test and commision, Control cabling including terminations from the generator set mounted control panels to the main LV sub-board installed in the generator room.	Item	1		
F/16	Supply, install, test and commission 6mm2 PVC SWA PVC 12 core copper cable between the LV switchboard and the generator control panels and the synchronizing panel.	Item	1		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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F/17	Supply and install 8 x500mm² XLPE/SWA/PVC single core CU. cable +1x500mm² XLPE/SWA/PVC single core cables laid in cable trench/ tray between Main switch boards and generatorl to engineer's details.(rate for parallel run per meter)	LM	18		
F/18	Supply and install brass compression glands for the above cables	No.	1		
F/19	Supply and install cable lugs for the above cables	No.	1		
F/20	Supply, install, connect, test and commission 400 x 90 x 6 mm Copper Earth Bar mounted on insulators and having 6 nos. holes for terminating single core 70 Sq.mm flexible cable with the entire assembly enclosed in 1.6 mm thick MS enclosure of approved make, design & painted with approved paint shade.	No.	1		
F/21	Supply, install, connect, test and commission 150 sq.mm single core cable Green & Yellow colour 1100 volts grade PVC insulated sheathed copper conductor unarmoured cable including copper thimbles, fixing hardware as required.	L.m	30		
F/22	Supply, install, connect, test and commission 25 x 3 mm bare copper tapes / wires including all necessary fixing accessories and effecting connections as per specifications.	L.m	20		
F/23	Supply, install, connect, test and commission concrete inspection pit comprising copper earthing matt 1000mm x 1000mm constructed of 25mm x 3mm copper tape measuring with tapes at 150mm intervals, including Earth inspection concrete pit masonry chamber 1000 x 1000 mm with concrete base C I heavy duty / chequered plate manhole cover with frame painted with bitumastic paint and packing with mixture of charcoal and common salt around earth matt including digging of pit upto permanent moisture level and as per soil condition but not less than 1 meters and back filling as required to achieve an earth resistance of 1 ohms	No.	1		
F/24	Allow for training of two members of the Client's staff to be fully conversant with all aspects of system operation, management and programming.	Item	1		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
G	**MAIN HOSPITAL- LIGHTING AND SMALL POWER**				
G1	**GROUND FLOOR - LIGHTING AND SMALL POWER**				
	LIGHTING POINT WIRING				
G1/1	Supply, install, test and commission wiring lighting outlet points connected to the distribution boards with 3 x 1.5 sq.mm PVC insulated copper conductor 1000 volts grade, drawn in 25mm dia. heavy duty PVC conduit embeded in concrete as per BS Codes including providing all the necessary cover plates, supports, boxes, connectors, accessories, earthing, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings up to the satisfaction of the Engineer	No.	651		
	SUPPLY OF INDOOR LIGHTING FIXTURES				
G1/2	Supply the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect. (All LED lighting fixtures to have a minimum of 5 years warranty):				
a	Type A1	No.	160		
b	Type A2	No.	120		
c	Type A3	No.	10		
d	Type B	No.	20		
e	Type B1	No.	20		
f	Type EXIT	No.	60		
g	Type D1	No.	90		
h	Type D2	No.	100		
i	Type K	No.	15		
j	Type L	No.	20		
k	Type M	No.	18		
l	Type N	No.	18		
m	Type D3	No.	25		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	INSTALLATION OF LIGHTING FIXTURES				
G1/3	Deliver, store,connect, test and commission the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect.				
a	Type A1	No.	160		
b	Type A2	No.	120		
c	Type A3	No.	10		
d	Type B	No.	20		
e	Type B1	No.	20		
f	Type EXIT	No.	60		
g	Type D1	No.	90		
h	Type D2	No.	100		
i	Type K	No.	15		
j	Type L	No.	20		
k	Type M	No.	18		
l	Type N	No.	18		
l	Type D3	No.	25		
	WIRING DEVICES AND ACCESSORIES				
	LIGHTING ACCESSORIES				
G1/4	Supply, deliver, Install, terminate, test and commission the following lighting accessories including all necessary fittings, all in accordance with the specifications and drawings				
	Plate switches; 10 amp flush mounted, white plastic fronted; fitted brass earth terminal				
a	10 amp, 1 gang, 1 way switch	No.	80		
b	10 amp, 2 gang, 1 way switch	No.	5		
c	10 amp, 3 gang, 1 way switch	No.	5		
d	10 amp, 1 gang, 2 way switch	No.	15		
e	10 amp, 2 gang, 2 way switch	No.	10		
f	10 amp, 3 gang, 2 way switch	No.	5		
g	10 amp, one gang, 2 way Intermeidate switch	No.	13		
h	1 gang, 1 way; Dimmer switche; rotary action	No.	8		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
G1/5	Supply, install, test and commission Integrated sensor having combination of infra-red receiver,movement detector for remote or automatic detection having independent on/off for individual sensing component etc as required as per drawing and specifications.	No.	60		
	SOCKET OUTLETS				
G1/6	Supply, install, connect, test and commission sockets outlets white moulded coverplate;BS 1363; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	13A Single switched socket outlet	No.	101		
b	Ditto as item above; but weather proof type.	No.	10		
c	13A Single switched socket outlet; non standard; coloured red-UPS.	No.	20		
d	13A Single socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	10		
e	13A Twin switched socket outlet.	No.	260		
f	Ditto as item above; but weather proof type.	No.	20		
g	13A Twin switched socket outlet; non standard; coloured red - UPS.	No.	190		
h	13A Twin socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	10		
	CONNECTION/ CONTROL UNITS				
G1/7	Supply, install, connect, test and commission connection units, spur outlets white moulded coverplate; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	Hand dryer: 20A DP Switch; switched with neon indicator.	No.	8		
b	Toilet extract: 20A DP Switch; switched with neon indicator.	No.	8		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
c	Split Unit: 20A DP Switch; switched with neon indicator.	No.	10		
d	45A DP Switch; switched with neon indicator.	No.	4		
e	Cooker control unit: BS 4177; 45A DP main switch with single 13A switched socket outlet;	No.	4		
f	32 A (3P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	5		
g	16 A (1P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	5		
h	Spur outlet for Medical Gas Alarm Panel.	No.	2		
i	Spur outlet for BMS Central Equipment	No.	2		
j	Spur outlet for Main Fire Alarm Control Panel.	No.	2		
k	Spur outlet for Master Nurse Call Control Panel.	No.	2		
l	Spur outlet for urinal sensor installed above false ceiling.	No.	8		
4	**WIRING OF ELECTRICAL OUTLETS**				
G1/8	Supply, install, connect, test and commission electrical outlets wiring connected with PVC insulated copper conductor 1100 volts grade stranded to lighting or power distribution board, drawn in embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits, including providing and fixing of HG conduits, conduit fittings, boxes, back boxes, wiring, earthing, cable trunking, terminations, all necessary accessories, ancillary works and materials required for a complete installation of all wiring devices (maximum eight no.of sockets shall be connected on one circuit), as specified and as indicated on the drawings for the following items:				
a	Ring circuit wiring for 13A Single socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	141		
b	Ring circuit wiring for 13A Twin socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	480		
c	Radial circuit wiring for Hand dryer: 20A DP Switch outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	8		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
d	Radial circuit wiring for Toilet extract: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	8		
e	Radial circuit wiring for Split Unit: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	10		
f	Radial circuit wiring for 40A DP Switch outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	4		
g	Radial circuit wiring for Cooker control unit: 45 amp DP outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	4		
h	Radial circuit wiring for 32 A (3P + N + E) Switched Industrial sockets/plugs outlet point, wired in 5x6 mm2 PVC insulated copper cable	No.	5		
i	Radial circuit wiring for 16 A (1P + N + E) Switched Industrial sockets/plugs outlet point, wired in 3x2.5 mm2 PVC insulated copper cable	No.	5		
j	Spur circuit wiring for Spur outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	16		
5	**OUTLET POINTS WITH DRAW WIRES**				
G1/9	Supply, install, connect, test and commission outlet points complete with an average of 20 meters of 25 mm diameter concealed PVC heavy duty conduit inclusive of: couplers, draw boxes, bends, junction boxes, outlet boxes with cover plates of approved make and design and any other necessary accessories required for a complete installation to the specialist's requirements complete with blanking cover as may be required (for Extra Low Voltage Systems) as specified and indicated on the drawings for the following:				
a	Data/ Telephone Outlet complete with Conduit only & Draw wire.	No	300		
b	TV/FM/SAT outlet point Conduit only & Draw wire.	No	10		
c	Security outlet point (CCTV) Conduit only & Draw wire.	No	70		
d	Security outlet point (Access Control) Conduit only & Draw wire.	No	30		
e	Speaker/ public address outlet point Conduit only & Draw wire.	No	70		
f	Nurse Call System outlet point Conduit only & Draw wire.	No	130		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
6	**ADAPTABLE BOXES**				
G1/10	Supply and install Sheet steel adaptable boxes; with knockout sides; fixed to backgrounds; including supports and fixings for the following:				
a	Square galvanized 300 × 300 × 100mm	No.	20		
b	Square galvanized 200× 200 × 75mm	No.	20		
c	Square galvanized 150 × 150 × 75mm	No.	20		
G1/11	Supply and fixing of embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits of following sizes including cost of junction boxes, bends, elbows, sockets, tees etc. laying in slab, cutting chasis and making good or surface mounted including all fixing hardware.				
G1/12	Ditto as Item above but 32 mm dia heavy duty PVC	LM	200		
G1/13	Ditto as Item above but 38 mm dia heavy duty PVC	LM	200		
G1/14	Ditto as Item above but 50 mm dia heavy duty PVC	LM	100		
G1/15	Heavy gauge, mild Steel Conduit; surface fixed on saddles to backgrounds, with standard pattern boxes and fittings including all fixings and supports (forming holes, conduit entry, draw wires etc. and components for earth continuity included)				
a	Ditto as Item above but 25 mm dia MS 16 gauge	LM	100		
b	Ditto as Item above but 32 mm dia MS 16 gauge	LM	100		
	Total Carried forward to Collection page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
G2/1	**FIRST FLOOR - LIGHTING AND SMALL POWER**				
	LIGHTING POINT WIRING				
G2/1	Supply, install, test and commission wiring lighting outlet points connected to the distribution boards with 3 x 1.5 sq.mm PVC insulated copper conductor 1000 volts grade, drawn in 25mm dia. heavy duty PVC conduit embeded in concrete as per BS Codes including providing all the necessary cover plates, supports, boxes, connectors, accessories, earthing, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings up to the satisfaction of the Engineer	No.	566		
	SUPPLY OF INDOOR LIGHTING FIXTURES				
G2/2	Supply the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect. (All LED lighting fixtures to have a minimum of 5 years warranty):				
a	Type A1	No.	135		
b	Type A2	No.	70		
c	Type W	No.	25		
d	Type B	No.	20		
e	Type B1	No.	32		
f	Type EXIT	No.	37		
g	Type D1	No.	65		
h	Type D2	No.	110		
i	Type K	No.	9		
j	Type L	No.	15		
k	Type M	No.	23		
l	Type N	No.	25		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	INSTALLATION OF LIGHTING FIXTURES				
G2/3	Deliver, store,connect, test and commission the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect.				
a	Type A1	No.	135		
b	Type A2	No.	70		
c	Type A3	No.	25		
d	Type B	No.	20		
e	Type B1	No.	32		
f	Type EXIT	No.	37		
g	Type D1	No.	65		
h	Type D2	No.	110		
i	Type K	No.	9		
j	Type L	No.	15		
k	Type M	No.	23		
l	Type N	No.	25		
	WIRING DEVICES AND ACCESSORIES				
	LIGHTING ACCESSORIES				
G2/4	Supply, deliver, Install, terminate, test and commissio the following lighting accessories including all necessary fittings, all in accordance with the specifications and drawings				
	Plate switches; 10 amp flush mounted, white plastic fronted; fitted brass earth terminal				
a	10 amp, 1 gang, 1 way switch	No.	75		
b	10 amp, 2 gang, 1 way switch	No.	12		
c	10 amp, 3 gang, 1 way switch	No.	3		
d	10 amp, 1 gang, 2 way switch	No.	10		
e	10 amp, 2 gang, 2 way switch	No.	25		
f	10 amp, 3 gang, 2 way switch	No.	3		
g	10 amp, one gang, 2 way Intermeidate switch	No.	17		
h	1 gang, 1 way; Dimmer switche; rotary action	No.	7		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
G2/5	Supply, install, test and commission Integrated sensor having combination of infra-red receiver,movement detector for remote or automatic detection having independent on/off for individual sensing component etc as required as per drawing and specifications.	No.	45		
	SOCKET OUTLETS				
G2/6	Supply, install, connect, test and commission sockets outlets white moulded coverplate;BS 1363; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	13A Single switched socket outlet	No.	100		
b	Ditto as item above; but weather proof type.	No.	5		
c	13A Single switched socket outlet; non standard; coloured red-UPS.	No.	15		
d	13A Single socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	15		
e	13A Twin switched socket outlet.	No.	175		
f	Ditto as item above; but weather proof type.	No.	5		
g	13A Twin switched socket outlet; non standard; coloured red - UPS.	No.	210		
h	13A Twin socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	5		
	CONNECTION/ CONTROL UNITS				
G2/7	Supply, install, connect, test and commission connection units, spur outlets white moulded coverplate; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	Hand dryer: 20A DP Switch; switched with neon indicator.	No.	11		
b	Toilet extract: 20A DP Switch; switched with neon indicator.	No.	9		
c	Split Unit: 20A DP Switch; switched with neon indicator.	No.	5		
d	40A DP Switch; switched with neon indicator.	No.	3		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
e	Cooker control unit: BS 4177; 45A DP main switch with single 13A switched socket outlet;	No.	3		
f	32 A (3P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	5		
g	16 A (1P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	5		
h	Spur outlet for Medical Gas Alarm Panel.	No.	3		
i	Spur outlet for BMS Central Equipment	No.	5		
j	Spur outlet for Main Fire Alarm Control Panel.	No.	2		
k	Spur outlet for Master Nurse Call Control Panel.	No.	2		
l	Spur outlet for urinal sensor installed above false ceiling.	No.	9		
4	**WIRING OF ELECTRICAL OUTLETS**				
G2/8	Supply, install, connect, test and commission electrical outlets wiring connected with PVC insulated copper conductor 1100 volts grade stranded to lighting or power distribution board, drawn in embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits, including providing and fixing of HG conduits, conduit fittings, boxes, back boxes, wiring, earthing, cable trunking, terminations, all necessary accessories, ancillary works and materials required for a complete installation of all wiring devices (maximum eight no.of sockets shall be connected on one circuit), as specified and as indicated on the drawings for the following items:				
a	Ring circuit wiring for 13A Single socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	135		
b	Ring circuit wiring for 13A Twin socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	395		
c	Radial circuit wiring for Hand dryer: 20A DP Switch outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	11		
d	Radial circuit wiring for Toilet extract: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	9		
e	Radial circuit wiring for Split Unit: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	5		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
f	Radial circuit wiring for 40A DP Switch outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	3		
g	Radial circuit wiring for Cooker control unit: 45 amp DP outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	3		
h	Radial circuit wiring for 32 A (3P + N + E) Switched Industrial sockets/plugs outlet point, wired in 5x6 mm2 PVC insulated copper cable	No.	5		
i	Radial circuit wiring for 16 A (1P + N + E) Switched Industrial sockets/plugs outlet point, wired in 3x2.5 mm2 PVC insulated copper cable	No.	5		
j	Spur circuit wiring for Spur outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	21		
5	**OUTLET POINTS WITH DRAW WIRES**				
G2/9	Supply, install, connect, test and commission outlet points complete with an average of 20 meters of 25 mm diameter concealed PVC heavy duty conduit inclusive of: couplers, draw boxes, bends, junction boxes, outlet boxes with cover plates of approved make and design and any other necessary accessories required for a complete installation to the specialist's requirements complete with blanking cover as may be required (for Extra Low Voltage Systems) as specified and indicated on the drawings for the following:				
a	Data/ Telephone Outlet complete with Conduit only & Draw wire.	No	250		
b	TV/FM/SAT outlet point Conduit only & Draw wire.	No	15		
c	Security outlet point (CCTV) Conduit only & Draw wire.	No	65		
d	Security outlet point (Access Control) Conduit only & Draw wire.	No	55		
e	Speaker/ public address outlet point Conduit only & Draw wire.	No	74		
f	Nurse Call System outlet point Conduit only & Draw wire.	No	85		
	ADAPTABLE BOXES				
G2/10	Supply and install Sheet steel adaptable boxes; with knockout sides; fixed to backgrounds; including supports and fixings for the following:				
a	Square galvanized 300 × 300 × 100mm	No.	15		
b	Square galvanized 200× 200 × 75mm	No.	15		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
c	Square galvanized 150 × 150 × 75mm	No.	25		
G2/11	Supply and fixing of embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits of following sizes including cost of junction boxes, bends, elbows, sockets, tees etc. laying in slab, cutting chasis and making good or surface mounted including all fixing hardware.				
G2/12	Ditto as Item above but 32 mm dia heavy duty PVC	LM	300		
G2/13	Ditto as Item above but 38 mm dia heavy duty PVC	LM	500		
G2/14	Ditto as Item above but 50 mm dia heavy duty PVC	LM	300		
G2/15	Heavy gauge, mild Steel Conduit; surface fixed on saddles to backgrounds, with standard pattern boxes and fittings including all fixings and supports (forming holes, conduit entry, draw wires etc. and components for earth continuity included)				
a	Ditto as Item above but 25 mm dia MS 16 gauge	LM	250		
b	Ditto as Item above but 32 mm dia MS 16 gauge	LM	250		
	Total Carried forward to Collection page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
G3	**SECOND FLOOR - LIGHTING AND SMALL POWER**				
	LIGHTING POINT WIRING				
G3/1	Supply, install, test and commission wiring lighting outlet points connected to the distribution boards with 3 x 1.5 sq.mm PVC insulated copper conductor 1000 volts grade, drawn in 25mm dia. heavy duty PVC conduit embeded in concrete as per BS Codes including providing all the necessary cover plates, supports, boxes, connectors, accessories, earthing, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings up to the satisfaction of the Engineer	No.	628		
	SUPPLY OF INDOOR LIGHTING FIXTURES				
G3/2	Supply the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect. (All LED lighting fixtures to have a minimum of 5 years warranty):				
a	Type A1	No.	140		
b	Type A2	No.	66		
c	Type W	No.	21		
d	Type B	No.	52		
e	Type B1	No.	12		
f	Type EXIT	No.	53		
g	Type D1	No.	102		
h	Type D2	No.	110		
i	Type K	No.	12		
j	Type L	No.	15		
k	Type M	No.	13		
l	Type N	No.	32		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	INSTALLATION OF LIGHTING FIXTURES				
G3/2	Deliver, store,connect, test and commission the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect.				
a	Type A1	No.	140		
b	Type A2	No.	66		
c	Type A3	No.	21		
d	Type B	No.	52		
e	Type B1	No.	12		
f	Type EXIT	No.	53		
g	Type D1	No.	102		
h	Type D2	No.	110		
i	Type K	No.	12		
j	Type L	No.	15		
k	Type M	No.	13		
l	Type N	No.	32		
	WIRING DEVICES AND ACCESSORIES				
	LIGHTING ACCESSORIES				
G3/3	Supply the following lighting accessories including all necessary fittings, all in accordance with the specifications and drawings				
	Plate switches; 10 amp flush mounted, white plastic fronted; fitted brass earth terminal				
a	10 amp, 1 gang, 1 way switch	No.	102		
b	10 amp, 2 gang, 1 way switch	No.	17		
c	10 amp, 3 gang, 1 way switch	No.	3		
d	10 amp, 1 gang, 2 way switch	No.	33		
e	10 amp, 2 gang, 2 way switch	No.	13		
f	10 amp, 3 gang, 2 way switch	No.	3		
g	10 amp, one gang, 2 way Intermeidate switch	No.	15		
h	1 gang, 1 way; Dimmer switche; rotary action	No.	3		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
G3/4	Supply, install, test and commission Integrated sensor having combination of infra-red receiver,movement detector for remote or automatic detection having independent on/off for individual sensing component etc as required as per drawing and specifications.	No.	56		
	SOCKET OUTLETS				
G3/5	Supply, install, connect, test and commission sockets outlets white moulded coverplate;BS 1363; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	13A Single switched socket outlet	No.	110		
b	Ditto as item above; but weather proof type.	No.	15		
c	13A Single switched socket outlet; non standard; coloured red-UPS.	No.	13		
d	13A Single socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	6		
e	13A Twin switched socket outlet.	No.	180		
f	Ditto as item above; but weather proof type.	No.	12		
g	13A Twin switched socket outlet; non standard; coloured red - UPS.	No.	238		
h	13A Twin socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	5		
	CONNECTION/ CONTROL UNITS				
G3/6	Supply, install, connect, test and commission connection units, spur outlets white moulded coverplate; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	Hand dryer: 20A DP Switch; switched with neon indicator.	No.	14		
b	Toilet extract: 20A DP Switch; switched with neon indicator.	No.	14		
c	Split Unit: 20A DP Switch; switched with neon indicator.	No.	6		
	Sub-Total Carried forward to next page				

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
d	40A DP Switch; switched with neon indicator.	No.	3		
e	Cooker control unit: BS 4177; 45A DP main switch with single 13A switched socket outlet;	No.	3		
f	32 A (3P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	3		
g	16 A (1P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	3		
h	Spur outlet for Medical Gas Alarm Panel.	No.	2		
i	Spur outlet for BMS Central Equipment	No.	2		
k	Spur outlet for Master Nurse Call Control Panel.	No.	2		
l	Spur outlet for urinal sensor installed above false ceiling.	No.	2		
4	**WIRING OF ELECTRICAL OUTLETS**				
G3/7	Supply, install, connect, test and commission electrical outlets wiring connected with PVC insulated copper conductor 1100 volts grade stranded to lighting or power distribution board, drawn in embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits, including providing and fixing of HG conduits, conduit fittings, boxes, back boxes, wiring, earthing, cable trunking, terminations, all necessary accessories, ancillary works and materials required for a complete installation of all wiring devices (maximum eight no.of sockets shall be connected on one circuit), as specified and as indicated on the drawings for the following items:				
a	Ring circuit wiring for 13A Single socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	144		
b	Ring circuit wiring for 13A Twin socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	435		
c	Radial circuit wiring for Hand dryer: 20A DP Switch outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	14		
d	Radial circuit wiring for Toilet extract: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	14		
e	Radial circuit wiring for Split Unit: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	6		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
f	Radial circuit wiring for 40A DP Switch outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	3		
g	Radial circuit wiring for Cooker control unit: 45 amp DP outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	3		
h	Radial circuit wiring for 32 A (3P + N + E) Switched Industrial sockets/plugs outlet point, wired in 5x6 mm2 PVC insulated copper cable	No.	3		
i	Radial circuit wiring for 16 A (1P + N + E) Switched Industrial sockets/plugs outlet point, wired in 3x2.5 mm2 PVC insulated copper cable	No.	3		
j	Spur circuit wiring for Spur outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	8		
	OUTLET POINTS WITH DRAW WIRES				
G3/8	Supply, install, connect, test and commission outlet points complete with an average of 20 meters of 25 mm diameter concealed PVC heavy duty conduit inclusive of: couplers, draw boxes, bends, junction boxes, outlet boxes with cover plates of approved make and design and any other necessary accessories required for a complete installation to the specialist's requirements complete with blanking cover as may be required (for Extra Low Voltage Systems) as specified and indicated on the drawings for the following:				
a	Data/ Telephone Outlet complete with Conduit only & Draw wire.	No	265		
b	TV/FM/SAT outlet point Conduit only & Draw wire.	No	15		
c	Security outlet point (CCTV) Conduit only & Draw wire.	No	42		
d	Security outlet point (Access Control) Conduit only & Draw wire.	No	70		
e	Speaker/ public address outlet point Conduit only & Draw wire.	No	92		
f	Nurse Call System outlet point Conduit only & Draw wire.	No	80		
	ADAPTABLE BOXES				
G3/9	Supply and install Sheet steel adaptable boxes; with knockout sides; fixed to backgrounds; including supports and fixings for the following:				
a	Square galvanized 300 × 300 × 100mm	No.	25		
b	Square galvanized 200× 200 × 75mm	No.	20		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
c	Square galvanized 150 × 150 × 75mm	No.	20		
G3/10	Supply and fixing of embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits of following sizes including cost of junction boxes, bends, elbows, sockets, tees etc. laying in slab, cutting chasis and making good or surface mounted including all fixing hardware.				
G3/11	Ditto as Item above but 32 mm dia heavy duty PVC	LM	500		
G3/12	Ditto as Item above but 38 mm dia heavy duty PVC	LM	300		
G3/13	Ditto as Item above but 50 mm dia heavy duty PVC	LM	300		
G3/14	Heavy gauge, mild Steel Conduit; surface fixed on saddles to backgrounds, with standard pattern boxes and fittings including all fixings and supports (forming holes, conduit entry, draw wires etc. and components for earth continuity included)				
a	Ditto as Item above but 25 mm dia MS 16 gauge	LM	250		
b	Ditto as Item above but 32 mm dia MS 16 gauge	LM	250		
	Total Carried forward to Collection page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
G4	**THIRD FLOOR - LIGHTING AND SMALL POWER**				
	LIGHTING POINT WIRING				
G4/1	Supply, install, test and commission wiring lighting outlet points connected to the distribution boards with 3 x 2.5 sq.mm PVC insulated copper conductor 1000 volts grade,drawn in 25mm dia. heavy duty PVC conduit embeded in concrete as per BS Codes including providing all the necessary cover plates, supports, boxes, connectors, accessories, earthing, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings up to the satisfaction of the Engineer	No.	503		
	SUPPLY OF INDOOR LIGHTING FIXTURES				
G4/2	Supply the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect. (All LED lighting fixtures to have a minimum of 5 years warranty):				
a	Type A1	No.	115		
b	Type A2	No.	23		
c	Type A3	No.	40		
d	Type W	No.	10		
e	Type B	No.	33		
f	Type B1	No.	12		
g	Type EXIT	No.	44		
h	Type D1	No.	105		
i	Type D2	No.	62		
j	Type K	No.	9		
k	Type L	No.	13		
l	Type M	No.	15		
m	Type N	No.	22		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	INSTALLATION OF LIGHTING FIXTURES				
G4/3	Deliver, store,connect, test and commission the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect.				
a	Type A1	No.	115		
b	Type A2	No.	23		
c	Type A3	No.	40		
d	Type W	No.	10		
e	Type B	No.	33		
f	Type B1	No.	12		
g	Type EXIT	No.	44		
h	Type D1	No.	105		
i	Type D2	No.	62		
j	Type K	No.	9		
k	Type L	No.	13		
l	Type M	No.	15		
m	Type N	No.	22		
	WIRING DEVICES AND ACCESSORIES				
	LIGHTING ACCESSORIES				
G4/4	Supply, deliver, Install, terminate, test and commission the following lighting accessories including all necessary fittings, all in accordance with the specifications and drawings				
	Plate switches; 10 amp flush mounted, white plastic fronted; fitted brass earth terminal				
a	10 amp, 1 gang, 1 way switch	No.	64		
b	10 amp, 2 gang, 1 way switch	No.	12		
c	10 amp, 3 gang, 1 way switch	No.	3		
d	10 amp, 1 gang, 2 way switch	No.	36		
e	10 amp, 2 gang, 2 way switch	No.	7		
f	10 amp, 3 gang, 2 way switch	No.	2		
g	10 amp, one gang, 2 way Intermeidate switch	No.	7		
h	1 gang, 1 way; Dimmer switches; rotary action	No.	8		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
G4/5	Supply, install, test and commission Integrated sensor having combination of infra-red receiver,movement detector for remote or automatic detection having independent on/off for individual sensing component etc as required as per drawing and specifications.	No.	35		
	SOCKET OUTLETS				
G4/6	Supply, install, connect, test and commission sockets outlets white moulded coverplate;BS 1363; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	13A Single switched socket outlet	No.	77		
b	Ditto as item above; but weather proof type.	No.	5		
c	13A Single switched socket outlet; non standard; coloured red-UPS.	No.	7		
c	13A Single unswitched socket outlet; non standard; coloured blue-UPS; medical grade.	No.	12		
d	13A Single socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	5		
e	13A Twin switched socket outlet.	No.	110		
f	Ditto as item above; but weather proof type.	No.	5		
g	13A Twin switched socket outlet; non standard; coloured red - UPS.	No.	176		
h	13A Twin unswitched socket outlet; non standard; coloured blue - UPS; medical grade.	No.	60		
h	13A Twin socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	13		
	CONNECTION/ CONTROL UNITS				
G4/7	Supply, install, connect, test and commission connection units, spur outlets white moulded coverplate; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	Hand dryer: 20A DP Switch; switched with neon indicator.	No.	8		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
b	Toilet extract: 20A DP Switch; switched with neon indicator.	No.	8		
c	Split Unit: 20A DP Switch; switched with neon indicator.	No.	6		
d	40A DP Switch; switched with neon indicator.	No.	3		
e	Cooker control unit: BS 4177; 45A DP main switch with single 13A switched socket outlet;	No.	3		
f	32 A (3P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	3		
g	16 A (1P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	3		
h	Spur outlet for Medical Gas Alarm Panel.	No.	2		
i	Spur outlet for BMS Central Equipment	No.	2		
j	Spur outlet for Main Fire Alarm Control Panel.	No.			
k	Spur outlet for Master Nurse Call Control Panel.	No.	2		
l	Spur outlet for urinal sensor installed above false ceiling.	No.	8		
4	**WIRING OF ELECTRICAL OUTLETS**				
G4/8	Supply, install, connect, test and commission electrical outlets wiring connected with PVC insulated copper conductor 1100 volts grade stranded to lighting or power distribution board, drawn in embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits, including providing and fixing of HG conduits, conduit fittings, boxes, back boxes, wiring, earthing, cable trunking, terminations, all necessary accessories, ancillary works and materials required for a complete installation of all wiring devices (maximum eight no.of sockets shall be connected on one circuit), as specified and as indicated on the drawings for the following items:				
a	Ring circuit wiring for 13A Single socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	106		
b	Ring circuit wiring for 13A Twin socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	351		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
c	Radial circuit wiring for Hand dryer: 20A DP Switch outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	8		
d	Radial circuit wiring for Toilet extract: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	8		
e	Radial circuit wiring for Split Unit: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	6		
f	Radial circuit wiring for 40A DP Switch outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	3		
g	Radial circuit wiring for Cooker control unit: 45 amp DP outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	3		
h	Radial circuit wiring for 32 A (3P + N + E) Switched Industrial sockets/plugs outlet point, wired in 5x6 mm2 PVC insulated copper cable	No.	3		
i	Radial circuit wiring for 16 A (1P + N + E) Switched Industrial sockets/plugs outlet point, wired in 3x2.5 mm2 PVC insulated copper cable	No.	3		
j	Spur circuit wiring for Spur outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	14		
	OUTLET POINTS WITH DRAW WIRES				
G4/9	Supply, install, connect, test and commission outlet points complete with an average of 20 meters of 25 mm diameter concealed PVC heavy duty conduit inclusive of: couplers, draw boxes, bends, junction boxes, outlet boxes with cover plates of approved make and design and any other necessary accessories required for a complete installation to the specialist's requirements complete with blanking cover as may be required (for Extra Low Voltage Systems) as specified and indicated on the drawings for the following:				
a	Data/ Telephone Outlet complete with Conduit only & Draw wire.	No	245		
b	TV/FM/SAT outlet point Conduit only & Draw wire.	No	9		
c	Security outlet point (CCTV) Conduit only & Draw wire.	No	32		
d	Security outlet point (Access Control) Conduit only & Draw wire.	No	36		
e	Speaker/ public address outlet point Conduit only & Draw wire.	No	55		
f	Nurse Call System outlet point Conduit only & Draw wire.	No	75		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	ADAPTABLE BOXES				
G4/10	Supply and install Sheet steel adaptable boxes; with knockout sides; fixed to backgrounds; including supports and fixings for the following:				
a	Square galvanized 300 × 300 × 100mm	No.	20		
b	Square galvanized 200× 200 × 75mm	No.	15		
c	Square galvanized 150 × 150 × 75mm	No.	15		
G4/11	Supply and fixing of embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits of following sizes including cost of junction boxes, bends, elbows, sockets, tees etc. laying in slab, cutting chasis and making good or surface mounted including all fixing hardware.				
G4/12	Ditto as Item above but 32 mm dia heavy duty PVC	LM	300		
G4/13	Ditto as Item above but 38 mm dia heavy duty PVC	LM	200		
G4/14	Ditto as Item above but 50 mm dia heavy duty PVC	LM	200		
G4/15	Heavy gauge, mild Steel Conduit; surface fixed on saddles to backgrounds, with standard pattern boxes and fittings including all fixings and supports (forming holes, conduit entry, draw wires etc. and components for earth continuity included)				
a	Ditto as Item above but 25 mm dia MS 16 gauge	LM	200		
b	Ditto as Item above but 32 mm dia MS 16 gauge	LM	200		
	Total Carried forward to Collection page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
G5	**FOURTH FLOOR - LIGHTING AND SMALL POWER**				
	LIGHTING POINT WIRING				
G5/1	Supply, install, test and commission wiring lighting outlet points connected to the distribution boards with 3 x 1.5 sq.mm PVC insulated copper conductor 1000 volts grade, drawn in 25mm dia. heavy duty PVC conduit embeded in concrete as per BS Codes including providing all the necessary cover plates, supports, boxes, connectors, accessories, earthing, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings up to the satisfaction of the Engineer	No.	447		
	SUPPLY OF INDOOR LIGHTING FIXTURES				
G5/2	Supply the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect. (All LED lighting fixtures to have a minimum of 5 years warranty):				
a	Type A1	No.	120		
b	Type A2	No.	35		
c	Type A4	No.	15		
d	Type B	No.	39		
e	Type B1	No.	15		
f	Type EXIT	No.	35		
g	Type D1	No.	93		
h	Type D2	No.	42		
i	Type K	No.	9		
j	Type L	No.	14		
k	Type M	No.	12		
l	Type N	No.	18		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	INSTALLATION OF LIGHTING FIXTURES				
G5/3	Deliver, store,connect, test and commission the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect.				
a	Type A1	No.	120		
b	Type A2	No.	35		
c	Type A3	No.	15		
d	Type B	No.	39		
e	Type B1	No.	15		
f	Type EXIT	No.	35		
g	Type D1	No.	93		
h	Type D2	No.	42		
i	Type K	No.	9		
j	Type L	No.	14		
k	Type M	No.	12		
l	Type N	No.	18		
	WIRING DEVICES AND ACCESSORIES				
	LIGHTING ACCESSORIES				
G5/4	Supply, deliver, Install, terminate, test and commission the following lighting accessories including all necessary fittings, all in accordance with the specifications and drawings				
	Plate switches; 10 amp flush mounted, white plastic fronted; fitted brass earth terminal				
a	10 amp, 1 gang, 1 way switch	No.	56		
b	10 amp, 2 gang, 1 way switch	No.	3		
c	10 amp, 3 gang, 1 way switch	No.	3		
d	10 amp, 1 gang, 2 way switch	No.	11		
e	10 amp, 2 gang, 2 way switch	No.	15		
f	10 amp, 3 gang, 2 way switch	No.	4		
g	10 amp, one gang, 2 way Intermeidate switch	No.	6		
h	1 gang, 1 way; Dimmer switche; rotary action	No.	2		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
G5/5	Supply, install, test and commission Integrated sensor having combination of infra-red receiver,movement detector for remote or automatic detection having independent on/off for individual sensing component etc as required as per drawing and specifications.	No.	32		
	SOCKET OUTLETS				
G5/6	Supply, install, connect, test and commission sockets outlets white moulded coverplate;BS 1363; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	13A Single switched socket outlet	No.	77		
b	Ditto as item above; but weather proof type.	No.	5		
c	13A Single switched socket outlet; non standard; coloured red-UPS.	No.	10		
d	13A Single socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	5		
e	13A Twin switched socket outlet.	No.	102		
f	Ditto as item above; but weather proof type.	No.	10		
g	13A Twin switched socket outlet; non standard; coloured red - UPS.	No.	75		
h	13A Twin socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	5		
	CONNECTION/ CONTROL UNITS				
G5/7	Supply, install, connect, test and commission connection units, spur outlets white moulded coverplate; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	Hand dryer: 20A DP Switch; switched with neon indicator.	No.	5		
b	Toilet extract: 20A DP Switch; switched with neon indicator.	No.	5		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
c	Split Unit: 20A DP Switch; switched with neon indicator.	No.	5		
d	40A DP Switch; switched with neon indicator.	No.	3		
e	Cooker control unit: BS 4177; 45A DP main switch with single 13A switched socket outlet;	No.	2		
f	32 A (3P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	6		
g	16 A (1P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	6		
h	Spur outlet for Medical Gas Alarm Panel.	No.			
i	Spur outlet for BMS Central Equipment	No.			
j	Spur outlet for Main Fire Alarm Control Panel.	No.	1		
k	Spur outlet for Master Nurse Call Control Panel.	No.			
l	Spur outlet for urinal sensor installed above false ceiling.	No.	5		
4	**WIRING OF ELECTRICAL OUTLETS**				
G5/8	Supply, install, connect, test and commission electrical outlets wiring connected with PVC insulated copper conductor 1100 volts grade stranded to lighting or power distribution board, drawn in embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits, including providing and fixing of HG conduits, conduit fittings, boxes, back boxes, wiring, earthing, cable trunking, terminations, all necessary accessories, ancillary works and materials required for a complete installation of all wiring devices (maximum eight no.of sockets shall be connected on one circuit), as specified and as indicated on the drawings for the following items:				
a	Ring circuit wiring for 13A Single socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	97		
b	Ring circuit wiring for 13A Twin socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	192		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
c	Radial circuit wiring for Hand dryer: 20A DP Switch outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	5		
d	Radial circuit wiring for Toilet extract: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	5		
e	Radial circuit wiring for Split Unit: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	5		
f	Radial circuit wiring for 40A DP Switch outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	3		
g	Radial circuit wiring for Cooker control unit: 45 amp DP outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	2		
h	Radial circuit wiring for 32 A (3P + N + E) Switched Industrial sockets/plugs outlet point, wired in 5x6 mm2 PVC insulated copper cable	No.	6		
i	Radial circuit wiring for 16 A (1P + N + E) Switched Industrial sockets/plugs outlet point, wired in 3x2.5 mm2 PVC insulated copper cable	No.	6		
j	Spur circuit wiring for Spur outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	6		
	OUTLET POINTS WITH DRAW WIRES				
G5/9	Supply, install, connect, test and commission outlet points complete with an average of 20 meters of 25 mm diameter concealed PVC heavy duty conduit inclusive of: couplers, draw boxes, bends, junction boxes, outlet boxes with cover plates of approved make and design and any other necessary accessories required for a complete installation to the specialist's requirements complete with blanking cover as may be required (for Extra Low Voltage Systems) as specified and indicated on the drawings for the following:				
a	Data/ Telephone Outlet complete with Conduit only & Draw wire.	No	166		
b	TV/FM/SAT outlet point Conduit only & Draw wire.	No	5		
c	Security outlet point (CCTV) Conduit only & Draw wire.	No	26		
d	Security outlet point (Access Control) Conduit only & Draw wire.	No	50		
e	Speaker/ public address outlet point Conduit only & Draw wire.	No	55		
f	Nurse Call System outlet point Conduit only & Draw wire.	No	10		
	Sub-Total Carried forward to next page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	ADAPTABLE BOXES				
G5/10	Supply and install Sheet steel adaptable boxes; with knockout sides; fixed to backgrounds; including supports and fixings for the following:				
a	Square galvanized 300 × 300 × 100mm	No.	5		
b	Square galvanized 200× 200 × 75mm	No.	5		
c	Square galvanized 150 × 150 × 75mm	No.	5		
G5/11	Supply and fixing of embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits of following sizes including cost of junction boxes, bends, elbows, sockets, tees etc. laying in slab, cutting chasis and making good or surface mounted including all fixing hardware.				
G5/12	Ditto as Item above but 32 mm dia heavy duty PVC	LM	150		
G5/13	Ditto as Item above but 38 mm dia heavy duty PVC	LM	150		
G5/14	Ditto as Item above but 50 mm dia heavy duty PVC	LM	150		
G5/15	Heavy gauge, mild Steel Conduit; surface fixed on saddles to backgrounds, with standard pattern boxes and fittings including all fixings and supports (forming holes, conduit entry, draw wires etc. and components for earth continuity included)				
a	Ditto as Item above but 25 mm dia MS 16 gauge	LM	100		
b	Ditto as Item above but 32 mm dia MS 16 gauge	LM	100		
	Total Carried forward to Collection page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL
Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
G	**MAIN HOSPITAL- LIGHTING AND SMALL POWER COLLECTION PAGE**				
G/1	Ground Floor- Lighting and Small Power				
G/2	First Floor- Lighting and Small Power				
G/3	Second Floor- Lighting and Small Power				
G/4	Third Floor- Lighting and Small Power				
G/5	Fourth Floor- Lighting and Small Power				
	Total Carried forward to the Summary Page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
H	**CHEMOTHERAPY AND AUXILIARY BUILDINGS - LIGHTING AND SMALL POWER**				
	LIGHTING POINT WIRING				
H/1	Supply, install, test and commission wiring lighting outlet points connected to the distribution boards with 3 x 1.5 sq.mm PVC insulated copper conductor 1000 volts grade, drawn in 25mm dia. heavy duty PVC conduit embeded in concrete as per BS Codes including providing all the necessary cover plates, supports, boxes, connectors, accessories, earthing, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings up to the satisfaction of the Engineer	No.	433		
	SUPPLY OF INDOOR LIGHTING FIXTURES				
H/4	Supply the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect. (All LED lighting fixtures to have a minimum of 5 years warranty):				
a	Type A1	No.	72		
b	Type A2	No.	35		
c	Type A4	No.	15		
d	Type B	No.	165		
e	Type B1	No.	20		
f	Type EXIT	No.	20		
g	Type D1	No.	31		
h	Type D2	No.	20		
i	Type K	No.	25		
j	Type L	No.	20		
k	Type M	No.	5		
l	Type N	No.	5		
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Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	INSTALLATION OF LIGHTING FIXTURES				
H/5	Deliver, store,connect, test and commission the following lighting fixtures including all lamps, control gear, mounting brackets, all necessary accessories, coordination with all other trades and all other incidentals required to provide a complete installation and a fully operational system as specified and as indicated in the drawings and lighting fixtures schedule, up to the satisfaction/ approval of the Engineer, Client and Architect.				
a	Type A1	No.	72		
b	Type A2	No.	35		
c	Type A3	No.	15		
d	Type B	No.	165		
e	Type B1	No.	20		
f	Type EXIT	No.	20		
g	Type D1	No.	31		
h	Type D2	No.	20		
i	Type K	No.	25		
j	Type L	No.	20		
k	Type M	No.	5		
l	Type N	No.	5		
	WIRING DEVICES AND ACCESSORIES				
	LIGHTING ACCESSORIES				
H/6	Supply the following lighting accessories including all necessary fittings, all in accordance with the specifications and drawings				
	Plate switches; 10 amp flush mounted, white plastic fronted; fitted brass earth terminal				
a	10 amp, 1 gang, 1 way switch	No.	30		
b	10 amp, 2 gang, 1 way switch	No.	13		
c	10 amp, 3 gang, 1 way switch	No.	2		
d	10 amp, 1 gang, 2 way switch	No.	5		
e	10 amp, 2 gang, 2 way switch	No.	5		
f	10 amp, 3 gang, 2 way switch	No.	4		
g	10 amp, one gang, 2 way Intermeidate switch	No.	18		
h	1 gang, 1 way; Dimmer switche; rotary action	No.	2		
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Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
H/7	Take, deliver, Install, terminate, test and commission the following lighting accessories including all necessary fittings, all in accordance with the specifications and drawings up to the satisfaction/ approval of the Engineer, Client and Architect.				
a	10 amp, 1 gang, 1 way switch	No.	30		
b	10 amp, 2 gang, 1 way switch	No.	13		
c	10 amp, 3 gang, 1 way switch	No.	2		
d	10 amp, 1 gang, 2 way switch	No.	5		
e	10 amp, 2 gang, 2 way switch	No.	5		
f	10 amp, 3 gang, 2 way switch	No.	4		
g	10 amp, one gang, 2 way Intermediate switch	No.	18		
h	10 amp,1 gang, 1 way; Dimmer switch; rotary action	No.	2		
H/8	Supply, install, test and commission Integrated sensor having combination of infra-red receiver,movement detector for remote or automatic detection having independent on/off for individual sensing component etc as required as per drawing and specifications.	No.	15		
	SOCKET OUTLETS				
H/9	Supply, install, connect, test and commission sockets outlets white moulded coverplate;BS 1363; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	13A Single switched socket outlet	No.	30		
b	Ditto as item above; but weather proof type.	No.	3		
c	13A Single switched socket outlet; non standard; coloured red-UPS.	No.	5		
d	13A Single socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	15		
e	13A Twin switched socket outlet.	No.	86		
f	Ditto as item above; but weather proof type.	No.	10		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
g	13A Twin switched socket outlet; non standard; coloured red - UPS.	No.	55		
h	13A Twin socket outlet: switched; 13 amp metal clad; BS 1363; galvanized steel box and coverplate.	No.	3		
	CONNECTION/ CONTROL UNITS				
H/10	Supply, install, connect, test and commission connection units, spur outlets white moulded coverplate; flush fitted including plugs, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	Hand dryer: 20A DP Switch; switched with neon indicator.	No.	4		
b	Toilet extract: 20A DP Switch; switched with neon indicator.	No.	4		
c	Split Unit: 20A DP Switch; switched with neon indicator.	No.	2		
d	40A DP Switch; switched with neon indicator.	No.	2		
e	Cooker control unit: BS 4177; 45A DP main switch with single 13A switched socket outlet;	No.	1		
f	32 A (3P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	1		
g	16 A (1P + N + E) Switched Industrial sockets/plugs flush mounted; Watertight; 240 volts, 50Hz; IP 67 complete with connector/ plug	No.	1		
h	Spur outlet for Medical Gas Alarm Panel.	No.			
i	Spur outlet for BMS Central Equipment	No.			
j	Spur outlet for Main Fire Alarm Control Panel.	No.	1		
k	Spur outlet for Master Nurse Call Control Panel.	No.			
l	Spur outlet for urinal sensor installed above false ceiling.	No.	4		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
	ISOLATORS				
H/11	Supply, install, connect, test and commission isolators fixed to backgrounds; IP54; including all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
a	20A, SPN isolator	No.	2		
b	32A, SPN isolator	No.	2		
c	32A, TPN isolator	No.	2		
4	**WIRING OF ELECTRICAL OUTLETS**				
H/12	Supply, install, connect, test and commission electrical outlets wiring connected with PVC insulated copper conductor 1100 volts grade stranded to lighting or power distribution board, drawn in embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits, including providing and fixing of HG conduits, conduit fittings, boxes, back boxes, wiring, earthing, cable trunking, terminations, all necessary accessories, ancillary works and materials required for a complete installation of all wiring devices (maximum eight no.of sockets shall be connected on one circuit), as specified and as indicated on the drawings for the following items:				
a	Ring circuit wiring for 13A Single socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	53		
b	Ring circuit wiring for 13A Twin socket outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	154		
c	Radial circuit wiring for Hand dryer: 20A DP Switch outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	4		
d	Radial circuit wiring for Toilet extract: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	4		
e	Radial circuit wiring for Split Unit: 20A DP Switch outlet point, wired in 3x4 mm2 PVC insulated copper cable	No.	2		
f	Radial circuit wiring for 40A DP Switch outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	2		
g	Radial circuit wiring for Cooker control unit: 45 amp DP outlet point, wired in 3x6 mm2 PVC insulated copper cable	No.	1		
h	Radial circuit wiring for 32 A (3P + N + E) Switched Industrial sockets/plugs outlet point, wired in 5x6 mm2 PVC insulated copper cable	No.	1		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
i	Radial circuit wiring for 16 A (1P + N + E) Switched Industrial sockets/plugs outlet point, wired in 3x2.5 mm2 PVC insulated copper cable	No.	1		
j	Spur circuit wiring for Spur outlet point, wired in 3x2.5 mm^2 PVC insulated copper cable	No.	5		
k	Radial circuit wiring for 16 A SPN Isolator outlet point, wired in 3x4 mm^2 PVC insulated copper cable	No.	2		
l	Radial circuit wiring for 32 A SPN Isolator outlet point, wired in 3x6 mm^2 PVC insulated copper cable	No.	2		
m	Radial circuit wiring for 32 A TPN Isolator outlet point, wired in 5x6 mm^2 PVC insulated copper cable	No.	2		
	OUTLET POINTS WITH DRAW WIRES				
H/13	Supply, install, connect, test and commission outlet points complete with an average of 20 meters of 25 mm diameter concealed PVC heavy duty conduit inclusive of: couplers, draw boxes, bends, junction boxes, outlet boxes with cover plates of approved make and design and any other necessary accessories required for a complete installation to the specialist's requirements complete with blanking cover as may be required (for Extra Low Voltage Systems) as specified and indicated on the drawings for the following:				
a	Data/ Telephone Outlet complete with Conduit only & Draw wire.	No	115		
b	TV/FM/SAT outlet point Conduit only & Draw wire.	No	5		
c	Security outlet point (CCTV) Conduit only & Draw wire.	No	20		
d	Security outlet point (Access Control) Conduit only & Draw wire.	No	15		
e	Speaker/ public address outlet point Conduit only & Draw wire.	No	35		
f	Nurse Call System outlet point Conduit only & Draw wire.	No	55		
	ADAPTABLE BOXES				
H/14	Supply and install Sheet steel adaptable boxes; with knockout sides; fixed to backgrounds; including supports and fixings for the following:				
a	Square galvanized 300 × 300 × 100mm	No.	5		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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b	Square galvanized 200× 200 × 75mm	No.	5		
c	Square galvanized 150 × 150 × 75mm	No.	5		
H/15	Supply and fixing of embeded 25mm dia. heavy duty PVC conduit as per BS Codes or surface mounted 25 mm dia 16 gauge MS conduits of following sizes including cost of junction boxes, bends, elbows, sockets, tees etc. laying in slab, cutting chasis and making good or surface mounted including all fixing hardware.				
H/16	Ditto as Item above but 32 mm dia heavy duty PVC	LM	50		
H/17	Ditto as Item above but 38 mm dia heavy duty PVC	LM	50		
H/18	Ditto as Item above but 50 mm dia heavy duty PVC	LM	50		
H/19	Heavy gauge, mild Steel Conduit; surface fixed on saddles to backgrounds, with standard pattern boxes and fittings including all fixings and supports (forming holes, conduit entry, draw wires etc. and components for earth continuity included)				
a	Ditto as Item above but 25 mm dia MS 16 gauge	LM	50		
b	Ditto as Item above but 32 mm dia MS 16 gauge	LM	50		
	Total Carried forward to the Summary Page				

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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
I	**EXTERIOR / LANDSCAPE LIGHTING**				
I/1	Supply, install, test and commission (Type P1) LED pole top amenity luminaire manufactured from die-cast aluminium polyester powder coated RAL9006 silver with high impact UV stabilised polycarbonate cover providing asymmetric distribution, IP66, LED light engine providing 100,000 hour life, 4000K, CRI 70+. Supplied finished with 6m flying lead Control gear and LED circuit boards replaceable for future maintenance complete with 5 m high stepped tubular galvanised steel columns to BS EN 40-2:2004 with hot dip galvanised fixing accessories powder coated RAL9006 silver including concrete base, base plate, excavation and back filling as required	No.	32		
I/2	Supply, install, test and commission (Type P2) LED Post top LED lantern centrally mounted luminaire with 360° light distribution manufactured from die-cast aluminium polyester powder coated RAL9006 silver with high impact UV stabilised clear polycarbonate cover rated IP66 and IK10 providing asymmetric distribution, LED light engine providing 100,000 hour life, 4000K, CRI 70+. Supplied finished with 6m flying lead Control gear and LED circuit boards 1x30W/4300lm, 3 m high stepped tubular galvanised steel columns, to BS EN 40-2:2004 with hot dip galvanised fixing accessories, powder coated RAL9006 silver including concrete base, base plate, excavation and back filling as required as Thornlux JUNO A or approved equivalent	No.	9		
I/3	Supply and install (Type P3) Bollard light H=1000 mm, 20W, 240V, IP65 warm white, symmetrical optic, 4000K/2300lm complete with all fixing accessories including concrete base, base plate, excavation and back filling as required	No.	25		
	Supply, install, test and commission the following lighting fixtures complete with all fixing accessories including pole,foundation of pole, base plate, excavation and back filling as required.				
I/4	Type U: Round, walk-over recessed in-ground weather proof IP67 paving light with LED lamp,10W, cool white 4000K, with transparent glass enclosure	No.	15		
I/5	Type S1: Rectangular wall recessed LED light, 3W, 230 V, 50Hz, cool white 4000K, IP 66 IK06 (Inside recessing box, adequate for outdoor use)	No.	16		
I/6	Type H: Surface mounted external up/down wall lights with replacable LED lamps	No.	10		
I/7	Type K1: Wall mounted weather-proof bulkhead fittings equipped with replacable LED lamps	No.	20		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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	Supply, install, connect, test and commission outdoor lighting outlet points including excavation, back filling, heavy gauge PVC conduits, conduit fittings, termination, water tight connection boxes, cabling, earthing, all necessary accessories, ancillary works and materials required for complete installation as specified and as indicated on the drawings for the following items:				
I/8	Outlet points for external lighting fixtures Type P1 wired in cable size 3 Core 6mm^2, copper, ***PVC/SWA/PVC drawn in 38mm heavy gange PVC conduits burried in ground.***	LM.	***400***		
I/9	Outlet points for external lighting fixtures Type P2 wired in cable size 3 Core 6mm^2, copper, ***PVC/SWA/PVC drawn in 38 mm heavy gange PVC conduits burried in ground.***	LM.	***200***		
I/10	Outlet points for external lighting fixtures Type P3 wired in cable size 3 Core 4mm^2, copper, ***PVC/SWA/PVC drawn in 32 mm heavy gange PVC conduits burried in ground.***	LM.	***350***		
I/11	Outlet points for external lighting fixtures Type U wired in cable size 3 Core 2.5 mm^2, copper, ***PVC/SWA/PVC drawn in 25 mm heavy gange PVC conduits burried in ground.***	LM.	***200***		
I/12	Lighting outlet points connected to the distribution boards with 3 x 2.5 sq.mm PVC insulated copper conductor 1000 volts grade, drawn in 25mm dia. heavy duty PVC conduit embeded in concrete as per BS Codes including providing all the necessary cover plates, supports, boxes, connectors, accessories, earthing, coordination with all other trades and all other incidentals required to provide a complete installation	No.	***46***		
I/13	Providing, installation, testing and commissining of 200 x 150 x 125 mm polycarbonate weather proof (IP-55) junction box recessed in wall or surface mounted as required for housing of 1 no. 10 amps SPN MCB's suitable size of terminal blocks complete. Suitable length of GI pipe upto junction box shall also be provided for laying of cables.	No.	3		
I/14	Supply and install, 8 ways plinth mounted three phase weather proof feeder pillar "FP", complete with 100A TP MCCB isolator, 3x40A TP, 12x20A SP MCCBs, all as specified and detailed on the drawings.	No.	1		
I/15	Supply and install 8 ways plinth mounted three phase weather proof feeder pillar "FP", complete with 40A TP MCCB isolator, 1x30A TP,1x20A TP, 15x20A SP MCCBs, all as specified and detailed on the drawings.	No.	2		
I/16	Label above feedar pillars inclusive of identifying and labeling all cables and circuit breakers to the engineer's approval.	No.	3		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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I/17	Supply, install and connect 25.0 sq. mm x 5 core XLPE SWA PVC s cables enclosed in concealed HG PVC conduit from main board	LM	50		
I/18	Cable lugs and glands for above cable.	No.	1		
I/19	Supply, install and connect 16.0 sq. mm x 5 core XLPE SWA PVC s cables enclosed in concealed HG PVC conduit from main board	LM	280		
I/20	Cable lugs and glands for above cable.	No.	1		
I/21	Supply and lay for the above cable, 'DANGER HATARI TILES', 100mm sand bed, 100mm in trench including reinstatement of surface all to engineer/architect approval	LM	400		
I/22	Supply, install and connect complete photo cell lighting control system complete with contactor, over ride/bypass switch and all other accessories and fixings	No.	4		
I/23	Supply and install cabling for photo cell control system	No.	4		
I/24	Supply, install and connect complete time switch lighting control system complete with contactor all other accessories and fixings.	No.	4		
I/25	Supply and install cabling for above time switch control system	No.	4		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
J	**LIGHTNING PROTECTION AND EARTHING SYSTEM**				
	LIGHTNING PROTECTION SYSTEMS				
	(EARLY STREAMER EMISSION AIR TERMINALS)				
	Supply, install, connect, test and commission the following complete building lightning protection system in accordance with BS 7430, BS EN 50164 and BS EN 62305 Parts 1, 2, 3 and 4.				
J/1	Early Streamer Emission (ESE) air terminals certified, with remote testing & autodiagnostic features.	No.	2		
J/2	Galvanized steel mast 6 metres high roof mounted complete with the corresponding adapting piece, anchorage	No.	2		
J/3	Supply and Install advanced digital flash lightning strikes counter with flash counter, recording, date, hour and peak current of lightning discharge	No.	2		
J/4	25mm x 3mm PVC covered copper tape for use as down conductor (colour to match building exterior wall)	L.m	100		
J/5	1C 70mm2 bare copper conductors for use as a down conductors complete with matching lugs	L.m	100		
J/6	Test clamp	No.	2		
J/7	Concrete inspection pit comprising 5 hole copper bar, 2 no. 1.2m long, 12.7mm dia copper bond earth rod coupling, driving head and cable to rod clamp to achieve an earth resistance of 0.5 ohms e.g. Furse PT006+RB105+CG170+ST100+ CR105, including Earth inspection concrete pit masonry chamber 600 x 600 mm with concrete base C I heavy duty / chequered plate manhole cover with frame painted with bitumastic paint and packing with mixture of charcoal and common salt around plate electrode including digging of pit upto permanent moisture level and as per soil condition but not less than 1 meters and back filling as required.	No.	2		
J/8	3/4", 1200mm copper plated earth rods	No.	6		
J/9	Allow for bonding to exposed metalwork on roof top	Sum	1		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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	EARTHING INSTALLATION (FOR BUILDING, POWER DISTRIBUTION SYSTEMS, UPS SYSTEM, MEDICAL IT & ICT)				
J/10	Supply, install, connect, test and commission 400 x 90 x 6 mm Copper Earth Bar mounted on insulators and having 6 nos. holes for terminating single core 70 Sq.mm flexible cable with the entire assembly enclosed in 1.6 mm thick MS enclosure of approved make, design & painted with approved paint shade.	No.	6		
J/11	Supply, install, connect, test and commission 95 sq.mm single core cable Green & Yellow colour 1100 volts grade PVC insulated sheathed copper conductor unarmoured cable including copper thimbles, fixing hardware as required.	L.m	100		
J/12	Supply, install, connect, test and commission 70 sq.mm single core cable Green & Yellow colour 1100 volts grade PVC insulated sheathed copper conductor unarmoured cable including copper thimbles, fixing hardware as required.	L.m	100		
J/13	Supply, install, connect, test and commission 25 x 3 mm bare copper tapes / wires including all necessary fixing accessories and effecting connections as per specifications.	L.m	100		
J/14	Supply, install, connect, test and commission concrete inspection pit comprising copper earthing matt 1000mm x 1000mm constructed of 25mm x 3mm copper tape measuring with tapes at 150mm intervals, including Earth inspection concrete pit masonry chamber 1000 x 1000 mm with concrete base C I heavy duty / chequered plate manhole cover with frame painted with bitumastic paint and packing with mixture of charcoal and common salt around earth matt including digging of pit upto permanent moisture level and as per soil condition but not less than 1 meters and back filling as required to achieve an earth resistance of 1 ohms	No.	6		
J/15	Allow for bonding to building reinforcement & metalic structure	Sum	1		
J/17	Allow for bonding to exposed /external metalic structure & mechanical equipments	Sum	1		
J/18	Allow for the supply, install, test and commission appropriate transient over voltage protection equipment on all power switchboards, telephone, data and structured cables entering or leaving the building, in order to protect equipment connected to power distribution system against transient over voltages coming into the building from outside all as per the requirements of the technical specifications	Sum	1		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
K	**FIRE DETECTION AND ALARM SYSTEM**				
1	**FIRE ALARM CONTROL PANEL**				
K/1	Supply, install, connect, programme, test and commission 6 Loops Analogue Addressable Fire Detection and Control Panel (FACP) complete with addressable loop cards, manual control switches with status LEDs, relays, fire man microphone, automatic voice dialer, power supplies, master fire fighter telephone hand set & selector, software interface with BMS system, color graphic station & printer, back up battery and battery charger, fire resistant cabling and all necessary accessories & ancillary works and materials required for complete and fully operational installation as specified and as indicated on the drawings.	No.	1		
2	**FIRE ALARM REPEATER PANELS**				
K/2	Supply, install, connect, programme, test and commission Analogue Addressable fire Repeater panel complete with associated accessories and all necessary accessories & ancillary works and materials required for complete and fully operational installation as specified and as indicated on the drawings.	No.	2		
3	**FIRE DETECTION AND ALARM DEVICES AND CABLING**				
K/3	Supply, install, connect, programme, test and commission **addressable optical smoke detector** complete with detector base, enhanced fire resistant (LSZH) cabling with a cross section of 2x1.5 sq.mm connected to Fire Detection Panel, 25mm diameter heavy duty PVC conduit, back boxes and all necessary accessories, ancillary works and materials required for complete and fully operational installation as specified and shown on the contract drawings as follows:				
a	Ground Floor	No.	138		
b	First Floor	No.	103		
c	Second Floor	No.	112		
d	Third Floor	No.	92		
e	Fouth Floor	No.	83		
f	External Buildings	No.	25		
K/4	Supply, install, connect, programme, test and commission **addressable heat detectors** complete with detector base, enhanced fire resistant (LSZH) cabling with a cross section of 2x1.5 sq.mm connected to Fire Detection Panel, 25mm diameter heavy duty PVC conduit, back boxes and all necessary accessories, ancillary works and materials required for complete and fully operational installation as specified and shown on the contract drawings as follows:				
a	Ground Floor	No.	5		
b	First Floor	No.	3		
c	Second Floor	No.	3		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
	brought forward from previous page				
d	Third Floor	No.	3		
e	Fouth Floor	No.	10		
f	External Buildings	No.	12		
K/5	Supply, install, connect, programme, test and commission **addressable manual call point** complete with detector base, enhanced fire resistant (LSZH) cabling with a cross section of 2x1.5 sq.mm connected to Fire Detection Panel, 25mm diameter heavy duty PVC conduit, back boxes and all necessary accessories, ancillary works and materials required for complete and fully operational installation as specified and shown on the contract drawings as follows:				
a	Ground Floor	No.	15		
b	First Floor	No.	15		
c	Second Floor	No.	20		
d	Third Floor	No.	13		
e	Fouth Floor	No.	13		
f	External Buildings	No.	9		
K/6	Supply, install, connect, programme, test and commission **addressable fire alarm sounder with strobe** complete with detector base, enhanced fire resistant (LSZH) cabling with a cross section of 2x1.5 sq.mm connected to Fire Detection Panel, 25mm diameter heavy duty PVC conduit, back boxes and all necessary accessories, ancillary works and materials required for complete and fully operational installation as specified and shown on the contract drawings as follows:				
a	Ground Floor	No.	15		
b	First Floor	No.	15		
c	Second Floor	No.	20		
d	Third Floor	No.	13		
e	Fouth Floor	No.	13		
f	External Buildings	No.	9		
K/9	Supply, install, connect, programme, test and commission **Addressable intelligent monitor modules** for water flow, tamper switches and zone contro valves connected with enhanced fire resistant cable with a cross section of 2x1.5 sq.mm to Fire Detection Panel, drawn in PVC heavy duty type conduit as specified and shown on the contract drawings	No.	5		
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Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
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K/10	Supply, install, connect, programme, test and commission **Addressable intelligent control module**s for interface with HVAC / smoke control equipment (Fans, AHU, Dampers,..etc) connected with enhanced fire resistant cable with a cross section of 2x1.5 sq.mm to Fire Detection Panel, drawn in PVC heavy duty type conduit as specified and shown on the contract drawings	No.	5		
K/11	Supply, install, connect, programme, test and commission **Addressable intelligent control modules** for interface with Public Address System connected with enhanced fire resistant cable with a cross section of 2x1.5 sq.mm to Fire Detection Panel, drawn in PVC heavy duty type conduit as specified and shown on the contract drawings	No.	2		
K/12	Supply, install, connect, programme, test and commission **Addressable intelligent monitor modules** for interface with Fire Fighting Systems connected with enhanced fire resistant cable with a cross section of 2x1.5 sq.mm to Fire Detection Panel, drawn in PVC heavy duty type conduit as specified and shown on the contract drawings	No.	2		
K/13	Supply, install, connect, programme, test and commission **Addressable intelligent Control module**s for interface with all Lifts connected with enhanced fire resistant cable with a cross section of 2x1.5 sq.mm to Fire Detection Panel, drawn in PVC heavy duty type conduit as specified and shown on the contract drawings	No.	3		
K/14	Supply, install, connect, programme, test and commission **Fault isolator module** connected with enhanced fire resistant cable with a cross section of 2x1.5 sq.mm to Fire Detection Panel, drawn in PVC heavy duty type conduit as specified and shown on the contract drawings	No.	5		
K/15	Allow for programming of the alarm system as described in the fire alarm sequence of operation	Sum	1		
K/16	Allow for TRAINING of Client personnel on the fire detection and alarm system operations	Sum	1		
K/17	Any other item not detailed but required for the satisfactory operation and completion of the installation.	Sum	1		
	Total Carried forward to the Summary Page				

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

Bill of Quantities for Electrical Installations

Item	Description	Unit	Qty	Rate (USD)	Amount (USD)
L	**INCOMING FIBRE OPTIC CABLE**				
L/1	Allow for the cost of incoming Fibre/ ISP Network (PROVISIONAL SUM)	P.Sum	**1**	**6,500**	
L/2	Allow for providing attendance as may be necessary for Fibre Optic Data Cable Service Provider connecting up of their incoming ISP services	Sum	1		
L/3	Allow for the cost of incoming Internet Service Provider (ISP) conduiting and pathways (PROVISIONAL SUM)	Sum	1		
	Total Carried forward to the Summary Page				

SECTION 6

Electrical Installations

Main Summary

PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

ELECTRICAL INSTALLATIONS TENDER SUMMARY PAGE

ITEM	DESCRIPTION	AMOUNT (USD)
i	PRELIMINARIES	
A	GENERAL ITEMS AND CONTINGENCY	
B	INCOMING UTILITY POWER SUPPLIES	
C	MEDIUM VOLTAGE (MV) RETICULATION	
D	LOW VOLTAGE (LV) RETICULATION	
E	UNINTERRUPTIBLE POWER SUPPLY (UPS)	
F	DIESEL GENERATOR POWER BACK UP & RETICULATION	
G	MAIN HOSPITAL- LIGHTING AND SMALL POWER	
H	CHEMOTHERAPY AND AUXILIARY BUILDINGS - LIGHTING AND SMALL POWER	
I	EXTERIOR / LANDSCAPE LIGHTING	
J	LIGHTNING PROTECTION AND EARTHING SYSTEM	
K	FIRE DETECTION AND ALARM SYSTEM	
L	INCOMING FIBRE OPTIC CABLE	
TOTAL CARRIED FORWARD TO THE FORM OF TENDER FOR ELECTRICAL INSTALLATIONS		

SECTION 6

Schedule of Cables

SCHEDULE OF RATES FOR SUPPLY AND INSTALLATION OF CABLES

Project: Kisii Cancer Center

S.NO	CABLE DESCRIPTION	RATE (USD) FOR SUPPLY AND INSTALLATION
1	2 CORE - 04 Sq.mm CU. PVC/XLPE/SWA/PVC + 1 CORE 04 Sq.mm CU/PVC/YG ECC	
2	2 x 1CORE - 06 Sq.mm CU. PVC/XLPE/SWA/PVC + 1 CORE 06Sq.mm CU/PVC/YG ECC	
3	2 CORE - 10 Sq.mm XLPE / SWA / PVC.CU + 1 CORE 10 Sq.mm CU/PVC/YG ECC	
4	2 CORE - 25 Sq.mm XLPE / SWA / PVC.CU + 1 CORE 16 Sq.mm CU/PVC/YG ECC	
5	4 CORE - 4 Sq.mm XLPE / SWA / PVC.CU + 1 CORE 4 Sq.mm CU/PVC/YG ECC	
6	4 CORE - 6 Sq.mm XLPE / SWA / PVC.CU + 1 CORE 6 Sq.mm CU/PVC/YG ECC	
7	4 CORE - 6 Sq.mm XLPE / SWA / PVC.CU + 1 CORE 6 Sq.mm CU/PVC/YG ECC	
8	4 CORE - 10 Sq.mm CU. PVC/XLPE/SWA/PVC + 1 CORE 10 Sq.mm CU/PVC/YG ECC	
9	4 CORE - 16 Sq.mm CU. PVC/XLPE/SWA/PVC + 1 CORE 16 Sq.mm CU/PVC/YG ECC	
10	4 CORE - 25 Sq.mm CU. PVC/XLPE/SWA/PVC + 1 CORE 16 Sq.mm CU/PVC/YG ECC	
11	4 CORE - 35 Sq.mm CU. PVC/XLPE/SWA/PVC+ 1 CORE 16 Sq.mm CU/PVC/YG ECC	
12	4 CORE - 50 Sq.mm CU. PVC/XLPE/SWA/PVC + 1 CORE 25 Sq.mm CU/PVC/YG ECC	
13	4 CORE - 70 Sq.mm CU. PVC/XLPE/SWA/PVC + 1 CORE 35 Sq.mm CU/PVC/YG ECC	
14	4 CORE - 95 Sq.mm CU. PVC/XLPE/SWA/PVC + 1 CORE 50 Sq.mm CU/PVC/YG ECC	
15	4 CORE - 120 Sq.mm CU. PVC/XLPE/SWA/PVC+ 1 CORE 70 Sq.mm CU/PVC/YG ECC	
16	4 CORE - 150 Sq.mm CU. PVC/XLPE/SWA/PVC+ 1 CORE 70 Sq.mm CU/PVC/YG ECC	
17	4 CORE - 185 Sq.mm CU. PVC/XLPE/SWA/PVC+ 1 CORE 95 Sq.mm CU/PVC/YG ECC	

SCHEDULE OF RATES FOR SUPPLY AND INSTALLATION OF CABLES

Project: Kisii Cancer Center

S.NO	CABLE DESCRIPTION	RATE (USD) FOR SUPPLY AND INSTALLATION
18	4 CORE - 240 Sq.mm CU. PVC/XLPE/SWA/PVC+ 1 CORE 120 Sq.mm CU/PVC/YG ECC	
19	4 CORE - 300 Sq.mm CU. PVC/XLPE/SWA/PVC+ 1 CORE 150 Sq.mm CU/PVC/YG ECC	
20	4X1 CORE - 400Sq.mm CU. PVC/XLPE/SWA/PVC+ 4X1 CORE 240 Sq.mm CU/PVC/YG ECC	
21	4X1 CORE - 630 Sq.mm CU. PVC/XLPE/SWA/PVC+ 4X1 CORE 300Sq.mm CU/PVC/YG ECC	
22	8X1 CORE - 630 Sq.mm CU. PVC/XLPE/SWA/PVC+ 8X1 CORE 300 Sq.mm CU/PVC/YG ECC	
23	11X1 CORE - 630 Sq.mm CU. PVC/XLPE/SWA/PVC+ 8X1 CORE 300 Sq.mm CU/PVC/YG ECC	

SECTION 7

Data Schedules

DATA SCHEDULE A - GENERAL

Item	Description	Manufacturer	Name of Local Agent	Delivery to Site in weeks
1	Cable Accessories			
2	L.V. Cable			
3	Control Cable			
4	Domestic Wiring			
5	Glands			
6	Lighting Fittings			
	Type A1			
	Type A2			
	Type B			
	Type D1			
	Type D2			
	Type W			
	Type A3			
	Type L			
	Type K			
	Type ML			
	Type N			
	Type H			
	Type P1			
	Type P2			
	Type S			
	Type P3			
7	Lighting Switches			
	1gang 1 way			
	2 gang 2 way			
8	Socket Outlets (13 Ampere)			
9	Power Outlets (15 Ampere SP&N)			
10	Power Outlets (15 Ampere TP&N)			
11	Power Outlets (30A TP/N isolator, 15A MPTPN isolators)			
12	Cable Trunking			
13	Cable Tray			
14	Conduits			
15	Earthing Electrodes			

DATA SCHEDULE A - GENERAL

Item	Description	Manufacturer	Name of Local Agent	Delivery to Site in weeks
16	Earthing Tape / Cable			
17	Main LV board			
18	PVC SWA PVC Cables			
19	XLPE Cables			
20	Voltage Stabilizer			
21	UPS			
22	MCCBs and Miniature Circuit Breakers			
22	Distribution Boards			
23	Switchgear and Panels			
24	Telephone Plates			
25	Lightning Protection system			
26	20 Ampere Switches			
27	Security Lighting Poles and Fittings			
28	Any other items to be listed below or on an attached sheet			
29				
30				
31				
32				

DATA SCHEDULE B – SPECIAL TOOLS

The Tenderer shall list hereunder his recommended list of tools for the plant supplied under this contract. The list shall be priced individually. A Provisional Sum is to be included in the Schedule of Prices.

Item No.	Description	Amount in USD
1	415V Switchgear	
2	PVC SWAPVC Cables	
3	Bus-bar Mains	
4	Any other items recommended	
	To be listed below	

Note: Tenderer to submit details of tools for which prices have been entered

Total for Special Tools USD _____

DATA SCHEDULE C – SPARE PARTS

The Tenderer shall list hereunder his recommended list of spares covering a period of one years for the plant supplied under this Contract. The list shall be priced individually. A Provisional Sum is to be included in the Schedule of Prices.

Item No.	Description	Amount USD.
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Total for Spare Parts USD.

Note: Tenderer to submit details of spare parts for which prices have been entered.

DATA SCHEDULE D – SUB CONTRACTORS

If the whole of the plant and equipment is not to be manufactured at the Tenderer's own works, he shall give the names and addresses of the firms to whom various items will be sub-contracted.

	Item	Name and Address of Sub-Contractor
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____

DATA SCHEDULE E – MANUFACTURERS, PLACES OF ASSEMBLY, TESTING AND INSPECTION

Item	Manufacturer	Place of Manufacture	Place of Inspection and Testing
L.V. Switchgear and panels			
Distribution Boards			
Voltage Stabilizer			
Generator Sets			
Generator Synchronisation Panel			
Bulk Fuel Tanks			
UPS			
H. T. Cables			
L. V. Cables			
Control cables			
Power Isolators			
Power Accessories			
Fluorescent Lighting Fittings			
LED Lighting Fittings			
Security Lighting Poles and Fittings			
Photo cell			
Earthing Equipment			
Others (Specify)			

DATA SCHEDULE F – DELIVERIES

The times to be entered below are the periods in weeks from the date of acceptance of the Tender in the event of a Contract.

In the column headed “Method of Shipping”, the Tenderer is to state whether items are to be shipped by sea or air and road or rail and whether as general cargo, in containers, etc. Each item of plant, equipment or materials shall be entered.

Item	Time of Despatch Ex-Works	Shipping Route From	To	Method of Shipping	Time of Arrival on Site

SECTION 8

Electrical Services Standards

ELECTRICAL AND MECHANICAL WORKS

		GERMAN		BS		IEC, KBS & OTHERS
	SUBJECT	**DIN**	**PART**	**BS**	**PART**	**OTHER**
001	FRACT. HORSE-POWER MOTOR (DIMENSIONS)	42021		2048	1	
002	CURRENT TRANSFORMERS			3938		IEC 185
003	VOLTAGE TRANSFORMERS			3941		IEC 186/186A
004	CIRCUIT BREAKERS 1 KV A.C.			5311		IEC 56/267
005	CIRCUIT BREAKERS A.C. VOLT OPERATED			842		
006	CIRCUIT A.C. CURRENT OPERATED			4293		
007	FUSE SWITCHES (AIR BREAK)			5419		IEC 408
008	MOTOR STARTERS AND CONTROLLERS	46062		587		
009	MOTOR STARTERS ABOVE 1000 V.A.C.			5856	1	IEC 632-1
010	ELECTRIC MOTOR DIMENSIONS	42673	BL 1-4	4999	10	IEC 72, 72A
011	INDUCTION MOTORS FOR GENERAL PURPOSE	42673	BL 1-4	5000	10	IEC 72
012	ENCLOSURE PROTECTION, SWITCH/CONTROL GEAR	40050	BL 2,6,9,10	4520		IEC 144 (IP32)
013	MOTOR STARTERS NOT EXC. 1000 V.A.C.	46062		4941	1, 3, 4	ICE 292 1, 2, 3, 4
014	ELECTRICITY METERS			37	1, 5, 8	
015	WATT-HOUR METERS			5685		IEC 521
016	ACCEPTANCE TESTS FOR PUMPS (CLASS C)	4325		5316	1	ISO 2548 IEC 190
017	ACCEPTANCE TESTS FOR PUMPS (CLASS B)	4325		5316	2	ISO 3555 IEC 198
018	CODE OF PRACTICE, ELECTRICAL WIRING			7671	2018)	IEE W. REGS. (18TH ED)
019	ELECTRICAL PROTECTIVE RELAYS			142		
020	FACTORY BUILT SWITCH GEAR ASSEMBLIES	57670	TL.6	5486	1, 2, 1, 13	IEC 439, 439-2
021	RECIPROCATING INT/COMB. ENGINES			5514	1, 2	ISO 3046 PT. 1, 2
022	MACHINES FOR MISC. APPLICATIONS			5000	99	
023	INSULATED MATERIAL FOR ELEC. MACHINES			2757		IEC 85
024	PVC INSULATED CABLES NOT EXC. 1900V A.C.	57207	4, 5	6346		
025	PVC INSULATED CABLES (CONT.)			6746		
026	ROTATING ELECTRICAL MACHINES - GENERAL			4999	1, 2, 3	IEC 34-1, 34-8, 72, 72A
027	CONCRETE CABLE COVER	279		2448		
028	ELEC. POWER SWITCH GEAR (LOW V.N.E. 1KV)	57660		162		
029	SAFETY INSULATING TRANSFORMERS			3535		
030	ROTATING ELEC. MACHINES - RATING PLATES	42961		4999	4	IEC 34-1
031	ROTATING ELEC. MACHINES - ENCLOSURES	40050		4999	20	IEC 34-5
032	ROTATING ELEC. MACHINES - CONDITIONS			4999	31	IEC 34-1
033	ROTATING ELEC. MACHINES TEMP. LIMITS	See E DIN		4999	32	IEC 34-1 E DIN
034	ROTATING ELEC. MACHINES VIBRATION	See E DIN ISO		4999	50	ISO 2373
035	ROTATING ELEC. MACHINES TESTS			4999	60	IEC 34-1
036	GENERATORS DRIVEN BY I/C ENGINES	See VDMA		5000	3	VDMA 6280
037	MACHINES WITH FRAMEPROOF ENCLOSURES	22418		5000	17	
038	MAIN. OF ELE. SWITCHGEAR (V.N.E. 145KV)			5405		
039	PROTECT. PROV. BY ENCL. (CLASS 'N'-DEG)			5490		IEC 529
040	ELECTRICAL EQUIP. OF INDUSTRIAL MACHINES			See CP		CP 1015
041	SWITCHGEAR AND CONTROL GEAR UPTO 1000V			4752		IEC 157-1 157-1A
042	PVC INSUL. CABLES - S/GEAR & CON. GEAR			6231		
043	BASIC ENVIRONMENTAL TESTING PROCEDURES			2011	1.1	IEC 68-1
044	DEFINITIONS & GENERAL REQUIREMENTS					IEC 51-1
045	PANEL MOUNTED INSTRUMENTS - DIMENSIONS					IEC 473
046	CELLULOSIC PAPERS FOR ELEC. PURPOSES			5626	1, 2, 3	IEC 554
047	COMMIS. OP. & MAINT. OF STORAGE PUMPS					IEC 805
048	RUBBER INSULATED CABLES					IEC 245
049	VOLTAGE FLUCTUATION LIMITS - GUIDE					IEC 827
050	ELECTRICAL CABLES - AMOURING - WIRE FOR					KBS 04-290
051	ROT. ELEC. MACH - HAZARDOUS AREAS (N)			5000	16	
052	POWER TRANSFORMERS - GENERAL			171		IEC 76 SABS 780
053	FUSES, MCB, MCCB			3871	1	
054	BUSHINGS FOR TRANSFORMERS					IEC 137
055	INSULATING OIL FOR TRANSFORMERS					IEC 296
056	LOADING GUIDE FOR OIL IMMERSED TRANSFORMERS					IEC 354
057	MEASUREMENTS OF TRANSFORMER SOUND LEVELS					IEC 551
058	LOW VOLTAGE CONTROL GEAR					IEC 158
059	LOW VOLTAGE FUSES					IEC 169
060	HIGH VOLTAGE SWITCHES					IEC 265
061	HIGH VOLTAGE FUSES					IEC 282
062	AC METAL ENCLOSED SWITCHGEAR					IEC 298
063	HIGH VOLTAGE ALT. CURRENT CONTACTORS					IEC 470
064	PAPER-INSULATED METAL SHEATHED CABLE					IEC 55
065	STEEL R/C ALUMINIUM ALLOY CONDUCTORS					IEC 209
066	EARTHING ARRANGEM'TS & PROT'T'VE CONDUCTORS					IEC 364-5-54
067	LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR					IEC 942-2

DIN Deutsches Instut fur Norming
IEC International Electrotechnical Commission
KBS Kenya Bureau of Standards
BS British Standards
ISO International Organisation for Standardisation

SCHEDULE OF APPLICABLE ELECTRICAL SERVICES STANDARDS

The following BS standards are the general specifications used for the electrical services. The latest revised or superseding versions shall apply.

BS 88			**Cartridge fuses for voltages upto and including 1000V a.c. and 1500 d.c**
	Part 1	1988	Specification for general requirements
BS 89			
			Direct-Action Indicating Electrical Measuring Instruments and their Accessories
	Part 3	1990	Specification for special requirements for ammeters and voltmeters
BS 90		1975 (1999)	**Specification for direct acting electrical recording instruments and their accessories**
BS 731			**Flexible steel conduit for cable protection and flexible steel tubing to enclose flexible drives**
	Part 1	1952 (1993)	Flexible steel conduit & adaptors for the protection of electric cable
BS 1363			**13 A Plugs, socket outlets and adaptors**
	Part 3	1989	Specification for adaptors
BS 1376		1974 (1985)	**Specification for colour of light signals**
BS 2692			**Fuses for voltages exceeding 1000V a.c.**
	Part 1	1986	Specification for current-limiting fuses
	Part 2	1956	Expulsion Fuses
BS 2782			**Methods of testing plastics**
BS 3676			**Switches for household and similar fixed electrical installations**
	Part 1	1989	Specification for general requirements
BS 4533			**Luminaries**
	Part 102		Specification for fixed general purpose luminaries
BS 4568			**Specification for steel conduit and fittings with metric threads of ISO form for electrical installations**
	Part 1	1970 (1993)	Steel conduit, bends and couplers
BS 4607			**Non-metallic conduits and fittings for electrical installations**
	Part 1	1984(1993)	Specification for fittings and components of insulating material
BS 4678			**Cable trunking**
	Part1	1971 (1999)	Steel surface trunking
BS 4999			**General requirements for electrical rotating machines**
	Part 0	1987	Specification introduction and information on other parts
	Part 111	1987	Specification for built in thermal protection for electric motors rated at 660V a.c. and below
	Part 143	1987	Specification for tests
BS 5000			**Rotating electrical machines of particular types or for particular applications**
BS 5308			**Instrumentation Cables**
	Part 1	1986	Specification for polyethylene insulated cables
	Part 2	1986	Specification for PVC insulated cables
BS 5311		1996	**Specification for high-voltage alternating current circuit breakers**

BS 5424			**Specification for control gear for voltages up to and including 1000V a.c. and 1200 d.c.**
BS 5445			**Components of automatic fire detection systems**
BS 5463			**Specification for high voltage switches**
BS 5467		1997	**Specification for 600/100V and 1900/3300V armoured electric cables having thermosetting insulation**
BS 5486			**Low-voltage switchgear and control gear assemblies**
BS 5733		1979	**Specification for general requirements for electrical accessories**
BS 5792			**Measurement of conductive liquid flow in closed conduits. Method using electromagnetic flowmeters**
BS 5839	Part 1	1988	**Fire detection and alarm systems for buildings** Code of practice for system design, installation and servicing
BS 5953	Part 1	1980	**Guide on power transformers** Application of power transformers
BS 6004		1991	**Specification for PVC insulated cables (non-armoured) for electric power and lighting**
BS 6007		1991	**Specification for rubber insulated cables for electric power and lighting**
BS 6207		1991	**Mineral insulated copper sheathed cables with copper conductors**
BS 6231		1990	**Specification for PVC-insulated cables for switchgear and control gear wiring**
BS 6360		1991	**Specification for conductors in insulated cables and cords**
BS 6346			**Specification for PVC-insulated cables for electricity supply**
BS 6480			**Impregnated paper-insulated lead or lead alloy sheathed electric cables for electricity supply of rated voltage up to and including 33000V**
BS 6500			**Specification for insulated flexible cords and cables**
BS 6651		1999	**Code of practice for protection of structures against lightning**
BS 7365			**Specification for hard drawn aluminium wire overhead line conductors**
BS 7430			**Code or practice earthing**
PD 6399			**Guide to insulation co-ordination within low voltage systems including clearances and creepage distances for equipment**
BS CP 1016			**Code of practice for the use of Semiconductors Devices**
PO D2155 C			**Solderless connections made by Wire-Wrapping Method (or equivalent standard)**
PO D2237			**Terminal tags for solderless wrapped connectors**
BS EN 50086			**Specification for conduit systems for electrical installations. Particular requirements**

BS EN 60076			**Power Transformers**
	Part 1	1997	General
BS EN 60470		2001	**High voltage alternating current contactors and contactor-based motor starters**
BS EN 60871			**Shunt Capacitors for a.c. power systems having a rated voltage above 1 KV**
	Part 1	1998	General testing and rating. Safety requirements. Guide for installation and operation
BS EN 60061			**Specification for lamp caps and holders together with gauges for the control of interchangeability and safety**
	Part 1	1997	Lamp caps
	Part 2	1997	Lampholders
BS EN 60081	1998		**Double capped flourescent lamps. Performance specification.**
BS EN 60099			**Surge arresters**
	Part 1	1994	Non-linear resistor type gapped sure arresters for a.c. systems
BS EN 60898		1991	**Specification for circuit breakers for overcurrent protection for household and similar installations**
BS EN 60617:2			**Graphical symbols for diagrams**
	Part 2	1996	Symbol elements, qualifying symbols ad other symbols having general application
BS 4778			**Quality vocabulary**
	Part 3.1	1991	Guide to concepts and related definitions
	Part 3.2	1991	Glossary of international terms
BS EN 60309			**Plugs, socket outlets and couples for industrial purposes**
	Part 1	1998	General requirements
BS EN 50086			**Specification for conduit systems for electrical installations**
	Part 1	1994	General requirements
BS EN 60947			**Contactors and motor starters**
	Part 4.1	1992	Electromechanical contactors and motor starters
BS EN 60298		1996	**A.C. metal enclosed switchgear and control gear for rated voltage above 1 kV and up to and including 52 kV**
BS EN 60129		1994	**Specification for alternating current disconnectors and earthing switches**
BS EN 60947			**Specification for low-voltage switchgear and control gear**
	Part 1	1998	General Rules
	Part 3	1999	Switches, disconnector, switch disconnectors and fuse combination units
BS EN 60265			**Specification for high voltage**
	Part 1	1998	Switches for rated voltage above 1 kV and less than 52 kV
BS EN 60439			**Specification for low-voltage switchgear and control gear assemblies**
	Part 1	1999	Type-tested and partially type-tested assemblies
BS EN 60529		1992	**Specification for degrees of protection provided by enclosures (IP Code)**
BS 60889		1997	**Hard drawn aluminium wire for overhead line conductors**

SECTION 9

Light Fitting Schedules

Schedule of Luminaires

Project Kisii Cancer Centre, Kisii County, Kenya

Date: Monday, 23 May 2022

Rev: 0

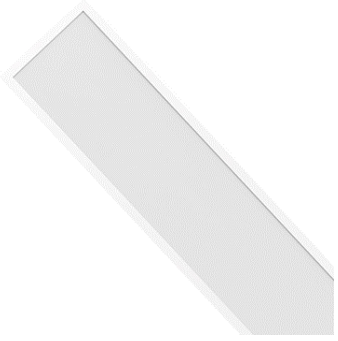
Type Ref.	Location	Luminaire Description	Luminaire Image	Control Gear & Lamps Type
D2	Circulation, Washrooms	A recessed LED downlight incorporating a thermally optimised, deep drawn aluminium body with IP54 as standard. Fixed or dimmable output or with emergency function. Correlated colour temperature is 3000K with CRI >80 and UGR-19. Overall height <100mm and cut out of 150mm, Rated median useful life*: L90 50000h at 25°C, **Warranty period 5 years**		Remote dimmable control gear. 25W LED, 3000lm, 4000K
DL2	Ramp	Surface circular downlighter with a spun aluminum body finished full polyester, non yellowing white (RAL9016), white moulded outer reflector and high performance vacuum metallised inner reflector. wide distributions with excellent glare control at 50o and above. Tool free access and no visible fixing. IP40 LED light engine providing Rated median useful life*: L90 50000h at 25°C, 4000K, CRI 80+, CRI90+ to special order. Control gear and LED circuit boards replaceable for future maintenance. **Warranty period 5 years**		LED Driver; 28W LED, 3000lm, 4000K
EXIT	Emergency escape, Circulation & Amenity Areas	Emergency exit sign with dedicated, Polycarbonate body finished white (RAL9016) with acrylic legend panel. Three-hour maintained operation, powered from an easily replaceable Nickel Metal Hydride (NIMH) battery. 5 year warranty. Integral downlight for exit illumination. Hinged battery compartment Choice of ISO7010 or Euro Legends. IP40. Suitable for ceiling or wall mounting with 3m wire suspension or cantilever bracket.		10W LED
D1	Circulation areas	Recessed circular downlighter manufactured from a high pressure die-cast ring finished full polyester powder coated, non-yellowing white with an aluminium heat sink and injection moulded reflector finished white. Accessories include frosted inner and frosted outer drop glass, green tinted halo and IK10 polycarbonate cover. IP40 below ceiling, IP20 above ceiling. LED light engine providing 70,000 hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. Warranty 5 years.		Control Dimmable; 16W LED, 1800lm, 4000K, CRI> 80

Schedule of Luminaires

Project Kisii Cancer Centre, Kisii County, Kenya

Date: Monday, 23 May 2022

Rev: 0

Type Ref.	Location	Luminaire Description	Luminaire Image	Control Gear & Lamps Type
A1	Examination room, Medical areas, offices	A versatile edge lit panel for recessed mounting with LED light source with , 3900 lm output, 3500°K colour temperature. Compliant to DSE requirements within EN12464 providing UGR < 19 due to unique Glare ProTech prismatic optic. CRI > 85, Lifetime is 50,000 hours (L80) at Ta 25°C, Warranty period 5 years		
A2	Corridors	A versatile edge lit panel for recessed mounting with LED light source with , 2900 lm output, 3500°K colour temperature. Compliant to DSE requirements within EN12464 providing UGR < 19 due to unique Glare ProTech prismatic optic. CRI > 85, Lifetime is 50,000 hours (L80) at Ta 25°C, Warranty period 5 years		
A3	Operating Rooms	Surgical Suite Luminaires (Medical grade), Recessed LED, 1200mmx 600mm, Antimicrobial finish standard on all exposed painted surfaces of the installed luminaire, High efficiency diffused, impact-resistant acrylic lens, full asymmetric optic with uniform appearance, Serviceable composite-bodied mid-power white LED array, 12,000 lm, 4000K color temperatures, Minimum 90 CRI, electronic, constant-current driver (<10% THD, >0.90 PF). Minimum 85% driver efficiency. Standard 0-10V dimming with 1-100% range. Dim-to-dark capabilities. LISTINGS: Luminaire is certified to UL standards . UL certified IP65 per IEC 60598, Meets FED-STD-209E/Class 1(ISO 3) Cleanrooms. Conducted emissions controlled as per MIL-STD-461G. CCEA Approved.		
L5	Corridors, Circulation	Narrow, low-glare, recessed, asymmetric corridor LED luminaires for individual manufactured from extruded aluminium body and die-cast ends finished satin white (RAL 9016), aluminium matt finish 10mm slim white frame, Complete with remote, long life, flicker free driver and 1.2m flex & plug. Supplied with fire retardant TP(a) polycarbonate high efficiency opal diffuser (UGR22 or low glare optic for EN12464-1 / LG7 (<3000 cd/m² @ 65°) compliance. IP40 LED light engine providing 50,000 hour @ 90 life, 4000K, CRI 80+ and LUX Guard LED PCB protection, Exit Lumen: 3700lm, UGR Design: 22, Beam Distribution: Symmetric, Warranty: 5 Years Control gear and LED circuit boards replaceable for future maintenance.		LED Driver; 32W LED, 3700lm, 4000K

Schedule of Luminaires

Project Kisii Cancer Centre, Kisii County, Kenya

Date: Monday, 23 May 2022

Rev: 0

Type Ref.	Location	Luminaire Description	Luminaire Image	Control Gear & Lamps Type
W	patient wards	Wall mounted hospital bed head luminaire Shallow depth extruded aluminium body with die-cast aluminium ends designed for easy cleaning, finished full polyester non-yellowing satin white (RAL 9016). Complies with the CIBSE 2008 Hospital Lighting Guide (LG2), separate switching facility for up and down light operation, dimmable down light for patient comfort. Optional centrally mounted 1W LED night light contained within the lower (downlight) compartment. Curved and sloping top discourages use as a shelf and helps minimise dust build -up. IP40 LED light engine providing 50,000 hour life, 4000K, CRI 80+ . Version with rear trunking section is available. Control gear and LED circuit boards replaceable for future maintenance.		LED Driver;26W LED, 3300lm, 4000K
N	Staircases/ ramp	IP65 Wall-mounted circular-shaped surface-mounted luminaire **LED;** Optic type Opal prismatic reflector**;** Optical cover/lens type: Opal bowl with painted cove ; system flux 3400 lm; CRI: 80, 36W; Colour Temperature 3500K; Lumen maintenance at median useful life 50000 h L70 as Philips Coreline Wall Mounted (WL131V LED34S/830 PSED WH) Approved.**Warranty period 5 years**		
P1	External area lighting	Precision engineered Pole top mounted LED luminaires manufactured from die-cast aluminium polyester powder coated RAL9006 silver and UV stabilised polycarbonate cover with area or roadway optical distribution options. Optical cover/lens material: Tempered glass IP67. LED light engine providing 100,000-hour life @ L80, 4000K, CRI 70+ and LED Protect LED PCB protection. **Warranty: 5 Years.** The proposed luminaire shall have an in-built surge protection system to protect the electronic driver and the LED module with a minimum surge protection rating of 10KV (15KV preferred). The LED driver shall be designed to operate large array of high power LED's through current controlled output. The driver shall be suitable for nominal 220V-240V 50/60Hz mains supply. The LED driver shall have an efficiency of at least 90%. single mounting options including pole top mounting accessories and 6m Galvanised tubular steel, root mounted columns for luminaires with fixing cradle/bracket (column supplied with all mounting accessories) - one Luminaire per column. Control gear and LED circuit boards replaceable for future maintenance. Luminaire design should support update and replacement with new LED modules or LED drivers.		LED Driver; 100W LED, 11,000lm, 4000K

Schedule of Luminaires

Project Kisii Cancer Centre, Kisii County, Kenya

Date: Monday, 23 May 2022

Rev: 0

Type Ref.	Location	Luminaire Description	Luminaire Image	Control Gear & Lamps Type
P2	landscape Lighting	LED pole top amenity luminaire manufactured from die-cast aluminium polyester powder coated RAL9006 silver with high impact UV stabilised polycarbonate cover providing symmetric and asymmetric distribution options. IP66. LED light engine providing 100,000 hour life @ L80, 4000K, CRI 70+ and LUX Guard LED PCB protection. **Warranty: 5 Years.** Supplied finished with 10m flying lead and 6m Galvanised tubular steel, root mounted columns for luminaires which fit directly onto column top shaft and all accessories. Control gear and LED circuit boards replaceable for future maintenance.		LED Driver; 60W LED, 10,000lm, 4000K
P3	landscape Lighting	High performance LED bollard (1m) manufactured from extruded aluminium with die-cast head unit and full polyester powder graphite finish, with on-site selectable distribution (between pathway and area distribution patterns), and less than 2% upward light component complete with alla accessories. Integral high performance driver, IP66 and IK10. LED light engine providing 100,000 hour life, 4000K, CRI 70+ and LUX Guard LED PCB protection. Control gear and LED circuit boards replaceable for future maintenance.		LED Driver; 38W LED, 5,000lm, 4000K
S	Steps/ Ramp	A rectangular, Recessed LED luminaire for pathway lighting applications. Electronic, fixed output control gear. Class I electrical, IP65, IK10. Body: die-cast aluminium, painted dark grey (Akzo Nobel 900). Glass: tempered glass, 8mm thick. Recessed housing (required, to be ordered separately): polypropylene. Complete with 4200K LED Supplied complete with clear glass frame.		11W LED, 500lm, 4000K

Schedule of Luminaires

Project Kisii Cancer Centre, Kisii County, Kenya

Date: Monday, 23 May 2022

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Type Ref.	Location	Luminaire Description	Luminaire Image	Control Gear & Lamps Type
L	Outdoor wall mouted	Surface mounted bulkhead with die-cast silver aluminium body and opal polycarbonate diffuser. IP65, IK10 double wall design that will conceal cable from view. Round small with bezel.		11W LED, 1200lm, 4000K
H	External façade	Surface mounted external Up/Down lighter with LED Lamps External facades		8W LED, 450lm, 4000K
U1	landscape Lighting	Round, walk-over recessed luminaires large, pre-wired with 5m cable, with recessed box and stainless steel frames. cool white 4000K. Sealed to IP68 IP67. For ground installation with transparent glass enclosure for illumination or frosted/dome windows for guidance.		11W LED, 500lm, 4000K
K	Servicea Ducts	Robust bulkhead luminaires for internal or external applications. Body and frame in strong pressure die-cast LM6M high corrosion resistance aluminium. Textured black full polyester powder finish, Fixings outside gasket line to preserve IP ratingl Covers in prismatic polycarbonate or 9mm thick (nominal) thermally shock resistant borosilicate glasslClip-on nylon coated steel wire guard availablelTamper-resistant cover screws availablel100oC high ambient GLS versionlComplies with M.O.D. JSP482 Chapter 8 Document for 'Category C' areas (up to 70W)lBSI Kite marked and ENEC approved versions, LED Versionl: High power white LEDs ; Aluminium gear tray with LED heat sink barlFitted with 4000K LED		32W LED

Schedule of Luminaires

Project Kisii Cancer Centre, Kisii County, Kenya

Date: Monday, 23 May 2022

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Type Ref.	Location	Luminaire Description	Luminaire Image	Control Gear & Lamps Type
B	Stores/ utility	Anti-corrosive LED luminaire manufactured from injection moulded polycarbonate finished grey with frosted prismatic polycarbonate cover. With smooth easy clean lines and snug-fit polycarbonate cover clips (stainless steel option). Fast installation via external stainless-steel brackets which preserve the IP rating. IP65 (IP54 when Smart). LED light engine providing 100,000 hour life, 4000K, CRI 80+ Flexible mounting options surface, suspended or adjustable wall mount. Control gear and LED circuit boards replaceable for future maintenance.		30W LED, 4800lm, 4000K
B1	Kitchen, Storage	Highly efficient LED corrosion resistant luminaire manufactured from extruded aluminium with die-cast ends finished full polyester non-yellowing white with choice of broad and narrow distributions, high impact resistant polycarbonate cover. Long life silicone gasket ensures the IP66 rating. LED light engine providing 100,000 hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. Suitable for surface, hook suspension and rod suspension mounting, with external fixing brackets . Control gear and LED circuit boards replaceable for future maintenance.		46W LED, 6725lm, 4000K
F1	Warm White	Architectural LED floodlight for fixed lighting.		60W LED, 6950lm, 4000K
M	Mirror light	Wall light 15W LED module Daylight White, K: 6500 Lm: 1350 Lm/W:90, IP44. Suitable for bathroom zone 2 Complete with integrated control gear		
D3	Restaurant	Type: 166mm Diameter with low depth housing (77mm max) recessed downlight with frosted lens. Trim in matte white finish. LED in warm white colour temperature (2700K). Control Gear: Electronic driver with transformer and power supply as required IP rating: 20, Mounting: Recessed, Lamps: 13.8W LED Colour Temp: 2700 oK (Warm White), Colour rendering index: 0.85		16W LED, 2025lm, 4000K

Schedule of Luminaires

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Type Ref.	Location	Luminaire Description	Luminaire Image	Control Gear & Lamps Type
A4	Examination room, Medical Areas, offices	A versatile edge lit panel for recessed mounting with LED light source with , 4300 lm output, 3500°K colour temperature. Compliant to DSE requirements within EN12464 providing UGR < 19 due to unique Glare ProTech prismatic optic. CRI > 85, Lifetime is 50,000 hours (L80) at Ta25°C, Warranty period 5 years		37W LED, 4300lm, 4000K

SECTION 10

Schedule of drawings