

REPUBLIC OF KENYA



KISII COUNTY GOVERNMENT



ARAB BANK FOR ECONOMIC
DEVELOPMENT IN AFRICA



SAUDI FUND FOR
DEVELOPMENT



MINISTRY OF HEALTH

BIDDING DOCUMENTS

For Procurement of

**PROPOSED CANCER CENTRE AT
THE KISII TEACHING AND REFERRAL HOSPITAL**

EXTRA LOW VOLTAGE (ELV) SYSTEMS INSTALLATIONS

TECHNICAL SPECIFICATIONS &

BILLS OF QUANTITIES

TENDER NO.: MOH/NCCP/ICB/003-3/2021-2022

(3 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

EXTRA LOW VOLTAGE INSTALLATIONS

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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 30 million and above for Extra Low Voltage 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

EXTRA LOW VOLTAGE INSTALLATIONS

Preamble

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

.

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

Date2022

SIGNATURE PAGE

.....

MAIN CONTRACTOR

Date 2022

PROPOSED KISII CANCER CENTER – AT KISII COUNTY

TENDER FOR EXTRA LOW VOLTAGE 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 EXTRA LOW VOLTAGE INSTALLATIONS

CONDITIONS OF TENDERING

- 1.01 Each Tenderer must submit, enclosed in a plain sealed envelope clearly marked, "TENDER FOR EXTRA LOW VOLTAGE 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 EXTRA LOW VOLTAGE 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 EXTRA LOW VOLTAGE 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 EXTRA LOW VOLTAGE 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 EXTRA LOW VOLTAGE 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 EXTRA LOW VOLTAGE INSTALLATIONS

PRELIMINARIES

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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 Institut für Normung
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 / STRUCTURAL ENGINEER

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

(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.

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 _____

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

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PROPOSED CANCER CENTRE AT THE KISII TEACHING AND REFERRAL HOSPITAL

PART I

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3 PART I - GENERAL SPECIFICATION

3.1 Extent of Light Current Systems 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 shall be exempt from all duties and taxes as imposed by the Kenya Revenue Authority.

The Light current installation 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 Light Current System Installations

The Tenderer shall provide within a stipulated period of acceptance of his tender and award of Contract, a complete programme for the light current system 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) ISP/Telkom Kenya installations;
- (x) 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 Light Current systems 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 equipment. If the Contractor finds any discrepancy in the Drawings or between the Drawings and the Technical Specifications or between the Light Current systems 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 Structured Cabling, CCTV and Access Control, routes etc;
- (d) Details of nurse call system;

- (e) Technical literature for all the services;
- (f) 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 pipe work, 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 pipe work 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 Light Current Installation

The Contractor shall instruct the Employer's Maintenance Engineer or his representative on the operation and maintenance of the various components forming the Light Current 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: -

Light Current Services

- (i) Relevant British Standards;
- (ii) Relevant International Standards Organisation/International Electro technical Commission (ISO/IEC);
- (iii) Commercial Building Telecommunications Wiring Standards ANSI/TIA
- (iv) CENELEC EN Standards;
- (v) The Institute of Electrical and Electronic Engineers (IEEE);
- (vi) Communications Authority of Kenya (CAK);
- (vii) Regulations and by-laws of the Ministry of Energy;
- (viii) Nairobi City Council By-Laws;
- (ix) Current Regulations of Telkom Kenya;
- (x) By-laws of the The Energy and Petroleum Regulatory Authority (EPRA)

- (xi) Any other duly constituted authorities' regulations having jurisdiction over the Works;
- (xii) The Specification and accompanying documentation and Drawings;
- (xiii) 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 pipe work, 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 pipe work and accessories to the shuttering and the steel reinforcement work.

Where ductwork is to be 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 Light Current 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 and Light Current 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 pipe work, 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 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 Light Current access control and intrusion plant, 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, cabinets and equipment 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 and Light Current 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
EXTRA LOW VOLTAGE (ELV) SYSTEMS INSTALLATIONS**

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4 PART 2 - PARTICULAR SPECIFICATION

4.1 Extent of installation

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

The proposed hospital comprises of the main hospital block, ancillary buildings and external areas.

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 Extra Low Voltage 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:

- ... Structured Cabling System
- ... CCTV & Surveillance System;
- ... Telephony System
- ... Nurse Call System;
- ... MATV;
- ... Audio Visual System;
- ... Other works described in Sub-clauses;

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

The project comprises the supply and installation of a structured telecommunications cabling system.

A backbone network shall be installed within the hospital. All IP-based services will run on the same physical network. These services include:

- ... Hospital Management System
- ... Building Management System
- ... Voice traffic (IP phones)
- ... Wireless network
- ... Data Network
- ... Nurse Call System
- ... IP CCTV
- ... Access Control System.
- ... IPTV

To ensure data security between the different services, Virtual networks or VLANs will be configured. All access VLANs will be routed by core switches however; physical network infrastructure will be shared.

4.2 Structured Data Cabling Network

Part 1 General

4.2.1 Related Documents

Drawings and General Provisions of the Contract, including Contract Conditions and Specification Sections, apply to work of this Section.

4.2.2 Summary

(a) General

This section covers the work of the structural cabling network as required for the project.

The structured cabling system shall be designed and installed in accordance with the telecommunications service provider's, cable manufacturer's recommendations and BS EN 50174

The extent of work of the network is described by the project documents as indicated on Drawings, in schedules and on single line diagram of the project.

(b) Warranty:

A twenty (20) year Extended Product Warranty and Applications Assurance for this wiring system shall be provided.

Extended Product Warranty: The Extended Product Warranty shall cover product defects for all passive cabling and cabling components. Passive components are defined as those exhibiting no gain or contributing no energy. The manufacturer shall warrant, from the date of installation and after a Registration Certificate is issued, the following:

- ... That the cabling system manufacturer's passive components that comprise of the registered cabling installation will be free from manufactured defects in material or workmanship under normal and proper use.
- ... That all approved passive cabling products that comprise the registered Cabling System installation meet or exceed the relevant NEXT (near end cross talk) PSNEXT, ELFEXT, PSELFEXT, return loss, bandwidth and attenuation/loss specifications of the latest ISO/IEC IS 11801, CENELEC EN 50173 and TIA/EIA 568-B (or any national equivalent) standards and their approved amendments/revisions.
- ... That the installation will meet or exceed the relevant attenuation/loss and bandwidth requirements of the ISO/IEC IS 11801, CENELEC EN50173 and TIA/EIA 568-B (or any national equivalent) standards and their approved amendments/revisions for fibre cabling.
- ... That the structured cabling solution will meet the Category 7 Channel Specifications for ISO/IEC and TIA, even under the worst-case channel configuration (100 meters.).

(c) Applications Assurance:

The Application Assurance shall cover failures of the CABLING SYSTEM installation to operate the application(s) the system was designed to support, as well as additional application(s) defined below. The manufacturer shall warrant that the registered CABLING SYSTEM installation will be free from failures, which prevent operations of the

specific application(s) for which the original CABLING SYSTEM was designed, not including failures due to electronic hardware and/or software problems.

The Application Assurance shall also cover the following additional applications:

- ... Those as specified in the current (at the time of installation) and future versions of the manufacturer's CABLING SYSTEM Performance Specification; and Any applications introduced in the future by recognized standards or user forums that use the relevant ISO/IEC 11801 or TIA/EIA 568-B UTP or fibre components and UTP or fibre link/channel specifications for cabling.

4.2.3 Standards

The design and installations shall be performed in strict accordance with the drawings, specifications and with relevant requirements and recommendations of:

- ... BS EN 50174-1; BS EN 50174-2; BS EN 50173-1
- ... ISO/IEC IS 11801, CENELEC EN 50173
- ... Kenyan Electrical Standard (KE)
- ... Kenya Bureau of Standards (KEBS)
- ... ISO/IEC 11801 Performance specification for 4- pair Category 7 cabling.
- ... EIA/TIA 569 Commercial building telecommunications pathways and spaces.
- ... EIA/TIA 606 Administration standard for the telecommunication infrastructure of commercial buildings.
- ... EIA/TIA 607 Commercial building grounding and bonding requirements for telecommunication.
- ... EIA/TIA-TSB72 Centralized Optical fibre cabling guidelines.
- ... EIA/TIA -TSB75 Additional horizontal cabling practices for open offices
- ... The relevant Kenyan Building Codes
- ... Standards of local authorities having jurisdiction

All System components shall pass the tests as mentioned in the standards. Certificate of these tests shall be submitted during handover of the project as part of handover documentation.

4.2.4 Submittals

The following complete sets of documentation shall be submitted to the engineer for verification indicating the type, size, rating, style, catalogue number, manufacturers' names, photos and catalogue data sheets for all items including specifications and installation instructions to ensure compliance with Specifications.

a) Pre-Construction Submittals:

- Product data sheets
- Shop drawings
- Factory tests
- Proof of certification as a certified installer for the system(s) to be installed
- Proof of project registration with system manufacturer(s) for extended warranty
- Manufacturer product and application wiring for approval

b) During Construction:

- Installation/commissioning schedules
- Pull schedules
- Field test reports

c) Commissioning:

- Commissioning plans
- Method statements
- Testing and commissioning schedules

d) d Post Construction:

- As-built drawings (both hard copy and electronic copy)
- Warranties

4.2.5 Quality Assurance

... Manufacturer's Qualifications: Manufacturer shall be ISO 9001, ISO 14001 and UL Certified for production of Copper and Fibre Communication Cables. An Independent Third-Party Verification for all proposed Category 7 products and an independent third-party certificate for compliance of Category 7 link and channel performance will be provided by the manufacturer.

... Installer Qualifications: Installer firm shall have at least 10 years of successful installation experience in similar projects. Installer Shall be certified from the manufacture for design, install and maintain the provided system. Software installer shall also be certified.

... Training: The proposal shall include two weeks training for selected employer's personnel on provided hardware and two weeks training on software implementation, operation, maintenance, etc.

... Testing Agency: Engage a qualified testing agency to evaluate cables.

... Factory test cables on reels according to TIA/EIA-568-C.2 and 568-C.3.

... Field test UTP cables according to TIA/EIA-568-C.0.

... Factory test multimode optical fibre cables according to TIA/EIA-526-14-A and TIA/EIA-568-C.3. or CENELEC EN 50289

... Factory test single mode optical fibre cables according to TIA/EIA-526-7 and TIA/EIA-568-C.3.

... Cable will be considered defective if it does not pass tests and inspections

... Prepare test and inspection reports.

4.2.6 As-built Drawings

During the construction of the system, the contractor shall put in writing all his remarks, during the progress of the work, concerning any suggested alterations, if existing, from the shop drawings in wiring routes, locations of equipment or devices which arise from coordination between the system and other activities.

No execution of alterations shall be allowed before receiving a written approval from the Engineer. All alterations shall be registered and filled by the contractor and extra copies shall be submitted to the Engineer.

A complete as-built draft set of drawings shall be prepared after completion of work for approval of the Engineer. The as-built draft shall include all previously approved alterations. Final originals and copies of drawings shall be submitted.

The network supplier/contractor shall be responsible to coordinate and exchange information with suppliers of other systems and equipment, which shall communicate with it to achieve the required functions.

4.2.7 Spare Parts

The system shall have the following spare parts:

- 10% of the outlets
- Number of one (1) UTP 24 port patch panel CAT 7

Part 2 System Equipment

4.2.8 Structured Cabling System General

The entire network component (end to end) shall be from a single manufacture. The network component shall consist of (but not limited) to the following items:

- ... Patch Panel CAT 7
- ... UTP RJ 45 Patch Cords CAT 7
- ... RJ 45 Outlets CAT 7
- ... UTP CAT 7 Horizontal Cabling
- ... Fibre cabling
- ... Fibre patch panel
- ... Fibre installation kits
- ... Labelling
- ... Earthing
- ... Testing
- ... Rack
- ... Labelling system connection with ground

The contractor shall submit technical data sheet for all the system component (end to end) indicating the worst value for every parameter not the average values.

All system components shall be certified that it passed the official tests mentioned in the standard. The contractor shall submit these certificates.

All RJ45 outlets shall be terminated on patch panels in the rack located at wiring rooms.

The contractor shall provide all the required equipment, component, etc. to make the system work as required without any extra cost, the contractor shall provide all equipment which are not mentioned in specifications, B.O.Q and Drawings but may be required to ensure the system is operational.

The horizontal networks shall be fully 4 pair structured networks supporting or exceeding Category 7 according to requirements for Category 7 component performance mentioned in standards.

All the cables shall be Flame retardant PVC

The contractor shall supply a table for guaranteed channel performance values when configured as a worst-case channel. All values in the table shall be guaranteed (minimum) to apply to worst-case 90 meters, 4 connector channels for the entire frequency.

The networks shall include supply installation and testing of indoor networks including wiring, conduits, socket outlets, patch panels' etc.

Conduit filling factor shall be 40% as max.

The system shall comply with all of the performance requirements for current and proposed applications such as

- ... Horizontal & building backbone cable
- ... Gigabit Ethernet,
- ... 10 Base-T,
- ... 100 Base-T
- ... 1000 Base-T(Gigabit Ethernet)
- ... 10G Base-T(10Gigabit Ethernet)
- ... FDDI
- ... ATM

4.2.9 Structured Cabling System Equipment

(a) Horizontal Cabling

The horizontal cabling shall cover the portion of the communication cabling that extends from the Work area (outlet/connector) to the patch panel as shown on the single line diagram.

Horizontal cabling shall run horizontally along the floors and/or ceilings of the building and shall include conduits, trays, wires, cables and necessary accessories for constructing complete network.

Horizontal cabling shall comprise of CAT 7 4 pair UTP cables approved by the service provider, wired in a star arrangement between RJ45 outlets and back to the data cabinet's patch panel.

All conductors in each cable should be connected to a single RJ45 socket at the work area outlets and patch panel. Each cable should be terminated to maintain the twists in each pair up to within 5mm of the termination. Proper strain relief should be provided for the cable at the outlets and patch panel, avoiding strain on the conductors. Numbering and colouring of the pairs should be as defined in EIA/TIA 568B, ISO 11801 / EN50173.

The number of CAT 7 UTP 4 pair cables to be installed between the work area outlets and the floor data cabinet, shall be in accordance with guidelines. The total installed length of cables from the floor cabinet to the furthest outlet point shall be less than 90 metres overall length including any necessary interleaving and patch cords.

Horizontal cabling shall consist of but not limited to the following:

UTP Cable:

- ... Category 7 unshielded twisted-pair cable (UTP)
- ... The horizontal UTP cable shall have a flame-retardant PVC jacket.
- ... Max distance between the active component and the devices shall not exceed 90 m.
- ... The horizontal UTP cable shall have conductors physically bonded as pairs to allow fixed and stable conductor-to-conductor centricity.
- ... The horizontal UTP cable shall have a maximum conductor DCR =77 Ohms/KM at 20°C.
- ... The horizontal UTP cable shall have a nominal mutual capacitance of 50 nF/KM at 20°C.

- ... The horizontal UTP cable shall have a propagation delay (Skew) of 15 ns/100 m.
- ... The horizontal UTP cable shall have a maximum operating voltage of 48 V RMS.
- ... The horizontal UTP cable shall have a nominal velocity of propagation (NVP) =0.70c
- ... The pulling tension shall not exceed 80 N for a 4-pair UTP cable.
- ... The horizontal UTP cable shall have a mean characteristic Impedance 4 -100 Mhz = 100 ±5 Ohm
- ... Temperature rating
- ... Operation -20° C. - +60° C.
- ... Installation +0° C. - +50° C.

(b) Patching

Specified number of UTP cables should be pulled from each IDF/CP and terminated on CAT7 RJ45 Patch Panels in the MDF Data services can be fed from the modular network equipment direct to the user outlet patch frame using standard 4 Pair Patch Cords.

(c) UTP Patch Panel:

The Copper Cables will be terminated on Category 7 Unshielded Patch Panels. A Patch Cord Management unit to offer easy administration shall also accompany every patch panel.

- ... The patch panels shall be 19" rack mounting, 1U in height.
- ... Cable termination must be LSA or 110 Insulation Displacement Connectors.
- ... Front connectors to be RJ45 style IEC 60603-7-4/5.
- ... Electrical performance to be Category 7.
- ... UTP patch panel system shall provide a Category 7 centralized, rack-mounted termination, identification and service assignment point for UTP horizontal, backbone and equipment cabling at the horizontal or main cross connect using modular cord assemblies.
- ... The UTP patch panel shall be available in 12-24- and 48-port configurations for greater design flexibility and optimization of rack installation
- ... The UTP patch panel shall be compatible with standard 19" equipment racks, cabinets or wall-mount brackets.
- ... The UTP patch panel shall have an integrated rear cable management bar that can be positioned at different heights to accommodate any installation need.
- ... The UTP patch panel shall have all ports numbered on the front and back of the panel.
- ... The UTP patch panel shall have large front labelling space to facilitate custom port identification.
- ... The UTP patch panel shall have openings for color-coded icons.

- ... The connection module shall be backward compatible with category 6a.
- ... The connection module shall be based on the encapsulated lead frame technology providing long term reliability and stability.
- ... The connection module shall allow termination of both T568A and T568B wiring configurations.
- ... The connection module used in the rack-mount UTP cross-connect/interconnect system shall be made of fire-retardant UL 94V-0 plastic.
- ... The connection module used shall have an insulation displacement connection featuring insulation-slicing, tin-plated clips, forming a gas-tight connection.
- ... The connection module shall have a contact resistance of 1 mΩ per contact.
- ... The connection module shall have a durability rating of 10 insertions of any combination of 22 to 24 AWG wire.
- ... The jack in the connection module shall be FCC Part 68, Subpart F and IEC 603-7 compliant.
- ... The durability of the IDC termination on the connection module shall be 1000 mating cycles.
- ... The contact material of the IDC termination on the connection module shall be phosphor bronze, plated with 50 micro-inches of gold over nickel.
- ... The maximum current rating of the IDC termination on the connection module shall be 1.5 amperes.
- ... The dielectric strength of the IDC termination on the connection module shall be 1000V RMS at 50 HZ for one minute.
- ... The minimum insulation resistance of the IDC termination on the connection module shall be 200 MΩ.

(d) UTP RJ 45 Patch Cords:

- ... The contractor shall provide factory terminated and tested UTP and optical fibre patch cords and equipment cords for the complete cabling system. The UTP patch cables shall meet the requirements of ANSI/TIA/EIA-568-B.2-1 for patch cord testing.
- ... Category 7 modular patch cords shall meet these requirements:
- ... The modular cord cable jacket shall be printed at two-foot intervals indicating cable code and AWG.
- ... The modular cord cable shall be 4-pair, with 23 AWG solid copper conductors.
- ... The modular plug shall meet the requirements of the ANSI/TIA/EIA-568-B.2-1.
- ... The modular plug shall meet the requirements of the latest issue of ISO/IEC 11801.
- ... The modular plug shall meet the requirements of the latest issue of FCC Part 68, part F.
- ... The modular plug shall meet the requirements of the latest issue of IEC 603-7:1990.
- ... The modular plug shall have a maximum voltage rating of 150V AC.

- ... The modular plug shall have a minimum dielectric strength of 1000 Ω RMS at 50 HZ for one minute.
- ... The modular plug minimum insulation resistance shall be 500 M Ω .
- ... The modular plug maximum contact resistance shall be 10 m Ω .
- ... The modular plug contacts shall be made of phosphor bronze.
- ... The modular plug contacts shall be plated with a minimum of 50 micro inches of gold over nickel.

(e) Work Areas outlets

The A 4-pair Cat 7 UTP cable terminated to a RJ45 unshielded modular jack for each Outlet marked in the drawing.
Colour of face plate to match with adjacent socket outlets to the approval of the Engineer.

(f) Labelling System

The Labelling shall be done for all cables on its both ends, all racks, all patch panels, every port in every patch panel, all devices, all the ports in every device, all outlets.

The Label Elements

All floor outlets, patch frames and horizontal cables should be labelled. The labelling scheme would follow a scheme to be agreed on with the Engineer.

Horizontal Cable Labels

Label all horizontal cables at both ends using a self-laminating, wrap around label.

User Outlet Labels

Each RJ45 user outlet should be labelled with a unique identifier, typically using the agreed scheme.: -

(g) Cabinets

Racks shall be used to house the patch panels, electronics and all management components

The racks shall be provided as indicated on drawings.

The Free-Standing Types (for TER/IDF) shall be:

- ... 42U 800mm wide x 800mm deep 19" equipment cabinet
- ... Glass front door with lock
- ... Bonded to a local earth point
- ... Closed rack style with sided covers
- ... Vertical cable organizers (filling factor shall not exceed 40%)
- ... Horizontal cable organizers (filling factor shall not exceed 40%)
- ... Blank plates
- ... Power strips
- ... All required accessories (screws, nuts, etc.)
- ... The Contractors shall submit a complete rack configuration showing every component including the components, which are not in scope of work (elevation and plan).

Wall Mounted Types (for ACPs) shall be:

- ... 6U/9U, 10" wiring/equipment cabinet
- ... 300mm wide x 260mm deep (useful depth 230mm minimum)
- ... Glass Front Door

(h) Incoming Service Ducts and Manholes:

Racks The containment system shall include all cable tray from the service providers point of entry to the building to the Main equipment room.

For the incoming services, provide uPVC ducts as shown on the drawings, from the service providers manhole to the point of entry, which shall be coordinated with the service provider and allow all provisions to comply with their external network and lead-in requirements.

Where shown on the drawings and also where so required to facilitate a bend in the route telephone manholes shall be constructed with appropriate service provider approved manhole accessories, covers etc to ensure that the duct route shall allow the simple and easy installation of backbone cables.

Nylon draw ropes (12mm dia) shall be installed in each duct for later installation of cables.

(i) Horizontal Containment:

The Contractor shall be responsible for ensuring that the telephone cable containment system trunking and/or conduit are continuous between every outlet point and the consolidation points, which shall be located as shown in the drawings.

The containment may be a combination of GI trunking run in the ceiling voids and concealed 25mm diameter heavy duty PVC conduits from the trunking in the ceiling voids dropping to the outlet locations outlets.

For all hospital Outlets shall be linked with conduit to the riser and then to the IDF/MDF on cable trays.

(j) Horizontal Containment:

The Contractor shall be responsible for ensuring that the telephone cable containment system trunking and/or conduit are continuous between every outlet point and the consolidation points, which shall be located as shown in the drawings.

The containment may be a combination of GI trunking run in the ceiling voids and concealed 25mm dia uPVC conduits from the trunking in the ceiling voids dropping to the outlet locations outlets.

For all hospital Outlets shall be linked with conduit to the riser and then to the IDF/MDF on cable trays.

(k) Vertical Containment (Cable Tray Riser):

The Cable trays shall be provided in the risers as shown on the drawings to support the backbone cables between the MDF and IDF rooms, and the horizontal cables from the IDF rooms to the consolidation points.

Riser cable trays shall be galvanised steel heavy-duty deep sided (min 50mm) return flange supported on galvanised steel 'U' channels. Tray width dimensions shall be as shown on the drawings and coordinated with the telecommunications service provider, prior to order and installation. Allow for trays as shown on the plan layouts to vertically connect all floors.

Cable trays shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular tray type or 40%.

(l) Vertical Backbone Cabling:

Backbone cabling system (subsystems 2 and 3 according to TIA/EIA 568 C.0) shall provide interconnections between Main Distribution Frame and Local Distribution Frame in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects mechanical terminations and patch cords or jumpers used for backbone-to-backbone cross-connection.

All the IDF's shall be linked to the MDF via 12 Core Fibre Optic Multimode Indoor Cable OM5. The specialist contractor shall coordinate with the service provider the supply and installation of the backbone cables to the Main Distribution Frames (MDF).

All Fibre cables shall be terminated using Small Form Factor (SFF) LC Connectors using the direct epoxy and polish method in accordance with the telecommunications service provider's regulations

General Performance: Backbone cabling system shall comply with transmission standards in TIA/EIA-568-C.0 or CENELEC EN 50173, when tested according to test procedures of this standard.

(m) Fibre Optic Cable:

Description: Multi-mode optical fibre with 12 fibres, OM5 type 50/125, with fibre counts as indicated on drawings, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA/EIA-568-C.3.

- Comply with ISO/IEC 11801.
- Comply with TIA/EIA-598-C.0 and 568-C.3.
- Fibre optic distribution cable, suitable for backbone applications.
- Listed and labelled: Communications, Type LSZH.
- For the fibre ties inside the DC use pre-terminated fibre optic assemblies.

(n) Fibre Optic Patch Cords

Contractor shall include patch cords duplex single-mode fibre for 25% of single-mode strands installed in each room and unit pricing for additional cords.

Part 3 Execution

4.2.10 Entrance Facilities

The contractor shall coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

4.2.11 Wiring Methods

- a) Wiring Method: Install cables in pathways and cable trays except within cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal pathways and cables except in unfinished spaces.
 - Install plenum cable in environmental air spaces, including plenum ceilings.
- b) Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- c) Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

4.2.12 Installation of Pathways

- a) Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-B.
- b) Comply with requirements for demarcation point, pathways, cabinets, and racks as specified; Drawings indicate general arrangement of pathways and fittings.
- c) Comply with TIA/EIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.

4.2.13 Installation of Cables

- a) Comply with CENELEC EN 50174.
- b) General Requirements for Cabling:
 - ... Comply with TIA/EIA-568-C.0.
 - ... Comply with BICSI ITSIM, Ch. 6 "Cable Termination Practices".
 - ... Install 110-style IDC termination hardware for copper cables unless otherwise indicated.
 - ... Terminate all conductors; no cable shall contain un-terminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - ... Cables may not be spliced. Secure and support cables at intervals not exceeding 750 mm and not more than 150 mm from cabinets, boxes, fittings, outlets, racks, frames and terminals.
 - ... Install lacing bars to restrain cables, to prevent straining connections and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
 - ... Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
 - ... Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - ... In the communications spaces, install a 3 m long service loop on each end of cable.
 - ... Pulling Cable: Comply with BICSI ITSIM, Ch. 4 "Pulling Cable". Monitor cable pull tensions.
- c) UTP Cable Installation:
 - ... Comply with TIA/EIA-568-C.0 or CENELEC EN 50174-1,2,3.
 - ... Do not untwist UTP cables more than 12 mm from the point of termination to maintain cable geometry. Comply with BICSI ITSIM, Ch. 6 "Cable Termination Practices".
- d) Fibre Optic Cable Installation:
 - ... Comply with TIA/EIA-568-C.0 and BS EN 50173-1.
 - ... Do not exceed minimum bend radius recommended by the manufacturer at all times.
 - ... Use inner duct at any times the fibre cables are mixed with other media type in the same pathway.
 - ... Field measure the fibre optic assemblies required in DC and allow 3 m of slack at each end.
- e) Open-Cable Installation:
 - ... Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - ... Suspend UTP cable not in a wire way or pathway, a minimum of 200 mm above ceilings by cable supports not more than 1500 mm apart.

- ... Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- f) Separation from EMI Sources:
 - ... Comply with BICSI TDMM and TIA/EIA-569-A and IEC/CISPR 22 recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 - ... Separation between open communications cables or cables in non-metallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - (Electrical Equipment Rating Less Than 2 kVA: A minimum of 130 mm).
 - Electrical Equipment Rating between 2 and 5 kVA: A minimum of 300 mm.
 - Electrical Equipment Rating More Than 5 kVA: A minimum of 600 mm.
 - ... Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - Electrical Equipment Rating Less Than 2 kVA: A minimum of 65 mm.
 - Electrical Equipment Rating between 2 and 5 kVA: A minimum of 150 mm.
 - Electrical Equipment Rating More Than 5 kVA: A minimum of 300 mm.
 - ... Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - (Electrical Equipment Rating between 2 and 5 kVA: A minimum of 75 mm.
 - Electrical Equipment Rating More Than 5 kVA: A minimum of 150 mm.
 - Separation between Communications Cables and Electrical Motors and Transformers, 5kVA or HP and Larger: A minimum of 1200 mm.
 - Separation between Communications Cables and Fluorescent Fixtures: A minimum of 130

4.2.14 Firestopping

- a) Comply with requirements in Division 07 Section "Penetration Fire stopping". Comply with TIA/EIA-569-AB, Annex "Fire stopping."
- b) Comply with BICSI TDMM, "Fire stopping Systems" Article.

4.2.15 Grounding

- a) Install grounding according to CENELEC EN 50310 application of equipotential bonding and earthing in buildings with information technology, and BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- b) Comply with ANSI-J-STD-607-A.
- c) Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 50 mm clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- d) Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

4.2.16 Identification

- a) Identify system components, wiring, and cabling complying with CENELEC EN 50144-1 or TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems".
 - Administration Class: 2
 - Colour-code cross-connect fields and apply colours to voice and data service backboards, connections, covers and labels.
- b) Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire resistant plywood, do not paint over manufacturer's label.
- c) See Evaluations for discussion about TIA/EIA standard as it applies to this Section. Paint and label colours for equipment identification shall comply with TIA/EIA-606-A for Class 3 level of administration, including optional identification requirements of this standard.
- d) Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- e) Cabling Administration Drawings: Show building floor plans with cabling administration-point labelling. Identify labelling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
- f) Cable and Wire Identification:
 - Label each cable within 100 mm of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - Each wire connected to building-mounted devices is not required to be numbered at device if colour of wire is consistent with associated wire connected and numbered within panel or cabinet.
 - Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 4.5 m.
 - Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - - Individually number the wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device with name and number of particular device.
 - Label each unit and field within distribution racks and frames.
 - Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware.
- g) Labels shall be pre-printed or computer-printed type with printing area and font colour that contrasts with cable jacket colour but still complies with requirements in TIA/EIA 606-A, for the following:
 - Cables use flexible vinyl or polyester that flexes as cables are bent.

4.2.17 Site Quality Control

1. Tests and Inspections:

- a) Identify Visually inspect copper cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with colour-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-C.2.
- b) Visually confirm Category 7, marking of outlets, cover plates, outlet/connectors, and patch panels.
- c) Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labelling of all components.
- d) Test copper backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
- e) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.2.
 - Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- f) Copper cables Performance Tests:
 - Perform the following tests according to TIA/EIA-568-C.2 for Cat 6A cables:
 - I. Wire map
 - II. Length (physical vs. electrical, and length requirements)
 - III. Insertion loss
 - IV. Near-end crosstalk (NEXT) loss
 - V. Power sum alien near-end crosstalk (PSANEXT) loss
 - VI. Attenuation crosstalk ratio- far end (ACRF)
 - VII. Power sum A (PCACRF)
 - VIII. Power sum alien ACRF (PSAACRF)
 - IX. Transverse conversion loss (TCL)
 - X. Transverse conversion transfer loss (TCTL)
 - XI. Propagation delay
 - XII. Propagation delay skew
 - In addition, for the screened cables perform the following in accordance with TIA/EIA 568-C.2, Annex K:
 - I. DC and AC resistance correlation
 - II. Open shield test
 - III. Measurement of shield verification.
- g) Fibre Optic Performance Tests:
 - Test fibre optic cable in accordance with TIA/EIA-568-C.3.
- h) Final Verification Tests: Perform verification tests for copper systems after the complete communications cabling and workstation outlet/connectors are installed.
 - Voice Tests: These tests assume that dial tone service has been installed Connect to the network interface device at the demarcation point. Go off-hook

and listen and receive a dial tone. If a test number is available, make and receive a local, long distance and digital subscription line telephone call.

- Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.
2. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
 3. Prepare test and inspection reports.

4.2.18 Demonstration

1. Engage a factory-authorized service representative to train Users' maintenance personnel in cable plant management operations, including moves, additions and changes, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets

4.3 IP Closed Circuit Television (CCTV) & Surveillance System

Part 1 General

4.3.0 Scope of Work and performance objectives

Design, supply, install, test and commission an integrated IP Security/ Access Control/ Video Surveillance (CCTV) system based on an open protocol communication network.

The Video Surveillance system shall provide high resolution digital visual images from the CCTV cameras monitoring strategic areas of the building, through the communications network to the monitoring/recording equipment in the security operations room as shown on the drawings. The CCTV cameras shall be controlled by a Network video recorder (NVR) and monitors located in the security operations room and with desktop CCTV monitoring from selected workstations.

A security monitoring and access control system shall allow controlled entry to each building.

System should facilitate viewing of HD live streaming video and recorded images and controlling of all cameras by the authorized users present in the LAN.

System should provide inter-operability of hardware, OS, software, networking, printing, database connectivity, reporting, and communication protocols. System expansion should be possible through off-the-shelf available hardware. To ensure compatibility with several manufacturers, the system shall be ONVIF compliant.

The contractor shall provide all necessary containment, active and passive equipment, cabling and power supplies for the whole system, which shall include such items or details as testing, adjusting, identification of equipment, training and manuals for operation and manufacture of this system.

4.3.1 Security Zones

The entire hospital and surrounding outdoor areas will have continuous CCTV coverage. Blind spots will be minimized as far as possible; however, this may not always be practical depending on building geometry and obstacles.

To optimize the balance between image quality and storage requirements of the CCTV system, critical areas will receive more detailed coverage while a broad overview with less detail will be sufficient for all non-critical areas. This means that facial identification may not always be possible in every area of the facility. However, the CCTV coverage will be sufficiently continuous in most cases to ensure that persons can be traced back to areas with more detailed coverage where facial identification is possible.

Parcels will be visible throughout the hospital and can be visually traced from point of entry to point of exit.

4.3.2 System Design

The CCTV system will run off dedicated Network Video Recorders (NVRs) in the server room. The servers will connect to all cameras through an IP-based network. The IP network will comprise a copper or fibre backbone which links the server to dedicated Power over Ethernet (PoE) switches located at the various wiring closets throughout the facility. Cat7 copper cable will link these PoE switches to all cameras.

The CCTV shall run off its own virtual LAN, but physical network infrastructure shall be shared with other services including corporate network traffic, Hospital Information Management System, access control, VOIP telecommunication services, etc.

Communication between all CCTV equipment shall be encrypted using at least 128-bit encryption algorithms.

The intent of this specification is to provide the owner with an integrated networked security system. Supplied by the contractor, the security video system shall be complete and operational per the performance requirements and objectives of these specifications. The contractor shall be

responsible for the coordination of related work with other trades affecting his/her work or the work of others.

4.3.3 System Description

The security video system shall be an IP network-based, fully Integrated Surveillance system. The security video system will utilize local area networks (LAN) as a transmission medium for video, configuration, as well as storage of all data. The security video system shall provide full video control at the control room, with additional full-selection capability at any point within the network from a workstation or a video console. The security video system shall provide unlimited expansion capability for the addition or modification of video inputs.

The contractor shall furnish and install all security video cameras, mounts, housings, power supply systems, coaxial cable, network cables, connectors, equipment racks, monitors and consoles, computer-controlled network switchers, work stations, network storage managers, video encoders, video decoders, video consoles and keyboards, and all other hardware and software to provide a fully operational system.

The security video system shall permit normal and event monitoring of all secured areas on digital monitors as required or shown in the specifications and drawings. Video monitoring consoles shall be installed at the control room, as described in these specifications. In all cases, the equipment shall be state of the art, standardized commercial off-the-shelf, and modular. In all cases, the method of communication from remote locations within the network to the central components shall be transparent to the user. Equipment shall be selected and installed so repairs can be accomplished on site by module replacement, using spare components whenever possible.

4.3.4 Quality Assurance

A. Manufacturer Qualifications:

Manufacturing firms of the CCTV shall be regularly engaged in manufacturing of CCTV system of type, size and characteristics similar to those required for the project and whose products have been in satisfactory service in similar projects for not less than ten years.

B. Supplier qualifications:

Engage an experienced installer who is a factory authorized sales and service representative to perform the work of this section.

The installer firm shall have at least ten years of successful installation experience of CCTV. Systems similar to that required for this project and shall provide full support during system installation and configuration to guarantee proper system operation. Supplier shall provide all needed software required during installation.

C. Training:

Equipment manufacturer and his authorized local representative shall provide, in depth equipment service and programming on site training to selected employer's personnel as required.

Part 2 Products

4.3.5 General

All products and shall comply with local and relevant international standards including but not limited to the following.

Kenya Bureau of Standards (KBS)
Institution of Electrical Engineers (I.E.E) Wiring Regulations
Relevant British Standards, current edition including the following:
BS 4737-1.
BS 4737-2.
BS 4737-3.
BS 6799.
BS 6800.
BS 7042.
BS 7150
BS 7230.
BS EN 50131
BS EN 50132.
BS EN 50134-1.
BS EN 50134-2.
BS EN 50134-3.
BS EN 50134-7.
BS EN 50136.

The management and control for the system shall be fully digital. All the system equipment shall be matching and operating all together as on system

The NVR (Network Video Recorder) shall provide digital and high-resolution IP camera support, outstanding video compression and storage, and Video Visual Intelligence applications for superior surveillance and operational efficiency.

The systems shall allow for future extension in number of cameras, storage and monitors

Sensitivity of cameras shall fit for clear reproduction of pictures in maximum and minimum light intensity conditions of each location.

Outdoor cameras shall be equipped with full environmental protection enclosures

4.3.6 System Operation

The CCTV system shall display live colour video footage for security and operations surveillance in areas indicated on drawings

The operator shall have the facility to record scenes from any camera for periods up to 24Hrs per day for 6 Months. Vender shall provide storage calculation criteria and this shall be approved by the engineer depending on the following criteria:

30 fps@ Highest resolution, Motion detection recording 24Hrs/ Day

The operator shall have the facility to select, observe, control and record any of the working cameras.

All cameras shall be CCD auto-iris or CCD with auto iris-lens sensor. And equipped with back light compensation (BLC), wide dynamic range (WDR) also shall be supplied by 12/24 VDC

Lens shall be selected vary focal and auto iris to provide the required field of vision according to location as indicated on the drawings.

Monitoring stations of the system shall be supplied from the project secured source to ensure uninterrupted operation in case of supply failure

Output signals from cameras, loss in cables and gain of the amplifiers, if necessary, are all of the responsibility of the Supplier so as to be in accordance with the manufacturer standards, and shall match the signal equipment to overcome attenuation in cables shall provide sufficient strength of video and data signals.

System shall be connected via network to centralized management software installed at security control room and shall provide all local features implemented on site.

Remote management software features shall include but not limited to live viewing, recording, retrieve recorded data, setup and Hardware monitoring.

4.3.7 Equipment and Materials

The CCTV system shall display live colour video footage for security and operations surveillance in areas indicated on drawings

(a) IP Dome Camera

1. General requirements

The camera shall conform to the following requirements:

- The cameras shall be designed to provide HD quality images via H.264 compression up to 30 fps without compromising other features or performance
- The cameras must fully integrate to manufacturers NVR and VMS solutions as well as offer integration to other 3rd party network recording solutions.
- The camera shall be part of the manufacturer's own family of IP cameras and designed for 24 hour/7 day/365-day application use.

2. Certifications and Regulatory

The IP CCTV camera shall comply with the following:

- CE – EMC Directive 2004/108/EC, Standards EN55022, EN55024, EN50130-4
- FCC Part 15 Subpart B, ICES-003
- UL 60950-1
- RoHS Directive (2002/95/EC)
- C-tick

(b) Product

1. Functionality

- The CCTV cameras shall encode H.264 and MJPEG streams simultaneously at different resolution and capture rates in real time at high video levels and low bit rates. The possible stream options shall be as follows:
 - ... Single H.264 stream
 - ... Single MJPEG stream
 - ... Simultaneous H.264 and MJPEG streams
 - ... Two simultaneous H.264 streams
- The camera shall have low, medium and high-quality settings for MJPEG streams.
- The cameras shall have options to provide progressive scan video in the following resolution formats:
 - ... QCIF (176 x 144 pixels)
 - ... CIF (352 x 288 pixels)

- ... D1 (720 x 576 pixels).
 - ... 720p (1280 x 720 pixels)
 - ... HD (1440 x 1080 pixels)
- The cameras shall provide the image detail listed above at capture rates of up to 30 Frames per Second (FPS). Other possible settings shall be 25, 15, 12, 10, 8, 5, or 4FPS.
 - The cameras shall support a Power over Ethernet (POE) Class 2 interface.
 - The cameras shall offer an integrated industry-standard SDHC memory card slot for local back-up of limited amounts of video and audio. SDHC recording options shall consist of continuous or motion-based recording. The cameras when used with integrated VMS solution shall offer a Shadow Archiving feature such that the video recorded on the SDHC card is accessible directly from compatible client software. In addition, recorded video and audio can be recalled via the cameras integrated web browser.
 - The cameras shall offer the ability to record directly to a NAS device independent of primary recording for applications requiring full redundancy. Video from the NAS shall be accessible via compatible client software. The cameras when used with integrated VMS solution shall offer a Shadow Archiving feature such that the video recorded on the NAS device is accessible directly from compatible client software.
 - The cameras shall have programmable username and password protection for enhanced security.
 - The cameras shall support RTP/RTSP protocol for integration to third party solutions for viewing and recording video.
 - The cameras shall offer up to 16 Privacy zones when used with manufacturer's VMS solution.
 - The cameras shall provide options to remotely program any of the following features via an integrated web browser interface:
 - ... Anti-Flicker
 - ... Video Color Style
 - ... DC Iris
 - ... Auto Exposure
 - ... Shutter Time
 - ... Global Gain
 - ... Auto White Balance
 - ... WB Red Gain
 - ... WB Green Gain
 - ... WB Blue Gain
 - ... Image Adjust
 - ... Brightness
 - ... Contrast
 - ... Saturation
 - ... Hue
 - ... Black White
 - ... Day/Night (electronic)
 - ... Mirror Mode
 - ... Frame Rate Base
 - The cameras shall be able to be set to detect motion and trigger alarms based upon programmable Sensitivity and Threshold settings.

2. Imager

- The camera shall utilize a 1/2.5" format, CMOS Progressive Scan Imager.
- The camera shall provide a Dynamic Range no less than 70.1dB.
- The camera shall provide light sensitivity less than 0.08 lux for operation in low light conditions.

3. Network Communications

The camera shall have robust IP networking features, in line with IT management team expectations. These features shall include the following:

- The camera shall operate using either DHCP or static IP addressing. If using DHCP addressing, client software must be able to connect to the camera using its new address without any action on the part of the user.
- The camera shall offer bandwidth limiting such that video data traffic on the network will not exceed a pre-set maximum when distributing live video or delivering recorded video.
- The camera shall offer communication protection using HTTPS encryption for camera configuration and password entry.
- The camera shall support the additional following protocols: RTP/RTSP, IPv4, HTTP, TCP, UDP, RTCP, ARP

4. Remote Access

- The camera parameters shall be programmed directly on the device via an integrated HTML web page. Settings such as video capture rates, compression formats, network streaming rates and more shall be controlled in this manner. The web page shall have a video window to display results of menu changes after they have been applied.
- The cameras shall have the ability to stream video in real time, with no appreciable delay or quality reduction other than limitations in the underlying network.
- The camera shall have the ability to offer a virtual (digital) zoom capability of up to 50% magnification.
- The cameras shall support the integration of video and bi-directional audio streams, enabling personnel at the central facility to communicate in real-time with persons at any remote site equipped for this type of interaction
- Alarms shall be triggered by the detection of motion within an area of a camera view.

5. Mechanical

- The camera shall have a compact industrial design aluminium casing.
- The overall dimensions (without lens) shall be no greater than 2.25" H x 2.12" W x 3.6" D (5.7cm H x 5.4cm W x 9.2cm D)
- The camera shall offer a CS type lens mount
- The camera shall have removable shoe to mount a 1/4" x 2 thread on either top or bottom
- The camera shall be light weight and weigh no more than 1.1 lb (0.5 kg)

6) Electrical

- The camera shall be powered from either a POE Class 2 device or 12VDC \pm 20%
- The camera shall have a power consumption less than 4

7) Environmental

- The camera shall have an operating temperature of 32 to 122°F or 0 to 50°C
- The camera shall have a Relative Humidity of 8-90 % non-condensing

8) Software Development Kit (SDK)

The camera shall also offer a comprehensive Software Development Kit (SDK) that shall provide for the integration to third party security and application solutions. This SDK shall have the following characteristics:

- The SDK shall provide a comprehensive set of industry-standard ActiveX controls for broad third-party application development and system integration.
- Interfaces to a number of third-party systems shall have already been developed and maintained (using this SDK or otherwise), and these integrations shall be available to new customers as appropriate.
- For new application integration, the SDK shall enable application access to view and program cameras.
- The SDK shall enable application access to audio streams in addition to video data.

(c) Indoor Fixed/ Dome CCTV. Camera

700TVL Min. 50 HZ, Colour CCTV camera for indoor use, AC operates and supplied through special AC adapter, equipped for C/CS lens mount, having interline transfer 1/3" CCD solid state Images.

The cameras shall have the following minimum characteristics:

- 1- Day/Night, colour/black-white Automatic or manual operation
- 2- Image device sensor CCD type 1/3" colour
- 3- TV standard: PAL 625 lines 30 Frame per second
- 4- Resolution: 700TVL Min. (horizontal)
- 5- Sensitivity: 0.5lux max (colour mode) 0.01 (B-W mode)
- 6- Video out: BNC 1V P.P at 75/OHM
- 7- Digital signal processing
- 8- Synchronization AC line lock with phase adjustment
- 9- Shuttering control
- 10- AGC
- 11- SNR
- 12- BLC
- 13- Ambient conditions -5 to 55 C , 95% RH
- 14- Vary focal lens 3.6-8mm

Camera Housing: the camera shall be housed in an enclosure suits the size of the camera including the lens and shall be tamper proof. The housing shall be according to camera type, ceiling mounted fixed dome to achieve camera hiding.

Camera support: rated for load in excess to the total weight with sufficient safety factor and shall be used for wall or ceiling applications.

(d) Outdoor fixed CCTV cameras:

Outdoor fixed camera shall be as indoor fixed camera but shall be housed in outdoor weatherproof housing. Anti-vandalism camera with same specification accepted. Camera to be equipped with 12DC power supply which shall be supplied and included with this offer

The cameras housing shall provide full protection form environmental condition (dust, sun, rain, temperature, etc.) and shall include sun hood, automatic fan and shall house all attached accessories of the cameras including the lens.

Housing shall not cause any loss in quality or sensitivity of pictures

The camera housing shall have the following minimum characteristics:

- 1- Day/Night, colour/black-white Automatic or manual operation
- 2- Image device sensor CCD type 1/3" colour
- 3- TV standard: PAL 625 lines 30 Frame per second
- 4- Resolution: 700TVL Min. (horizontal)
- 5- Sensitivity: 0.5lux max (colour mode) 0.01 (B-W mode)
- 6- Video out: BNC 1V P.P at 75/OHM
- 7- Digital signal processing
- 8- Synchronization AC line lock with phase adjustment
- 9- Shuttering control
- 10- AGC
- 11- SNR
- 12- BLC
- 13- Ambient conditions -5 to 55 C , 95% RH
- 14- Vary focal lens 3.6-8mm
- 15- power supply for the housing and for the camera
- 16- heater
- 17- blower
- 18- Sunshield option in cases of sunny areas
- 19- tamper proof with locking system

(e) Network Video Recorder - NVR:

A. NVR Unit Characteristics

Combined with Visual Intelligence Software, the NVR unit shall have the following characteristics:

1. The system shall be a networked device purpose built exclusively for the capture and processing of digital video and supporting alarm, storage and other services. The system shall not be based on generic industry PC components and architectures.

2. The recorder shall be part of a family of hybrid recorders consisting of 128, 64, 32, 16, 8, and 4 channel variants etc.
3. The NVR platform shall have an option use docking station architecture, marrying a removable 2U-high NVR chassis (containing all system and video processing and storage components) with a fixed housing capable of mounting in a standard 19" equipment rack and accepting power, camera, network and other wiring connections.
4. The NVR platform shall have the option of using a rack shelf or desk top.
5. All of the NVR platforms shall also have the option of being mounted on a wall using optional wall mount kits. The channel recorders shall further have an option for concealing the cabling using a tamper proof cover.
6. The NVR shall employ an embedded Linux operating system, housed in flash memory and capable of being upgraded remotely if needed, such that no system software shall be stored on hard-drive media, and the operating environment shall be more robust and immune to virus and illicit attack than other common operating systems. At the client desktop, however, all software applications shall support the latest Windows® operating environments.
7. The NVR shall provide for choice when selecting a software interface for either an integrated browser-based client or a tasked based suite of installable clients.
8. Once a software interface has been selected, the NVR shall employ a common software interface regardless of the model selected. This will yield consistent user training materials, documentation and system interaction.
9. The NVR shall provide 'hybrid' architecture, capable of supporting traditional analogue cameras in the quantities shown below as well as a number of IP cameras (see below) to increase the aggregate camera support, provide high-resolution video capture in critical customer areas, and allow migration to this new camera technology according to customer need.

B. NVR Unit Configuration

The NVR unit shall be available in the following configuration common across all models:

1. The 128 and 64 channel units shall support 32 alarm inputs and 16 switch outputs. The 32 and 16 channel units shall support 8 alarm inputs and 4 switch outputs
2. 1 RS-232 ports,(all models), 1 RS-485,(128 and 64 channel units only) ports for integrating banking ATM/Teller transaction or retail POS transaction capture information and PTZ camera controllers, and 4 USB 2.0 (excluding 4 channel unit, which will support 2 USB 2.0 ports) data port for connecting keyboard, mouse, or external media for export purposes
3. 1 RJ-45 Gigabit Ethernet network connection for LAN-based system access and management
4. 1 RJ-45 Gigabit Ethernet network connection for connecting IP cameras and encoders on a network separate from the corporate LAN
5. The 128 and 64 channel units shall support up to 16 Hot Swap HDD Capacity 128TB. All drives shall be high-capacity, SATA hard disk drives, supporting up to 8TB each. All drives shall be mounted for easy servicing.
6. internal back-up battery for filtering out power fluctuations.

7. The units shall support 2U-high docking-station chassis for simple mounting and servicing in a standard 19" equipment rack or a 2U-high desk top chassis if rack mounting is not required.
8. 16/8/4 BNC video inputs, dependent on model, (with software-controlled loop-through capability) able to accept NTSC or PAL composite signals
9. The NVR units shall support 1 composite video output (NTSC or PAL) capable of displaying both analogue and IP cameras in a programmable sequence.
10. The units shall support 1 HDMI video output capable of displaying both analogue and IP cameras in a high definition user interface for live display and archive searching.
11. 240 or 480 frame-per-second (FPS) aggregate video capture for the analogue inputs (based on the model selected), supporting CIF and 4CIF video format
12. Depending on the model selected, the total bandwidth available for IP cameras shall be minimum 384 Mbps Encoding Bit Rate.

C. Configuration and Viewing Applications

The Visual Intelligence configuration and viewing applications shall be compatible with the latest version of Windows®. Each application shall be installed from a CD using an automatic installation program. All applications shall have similar interfaces in order to reduce learning time, and shall operate consistently across all members of the NVR product family.

The Command Enterprise configuration and viewing applications shall be compatible with the latest version of Windows® or MAC O/S. The integrated application shall be installed on the Command Enterprise server from a CD using an automatic installation program. Once installed on the Command Enterprise server, the application can be accessed by any operator on the network via a supported browser.:

D. Operation Concept

1. The NVR unit shall capture, digitize and compress video (using industry-standard H.264 video compression technology and multi-level encoding to further optimize transmitted and stored video) and, if desired, accompanying audio signals on all enabled inputs. Once compressed, the unit shall either distribute the compressed data to any number of authorized users requesting the data over either of the unit's network ports from one of the supported application interfaces.
2. In parallel, the unit shall also store all compressed data to the available internal hard disk drive(s). These internal drives shall be expandable by the user, from a single drive configuration through to 4 high-capacity drives for extensive in-system storage. This in-system storage shall be capable of being set up in an offset mirrored configuration where 1 drive can be mirrored with up to 3 drives.
3. Internal system storage shall take advantage of Intelligent Video Archiving and Retention technology that uses the concept of retention rather than recording. A retention-based system captures, by default, video from all connected cameras at the highest per-camera frame rates available on the unit (based on model selected), and providing always-on high quality recording on all cameras in keeping with the FBI/Scientific Working Group on Image Technology [SWGIT] recommendations. The user shall then be able to set up rules to determine when the retained video is to be removed from the recorder and which video is to be retained.
4. After all of the attached storage has been filled, video of potential interest (e.g., motion video, alarm video, retail or financial transaction video) is reviewed according to the set rules and if tagged, is moved into the Longer-Term Storage area. All other video is

removed and the disk space freed up by this 'thinning' process shall be available for new video storage. Beyond long-term storage, a further Extended-Term Storage area shall be available to further thin and retain critical video for an extended period of time.

5. At any time, selected video/audio data shall be available for export by users across the network to their PCs as well as through a USB-connected media storage device (e.g., USB memory stick or USB hard drive) at the NVR. This video shall be completely appropriate for use in evidentiary purposes, and shall include a security (authentication) seal for continuity purposes and an auto-run Evidence Reviewer' utility for playback and assessment by third parties such as law enforcement officials
6. The unit shall simultaneously handle recording, retrieving, and live distribution of video and audio. The unit shall operate in a continuous record mode, even if only event driven recordings, scheduled recordings or motion detection recordings are to be retained for longer periods of time. The unit must be capable of independent operation with network access and control, centralized management in conjunction with a number of other NVR units, or operation under the control of a centralized, enterprise-level suite of multiple-system management software.
7. The unit shall support operation in a local control mode where video can be viewed live and searched using only a mouse and a monitor connected to the HDMI connection. When operating in this mode, the unit does not have to be connected to a network except for the purpose of configuration of the unit. The local control interface shall support the export of video clips to USB connected media.

E. System Security

1. The unit shall be able to mount on a desktop, wall, or particularly for 32 and 16 channel units, inside a 19" equipment rack with a secure docking station, and have a removable but secured top cover such that the unit cannot be easily powered down or have the disk drive(s) accessed inappropriately.
2. Each NVR shall be deployed almost exclusively 'behind' an existing network security firewall, benefiting from the default virus protection software and encryption options of that equipment to prevent hacker attacks. In addition, the NVR shall be capable of existing securely on an unprotected network, thereby providing superior security performance relative to most other video systems available.
3. Each NVR shall use an embedded (in flash memory) Linux operating system, which is inherently more robust in architecture and less susceptible to virus and other "hacker" attacks than other operating systems. Each NVR shall minimize the number of access points for hackers to try and gain access to the unit or by which a virus may attack the unit. Communications with the NVR shall be very restricted, with most external ports being blocked and no way made available to open them. Communication between all entities in the system (client software, management server software, and NVRs) shall be encrypted using SSL encryption.
4. The NVR unit shall not share any known or unknown vulnerabilities associated with popular PC or computer operating systems. It shall achieve a C2 level of security. All TCP and UDP ports not required for use will be blocked thus ensuring that points of network attack will be minimized.
5. The NVR unit shall operate without the requirement for a keyboard, monitor or mouse - also known as 'headless' operation – instead being controlled across the network from authorized client PCs. As a result, no tampering shall be possible at the unit itself..
6. All analogue video shall be captured and transmitted to the NVR over coaxial cables, directly connected to the rear of the units. No interception of these video streams shall be possible without physically tapping into the specific cable inside the customer premises.

7. All IP-camera-based video shall be captured and transmitted to the NVR using the IP protocol. The NVR shall have the capability of connecting with the cameras either through a routed network or directly via the IP camera card.
8. The NVR unit shall allow for the use of password authentication to prevent unauthorized access to the NVR. Two levels of authentication shall be supported (user and administrator) when the NVR is managed in a peer-to-peer fashion. When the NVR is being managed by server-based management software, the system shall support a large number of users and user groups, as well as a rich set of privileges. In this enterprise configuration, external user authentication using an existing enterprise application shall also be supported, providing the net effect for users of 'single sign-on' or single authentication through their traditional system access utility.
9. The NVR shall ensure command and control data packets are encrypted for network transmission using SSL security technology NVR.
10. The system shall provide the ability to limit operator access to NVR resources. Administrators shall be able to manage user rights to a fine granularity of control, down to the level of access to the individual resource (for example, a single camera, audio channel, or data port).
11. The local or centralized system administrator shall be able to access all NVR units that are visible on the network, subject to each user's privilege level. Each individual NVR unit shall keep a log of any user access to the unit. The log shall be retrievable remotely by an administrator, but no user will be able to remove entries from the log. The log shall be maintained automatically by removing entries that are six months old. It shall be an option to copy and save the report to a text-formatted file for import into a third-party application. It shall be an option to print the report. These capabilities shall be scalable such that they will work seamlessly under the control of a centralized, enterprise-level suite of multiple-system management software.

F. System Management

All NVR units shall be capable of being managed locally or centrally over a TCP/IP LAN or WAN network, using individual system or enterprise-level management utilities. All systems shall be capable of being managed by a set of consistent user interface applications that operate consistently across all members of the NVR product family. The enterprise-level management application shall be capable of managing system programming, monitoring the health of the system in real-time, of upgrading the software on an NVR unit, synchronizing the time on an NVR unit, remotely managing an NVR unit, and more.

Reports on systems use, problems, and alarms shall be capable of being printed. Reports shall also be capable of being copied or saved for importing into third party applications.

G. Automated Configuration

As NVR units are added to the network, the NVR management application shall automatically detect their presence on the network to support rapid configuration and administration.

H. Reliability

1. The NVR shall use an embedded (in flash memory) Linux operating system, which is inherently more robust in architecture and reliability than other operating systems.
2. No NVR operating software shall reside on the NVR hard-drives, eliminating hard-drive failure as a reliability issue and allowing the unit to operate without any hard-drives present (e.g., in a video streaming application, or when utilizing external storage).
3. The NVR unit shall contain hardware and software watchdog circuitry that maximize fault-free operation. The central management application shall report all problems detected by

any NVR units on the network. The NVR configuration software shall continuously supervise the health of both the unit and the network, including dial-up extensions. The management utility shall periodically connect to all dial-up connected NVR units in order to ascertain the health of both the unit and the line/modem on which the unit is connected. An option to 'connect on demand' shall also be provided to support low-activity NVR deployments.

4. The NVR shall use SMART disk technology to provide real-time monitoring of all internal hard- disks, including diagnostics and health reporting, to provide further system reliability. The unit shall offer internal disk mirroring in a multi-drive configuration to further protect stored data.
5. The administrator shall control the level of problem reporting (thresholds) in order to ensure the reliability of the NVR and the equipment connected to the NVR unit, but also to manage the amount of communications consumed by this activity. The administrator shall be able to have notification of problems e-mailed to specific users.

I. Video Capture

1. The video compression protocol used by the NVR unit shall be H.264, which uses an inter- frame mechanism to assist in achieving the optimum compression.
2. The NVR shall have an aggregate capture rate of 240 or 480 fps (NTSC) or 200 or 400 fps (PAL) across its 4/8/16 analogue inputs, depending on the model selected. On all units, five (5) levels of compressed video quality shall be supported to balance desired video clarity against available hard drive storage.
3. Video capture rates shall be allocated in a flexible manner per camera, with different frame rate settings on each camera. Frame rates can be set anywhere from 1 fps up to 15 or 30 fps per camera input, respecting the limit of the model selected.
4. Per-camera video capture rates shall have the option of being increased (to the maximum available based on system capability) on alarm or event triggering (i.e., detection of motion, activation of a panic alarm button, etc.)
5. The NVR shall be capable of capturing and distributing video at high frame rates while storing at a lower frame rate or vice versa. Display resolutions shall be: NTSC - CIF (352 x 240 pixels), and 4CIF (704 x 480 pixels); PAL –CIF (352 x 288), and 4CIF (704 x 576).

J. Video Loss Detection

The NVR unit shall constantly supervise all enabled video inputs for a synchronization signal and, if enabled, notify the administrator of signal loss. Video sync loss detection shall be filtered to ensure that brief interruptions are masked and problem cameras do not generate excess alarms.

K. Field of View Monitoring

Using video analytic capabilities, the NVR unit shall also provide camera obstruction detection and scene change detection. Both applications will offer user-programmable learning parameters, and alert thresholds, and can be used together or independently.

L. Video Output

The NVR unit shall have looping video inputs plus a single video output (excludes video output on 4 channel unit) which is capable of displaying video from selected camera inputs in a sequenced display application, with a programmable dwell sequence being available for each display. This sequence shall be interruptible in order to display specific video related to an event (i.e., alarm trigger) on the NVR unit, and shall return to the pre-set sequence once that event has been completed.

M. Storage

1. The 128 and 64 channel NVR shall support 1 through to 16 internal hard disk drives. With drives having a capacity of at least 8TB. No system (NVR) software or operating system elements shall reside on these hard drives, thereby avoiding any reduction in video storage capacity and increasing system robustness.
2. The NVR unit shall contain no removable media for off-line storage. All storage shall be on-line for as long a period as possible based on the configuration that has been selected. Configurable parameters for altering storage duration shall include:
 - ... Display size (CIF, 2CIF, 4CIF)
 - ... Frame rate
 - ... Video quality settings (most detailed, more detailed, medium, more compressed, most compressed)
3. Internal system storage shall take advantage of Intelligent Video Archiving and Retention technology that uses the concept of retention rather than recording. A retention-based system captures, by default, video from all connected cameras at the highest per-camera frame rates available on the unit. This provides an always-on high quality recording on all cameras in keeping with the FBI/Scientific Working Group on Image Technology [SWGIT] recommendations. The user shall then be able to set up rules to determine when the retained video is to be removed from the recorder and which video is to be retained.
4. After all of the attached storage has been filled, video of potential interest (e.g., motion video, alarm video, retail or financial transaction video) is reviewed according to the set rules and if tagged, is moved into the, Longer-Term Storage area. All other video is removed and the disk space freed up by this 'thinning' process shall be available for new video storage. Beyond long-term storage, a further Extended-Term Storage area shall be available to further thin and retain critical video for an extended period of time.
5. All video shall be stored at the NVR unit and only be delivered over the network when either the recorded video is searched and retrieved or if live video is requested.

N. Video Output

The information recorded on the NVR unit shall consist of the following data:

1. Compressed video
2. Time stamp consisting of date and time with millisecond resolution
3. Associated event information
4. Associated transaction information (for example, retail Point-of-Sale or ATM/Teller financial transactions)
5. Audit information

O. Recorded Format

Compressed video from all cameras shall be stored in such a way that it is independently retrievable. The operator shall be able to retrieve a video clip from the NVR unit at any file size up to a maximum of 2.0 GB.

P. Continuous Recording

The NVR unit shall be capable of recording continuously on each video. The capacity for recording shall not exceed 40G Bytes when recording continuously for 7 days on 4 cameras

at 15 fps, with a “More Compressed” setting and moderate to low motion. Capacity for recording on IP cameras shall be dependent on the configuration settings of the IP camera.

Q. On-Event Recording

1. The NVR unit shall be capable of recording any video input in response to an external alarm. The recording period shall be of any duration from 30 seconds to seven days. There shall be no hard association of an external alarm to a camera or audio source. Any alarm can cause an action to record on any or all cameras and the audio input.
2. Optionally, any given camera shall be programmable to record at up to the maximum capture rate (fps) available from the system in response to an alarm.
3. Events that trigger long or extended-term retention shall include:
4. Any external closed current loop device connected to the NVR unit (door sensor, motion sensor, etc.)
5. Motion in the video image (in the image overall, or in individual and configurable ‘masked’ areas of the image, with configurable sensitivity settings)
6. Extended retention on video motion detection shall be tuneable using full screen sensitivity setting to simplify configuration or using a user definable grid for area of interest. In order to reduce the frequency of motion alarms, the detection of next occurrence of motion can be delayed until there is a period of inactivity in the image. Detection of video motion shall be capable of being enabled during specific periods of the day according to a pre-determined schedule.

R. Scheduled Recording

The NVR unit shall be capable of executing any number of internal recording schedules defined by the administrator. Schedules shall be remotely configurable and control the following actions:

- 1- Extended retention (any combination of cameras for any duration from 30 seconds to 7 days)
- 2- Monitoring of physical alarms (during specified periods)
- 3- Monitoring of motion alarms (during specified periods)
- 4- Increase of the bandwidth throttle
- 5- Assertion of a switch (for a specified period)
- 6- Moving of a PTZ unit to a predefined position
- 7- Displaying of a specific camera on the spot monitor

S. Time Synchronization

The NVR unit shall allow for clock synchronization to occur manually or from a central location through a network time protocol (NTP) server or enterprise management server. The NVR unit shall also be capable of automatically adjusting the clock to Daylight Saving Time, and adjusting for deployment in varying time zones.

T. Live Video

The NVR viewing application shall be capable of displaying up to 36 video windows simultaneously in a 6 x 6 grid with video from cameras on the same NVR as well as video from different NVRs. Live video windows shall be able to co-exist on one monitor or across several, with playback windows on the same screen from within the same application. Each video window shall have independent control and all windows shall be capable of being linked together and controlled simultaneously. Each video window shall be capable of performing an instant replay of selected duration by simply using a slider control to move back in time. If audio is associated with the selected window there shall be a set of controls to adjust the volume or mute the audio.

U. Video Zoom/Full Screen Display

The currently selected video window shall support digital zooming of 50 percent to 200 percent using pre-defined buttons. As well, wire frame selection of area to zoom shall also be supported with the ability to pan to areas of interest that are outside of the displayed window frame. The displayed video shall have an option to adjust to the size of the window frame. Multiple windows shall be capable of having the zoom and fit-to-screen operations applied simultaneously. Any single video window shall be capable of being displayed in full screen mode with no window frame (audio will continue to be heard in this mode).

V. Video Image Settings

The video window shall support image controls for brightness, contrast, saturation, and hue levels to customize the appearance of video in the active display window. Recorded video is in no way altered by these controls, however, printed or saved still images can be image enhanced.

W. Data ports

The NVR unit shall be able to capture and store banking ATM/Teller or retail Point-of-Sale (POS) transaction information using the RS-232 data port available on the unit. The text information captured from a transaction system shall not overlay or obstruct the video in any way, but shall be synchronized with that video, and shall serve as a trigger to capture recorded video of preset duration (including pre-transaction video).

X. Switch Control

The NVR viewer shall be able to manually control devices connected to the switch output of the NVR unit by activating one either normally open (NO) or normally closed (NC) contact. The switch shall automatically reset after a configurable period of time. The switch shall also be set in response to an external event occurring or as a scheduled operation.

Y. Alarm Notification

The NVR unit shall distribute notification of alarms to clients who have requested notification. All video associated with the alarm shall be automatically displayed on receipt of an alarm. Audible and visual alarm cues shall also be optionally configurable. An operator shall be able to have notification of alarms e-mailed to specific users.

Z. Time Zones

The NVR unit shall be capable of operating in a different time zone than a viewing application. The operator shall be able to work in either the time zone of their PC or the time zone of the NVR when searching for video. Operator software shall display either the local (user) time zone, or the time zone of the NVR when displaying video timestamps.

AA. Search of Alarms

1. Video recorded on alarms shall be searchable by selecting the alarm of interest and entering a specific point in time and period of interest. Each type of alarm shall have a unique icon to represent it in the list. An operator shall be able to narrow down the search without having to re-enter all the parameters. All alarm-associated recordings (i.e. all cameras) shall be retrieved and displayed by selecting a specific entry from the alarm search results. The duration of retrieved video surrounding the alarm point shall be configurable by each user.
2. Video motion alarms shall be handled in the same way as other physical alarms. A mask shall be able to be applied to a search for video motion such that the results list displays only when motion was detected in the area(s) of interest.

3. Transaction events captured from an ATM or bank Teller machine interface shall be handled in the same way as other physical alarms, in that they shall be searchable by date and time as well as other custom user data. The search fields for ATM/Teller transaction alarms shall include:
 - Transaction type
 - Transaction number
 - Transaction amount
 - Card number
 - Time/date stamp
 - Other custom field
4. Transaction events captured from a Point-of-Sale (POS) retail interface shall be handled in the same way as other physical alarms, in that they shall be searchable by date and time as well as other custom user data. The search fields for POS transaction alarms shall include:
 - Transaction type
 - Transaction number
 - Transaction amount
 - Card number
 - Time/date stamp
 - Other custom field
5. A range will be used when searching on either transaction amounts (e.g., from \$1000.00 to \$5000.00, or from \$0.00 to \$100.00, with a maximum of \$1,000,000.00).

BB. Search and Retrieval of Recordings

1. Searching and retrieving video and audio from the NVR unit shall be done as a single operation (i.e. if the audio is associated with the video, it will be retrieved as well).
2. The search function shall allow multiple cameras, multiple NVRs, or multiple NVR locations to be specified and searched simultaneously.
3. Recorded video shall be searchable by:
 - Selecting the camera of interest and entering a range of times. The user shall be able to further refine this range by a simple “click-and-drag” operation, and not have to re-enter any search parameters. The user shall be presented with a histogram indicating the amount of motion during the time range, as well as a set of thumbnails to aid in pinpointing a time of interest.
 - Selecting an alarm and using the specific point in time of the alarm to locate the associated video.
 - Using the ‘activity scan’ feature to search based on motion detection
 - Specifying ATM or POS transaction data as mentioned above
4. The search function shall allow any duration of video to be retrieved (to a maximum file size of 2.0 GB).

CC. Playback Viewing

The retrieved video shall be displayed automatically in a window. The playback windows shall be capable of being displayed alongside the live video windows. If audio is associated with the video that is retrieved, it shall be automatically played when the video is played. A date/time stamp shall appear with the video being displayed and shall be updated for each frame that is displayed.

DD. Playback Controls

1. When a playback window is selected, the following controls shall be made available to control the playback of the video:

- Play – forward and reverse
- Pause
- Single frame – forward and reverse.
- Move to beginning to ending of video segment

- 2- In addition, the play speed shall be capable of being changed to 1x, 2x, and 4x normal speed. The recorded video shall also be capable of being quickly navigated using a shuttle search (slide bar). Video frames shall be displayed while the slide bar is being moved to assist in finding the frame of interest.

EE. Time Ruler

For navigation through a video clip, the operator shall be able to use a slide bar. The video image shall update while the slide bar is being moved. To change the time resolution for more accurate navigation, the time ruler shall be capable of being zoomed in or out.

FF. Video Images - Copy, Save and Print

An image from a live or playback video window shall be capable of being manipulated as follows:

- 1- The image shall be capable of being copied to the PC 'clipboard' and then pasted into any third-party application that will accept data from that clipboard. These applications include image enhancement, email, or word processing. Image copying options shall include specifying standard JPEG or .BMP file formats for the image. The copied information shall include both video and associated detail data (location, camera, time, date, and event information).
- 2- The resulting images shall then be able to be saved to the local PC or other network storage location, retaining their JPEG or .BMP file formats and their associated detail data.
- 3 The images shall also be capable of being printed to any network-connected printer. The printed image shall have the associated detail data (location, camera, time, and date) printed on the same page.

GG. Video Clips – Security Sealed

A video clip from a live or playback video window shall be capable of being controlled as follows:

- 1- The video clip shall be capable of being saved to the local PC or other network storage location in an industry-standard .AVI read-only file format. The captured information shall include the video clip itself, any audio data if recorded, and associated location, camera, time, date and event details, as well as any captured POS or ATM transaction data.
- 2- All video clips shall have a tamper-proof security seal applied automatically as part of this process, ensuring the authenticity of that video and its admissibility as evidence in a legal investigation or prosecution process. This security seal process shall be based on the SHA (Secure Hash Algorithm) of Digital Signature Standard [U.S. FIPS PUB 180-1, 1995].
- 3- Video clips shall be able to be exported from the NVR to a USB-connected CD Burner or memory stick. Control of this operation shall be made available to authorized clients locally or remotely over the network. This export process shall include the copying of a free, auto-run Evidence Reviewer utility with which third parties may play back the video clip. Users of the Evidence Reviewer utility shall have the ability to run the utility directly from the media, without requiring them to install it on their workstations.
- 4- The industry-standard .AVI video files shall be capable of being displayed by any commercial application that will render such media files. To display all associated

detail data, and to verify authenticity of the video, the Evidence Reviewer utility shall be necessary.

(f) Management Software

The Management software is an integral part of the Visual Intelligence suite that lets security staffs customize and maintain recorders in a local or centralized manner. Also set up system and maintain up- to-date health and status information for recorders.

The Management software expected to manage recorders at different sites from one Central location. This can be accomplished by directly communication with each recorder on the network or by communication through an Enterprise Service Manager which is in constant communication with each recorder.

From the Management software Console, you can:

- Access a system-wide status of recorders. In addition to this, alerts can be received in real-time to ensure timely resolution of recorder health issues.
- View a summary of users and quickly review their access rights. Access rights can be modified to restrict users from performing certain tasks, and restrict the recorders and peripherals they can access.
- Organize recorders into a hierarchy that matches the sequence needed.
- Centrally configure multiple recorders. This can include upgrading recorders to the latest software release or applying custom changes.

The recorder captures, records, and streams video from connected cameras. The following shall be performed locally and remotely:

- Configuring the Camera's Operation Settings
- Configuring and Adjusting PTZ Cameras
- Adding, Removing, and Configuring IP Cameras or Encoders
- Accessing an IP Camera or Encoder's Web Page
- Enabling and Configuring Video Motion Detection
- Configuring Field of View Monitoring
- Configuring Camera Obstruction Detection
- Additional Camera Configuration Options
- Configuring People Counting
- Setting up Networks IP Cameras and Encoders for Analytics
- Setting the Perspective for Networks IP Cameras or Encoders
- Configuring Loitering Detection
- Configuring Occupancy Detection
- Configuring Perimeter Protection
- Configuring Queue Length Monitoring
- Enabling and Configuring Alarms
- Adding Virtual Network Alarm Inputs
- Additional Alarm Configuration Options
- Scheduling: Creating a Schedule and Editing a Schedule
- Configuring How a Recorder Responds to Events
- Action Configuration Settings
- Retain Evidence Data Action
- Detect Events Action
- Activate Switch Action
- Move PTZ Action
- Output Video Action
- Control Bandwidth Action
- Copy to External Media Action
- Configuration Template Overview
- Reviewing a Recorder's Upgrade Information
- Upgrading a Recorder's Software
- Viewing Alert Details and Corrective Actions

- Acknowledging that You Have Reviewed an Alert
- Configuring Notification of Health Alerts
- Choosing the Alarms that are monitored
- Setting the Alarm Priority
- Associating Cameras with Alarm Sources
- Viewing the Network Communication Path
- Pinging a Recorder
- Configuring a Unit Using the Provisioning Interface
- Rebooting a Recorder

4.4 MATV System

PART 1: GENERAL

4.4.1 Scope of the Work

The intent of this document is to specify the minimum criteria for the design, supply, installation, and commissioning of the MATV System.

The television services for the building shall be served using IP television (IPTV) technology that will utilise the data network as the transport mechanism to distribute all required television channels.

4.4.2 MATV System Description

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

1. MATV SYSTEM

General: A complete system for receiving and distribution terrestrial (TV+FM) and Satellite signal shall be established.

The MATV system shall consist of:

- a) Two (2) satellite plates with LNB installed on roof floor for receiving satellite signal one terrestrial R-TV ANTENNA (VHF-UHF-FM) installed on mast.
- b) Lightning and surge protection equipment.
- c) Amplifier used for terrestrial signal.
- d) Main Amplifier used for satellite signal.
- e) A TV-R vertical cable network of nine RG-11 cables used to interconnect tap off equipment.
- f) Amplifier and split unit set, used to distribute TV-R signals up to tenant's multiswitch. One set per
- g) two floor levels shall be installed as indicated in the relevant drawings.
- h) A horizontal cable network of nine RG-6 cables used to connect tap off equipment with each
- i) amplifier - split unit set up to tenant's multiswitch.
- j) A 9 cable, 8 out multiswitch shall be provided per each floor to serve tenant's requirements.

2. IP/TV SYSTEM

The IPTV System consists of source signal receiving, encoding, decrypting, processing, signal distribution, decoding and display equipment.

The IP/TV IPTV system shall include multiple satellite service sources, integrated with IPTV pre-recorded programming server, programming scheduling applications and workstations, shall utilize a VLAN in the LAN for signal distribution, shall use IP distribution to IPTV set top boxes mounted locally on displays and to PC's or servers running IPTV standard browser-based software, and shall interface to other electronic systems. In particular it will allow for digital signage content to be delivered in predefined channels of the system.

The ICT/SI sub-contractor shall supply, setup and configure all aspects of the IPTV system.

The IPTV system shall be provided from a single manufacturer, which shall provide seamless operation and management through one software platform and which shall be available simultaneously to multiple users on the network.

The ICT/SI sub-contractor shall be an authorized distributor or manufacturer's representative of such equipment, maintaining local staff of specialists and trained technicians for engineering assistance, installation and maintenance of the system.

The ICT/SI sub-contractor shall ensure any software required for installation onto the Employer's computers or servers shall be approved by the Employer at least four weeks prior to off-site witness testing. The ICT/SI sub-contractor shall liaise with the Employer to ensure that suitable network policies are in place to allow communication back to the central servers.

The ICT/SI sub-contractor shall provide all information specific to the successful setup and integration for IPTV distribution over the LAN at an early stage of the system implementation to the Employer, in which the full deployment of the IPTV scheme and policies shall be agreed

The head-end shall be capable of distributing multicast (live TV) as well as unicast in the case of stored video (Video on Demand VoD) signals to all the TV points connected over the LAN.

The system shall support any number of endpoints that can easily be added or removed on demand allowing for an initial investment cost with scalable growth.

4.4.3 Submittals

1. General: Submittals shall be made in accordance with the Conditions of the Contract and Submittal Procedures Section.
2. Shop Drawings and Schematics: Shall depict the Intercom Security System in final proposed "as built" configuration. The following must be provided:
 - a) Connection/ riser diagrams for interfacing equipment.
 - b) List of connected equipment.
 - c) Locations for all major equipment components to be installed under this specification.
3. Product Data: The following shall be provided:
 - a) Technical data sheets.
 - b) A complete set of instruction manuals.
4. Quality Assurance Submittals: The following shall be submitted:
 - a) Checkout Report: The Contractor shall provide the Employer with a checkout report for each system. The report shall include:
 - I. A complete list of every device.
 - II. The date it was tested, and by whom.
 - III. (If retested, the date it was retested, and by whom.
 - IV. The final test report shall indicate that every device was tested successfully
 - b) Manufacturer's Instructions: The Contractor shall deliver 2 sets of System Operation and Maintenance Manuals (if available) to the Employer.
 - c) Notice of Completion: When the final acceptance has been satisfactorily completed, the Employer shall issue a notice of completion to the Contractor.

4.4.4 Quality Assurance

- a) Manufacturer's Qualifications:
 - i. Minimum of 10years experience in manufacture and design Intercom Security System.

- ii. Manufacturer's quality system: Registered to ISO 9001 Quality Standard. CE mark.
- iii. The manufacturer shall provide 24/7 technical assistance and support at no extra charge.

b) Installer:

- i. Minimum 5 years' experience in installation and factory certification.

4.4.5 Warranty

- a) General: The warranty period shall be a minimum of thirty-six (36) months from the manufacture date code under normal use and service.

4.4.6 Training

- a) Operator training shall be conducted for a minimum of 3 sessions, with a session length of 8 hours at the customer's site.
- b) Training shall include, but not be limited to MATV System operation and diagnostics.
- c) Administrator training shall be conducted for a minimum of 3 sessions, with a session length of 8 hours at the customer's site.
- d) Each contractor shall provide detailed training schedules.

Part 2: Products

4.4.7 Antenna UHF

a) Technical Data

- Channels: 21-69
- Gain (dB): 9.5-15
- Reception range (MHz): 470-862
- Half-power beam width: Horiz. °/vert. ° 50-28/59-31
- Front-to-back ratio (dB) 22-28
- Mast clamp range (mm) Ø 22-60
- Length (mm): 1270
- Wind load 103

4.4.8 Satellite Plate

<u>Description</u>	<u>Unit</u>	<u>Value</u>
Diameter	cm	90
Colour		Graphite-grey (similar to RAL 7012)
Reception	range GHz	GHz 10.70-12.75
Antenna gain at 10.70-11.70 GHz/11.70-	dBi	38.6/39.2/39.6
Half-power beam width ¹⁾	°	Typ. < 1.9
System figure of merit ²⁾ feed system incentre; UAS 177/572/584/585	dB/K	18.8/19.8

System figure of merit ²⁾ feed system distance 3°-4°; UAS 177/572/584/585	dB/K	18.3/18.3
System figure of merit ²⁾ feed system distance 6°; UAS 177/572/584/585	dB/K	17.9/18.7
Cross-polarisation decoupling	dB	Typ. > 27
Wind load ³⁾	n	730
Max. allowable wind speed	km/h	190
Mast clamp range	mm	48-90
Setting range Elevation/Azimuth	°	Mast-side mounting: 5-48/360 Wall bracket mounting: 5-50/360
Multifeed-adapter plate adjustment range	°	+/- 20

4.4.9 Quatro LNB

a) Features

- For reception of satellites in the Ku-band
- The feed system complies with the ASTRA specifications for universal SMATV feed systems
- Suitable for community antenna network systems with two polarisations and two frequency ranges (2 x low band/high band)
- Only to be used in conjunction with multi-switches EXR, EXE, etc.
- For linear polarisation
- Equipped with quatro LNB (four outputs)
- Power supply via drop cable, remote feeding is possible via any output
- Polarisation and frequency range independent of supply voltage
- Multi-feed suitable due to compact design
- Full protection of LNB and cable connections in a ventilated housing, protection category: IP 54

b) Technical feature

<u>Description</u>	<u>Unit</u>	<u>Value</u>
Suitable for parabolic antennas		CAS 60/80/90/120
Polarization		4 x (2 x horizontal and 2 x vertical)
Input frequency	GHz	10.70-11.70 and 11.70-12.75
Gain	dB	> 50

Output frequency	MHz	950-1,950/1,100-2,150
Oscillator frequency (L.O.)	GHz	9.75/10.60
Phase noise (L.O.: 10.60 GHz)	dBc	1 kHz: -50, 10 kHz: -75, 100 kHz: -95
System figure of merit (G/T)	dB/K	See offset parabolic antennas
Polarisation decoupling	dB	Typ. > 25
Output/impedance	Ohm	4 x F-type connector/75
LNB supply voltage	V	11.5-19.0
Current drain LNB	mA	Typ. 150

4.4.10 Amplifiers VHF+UHF+FM+BI

a) Features

- Multi-range amplifiers for house and community antenna networks
- Remote feeding +15 V to +18 V possible via the output
- VCA 28 and VCB 28 with variable attenuator
- Connections: IEC connectors (f) 2.4/9.5
- Mains connection: 230 V ± 10 %, 50/60 Hz
- Protection class II
- Temperature range: -20 to +55 °C
- For indoor installation

4.4.11 Adaptor IEC-F for Amplifiers

a) Technical Data

<u>Description</u>	<u>Unit</u>	<u>Value</u>
Product type	F-type right-angled plug	F-type adapter/ F-type connector (f) – IEC connector (m)
Screening factor	> 90 dB EMU02_2.jpg	VHF: > 85 dB/UHF: > 75 dB EMU09.jpg
VPE 1		10
EAN 1		4021121354281
VPE 2		100
EAN 2		4021121136924
VPE 3		1000

4.4.12 Amplifiers SAT+TERR 9in-9out

a) The Matrix distribution net amplifier is used at the input of larger multi-switch cascades for optimal signal provision or as a cascadable distribution network amplifier to equalise cable or tap/splitter losses.

b) Features

- Distribution network amplifiers for the Sat and terrestrial range in Sat-IF distribution system 8 x Sat-IF
- Nine amplifiers (8 x Sat-IF and 1 x terrestrial range) in one single housing
- High dynamic range of amplifier units
- High decoupling between the amplifier units
- Terrestrial amplifier unit is CATV-capable due to GaAs output stage
- For indoor installation
- Adjustable attenuators (1 dB steps) in each amplifier unit to equalise different input levels
- Fixed pre-equalisation in the terrestrial amplifier unit
- Adjustable pre-equalisation (2/4/6 dB) in each satellite amplifier unit
- Low power consumption due to high-efficiency switched-mode power supply unit
- LNB remote feeding over the input horizontal low. All other inputs are voltage-free (enabling operation with the UAS 585)

c) Technical Data

<u>Description</u>	<u>Unit</u>	<u>Value</u>
Inputs		1 x terrestrial 8 x Sat-IF
Frequency range	MHz	47-862 950-2,150)
Gain ¹⁾	dB	17 -> 21 24
Variable attenuator setting range (1-dB steps)	dB	0-15 0-15
Equalisation setting range	dB	- 2/4/6
Max. output level (interferences 3rd order)	dB μ V	113 ²⁾ 115 ³⁾
Max. output level (interferences 2nd order)	dB μ V	104 ⁴⁾ 110 ³⁾
Max. output level for CATV (up to 862 MHz) ⁵⁾	dB μ V	98 -
Trunk decoupling	dB	- 40
Nominal input voltage	V	230 (47-63 Hz)
Permissible input voltage range	V	198-253
Nominal input voltage at 0/300/500 mA load	W	7.5/13.6/18
Voltage secondary (input horiz. low)	V	18 500

Available remote feed current (input horiz. low)		
Supply voltage	V	
Current drain	mA	
Max. remote feed current (per Sat polarity signal)	mA	
Protection class/protection type II (insulated)/IP 30		II (insulated)/IP 30
Permissible ambient temperature	°C	-20 to +55
Connections		F-type connectors
VPE 1		1
EAN 1		4021121468889
VPE 2		10
EAN 2		4021121468902

- a. Frequency-dependent gain (pre-emphasis)
- b. 60 dB XMod to EN 50083-5
- c. 35 dB IMod to EN 60728-3
- d. 60 dB IMod to EN 60728-3
- e. To EN 60728-3, 60 dB CTB/CSO, CENELEC channel plan

4.4.13 Multi-switch 9 TO 8

a) Features

- Cascadable multi-switches for distribution of eight Sat polarities and terrestrial signals to many receivers
- Only one drop cable is required per receiver (for twin receivers two drop cables are required)
- Option to select horizontal/vertical, low band/high band, Sat position A/B independently from each receiver due to DiSEqC™ control
- If the receiver is not DiSEqC™ controlled, switching between horizontal/vertical, low/high is on Sat position A; with Tone Burst Sat position A/position B is additionally possible
- Integrated amplifier ensures low tap losses in the Sat-IF range
- Integrated pre-emphasis to equalise the cable loss
- Terrestrial signals can be received even when the satellite receiver is switched off
- Terrestrial range: 5-862 MHz passive
- High inter-output isolation
- LNB remote feeding over the inputs horizontal low. All other inputs are voltage-free (thus enabling operation with the UAS 585).
- For indoor installation
- Multi-switch for eight connections, with integrated power supply unit

b) Technical Data

<u>Description</u>	<u>Unit</u>	<u>Value</u>
Subscriber connections		8
Inputs		1 x terr. 8 x Sat-IF
Frequency ranges	MHz	5-862 950-2,150
Through loss	dB	dB - -
Tap loss ¹⁾	dB	10 -> 13 5 -> 0
Decoupling horiz./vert.	dB	- 25
Decoupling subscribers	dB	25 25
Trunk decoupling	dB	- -
Max. output level ²⁾	dB μ V	- 109
Control with DiSEqCTM		Vert./horiz., low/high, pos. A/B
Control without DiSEqCTM - with 14/18 V and 0/22 kHz - with		Vert./horiz., low/high (Pos. A) Pos.
Tone Burst		A/B
Current drain per subscriber	mA	30
Nominal input voltage	V	230 (47-63 Hz
Permissible input voltage range	V	198-253
Nominal input voltage at 0/300/800 mA load	W	1.7/7.5/18
Secondary voltage ³⁾	V	18
Max. total remote supply current ³⁾	mA	800
Protection class/protection type		II (insulated)/IP 30
Connections		F-type connectors
VPE 1		1
EAN 1		4021121464096
VPE 2		10
EAN 2		4021121468025

4.4.14 Tap-off for the SAT-RF Distribution System

a) Features

- Two-way tap and two-way splitter for the Sat-IF distribution system (8 x Sat-IF)
- For use in very large Sat-IF distribution systems with 9-line multi-switch cascades
- For indoor installation
- EAX 2912
- Two-way tap to connect two 9-line multi-switch cascades to one trunk
- Nine two-way taps (8 x Sat-IF and 1 x terr. range) in one housing
- Remote feeding via input <-> trunk output (8 x Sat-IF); isolating capacitors on tap outputs
- Can be cascaded with more EAX 2912 or EBX 2920 units

b) Technical Data

<u>Description</u>	<u>Unit</u>	<u>Value</u>
Inputs		1 x terrestrial 8 x Sat-IF
Frequency range	MHz	5-862 950-2,150
Through loss (input -> trunk-output)	dB	1.5 -> 2 ') 0.8 -> 1.5 ')
Tap/splitter loss (input -> tap/splitter output)	dB	12 13 -> 11 ')
Decoupling tap/splitter outputs	dB	30 30
Trunk decoupling	dB	- 50
Max. remote feed current per Sat polarity	mA	1000
Connections		F-type connectors
VPE 1		1
EAN 1		4021121464249
VPE2		10
EAN 2		4021121464256

4.4.15 SAT-IF F-type Splitter

a) Features

- Two-way tap and two-way splitter for the Sat-IF distribution system (8 x Sat-IF)
- For use in very large Sat-IF distribution systems with 9-line multi-switch cascades
- For indoor installation

- Two-way splitter to distribute trunks to two 9-line multi-switch cascades
- Nine two-way splitters (8 x Sat-IF and 1 x terrestrial range) in one housing
- Remote feeding via input <-> trunk output (8 x Sat-IF) and splitter output horizontal low
- (diode decoupling to trunk output); isolating capacitors on remaining splitter outputs

b) Technical Data

<u>Description</u>	<u>Unit</u>	<u>Value</u>
Inputs		1 x terrestrial 8 x Sat-IF
Frequency range	MHz	5-862 950-2,150
Through loss (input -> trunk-output)	dB	4.0 4.0
Tap/splitter loss (input -> tap/splitter output)	dB	4.0 4.0
Decoupling tap/splitter outputs	dB	25 30
Trunk decoupling	dB	- 40
Max. remote feed current per Sat polarity	mA	1000
Connections		F-type connectors
VPE 1		1
EAN 1		4021121464225
VPE2		10
EAN 2		4021121464232

4.4.16 RG-6 Coaxial Cable

a) Features

- Impedance: 75 Ohm
- Insulation of special PE compound, gas-injection foamed
- Metre marking
- Lead and silicone free, thus environmentally-friendly
- Conform to: EN 50117
- Simplified plug assembly due to the applied film
- Non-halogen, flame-resistant, UV-resistant; suitable for outdoor use (no laying in the ground)

4.4.17 RG-11 Coaxial Cable

- a) Features
 - Impedance: 75 Ohm
 - Insulation of special PE compound, gas-injection foamed
 - Metre marking
 - Lead and silicone free
 - Conform to: EN 50117

Part 3 Execution

4.4.18 Examination

- a) Submission of a proposal confirms that the contract documents and site conditions are accepted without qualifications unless exceptions are specifically noted.
- b) Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.
- c) The site shall be visited on a regular basis to appraise ongoing progress of other trades and contractors, make allowances for all ongoing work, and coordinate the requirements of this contract in a timely manner.
- d) The Intercom Security System must be inspected before installation, and shall be free of any cosmetic defects or damage.
- e) At each location a single RJ45 point shall be provided

4.4.19 Preparation

- a) Prior to installation, the MATV contractor shall be configured and tested in accordance with the manufacturer's and Employer's representative instructions.

4.4.20 Installation

- a) The MATV System must be installed, programmed, and tested in accordance with the manufacturer's instructions.
 - Interfaces shall be coordinated with the Employer's representative, where appropriate.
 - Precise details of the installation will be in accordance with and on the approval of the Employer's Representative.
 - All necessary back boxes, connectors, supports, conduit, cable, and wire must be furnished and installed to provide a complete and reliable Intercom Security System installation. Exact location of all boxes, conduit, and wiring runs shall be presented to the Employer for approval in advance of any installation.
 - Comply with applicable requirements in Division 26 Section "Identification

4.4.21 Testing and Certification

- a) The Contractor shall demonstrate the functionality of the RTV System upon completion of installation, documenting the result of all tests and providing these results to the Employer. The Intercom Security System shall be tested in accordance with the following:
- The Contractor shall conduct a complete inspection and test of all installed Intercom Security System equipment. This includes testing and verifying operation with connected equipment.
 - The Contractor shall provide staff to test all devices and all operational features of the system for witness by the Employer's representative. All testing must be witnessed by the Employer's representative, prior to acceptance.
 - The testing and certification shall take place as follows:
 - ... The RTV System shall be tested in conjunction with the manufacturer's representative.
 - ... All deficiencies noted in the above test shall be corrected.
 - ... Test results shall be submitted to the consultant or Employer's representative.
 - ... The test and correction of any deficiencies shall be witnessed by the Employer's representative, and note.
 - ... The Employer's representative shall accept the system.
 - A test certificate shall be provided to indicate that the tests have been performed, and all devices are operational.

4.5 Nurse Call System

4.5.1 General Requirements

- A. Be an IP-based system that is field programmable and configurable.
- B. Have the ability to interface with a computer display terminal.
- C. Have user-configurable software for nurse console system computers.
- D. Provide noninterrupted high quality, full duplex audio communication between patient/staff stations and nurse console station handset.
- E. Have hot-swappable field devices.
- F. Follow UL guidelines for network connectivity.
- G. Conform to UL 1069 standards and equipment and be UL listed under NBRZ Hospital Signalling and Nurse Call Equipment. Submitting the UL listing cards describing the equipment by model number shall be proof of such listing.

4.5.1 Scope of the Work

- A. Work includes provision of all materials, equipment, hardware, software, licenses, accessories, services and tests necessary to complete and make the system operational in accordance with Drawings and Specifications.
- B. The nurse call system shall consist of multiple master stations, communicating via a data bus with an IP-based system Master nurse stations, which receives and processes nurse call events from patient, staff, emergency, code blue and ancillary stations as described in part 2 below. These stations work together with zone / door lights, and corridor lights to build a complete and operable call system. A central Uninterrupted Power Supply (UPS) shall provide power to the call system. Systems shall run on IP based network to communicate to call stations throughout the hospital. The control panel shall be integrable with third party devices, proprietary master station controllers shall not be permissible.
- C. Proposed System Capacity shall be suitable to support & manage all of the Nurse Call Equipment / Devices in the hospital building in addition to 20% spare Capacity.
- D. Each master station shall provide LCD showing all of the call details, indicating pending calls, assigned services.
- E. The system architecture shall allow each individual nurse call systems to operate in a decentralized stand-alone mode, a centralized mode with any one master station being able to be designated the central master answering all calls from any nurse call unit in the facility, or a mixed mode where some nurse call masters of a centralized network operate independently.
- F. The equipment furnished under this specification shall be the standard product of one manufacturer.
- G. Provide full feature solid state nurse call systems in the areas indicated on drawings, System Wiring Criteria, wiring type & Sizes are manufacturer dependant, Contractor to Submit Detailed Wiring Diagrams / Shop Drawing approved & stamped by the system supplier.
- H. System Cables shall be as per the system manufacturer recommendations, however, contractor to ensure that cables shall be with LSZH Jacket.

4.5.2 Quality Assurance

- A. Manufacturers: Firms regularly engaged in the manufacture of nurse call system of the types and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years. Provide nurse call system produced by a manufacturer listed as an Acceptable Manufacturer or approved equivalent.

- B. The Nurse Call System shall be UL listed according to UL 1069 Hospital Signalling & Nurse Call Equipment and shall be compliant with the recommendation by Health Technical Memoranda (HTM 08-03).
- C. System shall be installed by trades specializing in nurse call system installation.
- D. The contractor shall be an authorized distributor for product supplied.
- E. The contractor shall produce an authorized distributor letter from manufacturer upon request of specifying authority.
- F. The contractor shall furnish all equipment, accessories, and material in strict accordance with specifications and applicable drawings as required for a nurse call system.
- G. The contractor shall ensure that the system is installed per plans and specifications.
- H. The contractor shall have at least one factory certified installer responsible for the installation.
- I. The contractor shall hold all applicable licenses. Copies must be available upon request.
- J. Provide a catalogue of designs and materials with the system. The supplier is required to submit the manufacturer's complete service notes and drawings detailing all interconnections.
- K. Include a five-year warranty for all manufactured components and a one-year warranty for labour.
- L. Factory technical training is available for the life of the system at no cost.
- M. Written confirmation on the type of speech offered includes full duplex, high quality speech (uninterrupted two-way speech).

4.5.3 Submittals

- A. Complete Detailed Original Catalogue for the Proposed Manufacturer and marked up for all of the proposed equipment.
- B. Complete & Detailed List of Equipment.
- C. Description of operation of the system as described herein, to include all exceptions, variances or substitutions listed at the time of bid.
- D. Provide shop drawings-approved by the system supplier-showing equipment locations, drawings and raceway runs, cable types, size, part numbers, ... etc.
- E. Complete riser diagram showing all equipment, cables, size, type and number of all conductors and conduits, Interface with all other trades.
- F. Typical Termination wiring diagram for each type of devices.
- G. Compliance list: submit a detailed point by point compliance statement with this specification. Where the proposed system does not comply or accomplish the stated function or specification in a manner different from that described and specified, a full description of the deviation shall be provided.
- H. Provide samples of various items for review / approval.

4.5.4 Warranty

- A. Guarantee equipment furnished under these specifications against defective parts and workmanship under terms of the manufacturer's and dealer's standard warranties for a period of not less than five years from date of initial start-up, Owner acceptance of the system and include labour and travel time for necessary repairs at the job site.
- B. The contractor to guarantee all wiring to be free from inherent mechanical and electrical defects for one year. The manufacturer to furnish a one-year maintenance contract, free of charge to the owner, effective from the date of installation for maintenance and inspections of the manufacturer's equipment; with a minimum of two inspections during the contract year. A local manufacturer service department which stocks standard parts to be available to the owner. If required, maintenance is to be performed during normal working hours, at no cost to the owner, for a period of twelve months from the completion date of the installation, unless damage is caused by misuse, abuse or accident.

4.5.5 System Functionality

- A. Call Annunciation:

Incoming calls shall annunciate with distinct, audible chime tones for their corresponding call priority. There shall be four distinct tones, one for each priority level. The priority levels shall be code, emergency, priority, (including staff calls) and routine. There may be several call types within any of the priority levels.

Priority order shall be as follows:

- i. Code
- ii. Emergency-Staff
- iii. Emergency-Auxiliary
- iv. Emergency-Patient
- v. Emergency-Shower
- vi. Emergency-Toilet or Bath
- vii. Generic-Emergency
- viii. Priority-Patient
- ix. Staff Assist (Patient Room)
- x. Routine-Patient
- xi. Routine1-Auxiliary
- xii. Routine2-Auxiliary
- xiii. Generic-Routine
- xiv. Routine-Staff
- xv. Equipment fault indicator

- B. The system shall have:

- 1. Capability to utilize either SIP or analogue audio.
- 2. The ability to interface to VoIP.
- 3. System must not require or rely on an owner furnished PABX for functionality to comply with UL 1069.
- 4. Unlimited field expandability.
- 5. Programmable priority levels for patient calls such as Routine, Priority and Emergency.
- 6. Programmable priority levels for staff calls such as staff emergency and code blue.
- 7. Devices that are supervised and provide system failure alarms.

8. Capability to immediately report the failure of any field device's microprocessor to a computer display.
 9. Capability to program the system to remotely cancel calls.
 10. Capability to configure all call types with assignable priorities, lights, and flash rates.
 11. The means to escalate a call to proper staff levels with specific request, with single touch at console system.
 12. Functionality to answer a call and send specific request to appropriate level of staff from console system.
 13. Capability to swing (move) patient calls between console systems.
 14. Password protection for critical and noncritical levels of system setup, allowing access to authorized personnel only.
 15. Call tone volume control (password protected) with automatic volume decrease at designated time of day (Quiet Mode). Quiet Mode can also affect radio pager beeping sequence.
 16. Capability to connect to a VPN connection for shop/factory troubleshooting, maintenance, reprogramming, and downloading future software upgrades.
 17. Capability for patient calls to report to any master configured on the nurse call system.
 18. Allow all masters configured on the same network to operate independently of each other
- C. System must have the ability to:
1. Interface with a wireless communication system
 2. Support patient stations for controlling the patient room TV and lights.
 3. Interface with computerized system(s) to receive external equipment alarms and optionally report such alarms to the facility EMR/EHR.
 4. Create productivity reports.
 5. Support two-way signalling and audio communication between console systems and audio-enabled devices.
 6. Create unlimited audio paging zones.
 7. Program any call type to transmit an automatic text message to any wireless pager, phone, or other wireless device.
 8. Activate unlimited number of auxiliaries signalling devices (ASD), connected to the system (i.e., zone dome lights or duty stations).

Part 2 Products

4.5.6 Material

- A. Wire and Conduit: provide in accordance with system requirements as recommended by the manufacturer and in accordance with all applicable codes and authorities having jurisdiction.
- B. All wall mounted stations shall be flush mounted using snap tight cover plates. Sub plates shall be slotted and adjustable for trimming the mounting for "squaring" the vertical and horizontal fit. All screws shall be hidden.
- C. All flush mount station buttons shall use a bio-seal cover to facilitate the use of disinfectant cleaners.

4.5.7 System Description

A. Architecture

1. The nurse call system shall be based upon a distributed network architecture that consists of intelligent devices (“Nodes”) that share status and event information over a common communications channel. The nurse call system shall be capable of being configured with up to 1200 intelligent nodes within one system.
2. Other non-intelligent system devices may be connected to the network for the purpose of initiating and annunciating calls and other system events using voltage coded inputs on system Room Controllers. The system Room Controllers shall further provide supervised serial interfaces for connecting Patient Stations, each Patient Station having voltage coded inputs permitting connection of additional non-intelligent system devices.
3. System devices shall be “hot swappable” and may be connected to or disconnected from the system without removing power to other system devices.
4. Each Node shall contain non-volatile memory that contains its individual operational programming, configuration, and status information.
5. The system shall provide a gateway through which ancillary system interfaces such as pocket pagers may be connected to the network. This gateway shall electrically isolate the ancillary interfaces so that any damage or electrical problems with them shall not affect the operation of the main system network.
6. The nurse call system shall allow sub-division into smaller Units and it shall further allow the programming of Zones that mirror the facility geography to increase ease of use for staff members and Groups of rooms spanning both Units and Zones called “Room Sets”. The system shall also be capable of vectoring Calls and system events to specific nurse stations, staff stations, pocket pagers, and corridor displays based on the Unit, Zone, and Room Set membership of the originating device. Units, Zones, and Room Sets shall be logical definitions programmed into individual nodes using a system configuration software utility. Systems whose unit and zone structure are determined by software configuration in a central controller or database shall not be acceptable.
7. The system shall provide at least 12 programmable Shifts that shall allow staff members to change call coverage and annunciation patterns within the system to accommodate operation under reduced staffing conditions (overnight hours) and allow for rooms to be operationally shifted from one care area to another (“swing rooms”). Shifts may be a combination of one or more Units or Zones and shall be logical, software-configurable groupings not determined by the wiring or physical layout of the system. Systems that do not support shifts or provide hard-wired shift configurations shall not be accepted.
8. The system shall support three levels of manual staff presence registration.
9. System power supplies shall include the following capabilities:
 - ... N + 1 Configuration.
 - ... Integrated battery charging circuitry
 - ... Backup batteries for 4 hours full operation.
 - ... Short circuit and thermal overload protection

B. Fault tolerance, supervision, and system survivability

1. Fault tolerance shall be a key requirement of the nurse call system. Intelligence and system control functions shall be distributed throughout the networked devices and shall not reside in a central control cabinet, processing unit, or communications exchange whose failure shall disable all or part of the system.

2. In the event of a network disconnection or failure, nodes shall continue to operate in a localized stand-
3. alone mode. Once communication with the rest of the system is restored the node shall again begin operating normally.
4. Intelligent node program software, status information, and system configuration parameters shall be stored in the node using non-volatile RAM so that it shall not be lost during power failure and disconnection. The device shall resume operation in exactly the same state that it was in prior to power removal and any calls or faults that were in progress shall be re-asserted when power is restored.
5. Room Controller nodes shall supervise the devices connected to them via voltage coded Call Lines and shall detect both open and short conditions. Call origination devices connected to Patient Stations shall be supervised for both connection to the station and cord damage (breakage or electrical short). Disconnection of the call device from the station shall produce a "Cord Out" alarm at the nurse stations and other call annunciation devices covering the patient station. Cord out alarms may be silenced by re-attaching the call cord or by pressing the "Cancel" button integrated into the patient station. Systems that use dummy plugs to simulate a call cord connection in order to silence a cord out call shall not be acceptable.

4.5.8 System Equipment

(a) Nurse Console Station/ Computer interface

- A. The display terminal is used as a supplemental display with a 15" touch screen monitor and is typically placed in a PABX room or other location where audio is not required from the patient room. The display terminal provides visual call display and sound only. The computer display terminal must have the ability to:
 1. Configure call annunciation.
 2. Configure call priority to determine call order.
 3. Mute active calls so that new incoming calls produce sound.
 4. Interface with paging system(s) to send alert pages to staff.
 5. Use same .wav files as the nurse call system software applications for call tones and priorities.
 6. Send staff information from another master or be manually entered.
 7. Receive patient information from the database management application via HMS or be manually entered.
 8. Support a mouse and keyboard.
- B. The computer interface must:
 1. Provide map mode customization to allow an entire unit to be graphically viewed by staff. Calls to be displayed in each room with no limit on the number of simultaneously displayed calls. Patient requests, staff presence, and admitted patients may be visually displayed on the map.
 2. Display simultaneous and constant patient requests and staff location in either a list or graphical (map) format. Multiple staff level location displays should be separate and designated by unique colours.

3. Display incoming calls by room number, bed number and call type. Call type to be differentiated by audible tone and screen colour. Patient name may be configured to display on screen with each call. Hospital should designate field programmable tones, colours, and flash rates. Settings can be changed at any time by factory-certified technician.
4. Display recalled patient calls and service request not answered within an allotted amount of time. An elapse timer should indicate the length of time the call is in the system. The hospital should have the ability to set recall time limits for all individual call types and tasks for all levels of staff.
5. Display original request upon recall with the ability to use the same or add additional requests as required.
6. Display at all times the hospital name, floor/unit name, time of day, and system status indicators.
7. Allow on-site configuration of room numbers, zone paging, patient priority, zone lights, and duty station assignments. Any combination of alphanumeric room configurations are allowable to a maximum of nine characters.
8. Provide auto-page feature (where applicable) to allow assigned staff to be paged automatically when any patient call is placed. The message on the wireless device must indicate location (room and bed) and the call type (Routine, Bath, etc.).

C. The computer interface must have the ability to:

1. Place a call on hold while answering a higher priority call. Any number of calls can be placed on hold with an on-screen indicator of ON HOLD status while the elapsed timer continues to run.
2. Support location mapping on all master models.
3. Register and locate staff by constant display in either a list or graphical (map) format.
4. View active staff requests on a monitor in either a list or graphical (map) format.
5. Set patient status at the console system to be Routine, Priority, or Emergency. Call should display on-screen based on status and have unique tones and colours for each call type.
6. Mute calls for a predetermined amount of time to allow staff to assist patients without annunciating the call at the console system.

(b) Distribution Panel Networking

A. General Description:

The distribution panel is used with the nurse call system and consists of up to eight controller boards, audio controller, and network switch. All nurse call distribution panels must:

1. Have the ability to be networked.
2. Use standard network cabling.
3. Communicate over IP-based network.
4. Be able to run networked or independently from the network.
5. Support unlimited number of distribution panels to be networked together.
6. Support remote or local network-based configuration.

B. Functionality

The distribution panel must have the ability to support:

1. Up to 128 dome lights.
2. Up to eight nurse console stations.
3. Notification of system failures.
4. Reporting for up to eight nurse console stations.
5. Eight external audio connections.
6. Full duplex audio.
7. Expansion by networking additional distribution panels.
8. Either surface or flush mount.
9. Notification of system failures.

(c) Nurse Station Equipment

A. Master/ Nurse Stations

1. Nurse Station (Master Station) Shall be Microprocessor based nurse control station with LCD touch display suitable for displaying the patient information described above indicating pending calls, assigned services, location of staff members by type and level, and other optional information about those rooms.
2. It Shall be capable of managing all calls, presences, and other events within the unit(s).
3. The Station tone signalling shall continue until a call is acknowledge. Tones shall include call reminder, call announce.
4. Each nurse console station is capable of displaying active calls, service requests, and staff locations in either graphical area map or list format.

Nurse console stations shall have:

1. Touch screen with integrated handset.
2. Graphical user interface.
3. Full duplex, high quality, two-way voice communication with adjustable volume.
4. Staff assignment and patient information.
5. Call list and active call list display, service request, and staff location capability via software.
6. Highly customizable features to meet nursing unit's needs.
7. Routine, priority, and emergency call annunciation throughout the NCS.
8. Unlimited call tones with adjustable volume level and repeat interval for each call type.
9. Capability for facility to control time and volume levels for Quiet Mode feature.
10. Nurse console stations must have the ability to support:
11. Information exchange of patient, staff, and other data between nurse consoles.
12. Cancellation of emergency and code calls only at the originating calling device.
13. Cancellation of routine calls from the device where the call originated, from any nurse console system assigned to receive call, or at a designated remote locator station.

14. Full messaging capability for pagers, text paging, and wireless devices with messaging interface software.
15. Ability to interface with the facility Hospital Information Management System with optional interface software.
16. Active call LED to match dome light colours.
17. One-button switching between a call list mode and a graphical floor map mode.
18. Staff location mapping in either graphical floor map or list format.

(d) Patient Room Equipment

A. Dome Light

The dome light provides clear visual notification to staff members of a room's status. The dome light must have:

1. A mini-dome LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.
2. Flexibility to connect to other devices, dome lights or controller.
3. Ability to display patient and room status while maintaining privacy.
4. Unique call assurance tone based on button pressed.
5. Capability to be used as a standalone or integrated into a nurse call system
6. Built-in speaker for call annunciation and feedback.
7. Up to six rounding timers with visual status to remind staff to check on a patient or room state.
8. Up to six status timers with visual status for staff reminders.
9. Optional Code Blue stat timer triggered by external event.
10. Network supervision.
11. Transport request paging function.
12. Field or remote configurable contact closure output relay.
13. Two configurable optically isolated inputs.
14. Ability to customize LED colours and flash rates on a per call type basis.
15. Solid, slow and fast flashing, and scrolling indications.
16. Built-in buzzer configurable for any call type.
17. Normal and emergency calls distinguished by different visual signals for positive identification of call priority.
18. Multisegmented luminary that allows multiple colours to be displayed simultaneously.
19. Adjustable LEDs through white balance control.

20. Power-up test sequence to verify proper LED illumination.
21. Wall or ceiling mounts for increased visibility from most angles.
22. Translucent lens sections, which allow maximum visibility in all directions under high ambient lighting conditions.
23. Optical contact closure input, configurable to any type of alarm.
24. Programmable contact closure output relay.
25. Ability to be used as zone light.
26. Automatic detection of attached devices during initial configuration.
27. Network supervision.

B. Patient Stations

1. Patient Station Shall be Single or double installed inside the Bed head units and shall be used to initiate and cancel calls for assistance and shall be fully supervised by the room controller.
2. It Shall include sockets with quick-disconnect design for the connection of call cord or call pendants and shall offer the following features:
 - a. Call initiation devices connected to the socket shall be automatically supervised for cord removal from the socket and for cord wire short or breakage between the socket and the call button
 - b. Breakaway" design of the socket shall allow cords to detach from the station when pulled without causing damage to either the cord or the station
3. Patient Station shall include three color-coded, integrated buttons with field-exchangeable caps and three associated reassurance LEDs.
4. The room controller shall report a fault condition if the wiring between the controller and the Patient Station is severed, shorted to ground, or shorted to power.
5. Patient stations are available in both a single or dual patient configuration and shall offer the following features:
 - a. Ability to be flush mounted directly to the back-box.
 - b. Ability to incorporate an easy-to-mount solid faceplate with station circuit boards attached.
 - c. Sub plates that can be removed or unsnapped only with the use of a tool.
 - d. Ability for full duplex audio when a pillow or external speaker is attached (1-gang single patient station).
 - e. Standard configuration of Routine, Cancel and Staff Emergency buttons. Code Blue option replaces Staff Emergency button (1-gang single patient station).
 - f. Compatibility with both VoIP and analogue systems.
 - g. Cleaning mode to prevent accidental call placement.

- h. Call assurance LED.
- i. Unique call assurance tone based on button pressed.
- j. Connectivity to the dome light.
- k. Cord-out override without requiring dummy plugs.
- l. External speaker connection.
- m. Compatibility with patient bed interfaces.
- n. Privacy LED that illuminates whenever microphone is active
- o. Support for television and room light controls.
- p. Network supervision.
- q. Configurable alert types.
- r. Ability to accept requests from nurse console station.
- s. Compatibility with side rail bed communications and bed exit emergency alarms.

C. Staff Stations

Used for voice communication between the nurse station and other nonpatient occupied areas such as nurses' lounge, waiting rooms, locker rooms, and break rooms. The Staff Station and shall offer the following features:

1. Standard configuration of Routine and Cancel buttons, with additional ¼" auxiliary input, Code Blue and Staff Emergency button options.
2. An internal speaker.
3. Buzzer to annunciate assigned duties.
4. An internal two-way audio system to ensure communication if a pillow speaker or bed disconnects.
5. Ability to be flush mounted directly to the back-box.
6. Ability to incorporate an easy-to-mount solid faceplate with station circuit boards attached.
7. Sub plates that can be removed or unsnapped only with the use of a tool.
8. Compatibility with both VoIP and analogue systems.
9. Cleaning mode to prevent accidental call placement.
10. Call assurance LED.
11. Unique call assurance tone based on button pressed
12. Connectivity to the dome light.
13. Cord-out override without requiring dummy plugs.
14. External speaker connection.

15. Compatibility with patient bed interfaces.
16. Remote jack capabilities.
17. Privacy LED that illuminates whenever microphone is active.
18. Support for television and room light controls.
19. Network supervision.
20. Configurable alert types.
21. Ability to accept requests from nurse console station.
 - a. Compatibility with side rail bed communications and bed exit emergency alarms.

D. Push/Pull Station

1. Emergency Station shall be a wall mounted; single-gang station used to signal emergency level calls.
2. It Shall include a large, easy to activate pull switch and integrated call reassurance LED.
3. Visible call assurance LEDs indicating a call is placed.
4. Large CANCEL button for cancellation of calls.
5. Yellow push-for-assistance button and pull cord allow for two call types from the same device.
6. Adjustable length pull cord for emergency calls.
7. Water-resistant gasket for shower stations.
8. Ability to connect to a remote water-resistant pull cord.
9. Ability to utilize multiple pull cord options, such as antimicrobial, glow in the dark.
10. Flexibility to connect to other devices, dome lights, or controller.
11. Unique call assurance tone based on button pressed.
12. Network supervision.
13. Field or remote configurable contact closure output relay.
14. Two configurable optically isolated inputs.

E. Emergency Pull Cords

Used to alert staff members of the location where prompt emergency help is required. These devices offer the following features:

1. Large color-coded labels for placement of calls.
2. Ability to display a visible call assurance LED when call is placed.

3. Large color-coded CANCEL or CANCEL AT TOILET label for cancellation of calls.
4. Flexibility to connect to other devices, dome lights, or controller.
5. Adjustable length pull cord that extends to the floor.
6. Ability to connect to a remote water-resistant pull cord.
7. Water-resistant gasket for shower stations.
8. Ability to utilize multiple pull cord options, such as antimicrobial, glow in the dark.
9. Unique call assurance tone based on button pressed.
10. Network supervision.
11. Field or remote configurable contact closure output relay.
12. Two configurable optically isolated inputs.
13. Ability to duplicate all buttons and LED functions on a secondary device.
14. Ability to activate a remote LED configurable for
15. dome colours and 7 flash assignments with ability to connect an additional remote lamp.

(e) Enhanced Duty Station

For remote call annunciation in areas such as nurse lounges, locker rooms, break rooms, soiled utility, clean utility, and med rooms. The duty station must have:

1. Multicolor LED.
2. Support for 16 different tone patterns.
3. Same call tones as nurse console configuration. Excludes custom tones.
4. Capability to temporarily silence using mute button.
5. (Available with no mute button.)
6. Flexibility to connect to other devices, dome lights, or controller.
7. Network supervision.
8. Availability for value engineered option without same call tones as nurse console configuration.
9. Adjustable volume level for each call tone.
10. A mini-dome LED configurable for 15 dome colours and 7 flash assignments with ability to connect an additional remote lamp.

4.5.9 Nurse Call System Software

Nurse call system software is a combination of server programs and user interface software that together deliver a complete nurse call management system.

- A. The user interface software that runs on the nurse console station shall offer the following features:
1. Ability to display all calls and staff locations via interactive map mode.
 2. Ability to import and display custom floor plan.
 3. Configurable menu task bar.
 4. Ability to set user-defined call tones, colours.
 5. Ability to set user-defined quiet mode parameters.
 6. Ability to show, at all times, detailed patient attributes such as gender, fall risk, isolation requirements, etc., via icon or text.
 7. Method to manually input detailed patient attributes into the nurse console station. (Not dependent on additional workstation.)
 8. Ability to input staff and set assignments directly into the nurse console station. (Not dependent on additional workstation.)
 9. Ability to accept staff information, scheduling, and assignments from an external system.
 10. Call answer screen for all incoming alerts and requests which includes multiple one-touch task selection, patient information, acuity level, alert type, and other user-defined parameters.
 11. Store unlimited pre-set alphanumeric messages sent to any combination of specific staff member(s), team(s) or individual pager numbers.
 12. Use an auto-page mode to direct all call levels to the pager assigned to the bed placing the call. Hospital must have the ability to determine which level(s) of calls go to any or all of the pagers assigned to the bed.
 13. Enable assigned staff member(s) to be paged automatically, using an auto-page feature, when any patient call is placed. Page message shows source of call (room, bed) and call type placed (Routine, Bath, Staff Emergency, etc.).
 14. Automatic escalation allowing a support staff member to be paged if a primary staff member does not respond to call/request in a specified time period.
 15. Supervisor Page feature allowing supervisory staff members to be automatically paged when a patient request is not completed the primary staff or support staff in a specified time period.
 16. Ability to manually message desired staff member by team, room assignment, name, or wireless device ID.
 17. Store the last eight manually input transmitted messages and recipients for easy re-paging.
 18. Assign any staff member to any wireless device or team.
 19. Assign an unlimited number of staff to any patient bed.
 20. Send an unlimited number of stored messages to any wireless device from any nurse console system in the system.
 21. Ability to schedule user-defined messages.

22. Have patient alert routed directly to the staff member(s) or team(s) assigned to the patient. The nurse call system must continue to indicate the alert until the assigned staff member cancels the alert in the room or the patient alert is answered at the nurse console system. The wireless device must display: alert type, room and bed number of the alert, and patient need in plain English format.
 23. Capability to swing (move) patient calls between console systems.
 24. Password protection for critical and noncritical levels of system setup, allowing access to authorized personnel only.
 25. Call tone volume control (password protected) with automatic volume decrease at designated time of day (Quiet Mode). Quiet Mode can also affect radio pager beeping sequence.
 26. Automatic notification to Environmental Services on patient discharge.
 27. Display at all times the room state on graphical floor map (clean, dirty, out-of-service).
 28. Audio capabilities to provide simultaneous communication to configurable groups of rooms.
 29. View and the ability to print real-time reports, such as staff assignment and patient information.
- B. Nurse Call System Web Interface

The nurse call system Web interface is a Web-based server software that provides access to many functions of the nurse console systems. This interface has the ability to:

1. Send text-based messages to wireless devices.
2. View and edit the patient room housekeeping status.
3. View staff members and edit profiles and room assignments.
4. View and edit patient profiles.
5. View the location of medical equipment (if used with a Real Time Locating System).
6. Apply security features to manage roles and accessibility.

Part 3 Execution

4.5.10 Inspection

- A. Examine areas and conditions under which nurse call system is to be installed. Notify Architect in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

4.5.11 Installation

- A. Examine areas and conditions under which nurse call system is to be installed. Notify Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturer's wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type recommended by the manufacturer.

- C. All equipment shall be furnished as required for mounting as directed by the manufacturer.
- D. All wiring shall be colour coded throughout and be provided and installed as per manufacturer's wiring diagram.
- E. The system shall be arranged to receive power from 240 volt, 50HZ emergency supplied circuits. All low voltage operation shall be provided within control cabinets.
- F. Field Quality Control: The completed system shall be fully tested under the supervision of a trained manufacturer's representative. The system shall be demonstrated to perform all of the functions as specified.
- G. Each individual system operation on a per area basis shall be tested for its complete operation. Procedure for testing each system shall be set forth with the consent of both architect and manufacturer.

4.6 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.

4.7 Samples

The Contractor shall allow in his tender price for supplying the engineer with samples for the light current equipment. The samples to be provided shall include: One unit of each devices, patch panels, cables, TV outlets telephone outlet, data outlet, MCB, fire alarm accessories (excluding panel), Nurse call accessories.

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 Data racks, Control panels, UPS, Cables, CCTV Cameras, NVR, fire alarm panel, Nurse call System Equipment etc.

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.

4.8 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.

SECTION 5

BILLS OF QUANTITY

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 Center at Kisii Teaching and Referral Hospital

Bill of Quantities for Light Current Installations

Item	Description	Unit	Qty	RATE (USD)	Amount (USD)
	GENERAL ITEMS				
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	10,000	10,000
A/2	Allow for the preparation of all working design drawings as specified (Minimum No. of drawings required - 30 No. Size A1)	Sum	1		
A/3	Preparation of 'As Installed Drawings", printing and distribution as specified. Drawings to include: (a) hard copies - 3 sets of each. (b) AutoCAD on CD – 3 No. (c) Operational Instructions, manuals and test certificates	Sum	1		
A/4	Allow for supply of spare parts as detailed in the data schedules	Sum	1		
A/5	Allow for supply of special tools as detailed in the data schedules	Sum	1		
A/6	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 for General Items Carried forward to the Summary Page					

Proposed Cancer Center at Kisii Teaching and Referral Hospital

Bill of Quantities for Light Current Installations

B	<u>STRUCTURED CABLING SYSTEM</u>				
	<u>CABLING</u>				
B/1	Supply, install, connect, test and commission Single Data/ Telephone Outlet cabling, with Copper cable, category 7 F/FTP, low smoke zero halogen (LSZH), 4-pair, conductors with PE insulation, twisted in pairs, wrapped in foil, surrounded by an overall metallic foil shield and protected by a low smoke, flame retardant LSZH jacket connected to Data Rack located in wiring center, drawn in PVC HG conduit including all necessary accessories and ancillary works and materials required for a complete and a fully functional installation as specified and as indicated on the drawings.	No.	1,140		
B/2	Ditto as item above but for voice outlet	No.	275		
B/3	Ditto as item above but for for 1No.Data (Wireless Access Point)	No.			
B/4	Ditto as item above but for for 1No.Data (IP CCTV camera)	No.	195		
B/5	Supply, install, connect, test and commission of Backbone fibre optic cable tight buffered, internal only application, OM5, 50/125 12 core multimode fibre, LSOH sheathed including; multimode connectors, couplers and termination and all necessary accessories and ancillary works and materials required for complete fully functional installation as specified and as indicated on the drawings	m	2,500		
B/6	Supply, install, connect, test and commission Backbone single mode 9/125 fibers optic cable OM5 including all necessary accessories and ancillary works and materials required for a complete and fully functional installation as specified and as indicated on the drawings	m	500		
B/7	Supply and install Category 7, 10 Gb/s S/FTP patch cord with TX6A™ 10Gig™ Modular Plugs on each end. International Gray, 1 meters	No.	1,000		
	Sub-total Carried forward to next page				

Proposed Cancer Center at Kisii Teaching and Referral Hospital

Bill of Quantities for Light Current Installations

	Brought forward from previous page				
B/8	Ditto as item above but 3 meters .	No.	600		
B/9	Ditto as item above but 5 meters.	No.	200		
B/10	Supply and installation of fiber optic OM5 LC duplex to LC duplex patch cord, low smoke zero halogen (LSZH) 16mm jacketed cable.	No.	180		
	DATA OUTLETS				
B/11	Supply, install, connect, test and commission data outlet, Category 7, RJ45, 10 Gb/s, 8-position, 8-wire universal shielded black module with integral shield, complete with faceplate outlet, 45mm x 45mm adapter with one 1/2-size sloped shuttered insert, accepts two modules, includes label and label cover. Arctic White and all necessary accessories and ancillary works and materials required for a complete installation and fully functional system as specified and as indicated on the drawings as follows:				
a	Single Data Outlet.	No.	120		
b	Dual Data Outlet.	No.	170		
c	Data & Voice Outlet.	No.	230		
d	RJ45 Cat.6A Data Outlet for Wireless Access Point.	No.	66		
	ICT DATA RACK CABINET				
B/12	FLOOR ICT DATA RACK CABINET: Supply, install, connect, test and commission ICT 42U (800mm x 800mm) Powder Coated free standing cabinet complete with with 2 No. rack mounted power distribution units-13 amps - 12 outlets, as APC or equal, surge protection, Fan Trays, earthing kits, vertical and horizontal management, glass door, labeling and all necessary accessories and ancillary works and materials required for complete installation specified and as indicated on the drawings:	No.	10		
	Sub-total Carried forward to next page				

Proposed Cancer Center at Kisii Teaching and Referral Hospital

Bill of Quantities for Light Current Installations

	Brought forward from previous page				
B/13	FLOOR ICT DATA RACK CABINET: Supply, install, connect, test and commission ICT 32U (600mm x 800mm) Powder Coated free standing cabinet complete with with 2 No. rack mounted power distribution units-13 amps - 12 outlets, surge protection, Fan Trays, earthing kits, vertical and horizontal management, glass door, labeling and all necessary accessories and ancillary works and materials required for complete installation as specified and indicated on the drawings.	No.	2		
B/14	Supply, install, connect, test and commission 24 Port modular all metal shielded angled copper patch panel, Category 6A, RJ45, 10 Gb/s, 8-position, 8-wire universal shielded black module with integral shield.	No.	99		
B/15	Ditto as item above but 12 Port modular patch panel.	No.	6		
B/16	Ditto as item above but 48 Port modular patch panel.	No.	5		
B/17	Supply, install, connect, test and commission 12 Port Duplex fibre patch panel complete with Fiber Optic Splice Module protects up to 24 fusion splices Includes base and LC 10Gig™ OM4 FAP loaded with six LC 10Gig™ Duplex Multimode Fiber Optic Adapters (Aqua) with zirconia ceramic split sleeves.	No.	15		
B/18	Supply, install, connect, test and commission 1-U cable managers complete with covers.	No.	80		
B/19	Supply, install, connect, test and commission 5.0kVA Online Double-Conversion UPS, rack mount 3U, LCD, Unity Power Factor (VA=W) with Power Factor Correction (PFC) system, 3-years warranty on UPS, 2-years warranty on batteries	No.	10		
	Sub-total Carried forward to next page				

Proposed Cancer Center at Kisii Teaching and Referral Hospital

Bill of Quantities for Light Current Installations

	Brought forward from previoud page				
B/20	SERVER ROOM DATA RACK CABINET: Supply, Install, Connect, test and commission ICT 42U (1200mm x 800mm) Powder Coated free standing cabinet complete with with 2 No. rack mounted power distribution units, 13 amps - 12 outlets, surge protection, Fan Trays, connection to Telecom Grounding Bar, vertical and horizontal management, glass door, labeling and all necessary accessories and ancillary works and materials required for complete installation as specified and as indicated on the drawings:	No.	2		
B/21	INTERNET SERVICE PROVIDER CABLE TERMINATION RACK CABINET: Supply, Install, Connect, test and commission ICT 42U (800mm x 800mm) Powder Coated free standing cabinet complete with with 2 No. rack mounted power distribution units, surge protection, Fan Trays, connection to Telecom Grounding Bar, vertical and horizontal management, glass door, labeling and all necessary accessories and ancillary works and materials required for complete installation and operation as specified and as indicated on the drawings:	No.	2		
B/22	Testing and commissioning of Structured Cabling system	Item	1		
Total for Structured Cabling Carried forward to the Summary Page					

Proposed Cancer Center at Kisii Teaching and Referral Hospital

Bill of Quantities for Light Current Installations

C	NURSE CALL SYSTEM				
C/1	Addressable Nurse Call System Control Panel	Sum	1		
C/2	Two Way Communication Nurses Call Repeater Station (Staff Console) complete with RJ45 Connector and any other associated accessories	No	2		
C/3	Nurse Call LCD Visual Display unit; Surface wall/ desk mount	No.	67		
C/4	Addressable Nurse patient standard call point	No.	85		
C/5	Nurse Call Fuse Junction Box	No.	26		
C/6	Emergency Bathroom Ceiling Pull Switch With Indicator as Intercall or equal and approved	No.	7		
C/7	Emergency Reset Button (Bathroom) Connector and any other associated accessories	No.	7		
C/8	Overdoor Warning Light	No.	115		
C/9	System cabling, termination, testing and commissioning	Sum	1		
C/10	Allow for any other material required to complete the Nurse Call system installation for a complete and fully operational solution.	Sum	1		
C/11	Operation and maintenance manuals and training for the technical staff.	Sum	1		
Total for Nurse Call System Carried forward the Summary Page					

Proposed Cancer Center at Kisii Teaching and Referral Hospital

Bill of Quantities for Light Current Installations

D	CCTV & SURVEILLANCE SYSTEM				
	Supply, install, connect, test and commission a complete IP Network CCTV System complete with all necessary equipment and fittings including softwares(License & programming), cables, conduits, boxes, camera support, pendant caps, accessories, coordination with all other trades, and all other incidentals required to provide a complete installation and a fully operational system integrated with other systems as specified and indicated on the drawings up to the satisfaction of the engineer for the following				
	CAMERA AND COPPER CABLES				
	Supply High Definition, True Day/ Night IR, Fixed Indoor Dome POE IP Camera, 3MP @30fps WDR off/on, with original chipset, 4.6mm fixed focal lens, H.265, IR viewable length 30m, 120dB WDR, USB port for easy installation, ONVIF compatibility, advanced video analytics including Loitering, Directional detection, Fog detection, Digital auto tracking, Sound classification, Heatmap, People counting, Queue management, Tampering, Motion detection, High powered IR LEDs range of 98', dual SD card, hallway view, HLC, DIS , PoE (802.3-af) 12VDC/24VAC, IP67, Audio, IK10Nema 4X, with suitable ceiling/wall/telescopic mounting accessories - Warranty 3 years	No.	80		
D/1	Fixed outdoor bullet IP camera, power over ethernet (PoE) WATERPROOF complete with housing and installation kits, features original chipset as core technology, 5MP resolution, full HD(1080p) @60fps WDR off or @30fps WDR on, motorized vari-focal Lens 4.3x (2.8~12mm) (119.5~27.9°), IR viewable length 70m, 150dB WDR, USB port for easy installation, ONVIF compatibility, advanced video analytics, loitering, directional detection, fog detection, tampering, Motion detection, object enter or exit an area and sound classification, high powered IR LEDs range of 164', True D/N, dual SD card, hallway view, HLC, defog detection with simple focus, DIS, 12VDC/24VAC/PoE, IP67, IK10, NEMA 4X, built-in -40°F with suitable ceiling/wall/telescopic mounting accessories as (warranty 3 years)	No.	20		
	Sub-total Carried forward to next page				

Proposed Cancer Center at Kisii Teaching and Referral Hospital

Bill of Quantities for Light Current Installations

	Brought forward from previous page				
	<u>MAIN SYSTEM, CONTROL ROOM AND SECURITY WORKSTATIONS STATIONS</u>				
	Supply, install, connect, programm, test and commission Integrated Security Management System server complete with power supply, software, software interfaces, operating systems, licenses, video surveillance module, access control module, intrusion detection and X-ray module and all software and hardware equipment.				
D/6	Control Room Monitoring Tower – Intel Core i7 Quad-Core CPU, 16GB RAM, 1TB HDD, Matrox Pro PCIe Quad-Graphics Card, Windows 10-Pro 64-Bit OS	No.	1		
D/7	Industrial Grade Full High-Definition LED Desktop Monitors 24" - warranty 36	No.	1		
D/8	Industrial Grade Full High-Definition LED Wall-Mount Monitors 32" - warranty 36	No.	4		
D/9	Command and Control unified Security Platform including: 1 Directory, 10 Security Desk client connections (incl. Web Client), Mapping Interface, Alarm Management, Advanced Reporting, System Partitioning, Zone Monitoring, IO Modules Support, Email Support, Macros Support, Support for server virtualization. Ability to fully control and monitor all security entities from single data base including Video Management System, Access Control, Intrusion detection system, Fire detection alarm system, Visitor Management system, BMS and Elevators system control and monitoring.	Item	1		
D/10	Video Management Software including all device licenses	Item	1		
D/11	Integration of Public Address/EVAC Voice Alarm system to Integrated Security Management Security Platform	Item			Future
D/12	Interface with BMS according to BMS I/O schedule including all necessary software & hardware	Item			Future
	Sub-total Carried forward to next page				

Proposed Cancer Center at Kisii Teaching and Referral Hospital

Bill of Quantities for Light Current Installations

	Brought forward from previous page				
D/13	Any other additional equipment, materials accessories and works not detailed but may be required for proper installation and operation of above CCTV system (Enclose a breakdown)	Item	1		
D/14	Spare parts and extra materials as included in the relevant specifications.	Item	1		
D/15	Operational and maintenance manuals, 'As built drawings' and Training of the technical staff.	Item	1		
D/16	Testing and commissioning of IP CCTV system	Item	1		
Total for CCTV System Carried forward the Summary Page					

SECTION 5

Extra Low Voltage Systems

Main Summary

PROPOSED CANCER CENTRE AT KISII TEACHING AND REFERRAL HOSPITAL

Light Current Installations Tender Summary Page

Item	Description	Amount (USD)
i	Preliminaries	
A	General Items	
B	Structured Cabling and IP PBX System	
C	Nurse Call System	
D	CCTV & Surveillance System	
Total for Light Current Installations carried forward to the Grand Summary Page for The Electrical Installations (Exclusive VAT)		
Amount in words.....		
Tenderer's Name and Stamp		
Address		
Period to Execute the Works		
Telephone Number		
Mobile Phone Number		
Tenderer's V.A.T No		
Tenderer's Signature Date.....		
Witness Signature Date.....		

SECTION 6

Data Schedules

DATA SCHEDULE A - GENERAL

Item	Description	Manufacturer	Name of Local Agent	Delivery to Site in weeks
1	IP PABX			
2	Nurse Call System			
3	Data Cabinet			
4	Unshielded twisted pair copper cables (UTP)			
5	Fibre-optic cable,			
6	Patch panels			
7	Fibre optic patch panels			
8	Work station PC			
9	Power Distribution Units			
10	Video Management Software			
11	Network video recorder			
12	CCTV CAMERAS			
13	Monitor Screen			
14	Network Switch			
15	Data Cabinet			
16	Wireless access points and controllers.			

17	Rack-mount UPS units			
18	Firewalls			
49	Network management system			
50	FIBRE			
51	IP telephone system			

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		
2		
3		
4		

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.

<u>Item</u>	<u>Name and Address of Sub-Contractor</u>
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
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Access Control

Main Access Control Panel

Electric gate Control panel

Licence Plate recognition

Traffic Boom Barrier

Turnstile

CCTV CAMERAS

Monitor Screen

Workstations

Cable and wiring

X Ray Baggage Scanner

Walk Through Metal Detector

Voice Evacuation System

Network Switch

Patch Panel

Data Cabinet

Wireless access points and controllers.

Rack-mount UPS units

Firewalls

Network management system

IP telephone system

ELV Systems

5-6

Issue 1.0

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
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SECTION 7

Standards

CODES AND STANDARDS

Work shall be performed in accordance with the applicable international and local codes or standards current at the commencement of installation. The following list summarizes the applicable codes and standards:

- 1) Kenya Bureau of Standards (KBS)
- 2) Institution of Electrical Engineers (I.E.E) Wiring Regulations
- 3) EN 50173-1:2011 - Information Technology—Generic Cabling Systems—Part 1: General Requirement
- 4) EN 50173-2:2007+A1:2010 - Information Technology—Generic Cabling Systems—Part 2: Office Premises
- 5) EN 50173-5:2007+A1:2011 - Information Technology—Data Centres
- 6) EN 50173-99-1:2007 - Cabling Guidelines in Support of 10 G Base-T (work in progress)
- 7) EN 50174-1:2009+A1:2011 - Information Technology—Cabling Installation—Part 1: Specification and Quality Assurance
- 8) EN 50174-2:2009+A1:2011 - Information Technology—Cabling Installation—Part 2: Installation Planning and Practices Inside Buildings
- 9) EN 50174-3:2003 - Information Technology—Cabling Installation— Part 3: Installation Planning and Practices Outside Buildings
- 10) CENELEC EN 50310:2010 - Application of Equipotential Bonding and Earthing in Buildings with Information Technology Equipment
- 11) CENELEC EN 50346:2008+A1:2008+A2:2010 - Information Technology—Cabling Installation— Testing of Installed Cabling
- 12) IEEE 802.1 series – Port-based Network Access Control
- 13) IEEE 802.3 series – Ethernet-based LANs
- 14) IETF RFCs
- 15) ITU-T H.323 Packet-Based Multimedia Communications Systems
- 16) IEEE 802.11 - Base standard including CSMA/CA protocol
- 17) IEEE 802.11a - 5GHz, 54Mbit/s Physical layer
- 18) IEEE 802.11i - WLAN security standard

- 19) IEEE 802.11n - 2.4GHz/5GHz, 540Mbit/s Physical layer
- 20) Wi-Fi Alliance - WLAN Interoperability Certifications
- 21) IEEE 802.11ac
- 22) WPA™ - Wi-Fi Protected Access
- 23) WPA2™ - Wi-Fi Protected Access, security compliant to IEEE 802.11i
- 24) WMM™ - Wi-Fi Multi Media, QoS in line with draft IEEE 802.11e
- 25) TIA TR42 - WLAN TSB
- 26) ISO/IEC TR 24704 - Information Technology Customer Premises Cabling for Wireless Access Points
- 27) IEEE 802.3af - Power over Ethernet Standard
- 28) BS 6701: Telecommunications equipment and telecommunications cabling - Specification for installation, operation and maintenance.
- 29) BS EN 50173 series: Information Technology - Generic Cabling Systems.
- 30) BS EN 50174 series: Information Technology - Cabling installation.
- 31) BS 6701: Telecommunications equipment and telecommunications cabling – Specification for installation, operation and maintenance.
- 32) BS EN 50173-1: Information technology – Generic cabling – General requirements.
- 33) BS EN 50173-2: Information technology – Generic cabling – Office premises.
- 34) BS EN 50173-3: Information technology – Generic cabling – Industrial premises.
- 35) BS EN 50173-4: Information technology – Generic cabling – Homes premises.
- 36) BS EN 50173-5: Information technology – Generic cabling – Data centres premises.
- 37) BS EN 50174-1: Information technology – Cabling installations – Specification and quality assurance.
- 38) BS EN 50174-2: Information technology – Cabling installations – Installation and planning and practices inside buildings.
- 39) BS EN 50174-3: Information technology – Cabling installations – Installation and planning and practices outside buildings.

- 40) BS EN 50310: Application of equipotential bonding and earthing in buildings
- 41) BS EN 50346: Information technology – Cabling installations – Testing of installed cabling.
- 42) BS EN 61935-1: Specification for the testing of balanced and coaxial information technology cabling. Installed balanced cabling as specified in the standards series EN 50173.
- 43) BS 6266: Code of practice for fire protection for electronic equipment installations.
- 44) BS 6396: Electrical systems in office furniture and educational furniture-Specification.
- 45) BS 7083: The accommodation and operating environment for Information Technology (IT) equipment.
- 46) BS 7671: Requirements for electrical installations. IEE Wiring Regulations.
- 47) BS 7799-1: Information technology - Security techniques - Code of practice for information security management. [aka BS ISO/IEC 27002]
- 48) BS 7799-2: Information technology - Security techniques – Information security management systems - Requirements. [aka BS ISO/IEC 27001]
- 49) BS 7799-3: Information security management systems - Part 3: Guidelines for information security risk management.
- 50) BS 8220-2: Guide for Security of buildings against crime — Part 2: Offices and shops.
- 51) BS 8492: Telecommunications equipment and telecommunications cabling-Code of practice for fire performance and protection.
- 52) BS EN 12464-1: Light and lighting - Lighting of work places - Part 1: Indoorwork places.
- 53) BS EN 12825: Raised Floor Access.
- 54) BS EN ISO 14644-4: Cleanrooms and associated controlled environments. Design, construction and start-up.
- 55) BS ISO/IEC 14763-2: Information technology - Implementation and operation of customer premises cabling - Planning and Installation.
- 56) BS ISO/IEC 14763-3: Information technology - Implementation and operation of customer premises cabling - Testing of optical fibre cabling.

- 57) BS EN 50098-1: Customer premises cabling for Information Technology -ISDN basic access.
- 58) BS EN 50098-2: Customer premises cabling for information technology -2048 kbit/s ISDN primary access and leased line network interface.
- 59) BS EN 50288-1: Multi-element metallic cables used in analogue and digital communication and control. Generic specification.
- 60) BS EN 50288-6-1: Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for unscreened cables
- 61) BS EN 50468: Resistibility requirements to overvoltages and overcurrents due to lightning for equipment having telecommunication ports
- 62) BS EN 60603-7 Series: Connectors for electronic equipment. Detail specification for 8-way, unshielded, free and fixed connectors.
- 63) BS IEC 61000-5-2: Electromagnetic Compatibility (EMC) - Installation and mitigation guidelines - Earthing and cabling.
- 64) BS EN 61000-6-3: Electromagnetic compatibility (EMC) - Generic standards - Emission standard for residential, commercial and light-industrial environments.
- 65) BS EN 61000-6-4: Electromagnetic compatibility (EMC) - Generic standards - Emission standard for industrial environments.
- 66) BS EN 61935-2: Testing of balanced communication cabling in accordance with series EN 50173. Patch cords and work area cords. Blank detail specification for class D applications
- 67) BS EN 62305-1: Protection against lightning — Part 1: General principles.
- 68) BS EN 62305-2: Protection against lightning — Part 2: Risk management.
- 69) BS EN 62305-3: Protection against lightning — Part 3: Physical damage to structures and life hazard.
- 70) BS EN 62305-4: Protection against lightning — Part 4: Electrical and electronic systems within structures.
- 71) PD CLC/TR 50173-99-1: Cabling guidelines in support of 10 GBASE-T.
- 72) National Fire Protection Association National Fire Codes, current edition
- 73) IEEE, RS 170 variable standard
- 74) IEEE, 802.3 digital data network standard

- 75) EIT/TIA-568A premises cabling standard
- 76) Compliant with ISO/IEC 14496 standard (also known as MPEG-4)
- 77) Compliant with ISO/IEC 14496-10 standard (also known as MGEP-4 Part 10 or H.264)
- 78) Compliant with International Telecommunication Union (ITU) Recommendation G.711, "Pulse Code Modulation (PCM) of Voice Frequencies"
- 79) Electric Power Act
- 80) Kenya Bureau of Standards (KBS)
- 81) Institution of Electrical Engineers (I.E.E) Wiring Regulations
- 82) Current recommendation of CCITT and CC1R
- 83) TIA/EIA-568-B, Commercial Building Telecommunications Cabling Standard
- 84) TIA/EIA-569-A, Commercial Building Standards for Telecommunications Pathways and Spaces
- 85) TIA/EIA-569-B, Commercial Building Standard for telecommunications Pathways and Spaces
- 86) TIA/EIA-606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- 87) TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications
- 88) TIA/EIA 526-7, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
- 89) TIA/EIA 526-14, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- 90) TIA Technical Committee TR-42, Technical Service Bulletin 162, Telecommunications Cabling Guidelines for Wireless Access Points

When more than one code or regulation is applicable, the more stringent regulation shall apply.

SECTION 8

Schedule of drawings