NAKURU COUNTY GOVERNMENT

DEPARTMENT OF HEALTH

TENDER NO: NCG/MOH/PGH/T/29/2018 -2020

Request for proposal for designing, building, equipping and commissioning of radiotherapy treatment Centre

CLOSING DATE: 24TH OCTOBER 2018

NAKURU COUNTY GOVERNMENT-MINISTRY OF HEALTH

RIFT VALLEY PROVINCIAL GENERAL HOSPITAL

P.O. BOX 71 NAKURU

About the County Government of Nakuru

County Government of Nakuru seeks to improve health care service delivery and has set up an oncology unit at the Rift Valley Provincial General Hospital.
The unit is overstretched as it is serving patient from bordering counties mainly Laikipia, Nyadarua, Baringo, Narok, Kericho, Bomet among others.

The County objective is to make this services more accessible, affordable and timely in term of delivering seamless services.

In view of the above the county would like to contract a firm that will come up with proposal on designing, building, equipping and commissioning of Radiotherapy treatment center.

SCOPE OF WORK

In order to alleviate the cancer burden challenge facing the Nakuru community and proximity regions, the County Government is desirous of constructing a Radiotherapy Cancer Treatment facility. The project shall incorporate but not limited to the following:

- Design and Construct a Radiotherapy Treatment Center;
- Provide required Civil Works Finishes and Furnishing of the Center;
- Supply, Installation, Testing and Commissioning of Radiotherapy Treatment LINAC;
- Supply of RT Equipment Support Equipment for QA Dosimetry & Immobilization Kits;
- Supply of OIS & TPS System with HIS (EMR) Integration Capabilities (HL7, IHE, ICDN 10, DICOM, DICOM RT, IEM)
- Training & Education both locally and overseas
- Support & Maintenance Support (5 years of Comprehensive Maintenance)

Invitation to tender

1) This Standard Tender Document has been prepared for use by healthcare OEM's, healthcare suppliers and service providers who can provide turnkey health care project delivery .

2) The following general directions should be observed when using the document.

   (a) Specific details should be furnished in the Invitation to Tender and in the special conditions of contract. The final documents to be provided to the tenderers should not have blank spaces or give options.

   (b) The Instructions to Tenderers and the general conditions of contract should remain unchanged. Any necessary amendments to these parts should be made through the special conditions of contract and the appendix to instructions to tenderers.

   (c) Information contained in the Invitation to Tender shall conform to the data and information in the tender documents to enable potential tenderers to decide whether or not to participate and shall indicate any important tender requirements.

   (d) The Invitation to Tender shall be issued as an advertisement in accordance with the regulations or a letter of invitation addressed to tenderers who have expressed interest following the invitation for expression of interest for which the invitation is issued.

Section I: Invitation To Tender

1.1 The County Government of Nakuru is fast-tracking the Government's objective of attaining equitable, affordable and quality healthcare services of the highest standards for its citizens in public hospitals across the County.

1.2 As part of its expansion programme based on vision 2030 health pillar, and in keeping with the National Strategic Plan on Cancer Prevention and Control 2011 – 2016 and Proposed National Cancer Prevention and Control Act of July 2012, Nakuru County intends to put up a modern Cancer Care Centre of Excellence Complex comprising of a modern Cancer Treatment Facility.

1.3 The project will be turnkey-based consisting of consultancy, design, construct and build, equip, train and support for a comprehensive cancer care facility.

1.4 The comprehensive cancer treatment facilities will be equipped with radiotherapy treatment equipment, Licac and Brachy Therapy.

1.5 The complex facilities will be located at Nakuru PGH hospital.

1.6 Nakuru County government now invites sealed tender from eligible bidders for provision of a comprehensive cancer care centre comprising of a modern cancer treatment facility, and other infrastructure support facilities

1.7 Bidding documents with detailed specifications to be obtained from the County Government of Nakuru website- www.nakuru.go.ke free of charge.

1.8 Bidders can access and download the same documents from the Government tender portal free of charge.

1.9 Clarifications and additional information may be addressed to:-

Nakuru County Procurement department

Nakuru County offices

Office Number +254783302594

Nakuru

1.10 The bidders should note that this is a two-envelop bid where the technical and financial bid properly labelled should be submitted in original and a copy in separate envelops and be put in a bigger outer envelope. The financial bid should be **clearly** marked **"DO NOT OPEN"**. In addition, bidders are required to submit a soft copy of both technical and financial bids in respective envelopes. The outer envelope bearing the name of the tender and number but without indication of tenderers' name should be addressed to:-

The Medical Superintendent
Riftvalley General Hospital
P.O Box 71-20100
Nakuru
Office Number +254721750460

1.11 All bids must be accompanied by a bid security of **KSHS. 5,000,000 that must be attached to the technical bid**, and be deposited in the Tender Box **situated at the Riftvalley General Hospital administration Block (gate 1**) Bulky documents that cannot fit in the tender box may be delivered to the office of the medical superintendent PGH (within the Bid submission time and date) and indicated on the outer envelope 'Do Not Open Before **24th October 2018 At 10.00a.m East African Time.**

1.12 Submitted bids will be opened at the **Riftvalley General Hospital** immediately after closing date and time in the presence of the tenderers' representatives who may choose to attend.

1.13 Prices quoted must be inclusive of VAT where applicable and shall remain valid for a period of 150 days after bid opening.

1.14 Late bids will be rejected and returned unopened

Section II:Instructions To Tenderers

2.1 Eligible Tenderers

2.1.1 This Invitation for Tenders is open to all tenderers eligible as described in the Invitation to Tender. Successful tenderers shall complete the supply of goods by the intended completion date specified in the Schedule of Requirements Section VI.

2.1.2 The procuring entity's employees, committee members, board members and their relatives (spouse and children) are not eligible to participate in the tender.

2.1.3 Tenderers shall provide the qualification information statement that the tenderer (including all members of a joint venture and subcontractors) is not associated, or have not been associated in the past, directly or indirectly, with a firm or any of its affiliates which have been engaged by the Procuring entity to provide consulting services for the preparation of the design, specifications, and other documents to be used for the procurement of the goods under this Invitation for tenders.

2.1.4 Tenderers involved in corrupt or fraudulent practices or debarred from participating in public procurement shall not be eligible.

2.2 Eligible Equipment

2.2.1 All equipment to be supplied and installed under the contract shall have their origin in eligible source countries.

2.2.2 For purposes of this clause, "origin" means the place where the equipment(s) are produced. Goods are produced when, through manufacturing, processing, or substantial and major assembly of components, a commercially-recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

2.2.3 The origin of equipment is distinct from the nationality of the tenderer and shall be treated thus in the evaluation of the tender.

2.3 Cost of Tendering

2.3.1 The Tenderer shall bear all costs associated with the preparation and submission of its tender, and the procuring entity, will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the tendering process.

2.3.2 The price to be charged for the tender document shall be downloaded free of charge from the County Government website- www.nakuru.go.ke

2.3.3 The procuring entity shall allow the tenderer to review the tender document free of charge during normal working hours.

2.4 Contents of The Tender Document

2.4.1 The tender document comprises the documents listed below and addenda issued in accordance with clause 2.6 of these instructions to Tenderers

(i) Invitation to Tender

(ii) Instructions to tenderers

(iii) General Conditions of Contract

(iv) Special Conditions of Contract

(v) Schedule of requirements

(vi) Technical Specifications

(vii) Tender Form and Price Schedules

(viii) Tender Security Form

(ix) Contract Form

(x) Performance Security Form

(xi) Bank Guarantee for Advance Payment Form

(xii) Manufacturer's Authorization Form

(xiii) Confidential Business Questionnaire

2.4.2 The Tenderer is expected to examine all instructions, forms, terms, and specifications in the tender documents. Failure to furnish all information required by the tender documents or to submit a tender not substantially responsive to the tender documents in every respect will be at the tenderers risk and may result in the rejection of its tender.

2.5 Clarification of Documents

2.5.1 A prospective tenderer requiring any clarification of the tender document may notify the Procuring entity in writing or by post at

the entity's address indicated in the Invitation to Tender. The Procuring entity will respond in writing to any request for clarification of the tender documents, which it receives not later than seven (7) days prior to the deadline for the submission of tenders, prescribed by the procuring entity. Written copies of the Procuring entities response (including an explanation of the query but without identifying the source of inquiry) will be sent to all prospective tenderers that have received the tender document.

2.5.2 The procuring entity shall reply to any clarifications sought by the tenderer within 3 days of receiving the request to enable the tenderer to make timely submission of its tender.

2.6 Amendment of Documents

2.6.1 At any time prior to the deadline for submission of tenders, the Procuring entity, for any reason, whether at its own initiative or in response to a clarification requested by a prospective tenderer, may modify the tender documents by amendment.

2.6.2 All prospective candidates that have received the tender documents will be notified of the amendment in writing or by post and will be binding on them.

2.6.3 In order to allow prospective tenderers reasonable time in which to take the amendment into account in preparing their tenders, the Procuring entity, at its discretion, may extend the deadline for the submission of tenders.

2.7 Language of Tender

2.7.1 The tender prepared by the tenderer, as well as all correspondence and documents relating to the tender exchange by the tenderer and the Procuring entity, shall be written in English language, provided that any printed literature furnished by the tenderer may be written in another language provided they are accompanied by an accurate English translation of the relevant passages in which case, for purposes of interpretation of the tender, the English translation shall govern.

2.8 Documents Comprising Of Tender

2.8.1 The tender prepared by the tenderers shall comprise the following components

(a) a Tender Form and a Price Schedule completed in accordance with paragraph 2.9, 2.10 and 2.11 below

(b) documentary evidence established in accordance with paragraph 2.1 that the tenderer is eligible to tender and is qualified to perform the contract if its tender is accepted;

(c) documentary evidence established in accordance with paragraph 2.2 that the goods and ancillary services to be supplied by the tenderer are eligible goods and services and conform to the tender documents; and

(d) tender security furnished in accordance with paragraph 2.14

2.9 Tender Forms

2.9.1 The tenderer shall complete the Tender Form and the appropriate Price Schedule furnished in the tender documents, indicating the goods to be supplied, a brief description of the goods, their country of origin, quantity, and prices.

2.10 Tender Prices

2.10.1 The tenderer shall indicate on the appropriate Price Schedule the unit prices and total tender price of the goods it proposes to supply under the contract

2.10.2 Prices indicated on the Price Schedule shall include all costs including taxes, insurances and delivery to the premises of the entity.

2.10.3 Prices quoted by the tenderer shall be fixed during the Tender's performance of the contract and not subject to variation on any account. A tender submitted with an adjustable price quotation will be treated as non-responsive and will be rejected, pursuant to paragraph 2.22

2.10.4 The validity period of the tender shall be 60 days from the date of opening of the tender.

2.11 Tender Currencies

2.11.1 Prices shall be quoted in Kenya Shillings unless otherwise specified in the Appendix to Instructions to Tenderers.

2.12 Tenderers Eligibility and Qualifications

2.12.1 Pursuant to paragraph 2.1. the tenderer shall furnish, as part of its tender, documents establishing the tenderers eligibility to tender and its qualifications to perform the contract if its tender is accepted.

2.12.2 The documentary evidence of the tenderers eligibility to tender shall establish to the Procuring entity's satisfaction that the tenderer, at the time of submission of its tender, is from an eligible source country as defined under paragraph 2.1

2.12.3 The documentary evidence of the tenderers qualifications to perform the contract if its tender is accepted shall be established to the Procuring entity's satisfaction;

(a) that, in the case of a tenderer offering to supply goods under the contract which the tenderer did not manufacture or otherwise produce, the tenderer has been duly authorized by the goods' Manufacturer or producer to supply the goods.

(b) that the tenderer has the financial, technical, and production capability necessary to perform the contract;

(c) that, in the case of a tenderer not doing business within Kenya, the tenderer is or will be (if awarded the contract) represented by an Agent in Kenya equipped, and able to carry out the Tenderer's maintenance, repair, and spare parts-stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications.

2.13 Goods Eligibility and Conformity to Tender Documents

2.13.1 Pursuant to paragraph 2.2 of this section, the tenderer shall furnish, as part of its tender documents establishing the eligibility and conformity to the tender documents of all goods which the tenderer proposes to supply under the contract

2.13.2 The documentary evidence of the eligibility of the goods shall consist of a statement in the Price Schedule of the country of origin of the goods and services offered which shall be confirmed by a certificate of origin issued at the time of shipment.

2.13.3 The documentary evidence of conformity of the goods to the tender documents may be in the form of literature, drawings, and data, and shall consist of:

(a) a detailed description of the essential technical and performance characteristic of the goods;

(b) a list giving full particulars, including available source and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the goods for a period of two (7) years, following commencement of the use of the goods by the Procuring entity; and

(c) a clause-by-clause commentary on the Procuring Entity's Technical Specifications demonstrating substantial responsiveness of the goods and service to those specifications, or a statement of deviations and exceptions to the provisions of the Technical Specifications.

2.13.4 For purposes of the documentary evidence to be furnished pursuant to paragraph 2.13.3(c) above, the tenderer shall note that standards for workmanship, material, and equipment, as well as references to brand names or catalogue numbers designated by the Procurement entity in its Technical Specifications, are intended to be descriptive only and not restrictive. The tenderer may substitute alternative standards, brand names, and/or catalogue numbers in its tender, provided that it demonstrates to the Procurement entity's satisfaction that the substitutions ensure substantial equivalence to those designated in the Technical Specifications.

2.14 Tender Security

2.14.1 The tenderer shall furnish, as part of its tender, a tender security for the amount specified in the Appendix to Invitation to Tenderers

2.14.2 The tender security shall be in the amount of 2 per cent of the tender price.

2.14.3 The tender security is required to protect the Procuring entity against the risk of Tenderer's conduct which would warrant the security's forfeiture, pursuant to paragraph 2.14.7

2.14.4 The tender security shall be denominated in Kenya Shillings or in another freely convertible currency, and shall be in the form of a bank guarantee or a bank draft issued by a reputable bank located in Kenya or abroad, or a guarantee issued by a reputable insurance company in the form provided in the tender documents or another form acceptable to the Procuring entity and valid for thirty (30) days beyond the validity of the tender.

2.14.5 Any tender not secured in accordance with paragraph 2.14.1 and 2.14.3 will be rejected by the Procuring entity as non-responsive, pursuant to paragraph 2.22

2.14.6 Unsuccessful Tenderer's tender security will be discharged or returned as promptly as possible but not later than thirty (30) days after the expiration of the period of tender validity prescribed by the Procuring entity.

2.14.7 The successful Tenderer's tender security will be discharged upon the tenderer signing the contract, pursuant to paragraph 2.27 and furnishing the performance security, pursuant to paragraph 2.28

2.14.8 The tender security may be forfeited:

(a) if a tenderer withdraws its tender during the period of tender validity specified by the procuring entity on the Tender Form; or

(b) in the case of a successful tenderer, if the tenderer fails:

(i) to sign the contract in accordance with paragraph 2.27

or

(ii) to furnish performance security in accordance with paragraph 2.28

2.15 Validity of Tenders

2.15.1 Tenders shall remain valid for 90 days or as specified in the Invitation to Tender after the date of tender opening prescribed by the Procuring entity, pursuant to paragraph 2.18. A tender valid for a shorter period shall be rejected by the Procuring entity as non-responsive.

2.15.2 In exceptional circumstances, the Procuring entity may solicit the Tenderer's consent to an extension of the period of validity. The request and the responses thereto shall be made in writing. The tender security provided under paragraph 2.14 shall also be suitably extended. A tenderer may refuse the request without forfeiting its tender security. A tenderer granting the request will not be required nor permitted to modify its tender.

2.16 Format and Signing of Tender

2.16.1 The Procuring entity shall prepare two copies of the tender, clearly marking each "ORIGINAL TENDER" and "COPY OF TENDER," as appropriate. In the event of any discrepancy between them, the original shall govern.

2.16.2 The original and all copies of the tender shall be typed or written in indelible ink and shall be signed by the tenderer or a person or persons duly authorized to bind the tenderer to the contract. The latter authorization shall be indicated by written power-of-attorney accompanying the tender. All pages of the tender, except for un amended printed literature, shall be initialed by the person or persons signing the tender.

2.16.3 The tender shall have no interlineations, erasures, or overwriting except as necessary to correct errors made by the tenderer, in which case such corrections shall be initialed by the person or persons signing the tender.

2.17 Sealing and Marking of Tenders

2.17.1 The Tenderer shall seal the original and each copy of the tender in separate envelopes, duly marking the envelopes as "ORIGINAL" and "COPY." The envelopes shall then be sealed in an outer envelope.

2.17.2 The inner and outer envelopes shall:

(a) be addressed to the Procuring entity at the address given in the Invitation to Tender:

(b) bear, tender number and name in the Invitation for Tenders and the words, "DO NOT OPEN BEFORE," (*24th October 2018 before 10a.m*)

2.17.3 The inner envelopes shall also indicate the name and address of the tenderer to enable the tender to be returned unopened in case it is declared "late".

2.17.4 If the outer envelope is not sealed and marked as required by paragraph 2.17.2, the Procuring entity will assume no responsibility for the tender's misplacement or premature opening.

2.18 Deadline for Submission of Tenders

2.18.1 Tenders must be received by the Procuring entity at the address specified under paragraph 2.17.2 no later than (24th October 2018 before 10.Am*)*

2.18.2 The Procuring entity may, at its discretion, extend this deadline for the submission of tenders by amending the tender documents in accordance with paragraph 2.6, in which case all rights and obligations of the Procuring entity and candidates previously subject to the deadline will therefore be subject to the deadline as extended

2.19 Modification and Withdrawal of Tenders

2.19.1 The tenderer may modify or withdraw its tender after the tender's submission, provided that written notice of the modification, including substitution or withdrawal of the tenders, is received by the Procuring Entity prior to the deadline prescribed for submission of tenders.

2.19.2 The Tenderer's modification or withdrawal notice shall be prepared, sealed, marked, and dispatched in accordance with the provisions of paragraph 2.17. A withdrawal notice may also be sent by cable, telex but followed by a signed confirmation copy, postmarked not later than the deadline for submission of tenders.

No tender may be modified after the deadline for submission of tenders.

2.19.3 No tender may be withdrawn in the interval between the deadline for submission of tenders and the expiration of the period of tender validity specified by the tenderer on the Tender Form. Withdrawal of a tender during this interval may result in the Tenderer's forfeiture of its tender security, pursuant to paragraph 2.14.7

2.19.4 The procuring entity may at any time terminate procurement proceedings before contract award and shall not be liable to any person for the termination.

2.19.5 The procuring entity shall give prompt notice of the termination to the tenderers and on request give its reasons for termination within 14 days of receiving the request from any tenderer.

2.20 Opening of Tenders

2.20.1 The Procuring entity will open all tenders in the presence of tenderers' representatives who choose to attend, at (*24th October 2018 before 10a.m*) and in the location specified in the Invitation to Tender.

The tenderers' representatives who are present shall sign a register evidencing their attendance.

2.20.2 The tenderers' names, tender modifications or withdrawals, tender prices, discounts and the presence or absence of requisite tender security and such other details as the Procuring entity, at its discretion, may consider appropriate, will be announced at the opening.

2.20.3 The Procuring entity will prepare minutes of the tender opening.

2.21 Clarification of Tenders

2.21.1 To assist in the examination, evaluation and comparison of tenders the Procuring entity may, at its discretion, ask the tenderer for a clarification of its tender. The request for clarification and the response shall be in writing, and no change in the prices or substance of the tender shall be sought, offered, or permitted.

2.21.2 Any effort by the tenderer to influence the Procuring entity in the Procuring entity's tender evaluation, tender comparison or contract award decisions may result in the rejection of the tenderers' tender.

2.22. Preliminary Examination

2.22.1 The Procuring entity will examine the tenders to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the tenders are generally in order.

2.22.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantify, the unit price shall prevail, and the total price shall be corrected. If the candidate does not accept the correction of the errors, its tender will be rejected, and its tender security forfeited. If there is a discrepancy between words and figures the amount in words will prevail

2.22.3 The Procuring entity may waive any minor informality or non-conformity or irregularity in a tender which does not constitute a material deviation, provided such waiver does not prejudice or effect the relative ranking of any tenderer.

2.22.4 Prior to the detailed evaluation, pursuant to paragraph 2.23 the Procuring entity will determine the substantial responsiveness of each tender to the tender documents. For purposes of these paragraphs, a substantially responsive tender is one, which conforms to all the terms and conditions of the tender documents without material deviations. The Procuring entity's determination of a tender's responsiveness is to be based on the contents of the tender itself without recourse to extrinsic evidence.

2.22.5 If a tender is not substantially responsive, it will be rejected by the Procuring entity and may not subsequently be made responsive by the tenderer by correction of the non-conformity.

2.23 Conversion to Single Currency

2.23.1 Where other currencies are used, the procuring entity will convert these currencies to Kenya Shillings using the selling exchange rate on the ate of tender closing provided by the Central Bank of Kenya.

2.24 Evaluation and Comparison of Tenders

2.24.1 The Procuring entity will evaluate and compare the tenders which have been determined to be substantially responsive, pursuant to paragraph 2.22

2.24.2 The tender evaluation committee shall evaluate the tender within 30 days of the validity period from the date of opening the tender.

2.24.3 A tenderer who gives false information in the tender document about its qualification or who refuses to enter into a contract after notification of contract award shall be considered for debarment from participating in future public procurement.

2.25 Preference

2.25.1 Preference where allowed in the evaluation of tenders shall not exceed 15%

2.26 Contacting the Procuring entity

2.26.1 Subject to paragraph 2.21 no tenderer shall contact the Procuring entity on any matter related to its tender, from the time of the tender opening to the time the contract is awarded.

2.26.2 Any effort by a tenderer to influence the Procuring entity in its decisions on tender, evaluation, tender comparison, or contract award may result in the rejection of the Tenderer's tender.

2.27 Award of Contract

a. Post-qualification

2.27.1 In the absence of pre-qualification, the Procuring entity will determine to its satisfaction whether the tenderer that is selected as having submitted the lowest evaluated responsive tender is qualified to perform the contract satisfactorily.

2.27.2 The determination will take into account the tenderer financial, technical, and production capabilities. It will be based upon an examination of the documentary evidence of the tenderers qualifications submitted by the tenderer, pursuant to paragraph

2.12.3 as well as such other information as the Procuring entity deems necessary and appropriate.

2.27.3 An affirmative determination will be a prerequisite for award of the contract to the tenderer. A negative determination will result in rejection of the Tenderer's tender; in which event the Procuring entity will proceed to the next lowest evaluated tender to make a similar determination of that Tenderer's capabilities to perform satisfactorily.

(b) Award Criteria

2.27.4 The Procuring entity will award the contract to the successful tenderer(s) whose tender has been determined to be substantially responsive and has been determined to be the lowest evaluated tender, provided further that the tenderer is determined to be qualified to perform the contract satisfactorily.

(c) Procuring entity's Right to Vary quantities

2.27.5 The Procuring entity reserves the right at the time of contract award to increase or decrease the quantity of goods originally specified in the Schedule of requirements without any change in unit price or other terms and conditions

(d) Procuring entity's Right to Accept or Reject Any or All Tenders

2.27.6 The Procuring entity reserves the right to accept or reject any tender, and to annul the tendering process and reject all tenders at any time prior to contract award, without thereby incurring any liability to the affected tenderer or tenderers or any obligation to inform the affected tenderer or tenderers of the grounds for the Procuring entity's action

2.28 Notification of Award

2.28.1 Prior to the expiration of the period of tender validity, the Procuring entity will notify the successful tenderer in writing that its tender has been accepted.

2.28.2 The notification of award will constitute the formation of the Contract but will have to wait until the contract is finally signed by both parties

2.28.3 Upon the successful Tenderer's furnishing of the performance security pursuant to paragraph 2.28, the Procuring entity will

promptly notify each unsuccessful Tenderer and will discharge its tender security, pursuant to paragraph 2.14

2.29 Signing of Contract

2.29.1 At the same time as the Procuring entity notifies the successful tenderer that its tender has been accepted, the Procuring entity will send the tenderer the Contract Form provided in the tender documents, incorporating all agreements between the parties.

2.29.2 The parties to the contract shall have it signed within 30 days from the date of notification of contract award unless there is an administrative review request.

2.29.3 Within thirty (30) days of receipt of the Contract Form, the successful tenderer shall sign and date the contract and return it to the Procuring entity.

2.30 Performance Security

2.30.1 Within Thirty (30) days of the receipt of notification of award from the Procuring entity, the successful tenderer shall furnish the performance security in accordance with the Conditions of Contract, in the Performance Security Form provided in the tender documents, or in another form acceptable to the Procuring entity.

2.30.2 Failure of the successful tenderer to comply with the requirements of paragraph 2.27 or paragraph 2.28 shall constitute sufficient grounds for the annulment of the award and forfeiture of the tender security, in which event the Procuring entity may make the award to the next lowest evaluated Candidate or call for new tenders.

2.31 Corrupt or Fraudulent Practices

2.31.1 The Procuring entity requires that tenderers observe the highest standard of ethics during the procurement process and execution of contracts when used in the present regulations, the following terms are defined as follows;

(i) “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution; and

(ii) “fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Procuring entity, and includes collusive practice among tenderer (prior to or after

tender submission) designed to establish tender prices at artificial non-competitive levels and to deprive the Procuring entity of the benefits of free and open competition;

2.31.2 The procuring entity will reject a proposal for award if it determines that the tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.

2.31.3 Further a tenderer who is found to have indulged in corrupt or fraudulent practices risks being debarred from participating in public procurement in Kenya.

Appendix to Instructions to Tenderers

The following information regarding the particulars of the tender shall complement, supplement or amend the provisions of the instructions to tenderers. Wherever there is a conflict between the provision of the instructions to tenderers and the provisions of the appendix, the provisions of the appendix herein shall prevail over those of the instructions to tenderers.

INSTRUCTIONS TO TENDERERS REFERENCE	**PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS**
2.1.1	All Eligible bidders (Open International Tender) • Joint venture bidding is allowed • 1 bid per bidder per Original Equipment Manufacturer • Only comprehensive response allowed The project delivery timeline is 15 months. The following are the key delivery milestones. 1) Design consultancy services inclusive of approved construction plans. 2) Completion of earth works and foundation construction. 3) Completion of building structure complete with concrete formwork with steel reinforcement and roofing. 4) Completion of interior finishes and all MEP services for the site to receive equipment. 5) Equipment delivery and setting up 6) Equipment installation and testing. 7) Equipment training services. 8) Equipment commissioning services.
2.11.1	Currency to be used must be Kenya Shillings, or any other easily convertible currency.
2.14.1	Tender security of KSHS. 5,000,000 valid for 30 days after expiry of Tender validity.
2.18.1	*Tender Closing date 24/11/2018* AT 10.00 AM
2.24	**EVALUATION CRITERIA AND**

	COMPARISSON OF TENDERS: The evaluation shall be a three-stage process namely, • Preliminary Evaluation • Technical Evaluation and, • Financial Evaluation **i) Preliminary Evaluation** The tenderer shall submit copies of the following documents; a. Business Name Registration Certificate or Certificate of Incorporation b. Original and copy of tender document properly serialized and endorsed on each page c. Properly Filled, signed and stamped confidential business questionnaire d. Shall provide its certified audited financial statements for the past three years, i.e. (2015, 2016 and 2017); e. Tender validity period of 150 days f. Valid tax compliance certificate g. The bidders and the subcontractors must provide information for all the activities and areas of specialties including relevant licenses, registration and certifications for various works from government agencies/ professional bodies. h. All bidders must submit agreements entered into with subcontractors. i. Submit tender security of KSHS. 5,000,000. The Tender security shall be in form of bank guarantee or Insurance company approved by Public Procurement Regulatory Authority, and must remain valid for 180 days after tender closing/opening date. **NB:** Non-compliance on any of the above requirement shall lead to automatic disqualification of the candidate

	ii) Technical Evaluation; The evaluation committee will evaluate the bid on conformity to the technical specifications provided. The Technical evaluation will cover **80 points**. For bidders to be considered for financial evaluation they have to score a minimum of **60 points**. **N.B.** (1) Technical specification supported by clause-by-clause statement of Compliance (SOC)of the response in the stipulated format as laid out on Section (V) of the tender document will carry a total of 50 points. All the below requirements will carry a **total of 30 Points**. (1) The bidder should provide proof of a) Reference local hospitals with similar or radiotherapy treatment equipment proposed (10 points) b) Reference hospitals with similar or equal brachy treatment equipment proposed (2 points) c) Ability to provide local support with certified field engineers on similar equipment proposed (2 points) (2) Experience in consultancy and construction services in the local healthcare market. Bidder should a) Be duly registered and certified with valid practicing licenses by Engineers Board of Kenya (ERB), Board of Registration of Architects and Quantity Surveyors of Kenya (BORAQ) and membership with relevant professional bodies (5 points) ***b)*** Proof design and construction of at least 2 specialized radiotherapy equipment bunkers (4 points) (3) ***Staff Qualifications:*** a. Bidder shall have a designated Project Manager who shall take the role of Team

	Leader and oversee all project execution tasks. Project manager shall have at least Master's degree in information technology (IT), information systems (IS), Computer Science, Information Science or any other relevant qualifications. (4 points) b. Bidder shall have a designated construction management firm with over 5 years' experience in handling large construction works. (3 points) **(iii) Financial Evaluation** If the Bid satisfies the Technical requirements, it shall be subjected to financial evaluation. The financial evaluation will cover 20 points. a. The bidders shall have attached Properly Filled, serialized, signed and stamped form of tender b. The bid contained all items in the schedule of requirements. c. Price indicated includes government taxes. d. Arithmetic Errors Checked e. A financial commitment from bidder's bankers on project support **Calculation of Combined score;** Technical Score + Financial Score= Combined Score Financial Score (Sf) =20 * FM/F Where F= price of the proposal under consideration FM= Lowest priced financial proposal **Award** **For one to be considered for award, the bidder must score the highest combined score (Technical score+ Financial score).** *If the bid satisfies the above requirements, the successful bidder may be invited for contract negotiations*. The procuring

	entity will carry out due diligence before signing of the contract.
2.27	The client will evaluate the bids and determine the most responsive bid for award based on the evaluation criteria specified above.
2.30.1	Performance bond shall be 5% of contract sum issued by Kenyan financial institution or insurance company recognized by Public Procurement Regulatory Authority.

Section III:General Conditions Of Contract

3 Definitions

3.1 In this Contract, the following terms shall be interpreted as indicated: -

(a) "The Contract" means the agreement entered into between the Procuring entity and the tenderer, as recorded in the

Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

(b) "The Contract Price" means the price payable to the tenderer under the Contract for the full and proper performance of its contractual obligations

(c) "The Goods" means all of the equipment, machinery, and/or other materials, which the tenderer is required to supply to the Procuring entity under the Contract.

(d) "The Procuring entity" means the organization purchasing the Goods under this Contract.

(e) "The Tenderer' means the individual or firm supplying the Goods under this Contract.

3.2 **Application**

3.2.1 These General Conditions shall apply in all Contracts made by the Procuring entity for the procurement installation and commissioning of equipment

3.3 **Country of Origin**

3.3.1 For purposes of this clause, "Origin" means the place where the Goods were mined, grown or produced.

3.3.2 The origin of Goods and Services is distinct from the nationality of the tenderer.

3.4 **Standards**

3.4.1 The Goods supplied under this Contract shall conform to the standards mentioned in the Technical Specifications.

3.5 **Use of Contract Documents and Information**

3.5.1 The tenderer shall not, without the Procuring entity's prior written consent, disclose the Contract, or any provision therefore, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Procuring entity in connection therewith, to any person other than a person employed by the tenderer in the performance of the Contract.

3.5.2 The tenderer shall not, without the Procuring entity's prior written consent, make use of any document or information enumerated in paragraph 3.5.1 above

3.5.3 Any document, other than the Contract itself, enumerated in paragraph 3.5.1 shall remain the property of the Procuring entity and shall be returned (all copies) to the Procuring entity on completion of the Tenderer's performance under the Contract if so required by the Procuring entity

3.6 **Patent Rights**

3.6.1 The tenderer shall indemnify the Procuring entity against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Goods or any part thereof in the Procuring entity's country

3.7 **Performance Security**

3.7.1 Within thirty (30) days of receipt of the notification of Contract award, the successful tenderer shall furnish to the Procuring entity the performance security in the amount specified in Special Conditions of Contract.

3.7.2 The proceeds of the performance security shall be payable to the Procuring entity as compensation for any loss resulting from the Tenderer's failure to complete its obligations under the Contract.

3.7.3 The performance security shall be denominated in the currency of the Contract, or in a freely convertible currency acceptable to the Procuring entity and shall be in the form of a bank guarantee or an irrevocable letter of credit issued by a reputable bank located in Kenya or abroad, acceptable to the Procuring entity, in the form provided in the tender documents.

3.7.4 The performance security will be discharged by the Procuring entity and returned to the Candidate not later than thirty (30) days following the date of completion of the Tenderer's performance obligations under the Contract, including any warranty obligations, under the Contract

3.8 **Inspection and Tests**

3.8.1 The Procuring entity or its representative shall have the right to inspect and/or to test the goods to confirm their conformity to the Contract specifications. The Procuring entity shall notify the tenderer in writing in a timely manner, of the identity of any representatives retained for these purposes.

3.8.2 The inspections and tests may be conducted in the premises of the tenderer or its subcontractor(s), at point of delivery, and/or at the Goods' final destination If conducted on the premises of the tenderer or its subcontractor(s), all reasonable facilities and

assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Procuring entity.

3.8.3 Should any inspected or tested goods fail to conform to the Specifications, the Procuring entity may reject the equipment, and the tenderer shall either replace the rejected equipment or make alterations necessary to make specification requirements free of costs to the Procuring entity.

3.8.4 The Procuring entity's right to inspect, test and where necessary, reject the goods after the Goods' arrival shall in no way be limited or waived by reason of the equipment having previously been inspected, tested and passed by the Procuring entity or its representative prior to the equipment delivery.

3.8.5 Nothing in paragraph 3.8 shall in any way release the tenderer from any warranty or other obligations under this Contract.

3.9 **Packing**

3.9.1 The tenderer shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract.

3.9.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract

3.10 **Delivery and Documents**

3.10.1 Delivery of the Goods shall be made by the tenderer in accordance with the terms specified by Procuring entity in its Schedule of Requirements and the Special Conditions of Contract

3.11 **Insurance**

3.11.1 The Goods supplied under the Contract shall be fully insured against loss or damage incidental to manufacturer or acquisition, transportation, storage, and delivery in the manner specified in the Special conditions of contract.

3.12 **Payment**

3.12.1 The method and conditions of payment to be made to the tenderer under this Contract shall be specified in Special Conditions of Contract

3.12.2 Payments shall be made promptly by the Procuring entity as specified in the contract

3.13 Prices

3.13.1 Prices charged by the tenderer for goods delivered and services performed under the Contract shall not, with the exception of any price adjustments authorized in Special Conditions of Contract, vary from the prices by the tenderer in its tender.

3.13.2 Contract price variations shall not be allowed for contracts not exceeding one year (12 months)

3.13.3 Where contract price variation is allowed, the variation shall not exceed 10% of the original contract price.

3.13.4 Price variation request shall be processed by the procuring entity within 30 days of receiving the request.

3.14. Assignment

3.14.1 The tenderer shall not assign, in whole or in part, its obligations to perform under this Contract, except with the Procuring entity's prior written consent

3.15 Subcontracts

3.15.1 The tenderer shall notify the Procuring entity in writing of all subcontracts awarded under this Contract if not already specified in the tender. Such notification, in the original tender or later, shall not relieve the tenderer from any liability or obligation under the Contract

3.16 Termination for default

3.16.1 The Procuring entity may, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the tenderer, terminate this Contract in whole or in part

(a) if the tenderer fails to deliver any or all of the goods within the period(s) specified in the Contract, or within any extension thereof granted by the Procuring entity

(b) if the tenderer fails to perform any other obligation(s) under the Contract

(c) if the tenderer, in the judgment of the Procuring entity has engaged in corrupt or fraudulent practices in competing for or in executing the Contract

3.16.2 In the event the Procuring entity terminates the Contract in whole or in part, it may procure, upon such terms and in such manner as it deems appropriate, equipment similar to those undelivered, and

the tenderer shall be liable to the Procuring entity for any excess costs for such similar goods.

3.17 Liquidated Damages

3.17.1. If the tenderer fails to deliver any or all of the goods within the period(s) specified in the contract, the procuring entity shall, without prejudice to its other remedies under the contract, deduct from the contract prices liquidated damages sum equivalent to 0.5% of the delivered price of the delayed items up to a maximum deduction of 10% of the delayed goods. After this the tenderer may consider termination of the contract.

3.18 Resolution of Disputes

3.18.1 The procuring entity and the tenderer shall make every effort to resolve amicably by direct informal negotiation and disagreement or dispute arising between them under or in connection with the contract

3.18.2 If, after thirty (30) days from the commencement of such informal negotiations both parties have been unable to resolve amicably a contract dispute, either party may require adjudication in an agreed national or international forum, and/or international arbitration.

3.19 Language and Law

3.19.1 The language of the contract and the law governing the contract shall be English language and the Laws of Kenya respectively unless otherwise stated.

3.20 Force Majeure

3.20.1 The tenderer shall not be liable for forfeiture of its performance security or termination for default if and to the extent that it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

4.1. Special Conditions of Contract shall supplement the General Conditions of Contract. Whenever there is a conflict, between the GCC and the SCC, the provisions of the SCC herein shall prevail over these in the GCC.

42. Special conditions of contract as relates to the GCC

REFERENCE OF GCC	**SPECIAL CONDITIONS OF CONTRACT**
3.2.1	These General Conditions shall apply in all Contracts made by the Procuring entity for the procurement of consultancy, design, construct and build, equip and support of the comprehensive cancer facility.
3.7.1	On receipt of notification of contract award, the successful tenderer shall furnish the Ministry with a performance security of 5% of the price from a reputable bank or an insurance company approved by Public Procurement Regulatory Authority (PPRA).
3.12.1	The project payment will be milestone based as below 1) 10% total construction cost after delivery of approved construction plans. 2) 30% of the total construction cost after completion of earth works and foundation construction. 3) 30 % of the total construction cost after completion of building structure complete with concrete formwork with steel reinforcement and roofing. 4) 20% of the total construction cost after completion of interior finishes and all MEP services for the site to receive equipment. 5) 10% retention of the total construction cost to be paid 6 months after commissioning of the construction works.
3.13.1	Index mechanism to adjust prices will be based on relevant public information. (CPI, inflation, exchange rate and prevailing market prices)
3.16.1	The Tenderer will be automatically disqualified where false or fraudulent Information is given

5.1 General

5.1.1 These specifications describe the requirements for goods and services. Tenderers are requested to submit with their offers the detailed specifications, drawings, catalogues, etc. for the products they intend to supply

5.1.2 Tenderers must indicate on the specifications sheets whether the equipment offered comply with each specified requirement.

5.1.3 All the dimensions and capacities of the equipment to be supplied shall not be less than those required in these specifications. Deviations from the basic requirements, if any shall be explained in detail in writing with the offer, with supporting data such as calculation sheets, etc. The procuring entity reserves the right to reject the products, if such deviations shall be found critical to the use and operation of the products.

5.1.4 The tenderers are requested to present information along with their offers as follows:

(i) Shortest possible delivery period of each product

(ii) Information on representative and service center details for back-up service support and maintenance including their names and addresses.

(iii) Detailed Project Plan

(iv) Detailed Staffing Plan

5.1.5 Bidder shall note that references to brand names or model numbers or national or proprietary standards designated by the Purchaser in its Technical Requirements are intended to be descriptive and not restrictive. Except where explicitly prohibited in the tender document for specific items or standards, the Bidder may substitute alternative brand/model names or standards in its bid, provided that it demonstrates to the Purchaser's satisfaction that the use of the substitute(s) will result in the system/good/service being able to perform substantially equivalent to or better than that specified in the Technical Requirements

Nakuru County Government is seeking for proposals from a healthcare technology integrator to undertake engineering, procurement, construction, training and support cancer treatment facility. The project will entail design and building of a cancer care facility, offices and support infrastructure, supply and installation of radiotherapy equipment, support and maintainance of the equipment.

The implementation timeline is 15 months from the date of letter of award and contract signing

The delivery of this project is to be done by a multi displinary team of experienced and qualified equipment manufacturers, healthcare integrators, building and construction consultants and contractors, medical physicist and environmental impact assessment consultants. The building industry consultants should be locally registered in Kenya with valid practicing license from the relevant authorizing bodies.

6 Schedule of Works

Equipment Schedule

The schedule of equipment to be procured is:

- Treatment equipment
  - Linear accelerators
  - Brachy therapy
  - Dosimetry
  - Immobilization accessories
- Auxiliary support infrastructure
  - Generator
  - Automatic Voltage Regulators (AVR)
  - Uninterrupted Power Systems (UPS)
  - HVAC equipment
  - Shield doors

Construction Schedule

Construction of equipment bunker facility with additional office and equipment spaces including, reception, Dr's offices, patient waiting area, ICT technical rooms, washroom facilities, Brachy treatment room, changing rooms etc.

6.1 Project Delivery Phase

The delivery of this project will entail the following key phases

6.1.1 Geotechnical and Engineering design services;

- Engineering services to investigate soil profile mechanics and suitability of site.
- Architectural scheme designs
- Architectural concept designs
- Architectural final detailed designs for approval.
- Structural and services engineering detailed designs.
- Bill of quantities development, analysis and approvals.

6.1.2 Procurement and Construction

- Civil works construction; building and bunker construction,
- Medical and auxiliary equipment procurement
- Equipment installation, testing and commissioning
- Site handover

6.1.3 Education and training

- clinical training services on medical equipment operations, applications and support.

6.1.4 Support and maintainance

- warranty and maintainance support services for both medical and auxiliary equipment.

6.2 Engineering scope of works

Engineering scope of design shall entail geotechnical services, architectural scheme design and final designs, for approval by the client. The final designs for approval shall consist of all building construction elements namely structural, electrical, mechanical, safety, interiors, bunkers shield calculation etc.

The design should take into consideration optimal use of space, patient flow and should have an approach focusing on factors that support human health and well-being.

The scope of engineering services shall include but not limited to:

6.2.1 Undertake necessary site survey, catchment area survey and soil profile investigation before site approval and preparation of detailed engineering development plans and estimates are done.

6.2.2 Preparing architectural drawings, structural and construction drawings, services drawings, landscape layout out plans, with all required details and estimation of the project cost.

6.2.3 Approval of designs by Radiation Protection Board (RPB) of Kenya.

6.2.4 Construction drawing designs approval by authorized bodies e.g. NEMA, NCA etc.

6.3 Spatial allocations

The tenderer shall take into considerations space available and allocate it accordingly. Space allocation guidelines for equipment and functional rooms is as per table below. Tenderer's team is to make optimal use of the site and come up with best fit design. The designs will be subject to approval by the client before moving to the next stage of execution.

Table 1- Proposed schedule of equipment and estimated space allocation.

No	Area Description	Approx. Size Square Metres
	Equipment Rooms	
1.	Radiotherapy (RT) Bunkers	174
2.	RT Control rooms	28
3.	RT changing rooms	4
4.	Brachy Therapy room	22
5.	Brachy Therapy control room	28
6.	Brachy Therapy Changing rooms	4
7.	Power, UPS and Server rooms	16
	Functional Rooms	
8.	Main Reception with patient waiting area	30
9.	Treatment planning/Physicists' room	16
10.	Doctor's room	16
11.	Staff lounge	20
12.	Meeting/Board room	30
13.	Wash rooms facilities	60
14.	Recovery room	5 beds
15.	Mould room	30
	Other External Spaces	

16.	Generator space	TBA

6.4 Design Considerations:

The design should take into considerations health aspects in the design of the facilities and necessary circulation considerations.

6.4.1 Radiation

- The design should consider future expansions such that in future some high-energy machines could be placed in the facility.
- The design of the bunker units should shield staff, visitors and patients against avoidable risk of radiation.
- Occupational health and safety standards should be complied with.
- Workspaces should be correctly designed to protect staff against injury while focusing on work and process flows.
- Hand rails should be provided to allow patients to support themselves without risking falls
- Positioning of controls where repetitive bending is required should consider the occupational health of staff

6.4.2 Safety

- The occupational risk and safety standards for this type of building should be uncompromised.
- Radiation safety standards must be adhered to for the following spaces where radiation is generated: diagnostic rooms (CT scanner, MRI, PET-CT), Radiotherapy rooms (Radiotherapy and Brachytherapy bunkers).

6.4.3 Structural Safety

- Equipment bunkers should be radiation protected, constructed per the standards for such rooms.
- Ceiling mounted equipment should have the approved structural support above the ceiling height to provide safe fitting of heavy ceiling mounted equipment
- A minimum ceiling height of 3.0m is required in treatment areas, with at least 1m ceiling space above for heating, ventilation and air-conditioning

- The floor of the bunkers should be reinforced to be able to carry the weight of the equipment. (approx. load is 12 tonnes)

6.4.4 Communication and Information Systems

- Telecommunication, Video conferencing, Voice and data systems
- CCTV monitoring of sensitive areas
- Infrastructure for PACS electronic record and radiotherapy information system.
- LAN, WAN and security systems for patient treatment and management
- Server room

6.4.5 Finishes, Surfaces and Fittings

- The impact of finishes, surfaces and fittings should consider patient and staff safety.
- Provide slip resistant floor finishes
- Avoid protrusions and sharp corners
- Ensure stable fittings and the correct height of equipment
- Provide appropriate drainage facilities

6.4.6 Electrical Requirements

- The power supply should provide for current and future expansion
- An emergency back-up system and UPS should be provided for essential computing equipment and illumination only. In the event of primary power failure, power backup systems will ensure services will continue until when primary power is restored.
- Cable ducts or conduits should be placed in the floors, walls and ceilings as required by standards
- Power and grounding of electronic equipment should be provided.
- Sensitivity to power surges, distortions and noise (RF, EMI etc.)

6.4.7 Air Quality and Distribution

- All patient spaces that do not need to be under negative pressure shall have positive pressure with respect to adjoining areas. This will reduce dust with respect to electronic equipment.
- Air Cycle transfers in equipment rooms shall be as per ASHRAE standards recommendations.

6.4.8 Mechanical services

- Temperature and humidity controls control should be provided as per recommended standards for each space.
- Air-handling and cooling system should be provided in closed spaces and in all equipment room,
- HVAC systems for radiotherapy rooms should have air treatment units in the inlet and exhaust channels.

6.4.9 Flow and pathways

- The flow of staff and patients should be efficient, with easy access to treatment spaces for patients and support efficient service by the staff.
- Patients should not cross public circulation spaces to access treatment areas.
- Patient privacy should be considered.

6.4.10 Infection controls

Patients treated at the oncology unit may be in a severely immuno-compromised or suppressed state. Infection control standards should be applied to ensure a safe environment

- The facilities design should allow for minimized contamination of work areas
- Efficient workflow design finishes and material that facilitate cleaning
- Hand wash facilities in all patient areas are to ensure safe hand hygiene
- Appropriate air management
- Management of waste and contaminated waste in an appropriate manner

6.4.11 Waiting Areas

- Sub-waiting area should be provided at convenient points associated with consulting and treatment units.
- Space should be allowed for wheelchair bound patients
- Comfortable seating and space for coffee tables should be provided
- Natural light and outside views are to be provided (avoid direct sunlight and glare)
- Good ventilation system (the infectious status of many patients accessing the unit may be unknown and many may be in a severely immune-compromised or suppressed state)
- Easy and quick access to water closets and washrooms facilities is required

6.4.12 Access

- Dedicated parking spaces for both staff and patients
- Access routes to radiation treatment areas must allow access to large equipment. The height, width and floor loads must be considered in the design of the access routes.

Toilet and change area doors should be easily opened from outside of the cubicle to assist patients when required

6.5 Radiation Shielding Details

Treatment room shielding is required for the protection of therapists and other personnel while the Linear Accelerator has the beam on. Bunker shielding shall be provided by either concrete, lead/steel plate or a prescribed combination of both depending on linac accelerator energy levels.

The amount and type of shielding on treatment room entrance doors have varying requirements based on the presence and length of the maze, and the energy of the Linear Accelerator.

High Energy accelerators usually require steel doors with a lead and borated polyethylene core and motorized operation. Exact accelerator door shielding requirements are dependent on maze and shielding configuration.

To reduce radiation exposure outside room, air handling ducts should enter/exit the room through penetration(s) above the maze door. The ducts should be placed as high as possible in order to minimize radiation exposure to occupied space. The ducts should be designed to minimize the area of penetration through the wall. Typical room shielding tables is

provided below for reference only, a qualified physicist should be involved for shielding calculations.

Primary Barrier	4MV	6MV	8MV	10 MV	15 MV	18 MV	20 MV
At 100% occupancy	66 (1676)	75 (1905)	84 (2134)	86 (2184)	91 (2311)	93 (2362)	96 (2438)
At 10% occupancy	53 (1346)	62 (1575)	70 (1778)	72 (1829)	75 (1905)	78 (1981)	80 (2032)
Secondary Barrier							
At 100% occupancy	30 (762)	33 (838)	39 (991)	40 (1016)	43 (1092)	43 (1092)	44 (1118)
At 10% occupancy	21 (533)	22 (559)	27 (686)	28 (711)	30 (762)	31 (787)	32 (813)
Note: Inches (mm) of 147 lbs./cu. ft. (2355 kg/cu. M) Concrete.							

Table 2-2 Typical Shielding for Standard Procedures with 50% IMRT of a Factor F=3

Secondary Barrier	4MV	6MV	8MV	10 MV	15 MV	18 MV	20 MV
At 100% occupancy	34 (864)	37 (940)	42 (1067)	43 (1092)	47 (1194)	47 (1194)	48 (1219)
At 10% occupancy	24 (610)	26 (660)	31 (787)	32 (813)	34 (864)	35 (889)	36 (914)
Note: Inches (mm) of 147 lbs./cu. ft. (2355 kg/cu. M) Concrete.							

Table 2-3 Typical Shielding for SRS Procedures with 20% IMRT of a Factor F=3

Primary Barrier	6MV	10 MV
At 100% occupancy	81 (2057)	92 (2337)
At 10% occupancy	68 (1727)	77 (1956)
Secondary Barrier		
At 100% occupancy	40 (1016)	46 (1168)
At 10% occupancy	29 (737)	35 (889)
Note: Inches (mm) of 147 lbs./cu. ft. (2355 kg/cu. M) Concrete.		

Table 2-4 Concrete to Lead and Steel Ratios

		4 MV	6 MV	8MV	10 MV	15 MV	18 MV	20 MV
Steel	Primary Barrier	3.5	3.7	3.8	4.0	4.0	4.1	4.2
	Secondary Barrier	3.2	3.5	3.6	3.6	3.8	3.8	3.9
Lead	Primary Barrier	6.1	6.5	7.0	7.2	7.7	7.9	8.1
	Secondary Barrier	5.4	6.2	6.3	6.6	7.0	7.0	7.0
Note: Inches (mm) of 147 lbs./cu. ft. (2355 kg/cu. M) Concrete Equal to Inches (mm) of Lead/Steel.								

Table 2-5 Tenth Value Layer (TVL) for Concrete vs. X-Ray Energy

	4 MV	6 MV	8 MV	10 MV	15 MV	18 MV	20 MV
Primary Beam X-Rays	11.4 (290)	13.5 (343)	14.3 (363)	15.3 (389)	17.0 (432)	17.5 (455)	18.0 (457)
Leakage X-Rays (90°)	10.0 (254)	11.0 (279)	11.5 (292)	12.0 (305)	13.0 (330)	13.0 (330)	13.5 (343)
Note: Inches (mm) of 147 lbs./cu. ft. (2355 kg/cu. M) Concrete.							

6.6 **Construction** Works

General Considerations for civil builders and construction works includes

6.6.1 General Construction works

- Civil works.
- Internal & External Electrical work
- Internal & External Water supply & Drainage work.
- Rain water Harvesting & Storm water drainage.
- Compound Wall & Internal Road work.

6.6.2 Specialized work.

- Bunkers
- HVAC work.
- Fire Fighting work.
- Sewage and/or Effluent Treatment Plant.
- Diesel Generators & UPS work.
- Power Substation

6.6.3 Other allied work.

- Communication – PBX, Data Cabling, etc.
- Interior decorations
- Signage
- Furniture

7 Radiotherapy Equipment Specifications

7.1 LINAC

A dual energy (low and high photon and electron beams) linear accelerator should be able to perform various specialized treatment techniques such as: Three-Dimensional Conformal Radiotherapy (3D CRT); Intensity Modulated Radiation Therapy (IMRT); Volumetric Modulated Arc Therapy (VMAT); with adaptability for future upgrade to SRS/SRT.

7.1.1 Photon Beams

- Energy: Up to three photon beams may be selected between 6MV and 23 MV
- One Energy can be of high dose rate (FFF)
- Dose Rate: the dose rate can be selected in fixed steps of 100 MU/min up to a maximum dose rate of 300, 400, or 600 MU/min.
- Maximum Field Intensity at Dmax: The intensity at the depth of maximum buildup (Dmax) must not exceed 109% of the central axis intensity anywhere in the measurement plane of any field size.
- Leakage: The X-ray absorbed dose must not exceed 0.1% of the absorbed dose at the isocenter measured anywhere in the patient plane outside of the maximum useful beam. The neutron dose equivalent (Sievert) must not exceed 0.2% of the X-ray absorbed dose (Gray) at the isocenter.
- The patient plane is defined as a circular plane with a radius of 2 m, centered on and perpendicular to the axis of the beam at isocenter. The X-ray measurements may be averaged over an area not to exceed 100 cm2. In all other directions, the X-ray absorbed dose 1 m from the path of the electrons between the electron gun and the target or electron window does not exceed 0.1% of the absorbed dose at isocenter.

- Collimator Transmission: The X-ray transmission of the upper and lower movable collimator must not exceed 0.5%.
- Spot Size: The electron spot size must be less than 3 mm in diameter at the X-ray target.
- Penumbra: The distance between the 20% and 80% isodose lines for a 10 x 10 cm2 field, measured at a depth of 10 cm with a 100 cm TSD along the major axes, measures less than or equal to 9 mm.
- Field Size: The field size must be variable from 0.5 x 0.5 cm2 to 40 x 40 cm2 as measured at 100 cm TSD. The field size is defined as the distance along the radial and transverse axes between the points of 50% density on an X-ray film taken at 100 cm TSD with minimum buildup.
- Upper and Lower Independent Collimators: Asymmetrical collimation is provided for upper and lower sets of collimators.
    - Independent, asymmetrical Upper Collimator travel range: >20cm
    - Independent, asymmetrical Lower Collimator travel range: >20cm

7.1.2 Electron Beams

- Four (4), five (5), or six (6) electron beams that can be selected between 4 and 22 MeV. The specifications apply to a 15 x 15 cm2 electron applicator and 100 cm TSD.
- Dose Rate: up to 1000 Mu/min
- Field Sizes: A set of electron applicators to be provided, with selection from 6 sizes: 6 x 6 cm2, 6 x 10 cm2, 10 x 10 cm2, 15 x 15 cm2, 20 x 20 cm2, and 25 x 25 cm2.
- Accelerator System Features
- RF Power Source: preferred klystron operated in linear amplifier mode and driven by a solid-state oscillator, with power and frequency automatically locked to required operating levels.
- Gun: Capable to rapidly and precisely vary output dose rate and turn the beam on or off. This capability is especially important in dynamic dose delivery, where high-speed beam gating and elimination of dark current during beam-off time periods is important.
- Accelerator section: preferred standing wave. Spectrum characteristics, with and without use of an energy switch,

- Radial and Transverse Steering Systems: ensure basic beam alignment in all modes, as well as gantry orientation. Ion chamber sensors, in conjunction with the steering coils and servo electronics, maintain beam symmetry changes to within 2% under all conditions.

7.1.3 Dosimetry System

- Reproducibility with Energy: Precision of the dosimetry measurement system for each energy to be within ±1% 4.2
- The linearity as:
- 1% for 20-999 MU • 2% for 10-20 MU • 3% for 5-10 MU
- Reproducibility of Dose vs. Gantry Angle: The precision of the dosimetry system must be ±1.5% at any gantry angle from 0 to 360 degrees.
- Reproducibility with Dose vs. Dose Rate: The dose rate dependence of the dosimetry system with variations in dose rate from minimum to maximum must be less than ±1%
- Beam-Off Interlocks: The radiation beam must automatically terminate in the event of any of the following:
- Monitor Units 1 complete• Monitor Units 2 complete• Treatment time complete• Radial symmetry exceeds 2%• Transverse symmetry exceeds 2%• Excess dose rate• Excess dose per pulse• Excess dose per degree• Loss of ion chamber bias voltage• under dose rate

7.1.4 Mechanical Features

7.1.4.1 Gantry

- Rotation Range: ±185° from the vertical
- Target to Axis Distance: 100 ±0.2 cm
- Mechanical and radiation isocenter accuracy
- ≤1 mm radius sphere for gantry,
- ≤2 mm radius sphere for gantry, collimator, and couch axes
- Position Indicators
- Scale Conventions
  - IEC Scale convention per IEC Publication IEC 60601-2-1
  - IEC 1217 Scale convention per IEC Publication IEC 61217
- Digital Readouts
- Accuracy: ±0.5° • Resolution: 0.1°
- Mechanical Scales:

- Accuracy: ±1.0° • Resolution: 1.0°
- Target to Surface Distance Indicators
- Optical Distance Indicator:
- Accuracy: ±0.1 cm at 100 cm ±0.5 cm at 70 cm and 156 cm • Resolution: 0.5 cm
- Mechanical Front Pointer:
- Range: 70-110 cm • Accuracy: ±0.1 cm at 100 cm • Resolution: 0.2 cm
- Isocenter Height (nominal): 129.5 cm

7.1.4.2 Collimator

- Extended Rotation Range: ± 165°
- Position Indicators (gantry and console)
- Digital Readouts: • Accuracy: ± 0.5° • Resolution: 0.1°
- Mechanical Scales: • Accuracy: ± 1.0° • Resolution: 1.0°
- Field Size Collimation
- Range: The field size is continuously variable from 0.5 x 0.5 cm2 to 40 x 40 cm2 as measured at 100 cm TSD. Field sizes larger than 35 x 35 cm2 are limited to a 49.5 cm diagonal (the diameter of the circle defined by the primary collimator at 100 cm TSD). The field size is defined as the distance along the radial and transverse axes between the points of 50% density on an X-ray film taken at 100 cm TSD with minimum buildup. 5.3.2 Position Indicators • Accuracy: ± 0.2 cm • Resolution: 0.1 cm
- Light and X-ray Field Coincidence: The field-defining light coincides to within 1.5 mm of the 50% isodensity line on an X-ray film. This is defined at 100 cm TSD with minimum buildup for any field size.
- (5.4 Couch and Couch Top
- Capacity >200kg
- Motion Controls
- Two Hand Pendants control all axes of the Couch can be moved simultaneously through the pendants Side Panels

7.1.5 Treatment Console

The Treatment Console must provide a streamlined front end to the delivery system. The console integrates use of the accelerator, MLC, and imager into one application on a single workstation. For image-guided

radiotherapy using kV images, the console is used in combination with the KV Imager workstation. The Treatment Console uses a DICOM RT interface to communicate with the oncology information system and other information system databases.

7.1.6 Multileaf Collimator

The MLC offers 0.5 cm leaf resolution at isocenter for the central 20 cm of the 40 cm x 40 cm field. The MLC operates in static, dynamic, and conformal arc modes. The static mode provides efficient beam shaping for 3D conformal radiation therapy. The dynamic mode enables IMRT with both step-and-shoot and sliding window delivery. The conformal arc mode enables conformal arc therapy in which the leaves always conform to the outer boundary of the target as the gantry rotates around the patient.

7.1.7 MV Imager

The MV imaging system that allows for verification of patient setups, treatment portals, and Portal Dosimetry.
The detector is of modern technology, preferably amorphous silicon has an active imaging area of minimum 43 cm x 43 cm with a pixel resolution of 1280 x 1280. Image acquisition is supported before, during, and after treatment.
Match and Review IGRT software is included for image analysis.
A motorized, robotic arm is used to position and hold the detector.
The movements of the arms will allow to position the detector along the X-Y-Z axes, remotely, from within the treatment room and form the console room.
The MV imager can be placed at isocentre in order to be used to utilities such as QA verification

7.1.8 MV Image Based IGRT

The MV-based IGRT should offer 2D/2D Match and Marker Match (orthogonal paired images) using Digitally Reconstructed Radiographs (DRRs) or simulator images as reference and remote arm options for easy and safe operation.

7.1.9 Motorized Wedges

An in-built motorized wedge should be provided that can produce an effect of any wedge angle ranging 0 - 60 degrees.

7.1.10 Radiation Leakage

Radiation leakage limits should be within appropriate agency guidelines as follows:

- Photon Leakage: The photon leakage rate at any point one meter from the target outside the cone defined by the primary x-ray collimator should be less than 0.1% of the absorbed dose at the isocenter.
- Collimator Transmission: The movable collimators should not permit transmission of radiation exceeding 0.5% of the central axis dose at Dmax measured in air for both photon energies.
- Neutron Leakage: The neutron leakage rate should not exceed 0.15% expressed in neutron dose equivalent (REM) when added to the photon leakage for a 10 x 10 cm field at the isocenter at any point one meter from the target when the jaws are closed.
- In addition to meeting above specifications for radiation leakage, the linac should also meet all the mandatory safety and radiation leakage as per ICRP No.33.

7.1.11 Photon Arc Therapy

Bi-directional arc therapy should be included with Automatic calculation of Dose per Degree based on the Dose Rate selected and the Arc angle set.

7.1.12 Portal Dosimetry

Portal Dosimetry solution should be offered using of the MV imager to record the intensity patterns of IMRT and VMAT fields for pretreatment quality assurance of IMRT planning and delivery.

Portal Dosimetry should include integrated image acquisition mode for recording of IMRT and VMAT fields and image viewing and analysis software.

7.1.13 kV Imaging System

The KV imaging system is to provide high-quality kV images in the treatment room for target localization, patient positioning, and motion management.

The following clinical capabilities must be supported:

- Online setup correction based on either a kV-kV or kV-MV pair of radiographs

- Automated and manual alignment of a pair of radiographs to their reference images
- Acquisition of gated radiographs
- Online setup correction based on radiopaque markers
- Pretreatment verification of gated treatment portals using kV fluoroscopy
- Remote couch motion to correct patient setups
- Optional: Acquisition of Cone-beam CT (CBCT) scans

7.1.14 Remote Couch Motion

Control of couch motion at the treatment console for

- Corrective motions: small translations (in x, y, and z) and small rotation of the couch to fine-tune patient setups
- Planned motions: large rotations of the couch to sequence between non-coplanar fields and arcs

7.1.15 Optional Treatment Procedures

- Optional High Dose Total Skin Electron Mode: The accelerator is capable of delivering electron treatments at high dose rates for the purpose of total body skin irradiation with electrons. The dose rate at 1.6 m is 888 MU/min, corresponding to nominally 2,500 MU at isocenter. This mode is available in 6 MeV or 9 MeV.
- X-ray contamination at calibration point is <1%.
- Symmetry at isocenter is ±2%.
- Integrated dose monitor: 1 to 9,000 MU.
- Exposure time: 0.1 to 99.9 min.
- Optional Total Body Electron Mode: Delivers 9,000 MU at isocenter with all normal machine safety and dosimetry interlocks operational, and delivers standard energies at standard dose rate ranges.
    - Special TBE accessory tray is provided.
    - All beams are calibrated at machine isocenter.
    - Integrated dose: 1 to 9,000 MU.
    - Exposure time: 0.1 to 99.9 min.
    - Optional Total Body Photon X-ray Mode:
- Delivers 9,000 MU at isocenter with all normal machine safety and dosimetry interlocks operational, and delivers standard energies at standard dose rate ranges. Special TBI accessory tray is provided.
    - All beams are calibrated at machine isocenter.

- Integrated dose: 1 to 9,000 MU.
- Exposure time: 0.1 to 99.9 min.

7.1.16 Dynamic Treatment Procedures

Standard Photon Arc Mode and optional Electron Arc Mode: The accelerator is capable of delivering the following dose over a preset gantry rotation of up to 360 degrees or any fraction thereof. MU per degree (MU/DG) is automatically computed based on the preset total dose and the preset arc segment.

- Precision: During Arc treatment, the position of the gantry deviates no more than 0.5 degrees from the desired instantaneous gantry angle, and the dose deviates no more than 0.20 MU from the desired instantaneous total dose, as specified by the user-preset total dose and arc segment.

If these tolerances are exceeded, the dose delivery is suspended and the gantry position is targeted to the position dictated by the actual dose delivered. When the gantry is again within 0.5 degrees of the desired position, the treatment will resume. The Dose Position Interlock (DPSN) is asserted if the gantry is not positioned within 0.5 cm of the desired position within 3 seconds.

The DPSN will terminate the beam immediately if the position deviates 3.0 degrees or more from the desired position, or the dose delivered exceeds 0.45 MU for dose rates less than 600 MU/min (0.54 MU for dose rate 600 MU/min and 0.72 MU for dose rates greater than 600 MU/min, 11.1.2 _Arc Dose Rate: The dose rate during a dynamic arc treatment is automatically modulated between zero and the ceiling dose rate selected in Physics Mode.

- Arc Direction: accelerator may be programmed to perform arc therapy in either a clockwise or counterclockwise direction.
- Dynamic Wedge Mode: utilizes Y-jaws to create wedge shaped dose distributions. Enhanced Dynamic Wedges of 10, 15, 20, 25, 30, 45, and 60 degrees are included, with up to 30 cm (wedge direction) by 40 cm field sizes.
- Optional Dynamic MLC Techniques
- Intensity-modulated radiation therapy (IMRT) and conformal arc therapy are optional advanced dynamic procedures in which the leaves of the MLC move during treatment.
- Arc Dynamic MLC allows delivery of MLC fields as a function of gantry arc angle, also known as conformal arc therapy. An MLC shape change every 2° is possible.

- Dose Dynamic MLC allows delivery of MLC fields as a function of percent dose delivered, also known as IMRT. Both dynamic IMRT (i.e., sliding window) and segmental IMRT (i.e., step-and-shoot) techniques are supported. Combinations of the two IMRT techniques also are supported. In addition, Dose Dynamic MLC enables treatment delivery with electronic compensation, in which MLC leaf motion simulates the dosimetric effect of a physical compensator.

7.1.17 VMAT

The accelerator should be capable of delivering VMAT plans with one or two energies capable of delivering 0.10 to 20 MU (60 MU for SRS beam) per degree over a preset gantry rotation of up to 360 degrees or any fraction thereof. Desired zero (0.0) MU per degree dose delivery control over a preset gantry rotation range is accommodated. MU per degree (MU/DG) is computed by TPS based on the dose and the arc segment as represented by the treatment plan.

VMAT delivery should also provide the following capabilities

- Partial arcs:
- Sector Avoidance: capability to interrupt the beam during the rotation of the gantry, thus allowing to deliver partial or interrupted arcs
- Gated VMAT: Allowing to use the patient monitored breathing to pause beam delivery and gantry rotation temporarily during the treatment.

7.1.18 Collision Detection System

Collision Detection monitors the MLC collimator face with a plane of infrared light that emanates from a device located within the gantry or a touch ring. Any object that intrudes into this area, called the protection zone, triggers an emergency stop of all accelerator motion.

7.1.19 Auto Field Sequencing

Auto Field Sequencing (AFS), for use with the 4D Integrated Treatment Console provides automated delivery of multiple coplanar and non-coplanar fields. With this time saving feature, the accelerator automatically acquires the mode up signal and machine setup information from the Treatment Console, and then allows the operator to remotely move the gantry, jaws, collimator, and Couch axes between coplanar and noncoplanar treatment fields. This feature eliminates the need to go back into the treatment room to alter the machine setup between treatment

fields. AFS works in concert with the MLC to deliver both static and dynamic plans efficiently and smoothly.

7.1.20 Gating system

The gating system enables passive, real-time monitoring of patient respiration for the purpose of intrafraction motion management. Two gating systems must be provided. Each system should include an infrared tracking camera, external marker block, workstation. The gating system supports gated treatment delivery and image acquisition on accelerators, gated simulation on compatible simulators, and gated CT acquisition on compatible third-party CT scanners (not all CT scanners are compatible). Depending on the capabilities of the CT scanner, the gating system supports both retrospective and prospective gating of CT scans.

7.1.21 Information system

The information system will include a Server with rack and UPS and 8 client workstations

- Preferably windows based
- It will include the following features
  - Patient demographic data
  - Diagnosis and staging entry
  - Agenda and resource planning
    Reporting capability

7.1.22 Treatment planning system

The treatment planning system will include 4 client workstations, 2 with calculation capabilities and VMAT/IMRT planning, 4 contouring capabilities.
Will be residing on the same database as the patient information system – OIS.
Preferably windows based

7.1.23 Immobilization package

Immobilization and Essential Accessories to be Included with the Unit
The supplier should include the following key accessories at a minimum:

7.1.24 Carbon Fiber Immobilization Devices:

Carbon fiber standard baseplates (2), carbon fiber head and shoulder baseplate (2), foam head support (18 pieces), acrylic prone baseplate (1), carbon fiber wingboard (2) carbon fiber breast board (2), carbon fiber belly board (2), foam knee rest (2), foam foot rest (2), water tank (1), vacuum pump (1) and table index bar (6).

7.1.25 Accessories and Thermoplastic Masks:

Thermoplastic head mask (50), thermoplastic head and neck mask (40), thermoplastic head and shoulder mask (40), thermoplastic head mask IMRT (20) thermoplastic head and neck mask IMRT (20), thermoplastic head and shoulder mask IMRT (20), thermoplastic breast mask (20), thermoplastic pelvis mask (20), vacuum bags >40 x 60cm (4), vacuum bags >60 x 80cm (4), bolus 0.5 and 1cm (3 each), skin markers (3) and CT markers (3).

- Head Base plate
- Head support set, position "supine"
- Head support, position "prone"
- Head thermoplastic masks
- Head and Neck thermoplastic masks
- Head and Shoulder thermoplastic masks
- Carbon fiber wingboard
- Immobilization board for treating breast and thorax with precise hand immobilization
- Thermoplastic breast mask
- Base plate for Abdomen and Pelvis made of carbon fiber
- Thermoplastic mask for Abdomen and Pelvis
- Knee support device
- Foot support device
- Whole body immobilization vacuum bags 70/100cm
- Whole body immobilization vacuum bags 50/70cm
- Vacuum bags for special size order
- Bolus 0.5cm
- Bolus 1cm
- Table index bar
- Water bath for thermoplastic masks heating
- Vacuum pump

7.1.26 Dosimetry Package

The dosimetry serve system beam performance should meet internationally acceptable standards. The stable time for beam output should not be >0.5sec and the dose stability error not >2% in 5 days. The system should allow for a safety interlock activation when longitude and lateral beam symmetry is => 2%. The ionization chamber should have a 4-channel structure.

The system should include the following: water phantom, control software, dual channel electrometer, exradin ion chamber, electric lift table, calibration therapy ion chamber, calibration electrometer barometer, thermometer and a laptop.

Features

Blue Phantom2 3D Water Phantom System 1997-105 - OmniPro-Accept Advanced Acquisition and analysis software version 7 1997-120 - OmniPro-Accept v. 7 RTPS i/f

7.1.27 Module for RTPS specific measurement

Triaxial ion chamber/diode detector cable (low noise), 5m on cable reel,

Water phantom carriage, manually operated, including leveling frame
Water reservoir carriage with uni-directional pump, power supply 230V

Detector holder for CC and FC chambers as well as third party detectors with a diameter of 10 mm to 15 mm
Ionisation chambers DS02-000 CC13 Ion chamber: 0.13 ccm, shonka plastic, waterproof, TNC triax,30 mm diameter for 4 - 6 MV photon and 8 - 12 MeV electron, 60 mm diameter for 15 - 20 MV photon

Reference electrometer
DOSE 1 Therapy Dose Meter Standard Version
Triaxial ion chamber cable (low noise) thick version, 18 m on cable reel, TNC triax connector FC65-P "Farmer" type ion chamber: 0.65 ccm, POM, waterproof, TNC triax

Check sources
Radioactive Check Device type CDC for cylindrical detectors
Adapter for use of "Farmer" type chambers with CDC radioactive check dev
Adapter for use of CC type chambers with CDC radioactive check device

Plates phantom
SP34 Plate phantom consisting of 33 RW3 plates including storage case

RW3 Adapter plate for CC13
RW3 Adapter plate for FC65-P/FC65-G "Farmer" type, PTW 30010/30012 and NE 2571/2581

Isocenter check device
Base plate Disk phantom for isocenter check (base plate (item SA27-000) required)

Thermometer and barometer
C300 Digital Barometer
C100 Laboratory Thermometer

LINAC QA

StarTrack*-2D Comprehensive Linac QA Device with OmniPro-Advance Software, Energy Constancy for StarTrack / MatriXX, Water phantom carriage with electrically operated telescopic lift mechanism, Water reservoir carriage with bi-directional pump, power supply 230V

7.2 OTHER SPECIFICATIONS

The target to axis distance should be 100 ± 0.2 cm. The isocenter shall lie within a sphere of radius 1 mm. The accelerator gantry shall be capable of rotation equal to or greater than 360 degrees with a variation of the mechanical and radiation iso centers during rotation of less than ± l.0 mm throughout the entire rotation. Digital scales indicating gantry angle position shall be provided both in the treatment room and at the control console. Accuracy of the scales shall be ± 0.5 degree. The distance from the end of the lower collimator to the isocenter shall be greater than 45 cm. The bottom of the blocking tray should be greater than 30 cm from the isocenter. The height of the isocenter above the finished floor shall be less than 135 cm. Digital scales indicating collimator angle position shall be provided both in the treatment room and at the control console. Accuracy of the scales shall be ± 0.5 degree. A complete set of Pre-shaped beam blocks shall be provided. In-built ion chambers of high accuracy for dosimetry for both photon and electron beams should be specified.

7.2.1 Treatment Couch (with indexed carbon fiber table top)

The maximum height of the couch shall be at least 40 cm above the isocenter. The lowest couch position shall be less than 63 cm above the finished floor. Motions (except couch top rotation) shall be both manual and variable-speed motor driven. The linear accelerator's use of conformal therapy and intensity modulated radiation therapy requires an indexed carbon fiber couch top that is designed for precise and repeatable patient positioning. The couch should be motorized in 4 directions and controlled either from the treatment room or the console area. It should be integrated with the control system of the linac in order to allow daily shifts based on acquired MV images. Convenient digital scales in metric units shall be incorporated on the couch or on an in-room monitor which will allow the operator to check the orientation of the couch height and couch angle with respect to the gantry. Couch positions (except couch top rotation) shall also be displayed at the control console. Accuracy of the scales for vertical, lateral and longitudinal motions shall be within ± 1 mm. Two hand pendants shall be provided.

7.2.2 Treatment Room and Console Position Displays

For accuracy of patient set-up, digital displays of gantry rotation angle, collimator rotation angle, collimator jaw settings (symmetric and asymmetric), and treatment couch vertical position, lateral position, longitudinal position and turntable rotation angle about isocenter shall be provided both in the treatment room and at the operator console. Accuracy of collimator and gantry angle displays shall be ± 0.5^{o}, with a

resolution of 0.1^{o}. Accuracy of collimator jaw position displays shall be $\pm$ 1 mm with a resolution of 1 mm. Accuracy of the couch vertical, lateral and longitudinal displays shall be $\pm$ 2 mm with a resolution of 1 mm.

7.2.3 Oncology Treatment Planning System (TPS)

The treatment planning system provided should be capable of contouring manually and automatically, beam setup, forward dose calculations and inverse (IMRT) calculations.
The system should share the same database as the patient information system in order to avoid systematic data transfers of planning data and should consist of two (2) workstations capable of contouring and planning and two (2) workstations for contouring and beam setup.

7.2.4 Oncology Information and Image Management / Treatment Record and Verify System

The vendor should provide a comprehensive oncology information & image management and treatment record & verify system. The system shall assist in the integration of radiotherapy patient data throughout the entire department which includes linear accelerators, CT-Simulator, imaging units in the hospital, treatment planning systems. It shall also record and verify treatment parameters of patients undergoing treatment on the linac(s). The system shall be based on one comprehensive database, thereby eliminating the need for redundant entry of data used in different applications.

The system should provide the following functions: Record and Review Patient Diagnoses; Plan a course of treatment in advance so that treatments are readily delivered when the patient arrives; Write RT prescriptions that detail treatment techniques, fractions, and dose; Define treatment fields; Link setup fields and notes to treatment fields; Setup notes can include photos that show how to set up the patient; Track dose to specific sites; Define site breakpoints with instructions that appear when the breakpoint will be exceeded; Store treatment plan information to avoid redundant and time-consuming data entry.
MLC user operation should be accomplished entirely through the Oncology Information System (OIS), thereby eliminating the need for a separate control station for the MLC. Planned leaf shapes shall be incorporated directly into a patient's planned treatment field(s) in the electronic Chart.
The MLC shape should automatically appear on the OIS treatment screen during the setup and treatment of any patient with a planned MLC shape. The shape shall be displayed simultaneously with all other pertinent treatment parameters.

The system should have the capability of storing patient photos facilitating correct treatment. The digital patient photographs should upload to the database. After treatment of the first field, all subsequent fields shall be automatically and sequentially downloaded to start auto-setup of the next field without requiring operator interaction at either the OIS console or In-Room Monitor.

Port Films should be capable of being planned ahead for appropriate treatment sessions, completed with prompting from the system, and automatically recorded in the electronic chart. Port Film dose shall be capable of being accumulated, if desired. The system shall permit override of individual treatment parameters (couch longitudinal for example) and require a password and appropriate user rights to successfully complete the override.

The record and verification station shall accept and store demographic data, notes or comments and diagnostic information for each radiotherapy patient. When the patient proceeds with tumor localization, treatment planning and simulation, the treatment parameters will also be entered into the patient's file automatically or manually.

A daily patient schedule and time management schedule must be capable of being displayed on the computer monitor at the record and verify workstation. This schedule shall include, at a minimum, the scheduled treatment time for each patient, the patient's identification number and the patient's name. The schedule shall be used to select a patient for treatment on the accelerator.

The system should be capable of maintaining a record of field-specific and treatment-specific daily and cumulative doses for the target site and additional sites of interest. It shall be possible to specify a prescribed dose for each treatment site for every patient. The system shall prevent treatment if this dose will be exceeded upon completion of the treatment. A manual override shall be provided. Overriding prescribed dose limits by unauthorized personnel shall not be permitted. After the daily irradiation of a patient, the therapy history will be updated and the given target doses, or doses calculated to other sites, shall be accumulated.

The Operating System should provide a convenient and efficient means for the user to generate and to print hard copy reports of information contained in the database.
The scheduler of the OIS should be capable of maintaining schedules for multiple departments and scheduling any resource desired by the site. It should have a graphical user interface for ease of customizing schedule views, changing appointment times and minimizing keystrokes.

The OIS should provide the capability to integrate simulation, CT, MRI, PET and electronic portal imaging system images into the OIS database to provide a readily available reference during the patient's course of treatment. Reviewing images immediately after acquisition from a remote location shall be permitted. The OIS shall provide the additional feature of managing drug administration to patients.

The Hardware should consist of the following: Two separate, but fully integrated servers, one each for data management and image management with back up with 120 GB capacity or more to handle our busy department workload; 6 additional Image Workstations for Review and Approval; a latest 5 mega pixel digital camera (lithium ion battery with at least 1 GB memory card) for acquiring patient photos; a networked color image DICOM laser printer; capability for high speed internet connectivity for Online Service support. A camera having capable of taking both still as well as motion picture having latest configurations should be supplied. The unit should be able to integrate with the existing Record and Verify System.

8 Brachytherapy Unit

8.1 Technical Specifications

- Radioactive Source – Brachytherapy Unit
- Iridium-192, metallic
- Cylindrical configuration
- Iridium-192 pellet- HDR: 0.6 mm diameter, 3.5 mm active length; PDR: 0.6 mm diameter, 0.5 mm active length
- Capsule- HDR: 0.9 mm diameter, 4.52 mm length; PDR: 0.9 mm diameter, 2.97 mm length
- Nominal activity- HDR: 370 GBq (10 Ci)*; PDR: 37 GBq (1 Ci)
- Air Kerma Rate (HDR): 0.063 Gy/h (±5%) for 555 GBq at 1 m

8.1.1 Source cable

- Iridium-192 source encapsulated in stainless steel
- Capsule welded to a flexible stainless steel cable
- Distance from distal cable tip to the beginning of the active pellet- HDR: 0.67 mm; PDR: 2.07 mm (To ensure consistent "cable tip to source center" distance for HDR and PDR sources)
- Cable diameter: 0.9 mm
- Maximum extension length: 130 cm

- The most distal 200 mm section of the cable is an ultra-flexible cable.
- Source manufactured according to ISO1677, ISO2919, ISO/TR4826, ISO9978 resulting in ISO source classification: C63333

8.1.2 Transportable options

Transportation Options system has been qualified as a Type A shipping container. Afterloader capacity that can be converted to a transportable system for use in multiple locations.

8.1.3 Afterloader

Meets the recommitments of the following standards:

- Electrical safety of medical devices standard IEC 60601-1
- Collateral standards of IEC 60601-1 specific to afterloaders IEC 60601-2-17
- IAEA and US DOT-7A.

8.1.4 Cable and drive parameters

- Nominal cable speed zero slip: approximately 60 cm/s
- Source positioning accuracy: ±1 mm relative to the indexer

8.1.5 Source placement

- Treatment channels
- Dwells per channel
- Step size: default 5 mm, programmable from 1-10 mm, in 1 mm increments
- Minimum radius of curvature at the distal end of the catheter: 1.3 cm in a ring probe of diameter 2.6 cm and in a 5 Fr bronchial catheter
- Method of source movement: commences at most distal dwell positions and steps back

8.1.6 Afterloader shielding

- Safe material: Tungsten
- Maximum storage capacity of safe: 555 GBq (15 Ci)
- Maximum Air Kerma Rate 1 m from afterloader: does not exceed 3 μGy/h for maximal load
- Radiation shielding: Conforms to International Electrotechnical Commission requirements (IEC 60601-2-17) ICRP codes and applicable NRC standards in the USA

8.1.7 Room shielding

- Controlled by local codes and conditions of operation

- Approximately 4 cm of lead or 35 cm of concrete is generally required

8.1.8 Electrical Power Requirements

- System power rating: 115 VAC / 60 Hz or 220V / 50 Hz models available; 100 VA
- In the event of a power failure, the afterloader is powered through the internal batteries to allow the source to retract to the safe.

8.1.9 Environmental requirements

- Operating temperature range: +15 to +35°C
- Humidity range: 30% to 75% (non-condensing)
- 36.1.3 Air pressure: 70 kPa - 110 kPa
- 36.1.4 Weight & dimensions 130 kg 105 cm H x 51 cm W x 57.5 cm D

8.1.10 Equipment classification

- Type of protection against electric shock: CLASS 1
- Degree of protection against electric shock: TYPE B
- Degree of protection against harmful ingress of water: IP 40
- Equipment not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide
- Class of operation: CONTINUOUS

8.1.11 Safety equipment (emergency container)

- Emergency source container is designed to hold most applicators directly
- 38.1.2Minimum shielding: 26 mm lead
- 38.1.3 Minimum diameter (inner plastic container): approximately 60 mm
- 38.1.4 Container height (internal): 270 mm

8.2 Linear Accelerator Commissioning

8.2.1 Scope of Services –Acceptance testing

BIDDER will perform the acceptance of the Oncology Information System and High Energy Linear Accelerator using manufacturer protocol and will establish the important baseline values for the future use. Bidder will submit the complete acceptance test report to the hospital management committee.

8.2.2 Commissioning

Bidder will commission the linear accelerator based on the American association of medical physics Task group TG-106 report. Commissioning timelines are as specified below subject to discussion and agreement with the client

- 2 weeks photon beam scanning inclusive of point data collection,
- 2 weeks for electrons, and
- 1 week for verification.
- 2 weeks analysis and report writing.

The bidder will perform quality assurance tests for the linear accelerator based on the American association of medical physics Task group TG-142 recommendations. Bidder will device a QA strategy for performing on Daily Monthly & Annual basis.
Bidder's team and the client will establish institution-specific baseline and absolute reference values for all QA measurements. The team will meet regularly and monitor the measurement results against the established values to

- ensure the machine performance
- determine any significant dose deviations from the treatment planning calculations.

In addition, the team will device a QA strategy for performing on Daily Monthly & Annual basis.

1) **Daily (Photons & Electrons):**
   - Energy constancy- TPR 20/10 Phantom measurement using IAEA TRS 398 protocol -Flatness and Symmetry measurement (applicable only if appropriate QA device is provided by the hospital)
   - Output constancy
   - Laser/ODI check
   - IGRT-OBI imaging isocenter verification
2) **Monthly (Photons & Electrons)**
   - Absolute dose measurements
   - LINAC Mechanical QA
   - LINAC Radiation performance check
   - DMLC QA using film / EPID
   - Garden fence
   - Picket fence
   - DMLC Test patterns
   - DMLC output
   - Dynalog file Analysis
   - OBI Mechanical QA
   - OBI Imaging QA
   - CBCT Calibration (If required)
   - Arc Dosimetry
   - Picket fence test for static gantry angle
   - Picket fence test for VMAT delivery

- Picket test with intentional errors for VMAT delivery
- Dose rate & Gantry speed for VMAT delivery
- MLC Speed test for VMAT delivery

Bidder's Radiation safety officer and his team members will conduct the radiation survey of the radiation oncology facility as per IAEA radiation safety code for radiotherapy.

Commissioning of linear accelerator in treatment planning system to perform 2D, 3DCRT, IMRT and VMAT treatments

Bidder will perform treatment Planning System Commissioning and Quality Assurance - using IAEA Technical Report Series 430 for **"Commissioning and Quality Assurance of Computerized planning system for Radiation treatment of Cancer".** In addition to the above following newer technique algorithms will also be commissioned

- Dose Volume Optimizer commissioning
- Progressive Resolution Optimizer Commissioning Enhanced dynamic wedge commissioning
- Portal Dose Image Prediction algorithm commissioning for portal dosimetry
- Plan Geometry Optimizer for IMRT
- optimization

3DCRT- Commissioning and validation of

- Physical wedges
  - Enhanced dynamic wedges
  - Field in Field techniques
- Irregular field
- Electronic compensator (if applicable)
- Customized block (if applicable).

- IMRT- Commissioning and validation of
  - DMLC
  - DVO
  - Clinical site-specific validation
- IGRT - Commissioning and validation of
  - OBI- kV imaging
  - OBI - CBCT
  - MV imaging
  - kV-MV match
- Special Procedures (If applicable)
  - Stereotactic Radio Surgery - Planning & Implementation
  - Stereotactic Radio Therapy- Planning & Implementation
  - Stereotactic Body Radio Therapy- Planning & Implementation
  - Hemi Body Irradiation - Planning & Implementation
  - Cranio-spinal Irradiation - Planning & Implementation
- RapidArc - Commissioning and validation of

- Clifton ling test
- Arc dosimetry
- Clinical site-specific validation

- Respiratory gating - Commissioning and validation (If applicable)
  - Creation of 4D image set
  - Creation and Validation of Maximum intensity - projection and minimum intensity projection CT images for Lung and Liver tumors
  - Deep breath-hold technique for breast cancer patients.
  - Selection of respiratory phase for the treatment of lung cancers

Bidder will perform the necessary QA to validate the data transfer from the server to linear accelerator, treatment planning system, contouring workstation and all the peripheral system.

8.2.3 CT Simulation Commissioning

8.2.3.1 Scope of Service

- Bidder will commission, validate and to perform CT simulation
- Bidder will perform complete CT image quality QA using CAT phan phantom (Supplied along with ONCOLOGY INFORMATION SYSTEM and linear accelerator).
- In addition, bidder team will setup QA protocol to check the data transfer from CT simulator to server.
- Bidder will perform commissioning and QA of moving laser (if available

8.2.4 Brachytherapy Commissioning

Bidder will help in selection of essential radiation dosimetry and equipment and Quality Assurance equipment required for commissioning and continuing the Quality Brachytherapy as per international standards.

8.2.4.1 Scope of Services

- Bidder, along with local radiotherapy team will perform the acceptance of the Brachytherapy unit using manufacturer protocol.
- The team will also perform detailed Electrical; Mechanical and Radiation checks during commissioning.
- All the applicators will be checked mechanically and Autoradiograph will be performed for all applicators to verify the source positional accuracy within the applicator.

Bidder team will submit the complete acceptance test report to the local hospital management committee.

- **Radiation Safety Survey during source loading**
    - Bidder's Radiation Safety Officer (RSO) and team will perform detailed radiation leakage tests on the Brachytherapy treatment unit head and perform radiation survey around the installation as per IAEA Safety code for radiotherapy, to ensure the safety of the patient, public, radiation workers and the hospital before starting treatment.
    - During first source loading, the bidder will perform detailed radiation leakage tests on the Brachytherapy treatment unit head and perform radiation survey around the installation to ensure the safety of the patient, public and radiation workers.
    - Bidder's RSO will formulate procedures for safe handling of radioactive isotopes from the moment it is received at the hospital.
    - The new source container upon receipt at the hospital will be surveyed and inventory will be made for safety and regulatory concerns.

8.2.4.2 Regular Quality Assurance Procedures

- **Daily Quality Assurance**
    - Source Activity/Decay
    - functioning of Door Interlock
    - Treatment interruption and recovery
    - Radiation Survey meters functionality check
    - Gamma area monitors functionality check.

- **Source loading Quality Assurance**
    - Electrical, Mechanical and Radiation Checks will be performed after each source loading.
    - Radiation leakage survey of treatment unit and installation,
    - Source positional accuracy using auto radiographs
    - Calibration of radioactive source against reference.
    - Temporal accuracy - Timer linearity and end error, against reference.
    - Swipe test of applicators
    - Then new source data will be entered in to the Treatment planning system and treatment times will be calculated and verified with a reference test patient
    - Mechanical Integrity of applicators,
    - Source positional accuracy – autoradiograph
    - Emergency interlocks and recovery of treatment after interruption.

- **Treatment Planning System (TPS) QA.**

    - Digitizer-Accuracy of digitization of point Co-ordinates.
    - Calculation Algorithm
    - Source specification required for TPS
    - Initial activity quoted by the supplier
    - Agreement of source decay corrections
    - Agreement between TPS and published/ manual calculation for single source, at relevant points

8.2.5 Clinical Implementation

- **Patient Immobilization**
    - Bidder will establish site specific immobilization protocol to perform
        - Head& Neck
        - Thorax
        - Abdomen
        - Pelvis
        - Extremities
        - Special procedures
          SRS, SRT, SBRT, Hemi body, craniospinal, mantle field technique, Total Body irradiation
        - Patient preparation
        - selection of immobilization devices
        - Setup notes and documentation
        - Protocol for CT image acquisition for Radiotherapy planning
        - Protocol for MRI & PETCT image acquisition for Radiotherapy planning
        - Hands on Training of RT procedures
        - Setting up protocol for special procedures.

- **Planning Simulation**
    - Bidder will assist the local team to perform the required CT simulation for all the new cancer patients so that they can be taken up for the further contouring treatment planning and delivery.

- **Treatment Planning**

    - Bidder will perform treatment planning
        - Selection of treatment technique
        - Selection of modality and energy

- Selection of field directions for complex field arrangements
- Shaping of fields
- Computation of dose distribution and verification of accuracy
- Dose volume histogram
- Clinical Implementation of 3DCRT, IMRT, VMAT, IGRT & SRS/SRT (If available)
- VMAT - Planning & Implementation

- **Fabrication of Treatment Aids**

  - Bidder team will assist the local team to create custom made block electron blocks.

- **Simulation of Treatment**

  - Radiographic documentation of treatment ports.
    - Bidder will assist and teach the local team to check and approve every image of the treatment site at treatment machine prior to treatment individual patient

- **Treatment**
  - Transfer of treatment data to the treatment machine
  - Initial verification of treatment set-up.
  - Verification of accuracy of repeated treatments.
  - Continual assessment of equipment performance
  - Periodic check protocol

8.2.6 Training

1) The vendor should provide comprehensive training delivered by application specialists for the linear accelerators don site during installation and to the full satisfaction of the Department of Radiotherapy. The training period should be at least for four weeks or more.
2) Training in a well-advanced centre for two Radiation Oncologists, two Medical Physicists and two Radiotherapy Technicians for two weeks should be provided for each hospital.
3) Maintenance/service training should be provided for two Biomedical Service Engineers of each hospital at the manufacturer's factory for not less than two weeks.

9 Equipment Support and Services

The bidder should provide a warranty and support plan cover for the first 1 year and optional warranty support for year 2, year 3, year 4, year 5 and year 6

CLAUSE-BY-CLAUSE STATEMENT OF COMPLIANCE

(SOC)

This form will be use to show compliance for all items under Section V: Technical Specifications

PERFORMANCE SPECIFICATIONS		**COMPLIED YES/NO**	**OFFERING & REFERENCE**
<Technical specification Item>	*<Performance Specification>*		

10 Summary Schedule of Equipment, Goods & Services and Infrastructure

Item	Description
1.	**RadioTherapy Equipment**
	A dual energy linear accelerator -Energy Linear Accelerator Complete with all software's and Accessories per Specifications
	Brachy Therapy complete with all accessories per specifications
	Dosimetry and accessories
	Immobilization accessories
2.	**Infrastructure Support Equipment**
	UPS with Rating to Support Equipment Incl. Installation Accessories
	AVR with Rating to Support all Equipment Incl. Installation Accessories
	Chiller water system inclusive of accessories for a complete installation.
	Power Generator with Specified KVA plus a Back-up with Installation Accessories.
	HVAC systems for: Treatment Planning, Technical and Control Room Air Conditioning Systems with Specified BTU incl. AVR & Accessories
	Shielded bunker doors as per equipment manufactures specifications
3.	**Construction Services**
	Facility building Design Consulting services (Architectural, MEP, EAI, Structural)
	Facility and Bunker Construction complete with all building services and finishes ready for operations