Notice Inviting e-Tender

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SUPPLY AND COMMISSIONING OF DIFFERENT TYPES OF ONCOLOGY EQUIPMENT IN THE MEDICAL COLLEGES OF THE GOVERNMENT OF WEST BENGAL

(Submission of Bid through *online*)

Bid Reference No.: WBMSCL/NIT-239/2023	**Dated-11.05.2023**

Amendment-V

Section IV. Schedule of Requirements

2. TECHNICAL SPECIFICATION

High Energy Linear Accelerator (LINAC)

The Medical Linear Accelerator with Multi-leaf collimator capable of producing following energy photons:

- 6, 10 & 15 MV (Flattened)
- 6 & 10 MV (FFF)

Electron beams of at least 5 energies between 4-18 MeV or above. Latest model & technology should be offered. Year of Type approval of AERB should be mentioned.

The Medical Linear Accelerator should be capable of delivering

- Three dimensional conformal therapy.
- Intensity Modulated Radiotherapy.
- Image Guided Radiotherapy with facilities for management of respiratory motion.
- Real-time patient position management.
- Stereotactic body Radiation Therapy (SBRT)
- Volumetric Intensity Modulated Arc therapy.
- Kilo voltage X-ray Cone Beam CT (CBCT).
- Electronic Portal Imaging Device (EPID).

- Flattening Filter Free (FFF) mode with high dose rate.
- Volumetric Modulated Arc Therapy Delivery System (VMAT)
- Electron beam energies
- All items (mandatory & optional) quoted should be clinically operational.

The model should be of latest technology and must comply with Atomic Energy Regulatory Board (AERB) Guidelines and must be AERB TYPE APPROVED. The machine should be a **FDA, CE, IEC, AERB** approved product.

A. MACHINE PARAMETERS:

1. **RF Power Source**: High efficiency Klystron / Magnetron (specify) with **5 years full replacement warranty** on full RF chain.
2. **The Accelerator Wave Guide:** A compact standing / travelling type wave guide should be provided for optimum use of RF power source. The wave guide should have **at least 5 years full replacement warranty.**
3. **Electron Gun:** Specify whether the electron gun is sealed or unsealed. The electron gun shall be demountable or filament change option from the accelerator to minimize cost and down time in case of gun problem. The Electron gun shall have **5 years full replacement warranty.**
4. **Bending Magnet System:** A bending magnet of 270 degree or any other degree more than 90 deg based technology equally or better with electron energy spread within ± 3% must be provided. 90 deg bending magnet systems will not be accepted. Precautions shall be made in the selection of materials in the bending magnet system to reduce the neutron production above photonuclear thresholds.

B. PHOTON BEAM CHARACTERISTICS:

1. **Photon Beam Energy:** The Linear accelerator shall be capable of producing three clinically useful photon beams with energies 6 MV, 10 MV and 15 MV. The beam characteristics for a 10 cm x10 cm field at 100 cm TSD should be as follows.

Nominal energy	Dmax (cm)	% DD at 10 cm
6 MV	1.5 ± 0.2	67.1 ± 2.0 %
10 MV	2.25 ±0.2	73.0 ± 2.0 %
15 MV	3.0 ± 0.2	76.5 ± 2.0 %

2. **Dose Rate and Beam Stability:** The minimum dose rate for 10 cm x 10 cm field size at the depth of maximum build up at a TSD of 100 cm should not be less than 500 MU/min for all the three flattened photon beams, should not be less than 1000 MU/min for 6 MV FFF beam, not less than 2000 MU/min for 10 MV FFF beam. Specify whether the dose rate variability is in steps or continuous. Specify whether the dose rate variability is in steps or continuous. **Higher dose rate will be highly preferable.**

   Beam stability should be achieved within minimum time to ensure dynamic applications. Specify the beam stability time in milliseconds.
3. **Field Size:** 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 build-up. The digital display, light field size and mechanical display should be accurate to within ± 2 mm for all field sizes and comply AERB requirements.

   The accelerator shall provide a continuously variable rectangular, unclipped field size from 1 x 1 cm^2 to 35 x 35 cm2 at 100 cm SSD. The maximum clipped field size should be equal or exceed 40x40 cm^2 at 100 cm SSD. Clipped corners are unacceptable for field smaller than 35x35 cm^2

   Radiation field penumbra:

   The width between the 20% and the 80% isodose lines measured for 10x10 cm at depth of 10 cm at 100 cm SSD should be less than 10 mm for all the given photon energies and comply AERB requirements.

Lower penumbra will be preferred.

4. **Beam Flatness:** Field Flatness Specification : Variation of x-ray intensity relative to the central axis shall be ± 3% at 100 cm SSD and 10 cm depth over the central 80% of the field for the longitudinal, transverse and diagonal axes of all field sizes from 10x10 cm to 40x40 cm. Stability of the flatness with gantry rotation at 0 deg. 90 deg. 180 deg. and 270 deg. at 10 cm depth on x, y and diagonal axis for all field sizes from 10x10 cm to 40x40 cm should not be more than ± 3%.The flatness criteria applied to beam profile at D max should show peripheral horns not exceeding 105% of the central axis dose. The parameter should comply with AERB limits.
5. **Beam Symmetry:** The maximum percent difference of average doses shall not exceed ±2% for the longitudinal and transverse halves of the field at 100 cm TSD and 10 cm depth, at gantry angles 0, 90, 180, 270 degrees. Field sizes shall be specified at 10 cm x 10 cm and 40 cm x 40 cm. Average dose is defined as the arithmetic average of minimum and maximum doses within the central 80% of the field for both axes. The parameter should comply with AERB limit.
6. **Quality Index:**

   The ratio of ionizations measured at 20 cm and 10 cm depth for a field size 10x10 cm at the detector level and with constant detector source distance = 100 cm should be as given below:-

Sl. No.	Photon beam energy (MU)	Quality Index (QI)
1	6 MV	Specify
2	10 MV	Specify
3	15 MV	Specify

7. **Photon Beam Energy Stability:**

The quality index of a photon beam should not vary with time by more than ± 1%. The bend magnet system shall be provided with energy defining apertures such that the nominal energy of the electron beam existing from the bend magnet shall be within ± 3% of the nominal energy selected at control console for both photons and electrons.

8. **Radiation Leakage: Minimum and maximum dose rate**

   X-ray leakage: The air kerma rate due to leakage radiation (excluding neutron) at any point outside the maximum useful beam, but inside a plane circular area of radius 2 m centered around and perpendicular to central axis at normal treatment distance should not exceed 0.2% of the air kerma rate at the same distance. Parameter should comply with AERB limits.

   The kerma rate of leakage radiation (excluding neutrons) at 1 m from the path of the electrons between their origin and the target or electron window shall not exceed 0.5% of air kerma rate on the central axis of the beam at normal treatment distance. Parameter should comply with AERB limits.

   Lower leakage will be preferred.

   Collimator transmission: The movable collimators shall not permit transmission of radiation exceeding 0.5 % of the central axis dose at Dmax measured in air for both photon energies.

   For radiation fields of any size, the average air Kerma rate due to transmission through the beam limiting jaws, including MLC jaws, shall not exceed 0.75% of the maximum Kerma rate on the central axis at NTD in a 10 cm x 10 cm field. Lower transmission will be preferred.

   Neutron Leakage: The neutron dose rate should not exceed 0.1% of photon dose rate at isocentre within a radius of 1m.

   In addition to meeting above specifications for radiation leakage, the LINAC should also meet all the mandatory safety and radiation leakage regulations as specified by the AERB, for a medical linear accelerator. In case of any type of radiation leakage (e.g. Photon, Neutrons etc) outside of LINAC room door, necessary arrangements shall be done by the vendor to minimize the contamination (radiation at door)to a safe limit as specified by AERB.

9. **Photon ARC Therapy:** Bi-directional (CW, CCW) arc therapy should be included with automatic calculation of dose per degree based on dose rate selected and the Arc angle set. Specify whether the dose rate variation mode is continuous or not. **Higher dose rate and higher gantry speed will be preferred.**

C. ELECTRON BEAM CHARACTERISTICS:

1. **Electron Beam Energy:** Minimum **5** electron energies between **4– 18 MeV** to be specified. Energy shall be specified as the most probable energy (Ep) of the electron energy spectrum at 100 cm from the accelerator exit window. **Higher dose rate will be preferred.**
2. **Dose rate:** The maximum dose rate at isocentre for each electron energy should be 600 MU/min or more. Specify whether the dose rate variability is in steps or continuous. **Higher dose rate will be highly preferable.**
3. **Field Size:** The electron beam size is defined by the inside dimensions of the electron beam applicators projected geometrically to a plane surface at 100 cm SSD. Specify the number of applicators to be supplied with minimum size of - 6 x 6 cm2 or less, maximum – 20 x 20 cm^2 or more. There shall be an arc applicator provided for electron arc treatment. A method to obtain irregular field shapes shall be provided. It shall be possible to visualize both the field defining light and the optical distance indicator with an electron applicator in place. Higher field size will be preferred.
4. **Beam Flatness: Maximum percent v**ariation of the electron intensity at 100 cm SSD at Dmax shall not exceed ± 5% (within the over central 80% of the longitudinal and transverse axes relative to central axis) for all field sizes for all electron energies. Lower limits are preferable. The parameter should comply with AERB limits.
5. **Beam Symmetry:** The maximum percent variation in the average electron intensity to the longitudinal and transverse halves of the electron field at Dmax for a 10x10 cm and 25x25 cm field at 100 cm SSD shall not exceed ± 2% at gantry angles of 0, 90,180, and 270 degrees. The average electron intensity is the average of the maximum and minimum points within the central 80% of the field for each of the axes. The parameter should comply with AERB.
6. **X-ray contamination:** The X-ray contamination of the electron beam shall be less than 5% of the maximum dose for all available energy.
7. **Electron Arc Therapy:** Electron Arc therapy with necessary applicators shall be provided, if available. The clockwise and anticlockwise gantry rotation must be possible for arc therapy. The MU/Deg must automatically be computed for a defined arc and calculated total MUs. – must be provided, if available with the system.

D. MECHANICAL FEATURE SPECIFICATIONS:

1. **Treatment mode:** Normal: TSD /TAD
   Rotation: CW/CCW
   Arc: CW / CCW
   Dose rate: MU/min & MU/deg
2. **Isocentre**: Target to Axis Distance should be 100 ± 0.2 cm. The isocenter should lie within a sphere of diameter ≤2 mm.
3. **Gantry:**

- **Rotation**: The accelerator gantry shall be capable of rotation equal to or greater than 360 degrees.
- **Readout:** Digital & mechanical readout is required indicating gantry angle position, should be provided in the treatment room and at the control console. Readout accuracy shall be ± 0.5 deg.
- **Controls:** Can be operated both from hand pendant and control console. Two hand pendants should be provided.

- **Optical Distance Indicator (ODI):** ODI should read between 75 -130 cm or more with a tolerance of ± 1.5 mm.
- **Optical field light system** for both photons and electrons must be provided. The coincidence between the optical field and radiation field shall lie within 2 mm.

4. **Collimator:** Rotation ± 165° (with a variation of the mechanical and radiation isocenter during rotation of less than ± 1.0 mm throughout) at mid position, however full ± 180° rotation preferable. Control - Hand pendent and control – console, Readout accuracy - ± 0.5°, Collimator Rotation Isocentre 2 mm diameter Sphere.
5. **Asymmetric Collimator:** Asymmetric collimation shall be provided. Specify the travel ranges and over travel ranges of the jaws.
6. **Dosimeters:**

   Photon Ionization Chamber

   A transmission ionization chamber shall be used for the photon mode. The chamber shall incorporate completely separate collection electrodes consisting of two plates for dose monitoring and a quadrant plate for field symmetry.

   Electron Ionization Chamber

   A transmission ionization chamber shall be used for the electron mode. The chamber shall incorporate two independent channels capable of monitoring both dose and symmetry. Symmetry monitoring shall consist of a quadrant system.

   Dual Channels

   The dosimetry system shall utilize two completely independent channels for monitoring accumulated dose (i.e., a primary and a redundant channel). A dose rate channel and a channel for monitoring differential field symmetry shall be provided. The redundant channel will terminate an exposure of no more than a specified MU higher than the machine setting. The system shall also provide a backup timer with a minimum significant time setting of 0.01 minute. The backup time shall be automatically calculated and set at a user specified value above the expected duration of the treatment.

   Specify the dose rate variation at the isocenter for each photon/electron energy. The time averaged dose rate should be constant (flatness) with minimum variation. Specify the Time Averaged Dose Flatness.
7. **Monitor Chamber**

   The dose monitoring chambers shall be sealed/ unsealed and shall operate independent of ambient temperature and pressure. The dosimetry electronics shall incorporate circuitry to permit interrogation of the accumulated dose, dose rate, and symmetry channels prior to each patient treatment. This interrogate function shall check cable continuity, electrical calibration and interlock trip levels before each treatment. All dosimetry and patient safety- related interlocks must be sensed and controlled by hardware. Primary software sensing and control of safety-related interlocks is not acceptable.

   The dosimeters shall be reproducible to within + 1% or 1 monitor unit, whichever is greater, at any fixed gantry angle from 0 to 360 degrees.

   The linearity of the dosimeters shall be +1 % or 1 monitor unit, whichever is greater, for accumulated doses between 50 and 999 monitor units. Specify the linearity tolerance for less than 10 MU in view of IMRT.

   Backup Counter

   The integral dose shall be retained on a counter, which indicates the monitor units delivered to that time with the unexpected loss of power or malfunction of the accelerator or dose measuring systems. The dose shall be retained for at least 20 minutes after power interruption.

   Dose Rate

   The reproducibility of the dosimeters shall be + 1 % or 1 monitor unit, whichever is greater, at a fixed dose rate. With variations in the dose rate from minimum to maximum, the reproducibility of the dosimeters shall be + 2%.
8. **Couch:**

- A modern, versatile extended range robotic couch top made of new generation homogenous true carbon fibre with 6 degrees of freedom and indexed immobilization movements shall be provided. This will comprise a fully robotic patient positioning system with capability to correct misalignments of the patient remotely not only along the traditional transversal axes, but also for roll, pitch and yaw/isocentric rotations around Y, X and Z axes.
- The Table top shall comply with the deflection requirement of IEC norm.
- IEC scale convention shall be provided.

- Specify the range of motions of the treatment couch including in X, Y, Z axis as well as Pitch, Roll and Yaw. The maximum height of the couch shall be at least 40 cm above the isocenter. The lowest couch position shall be at least 73 cm above the finished floor. Motions (except couch top rotation) shall be both manual and variable-speed motor driven. Specify which motions can be performed simultaneously. Lateral and Longitudinal couch displacement shall not exceed 1mm under braked condition.

Specification	Minimum Required	
Vertical	≧	95 cm
Lateral	±	25 cm
Longitudinal	≧	100 cm
Turntable Rotation	±	90 degree

- Patient support panels in the carbon fibre couch top shall be provided to facilitate the large posterior treatments at extended distances without moving the patient. Specify the combined dimensions of the patient support panels in the couch.
- It should have auto correction facility in at least X, Y & Z directions for accurate positioning for IMRT, IGRT & SRS/SRT.
- The couch must be capable of carrying a load of 180 kg or more.
- Emergency down drive (with battery / manual) shall be provided to remove the patient in case of power failure.
- To simplify mechanical motion control and expedite patient set-up, the motorized mechanical motion control system of the accelerator shall be computerized such that gantry rotation, collimator rotation, collimator jaw settings, and treatment couch vertical, lateral, and longitudinal and turntable rotation about isocenter can be operated with the hand-held pendants.
- **Two hand pendants** shall be provided for operating the machine and the table.

  The hand pendant must have the control of gantry rotation, collimator rotation, collimator jaw settings, treatment couch motions (vertical lateral, longitudinal and turntable rotation around isocentre and room light control). If two operators are in the treatment room, both pendants shall be capable of being used simultaneously. To prevent possible malfunctioning, when hand pendant is in operation, the computer system must prevent conflicting signals from being sent to the same mechanical device.
  To prevent possible damage to mechanical device motors when both pendants are being used, the computer system shall prevent conflicting commands from being sent to the same mechanical device (e.g., simultaneous couch up and couch down commands cannot be issued). The hand pendants shall each have a hardwired motion- enable switch which must be depressed to activate these motions.
- 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.
- Machine space: Details about the physical dimensions and weights of the machine and its accessories including control console is to be provided.

9. **Accessories:**

- **Wedges:**
- A Dynamic / motorised wedge shall be provided that can produce an effect of any wedge angle up to 60 deg.
- **Stationary –** 15, 30, 45& 60 degree wedges for all IN, OUT, RIGHT, LEFT. Specify the maximum field sizes covered, if available.
- **Mechanical front pointer:** A mechanical front pointer **and/or LASER** shall be provided to locate the isocenter of the machine to within ± 2 mm. This accuracy shall apply to any orientation of the machine. A range finder shall be provided to locate the target to surface distance on the patient to within ± 5 mm.

- **Accessory mount – shadow block tray assembly** for holding shielding blocks shall be supplied. The distance of the bottom of the tray from the isocenter to be specified. A detachable block holder is highly preferable to accommodate 2 trays simultaneously for wedges and block trays. The spacing above the blocking tray should be specified. The size of the blocking trays should be larger than the maximum field size at the lower position. Specify traction and size of the blocking trays.
- **Universal clamps to be provided.**
- **CCTV / camera:** Two numbers – one wide angle & one remote control with remote zoom & focus facility for control room with Colour monitors should be provided.
- **In-room LCD monitor: Two** such shall be provided. **All screens** associated with equipment must be flat panel and **not less than 19 inches**.
- A **patient communication** system with latest standard model shall be supplied.
- **Laser alignment system:** Total 04 (four) Lasers precisely adjustable vertically and horizontally by remote control should be provided whose beams shall intersect at the isocenter. The diameter of the sphere of intersection of the laser beams as shown on a phantom located at isocenter shall be less than 1 mm. The system should have 0.5 mm line thickness at isocenter for patient alignment and setup. The levelness (tolerance: 1 mm) and plumb (tolerance: 0.3°) using a level (horizontal & vertical lasers) or a plumb (vertical lasers) will be preferable. In addition a sagittal line laser shall be provided which should pass through the mechanical isocenter.
- **Blue/green color laser will be preferable. All provided Lasers must comply with the respective code of IEC safety of Laser products and comply with AERB norms.**
- An **arm board** which may be attached to the side rails of the treatment couch for use in breast set-ups shall be provided.
- A mechanism to support the patient's hands shall be provided.
- Mechanism to immobilize the patient shall be provided.
- **Spare Parts Kit and Required Tools**
- A spare parts kit consisting of assorted printed circuit boards, relays, lamps and a container of dielectric gas shall be provided. Specify inventory. Include a spare pendant control module as part of the inventory. Standard spare parts should be provided with the machine.

- **Data Link to Field Service via Modem**
- The vendor shall provide a computer link to connect the accelerator to the Field Service facility for efficient off-site analysis of pertinent files, if available.
- **Field Illuminating Light**
- A field illuminating system should be provided for both photon and electron modes. The edge of the defining light field should coincide to within ± 2 mm of the 50% iso density line on an x-ray film taken with minimum build-up for any field size at one meter and any angulation of the gantry or collimator system.
- **TSD Indicator**
- An optical distance indicator which indicates the SSD to at least ± 4 mm over the 80 to 150 cm range shall be provided. Accuracy at 100 cm shall be ± 1 mm. A mechanical indicator which indicates the SSD to within ± 2 mm maximum error over the range 90 to 110 cm should be provided.
- The **accessory rails** beside the patient support panels shall be removable, allowing treatment and port film images without interference from the rails.
- **UPS system**
- An on-line UPS system with the appropriate power rating with voltage regulation and spike protection to operate the entire LINAC system for uninterrupted treatment delivery (including TPS, server etc.) for 15 min or more shall be supplied. The UPS system should work on a three phase 400-440 V/50 Hz Power.
- A resettable over current breaker shall also be fitted for protection. Details about the physical dimensions and space required for the UPS system to be specified.
- **Chiller system**
- The vendor should provide a fully automatic water chiller system for sufficient cooling of the linear accelerator. The chiller system must be imported / export quality with backup compressor and fully compatible with the machine as per specifications of the manufacturer. The chiller system shall incorporate automatic back-up facilities, remote control and alarm panel with warning facilities.
- Details about the physical dimensions and space required for the chiller to be specified.
- The maintenance of the CCTV system (Zoom & wide angle with separate display), UPS including electrical components thereof and the chiller will be seamlessly provided by the vendor for a period of 5 years under the terms of on-site warranty.

- The supply of all components of CCTV, UPS and chiller systems as and when required shall be provided by the vendor for a period of 5 years under the terms of on-site warranty.
- A standard patient calling system (as per concerned departmental requirement) shall be supplied.

10. **Control Features:**

- **Console**

A computerized standard control console shall be located outside the treatment room. This console shall provide controls that must be activated in order for the accelerator to become operational in any of its various modes of operation and also provide displays of accelerator parameters. The following shall be present:

a) Power Off: Turns off all electrical power, including power to the computer, except for that power needed to maintain the accelerator in a "Stand By" condition.
b) Power On: Turns on electric power to the accelerator.
c) Total Dose: Sets the desired total dose for patient's treatment.
d) Time: Sets time for patient's treatment. Time shall be used as a back-up in case of failure of total dose interlock. Backup time shall be calculated automatically with provision for manual reset.
e) MU/Degrees: Sets the desired MU/degree for rotational therapy. MU/degree shall be calculated automatically with provision for manual reset.
f) Mode Selection: Selects x-rays or electrons for treatment.
g) X-ray Energy: Selects photon beam energy.
h) Electron Energy: Selects electron beam energy.
i) Radiation On: Turns on accelerator and radiation is produced.
j) Interrupt: Immediately stops treatment.
k) Complete: Indicates that desired dose has been delivered. In addition, the operator should be alerted if radiation terminates for any reason other than reaching the set integrated dose. In such cases, the dose remaining to be given shall be indicated.
l) Arc Therapy: Enables the accelerator to perform arc therapy.
m) Wedge: Requires that the presence, identification and orientation of a wedge must be confirmed at the control console.
n) Port Film: Opens jaws completely or partially, as selected by the operator, and limits the amount of radiation to be delivered. This shall be operational in both the photon and electron modes but allow only the production of low energy photons. Once the port film has been completed, it should be possible to return the collimators to their original setting automatically.
o) When the LINAC control system determines a plan trajectory, it commands every element of treatment delivery (treatment beam, system motion and image acquisition) in rhythm with the system's heartbeat of preferably 10 ms for achieving the imaging, couch, gantry and collimator movements and treatment beam.
p) Special Procedures: Prohibits accidental selection of procedures such as electron arcs or high dose rate electron irradiation by providing an "extra step" in selection procedure. Describe the mechanism used.
q) Accelerator parameter checks: It shall be possible to monitor different accelerator parameters via an oscilloscope at or near the control console.

- **Control Console Monitors**

The following standard monitors and displays should be available at the control console, and with the exception of a back-up dose counter, it should be possible continuously to visually observe the value being registered on these counters and displays from the position of the operator.

a) Dose Rate Indicator: Indicates the dose rate at maximum build up for a 10 x 10 cm field at 100 cm TSD.
b) Dose Counters: Two counters which count integral dose detected by each of the two dosimeters.
c) Mechanical Total Dose Counter: In case of power failure, a means of preserving the total dose delivered to the patient under treatment when the power fails for an indefinite time period should be provided.
d) Total Time Counter: Counts total treatment time in 0.01 minute increments up to 9.99 minutes.
e) Angle: Indicates position of gantry in degrees with precision of ± 0.5 degrees.
f) Symmetry: Indicates beam symmetry in both major axes.

- **Control Console Adjustments**

It should be possible to adjust the following parameters at or near the control console:

a) Dose Rate: Permits the change of radiation output of the unit.
b) System Calibration and Servicing

A separate mode of operation shall be provided which is used to monitor accelerator parameters and facilitate adjustments to those parameters. While in this mode of operation, the operator shall be able to accomplish the following from the control console:

(i) Monitor machine parameters including both input and output signals.
(ii) Display interlock status, and over ride interlocks.
(iii) Adjust equipment timing.
(iv) Perform computer diagnostics.
(v) Control all mechanical motions from the console, either by automatically moving multiple mechanical devices simultaneously to preset positions or by moving individual devices manually.
(vi) Select dose to appropriate monitor units.
(vii) Select time to appropriate number of minutes.
(viii) Operate the machine for at least two hours without stopping for the purpose of dosimetry measurements.
(ix) Calibrate mechanical motion scales.
(x) Selectively turn off various accelerator servo systems.
(xi) Operate the system calibration and servicing mode remotely within the treatment room using the hand pendants. W hen leaving this mode of operation, all overridden interlocks shall automatically be re-enabled to ensure patient and operator safety. This mode of operation shall be interlocked against unauthorized use.

c) Event Logging
During clinical operation, the accelerator shall record relevant equipment parameters for later review in the event of abnormal machine conditions.

d) Gantry Angle and Collimator Size: Permits changes in the gantry angle and collimation field size. Automatic setting of field size should also be permitted.

e) Accelerator Parameter Checks
The following accelerator parameters should be monitored at or near the control console. A separate BNC connector should be provided such that each of the following voltage wave forms can be monitored via an oscilloscope:

(i) Reflected RF pulse
(ii) Klystron / Magnetron current
(iii) Gun current
(iv) Charge current
(v) Pulse forming network volts

N.B. : This will be in the scope of service engineer.

In addition, a connector for a multi meter should be provided at or near the control console with an appropriate switch such at that one of the following voltages can be displayed:

(i) Gun current
(ii) Pulse forming network voltage
(iii) Electron gun heater voltage
(iv) Power tube heater voltage
(v) Power tube frequency
(vi) Charging current
(vii) Vacuum pump current
(viii) Dosimetry System

There shall be a separate, completely independent indicator of the accumulated dose and dose rate at the control console. It should be possible to set accumulated dose and dose rate. The system shall warn the operator if the set dose exceeds a preset maximum value. This value shall be determined by the user.

In addition, a safety timer shall be incorporated to prevent irradiation from the accelerator after a fixed period of time, which shall be calculated automatically or determined by the operator. To prevent possible overexposure due to a malfunction of the ionization chambers, an interlock system shall be incorporated to prevent the operation of the accelerator should there be a fault with the ion chambers. The status of all dosimetry interlocks and integrity of ion chambers shall be checked immediately prior to initiation of each treatment. The nature of the interlock system shall be such that a positive indication of the malfunction of the ionization chambers shall be visible at the control console. In addition, failure of the accumulated dose indicator or a portion of the system controlling this indicator shall prevent operation of the accelerator but shall retain the last recorded accumulated dose indication.

In addition, separate control console/s, where specifically warranted, for other add-ons such as for specific IMRT, IGRT (including respiratory motion control, gating, tracking etc.), kV CBCT and matching/correction with DRRs and/or planning CTs, SRS, SRT, SBRT etc. to be provided with all necessary hardware and software solutions required.

11. **Interlocks and Indicators and Safety Features**

- Dose Rate Interlock

  The accelerator should be disabled when the dose rate is not within stipulated value.

- Emergency Off Switches

  Provision for connecting emergency off switches into the interlock chain shall be provided to allow immediate disabling of the accelerator in case of an emergency. There should be at least one emergency Off switch on the console and four on the treatment unit (at least seven inside the treatment room including the machine). Describe the location of all emergency Off switches.

- Wedge Filter Interlocks

  The presence, identification, and orientation of the particular wedge filter in use shall be indicated on the control console and be interlocked against use during electron therapy.

- Dosimeter Interlocks

  The normal treatment delivery will be designed to terminate upon a prescribed given dose at 100 cm TSD for a 10 x 10 cm field at the depth of maximum dose. In addition, a timer shall be used as a safety device to terminate treatment in the case of failure of the integrated dose meters. The timer should indicate the treatment time in units of tenths and hundredths of minutes and be accurate to within ± 0.1 minutes. The backup treatment time shall be automatically calculated.

- Door Interlock

  The treatment room door and appropriate accelerator cabinet doors shall be closed before the accelerator can produce radiation.

- Rotational Therapy Interlock

  To perform a rotational therapy treatment, the arc therapy mode shall be selected on the control console. In addition, there shall be an interlock to interrupt treatment if the dose rate per degree is too high or too low as per specifications.

- Port Film Interlock

  This interlock shall allow partial or complete opening of the collimators from the control console and limit the total dose delivered. It shall also automatically allow radiographs to be taken with the low energy photon beam for either photon or electron modes.

- Electron Mode Selection

  The presence and identification of the particular electron applicator in use shall be indicated on the control console and be interlocked against use in photon therapy (except for port films). This interlock should be in addition to a separate interlock which is required for electron mode selection.

- Electron Collimator Interlock

  This interlock should prevent accelerator turn-on in the electron mode if the electron scattering foils and the dosimeter are not in the correct position.

- Key Switch Interlock

  This interlock should be controlled by a separate key, which must be in the "on" position before it is possible to turn the accelerator on.

- Vacuum Interlock

  This interlock should prevent high voltage from being turned on if the vacuum in the accelerator guide is not low enough.

- Pressure Interlock

This interlock should prevent high voltage from being turned on if the dielectric gas or cooling water pressure is too high or too low.

- Modulator Interlock

  This interlock should prevent high voltage from being turned on if there is a fault condition in the high voltage power supply or modulator.

- Warm Up Interlock

  This interlock should prevent high voltage from being turned on during the warm up period when electric power has been turned on.

- RF Interlock

  In the photon mode of operation, the accelerator should be interlocked such that no RF power can be applied to the accelerator unless the photon beam converter is accurately and correctly positioned to prevent the electron beam from being directed toward the patient.

- Collision Protection

  The accelerator should include protection devices designed to minimize injury resulting from collision of an electron applicator with the patient. Describe these devices.

- Symmetry Interlock

  A symmetry interlock is required which shall terminate an exposure if the ratio of the maximum dose off axis in air at two symmetric points exceeds the range 0.98-1.02. The vendor shall demonstrate that this interlock operates as specified.

- Excess Dose per Pulse Interlock

  This interlock should terminate irradiation if the dosimetry system detects an excess dose from a single electron gun pulse.

- High Voltage Protection

  Interlock systems should be provided to afford maximum protection for personnel against high voltage hazards. Unshielded high voltage contacts should be prominently and appropriately labeled. In addition, a manual grounding system should be made available in the modulator enclosure and near other high voltage sources.

- Last man out (LMO) switch with full installation.
- Door light (Red, Yellow, Green LED panel for the LINAC bunker doors). Light should be as per the AERB safety code for Radiotherapy.

12. **MULTI-LEAF COLLIMATOR:**

The MLC system shall have at least 120 leaves (60 pairs or more MLC) with following features:
N.B : The bidder should specify the number of leaves .

a) Leaves shall have independent drives.

b) Leaf width at isocentre shall be ≤ 5 mm for central leaves and ≤ 10 mm for lateral leaves.

c) Maximum leaf retracting and extending position – to be specified.

d) The over travel distance of the MLC to be specified.

e) Leaf height & material and peak transmission – to be specified.

f) Transmission through leaves should meet AERB guidelines.

g) Interleaf leakage limits should meet AERB guidelines.

h) Leaf end position and side position accuracy and reproducibility – to be specified.

i) The minimum & maximum leaf speed. (The bidder should specify minimum & maximum value)

j) The carriage speed – to be specified.

k) Penumbra for all square fields with or without MLC – to be specified.

l) Should be capable of performing multiple static fields and dynamic multi-leaf collimation, IMRT & Arc IMRT treatment.

m) There should be facility to treat patients conventionally, using blocks without MLC.

n) Should be integrated with planning system, CT simulator (4D), RFA and/or MRI via planning system

o) The MLC workstation must have user interface, can open or close desired patient file, can load treatment plan, graphical beams eye view of the MLC leaf and collimator jaw position as well as 3-D transparent image of the surface contour, body organs and gross tumor volume, clinical target volume and planning target volume as planned in the treatment planning system.

p) Maximum static field size and maximum static aperture field size: at least 30x30 cm2

q) Maximum IMRT field size to be specified.

13. **IMRT TREATMENT DELIVERY:**

The LINAC should be capable of performing **Step & Shoot and Sliding Window MLC delivery** and all necessary planning system, software and algorithm should be offered.

(Details given in section titled 3-D TREATMENT PLANNING SYSTEM WITH MULTIPLE WORKSTATIONS below).

14. **PORTAL IMAGING SOLUTIONS:**

- The electronic portal image system shall be based on Amorphous Silicon Flat Panel Detector Based Technology.
- Should be able to take images at any gantry angle with variable X-Y movements. Should have motorized Robotics Arm with remote control from console without entering the machine room.
- The size of the flat panel shall be at least 30 cm x 30 cm with a resolution of not less than 1024 x 768 pixels.
- Necessary hardware & software with licenses to be provided for imaging for IMRT QA to check the machine fluence of the planned treatment and auto -verification with planning fluence shall be provided.
- Mention the size and pixel density of the detector.
- Mention the full active viewing area.
- Mention the number of bits used in detector digitizer.
- Mention the minimum detector dose to acquire a full field image.
- Minimum time after acquisition required to display image shall be as less as possible.
- Mention the image acquisition rate per frame.
- Mention range of lateral and longitudinal movement.
- Mention type of read out provided for movement and its location.
- There should be a collision detection/avoidance system (specify detail).
- Specify beam energy at which system can be used
- Dose rate for portal image acquisition to be specified
- Minimum and maximum settable exposure to be specified
- Contrast resolution to be specified
- Necessary QA tools for EPID to be provided
- Imager alignment to mechanical isocentre to be specified
- **Facilities for Portal dosimetry and dosimetry for FFF mode.**

15. **Image Guided Radiotherapy (IGRT) System**

A dedicated KV imager with solutions for IGRT including kv CBCT is to be provided. The kv imager performance specifications, imager travel range, image acquisition rate detector (made of amorphous silicon) specifications, typical radiographic image specifications are to be specified. The specifications for kv CBCT image acquisitions and reconstruction are to be specified. The optical imager specifications are also to be mentioned. All of the abov e specifications should be AERB/IEC/FDA compliant.

Higher field of view, higher spatial resolution, low contrast detect ability, low organ dose, lower acquisition time.

16. **Respiratory Gating:**

All accessories needed for the Respiratory gating and correction in 6DoF and monitoring of tumour motions should be included along with the IGRT package. The proposed system should aid in faster positioning of patients with a live video feed enabling the users to switch between different camera angles to ensure accurate positioning.

Respiratory Gating should be installed in the Linear Accelerator room and in the 4D CT Simulator Room. The Respiratory gating system should be quick and easy for day-to-day use. It should have seamless integration with the following:

- Linear Accelerator
- Treatment Planning System
- Record & Verify System
- RPM/ ABC should be offered by the bidder and should supply 2 sets of RPM/ABC (one at CT end and other at LINAC end) with all necessary consumables / disposables.
- The bidder should supply surface guided RT comprehensive motion management package with latest hardware and software (with company certification) for LINAC (3 camera pod, camera should have 4 MP or more resolution) to support intrafraction imaging and non-coplanar tracking.
- The system should have 6 DOF beam hold and 6 DOF / 3 DOF couch control (at least 3 no. of Govt. installation in India)
- The proposed system should aid in patient positioning with the live video feed.

The Respiratory Gating system should be real time and should be able to accurately track the tumor so that maximum dose to tumor is delivered during the treatment. Accurate gating should be possible in the 4D CT Simulator and with the Linear Accelerator for gated treatments.

The Respiratory Gating system should be able to provide retrospectively and prospectively gated imaging studies. The Respiratory Gating system should track the patient breathing pattern within the specific threshold that determines when the treatment beam will be gated on and off in all 6DoF.

The gating system should support 4D CT for the CT scanner installed in the department. Adequate and appropriate software along with the necessary high-end hardware must be supplied. 5 years warranty + 5 Years CMC (total 10 years) with onsite support, software and hardware up gradation if any during this period. Free in house training for Physicists, Oncologists and Technologists should be provided.

TREATMENT PLANNING SYSTEMS FOR LINAC MACHINE WITH WORKSTATIONS

Advanced approved latest 3-dimensional treatment planning system (TPS) for the machine that should be capable of planning for conventional radiotherapy, 3D Conformal Radiotherapy (3DCRT), Intensity Modulated Radiotherapy (IMRT), Volumetric Modulated Arc Therapy (VMAT), IGRT, 4D Planning including solutions integrating respiratory motion), SRS, SRT, FFF planning and SBRT with both forward and inverse planning with adaptability for future up gradation shall be supplied. **Any software update within 5 years warranty + 5 Years CMC (total 10 years) of procurement should be incorporated free of cost by the vendor**. Virtual simulation software should be part of the planning system. The system should have an integrated patient data base that is accessible to all radiotherapy applications present in the division through planning and contouring workstation. It should work on client server architecture. The server should not be counted as a planning system. The planning system offered should be latest version available with the company.

Single TPS solution for all kind of planning facility 3DCRT, IMRT, VMAT, SRS & SRT with localizers is preferable

Recommended single unified integrated for OIS & TPS.

- **Hardware**

Latest window based workstation with latest hardware (Processor speed, hard disk memory, RAM, video card, hard drive, tape drive, CD RW, DVD reader writer, modem, keyboard and mouse)at the time of purchase should be supplied. The TPS and its workstations should have 20"or more flat panel monitors. TWO (At least 1A3printer) advanced colour laser printer with network connectivity shall be provided. New cartridges for the printers to be provided as and when required for a period of five years i.e. till the completion of warranty period and bidder should ensure undisrupted service. The bidder should mention the price of the cartridge as per the prescribed format given in the Form 9(b). A3 Scanner of high quality for data acquisition from plain X-rays, CT/MRI films should be provided. Appropriate battery and UPS for smooth running of the TPS to be provided with facility for replacement of batteries as and when required for a period of 5years.

No of workstations to be provided: **Six (6)**

With capability of planning: **Three (3)**

With capability of contouring: **Three (3)**

- **Planning and contouring software**

Should have the following specifications:

- Virtual fluoroscopy Isocentre placement from AP and lateral DRR's, auto computation of isocentre from target volume should be possible. Editing of origin placement in the reference slice and computation of isocentre with reference to origin. Should calculate each phase of treatment plan independently and as a composite plan. Should plan for the following combination:

  Photon-Photon

  Photon-Electron: All energy combinations

  Electron-electron: all energy combinations

- Dose and marker point definition. Export of isocentre coordinates with reference to origin to laser control system. The system should support multi laser marking software. Provide pre-defined structure templates that can be used for all type of treatment. Must be able to add/subtract predefined organs and/or parts of organs for defining areas of interest. Tool to match MRI, CT and PET image using reference point should be available. Mutual matching algorithms must be available to auto match images using different modalities. It should be possible to display the calculated dose on sagittal, coronal and arbitrary planes and on MR, PET and fusion images. Should be fully integrated with the record and verify system. Should support addition of bolus of different thickness.
- Volume definition should be possible using Volume Segmentation using threshold, Free hand contour tracing, Contourediting,3D anisotropic margins etc.
- Volume delineation should be possible with Free hand contour tracking or Advanced volume segmentation using threshold in 2D or 3D or with predefined shapes. Various contour editing tools to modify the contour at any plane should be possible.
- Contouring options in Axial, Sagittal, and Coronal or in any oblique planes must be available.
- It should be possible to do manual, semi-automated, fully automated contouring/segmentation in the images.

- The software should have facility for automated uniform or non-uniform margins. For example it should be possible to expand the clinical target volume (CTV) three dimensions by same magnitude or by different magnitudes to define the planning target will be considered as not meeting the requirements.
- It should be possible to copy one organ to another with margin; add margins on a single slice, arrange of slices or all slices.
- It should also be possible to interactively edit the contours with user choice of segments to reject or accept.
- Interpolate algorithm should be available to provide inter active, shape based interpolation– i.e. after contouring only in selected slices, the algorithm should automatically interpolate the closely fitting contours in other slices. Interpolated contours may be edited: accepted or rejected.
- The DRR/BEV image should display the machine diagram to allow real-time checking of machine and patient geometry.
- Auto-outlining with Non-Uniform Margins.
- Facility to contour on coronal and sagittal and on any arbitrary planes.

Per institute planning system should have Two (2) numbers of independent 3D-CRT and IMRT licenses and VMAT licence which can work separately, individually and simultaneously for all planning modalities, optimizations and calculation algorithms.

- **All Planning workstations must be equipped with individual licenses for planning including 3DCRT, IMRT and VMAT.**
- **3 numbers of independent contouring licenses which can work separately, individually and simultaneously for all type of radiotherapy contouring should be provided by the vendor.**

➢ **Image Fusion Software**

- This should include auto matic and interactive image registration and fusion of CT with MR/PET/SPECT images for treatment planning.
- This should include real time image reformatting and fully automated image alignment.
- 3DFusion display with delineation of target in the fused image should be available.
- Highly preferable: Deformable registration facility.

➢ **Networking System**

Latest version of networking software with standard server to be provided and installed for local area networking compatible with the TPS, Machine, treatment console, CT Simulator (4D) & MRI (if any). Preference will be given to minimum 64 bit digital networking system. Full network connectivity between the LINAC, the oncology information and treatment record & verify system, workstations on either location, all imaging treatment planning and treatment delivery system on both locations must be established. Provision must be available for adding more work stations. Storage media for archiving and export through Ethernet and TCP/IP format must be provided.

- The TPS should be of the latest & able to network with LINACs, CT Simulator (4D), HDR Brachytherapy machine.

- **Imaging Tools**

  DRR features

  Interactive DRR calculation mode must be available Automatic window width/level selection for DRR. DRR should be interactively updated when the isocenter position is modified should be possible to highlight or suppress different density regions in the DRR Printing of DRR images should be possible. The DRR generation methods should include normal summed, MIP and volume rendered (for soft tissue/bone weighted DRR).
  DRR presets should be user defined Macro function to save a series of frequently used steps should be available.
  Specify DRR image enhancement tools to improve DRR image quality Reconstruction of DRRs should be real-time or sub-second direct printing of DRR on laser film should be possible.
  Real-time displays of DRR as beam parameters are changed.
  It should be possible to transfer DRR and BEV images to EPID of Linear Accelerator. Depth Control in oblique projections must be possible
  Cross-hair display on DRR to provide scale information.

- **IMRT**

  Support for coplanar and non-coplanar beam arrangements and synchronous IMRT optimization with delivery by both Sliding window and static step and shoot should be available. QA data generation tools per beam and per plan. Support for multiple MLC vendors. IMRT QA tools. Ability to run IMRT plans on phantoms to create digital composite files for film comparison. Dose QA export to IMRT plan verification software. Intensity map BEV display. Offered IMRT module can have MLC segmentation settings as Minimum number of monitor units per segment, Maximum number of MLC segments per plan, Minimum open area per segment and Minimum number of open leaf pairs per segment.

  Should have full integration with IGRT planning and delivery - should be able to send DRR of desired gantry orientation to IGRT system for comparison with KV/MV radiographic image to determine patient shift. It should also be able to send CT images to IGRT system to compare with reference CT images. Should be able to import Cone beam CT images from Treatment machine and compute dose on the imported images to evaluate dose to critical structures of the patient during treatment. If IMRT is delivered as a boost dose after delivery of partial treatment by conventional, 3D-CRT plan, then it must be possible to incorporate the delivered plan to optimize the IMRT treatment plan. It shall include IGRT software also.

  Advanced library based intuitive fast and planning solution should be provided.

  A method for estimating Dose Volume Histograms (DVHs) based on patient geometry (structure set) and previous knowledge contained in a set of existing patient cases.

- **DICOM Import and Export**

  All required licenses for latest DICOM version and DICOMRT import and export through network between various imaging and treatment systems which are available or to be procured in future (CT,MRI, PET and Simulator) must be provided. In addition to latest DICOM version and DICOM RT the vendor shall also provide DVD based connectivity. The system should be able to acquire and display on-board 2D and 3D volume images of the patient immediately prior to treatment. The network provided should be able to transfer images to (from) EPID/CBCT from (to) TPS and simulator and additional workstations.

- **Calculation Algorithm**

  - TPS should include the following algorithms:

  1. Electron beam: Monte Carlo
  2. Photon beam: CC/AAA and MC/Acuros - XB for 3DCRT, IMRT and VMAT
  3. Portal dose calculation algorithm
  4. Photon optimization for IMRT and VMAT

  - The TPS should have MCO feature.

Configuration of Treatment Parameters

Beam Data entry via keyboard, digitizer, and water phantom. Should accept data from standard Dosimetry systems. Generation beam parameters: Gantry/ collimator/ table conventions/ single and dual asymmetric jaw limits/PDD/OAR/TAR/TPR/BSF/Phantom scatter correction factor/wedges/ blocks. Should accept physical/motorized or dynamic wedge parameters. Multi-window overlay of measured vs. generated depth dose and profiles and multiple tray factor definition for each treatment machine should be provided.

- **Utilities**

The following facilities should be available: Template plan storage/ recall including graphics layout. Single/dual asymmetric jaws. Manual divergent blocking. Automatic blocking with margin. MLC planning. Automatic MLC shaping with changes in machine parameters. Enhanced dynamic wedge. Virtual wedge, motorized wedges. Arbitrary weight point location. Relative dose, absolute dose or MU weighting. Bolus. 3D Room's eye view with real time rotation of wire frame, solid and transparent structures and dose clouds. Transverse, sagittal, coronal and oblique views with/ without CT. BEV with variable content display. Export of DRR in DICOM secondary capture format. Real time display of doses on sagittal, coronal and arbitrary planes. Global hot spot display. MU/time calculation for both photons and electrons.Dose profile generator. DVH: differential and cumulative with Multiplan comparison.

VOLUMETRIC MODULATED ARC THERAPY:

Both the planning systems should have support volumetric modulated arc therapy treatments, delivering comparable or better dose distribution as IMRT. VMAT Delivery for a single linear accelerator with the capability to simultaneously modulate aperture shape, dose rate, and gantry speed continuously through 360 degrees of gantry rotation, during an arc beam delivery. When coupled with VMAT Planning and a VMAT - compatible information system, the TPS should have the capability to generate IMRT-quality or better dose distributions in a single, optimized arc deliverable by the accelerators.

FEATURES

- Latest version of Inverse Planning software for VMAT with option for SRS/SRT/SBRT should be offered
- Simultaneous modulation of MLC aperture shape, beam dose rate, and gantry rotation speed during beam delivery
- Radiation beam is continuously and smoothly modulated for dose rate
- Provides IMRT-quality dose distributions in a single arc/multiple arc delivery in minimum possible time.
- Should be capable to generate superior plans while limiting leakage, scatter and integral dose to the OARs
- Seamless connection with compliant R&V systems
- Should be Capable to perform Single and multiple arc capable Non-coplanar arcs for support of stereotactic radiotherapy and SBRT
- Gated VMAT is preferable
- Infractional imaging should be available for SBRT.

SRS, SRT AND SBRT SOLUTIONS:

Necessary hardware and software solutions (including image acquisition, fusion, segmentation, planning, evaluation, record and verification) for Frame based/ Frameless SRS, SRT and SBRT using same MLC to be provided by the vendor, specifications of which are to be mentioned and those should be US FDA, CE, AERB compliant. IGRT planning and delivery solutions for the same to be provided and specified. Necessary QA tools (hardware and software) to be provided and specified.

ONCOLOGY INFORMATION SYSTEM / TREATMENT RECORD AND VERIFY SYSTEM:

- Patient record & verify system for two LINACs.
- Transfer all parameters from TPS, Simulator to Accelerator for automatic treatment setup & delivery shall be done.
- Transfer of portal imaging system data for comparison.
- Transfer & execution of MLC position parameters for normal treatment & IMRT treatment including step & shoot & dynamic sliding window techniques from treatment planning system should be provided.

- Should be networked with existing network system and all required interfaces should be provided for all features such as IMRT, VMAT, IGRT, SRS and SRT.
- The LINAC should have the feature of ultrafast first automatic morning QA check in minutes for the positional accuracy of gantry, collimator, MLC and jaws and beam constancy with clear pass/ fail criteria.

IMAGE GUIDED RADIOTHERAPY (IGRT):

The vendor shall quote an IGRT verification system including solutions for management of respiratory motion that should be FDA/CE approved and should be in clinical use in renowned centers worldwide.

The system shall be based on Cone beam CT imaging. For image guidance, either the digitally reconstructed radiograph from the planning system or a 2D image or a 3D cone beam CT image set will be kept as the reference image and the appropriate image set acquired on the subsequent treatment days will be compared against this reference standard.

The couch top should shift at least in three directions (x, y and z-axes) for IGRT required for matching the patient's position with the reference image set which will then be computed by the image guidance software provided.

The software shall then drive the couch automatically to the desired position. The software shall offer both automatic and manual matching modes.

It shall also be possible to do matching based on implanted marker seeds.

It shall be possible to use the cone beam CT images acquired by the LINAC for routine treatment planning and the accuracy should be within ± 2% of the dose calculated using the conventional CT images.

It shall be possible to acquire such image guided verifications and adjustments of patient's position daily or on selected days during the course of treatment. All such data shall be automatically stored in the database.

All data and image transfer shall be fully DICOM-RT compliant. Full DICOM-RT compliance with all import/ export licenses shall be provided.

Vendor should also provide DICOM-RT licenses for the existing planning systems with the LINAC.

KV and MV Imager specifications should be as per USFDA, CE, AERB guidelines and details to be mentioned.

Facilities for offline review (matching of images & shift calculation) should be provided.

4D advanced IGRT software including software for 4D motion management and management of respiratory motion should be provided.

There should be imaging during the beam on to facilitate intra fraction motion review (IMR).

VIRTUAL SIMULATION SOFTWARE:

Virtual Simulation Software with moving lasers compatible to CT Scan machine in this institute shall be provided. An indexed flat CT table top for IMRT planning imaging purpose shall be provided for the purpose. The Vendor shall ensure easy integration of the Radiotherapy CT Simulator software for acquisition, virtual simulation and image transport with the TPS and machine.

Backup Facility

Sufficient back up facility for storage of all information related to imaging, planning and treatment of patient for10years with NAS Drive (minimum 20 TB usable space) with RAID facility.

The model or version of both the LINAC machines must be on Digital Platform and of latest version.

DOSIMETRY AND QA EQUIPMENTS

DOSIMETRY & QA EQUIPMENTS AS PER THE FOLLOWING SPECIFICATIONS

Sl. No.	Specification	Remarks	Qty. needed per institute

1	**RADIATION THERAPY BEAM ANALYZER**		**1 set**
	Require a full-fledged three dimensional Water Phantom & Dosimetry System and therapy beam analyser for performing Off-axis profiles, PDD, point dose measurement, beam symmetry tuning, Dose rate constancy check, vector scan and TG51 lead foil measurement for low and high energy Photon and electrons. All the measurements should be computer controlled and user friendly. All components comply with national and international regulations and safety rules. All components of the system and all available options are controlled by the same software that runs under Microsoft Windows. The system should suitable to measure pulsed radiation with fluctuation dose rate. The parent company should have direct service staffs in India, for smooth and efficient troubleshooting. The product should be robust and reliable and the parent company should have atleast 50 installed and working water phantom systems in India.	A robust and reliable 3D water phantom along with accessories are required for the fast commissioning of the linear accelerator (3D radiation field analyzer)	
a)	**Water phantom**		**1 set**
	The scanning volume should be large enough to scan and should not be less than 48x48X40 cm. It should be square in shape and the system should come with suitable thickness to the avoid bending of the tank's walls by water pressure and water absorption of the acrylic material. The reproducibility of a position should be ±0.1 mm throughout the whole phantom. The positioning tool should be there to allow easy and exact positioning of the chamber's geometrical centre in the central beam and at the water surface. Apart from this the exact position of the chamber in the radiation beam should be possible via software/Pendant. The positioning speed should be adjustable upto 50mm/s. The acceleration of the step movement should also be changed as and when required. The zero point, reference point and limit of the different detector units should be stored separately in the control unit /Pendant. The control pendant should display the actual position of the chamber position at any given measuring time. The system should be capable of performing fast continuous mode / step by step mode. Availability of both the mode will be preferred.	A rectangular/square scanning volume make sure that the water phantom measurement correlates with the field of view of the LINAC, which is also square/rectangular. A higher reproducibility makes sure that the repeated measurements give the same value and a faster scanning helps in faster data collection and hence faster commissioning	
b)	**Ionisation Chamber for RFA**		**1 Set**
	2 nos of 0.13cc or 0.125 cc ion chambers, along with detector adapters and 2 nos of 5m cables should be provided	2 nos of 0.13cc or 0.125 cc chambers are needed for scanning and reference purpose.	
c)	**Water reservoir**		**1 set**

	The water reservoir should be atleast 180 litres to store the water and can be pump and drain to the water phantom as quick as possible. The water Reservoir must be able to hold the entire weight of the water without any change. The weight of the whole assembly can be puss or pull though the wheel with polyethylene or equivalent. The lifting carriage should come with the technology that keeps the height absolutely accurate. The Lifting carriage and Water Reservoir should be separate /integrated for easy movements, must be imported and directly from the suppliers. The water reservoir should have a safety circuit that avoids the dry pump running. Automatic Lifting facility should be quoted mandatorily. Provision for leveling water phantom manually / automatically should be provided.	Imported table and reservoir make sures that the accuracy and robustness is not compromised, even in the accessories division	
d)	**Control Unit**		**1 set**
	A separate control unit for controlling the movement of the detector in any three directions should be possible. The control unit should permanently store zero point, reference point and limit points for water phantom. It should have a time constant of minimum 20ms and the leakage current should be less than 200fA.		
e)	**Control Laptop**		**1 set**
	The latest version of W indows , Professional laptop (with higher version processor, 8GB RAM, 1TB hard disk, 2GB Nvidia graphics card) should have all the latest feature with color FULL HD monitor and with printer/plotter (color) . The system should be upgradable.	A powerful computer ensures that the system software run smoothly	
f)	**The Software**		**1 set**
	Fully workflow oriented acquisition and analysis software to increase efficiency and to reduce the commissioning and QA time of the LINAC should be provided with the following minimum properties:	An User friendly and comprehensive software to compliment the powerful water phantom.	
	-Many data exchange with IMRT software system		
	-Support of all international and industry protocols		
	-Licenses for installation of acquisition and analysis software on up to five workstations Common settings:		
	-Complete settings in one window		
	-Visibility of connected controller and electrometer		
	Queue Set-Up:		
	-Highlights discrepancies prior to measurement		
	-Queues pre-defined though flexible; measurements are prepared based on RTPS Requirements		
	-Queue filtering and sorting base for grouping scans and optimization queues functions for modify, extend and exchange queues		
	-Import of RFQ files (queue files)		
	Data Acquisition:		
	-1D, 2D and 3D data views		
	-Online display of measurements and online data analysis of each scan controller panel.		
	-Central axis check facility		
	-Adaptive scan optimization facility		
	-Output factor table		

	Data Analysis: -Electron depth-curves/profiles photon depth-curves/profiles TPR/TMR -Isodose / Array calculation mathematics: add, multiply, subtract and divide curves data modification tools, e.g. rescale, move, mirror RTPS: -Generation of measurements queue data transfer plug-in module for new RTPS update Archiving / Printing: -Appropriate data archiving customized print templates creation and export of tables		
g)	**Administrative Data**		**1 set**
	Comprehensive documentation of the measured data by automatic saving of the used measuring environment should simplify the interpretation of data even a long time. The used measuring routine data can be reused either unchanged or with some of the parameter changed. Data can be printed and plotted in numerical and graphical form on all printers and plotters that are supported by windows. The administrative data can be changed after saving the measuring data. All measuring data should furnished automatically with their administrative information and comprehensive filter function allows the easily selection of specific data. The necessary software to network the 3D TBA system with the existing 3D TPS in the department of Radiotherapy must be offered.		
h)	**Data Analysis**		**1 set**
	Various normalization should possible viz. normalization to maximum for depth dose curves, normalization to maximum or center for profiles and normalization to maximum, enter, position and value for isodose lines. Homogeneity and symmetry should be calculated automatically and various national and international protocols can be selected. Depth dose curves can be analyses according to AERB protocols.		
2	**ARRAY DETECTOR for IMRT& Rotational IMRT**		**1 set**
	The device must be based on ion chamber matrix / diode with more than 1000 detectors, having the facility to use with dedicated phantom with 3D dosimetry system having facility for measurements of IMRT/ VMAT/Rapid-Arc and should be calibrated for FFF applications at high dose rate. The device should come with a physical device to calculate the gantry angles for VMAT/Rapid Arc plans. The chamber must be a vented plane-parallel square shaped ion chambers with center to center spacing less (per institution) than 8mm. It should be able to use for the dose verification of IMRT beams and routine quality control of high energy photon and electron beams by using the software. The device should include a temperature and pressure sensor to perform an automated correction of the chamber signal (optional). The software should allow for the Registration of measured vs planned data, Complete IMRT verification of measured vs. planned TPS data incl. 1D profiles, 2D isodose maps, DVH, automated verification such as sum, (absolute difference, correlation, multiplication, DTA (distance to agreement) calculation, Gamma analysis, including threshold and gamma angle Histograms (for data sets and results) Region (ROI) of interest analysis Time based analysis (tables) e.g. start-up License for complete DICOM for: Import of planned 2D and 3D data from all TPS supporting DICOM RT and RTOG formats Import of EPID data via DICOM Interface to DICOM compatible scanners (e.g. Kodak CR, Agfa) via import of DICOM CR files	Ion chamber based detector array make sures that most accurate IMRT and Rotational IMRT QA is done. 1000+ detectors ensure that the spacial resolution of the array is superior and hence no information is lost. If the sampling time is less, this ensures that the data collection by the detector is very fast. So be best detector will have lower spacial resolution along with lower sampling time!	

	The parent company should have direct service staffs in India, for smooth and efficient troubleshooting. The product should be robust and reliable and the parent company should have atleast 10 installed and working IMRT QA systems in India.	This make sure that the department gets a reliable and robust Rotational IMRT QA device, supported by the principal company from India	
	Pin point chamber should be provided for small field IMRT QA		**1 set**
3	**Machine QA and Daily QA**		**1 set**
	A Daily Independent QA device with minimum of 12 ionisation detectors which can perform constancy checks on LINACs to check homogeneity, symmetry, central dose, wedge angle needs to be supplied with option to analyse the data according to all the International and Linear accelerator vendor protocol. The device should be capable of printing the daily data for selective period, selective energy, field size and any other filter options. There should be options to print the trend analysis in graphical format, along with the summary for the chosen period. It is also desirable to print the analysis of the daily data for the selected period. The actual measurements of the chambers should also be pintable in table format. The Daily QA should be offered for available all features including FFF compensators blocks. The device should be a wireless & should have a built-in LCD Screen displaying all the measured values. The device should have a capability to store upto 8000 number of measurements. The device should trigger the next measurement automatically. Dedicated software should be provided for data documentation and trend analysis. The device should be capable of correcting for temperature and pressure variation The device should also have the feature to be operable through software. Software License should be at least for five systems.	Advanced LINAC QA solution needed for the daily / weekly LINAC check	
4	**Absolute Dosimetry and Detectors**		**2 Sets** Quantities needed for 02 set per institute
	A reference class electrometer with TNC connector, with a sampling time of minimum 20ms should be provided. 2 farmer chamber 0.65cc or 0.6 cc, 0.4cc parallel plate chamber and 18m long triax cables with TNC connectors should be provided. Adequate build-up caps for (6MV, 10 MV and 15MV) farmer chamber should be also provided. All chambers supplied should be water-proof and should have TNC/M type connection. (per institute irrespective of no. of LINACS)	Reference class electrometer helps in cross calibration of chambers and TNC connector makes sure that the electrometer can work with any TNC chamber	
	The following items should be included in the absolute dosimetry package - imported RW 3 slab phantom of 30x30cm with adapter plates for pin point chamber, FC and PPC, imported fluke/ Ludlum survey meter, a local D10/20 phantom, an imported at least 25 cm variable depth (manual)30x30x30 phantom with chamber insert for FC and PPC, digital calibrated thermometer and barometer.	Essential items needed for	1 set of slab phantom per machine.
5	**SRS/SRT QA**		**1 set**
	The following items should be quoted for SRS/SRT QA:		All the stated inserts shall be a homogeneous cubic insert with automatic locking mechanism and

			must have same material and density as that of base phantom. They should also contain cylindrical CT markers so that the isocentre position can be easily and acurately defined and the dose value at the isocentre can be extracted. A homogenous plug shall also be supplied wherever applicable to fill into detector cavity to avoid artifacts caused by the inserted detector while planning CT of those inserts combined with base phantom. A corresponding detector holder wherever applicable that can be screwed in to the insert must be supplied for the exact positioning of the detector in the centre of the insert.
	1. Reference diode detector along with Stereotactic diode detector	Mandatory package for SRS/SRT QA	
	2. Photon and Electron field detector	Necessary package for SRS/SRT QA	
	3. Dedicated array detector for SRS & SRT QA / Software solution for SRS & SRT QA. The array should be ionization based with minimum 2.5mm resolution. The array should be able to be placed in the rotational phantom to get the Volume dose for SRS/ SRT treatment	These items ensure that the SRS/SRT QA done is of high quality	
	4. A technologically advanced and fast phantom with powerful and ready-to-use application-specific inserts are required. The system set up and operation should be simple with unrivalled flexibility to add and combine inserts as and when needed. All components should be designed and manufactured with sub-millimeter precision. It must support SRS, SBRT. It should have CT markers on the base phantom to coincide with all inserts for enhanced visibility. A phantom should be made of polystyrene material with octahedral symmetry and Polyhedron design having physical density of at least 1.05 g/cm³. The phantom must be usable with various inserts for end – to – end testing, patient plan verification, and additional tests for LINAC QA in a clinical environment. It should have an integrated and compatible solution with application-oriented inserts and appropriate detectors.	Base Phantom for SRS/SRTQA	
	5. The insert shall have capability to check 2D/3D coincidence of MV & kV Isocentre with MV Imaging system (EPID–2D) and kV CBCT (3D) system, respectively using minimum four Tissue-equivalent bone structures for enhanced visibility. It should also have the capability of daily checks of IGRT and SGRT positioning accuracy, including remote controlled couches as recommended by AAPM TG-179 and TG-142. It should have a high-density radiopaque ceramic spherical ball having dia of less than 9 mm to perform Winston-Lutz testing 3D iso – centre verification. There should be a software module to determine 3 D isocentre deviation.	LINAC QA insert	

	6. This insert when combined with base phantom must enable a comprehensive end-to-end testing and patient QA of stereotactic treatments (SRS, SBRT, SRT) as recommended in major QA protocols and guidelines, including AAPMTG-101 and tissue-equivalent materials (brain, lung and bone) for enhanced CT visibility and additionally the insert should be compatible for accurate verification of the CT/MRI image fusion algorithm of the treatment planning system. A detector borehole in the centre of the same insert is required for Patient-specific single-point dose measurements with different detector types. The insert must be compatible with patient positioning systems and patient masks for accurate set up.	System QA insert	
	7. The insert should be usable in measurement based patient specific plan verification including non co planar treatments with different detector types. This insert must allow fast point - dose verification of treatment plans of any gantry angle.	Detector insert for patient QA	
	8. The insert should be usable in measurement based patient specific plan verification including non coplanar treatments with high resolution radio chromic films for high precision radiotherapy and SBRT /SRS treatment plans. This insert must allow 2 dimensional dose verification of treatment plans of any gantry angle without repositioning. The patient QA insert for radio chromic film shall allow the use of minimum 14 cm x 9cm sized radio chromic film. The design of the insert when combined base phantom shall permit the film to be positioned at different planes. It shall also contain cylindrical CT markers so that the isocentre position can be easily and accurately defined. Any accessory which will be useful to mark the film relative to the CT markers in the phantom or film perforation shall be supplied.	Film insert for patient QA	
	9. An insert should be available to perform the quality assurance of irradiation of multiple metastasis with one Isocentre or non-iso-centric treatment / irradiation techniques, with or without couch rotation. It shall also embed at least three bone equivalent cylinders enabling compatibility with IGRT systems and to provide contrast for positioning using kV imaging systems. Necessary homogenous plug shall also be supplied to fill into detector cavity to avoid artifacts caused by the inserted detector while planning CT of the insert combined with base phantom.	Optional insert for Multiple Metastasis applications	

	10. A phantom should be supplied and be compatible to do QA for SRS / SRT QA The Phantom in combination with all above said inserts shall be used in conjunction with 6D couch treatment techniques. The Phantom should be visible for all in-built LINAC Imaging system i.e., MV Image, DRR Image, kV Planar and kV CBCT. All components shall be designed and manufactured with submillimetre precision. This phantom when combined with Insert for Multiple metastasis applications shall enable realistic treatment planning of brain metastases. The head phantom shall be of polystyrene material having physical density of at least 1.05 g/cm³.	Optional phantom for SRS/SRT with Head shells	
6.	**IN-VIVO DOSIMETRY**		**1 set**
	Mobile MOSFET: For routine, IMRT vivo dosimetry, a set of ten (10) MOSFET with associated Remote dose verification software, wall mounted Bluetooth wireless trans receiver, reader, software and final dose reporting system.	For the Patient dose verification purpose	
7.	**Warranty & Service Facilities**		
	Five years warranty and additional 5 years CMC on all products should be provided. Factory trained Application specialist should be available in India to look after the installation and maintenance of the systems.	Make sure to provide the best support always	
	All radiation measuring detectors and instruments which needs periodic calibration (Ion chambers, pocket dosimeters, survey meters, GAMMA zone Monitors etc.) should be calibrated periodically as per AERB norms within the period of warranty and CMC by vendor companies.		
8.	Additional item to be included		
	1) 5 boxes of 8x10 inches & 2 boxes of 14x17 inches Gafchromic film for QA purpose		**1 set**
	2) Imported Specific phantom for image Verification		**1 Set**
	3) Digital pocket dosimeter with online real-time Bluetooth connectivity with android mobile – 02 number		
	4) A3 Flat bed film scanner with necessary software for dosimetry analysis		
	5) Iso-alignment device for verification of the iso-centre QA and light field congruence QA verification system.		
	6) Dedicated phantom for IMRT (both homogeneous and incorporating in-homogeneities mimicking actual patient anatomy like lung etc) for all steps from imaging to dose verification and SRS (including capabilities of imaging, image fusion, absolute, relative and point-dose dosimetry measurements at isocenter and at exact positions off isocenter. This should allow for a seamless evaluation of dose as well as geometric accuracy, including CBCT and MV/kV alignment.		

	7) Digital Radiation Survey Meter: Fluke/Ludlums/equivalent. Reading in Sievert and Sievert/Hour. – 2 per institution		

MISCELLANEOUS

- One LCD Projector with a projection screen and smart board technology of latest make to be provided.
- Five books of most recent edition on IMRT, IGRT and Radiotherapy and Medical Physics along with online access to any intensive planning / QA / delivery resource for academic use to be provided.
- Intercom system as per departmental requirement must be provided.

MOULD ROOM ACCESSORIES TO BE SUPPLIED WITH LINEAR ACCELERATOR:

Mold room accessories consisting the following items should be provided,

1. Vac. Lock System - Nylon re-enforced blue urethane materials with one suitable vacuum pump for the system (Complete set).	
Item	**Qty.**
Breast & Thorax	6
Hip & Pelvic	10
Whole Body	6
Paediatric Vac. Lock	10
2. Electron block cutter system with accessories	1 sets
3. Various sizes holders to accommodate electron cut out of available electron applicators, cadmium free low melting alloy	30 pcs.
4. Immobilization Devices (Following Mould Room equipments are to be provided) All the products should be imported, if available and all immobilization devices must have certified dosimetric property for different energy. **All immobilization system must be with suitable storage cabinet.**	
All in one board True carbon fiber - (per institution) It shall be One for All, Immobilization devices having a total solution to treat Paediatric to Adult in supine and prone and capable of treating Head, Head & Neck, Breast, Thorax. Abdomen, Pelvic and Extremities The Offered All IN One Base Plate shall be of a Long Board Minimum Length 160 cm and thickness 2cms	4 sets
True Carbon fibre Breast Board for supine patient with different angulation,arm support,wrist support with grip hole ,bottom stop with hip position adjustment(Compatible with 80 cm bore aperture of CT scan)	4 sets
Head Rest (Set of 3 size)-Should be very low density foam	Each 4 sets
Paediatrics Head Rest(Set of 2 size)-Should be very low density foam	Each 4 sets
Carbon fibre tilting Head & Neck base plate	2 sets
Prone head rest adult and pediatric (per institution) -Should be very low density foam	4 nos.for adult and 4 nos for Paediatric
Foot rests & knee rest	Each 4 sets
Breast callipers (digital)	2 sets
Multipurpose support cushions of various shapes	4 sets
Immobilization straps for various sites	4 sets
Separation meter - Should be made up of light metal with accurate scales	2 nos.
Shoulder retractor for head and neck patients	4 nos.
Digital water bath for thermoplastic precuts	2 no.

All the thermoplastic sheets must have clamp-based fitting with the base plates and the base plates should have the fitting for both clamps based as well as push pin types fittings.

Heat gun	2 nos.
Gel Bolus sheets 30 cm x 30 cm of thickness 0.5 cm	30 pcs per LINAC
Gel Bolus sheets 30 cm x 30 cm of thickness 1 cm	20 pcs

Styrofoam cutter for electron	2 no.
Alloy Melter	2 no.
Low/medium melt shielding alloy (cadmium free)	25 kg
Styrofoam blocks 12"x12"x3"	1 set
Styrofoam blocks 12"x12"x1"	1 set
Body caliper	2 nos
Curved stainless steel caliper	2 nos.
Tissue compensator	1 sets
Rectal marker	2 nos.
CT markers (2mm dia)	500 nos.
Wax bolus	50 box
Indexer bar for LINAC couch top carbon fibre to fit variety of base plates. (per institution)	4 sets
Tungsten eye shields set consist of three sizes, for paediatric and adult patients	1 set each
5. Customized Thermoplastic Immobilization precuts best quality (for two Years)	
Head & neck 4 clamp	250 pcs/ per year for 5 years in phased manner.
Head 3 clamp	200 pcs / per year for 5 years in phased manner
Pelvis (supine) 4 clamp	50 pcs / per year for 5 years in phased manner
Head & neck 5 clamp	50 pcs/ / per year for 5 years in phased manner
Pelvis (supine) 6 clamps	50 nos/ / per year for 5 years in phased manner
Paediatric Head 3 clamp	30 pcs/ / per year for 5 years in phased manner
Tattoo ink	10 bottles
Treatment Brassieres(for breast irradiation)	20 pcs
Thorax Abdomen- Arm rest – low	4 nos.
Knee & leg positioning cushion- low	4 nos.
Tegaderm	75 pieces
Adjustable arm support and Grip pole- Complete system-Should compatible with all in one board	4 nos.
Side Panels for Vacuum cushions (set of 4)	4 nos.
Leg separator Low	4 nos.
Block 20mm Carbon Fiber	4 nos.
Wedge 3 different angle- True Carbon fiber	Each 3 sets
Pressure belt for SBRT with manual pump	1 set
SRT/SRS Starter Kit Including Frame, carbon fiber Base plate, Storage Base, 10 no of SRT/SRS Thermoplastic Mask	1 set

Customized Thermoplastic Immobilization precuts should be provided as and when required by the concerned department and after installation of LINACs.

To install the Mould room facilities the demarcated area is to be prepared to make a room for Mould room facility. An indexed stable flat top couch of good make along with fixed sagital LASER in-tune and aligned with the sagital LASER of the CT simulator and treatment room should be provided at the ceiling of the mould room.

GENERAL CONDITIONS AND REQUIREMENTS:

- Life span of LINAC machines should be minimum of 10 years. The bidders should provide all necessary spare parts & services for satisfactory functioning of the equipment for the period.
- No conditional warranty like mishandling, manufacturing defects etc. will be acceptable.

- The cost of the CMC shall be quoted in Indian Rupees. All the items of the entire system, be it warranty or CMC period will be supplied from reputed manufacturers abroad and not from India.

  In the above specifications wherever the word 'shall' is mentioned, it is taken in the meaning that the required feature/facility/procedure specification/standard is mandatory. All claims regarding meeting of the specifications shall be duly supported by appropriate, latest technical catalogues/brochures from the manufacturer. Simply stating that the equipment meets the specifications is not sufficient and any such quotations will be summarily rejected. Computer printed documents or laser printouts will not be accepted as technical catalogues/brochures. During the warranty and CMC period, all software up gradation/s of any and all of the machine and allied systems shall be provided free of cost.

- The vendor shall submit a compliance statement point wise in regard to the specifications asked for in the tender. It will be responsibility of the vendor to go through all the tender requirements carefully and accordingly address each and every point about their compliance. The compliance statement shall preferably be made in an Excel worksheet. The soft and hard copy of the compliance statement shall be provided. The yes or no statement mentioned in the compliance statement shall not be contradicted in the tender document.
- The vendor shall supply all the items required for running the entire Linear Accelerator system (including all parts consumables and non-consumables, imported or local). This assurance will remain valid for the entire life of the Linear Accelerator system. This assurance includes supply of all the parts required for proper functioning of the entire unit even if those have not been mentioned in the tender specifications advertised and the supply order / agreement contract. The Company shall carry out all the regulatory clearance required for installation, commissioning proper clinical use of the entire Linear Accelerator till the time the machine is functioning. The company shall coordinate the preparedness of the site for housing the Linear Accelerator and the shipment and delivery of the system to the Hospital complex so that the machine does not remain idle. The insurance up to the date of commissioning for the entire system will be company responsibility. The company shall not request the Hospital to purchase any items for 10 years from the date of commissioning which includes five years warranty and subsequent five years as CMC. The payment with regard to CMC will be made to the company by the Hospital at the end of every year of successful maintenance which will be certified by the user. The company will supply all the quality assurance tools/gadgets required for the smooth functioning of the machine for entire life of the machine. The company shall supply all the items required for remote diagnosis and servicing. The company shall provide networking with the existing systems of the Hospital like TPS and the future purchase of any equipment in consultation with the vendor concerned (The cost of license from the respective vendors of the above equipments available in the department will be quoted).
- The custom duty/cost of insurance etc. for procuring the machine for the commissioning and any subsequent spare part /accessory etc. will be paid by the company at least for the entire 5 years of warranty and 5 years of CMC.
- The IMRT, IGRT LINAC system shall be FDA/CE approved and type approved from the regulatory body AERB, Mumbai. **Year of manufacturing of the unit and average life of the unit must be mentioned.** The suppliers shall bear all responsibilities and expenditures relating to transportation, custom clearance, loading, unloading, insurance of the equipment till commissioning, pre-commissioning approval of AERB and handing over the machine to the hospital authority.
- The acceptance/performance tests will be done as per AERB protocols and any deviation from their tolerance limit shall not be accepted. Dispute if any with regard to the tender shall be settled in the court in the jurisdiction of Kolkata, West Bengal.
- The LINAC system will be installed in the building (as per Layout plan approved by AERB).
- The vendor must depute an expert to acquire the requisite AERB data at the site during commissioning.

  Vendor shall inspect the site and assess according to the need of the specific machine which will be supplied. Any masonry, electrical or other work, if it is not done required for installation including finishing of treatment room and control area walls, floors etc. or any minor alteration / adjustments of the same will be completed by the vendor on a turnkey basis.

- **All furniture required for the control area, Treatment Planning systems room, Contouring room, Mould room, work stations, Physicist rooms, treatment rooms and patient waiting areas are also to be**

supplied by the vendor. Those must be of modern and reputed make in keeping with design and functioning of the entire area.

- Vendor shall quote their optional items separately as described in the specifications. Optional or additional items not included in the essential items of the tender, if available may also be quoted by the firms as optional features, separately with individual prices. These may include advanced features/special features/advanced clinical applications etc. However, if the Hospital wants to purchase anyone of the optional items in future, the prices can be taken as frozen until the expiry of warranty period. (The technical and price bids of such items shall be quoted separately item wise and not with the main equipment).
- **Last Man out Switch to be installed in LINAC Bunker by the vendor as per guidelines of AERB.**
- **Door light (Red, Yellow, Green LED panel) for all the installed machines; lights should be as per the AERB safety code for Radiotherapy.**
- **One good quality Radiation survey meter.(Fluke/Ludlums reading in Sv, Sv/hr)**
- Sulfer Hexa-fluride (SF6) gas cylinder to be supplied throughout the warranty period and same to be included in CMC thereafter.
- **Vendor should add the necessary dosimetry equipments & accessories which they feel to be essential for their offered machine but not mentioned in this document.**

CT SIMULATOR (4D)

CT Simulator is a latest wide bore 4D multi slice CT scanner with a virtual simulation workstation and moving external laser system.

1. **MANDATORY REQUIREMENTS**

1.1. The quoted model should have BIS/ISO/USFDA/ CE (European) / CDSCO / AERB approval.

1.2. In addition, the quoted model should be NOC/type approved by AERB and should be the latest model available with the vendor. The related certificate & documents should be enclosed with the technical bid.

2. **GENERAL REQUIREMENTS**

2.1 The quoted model should be a dedicated CT-Simulator which is required for the Radiotherapy Department for conventional, 3-D CRT, IMRT and VMAT planning. The CT-Simulator should be able to use for most accurate simulation, placement of treatment fields and marking of radiation field portals on patients' skin for radiation therapy of cancer.

2.2. The quoted model should be the latest, state-of-the-art model.

2.3. The CT scanner should be a spiral, 16 slice or more multi-detector slip ring technology incorporating latest technology available in the market.

2.4. The simulator software should be user-friendly and should be easy, error-free and should have total compatibility between scanner and simulator workstation. If third-party software is supplied, it will be the sole responsibility of the vendor supplying the CT-Simulator to run the software seamlessly for the entire periods of comprehensive warranty and comprehensive maintenance contract.

2.5. The system should be networked to the existing 3-D Treatment Planning Systems, Brachytherapy Systems and High Energy Linear Accelerators in the department for DICOM RT Import and export and this will be entirely and direct responsibility of the CT-Simulator Vendor Co-ordination should be done by the turnkey supplier with the existing Radiotherapy Systems in the department. Compatibility should be complete in all respects.

3. **CT-SCANNER SPECIFICATION**

3.1 GENERAL: The quoted model should be a whole body spiral, 16-slice per rotation or more CT (multi-detector) with flat carbon fibre indexed table top for Radiotherapy Treatment Planning and Simulation of 4D-pulmonary CT scan acquisition.

3.2. **GANTRY**

3.2.1. Gantry aperture should be adequate enough to plan all types of RT planning with patients in their actual treatment position. Hence larger aperture of more than or equal to 80 cm will be desirable.
3.2.2. Scan Field of View should be 50 cm or more. Extended Field of View should be preferable equal to bore size.
3.2.3. Metal-free Scannable range should be at least 150 cm.
3.2.4. Gantry must have internal laser-positioning lights with a positioning accuracy of ± 1 mm or better.

3.3. **X-RAY GENERATOR**
3.3.1. High frequency x-ray generator with power rating of at least 75 kW or more.

3.4. **X-RAY TUBE**
3.4.1. The x-ray tube should have anode heat storage capacity of 6 MHU or more.
3.4.2. The anode peak heat dissipation rate should be 700 KHU/ min or more.
3.4.3. X-ray tube should have dual focal spot. The bidder should specify the size of the focal spots.
3.4.4. There should be at least two kV Settings or more available over a range of 80 kV to 140 kV.
3.4.5. The mA range must be from 20 mA to 600 mA or better, with step size of 10 mA or lesser.

3.5. **DETECTOR SYSTEM**
3.5.1. The detector system should have a high-performance and low-noise 16 rows of detectors or more with high data density, active response data acquisition system.
3.5.2. The detectors should be solid state.
3.5.3. The detector system should be free from repeated calibrations.
3.5.4. The detector should have minimum 16 rows of physical detectors.

3.6. **PATIENT COUCH**
3.6.1. The couch top material must be indexed carbon fibre having horizontal moving range of 150 cm or more.
3.6.2. The table should be universally flat/ Carbon fibre flat tabletop.
3.6.3. The table should be compatible with the tables of quoted High Energy Linear Accelerator.
3.6.4. The table should have a patient positioning index system on carbon fibre tabletop. 2 Index rods have to be supplied for positioning of Immobilization base-plates (Head & Neck, Abdomen and Pelvis and Knee at Rest) for Radiotherapy Patient Simulation.
3.6.5. The table should be able to bear weight up to 180 kg or more and the tabletop sagging should be as per IEC guidelines.
3.6.6. The table should have a metal free range of about 150 cm and should have a scan able horizontal range of 150 cm.
3.6.7. The horizontal accuracy should be ±1 mm or less.
3.6.8. It should be possible to move the table top from the Gantry/control console.
3.6.9. The table should have auto-home facility.

3.7. **CONTROL CONSOLE**
3.7.1. It should have 19" or more display monitor for display of 1280x1024 matrix or more.
3.7.2. All functions viz., scanning, image reconstruction, film documentation, MPR, CT maximum intensity projection, 3D with SSD etc., should be possible from the main console and / or workstation with pulmonary and ECG probe, interface card and driver.
3.7.3. Image storage of 1TB or at least 2,50,000 images of 512x512 matrixes uncompressed or better should be provided. The latest configuration may be quoted.
3.7.4. Latest fast DVD R/RW facility for archiving must be available.
3.7.5. The image reconstruction time should be less than 1.5 second from any mode.

3.8. **CT-SCANNING PARAMETERS**
3.8.1. The slice thickness should be user-selectable from 0.625 mm to 10 mm or lesser.
3.8.2. kV range: 80 or lesser to 140 kV.
3.8.3. mA range: 20 to 600 mA in increment of 10 mA or lesser increment or larger range.
3.8.4. Scan time for full 360-degree rotation should be 0.5 second or less.
3.8.5. Scan field view should be 50 cm or more.
3.8.6. Display field of view should be 50 cm or more.
3.8.7. Intra-Plan delay of 5 seconds or less should be possible.
3.8.8. Retrospective reconstruction should be possible on raw data files with change in parameter such as FOV.

3.8.9. The following scanning modes should be possible:
- Scannogram
- Axial
- Spiral

3.8.10. It must be possible to obtain the scanogram for AP or PA or left-to-right or right-to-left directions.
3.8.11. The accuracy of slice prescription from scanogram should be 0.5 mm or better.
3.8.12. The scanogram length should be more than 1500 mm long and 500 mm wide.
3.8.13. Reference scan should be possible on an arbitrary slice within the proposed treatment volume.

3.9. **IMAGE QUALITY**
3.9.1. The reconstruction matrix must be 512x512 or higher.
3.9.2. The reconstruction time should be as less as possible. Specify the reconstruction time.
3.9.3. Simultaneous scanning and reconstruction should be possible. It should be possible to do:
3.9.3. Simultaneous scanning & routing analysis
3.9.3. Simultaneous scanning & archiving and/or hard copying, and
3.9.4. Simultaneous scanning and transfer to the second console / workstation.
3.9.5. The system must have automatic mA control software that automatically adjusts mA for patient size; adjust mA along the z-axis, modulates mA during rotation.
3.9.6. High contrast Spatial Resolution: It should be 15 lp/cm or more for a slice of 10 mm thickness.
Clearly specific the phantom used, scan time, mA, filter for image reconstruction, scan field.
Low contrast detectability 5 mm or less with 10 mm slice thickness on CATPHAN phantom.
3.9.7. The CT number accuracy must be better than ± 4 HU for water and ± 10 HU for air.
3.9.8. All necessary phantoms to check the spatial resolution of the scanner should be provided.
3.9.9. Spiral parameters: Different selection of pitch should be possible, from 0.5 to 1.5.

3.10. **COMPUTER SYSTEM OF CT-SCANNER**
3.10.1. A very high-end main computer system, latest available in the market must be provided.
3.10.2. RAM size must be at least 32 GB or higher.
3.10.3. There must be two monitors in the console and they must be 19-inch or higher displays. One of these will be used for acquisition and other will be used for review and processing.
3.10.4. The hard disk capacity of the main computer system must be at least 700 GB (solid state) or more.
3.10.5. In the hard disk meant for image storage, the number of uncompressed 512x512 images that can be stored should be at least 2,50,000 or more/ 1 TB. The maximum possible hard disk Capacity must be provided.
3.10.6. For archiving, DVD writer should be provided. The images should be able to convert to JPEG/MEPG to be recorded onto recordable CD and DVD.
3.10.7. The CT simulator system should be fully DICOM RT compliant. The DICOM should support the following:
3.10.7.1. DICOM 3.0 Storage class as a user.
3.10.7.2. DICOM 3.0 Storage class as a provider.
3.10.7.3. DICOM 3.0 Send/Receive.
3.10.7.4. DICOM 3.0 Query/Retrieve service class as a user.
3.10.7.5. DICOM 3.0 Query/Retrieve service class: a provider.
3.10.7.6. DICOM compliance statement must be provided.
3.10.8. A bidirectional speaker communication must be provided between the operator and the patient.

3.11. **STANDARD SOFTWARES**
3.11.1. Complete scanning and evaluation software.
3.11.2. 3-D surface shaded and 3-D volume rendering.
3.11.3. Quantitative CT measurement tools should be provided.
3.11.4. 3-D small volume analysis software for solitary nodules is desirable.
3.11.5. Metal Artifact Reduction feature should be provided to reduce metal artifacts.
3.11.6. Interface and essential software for four-dimensioal pulmonary CT scan for both amplitude and phase-bin CT data acquisitions to reconstruct the MIP (Maximum Intensity Projection), MinIP (Minimum Intensity Projection) and AIP (Average Intensity Projection) CT Image datasets should be provided. Retrospective four-dimensional CT scan acquisition options should also be available.

4. **MOVING LASER SYSTEM**
4.1. The CT simulator should have at least three green lasers for marking field reference points and field isocentres - two lateral laser stations and one sagittal laser station. Two left and right lateral Laser stations, guarded with outer steel mesh to avoid the movement of Laser Stations by routine CT Simulator users and

each lateral laser station consists of a horizontal and a vertical laser source. One sagittal Laser station consists of a sagittal and vertical laser source. The wavelength of these Lasers should be ~520±30 nm. The positional accuracy should be within ± 0.5 mm and the width of the laser should be within 1 mm.
4.2. In addition to the above moving lasers the CT scanner should have conventional in-built lasers for positioning the patient.

5. CT SIMULATION PLANNING SYSTEM

5.1. GENERAL
5.1.1. The workstation/console computer should have advanced CT simulation tools for radiation therapy treatment planning compatible with the LINAC.
5.1.2. The workstation/console computer should be able to provide complete volume definition and geometric beam placement for radiotherapy.
5.1.3. The CT simulation should generate digitally reconstructed radiographs (DRRs) in a true volumetric environment.
5.1.4. It should have complete compatibility and error-free DICOM networking with a CT scanner computer, TPS and existing Linear Accelerators. All licenses required for DICOM 3 and DICOM RT (RT Plan, RT Structure, RT Dose) import and export to other Treatment planning systems (including Third Party) should be permanent and included in the offer.
5.1.5. Vendors should provide the DICOM connectivity of CT Simulator to be connected with the existing MOSAIQ and ARIA Oncology Information System softwares.

5.2. HARDWARE

5.2.1. Hardware specification should be mentioned clearly.
5.2.2. Display should be Medical Grade 2 Mega pixel higher display monitor with a high resolution of 1920 x 1024 pixels or better.
5.2.3. Networking with TPS: All the software with essential licences required should be included. Complete DICOM-RT export/import license should be available.

5.3. SOFTWARE FOR SIMULATION AND CONTOURING

5.3.1.1. Console/Workstation should be able to Import of CT, MR, PET, PET CT Images and other images taken at or outside the Department of Radiotherapy & Oncology.
5.3.1.2. It should automatically create 3D image from the supplied axial images and should make the body structure though auto segmentation.
5.3.1.5. On the monitor screen it should be possible to view DICOM in multiple slices viewports at least 16 images or more.
5.3.1.6. The standard screen layout should consist of one main view port and three sub-view ports for frequent usage of other images, quick manipulation of images or for displaying reference views, while the main view port is used for high resolution display.
5.3.1.7. Image manipulation such as changing window width and window level, hot keys activated, automated study archive, deletion, screen layout changes, disk space display, archiving, and graphic overlays such as annotation.
5.3.1.8. It should be possible to simulate all kinds of teletherapy machines in the simulation workstation. It should conform to IEC and other international standards for linear accelerator conventions.
5.3.1.9. It should be possible to visualize interactively reference views in axial, coronal, sagittal, isocenter image planes in any oblique directions with overlay of beams on DRRs.
5.3.1.10. DRR must provide a fully divergent beam's eye view of 512 x 512 matrix.
5.3.1.11. The DRR/BEV should display the machine diagram to allow real time checking of machine and patient geometry.
5.3.1.12. Facility for multimodality fusions to accept data from other DICOM compatible and DICOM supporting modalities like MRI/CT/PET/SPECT and should be able to fuse them.

5.4. CONTOURING SOFTWARE

5.4.1. Contouring tools for 3D auto margin and 3D variable margin.
5.4.2. Automatically/manually create margins in all six directions. Both positive and negative uniform and non-uniform margins should be possible and individual expansions should be possible in all dimensions.
5.4.3. Edit/Draw all contours, contour names, CT densities and colour for each structure. Facility for selection of colour for DVH display is available should be specified.
5.4.4. Continuous trace, point to point and auto contour via CT threshold.

5.4.5. Contour on primary image (CT) or secondary study images (MRI / PET) after image fusion. Also should be feasible to contour on fused images like MRI, PET Images acquired with localizing frames send after image registration in other systems.
5.4.6. Outline tumor volumes and critical structures on transverse planes with visualization in any 3 axes including real time 3D visualization.
5.4.7. Contour interpolation facility.
5.4.8. Asymmetric stretch and resize facility should be available.
5.4.9. Rapid copy to superior and inferior slices.
5.4.10. Advanced editing tools like facility to give negative margins, crop structures with arbitrary margins, remove structures extending outside or inside other structures; wall extraction from a solid structure with positive or negative margin, auto-segmentation based on CT numbers and limiting contours by the Volume of Interest tool should be provided.
5.4.11. It should be possible to add/subtract/join one or more contours of drawn structures.
5.4.12. It should have the capability for interpolation of contiguous and non-contiguous contours between one or more image planes. It should be able to copy and extend the contours in arbitrary lengths along the cranio-caudal direction.
5.4.13. Facility for rigid image registration should be available. The result of registration of such type should be editable and exportable. The system should be capable of registering arbitrary images like CT, MRI, PET, PET-CT.

5.5. **3-D VIEW AND VOLUME RENDERING CAPABILITIES**
5.5.1. Post-processing features like Volume Rendering, Real-time multi-axial volume reconstruction, 3-D surface rendering, color 3-D should be available.
5.5.2. It should allow complete 3-D volume to be defined including complex 3-D volumes, user selectable multi-image views, reformatted sagittal, coronal fate and oblique images etc.
5.5.3. DICOM-RT structure set with import/export of data should be possible. The DICOM compliance statement should be provided.

5.6. **DRR FEATURES**
5.6.1. The virtual simulation software should have the capability to display real time Digitally Reconstructed Radiographs.
5.6.2. It should be possible to have adjustable Window and Length for display of DRR.
5.6.3. Various preset DRR modes should be available specially to display the bone, air cavity and lung.
5.6.4. The DRR generation method should include normal sum, Maximum Intensity Projection (MIP) 3D image data set.
5.6.5. The system should have the Capability to display the Beams Eye View in various orientations. There should be facility for real time rotation of wire frame, solid and transparent structures.
5.6.6. Real time display of DRR as beam parameters are changed.

5.7. **DEPTH CONTROL**
5.7.1. The system should support depth control mode creating a DRR from slab of 3-D mode, perpendicular to beam axis.
5.7.2. DRR must be calculated over a user defined thickness.
5.7.3. Depth control in oblique projections must be possible.
5.7.4. Cross-hair display on DRR to Provide scale information should be available.

5.8. **DOCUMENTATION & ARCHIVING**
5.8.1. Laser colour printer A4 size, latest model should be provided.

5.9. **MEASUREMENT PACKAGE**
5.9.1. The software should provide the density value (in Hounsfield Unit) of a particular point on an image. It should compute distance along straight lines and curved lines, angle between the lines, and radius of curvature for curves.
5.9.2. For specific region of interest (ROI) the area, minimum and maximum voxel values, mean and standard distribution and a density histogram should be available.
5.9.3. The software should be able to calculate the volume of a displayed 3-D object.

5.10. **IMAGE MANIPULATION**

5.10.1. Different kinds of image manipulation features should be available like multiplanar reconstruction and curved reformatting.
5.10.2. 3-D reconstruction with no waiting for reprocessing.

6. ENVIRONMENTAL FACTORS

6.1. Complete installation should include:
6.1.1. Room planning, designing and modification of the existing site as per AERB guidelines and approval taken by department.
6.1.2. Air conditioning and monitoring of temperature and dehumidifier for maintaining the relative humidity and air changes (to specify number per hour) to be installed by the vendor.
6.1.3. The unit shall be capable of being stored continuously in ambient temperature of 0 to 50 degree Celsius and relative humidity of 15 to 70%.
6.1.4. The unit shall be capable operating in ambient temperature of 20 to 30 degree Celsius and relative humidity of less than 70%.
6.2. The unit shall met IEC-60601-1-2:2001 (or equivalent BIS) General Requirements of Safety for Electromagnetic Compatibility or should comply with 89/366/EEC; EMC-directive.

7. POWER SUPPLY AND AIR CONDITIONER

7.1. Should work on three phase 200 to 220 volts/50 Hertz Power.
7.2. Onine UPS of suitable rating should be supplied for the power backup of the complete system including gantry, computer system and room lights with at least 30 minutes back up time.
7.3. Reset-table over current breaker shall be fitted for protection.
7.4. The vendor should procure, install and maintain the air conditioning and humidity control systems as needed for the perfect functioning of the Equipment and its subsystems for the entire warranty and CAMC period.
7.5. Complete details of such units must be furnished.
7.6. After completion of the warranty period of 5 years the actual supplier of the Air Condition system must enter into a comprehensive maintenance contract for all those units for 5 years. All the consumable items for the maintenance of Air Conditioning, UPS, should be included in this CAMC quotation. The details and rates for the same which should be supplied by the third party should be quoted separately.

8. ACCESSORIES & DOCUMENTS

8.1. A complete User/Technical/Maintenance manual to be supplied in English (Soft copy & Hard copy)
8.2. Certificate of calibration and inspection from factory.
8.3. All necessary phantoms and QA systems/ tools/ gadgets required for commissioning and validation tests for clinical implementation of above systems should be provided.
8.4. Latest Dell laptops of Intel I-7 processor with 32 GB ram and 1 TB hard disk for dedicated QA applications, 1 TB external HDD for backup, software for analysis and all associated essential QA tools.
8.5. Focal spot test tool with analysis software etc.
8.6. Image calibration/High and Low Contrast, Spatial Resolution, Slice Thickness, CT No. uniformity and Dosimetry QA phantoms [CAT phantoms (604 or 504), LASER phantoms] /check devices, ion-chamber based dosimeter with electrometer for patient dose measurement.
8.7. Set of Aluminium filters for HVL measurements.
8.8. kVp and Timer meters of x-ray tube. mA meter for x-ray tube current measurement.
8.9. Aluminium Step Wedge for Sensitometry curve measurement.
8.10. **Contrast Injector:** A latest high quality automatic dual (double) head CT contrast pressure injector with auto refill system should be provided with the system. 250 number disposable syringes compatible with contrast injector. To be supplied in phased manner over 5 years. Further requirement should be supplied on demand.
8.11. Temperature management and relative humidity management as per maintenance specifications of the concerned 4D CT simulator machine should be done by 4D CT simulator vendor company for the 4D CT simulator as well as control console. (Sufficient AC machines with 100% backup and dehumidifiers should be mentioned separately in turnkey for this purpose).
8.12. All furniture, cabinet, table, desk, chairs for CT room and control console – no. to be included in turnkey.
8.13. The dehumidifier system for keeping the humidity of the CT simulator room within the vendor specific ranges.
8.14. The main machine and all the third party items should be installed within 180 days after the date of letter of credit opening or AERB site drawing approval whichever is later.

8.15. During the warranty period the vendor should provide a service uptime guarantee of 95%. The minimum period of downtime more than or equal to 60 minute will be counted in the annual downtime hours calculation. Downtime will include any and all the time in which the machine was not functional due to other accessory systems like AC, UPS system and all internal hardware, workstation, software or network related issue.
8.16. Compliance Report to be submitted in a tabulated and point wise manner clearly mentioning the page/Para number of original catalogue/data sheet. Any point, if not substantiated with authenticated catalogue/manual, will not be considered.

8.17. QA Test for CT Machine (once in two years as per AERB requirement) for 10 years after installation should be conducted by vendor Company.

HDR Brachytherapy

A. General Specification

1. The system should be high dose rate Remote After loading Ir-192 Brachytherapy system capable of Intra cavitary, Intraluminal, Interstitial, surface mould Brachytherapy.
2. The offered model whose hardware & software up gradation done in the year 2018 or after.
3. The HDR system should be microprocessor based with PC control.
4. The HDR system must be from a well established company with a documented history of reliability.
5. The HDR machine should be in compliance of all AERB specified safety regulation and AERB type approved.
6. The HDR system manufacturer should have an ISO 9001 and FDA approval.
7. The HDR system must have a "check" cable that automatically checks the operation of the complete system prior to Treatment. The check cable must also be possible to use as a "Dummy" source to allow simulation of particular source Locations.
8. The system should be in use in renowned centers in India. The tender offer must be accompanied with letters of reference from at least 3 (three) existing users of the offered product. At least 1 (one) reference should be from user in India.
9. The vendor should provide warranty for at least 5 years and CAMC for at least subsequent 10 years. The vendor should provide service and all necessary part for at least 15 years from the date of installation.
10. The room for installation of the HDR Brachytherapy system has already been constructed as per AERB approval. If any modification work is required depending on the model is to be done by the Supplier as per AERB recommendation.
11. All the AERB specified Radiation safety features in the control unit and in the room should be available.

B. Detailed Specification: Treatment Unit–HDR

1. Treatment unit should be on wheels for easy mobility within the room.
2. Separate stepper motors to control the dummy check cable and source cable.
3. Maximum air kerma rate at 1 meter and on the surface of the after loader treatment unit should not exceed AERB specified limit.
4. The maximum source holding capacity without exceeding AERB specified air kerma rate at a distance 1 meter from the surface of the after loader and on the surface of after loader should be specified.
5. Multichannel indexer with a minimum of physical 30 channels having an automatic/optical verification of channel number and applicator connection.
6. The source must be retractable in the event of an emergency/power failure by following methods:
   i) By an independent DC Motor
   ii) Manual source retraction through hand crank.
7. UPS back up for at least 30 min should be provided separately for HDR Brachytherapy Machine, control unit and in the TPS. A detailed circuit for checking the battery condition should be provided
8. Nominal wire speed should be specified.
9. Unit should have Catheter end check for enhanced safety
10. A Safe must to be contain the source which complies with AERB and international safety regulations to hold source with minimum 10 Ci (370 GBq) for Ir-192.The activity of the sources to be supplied should be mentioned.

C. RADIATION SOURCE AND TRANSFER MECHANISM:

1. The source must be a single, High Dose Rate Iridium-192 Source.
2. The source cable connection must be tested to withstand minimum 5,000 transfers per source. The source transfer guarantee must be high to ensure optimal usage of each individual source.
3. Treatment curvature of the source cable should be mentioned.
4. A package of twenty radioactive sources (for Ir 192) for an appropriate time period (around 10 years) depending on the source transfer guarantee specified by the manufacturer must be provided. The price of the sources should be mentioned separately.
5. The sources should be supplied as and when required/requisition by the user department.
6. Insurance and freight cost, the custom clearance and transport cost, and all other cost related to the import and delivery to the department of the new/unused sources; and export/disposal of the used sources from the department must also be included in the order for all the sources to be procured.
7. The logistic arrangement for import and delivery to the department of new/unused sources; and the export /disposal of the used source from the department should be arranged by the vendor.
8. The source transfer guarantee and uninterrupted functioning of each source should be ensured for minimum 6 (Six) Months for Ir-192 source.
9. The dimension of the source to be specified.

D. Control Unit:

1. Stand alone and independent PC based control unit with colour monitor, keyboard, mouse, printer (for hardcopy) built in audio card, network card and a backup media.
2. Control unit should have a graphical user interface and should contain an extensive reporting facility.
3. Control Unit software should run on Windows application.
4. Control Unit should have a self-testing feature.
5. Control unit must keep track of patient's fractionated treatment.
6. Access must be limited to authorized users with Password protection.
7. The treatment times must be automatically corrected for the decay of the source.
8. The no of dwell positions for the source in each channel should be mentioned.

9. Display window should show dwell time and dwell position.

10. Display of Total reference air Kerma and dose should be available.

11. The control unit should contain:

i) An inbuilt protection circuit to prevent treatment without proper applicator connection and proper indexer locking.
ii) Minimum 1 TB internal Hard drive should be provided along with a backup option to an internal/external storage device of 1TB or more.
iii) Availability of a built-in log book and event recording in Control unit should be specified.

E. Brachytherapy Treatment Planning System

i) Hardware

1. The hardware should be of high end graphics workstation with latest high resolution scanner and multicolour network Printer.

2. The software should be latest and up-datable for at least 10 yrs.

3. Latest version of DICOM facility for Import/export from all existing CT/MR/PET/PACS/C- ARM/ultrasound should be available. The HDR Brachytherapy system and all imaging machines available should be integrated with the network for import/export of image/ structure.

4. Two separate workstations to be provided for contouring and treatment planning with all relevant licenses.

ii) SOFTWARE:

1. The Brachytherapy treatment Planning software should 3D and be able to perform all kinds of 2D/3D planning, isodose plotting and display of patient files, beam data acquisition etc.

2. It should support treatment modalities including intracavitary, interstitial, intraluminal and surface mould techniques.

3. All the reconstruction technique like: Orthogonal Semiorthogonal with reconstruction box Variable angle Isocentric must be available.

4. Dose Calculation should be based on TG43 (Mandatory). Automatic placement of Basal Dose Points for Paris Technique (optional).

5. Different Optimization techniques like Dose point Optimization on distance and volume. Geometrical Optimization on distance and volume, Graphical Optimization with local and global control should be available.

6. Fast and accurate dose calculation considering radial dose function, anisotropy function and geometric function should be there.

7. Rapid reconstruction of catheter using tracking algorithm and indication of corresponding lines on the images should be present.

8. Extremely accurate and dwell time optimization and dose calculation must be available.

9. Wide range of dose volume histogram methods, Point dose option. Different planes view must be available.

10. Catheter/applicator reconstruction in 3D space for 3D image imported from simulator, CT scanner, MRI scanner & Ultrasound scanner should be available.

11. Reconstruction of 3DS models of anatomical structures, based on 3D data set from simulator, CT, MRI and Ultrasound scanner.

12. Catheter /applicator reconstruction in 3D space from: orthogonal film, semi orthogonal film stereo shift films using zig reconstruction.

13. CT and MR fusion features should be available

F. Standard applicator set to provided. For detail ANNEXURE I attached.

G. The Following Quality assurance tools and other equipment to be provided:

1. One G.M based Survey meter for Brachytherapy Installation (Reputed brand).

2. Source position check device

3. One Electrometer with well type chamber (Reputed brand) with connecting cable of at least 20 meter length.

4. The source holder for dosimetry (for well type chamber) should be machine and source dimension specific.

5. One Gamma zone monitor for Brachytherapy installation (Reputed Brand).

6. One mercury thermometer and aneroid barometer.

7. One PC with scanner and printer with latest configuration.

8. One packet (25 pieces) of Gafchromic film for Brachytherapy auto radiograph

9. Contamination monitor: 1 no (Reputed Brand).

10. CC TV camera with monitor: 3 nos

11. LMO Switch: 1 no

12. Radiation Signage: 2nos

13. Radiation warning Lights: 2nos

14. New sliding door along with interlock for treatment room (with maintenance) Require Door/Glass Door of Brachytherapy room and control console and Minor OT room should be provided.

15. Core Cutting: 1 no between treatment room and Console, for cable connecting

16. Brachytherapy machine with console.

17. Networking Cable from Brachytherapy treatment room to CT simulator room to be provided by the supplier (approximate distance 5-10m) with RJ 45 socket– 3nos and one networking switch to be provided by Supplier.

18. Emergency light-4 nos.

ANNEXURE I

Brachytherapy Applicator Requirements

A. INTRACAVITARY

1. Segmented Cylinder Applicator Set CT Compatible and MR Compatibility: Conditional
2. Single channel- all sizes (3 each)
3. Multiple channel- all sizes 2 sets of Cylinder–Diameter– 2 cm, 2.5 cm and 3 cm
4. Fletcher-style Applicator Set – Defined Geometry
5. All tandem angles, all ovoid diameters (2 each)-3
6. Fletcher – INTRA UTERINE TANDEM – Anteflexion angulation 15°, 30 °, 45 ° B/L OVOID– Full & Half.
7. CT/MRI Fletcher-Suit- Applicator Set, Flexible Geometry CT Compatible and MR Compatibility: Conditional All tandem angles, all ovoid diameters (2 each)
8. Fletcher – INTRA UTERINE TANDEM– Anteflexion angulation 15°, 30°, 45° B/L OVOID– Full & Half.
9. Manchester-style / Fletcher type Applicator Set–Flexible Geometry -2 sets
10. Fletcher – INTRA UTERINE TANDEM – Anteflexion angulation 15°, 30°, 45°, 60 ° (any three) B/L OVOID– Full & Half.
11. Ring & Tandem Applicator Set CT Compatible/MR Compatibility: Conditional
12. All angles (2 each)
13. Fetcher– INTRA UTERINE TANDEM – Anteflexion angulation 15°, 30°, 45°, 60 ° (any three) WITH DIFFERENT RING DIAMETERS.
14. BALLON CATHETER APPLICATOR CT & MRI (CONDITIONAL) COMPATIBLE FOR CA BREAST (MAMMOSITE) - 15 qty to be complied

B. Advanced ICRT+ISRT set (combined interstitial plus intracavitary applicator with ring and tandem interstitial needle application.) – MR Compatible- (2)

C. INTRALUMINAL

1. Esophagus Bougie Set CT Compatible (2)
2. Centering Intraluminal Applicator Set CT Compatible (1)

D. INTERSTITIAL

1. Perineal Implant Template Set
   a. MUPIT/ Martinez Template Set- (2) + Needles (CT or MR Compatible)-(2 sets)
   b. Syed Neblett template / equivalent template set (2) + needles-(2 sets)
2. Breast Implant Template Set CT Compatible (any one)-2
   I.SQUARE
   or
   II. TRIANGLE
3. Prostate - i. MUPIT set + needles (CT and MR Compatible)
4. ISRT Needles (CT & MR compatible) as available-
   Long- 100 pcs
   Medium -100 pcs
   Short-100 pcs
5. Plastic Catheters- Single ended- 500 nos. (3 yr life span) Double ended- 500 nos. (3 yr life span)

The Scope of Work for Turnkey–for Bardhaman MCH (High Energy LINAC)

1. The prospective bidders already visited the proposed site for HIGH END HIGH ENERGY Linear Accelerator (LINAC) bunker at Burdwan Medical College and Hospital, Burdwan. Bidders are advised to acquaint themselves with access to site, location of work and any other matter relating to availability and carriage of construction materials. The construction of the concrete shell of the Bunker(LINAC ROOM) has already been built. The turnkey work shall include all other site preparation work required for installation and functioning of the LINAC at the proposed site. The selected bidder shall submit 3D view of the interior work to be under taken for approval of WBMSCL. Along with interior works as specified in details, the scope of work for Turnkey shall also include the following,

a) The cut out kept for transporting the LINAC consignment from Ground floor to lower basement with the help of Chain Pulley should have an Iron I-girder fixed at one level higher floor. To fulfill this requirement additional temporary structure for hanging the LINAC consignment will be provided by Civil engineering department of concerned Institute. The chain pulley or other similar additional civil & mechanical arrangements should be done by the vendor for hanging and transporting the heavy weight boxes from Ground level to lower basement.

a) Remaining necessary civil work for enhancement in thickness of floor, walls and ceiling of concrete wall in the present bunker already constructed at Burdwan Medical College and Hospital.

b) The sunken area inside LINAC bunker and console area should be filled /raised by selected LINAC vendor using RCC so that the trenches/base frame, table pit can be accommodated as per the selected vendor and also to match with AERB approved plans.

c) Temperature management (Sufficient AC machines with 100% back up) and relative humidity (Sufficient Dehumidifier) management as per maintenance specifications of the concerned LINAC Machine should be done by LINAC vendor company for the LINAC room as well as console area.

d) All further core cutting needed through walls and ceilings other than existing should be done by vendor.

e) The outdoor unit of AC should have grill coverage with lock and key facility to prevent theft and damage. The water drainage storage and pumping management system for the AC units should be arranged by Vendor.

f) The chiller system, if placed outside of the building, the vendor should make necessary arrangements like shades above, grill around with lock and key facility for the same to ensure physical safety and security.

g) Necessary Heavy Duty wooden door at the entrance of console and at the entrance of the treatment room with necessary lead thickness to be provided.

h) Vacuum Cleaner

The AERB approved drawings of the LINAC building is attached herewith.

2. While preparing the plan, the following aspects have to be addressed,

i) Easy movement of the patient stretchers/trolleys through corridors and doors.

j) Adequate Radiation shield is as per AERB norms, if necessary.

k) Supply of furniture like desk, chairs, shelves, locker etc.

l) Supply of Patient stretcher and other furniture/accessories to make the LINAC functional.

m) Construction / modification work including construction of brick wall if any, plastering, flooring as per the approved plan and equipment lay out plan.

n) Construction of renovation/modification demolition, exaction, filling work including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contractor without any extra cost.

o) Making surface good for floor modification for installing the LINAC.

p) Platform for unloading and if necessary.

q) Cable tray, trench & channel–necessary trenches, cable tray and channels at required locations.

r) Anti-termite treatment and pest controls should be done in and around the facility once in a year. Basements and ground floor will be made rodent/pest proof.

s) Core cutting in the ceiling of LINAC console room for electrical mains cable if require. (dimension: approx. 6 inch of 4 no's)

t) The intending bidders are to calculate the cost of necessary turnkey job (site preparation, interior works, furniture and office accessories) based on the area as demarcated in the site wise drawings attached with the tender document.

3. Specification of materials

t) **Flooring**:

Granite- 2400 x 800 mm or bigger good quality heavy duty hard Granites of 18 mm thick

u) Walls:

Premier Tiles- 800 x 800 mm mirror polished premier quality double charged joint less vitrified tiles

v) False Ceiling:

Metal type ceiling at LINAC room, control room, lobby and patient preparation area, (all rooms in lower and upper basement except 2nd LINAC room, CT room, CT console, CT UPS room and Brachy room)

PLUMBING WORK

1. All necessary plumbing work to install LINAC and Chiller piping work should be done by vendor

ELECTRICAL WORK: (all rooms in lower and upper basement except 2nd LINAC room, CT room, CT console, CT UPS room and Brachy room.)

(i) The supplier shall be required to specify the total load requirements for the LINAC centre including the load of air conditioning, room lighting and for the accessories if any. The supply line will be provided by the Institute up to one point within the LINAC centre. Few lights in each room shall be connected to the UPS to provide emergency lighting.

(ii) The electrical work shall include the following:
Wiring – Wiring with colour code for all types of points and plugs etc.All interior electrical wiring – with main distribution panel board, necessary vertical TPNMCBDBs to control MCCBs, TPNMCBDBs and SPNMCBDB if any necessary. Every point should be wired with both neutral and phase and earth separately from the copper link bar of phase, neutral and earth. Copper link Bar should be housed into the switch board on 1.1 KV grade insulators. There should not be any joint in between of any two terminals of all the installations. The 3wires system shall be of copper wire (minimum 1.5 Sq-mm) of different capacity as per the load and should be of renowned make as listed below.

w) All the internal wiring including that of telephone, LAN, DICOM & PACS etc. will be of concealed variety.

x) Earthing: Double earthling with copper plate for the LINAC and all accessories should be as per ISO rule

y) Switches light and power points should be of modular type and of standard make as listed below.

z) General lights – LED Lights of 400 LUX

aa) Sky Light should be in the ceiling of LINAC room. All wires used must be FRLS

(Fire Retardant with low smoke) type only

2. AIR CONDITIONING: The LINAC room, Control console, TPS room, UPS room need to be air-conditioned. VRV AC system should be used according to room requirement and suitability. Humidity control should be provided to effectively eliminate moisture condensation on the equipment. The Air conditioning system should be designed with standby provision to function 24 x 7.The outdoor units of AC should have grill coverings to prevent theft and damage.

Dehumidifier: Two of 25 liter/day per LINAC bunker, one for TPS cum server room and ONE for console should be provided. Total 4 Dehumidifiers. (Capacity 25 liters/day)

3. Environment specifications:

bb) Humidity range: Relative humidity 60% and 80% in all areas except equipment room which shall be as per requirement of the equipment.

cc) **Temperature ranges:** 22 +/- 2° C in all areas throughout the year, except equipment room which shall be as per requirement of the equipment.

dd) **Air conditioning load:** The heat load calculations and maintaining the desired temperature and humidity shall be the responsibility of the supplier.

4. Painting:

Two coat plastic emulsion paint over two coats of wall putty including primer in all area except LINAC room. LINAC room walls-High quality high density vitrified tiles clad on the side walls up to false ceiling.

FURNITURE AND OTHER OFFICE ACCESSORIESFOR PATIENT BENEFIT:

➢ LINAC

BURDWAN MEDICAL COLLEGE& HOSPITAL,WESTBENGAL			
Sl. No.	**Rooms**	**Required facilities**	**Remarks**
1.	LINAC room (Lower basement)	• Customized cupboards for storing immobilization devices / machine accessories/Daily QA equipments – at least 60'(W)x6'(H)x3'(D) in parts. • Patient changing area with chair, full length curtains, mirror, small rack /drawer for keeping belongings patient. • Table with drawers-5'(W)x3'(D) • Trolly for carrying dosimetry devices. • Sky lighting.	Inside LINAC room
2.	LINAC console room (Lower basement)	• Long tailored made table 20'(W)x3'(D) with drawers for installing 4-6 computers and printers etc. • Executive revolving chair with full backrest–4 • Executive revolving chair with half backrest–4 • Customized wall cabinet of at least 20'(W)x4'(H)x3'(D) with lock and key facility – 2 such • Steel almirah / wall cabinet of standardsize6'(H)x2'(D)withlockandkey–2 • X-ray viewer with digital backlight 4 plates - 1 • Dustbin –4	For operating LINAC from control console area

3.	TPS room (Lower basement – Presently designated as Physicist Room in plan layout)	• Customized table tops along three sides of the room with a depth of 2.5' for installing 8-9 computers, 2 printers etc. • Executiverevolvingchairwithfullbackrest–6 • Executive revolving chair with halfbackrest–6 • Customized wall cabinet along 2sides of the room with a depth of 2'withlockandkeyfacility • Steel almirah/cabinet of standardsize6'(H)x2'(D)withlockandkey–3 • X-Ray viewer with digital backlight (4plates)–1 • Dustbin–2 • CPU trolleys/UPS trolleys as needed • Polycarbonate based suitcase with wheels (Air cabin luggage size) -2 such for ion chamber calibration purpose.	Treatment planning Stations Room for LINAC.
4.	Contouring Room (Lower Basement – Presently designated as TPS room in plan layout)	• Customized table tops along three sides of the room for contouring workstations with a depth of 2.5' with drawers. • Executiverevolvingchairwithfullbackrest–6 • Executiverevolvingchairwithhalfbackrest–6 • Customized wall cabinet of at least 40'(W)x5'(H)x2'(D) with lock and key facility • X-Ray viewer with digital backlight (4plates)–2 • Dustbin–2 • CPU trolleys/UPS trolleys as needed • Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 3	Doctor's Contouring Station room
5.	Mould Room – (Lower basement as it is in the plan lay out)	• Tablewithdrawers–5'(W)x3'(D)–2 • One standard table for patient mould preparation. • 4 bed mats. • Smoke Exhaust System. • Executiverevolvingchairwithfullbackrest–2 • Executiverevolvingchairwithhalfbackrest–4 • Customizedwallcabinetofatleast20'(W)x4'(H)x3'(D) with lock and key facility • Steel almirah / cabinet of standardsize6'(H)x2'(D)with lock and key–2 • Dustbin –2	Necessary plumbing work to be done.
6.	QA accessories room - (Lower basement as it is in the plan lay out)	• Table with drawers–5'(W)x3'(D)–2 • Executive revolving chair with full backrest–2 • Executive revolving chair with half backrest–4 • Customized wall cabinet of at least 20'(W)x4'(H)x3'(D) with lock and key facility • Steel almirah / cabinet of standard size 6'(H)x2'(D)with lock and key–2 • Dustbin –2	
6.	Physicist cum RSO room –(Presently designated as Chiller room at upper basement as the chiller is planned in other suitable place) (Seating arrangement with 4 separate office cubicles for minimum 4 Physicists cum RSO)	• Table with drawers – 5'(W)x3'(D) –4 • ComputerTable-4 • Executive revolving chair with full backrest–4 • Executive revolving chair with half backrest–8 • Customized wall cabinet of at least 5'(W)x4'(H)x3'(D) with lock and key facility-4 • Steel almirah / cabinet of standardsize6'(H)x2'(D)with lock and key–4 • Dustbin–4 • Desktop Computer system with latest configuration for e- LORA and other official work along with A4 scanner, LASER Printer (wifi enabled) and UPS.–4 such • One Dell Precision 5470 workstation with highest configurations, preloaded with all licenses, latest operating system, antivirus, essential office applications and software with minimum 3 years warranty and supports - for Dosimetric data evaluation and software QA, research simulation. • Office cubicles by wooden and glass separation with doors covering area 6200 mm x 4725.	Office room accessories for Medical Physicist cum radiation safety officers.

7.	Doctors Room – 3 (At upper basement)	• Tablewithdrawers–5'(W)x3'(D)– 2 • Executive revolving chair with fullbackrest–2 • Executive revolving chair with half back rest – 2 • Patient'sexaminationtable-2 • Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key–1 • Desktop Computer with latest configuration for official work along with A4 scanner, LASER Printer (wifi enabled) and UPS. - 1 • X-Ray viewer with digital backlight(4plates) • Dustbin-2	3 set for 3 Doctors room for patient examination and prescription, record keeping, other office works related to treatment etc.
8.	Technologist's room – (At upper basement presently designated as Physicist room in lay out plan)	• Table with drawers – 5'(W)x3'(D) –4 • ComputerTable-1 • Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key -2 • Executive revolving chair with half backrest–10 • Dustbin–2	
9.	Nurse's Station – (Upper basement)	• Tablewithdrawers–5'(W)x3'(D)–2 • Executive revolving chair with halfbackrest–4 • Steel Almirah/ Cabinet with lock andkey-4 • Fridge for medicine storage. (Capacity - 300 liter or more)	
10	Patient's waiting Area (Lower basement – Walls around Lift lobby and space below upper half of staircase)	Sitting arrangement for sixty patients. Steel chairs – 60. (3 seater)	
11	LED Smart TV 48" (With internet connection)	1 unit	Patient waiting area/Lobby
12	Cartridge (black and color) for Printers associated with TPS and Control Computer of LINAC. Copier and Scanner.	10 nos. for each Printer over a period of 5 years as and when required by the end user upto 10 years.	TPS room and Control Console of LINAC
13	Trolley with facility for oxygen cylinder Attachment	3	Patient Transportation
14	Wheel Chair	4	Patient Transportation
15	Vacuum Cleaner	2	For cleaning LINAC, TPS rooms etc.
16	Shoe Shelf (capacity - 25pairs)	4	Outside LINAC room Outside waiting area
	Slipper	100 pairs and disposable shoe cover (500)	
17	Door Mat	20 size minimum (3 ft x 2 ft)	Outside waiting area & outside LINAC room
18	Microphone system (Two way)	2 units	LINAC room for calling patients

19	Dehumidifier	Two/three per LINAC covering up to console area should be provided as per machine specific requirement after proper pint calculation for room volume and relative Humidity level.	Humidity control for LINAC
20	Smart Projector – Interactive smart board with short throw projector bundle.	1 unit	For onsite training and teaching purpose.
21	Patient calling system	1 unit	

FIRE SAFETY MEASURE:

1. A fire alarm system of reputed make with smoke/heat detectors, indicator panels, call boxes, electronic sirens and wiring will be installed.

2. Supplying, Installing adequate numbers of Dry chemical power type fire extinguisher of 6 kgs capacity, with initial filling in brand new cylinder with power coated finish, fitted with Gun metal union, high pressure CO2 gas cartridge, discharge hose, wall mounting bracket etc.

MISCELLANEOUS:

1. Cabling of Network (LAN) connectivity and required branded switches for networking the LINAC, TPS, CT simulator, Brachytherapy and any other work station used within the site.
2. Broadband connection with static IP for REMOTE SERVICE of LINAC system Land line based Broad Band internet connection will be procured by the Hospital Authority & the bill for the broadband should be paid by the supplier.
3. One Computer Trolley should be provided at site by the supplier.
4. Radiation related Signage to be provided as per requirement.
5. Inter com system having at least 60 channels should be provided.
6. 1 no of Digital camera to upload patient photo into R&V system.
7. Required De-Ionized water supply over period of 10 years when ever require for LINAC maintenance.
8. The outdoor unit of all AC should have grill coverage to prevent the theft and damage.
9. The chiller unit should have grill and asbestos coverage to prevent damage and theft. It should have lock and key facility.
10. Contamination Monitor – 1 no (Fluke/Ludlum/Equivalent)
11. Universal network booster
12. Background sound systems for LINAC 2 units
13. TPS room power and data point : extra 10 power and data points need to be provided by vendor
14.

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/BRANDS		
Sl. No.	**ITEMS**	**PREFERRED MAKES**
A	**CIVIL**	
	Granite	Thar Marble/GCL India Pvt. Ltd.
1	**TILES**	Kajaria/Johnson/, Restile
2	**PAINT**	Dulux/AsianPaints/Nerolac
3	**PLUMBING**	Kohler/Jaguar/Grohe/Roca
4	**SANITARYITEMS**	CERA/Hindware/Parryware
B	**ELECTRICAL**	
1	**CABLES**	Finolex/Havells/V-Guar
2	**SWITCHES**	Legrand/L&T/Crabtree

3	**DISTRIBUTION BOX, MCB**	Legrand/L&T/Siemens
4	**LIGHT FITTINGS- (LED light)**	Philips/Crompton/Wipro.
C	**AIR CONDINTIONING (Copper Condensing unit)**	Mistubishi/Hitachi/Daikin/Carrier
D	**FURNITURE**	Godrej/Hermen Miller/Featherlite/Damro
E	**SKYLIGHT**	Reputed company

The Scope of Work for Turnkey–for Bardhaman MCH (4D-CT Facility)

1. The prospective bidders already visited or about to visit the proposed site for 4D-CT bunker at Burdwan Medical College and Hospital, Burdwan. Bidders are advised to acquaint themselves with access to site, location of work and any other matter relating to availability and carriage of construction materials. The construction of the concrete shell of the Bunker (4D-CT room) has already been built. The turnkey work shall include all other site preparation work required for installation and functioning of the 4D-CT at the proposed site. The selected bidder shall submit 3D view of the interior work to be under taken for approval of WBMSCL.

Along with interior works as specified in details, the scope of work for Turnkey shall also include the following.

1. **General:**

a. Remaining necessary civil work for enhancement in thickness of floor, walls and ceiling of concrete wall in the present bunker already constructed at Burdwan Medical College and Hospital.
b. Temperature management (Sufficient AC machines with 100% back up) and relative humidity (Sufficient Dehumidifier) management as per maintenance specifications of the concerned CT Machine should be done by vendor for the CT room as well as console area.
c. All further core cutting needed through walls and ceilings other than existing should be done by vendor.
d. The outdoor unit of AC should have grill coverage with lock and key facility to prevent theft and damage. The water drainage storage and pumping management system for the AC units should be arranged by Vendor.
e. The chiller system, if placed outside of the building, the vendor should make necessary arrangements like shades above, grill around with lock and key facility for the same to ensure physical safety and security.

The AERB approved drawings of the CT- Building is attached herewith.

2. While preparing the plan, the following aspects have to be addressed,

a) Easy movement of the patient stretchers / trolleys through corridors and doors.

b) Adequate Radiation shielding as per AERB norms, if necessary.

c) Supply of furniture like desk, chairs, shelves, locker etc.

d) Supply of Patient stretcher and other furniture / accessories to make the 4D-CT functional.

3. The intending bidders are to calculate the cost of necessary Turnkey job (site preparation, interior works, Furniture and office accessories) based on the area as demarcated in the site wise drawings attached with the tender document.

a) Construction / modification work including construction of brick wall if any, plastering, flooring as per the approved plan and equipment layout plan.

b) Construction of renovation/modification demolition, exaction, filling work including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL,

shall be provided by the contractor without any extra cost.

c) Making surface good for floor modification for installing the 4D-CT.

d) Platform for unloading and if necessary.

e) Cable tray, trench & channel – necessary trenches, cable tray and channels as required.

f) **Anti-termite treatment and pest control** should be done in and around the facility once in a year. The entire complex will be made rodent/pest proof.

g) Core cutting in the ceiling of CT console room for electrical mains cable if required.

4. Specification of materials:

Floor: Floor (except of CT room) should be of premier quality double charged joint less vitrified mirror polished tiles. **Granite**- 2400 x 800 mm or bigger good quality heavy duty hard Granites of 18 mm thick

a) **Ceiling**: Ceiling should be of Mineral fiber board with aluminum grid. 2/3 coats of distemper on true ceiling.

b) **Wall**: Walls should be of premier quality double charged joint less vitrified mirror polished tiles up to false ceiling. Wall specification should be as per AERB norms

c) **Door**: (One Patient entry door and one console to CT room entry door)

i) **CT Scan room**: Double leaf door lined with 2.0 mm lead equivalence as per AERB norms

ii) **Main Entry to the unit**: First quality seasoned shagoon wooden door of minimum 40 mm thick double leaf of width 1500 mm with 150 mm X 150 mm vision panel, viewing window, plastic kicking plate fixed with headless screw, high gloss wax polish. The door should be fitted with proper locking arrangement, door closure, handle and stopper. Wooden frame from 125 mm x 100 mm of good quality Shal / Shagoon wooden block.

iii) **Other**: Good quality Flush Door with / viewing window

d) **Paint**: 2 coats synthetic enamel paints over 2 coats primer over wall putty (if required)

e) **Viewing Window**: 2ft x 4ft of 2 mm lead equivalence lead grass

5. Air-conditioning machine:

4D-CT room, control console room, CT-UPS room need to be air conditioned.VRV AC system should be used according to requirement and suitability. Humidity control should be provided to effectively eliminate moisture condensation on the equipment. The Air conditioning system should be designed with standby provision to function 24 x 7.The outdoor units of AC should have grill coverings to prevent theft and damage

AC machines having appropriate rating to bring down and maintain room temperature to be 20° ± 2° celsius.

There should be sufficient number of the AC indoor units to run the service round the clock (i.e 100 % backup). The service should be uninterrupted in case of breakdown of any of the AC machine(s).

A/C ducting to be prepared, if required. Dehumidifier should be provided to maintain the humidity level at 40 - 60 % at Gantry room and in other area(s), if technically required.

6. High quality room lighting (LED up to 400 LUX of illuminance)

7. Necessary power supply points for the followings should be provided in addition to standard power supply points:

a. Vac. Lock System
b. Digital water bath for thermoplastic precuts
c. Heat gun

8. The bidders to submit drawing layout plan of the interior. At least 15 -20 patient holding positions has to be mentioned in the drawing layout plan. Sufficient furniture to be supplied for the console room.

9. **Wiring System:**

a. Light, Fan, 5 Amp Plug: 3 X 1.5 sq. mm copper conductor FRLS wire should be provided.

b. Power Plug (15 Amp): 2 X 2.5 + 1 X 1.5 sq. mm copper conductor FRLS wire should be provided.

c. Split/ Ductable AC wiring: 2 X 4 + 1 X 2.5 sq. mm / suitable gauge copper conductor FRLS wire should be provided.

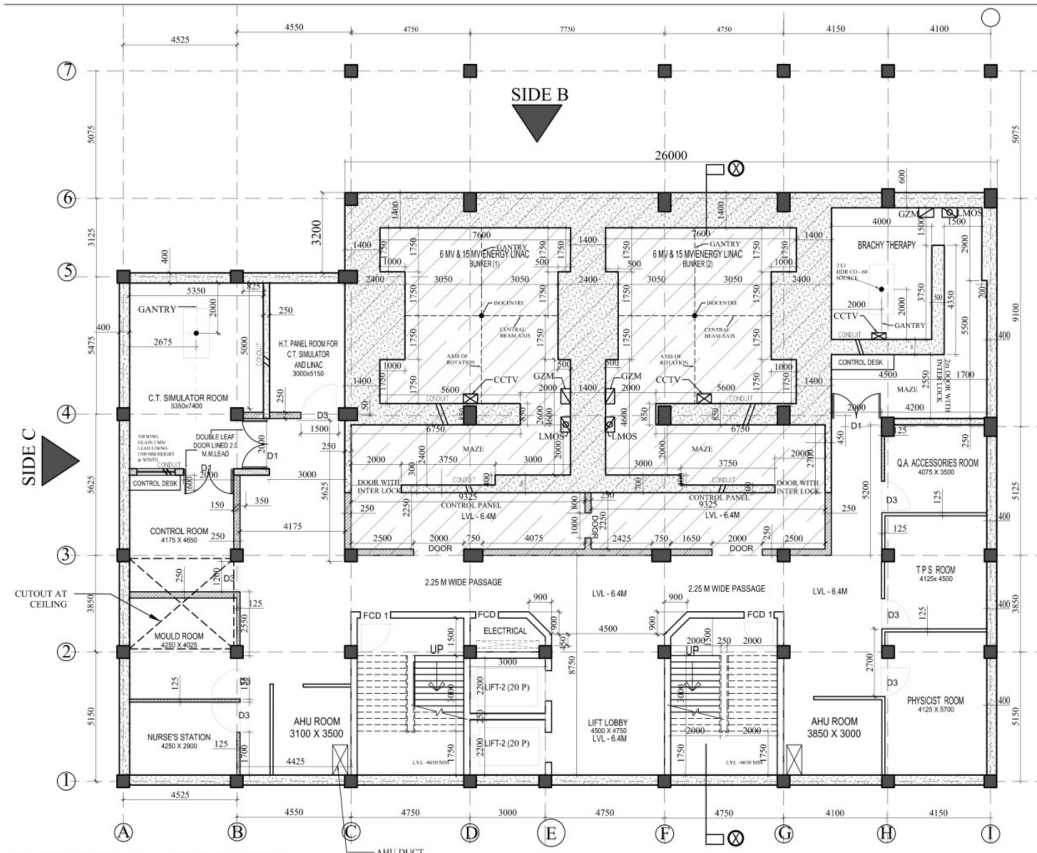
Earthing: Two nos. Copper plate earthing as per PWD schedule

10. **Furniture item to be supplied:**

Racks and platforms for keeping mould room accessories should be provided.

i) Executive revolving chair with arm rest: 6 Nos. (Godrej / Featherlite or equivalent)
ii) Storage Cupboard: 3 Nos. high quality customized Wall mounted
iii) Shoe Rack: 2 No (25 pairs of each)
iv) Corner Table: 2 Nos. (Godrej / Featherlite or equivalent)
v) Change room with Mirror
vi) 2 Kg Fire extinguisher cylinder: 4 Nos.
vii) Console Table from OEM
viii) Workstation table 1200 x 600 mm: 1 No. (Godrej/Featherlite or equivalent)
ix) Emergency Crash Cart in the CT room for storage of emergency medicines, medical equipment, true cut biopsy needles etc. – (Godrej/Janak)
x) LED view box for four films
xi) Patient trolley with mattress side rails, oxygen cylinder and fluid stand attachment: 2 Nos.
xii) Dehumidifier - 25 liters/day: 4 Nos.
xiii) Patient waiting chair 3-seater: - 3 Nos.
xiv) One flat top table for patient.
xv) Patient addressing microphone system – 1 unit
xvi) Laptop computer system for QA record and data analysis.(Core i7 or more, 16 GB RAM, Hard disk SSD 500 GB, 4 gb grafix card)

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/ BRANDS		
Sl. No.	**ITEMS**	**PREFERRED MAKES**
A	**CIVIL**	
	Granite	Thar Marble/GCL India Pvt. Ltd.
1	**TILES**	Kajaria/ Johnson / Restile
2	**PAINT**	Dulux/ Asian Paints / Nerolac
3	**PLUMBING**	Kohler/ Jaguar / Grohe / Roca
4	**SANITARY ITEMS**	CERA/ Hindware/ Parryware
B	**ELECTRICAL**	
1	**CABLES**	Finolex/ Havells/ V-Guar
2	**SWITCHES**	Legrand/ L&T/ Crabtree
3	**DISTRIBUTION BOX , MCB**	Legrand/ L&T/ Siemens
4	**LIGHT FITTINGS- (LED light)**	Philips/ Crompton/ Wipro.
C	**AIR CONDINTIONING (Copper Condensing unit)**	Mistubishi/ Hitachi/ Daikin/ Carrier
D	**FURNITURE**	Godrej/ Hermen Miller/ Featherlite/ Damro
E	**SKY LIGHT**	Reputed company



1. HATCH PORTION OF THE FLOOR AREA TO BE SUNKEN BY 350 MM FROM FINISHED FLOOR LVL OF LOWER BASEMENT FLOOR (I.E. FROM LVL - 6.4M) FOR LAYING OF CONDUIT / EQUIPMETS ETC. FLOOR SHALL BE FINISHED WITH RCC TO FLUSH LEVEL -6.4M AFTER INSTALLATION OF CONDUITS/ EQUIPENTS ETC.

2. AN ISMB 300 SHALL BE FIXED AT THE RCC CEILING AT EACH LINAC BUNKER ALONG THE CENTRAL AXIS.

LOWER BASEMENT

DEPT. OF RADIOTHERAPY. BURDWAN
MEDICAL COLLEGE AND HOSPITAL , BURDWAN

(SIX STORIED BUILDING ON GROUND WITH DOUBLE BASEMENT)

SCHEDULE OF OPENINGS		
TYPE	SIZE	REMARKS
D1	2000X2100	DOUBLE LEAF PANEL DOOR
D3	1000X2100	SINGLE LEAF PANEL DOOR
FCD1	1200X2100	2 HRS FIRE RATED FIRE CHECK DOOR WITH PANIC BAR

NOTE: THIS DRAWING SHALL SUPERSEDE CGA DRAWING NO.

O.T. OR OTHER LAB SPACES -
FLOORING & DADO UPTO 2.4 M LVL. - EPOXY FLOORING (E.G. SIKAFLOOR®81 EPOCEM® OR EQUIVALENT).
WALL - ACRYLIC EMULSION PAINT

LOBBY SPACES -
FLOOR - VITRIFIED TILES 1200X1200 OR LARGER,
WALL- DISPEMPER OVER PUTTY

CORRIDOR=
FLOOR= CLASS IV VITRIFIED 600X600,
WALL = 6"X 4'-0" WOODEN PLANKS AS WALL PROTECTION/ CONTINUOUS @ 1M HEIGHT FROM FLOOR.

STAIRCASES-
SANDBLASTED GRANITE/ ANTISKID GRANITE.

TOILET- CERAMIC TILES,
KITCHEN- KOTA STONE.
WARD- CLASS IV VITRIFIED 1200X1200
EXTERNAL FACADE- GLASS MOSAIC TILES AND WEATHERCOAT PAINT
BASEMENT TCC- REFER TCC SPECIALIST/ VENDOR'S SPEC FOR DOORS AND OTHER SPECIFICATION.

NOTES

1. ALL DIMENSIONS ARE IN MM.UNLASS OTHERWISE MENTIONED.
2. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
3. SITE DIMENSION AND ALL DRAWING-DIMENSIONS TO BE CHECKED AT SITE (BEFORE CONSTRUCTION) IN CASE OF ANY DISCREPANCY, REPORT TO THIS OFFICE IMMEDIATELY.
4. FOR STRUCTURAL DETAILS REFER TO RELEVANT STRUCTURAL DRAWINGS PREPARED BY CONCERNED DESIGN DIVISION OF P.W.D.
5. FOR FLOOR ,WALL AND OTHER FINISHES REFER TO SPECIFICATIONS DULY APPROVED BY THE CONCERNED ARCHITECT.
6. BUILDING TO BE LOCATED AS PER ORIENTATION & LOCATION SHOWN IN SITE PLAN DULY APPROVED BY C.G.A.

AREA STATEMENTS

PROPOSED AREA	
BASEMENT(LOWER) FL. AREA =	782.80 Sq.M.
BASEMENT(UPPER) FL. AREA =	676.40 Sq.M.
GROUND FLOOR AREA =	885.00 Sq.M.
FIRST FLOOR AREA =	885.00 Sq.M.
SECOND FLOOR AREA =	885.00 Sq.M.
THIRD FLOOR AREA =	885.00 Sq.M.
FOURTH FLOOR AREA =	885.00 Sq.M.
FIFTH FLOOR AREA =	885.00 Sq.M.
TOTAL =	5884.00Sq.M.

NO	DATE	DESCRIPTION	CKD. BY
3.	28.01.19	REVISED AS PER MAIL RECIEVD FROM A.E., S.S.	
2.	24.12.18	REVISED AS PER LETTER NO. 951/ 951(1) DATED 24.12.18. of CGA .	
1.	11.05.18	REVISED AS PER LETTER NO. ....DATED	

REVISION SCHEDULE

OFFICE OF THE CHIEF GOVT. ARCHITECT P.W.D. WB.

PROPOSED MULTISTORIED BUILDING FOR TERTIARY CANCER CARE CENTRE (TCCC) AT BURDWAN MEDICAL COLLEGE & HOSPITAL,BURDWAN

DRG.NO.

WORKING DRAWING

LOWER BASEMENT

N

SCALE=1:150

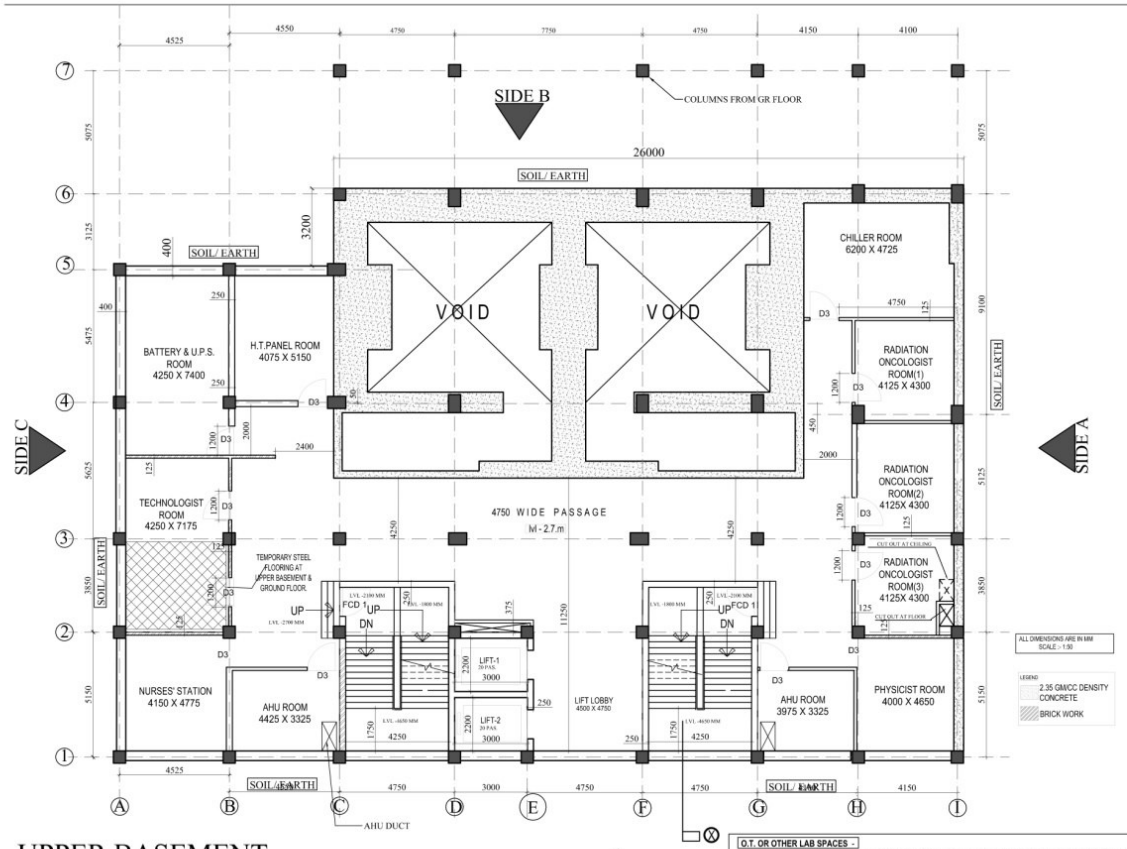
DRAWN BY

BISWAJIT DEY
ASSTT. ARCHITECT,
P.W.D. (W.B.)

ARCHITECT,
P.W.D. (W.B.)

SUPERINTENDING ARCHITECT,
P.W.D. (W.B.)

NUPUR BANERJEE
CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER,
P.W.D. (W.B.)



UPPER BASEMENT

DEPT. OF RADIOTHERAPY, BURDWAN
MEDICAL COLLEGE AND HOSPITAL , BURDWAN

(SIX STORIED BUILDING ON GROUND WITH DOUBLE BASEMENT)

ALL DIMENSIONS ARE IN MM
SCALE - 1:50

LEGEND
2.35 GM/CC DENSITY CONCRETE
BRICK WORK

SCHEDULE OF OPENINGS		
TYPE	SIZE	REMARKS
D1	2000X2100	DOUBLE LEAF PANEL DOOR
D3	1000X2100	SINGLE LEAF PANEL DOOR
FCD1	1200X2100	21MM THK ISMTO FIRE CHECK DOOR WITH FIXING BAR

NOTE: THIS DRAWING SHALL SUPERSEDE CGA DRAWING NO.

O.T. OR OTHER LAB SPACES -
FLOORING & DADO UPTO 1.2M LVL. - EPOXY FLOORING (E.G. SIKAFLOOR881 EPOCEM® OR EQUIVALENT).
WALL - ACRYLIC EMULSION PAINT

LOBBY SPACES -
FLOOR - VITRIFIED TILES 1200X1200 OR LARGER,
WALL- DISPEMPER OVER PUTTY

CORRIDOR=
FLOOR= CLASS IV VITRIFIED 600,600,
WALL = 6"X 4'-0" WOODEN PLANKS AS WALL PROTECTION/ CONTINUOUS.

STAIRCASES-
SANDBLASTED GRANITE/ ANTISKID GRANITE.

TOILET- CERAMIC TILES,
KITCHEN- KOTA STONE,
WARD- CLASS IV VITRIFIED 1200X1200
EXTERNAL FACADE: GLASS MOSAIC TILES AND WEATHERCOAT PAINT
BASEMENT TCC- EFER TCC SPECIALIST/ VENDOR'S SPEC FOR DOORS AND OTHER SPECIFICATION.

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6. BUILDING TO BE LOCATED AS PER ORIENTATION & LOCATION SHOWN IN SITE PLAN DULY APPROVED BY C.G.A.

AREA STATEMENTS

PROPOSED AREA

BASEMENT(LOWER) FL. AREA =	782.80 Sq.M.
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FIRST FLOOR AREA =	885.00 Sq.M.
SECOND FLOOR AREA =	885.00 Sq.M.
THIRD FLOOR AREA =	885.00 Sq.M.
FOURTH FLOOR AREA =	885.00 Sq.M.
FIFTH FLOOR AREA =	885.00 Sq.M.
TOTAL =	5884.00Sq.M.

NO	DATE	DESCRIPTION	CKD. BY
2.	24.12.18	REVISED AS PER LETTER NO. 951/ 951(1) DATED 24.12.18. of CGA .	
1.	11.05.18	REVISED AS PER LETTER NO. ....DATED	

REVISION SCHEDULE

OFFICE OF THE CHIEF GOVT. ARCHITECT P.W.D. WB.

PROPOSED MULTISTORIED BUILDING FOR TERTIARY CANCER CARE CENTRE (TCCC) AT BURDWAN MEDICAL COLLEGE & HOSPITAL,BURDWAN

DRG.NO.

WORKING DRAWING

UPPER BASEMENT

DRAWN BY

BISWAJIT DEY
ASSTT. ARCHITECT,
P.W.D. (W.B.)

ARCHITECT,
P.W.D. (W.B.)

SUPERINTENDING ARCHITECT,
P.W.D. (W.B.)

NUPUR BANERJEE
CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER,
P.W.D. (W.B.)

The Scope of Work for Turnkey–for Murshidabad MCH (Brachytherapy)

GENERAL

The prospective bidders already visited the proposed site for HIGH END HIGH ENERGY BRACHYTHERAPY bunker at Murshidabad Medical College and Hospital, Murshidabad. Tenderer's are advised to acquaint themselves with access to site, location of work and any other matter relating to availability and carriage of construction materials. The construction of the concrete shell of the Bunker (BRACHYTHERAPY ROOM) has already been built. The turnkey work shall include all other site preparation work required for installation and functioning of the BRACHYTHERAPY at the proposed sites. The selected bidder shall submit 3D view of the interior work to be under taken for approval of WBMSCL.

Along with interior works as specified in details, the scope of work for Turnkey shall also include the following,

- Remaining necessary civil work except enhancement in thickness of walls and ceiling of concrete wall in the present bunker already constructed at Murshidabad Medical College and Hospital.
- Electrical, Plumbing, Furnishing, Air-conditioning.
- Fire fighting works.
- Necessary Heavy Duty wooden door and aluminum panel glass door to be provided at BRACHYTHERAPY and control console room.

The drawings of the proposed BRACHYTHERAPY building layout are attached herewith.

While preparing the plan, the following aspects have to be addressed,

- Easy movement of the patient stretchers / trolleys through corridors and doors.
- Supply of furniture like desk, chairs, shelves, locker etc.
- Supply of Patient stretcher and other furniture / accessories to make the BRACHYTHERAPY functional.
- The intending bidders are to calculate the cost of necessary Turnkey job (site preparationand interior works) based on the area as demarcated in the site wise drawings attached withthe tender document.

CIVIL WORK:

- Construction / modification work including construction of brick wall if any, plastering, flooring as per the approved plan and equipment layout plan.
- Construction of renovation / modification demolition, exaction, filling work including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contractor without any extra cost.
- Making surface good for floor modification for installing the BRACHYTHERAPY.
- Platform for unloading and shifting the BRACHYTHERAPY if necessary.
- Cable tray, trench & channel – necessary trenches, cable tray and channels at required locations.
- **Anti-termite treatment and pest control** should be done in and around the facility oncein a year. The entire complex will be made rodent/pest proof.
- If core cutting between tx room & control-console for connecting cables between console & B.T. machine
- **Specification of materials**

Flooring:

Enhancement of thickness of floor as per AERB layout should be constructed by vendor considering cable pit.

Granite- 2400 x 800 mm or bigger good quality heavy duty hard Granites of 18 mm thick

Walls:

Premier Tiles- 800 x 800 mm mirror polished premier quality double charged joint lessvitrified tiles

a) False Ceiling: Mineral fibre board with powder coated GI grid at BRACHYTHERAPY room, control room.

PLUMBING WORK

All necessary plumbing work to install Brachytherapy.

ELECTRICAL WORK:

The supplier shall be required to specify the total load requirements for the BRACHYTHERAPY centre including the load of air conditioning, room lighting and for the accessories if any. The supply line will be provided by the Institute up to one point within the BRACHYTHERAPY centre. Few lights in each room shall be connected to the UPS to provide emergency lighting.

The electrical work shall include the following:

- **Wiring** – Wiring with colour code for all types of points and plugs etc. All interior electricalwiring – with main distribution panel board, necessary vertical TPNMCBDBs to control MCCBs, TPNMCBDBs and SPNMCBDB if any necessary. Every point should be wired with both neutral and phase and earth separately from the copper link bar of phase, neutral andearth. Copper link Bar should be housed into the switch board on 1.1 KV grade insulators. There should not be any joint in between of any two terminals of all the installations. The 3 wires system shall be of copper wire (minimum 1.5 Sq-mm) of different capacity as per theload and should be of renowned make as listed below.

  All the internal wiring including that of telephone, LAN, DICOM & PACS etc. will be ofconcealed variety. The internet broadband connection at a single point will be provided by hospital. The distribution of internet will be carried out by vendor only.

- **Earthing:** Double earthling with copper plate for the BRACHYTHERAPY and allaccessories should be as per ISO rule
- Switches light and power points should be of modular type and of standard make as listedbelow.
- General lights – LED Lights of 400 LUX (BRACHYTHERAPY Room along with Control- Consoleroom)
- Sky Light should be in the ceiling of BRACHYTHERAPY room. All wires used must be FRLS (Fire Retardant with low smoke) type only
- **AIR CONDITIONING:** All rooms (BRACHYTHERAPY Room along with Control-Console room)need to be air-conditioned. Ductable central AC for BRACHYTHERAPY room and control room and should be used according to room requirement and suitability. Humidity control should be provided to effectively eliminate moisture condensation on the equipment. The Air conditioning system should be designed with standby provision tofunction 24 x 7. The outdoor units of AC should have grill coverings to prevent theft and damage.

  Dehumidifier: one of 2 tonnage per BRACHYTHERAPY should be provided.

- **Environment specifications:** (BRACHYTHERAPY Room along with Control-Console room)
- Humidity range: Relative humidity 60% and 80% in all areas except equipment roomwhich shall be as per requirement of the equipment.
- **Temperature ranges:** 22 +/- 2° C in all areas throughout the year, except equipment room which shall be as per requirement of the equipment.
- **Air conditioning load:** The heat load calculations and maintaining the desired temperatureand humidity shall be the responsibility of the supplier.
- **Painting:** (BRACHYTHERAPY room along with Control Console) Two coat plastic emulsion paint over two coats of wall putty including primer in allarea of BRACHYTHERAPY room and control console room.

FURNITURE AND OTHER ACCESSORIES REQUIREMENT

BRACHYTHERAPY with Control -Console Room

Sl. No.	Room	Required facilities	Remarks
1	Brachytherapy Console & Inside Brachytherapy Machine Room	2 Almirah (78x48x22 inch), 2 Cabinet to keep brachytherapy accessories, applicators and medicines, L shaped table(Qty:1)-2.5 m x 2.5m, L shaped wall hanging cabinet (2 Nos)- 2.5m x2.75m Revolving Chair with wheels 6 nos,	
2	Minor OT	1 OT Table (Brachytherapy C-Arm table), 2 Chair, 1 standard Table, 4 OT stool, 2 steel cabinet	
3	Nurse's Room	1 table, 4 chairs, 1 almirah, 1 shoerack, 1 desktop with laser printer and UPS, 1 computer table 1 Fridge	

MISCELLANIUS

4	Trolley with facility for oxygen cylinder attachment	1	Patient Transportation
5	Wheel Chair	1	Patient Transportation
6	Shoe Shelf/ Rack for Brachytherapy, TPS	2	Outside waitingarea
7	Door Mat	2	
8	Dehumidifier (25 litre / day each)	1 for Brachytherapy	
9	Dustbin	2	
10	Microphone	1 unit	1-BRACHYTHERAPY
11	Cartridge for Printers associated with TPS andControl Computer of LINAC and Control console computer	Printer cartridgeover a period of 10 years as and when required by the end user.	

FIRE SAFETY MEASURE:

- A fire alarm system of reputed make with smoke / heat detectors, indicator panels, call boxes, electronic sirens and wiring will be installed. Audio call bell system with intercom & remote locking/unlocking facility to be provided at the main door of the complex.

- Supplying, installing adequate number of dry chemical type fire extinguisher of 6 kg capacity as per fire safety norms, with initial filling in brand new cylinder with power coated finish, fitted with gun metal union, high pressure carbon dioxide gas cartridge,discharge hose, wall mounting bracket etc.

MISCELLANEOUS:

- **Cabling of Network (LAN)** connectivity and required branded switches for networkingthe BRACHYTHERAPY, TPS and any other workstation used within the site.
- The internet broadband connection at a single point will be provided by hospital.Thedistribution of internet will be carried out by vendor only .
- **Broadband connection** with static IP for REMOTE SERVICE of BRACHYTHERAPY.
- **Radiation related Signage** to be provided as per requirement.
- **Inter com system** should be provided.
- **The outdoor unit of all AC should have grill coverage to prevent theft and damage.**
- Necessary power supply plug point should be provided at BRACHYTHERAPY machine room, BRACHYTHERAPY control consoleroom.
- Patient change area with full length curtain, small rack/drawer for keeping belongings.

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/BRANDS		
Sl. No.	**ITEMS**	**PREFERRED MAKES**
A	**CIVIL**	
	Granite	Thar Marble/GCL India Pvt. Ltd.
1	**TILES**	Kajaria, Johnson , Restile
2	**PAINT**	Dulux, Asian Paints , Nerolac
3	**PLUMBING**	Kohler, Jaguar , Grohe , Roca
4	**SANITARY ITEMS**	CERA, Hindware, Parryware
B	**ELECTRICAL**	
1	**CABLES**	Finolex, Havells, V-Guar
2	**SWITCHES**	Legrand, L&T, Crabtree
3	**DISTRIBUTION BOX , MCB**	Legrand, L&T, Siemens
4	**LIGHT FITTINGS- (LED light)**	Philips, Crompton, Wipro.
C	**AIR CONDINTIONING (Copper Condensing unit)**	Mistubishi, Hitachi, Daikin, Carrier
D	**FURNITURE**	Godrej, Hermen Miller, Featherlite,Damro
E	**SKY LIGHT**	Reputed company

The Scope of Work for Turnkey–for Murshidabad MCH (4D CT Simulator)

GENERAL

1. The prospective bidders already visited the proposed site for HIGH END HIGH ENERGY CT bunker at Murshidabad Medical College and Hospital, Murshidabad. Tenderer's are advised to acquaint themselves with access to site, location of work and any other matter relating to availability and carriage of construction materials. The construction of the concrete shell of the Bunker (CT ROOM) has already been built. The turnkey work shall include all other site preparation work required for installation and

functioning of the CT at the proposed sites. The selected bidder shall submit 3D view of the interior work to be under taken for approval of WBMSCL.

Along with interior works as specified in details, the scope of work for Turnkey shall also include the following,

a) Remaining necessary civil work except enhancement in thickness of walls and ceilingof concrete wall in the present bunker already constructed at Murshidabad Medical College and Hospital. Plastering and flooring with tiles also completed at CT Machine room, Control-Console room.

b) Electrical, Plumbing, Furnishing, Air-conditioning, Fire fighting works.

c) Necessary Heavy Duty wooden door (2 nos.) to be provided at CT and control console room.

The drawings of the proposed CT building layout are attached herewith.

2. While preparing the plan, the following aspects have to be addressed,

a) Easy movement of the patient stretchers / trolleys through corridors and doors.

b) Supply of furniture like desk, chairs, shelves, locker etc.

c) Supply of Patient stretcher and other furniture / accessories to make the CT functional.

3. The intending bidders are to calculate the cost of necessary Turnkey job (site preparation and interior works) based on the area as demarcated in the site wise drawings attached with the tender document.

CIVIL WORK:

(i) Construction / modification work including construction of brick wall if require, plastering, flooring as per the approved plan and equipment layout plan.

(ii) Construction of renovation / modification demolition, exaction, filling work includingconstruction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contractor without any extra cost.

(iii) Making surface good for floor modification for installing the CT.

(iv) Platform for unloading and shifting the CT if necessary.

(v) Cable tray, trench & channel – necessary trenches, cable tray and channels at requiredlocations.

(vi) Anti-termite treatment and pest control should be done in and around the facilityonce in a year. The entire complex will be made rodent/pest proof.

(vii) Core cutting between CT machine room and Control-Console for connecting cables.

4. Specification of materials

1. General

a) **Ceiling:** Ceiling should be of Mineral fiber board with aluminum grid. 2/3 coats of distemper on true ceiling.

b) **Door:**

(i) **CT Scan room:** Double leaf door lined with 2.0 mm lead equivalence as per AERB norms

(ii) Main Entry to the unit: First quality seasoned shagoon wooden door of minimum 40 mm thick double leaf of with 150 mm X 150 mm vision panel (2mm lead equivalent glass), viewing window (lead equivalent glass-2 mm lead equivalent), plastic kicking plate fixed with headless screw, high gloss wax polish. The door should be fitted with proper locking arrangement,door closure, handle and stopper. Wooden frame from 125 mm x 100 mm of good quality Shal / Shagoon wooden block.(Viewing glass dimension: 1500mm x 1500mm)

(iii) Other: Good quality Flush Door with / viewing window

c) **Viewing Window:** 2 mm lead equivalence lead grass with adequate dimension.

Fire door: 1 fire door at HT PANEL room.

2. Air-conditioning machine:

The total carpet area mentioned has to be properly air-conditioned @ 750 cu ft. for one ton. In the CT Scan additional AC to be considered depending on the heat dissipation by the machines.

Split/Ductable Split type AC machines having appropriate rating to bring down and maintain room temperature to be 20° ± 2° celsius.

There should be sufficient number of the AC machines to run the service round the clock (i.e 100 % backup). The service should be uninterrupted in case of breakdown of any of the AC machine(s).

A/C ducting to be prepare, if required. Humidifier and Dehumidifier should be provided to maintain the humidity level at approx 60-65 % at Gantry room and in other area(s), if technically required.

3. High quality room lighting (LED up to 400 LUX of illuminance)
4. Necessary power supply points for the followings should be provided in addition to standard power supply points:
    a. Vac. Lock System
    b. Digital water bath for thermoplastic precuts
    c. Heat gun
5. Medical Gas Pipeline system [O2, N2O, Air (4 Bar) and Suction] with imported outlet points along with matching adapter etc. should be provided. Inside pipeline in the Gantry room to be completed in all respect and the entry points of the pipelines should be terminated at a suitable place outside the Gantry room with medical grade isolation valves.
6. The bidders to submit drawing layout plan of the interior. At least 15 -20 patient holding positions has to be mentioned in the drawing layout plan. Sufficient furniture to be supplied for the console room.
7. **Wiring System**:

a) Light, Fan, 5 Amp Plug: 3 X 1.5 sq. mm copper conductor FRLS wire should be provided.
b) Power Plug (15 Amp): 2 X 2.5 + 1 X 1.5 sq. mm copper conductor FRLS wire should be provided.
c) Split/ Ductable AC wiring: 2 X 4 + 1 X 2.5 sq. mm / suitable gauge copper conductor FRLS wire should be provided.

8. **False Ceiling:** Mineral fibre board with powder coated GI grid at CT room, control room.

9. PLUMBING WORK

All necessary plumbing work to install CT. Chiller piping work should be done by vendor. (if require)

10. **ELECTRICAL WORK:**

1. The supplier shall be required to specify the total load requirements for the CT room including the load of air conditioning, room lighting and for the accessories if any. The supply line will be provided by the Institute up to one point within the CT room. Few lights in each room shall be connected to the UPS to provide emergency lighting.
2. The electrical work shall include the following:

a. **Wiring** – Wiring with colour code for all types of points and plugs etc. All interior electrical wiring – with main distribution panel board, necessary vertical TPNMCBDBs to control MCCBs, TPNMCBDBs and SPNMCBDB if any necessary. Every point should be wired with both neutral and phase and earth separately from the copper link bar of phase, neutral and earth. Copper link Bar should be housed into the switch board on 1.1 KV grade insulators. There should not be any joint in between of any two terminals of all the installations.

The 3wires system shall be of copper wire (minimum 1.5 Sq-mm) of different capacity as per theload and should be of renowned make as listed below.

b. All the internal wiring including that of telephone, LAN, DICOM & PACS etc. will be of concealed variety.The internet broadband connection at a single point will be provided by hospital.The distribution of internet will be carried out by vendor only .

c. **Earthing:** Double earthling with copper plate for the CT and allaccessories should be as per ISO rule

d. Switches light and power points should be of modular type and of standard make as listedbelow.
General lights – LED Lights of 400 LUX (CT Room along with Control-Consoleroom)

e. Sky Light should be in the ceiling of CT room. All wires used must be FRLS (Fire Retardant with low smoke) type only

Dehumidifier: Two of 25 litre /day CT should be provided.

Environment specifications: (CT Room along with Control-Console room)

a. Humidity range: Relative humidity 60% to 65% in all areas except equipment roomwhich shall be as per requirement of the equipment.
b. **Temperature ranges:** 20 +/- 2° C in all areas throughout the year, except equipment room which shall be as per requirement of the equipment.
3. **Air conditioning load:** The heat load calculations and maintaining the desired temperatureand humidity shall be the responsibility of the supplier.

11. Furniture item to be supplied:

Racks and platforms for keeping mould room accessories should be provided.

- Executive revolving chair (medium back) with arm rest: 6 Nos. (Godrej / Featherlite or equivalent)
- Storage Cupboard: 3 Nos. high quality customized Wall mounted(900x400x1800)mm
- Shoe Rack: 1 No
- slotted angle storage rack of size : (1000x500x2100)mm Qty:1
- Corner Table: 2 Nos. (Godrej / Feather lite or equivalent)
- Patient Change area with Mirror, full length curtain, small rack/drawer for keeping belongings.
- Console Table from OEM
- Workstation table 1200 x 600x750 mm: 1 No. (Godrej / Featherlite or equivalent)
- Emergency Crash Cart in the CT room for storage of emergency medicines, medical equipment, trucut biopsy needles etc. – (Godrej/Janak)
- LED view box for four films
- Patient trolley with mattress side rails, oxygen cylinder and fluid stand attachment: 1Nos.
- Dehumidifier - 22 Ltrs: 2 Nos.
- Patient waiting chair for at least 6 nos.
- Microphone:1 no
- Cartridge for printer associated with CT computer should supply for 10 yrs. whenever require.
- Dustbin: 3 nos
- Door mat: 2 nos
- Wheel chair: 1 no
- Emergency light: 4 nos.

Note: The items mentioned above are indicative in nature

FIRE SAFETY MEASURE:

1. A fire alarm system of reputed make with smoke / heat detectors, indicator panels, call boxes,electronic sirens and wiring will be installed. Audio call bell system with intercom & remote locking/unlocking facility to be provided at the main door of the complex.
2. Supplying, installing adequate number of dry chemical type fire extinguisher of 6 kg capacity as per fire safety norms, with initial filling in brand new cylinder with power coated finish, fitted with gun metal union, high pressure carbon dioxide gas cartridge,discharge hose, wall mounting bracket etc.

MISCELLANEOUS:

1. **Cabling of Network (LAN)** connectivity and required branded switches for networkingthe CT, TPS and any other workstation used within the site.
2. The internet broadband connection at a single point will be provided by hospital. Thedistribution of internet will be carried out by vendor only.

Broadband connection with static IP for REMOTE SERVICE of CT.

Radiation related Signage to be provided as per requirement.

3. **Inter com system** should be provided.
4. The outdoor unit of all AC should have grill coverage to prevent theft and damage.
5. Necessary power supply plug point should be provided at CT machine room, CT control console room.

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/BRANDS		
Sl. No.	**ITEMS**	**PREFERRED MAKES**
A	**CIVIL**	
	Granite	Thar Marble/GCL India Pvt. Ltd.
1	**TILES**	Kajaria, Johnson, Restile
2	**PAINT**	Dulux, Asian Paints , Nerolac
3	**PLUMBING**	Kohler, Jaguar, Grohe , Roca
4	**SANITARY ITEMS**	CERA, Hindware, Parryware
B	**ELECTRICAL**	
1	**CABLES**	Finolex, Havells, V-Guar
2	**SWITCHES**	Legrand, L&T, Crabtree
3	**DISTRIBUTION BOX , MCB**	Legrand, L&T, Siemens
4	**LIGHT FITTINGS- (LED light)**	Philips, Crompton, Wipro.
C	**AIR CONDINTIONING (Copper Condensing unit)**	Mistubishi, Hitachi, Daikin, Carrier
D	**FURNITURE**	Godrej, Hermen Miller, Featherlite, Damro
E	**SKY LIGHT**	Reputed company

The Scope of Work for Turnkey–for Murshidabad MCH (High Energy LINAC)

GENERAL

1. The prospective bidders already visited the proposed site for HIGH END HIGH ENERGY **LINAC bunker** at Murshidabad Medical College and Hospital, Murshidabad. Tenderer's are advised to acquaint themselves with access to site, location of work and any other matter relating to availability and carriage of construction materials. The construction of the concrete shell of the Bunker (LINAC ROOM) has already been built. The turnkey work shall include all other site preparation work required for installation and functioning of the LINAC

at the proposed sites. The selected bidder shall submit 3D view of the interior work to be under taken for approval of WBMSCL.
Along with interior works as specified in details, the scope of work for Turnkey shall also include the following,

- Remaining necessary civil work except enhancement in thickness of walls and ceilingof concrete wall in the present bunker already constructed at Murshidabad Medical College and Hospital.
- Electrical, Plumbing, Furnishing, Air-conditioning, Fire fighting works.
- Noted: Plastering and flooring with tiles at LINAC Control-Console room have been done at MMCH
- Aluminium panel glass door at the entrance of control-console of LINAC have been done at MMCH.
- Necessary Heavy Duty wooden door to be provided at LINAC and control console room.
  The drawings of the proposed LINAC building layout are attached herewith.

2. While preparing the plan, the following aspects have to be addressed,

a) Easy movement of the patient stretchers / trolleys through corridors and doors.

b) Supply of furniture like desk, chairs, shelves, locker etc.

c) Supply of Patient stretcher and other furniture / accessories to make the LINAC functional.

3. The intending bidders are to calculate the cost of necessary Turnkey job (site preparationand interior works) based on the area as demarcated in the site wise drawings attached withthe tender document.

3. CIVIL WORK:

a) Construction / modification work including construction of brick wall if any, plastering, flooring as per the approved plan and equipment layout plan.

b) Construction of renovation / modification demolition, exaction, filling work including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contractor without any extra cost.

c) Making surface good for floor modification for installing the LINAC.

d) Platform for unloading and shifting the LINAC if necessary.

e) Cable tray, trench & channel – necessary trenches, cable tray and channels at requiredlocations.

f) **Anti-termite treatment and pest control** should be done in and around the facilityonce in a year. The entire complex will be made rodent/pest proof.

g) Core cutting in the ceiling of LINAC console room for electrical mains cable ifrequire.(dimension: approx 6 inch of 4 no's)

4. Specification of materials

Flooring:

Enhancement of thickness of floor as per AERB layout should be constructed by vendor considering dimension of Base Frame of LINAC, and cable pit.

Granite- 2400 x 800 mm or bigger good quality heavy duty hard Granites of 18 mm thick

Walls:

Premier Tiles- 800 x 800 mm mirror polished premier quality double charged joint lessvitrified tiles

a) False Ceiling: Mineral fibre board with powder coated GI grid at LINAC room, control room, TPS room.

PLUMBING WORK

All necessary plumbing work to install LINAC. Chiller piping work should be done by vendor.

5. **ELECTRICAL WORK:**

1. The supplier shall be required to specify the total load requirements for the LINAC centre including the load of air conditioning, room lighting and for the accessories if any. The supply line will be provided by the Institute up to one point within the LINAC centre. Few lights in each room shall be connected to the UPS to provide emergency lighting.

2. The electrical work shall include the following:

a) **Wiring** – Wiring with colour code for all types of points and plugs etc. All interior electricalwiring – with main distribution panel board, necessary vertical TPNMCBDBs to control MCCBs, TPNMCBDBs and SPNMCBDB if any necessary. Every point should be wired with both neutral and phase and earth separately from the copper link bar of phase, neutral andearth. Copper link Bar should be housed into the switch board on 1.1 KV grade insulators. There should not be any joint in between of any two terminals of all the installations. The 3 wires system shall be of copper wire (minimum 1.5 Sq-mm) of different capacity as per theload and should be of renowned make as listed below.

b) All the internal wiring including that of telephone, LAN, DICOM & PACS etc. will be of concealed variety.The internet broadband connection at a single point will be provided by hospital. The distribution of internet will be carried out by vendor only .

c) **Earthing:** Double earthling with copper plate for the LINAC and allaccessories should be asper ISO rule

d) Switches light and power points should be of modular type and of standard make as listedbelow.

General lights – LED Lights of 400 LUX (LINAC Room along with Control-Consoleroom)

e) Sky Light should be in the ceiling of LINAC room. All wires used must be FRLS (Fire Retardant with low smoke) type only.

6. **AIR CONDITIONING:** All rooms (LINAC Room along with Control-Console room, TPS room, UPS room and panel room)need to be air-conditioned. Ductable central AC for LINAC room and control room and should be used according to room requirement and suitability. Humidity control should be provided to effectively eliminate moisture condensation on the equipment. The Air conditioning system should be designed with standby provision tofunction 24 x 7. The outdoor units of AC should have grill coverings to prevent theft and damage.

Dehumidifier: Two of 25 litre /day LINAC should be provided.

7. **Environment specifications:** (LINAC Room along with Control-Console room)

a) Humidity range: Relative humidity 60% and 80% in all areas except equipment roomwhich shall be as per requirement of the equipment.
b) **Temperature ranges:** 22 +/- 2° C in all areas throughout the year, except equipment room which shall be as per requirement of the equipment.
c) **Air conditioning load:** The heat load calculations and maintaining the desired temperatureand humidity shall be the responsibility of the supplier.

Painting: (LINAC room)

Wall putty including primer and painting at linac control console room have been done.

LINAC room walls- High quality high density vitrified tiles clad on the side walls up tofalse ceiling.

FURNITURE AND OTHER ACCESSORIES REQUIREMENT:

LINAC with Control -Console Room

Sl. No.	Rooms	Required facilities	Remarks
01	TPS Room	Long table/wall shelves for installingtotal 8-9 computers, 2 printers etc, 08 revolving Chairs, one Almirah (78x48x22 inch), One view box, Wall cabinet(2) with lock and key facility	
02	Mould Room	One standard long table for patient mould preparation,2cabinet,1 almirah (78x48x22 inch), 3 chair, 4 no's of bed mat	
03	LINAC console	Long wooden shelves/table for installing 4-6 computers and printers etc, one Almirah (78x48x22 inch) 06 revolving chairs + wall cabinet(2)	
04	Physicist's Room & e-LORA Room	Two standard table (L-125cm, width-65cm, height 75 cm), Two computer table, 4 chairs, 2 almirah (78x48x22 inch), 2 no of desktop computer with laser printerand UPS, one A4 scanner	e-LORA related work-1 desktop computer official work-1 desktop computer
05	Doctor's Room (3 doctor's room)	Three(3)standard table (L-125cm, width-65cm, height 75 cm) + 12 chairs + 3 Patient's examination table/couch with mat and pillow, 3 almirah (78x48x22 inch), 3(three)view box Specifications for the View Boxes LEDX-Ray film viewer with adjustable brightness, capable of Holding 3films (14"x17") 3desktop with laser printer and UPS3 computer table	For Three Doctors room
06	Technician's Room with Dosimetry /physics accessories Room	Two standard table(L-125cm ,width- 65cm,height 75 cm)+ 8 revolving chairs+1 desktop with laser printer and UPS with computer table , Three Almirah (78x48x22 inch)	
07	Inside LINAC Room	Two Cabinet for keeping electron Applicators and other accessories, Patient changing area with full length curtain, small rack/drawer for keeping belongings Storage cabinet: 2 nos wall mounted (900x400x1800)mm	To keep immobilization devices
08	LINAC room	Polycarbonate based suitcase with wheels (Air cabin luggage size) for ion chamber calibration purposes -2 such	

MISCELLANIUS

08	Tumor Board Room	1 Big table, 1 computer Table, 15 revolving chair, 1 almirah, 1 desktop with laser printer and UPS	
09	Reception	1 table, 6 chair, desktop withlaser printer and UPS with computer table 1 sofa	
10	Patient's waitingArea/ Lobby	Sitting arrangement for 30patients.	
11	Smart LED TV 48" (with internet connection)	1 unit	Patient waiting area/lobby

12	Cartridge for Printers associated with TPS and Control Computer of LINAC and Control console computer	20 nos. for each Printer cartridge over a period of 10 years as and when required by the end user.	
13	Trolley with facility for oxygen cylinder attachment	2	Patient Transportation
14	Wheel Chair	2	Patient Transportation
15	Vacuum Cleaner	1	For cleaning
16	Shoe Shelf/Rack for LINAC, TPS	5	Outside waiting area
17	Door Mat	15	Outside waiting area & Outside every RT room
18	Dehumidifier (2 Ton)	2 for LINAC	
19	Dustbin	20	
20	Microphone	1 unit	1-LINAC

FIRE SAFETY MEASURE:

1. A fire alarm system of reputed make with smoke / heat detectors, indicator panels, call boxes, electronic sirens and wiring will be installed. Audio call bell system with intercom & remote locking/unlocking facility to be provided at the main door of the complex.
2. Supplying, installing adequate number of dry chemical type fire extinguisher of 6 kg capacity as per fire safety norms , with initial filling in brand new cylinder with power coated finish, fitted with gun metal union, high pressure carbon dioxide gas cartridge,discharge hose, wall mounting bracket etc.

MISCELLANEOUS:

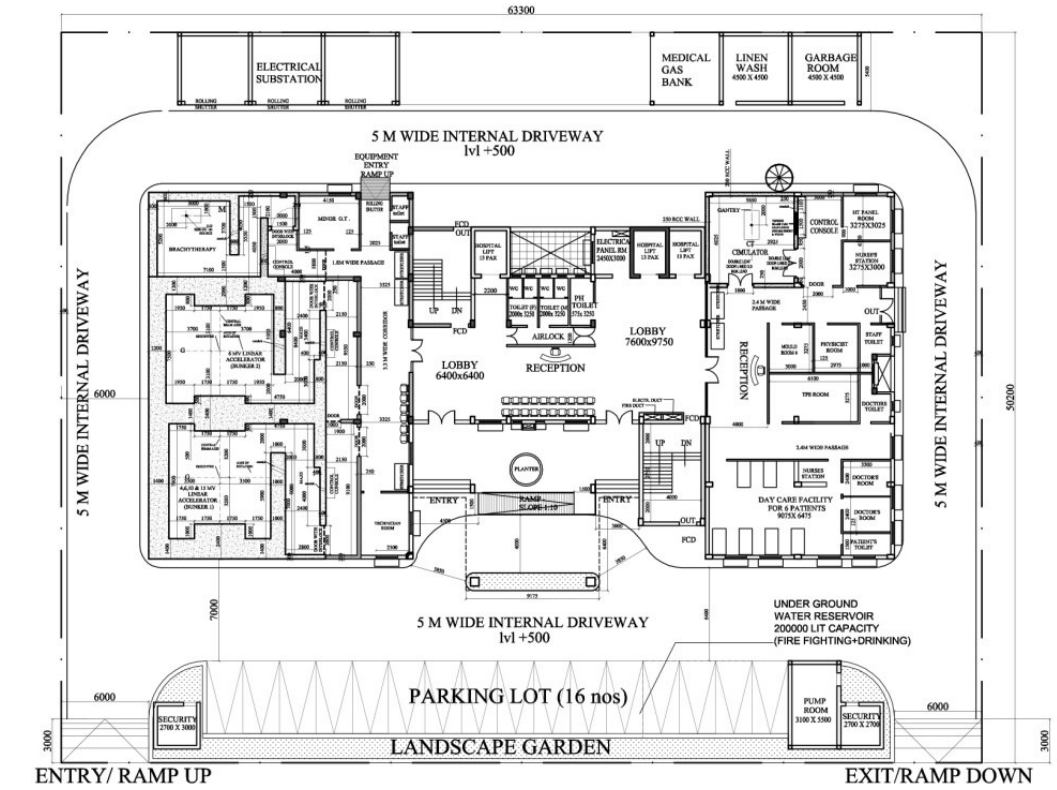
1. **Cabling of Network (LAN)** connectivity and required branded switches for networkingthe LINAC, TPS and any other workstation used within the site.
2. The internet broadband connection at a single point will be provided by hospital. Thedistribution of internet will be carried out by vendor only .

   Broadband connection with static IP for REMOTE SERVICE of LINAC.

   One Computer Trolley should be provided at site by the supplier.
3. **Radiation related Signage** to be provided as per requirement.
4. **Inter com system** having atleast 60channels should be provided.
5. **1 no of Digital camera**to upload patient photo into R& V system.
6. Required **De-Ionised water** supply over period of 10 years whenever require for LINAC maintenance.
7. **The outdoor unit of all AC should have grill coverage to prevent theft and damage.**
8. The **chiller unit** should have grill and asbestos coverage to prevent damage and theft.It should have lock and key facility.
9. Water basin water in out pipeline within mould room for mould preparation.
10. Necessary power supply plug point should be provided at LINAC machine room, LINAC control console room.
11. Universal network booster
12. Background sound systems for LINAC 2 units
13. TPS room power and data point : extra 10 power and data points need to be provided by vendor

14.

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/BRANDS		
Sl. No.	**ITEMS**	**PREFERRED MAKES**
A	**CIVIL**	
	Granite	Thar Marble/GCL India Pvt. Ltd.
1	**TILES**	Kajaria /Johnson /Restile
2	**PAINT**	Dulux/Asian Paints / Nerolac
3	**PLUMBING**	Kohler/ Jaguar /Grohe / Roca
4	**SANITARY ITEMS**	CERA/ Hindware/Parryware
B	**ELECTRICAL**	
1	**CABLES**	Finolex/Havells/ V-Guar
2	**SWITCHES**	Legrand/ L&T/Crabtree
3	**DISTRIBUTION BOX , MCB**	Legrand/ L&T/ Siemens
4	**LIGHT FITTINGS- (LED light)**	Philips/Crompton/Wipro.
C	**AIR CONDINTIONING (Copper Condensing unit)**	Mistubishi/Hitachi/ Daikin, Carrier
D	**FURNITURE**	Godrej/ Hermen Miller/Featherlite / Damro
E	**SKY LIGHT**	Reputed company



EXISTNG CAMPUS ROAD

DEPT. OF RADIOTHERAPY. MURSHIDBAD
MEDICAL COLLEGE AND HOSPITAL , MURSAHIDABAD
GROUND FLOOR PLAN(G+7 STORIED BUILDING)

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE MENTIONED.
2. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
3. SITE DIMENSIONS AND ALL DRAWING DIMENSIONS (INCLUDING LEVELS) TO BE CHECKED AT SITE NOW (BEFORE CONSTRUCTION) IN CASE OF ANY DISCREPANCY, REPORT TO THIS OFFICE IMMEDIATELY.
4. CENTER LINES ARE INDICATIVE BEAM CENTER LINE
5. FOR FLOOR,WALL AND OTHER FINISHES REFER TO SPECIFICATIONS DULY APPROVED BY THE ARCHITECT
6. BK. COBLAS-125/75 (MIN) TO BE USED AT ALL STRUCTURAL MEMBERS FOR FIXING DOORS AND WINDOWS RESPECTIVELY.

AREA STATEMENT:

GR. FLOOR AREA -1067.8 SQM.
1ST FLOOR AREA -1067.8 SQM.
2ND FLOOR AREA -704.5 SQM.
3RD FLOOR AREA -704.5 SQM.
4TH FLOOR AREA -704.5 SQM.
5TH FLOOR AREA -704.5 SQM.
6TH FLOOR AREA -613.25 SQM.
7TH FLOOR AREA -613.25 SQM.
TOTAL BUILT-UP AREA =6180 SQM.= 66521SQFT

SL. NO.	DATE	DESCRIPTION	SIGNATURE

REVISION SCHEDULE

OFFICE OF THE CHIEF GOVERNMENT ARCHITECT, P.W.D., W B.

PROPOSED G+7 BUILDING OF RADIOTHERAPY FACILITY WITH 120 BED CAPACITY AT MURSHIDADABAD MEDICAL COLLEGE AND HOSPITAL

DRAWING NO.

SCHEME DRAWING

SCALE - 1:200

SITE PLAN WITH GR FL. PLAN

DRAWN BY: KANAI LAL BISW.

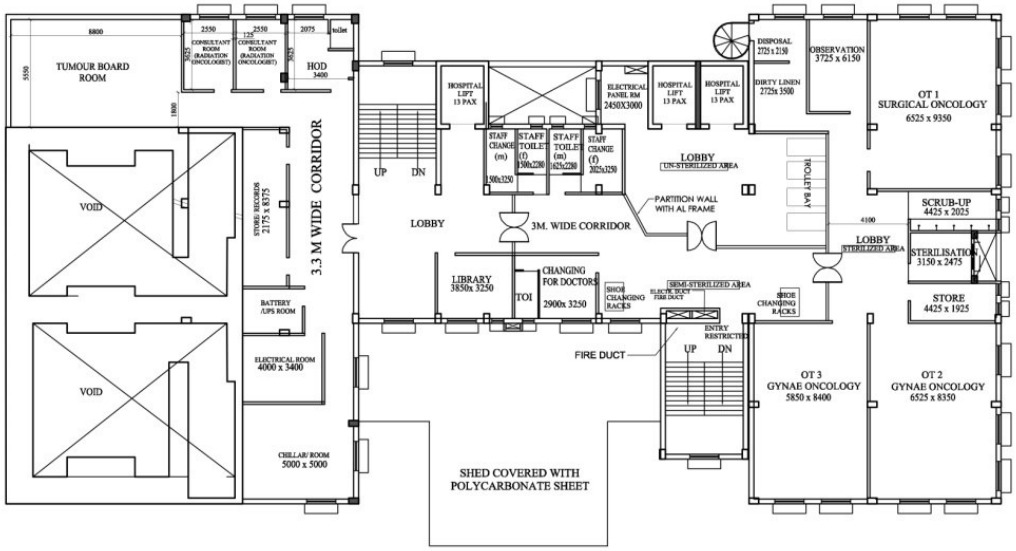
BISWAJIT DEY
JR. ASSISTANT ARCHITECT, P.W.D.

SENIOR ASSISTANT ARCHITECT, P.W.D.

SENIOR ARCHITECT, P.W.D.

ADDL. CHIEF GOVT. ARCHITECT, P.W.D.

NUPUR BANERJEE
CHIEF GOVT. ARCHITECT & EX. OFFICIO CHIEF ENGINEER, P.W.D. (WB)



DEPT. OF RADIOTHERAPY. MURSHIDBAD
MEDICAL COLLEGE AND HOSPITAL , MURSAHIDABAD
1st FLOOR PLAN(G+7 STORIED BUILDING)

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE MENTIONED.
2. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
3. SITE DIMENSIONS AND ALL DRAWING DIMENSIOI (INCLUDING LEVELS) TO BE CHECKED AT SITE NOW (BEFORE CONSTRUCTION) IN CASE OF ANY DISCREPANCY, REPORT TO THIS OFFICE IMMEDIATELY.
4. CENTER LINES ARE INDICATIVE BEAM CENTER LINE.
5. FOR FLOOR,WALL AND OTHER FINISHES REFER T SPECIFICATIONS DULY APPROVED BY THE ARCHITE
6. BK. COBLAS-125/75 (MIN) TO BE USED AT ALL STRUCTURAL MEMBERS FOR FIXING DOORS AND WINDOWS RESPECTIVELY.

SL. NO.	DATE	DESCRIPTION	SIGNATUR

REVISION SCHEDULE

OFFICE OF THE CHIEF GOVERNMENT ARCHITECT, P.W.D., W B.

PROPOSED G+7 BUILDING OF RADIOTHERAPY FACILITY WITH 120 BED CAPACITY AT MURSHIDADABAD MEDICAL COLLEGE AND HOSPITAL

DRAWING NO

SCHEME DRAWING

1ST FLOOR PLAN

SCALE - 1:20

DRAWN BY:

BISWAJIT DEY
JR. ASSISTANT ARCHITECT, P.W.D.

SENIOR ASSISTANT ARCHITECT, P.W

SENIOR ARCHITECT, P.W.D.

ADDL. CHIEF GOVT. ARCHITECT, P.W.

NUPUR BANERJEE
CHIEF GOVT. ARCHITECT & EX. OFFICIO CHIEF ENGINEER, P.W.D. (WB)

The Scope of Work for Turnkey–for Sagore Dutta Hospital (HDR Brachytherapy)

GENERAL

The prospective bidders already visited the proposed site for HDR **BRACHYTHERAPY bunker** at College of Medicine and Sagore Dutta Hospital, Kamarhati, Kolkata. Tenderers are advised to acquaint themselves with access to site, location of work and any other matter relating to availability and carriage of construction materials. The construction of the concrete shell of the Bunker (BRACHYTHERAPYROOM) has already been built. The turnkey work shall include all other site preparation work required for installation and functioning of the BRACHYTHERAPY at the proposed sites. The selected bidder shall submit 3D view of the interior work to be under taken for approval of WBMSCL.

Along with interior works as specified in details, the scope of work for Turnkey shall also include the following,

Remaining necessary civil work except enhancement in thickness of walls and ceiling of concrete wall in the present bunker.

Electrical, Plumbing, Furnishing, Air-conditioning, Fire fighting works.

Necessary Heavy Duty wooden door for Brachytherapy treatment room and aluminium panel glass door to be provided for BRACHYTHERAPY control console room.

The drawings of the proposed BRACHYTHERAPY building layout are attached herewith.

While preparing the plan, the following aspects have to be addressed,

1. Easy movement of the patient stretchers/trolleys through corridors and doors.
2. Adequate Radiation shielding as per AERB norms, if necessary.
3. Supply of furniture like desk, chairs, shelves, locker etc.
4. Supply of Patient stretcher and other furniture/accessories to make the BRACHYTHERAPY functional.
5. The intending bidders are to calculate the cost of necessary Turnkey job (site preparation and interior works) based on the area as demarcated in the site wise drawings attached with the tender document.

CIVIL WORK:

1. Construction / modification work including construction of brick wall if any, plastering, flooring as per the approved plan and equipment layout plan.
2. Construction of renovation/modification demolition, exaction, filling working including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan.
3. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contract or without any extra cost.
4. MakingsurfacegoodforfloormodificationforinstallingtheBRACHYTHERAPY.
5. Platform for unloading and shifting the BRACHYTHERAPY if necessary.
6. Cable tray, trench & channel–necessary trenches, cable tray and channels at required locations.

7. **Anti-termite treatment and pest control** should be done in and around the Brachytherapy facility once in a year.

Specification of materials

a) **Flooring:**
Enhancement of thickness of floor as per AERB layout should be constructed by vendor considering cable pit.
Granite - 2400x800 mm or bigger good quality heavy duty hard Granites of 18mm thick

b) **Walls:**
Premier Tiles- 800x800mm mirror polished premier quality double charged jointless vitrified tiles
Note: Epoxy base resin should be added with cement mortar with necessary keys tone while fixing of the Granite

c) **False Ceiling:** Mineral fibre board with powder coated GIgrid at BRACHYTHERAPY room, control room.

PLUMBING WORK

All necessary plumbing work to install Brachytherapy. Chiller piping work should be done by vendor.

ELECTRICALWORK:

The supplier shall be required to specify the total load requirements for the BRACHYTHERAPY bunker and console including the load of air conditioning, room lighting and for the accessories if any. The supply line will be provided by the Institute up to one point within the BRACHYTHERAPY centre. Few lights in each room shall be connected to the UPS to provide emergency lighting.

The electrical work shall include the following:

a) **Wiring**–Wiring with colour code for all types of points and plugs etc. All interior electrical wiring – with main distribution panel board, necessary vertical TPNMCBDBs to control MCCBs, TPNMCBDBs and SPNMCBDB if any necessary. Every point should be wired with both neutral and phase and earth separately from the copper link bar of phase, neutral and earth. Copper link Bar should be housed into the switch board on 1.1 KV grade insulators. There should not be any joint in between of any two terminals of all the installations. The 3 wires system shall be of copper wire (minimum 1.5 Sq-mm) of different capacity as per the load and should be of renowned make as listed below.

   All the internal wiring including that of telephone, LAN, DICOM & PACS etc. will be of concealed variety. The internet broadband connection at a single point will be provided by hospital. The distribution of internet will be carried out by vendor only.

b) **Earthing:** Double earthling with copper plate for the BRACHYTHERAPY and all accessories should be as per ISO rule

c) Switches light and power points should be of modular type and of standard make as listed below.
   General lights– LED Lights of 400 LUX (BRACHYTHERAPY Room along with Control-Console room)

d) Sky Light should be in the ceiling of BRACHYTHERAPY room. All wires used must be FRLS (Fire Retardant with lows make) type only

e) **AIRCONDITIONING:** All rooms (BRACHYTHERAPY Room along with Control-Console room) need to be air-conditioned. Ductable central AC for BRACHYTHERAPY room and control room and should be used according to room requirement and suitability. Humidity control should be provided to effectively

eliminate moisture condensation on the equipment. The Air conditioning system should be designed with standby provision to function 24x7. The outdoor units of AC should have grill coverings to prevent theft and damage.

f) **Dehumidifier:** one of 25 litre/day capacity per BRACHYTHERAPY should be provided.

g) **Environmentspecifications:** (BRACHYTHERAPYRoomalongwithControl-Consoleroom)

h) Humidity range: Relative humidity 60% and 80% in all areas except equipment room which shall be as per requirement of the equipment.

i) **Temperature ranges:** 22+/-2°Cin all areas through out they ear, except equipment room which shall be as per requirement of the equipment.

j) **Air conditioning load:** The heat load calculations and maintaining the desired temperature and humidity shall be the responsibility of the supplier. AC should be of VRV system and tonnage as per requirement.

k) **Painting:** (BRACHYTHERAPY room along with Control Console) Two coat plastic emulsion pain to ver two coats of wall putty including primer in all area of BRACHYTHERAPY room and control console room.

FURNITURE AND OTHER ACCESSORIES REQUIREMENT:

l) BRACHYTHERAPY with Control -Console Room

Furniture Requirement:		
01	HDR Brachytherapy console	Long L shaped tail or made table for HDR control console Executive revolving chair with half backrest – 8 Customized L Shaped wall cabinet of at least 20'(W)x4'(H)x3'(D) with lock and key facility Patient treatment Bed - 1 Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 2 Dustbin – 2
02	Trolley with facility for oxygen cylinder attachment	01 (For Patient transportation)
03	Wheel Chair	01
04	Shoe Shelf/ Rack for Brachytherapy, TPS	02
05	Dehumidifier (25 litre)	01 for HDR Brachy
06	Patient Calling System	01 unit for Patient Calling
07	Cartridge for Printers associated with TPS and Control Computer of LINAC and Control console computer	Printer cartridge over a period of 10 years as and when required by the end user.
08	Dustbin	02

FIRE SAFETY MEASURE:

1) A fire alarm system of reputed make with smoke / heat detectors, indicator panels, call boxes, electronic sirens and wiring will be installed. Audio call bell system with intercom & remote locking/unlocking facility to be provided at the main door of the complex.
2) Supplying, installing adequate number of dry chemical type fire extinguisher of 6 kg capacity as per fire safety norms, with initial filling in brand new cylinder with power coated finish, fitted with gun metal union, high pressure carbon dioxide gas cartridge, discharge hose, wall mounting bracket etc.

MISCELLANEOUS:

a) **Cabling of Network (LAN):** connectivity and required branded switches for net working the BRACHYTHERAPY, TPS and any other workstation used within the site.
b) The internet broadband connection at a single point will be provided by hospital. The distribution of internet will be carried out by vendor only.
c) **Broadband connection** with static IP for REMOTE SERVICE of BRACHYTHERAPY.
d) **Radiation related Signage** to be provided as per requirement.
e) **Intercom system** should be provided.
f) **The outdoor unit of all AC should have grill coverage to prevent theft and damage.**
g) Necessary power supply plug point should be provided at BRACHYTHERAPY machine room, BRACHYTHERAPY control console room.
h) Patient change area with full length curtain, small rack/drawer for keeping belongings.

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/BRANDS		
Sl. No.	**ITEMS**	**PREFERRED MAKES**
A	**CIVIL**	
	Granite	Thar Marble/GCL India Pvt.Ltd.
1	**TILES**	Kajaria, Johnson, Restile
2	**PAINT**	Dulux, Asian Paints, Nerolac
3	**PLUMBING**	Kohler, Jaguar, Grohe, Roca
4	**SANITARYITEMS**	CERA, Hindware, Parryware
B	**ELECTRICAL**	
1	**CABLES**	Finolex, Havells, V-Guar
2	**SWITCHES**	Legrand, L&T,Crabtree
3	**DISTRIBUTIONBOX,MCB**	Legrand, L&T,Siemens
4	**LIGHTFITTINGS-(LED light)**	Philips, Crompton, Wipro.
C	**AIRCONDINTIONING (Copper Condensing unit)**	Mistubishi, Hitachi, Daikin, Carrier
D	**FURNITURE**	Godrej, HermenMiller, Featherlite, Damro
E	**SKYLIGHT**	Reputedcompany

The Scope of Work for Turnkey–for Sagore Dutta Hospital (4D CT Simulator Machine)

GENERAL

The prospective bidders already visited the proposed site for **4D CT Simulator bunker** at College of Medicine and Sagore Dutta Hospital, Kamarhati, N 24 pgs. Tenderers are advised to acquaint themselves with access to site, location of work and any other matter relating to availability and carriage of construction materials. The construction of the concrete shell of the Bunker (CTROOM) has already been built. The turnkey work shall include all other site preparation work required for installation and functioning of the CT at the proposed sites. The selected bidder shall submit 3D view of the interior work to be under taken for approval of WBMSCL.

Along with interior works as specified in details, the scope of work for Turnkey shall also include the following,

1) Remaining necessary civil work except enhancement in thickness of walls and ceiling of concrete wall in the present bunker already constructed at College of Medicine & Sagore Dutta Hospital.
2) Plastering and flooring with tiles also completed at CT Machine room, Control-Console room.
3) Electrical, Plumbing, Furnishing, Air-conditioning, Fire fighting works.
4) Necessary Heavy Duty wooden door (1 no) for CT bunker and necessary lead glass window to be provided for control console room.

The drawings of the proposed CT building layout are attached herewith.

While preparing the plan, the following aspects have to be addressed,

a) Easy movement of the patients tretchers/trolleys through corridors and doors.
b) Adequate Radiation shielding as per AERB norms, if necessary.
c) Supply of furniture like desk, chairs, shelves, locker etc.
d) Supply of Patient stretcher and other furniture/accessories to make the CT functional.

The intending bidders are to calculate the cost of necessary Turnkey job (site preparation and interior works) based on the area as demarcated in the site wise drawings attached with the tender document.

CIVIL WORK:

1. Construction / modification work including construction of brick wall if any, plastering,
2. Construction of renovation / modification demolition, exaction, filling work including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contractor without any extra cost.
3. Making surface good for floor modification for installing the CT.
4. Platform for unloading and shifting the CT if necessary.
5. Cable tray, trench & channel – necessary trenches, cable tray and channels at required location
6. Anti-termite treatment and pest control should be done in and around the 4D CT facility once in a year.
7. Core cutting between CT machine room and Control-Console for connecting cables.

Specification of materials:

General

False ceiling, floor and walls are already completed. Any further works needed to be done by vendor (excluding the waterproofing of the CT bunker floor).

Door:

1. **CT Scan room:** Double leaf door lined with 2.0 mm lead equivalence as per AERB norms
2. **Main Entry to the unit:** First quality seasoned shagoon wooden door of minimum 40mm thick double leaf of with 150mm X 150mm vision panel (2mm lead equivalent glass), viewing window, plastic kicking plate fixed with headless screw, high gloss wax polish. The door should be fitted with proper locking arrangement, door closure, handle and stopper. Wooden frame from 125mm x 100mm of good quality Shal/Shagoon wooden block.(Viewing glass dimension: 1500mm x 1500mm)
3. **Other:** Good quality Flush Door with/viewing window.

Paint: 2 coats synthetic enamel paints over 2 coats primer over wall putty (if required)

Viewing Window: 2 mm lead equivalence lead glass with adequate dimension.

Fire door: 1 fire door at HT PANEL room.

Air-conditioning machine:
The total carpet area mentioned has to be properly air-conditioned @ 750 cu ft. for one ton .In the CT Simulator additional AC to be considered depending on the heat dissipation by the machines.

AC should be VRV system and tonnage as per requirementto bring down and maintain room temperature to be 20°±2° Celsius.

There should be sufficient number of the AC machines to run the service round the clock (i.e. 100% backup). The service should be uninterrupted in case of breakdown of any of the AC machine(s).

A/C ducting to be prepared, if required. Humidifier and Dehumidifier(25 litre /day) should be provided to maintain the humidity level at approx 60 % at Gantry room and in other area(s), if technically required.

1. High quality room lighting(LED upto 400 LUX of illuminance)
2. Necessary power supply points for the followings should be provided in addition to standard power supply points:
3. Vac. Lock System
4. Digital water bath for thermoplastic pre cuts
5. Heat gun
6. Dehumidifier – 2 nos. (25 litre/day)

The bidders to submit drawing layout plan of the interior. At least 15-20 patient holding positions has to be mentioned in the drawing layout plan. Sufficient furniture to be supplied for the console room.

Wiring System:
1. Light, Fan, 5 Amp Plug: 3X1.5 sq. mm copper conductor FRLS wire should be provided.
2. Power Plug (15 Amp): 2X2.5 + 1X1.5 sq. mm copper conductor FRLS wire should be provided.
3. Split/Ductable AC wiring: 2X4 + 1X2.5 sq. mm/suitable gauge copper conductor FRLS wire should be provided.

Flooring:
Granite- 2400 x 800 mm or bigger good quality heavy duty hard Granites of 18 mm thick

Walls:
Premier Tiles- 800 x 800 mm mirror polished premier quality double charged joint less vitrified tiles

False Ceiling: Mineral fibre board with powder coated GI grid at CT room, control room.

PLUMBING WORK

All necessary plumbing work to install CT. Chiller piping work should be done by vendor (if require).

ELECTRICALWORK:

1. The supplier shall be required to specify the total load requirements for the CT room including the load of air conditioning, room lighting and for the accessories if any. The supply line will be provided

by the Institute up to one point within the CT room. Few lights in each room shall be connected to the UPS to provide emergency lighting.

The electrical work shall include the following:

2. **Wiring–** Wiring – Wiring with colour code for all types of points and plugs etc. All interior electrical wiring – with main distribution panel board, necessary vertical TPNMCBDBs to control MCCBs, TPNMCBDBs and SPNMCBDB if any necessary. Every point should be wired with both neutral and phase and earth separately from the copper link bar of phase, neutral and earth. Copper link Bar should be housed into the switch board on 1.1 KV grade insulators. There should not be any joint in between of any two terminals of all the installations. The 3wires system shall be of copper wire (minimum 1.5 Sq-mm) of different capacity as per the load and should be of renowned make as listed below.
3. All the internal wiring including that of telephone, LAN, DICOM & PACS etc. will be of concealed variety. The internet broadband connection at a single point will be provided by hospital. The distribution of internet will be carried out by vendor only.
4. Earthing: Double earthling with copper plate for the CT and all accessories should be as per ISO rule
5. Switches light and power points should be of modular type and of standard make as listed below.

   General lights – LED Lights of 400 LUX (CT Room along with Control-Console room)
6. Sky Light should be in the ceiling of CT room. All wires used must be FRLS (Fire Retardant with low smoke) type only.
7. **Environment specifications:** (CT Room along with Control-Console room)
8. Humidity range: Relative humidity 60% to 65% in all areas except equipment room which shall be as per requirement of the equipment.
9. Temperature ranges: 20+/-2°C in all areas throughout the year, except equipment room which shall be as per requirement of the equipment.
10. Air conditioning load: The heat load calculations and maintaining the desired temperature and humidity shall be the responsibility of the supplier.

FURNITURE REQUIREMENTS FOR CT SIMULATOR:

Furniture Requirement:		
01	4DCT simulator room	a. Customized cupboard for storing immobilization devices/machine accessories – at least 60'(W)x6'(H)x3'(D) in parts. b. Patient changing area with chair, full length curtains, mirror, small rack / drawer for keeping belongings c. Table with drawers - 5'(W)x3'(D) – 3 d. Stainless steel sink of large size near water bath with granite table top of at least 5'(W)x3'(D) adjacent to it.

02	4DCT simulator Control Console	a. Table with drawers – 5'(W)x3'(D) – 3 b. Executive revolving chair with full backrest – 3 c. Executive revolving chair with half backrest – 3 d. Customized wall cabinet of at least 20'(W)x4'(H)x3'(D) with lock and key facility e. Steel almirah/cabinet of standard size 6'(H)x2'(D) with lock and key – 2 f. X-Ray viewer with digital backlight (4 plates) – 1 g. Dustbin – 2
03	Patient Calling System	1 unit

FIRESAFETYMEASURE:

1. A fire alarm system of reputed make with smoke/heat detectors, indicator panels, call boxes, electronic sirens and wiring will be installed. Audio call bell system with intercom & remote locking/unlocking facility to be provided at the main door of the complex.
2. Supplying, installing adequate number of dry chemical type fire extinguisher of 6 kg capacity as per fire safety norms, with initial filling in brand new cylinder with power coated finish, fitted with gun metal union, high pressure carbon dioxide gas cartridge, discharge hose, wall mounting bracket etc.

3. MISCELLANEOUS:

1. **Cabling of Network (LAN)** connectivity and required branded switches for net working the CT, TPS and any other workstation used within the site.
2. The internet broadband connection at a single point will be provided by hospital. The distribution of internet will be carried out by vendor only
3. **Broadband connection** with static IP for REMOTE SERVICE of CT.
4. **Radiation related Signage** to be provided as per requirement.
5. **Inter com system** should be provided.
6. **The outdoor unit of all AC should have grill coverage to prevent theft and damage.**
7. Necessary power supply plug point should be provided at CT machine room, CT control console room.

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/BRANDS

Sl. No.	ITEMS	PREFERRED MAKES
A	CIVIL	
	Granite	Thar Marble/GCL India Pvt. Ltd.
1	TILES	Kajaria/Johnson/Restile
2	PAINT	Dulux/AsianPaints/Nerolac
3	PLUMBING	Kohler/Jaguar/Grohe, Roca
4	SANITARYITEMS	CERA/Hindware/Parryware
B	ELECTRICAL	
1	CABLES	Finolex/Havells/V-Guar
2	SWITCHES	Legrand/L&T/Crabtree
3	DISTRIBUTIONBOX,MCB	Legrand/L&T/Siemens

4	**LIGHTFITTINGS-(LED light)**	Philips/Crompton/Wipro.
C	**AIR CONDINTIONING (Copper Condensing unit)**	Mistubishi/Hitachi/Daikin/Carrier
D	**FURNITURE**	Godrej/Hermen/Miller/Feather/lite/Damro
E	**SKYLIGHT**	Reputed/company

The Scope of Work for Turnkey–for Sagore Dutta Hospital (High Energy LINAC)

GENERAL:
The prospective bidders already visited the proposed site for HIGH ENERGY Linear Accelerator ROOM, bunkers at College of Medicine and Sagore Dutta Hospital, Kamarhati, Kolkata.

Bidders are advised to acquaint themselves with access to site, location of work and any other matter relating to availability and carriage of construction materials. The construction of the concrete shell of the Bunker (LINAC ROOM) has already been built. The turnkey work shall include all other site preparation work required for installation and functioning of the LINAC at the proposed site. The selected bidder shall submit 3D view of the interior work to be under taken for approval of WBMSCL.

Along with interior works as specified in details, the scope of work for Turnkey shall also include the following:

a) The cut out kept for transporting the LINAC consignment from Ground floor to lower basement with the help of Chain Pulley should have an Iron I-girder fixed at one level higher floor. To full fill this requirement additional temporary structure for hanging the LINAC consignment will be provided by Civil engineering department of concerned Institute. The chain pulley or other similar additional civil & mechanical arrangements should be done by the vendor for hanging and transporting the heavy weight boxes from Ground level to lower basement. Shifting the machine into the bunker is vendor's responsibility.

b) The sunken area inside LINAC bunker and console area should be filled /raised by selected LINAC vendor using RCC so that the trenches/base frame, table pit can be accommodated as per the selected vendor and also to match with AERB approved plans.

c) Remaining necessary civil work for enhancement in thickness of floor, walls and ceiling of concrete wall in the present bunker already constructed at Burdwan Medical College and Hospital.

d) Temperature management (Sufficient AC machines with 100% back up) and relative humidity (Sufficient Dehumidifier) management as per maintenance specifications of the concerned LINAC Machine should be done by LINAC vendor company for the LINAC room as well as console area.

e) All further core cutting needed through walls and ceilings other than existing should be done by vendor.

f) The outdoor unit of AC should have grill coverage with lock and key facility to prevent theft and damage. The water drainage storage to the existing drainage space for the AC units should be arranged by Vendor.

g) The chiller system, if placed outside of the building, the vendor should make necessary arrangements like shades above, grill around with lock and key facility for the same to ensure physical safety and security.

h) Necessary Heavy Duty **wooden door for LINAC room**and **Aluminum panel glass** door for LINAC console to be provided.

i) Vacuum Cleaner

The AERB approved drawings of the LINAC building is attached herewith.

j) Adequate Radiation shielding as per AERB norms (if necessary)

k) Supply of furniture like desk , shelves, chairs ,lockers etc for the control area.

l) Supply of Patient Strecher and other furniture/accessories to make LINAC functional.

The intending bidders are to calculate the cost of necessary turnkey job (site preparation, interior works, Furniture and office accessories) based on the area as demarcated in the site wise drawings attached with the tender document.

1) Construction / modification work including construction of brick wall (if any), plastering, flooring as per the approved plan and equipment layout plan,

2) Construction of renovation / modification demolition, exaction, filling work including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contractor without any extra cost.

3) Making surface good for floor modification for installing the LINAC.

4) Platform for unloading and if necessary.

5) Cable tray, trench & channel – necessary trenches, cable tray and channels at required locations.

6) **Anti-termite treatment and pest control** should be done in and around the LINAC facility once in a year.

7) Core cutting in the ceiling of LINAC console room for electrical mains cable if required. (Dimension: approx. 6 inches of 4 no's)

8) Necessary waterproofing of LINAC bunkers before installation of LINAC machines to be done by vendors.

Specification of Materials:

A. **Flooring:**

Granite- 2400 x 800 mm or bigger good quality heavy duty hard Granites of 18 mm thick

B. **Walls:**

Premier Tiles- 800 x 800 mm mirror polished premier quality double charged joint less vitrified tiles

C. **False Ceiling:**

Mineral fiber/ Metallic board with powder coated GI grid at LINAC room, control room.

PLUMBING WORK

All necessary plumbing work to install LINAC and Chiller piping work should be done by vendor.

ELECTRICAL WORK

1) The supplier should be required to specify the total load requirements for LINAC including the load of air conditioning, room lighting and for the accessories, if any. The supply line will be provided by the Institute up to one point within the LINAC centre. Few lights in each room shall be connected to the UPS to provide emergency lighting.

2) The electrical work shall include the following:
Wiring – Wiring with color code for all types of points and plugs etc. All interior electrical wiring– with main distribution panel board, necessary vertical TPNMCBDBs to control MCCBs, TPNMCBDBs and SPNMCBDB if any necessary. Every point should be wired with both neutral and phase and earth separately from the copper link bar of phase, neutral and earth. Copper link Bar should be housed into the switch board on 1.1 KV grade insulators. There should not be any joint in between of any two terminals of all the installations. The 3 wires system shall be of copper wire (minimum 1.5 Sq-mm) of different capacity as per the load and should be of renowned make as listed below.

All the internal wiring including that of telephone, LAN, DICOM & PACS etc. will be of concealed variety.

a) **Earthing:**

Double earthing with copper plate for the LINAC and all accessories should be as per ISO rule.

b) Switches light and power points should be of modular type and of standard make as listed below.

c) General lights – LED Lights of 400 LUX

d) Sky Light should be in the ceiling of LINAC rooms. All wires used must be FRLS (Fire Retardant with low smoke) type only

AIR CONDITIONING:

Air Conditioning is required inside LINAC bunker and LINAC Console. VRV type AC for LINAC room and control console should be provided according to room requirement and suitability and tonnage shall be calculated and provided by vendor as per requirement. Humidity control should be provided to effectively eliminate moisture condensation on the equipment. The Air conditioning system should be designed with standby provision to function 24 x 7. The outdoor units of AC should have grill coverings to prevent theft and damage.

ENVIRONMENT SPECIFICATIONS:

a) Humidity range: Relative humidity 60% and 80% in all areas except equipment room which shall be as per requirement of the equipment.
b) **Temperature ranges:** 22 +/- 2° C in all areas throughout the year, except equipment room which shall be as per requirement of the equipment.
c) **Air conditioning load:** The heat load calculations and maintaining the desired temperature and humidity shall be the responsibility of the supplier.

PAINTING:

Two coat plastic emulsion paint over two coats of wall putty including primer in all area except LINAC room.

LINAC room walls- High quality high density vitrified tiles clad on the side walls up to false ceiling.

FURNITURE REQUIREMENT (FOR FUNCTIONING OF LINAC AND PATIENT BENEFIT):

COLLEGE OF MEDICINE & SAGORE DUTTA HOSPITAL, WEST BENGAL			
Sl. No.	**Rooms**	**Required facilities**	**Remarks**
01	TPS room	a. Customized table tops along three sides of the room with a depth of 2.5' with drawers for installing 8-9 computers, 2 printers etc. b. Executive revolving chair with full backrest – 6 c. Executive revolving chair with half backrest – 6 d. Customized wall cabinet along 2 sides of the room with at least 30'(W) x 3'(H) x 2' (D) with lock and key facility. e. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 3 f. X-Ray viewer with digital backlight (4 plates) – 1 g. Dustbin – 2 h. CPU trolleys/ UPS trolleys as needed i. Polycarbonate based suitcase with wheels (Air cabin luggage size) for ion chamber calibration purposes -2 such	Treatment planning Stations Room
02	Contouring Room	a. Long tailor-made table tops along 3 sides of the room for installing 4-5 workstations with a depth of 2.5' with drawers. b. Executive revolving chair with full backrest – 4 c. Executive revolving chair with half backrest – 6 d. Customized wall cabinet along two side of the room of approx. 20' (W) x 3'(H) x 2'(D) with lock and key facility f. X-Ray viewer with digital backlight (4 plates) – 2 g. Dustbin – 2 h. CPU trolleys/ UPS trolleys as needed i. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 1	Doctor's Contouring Station room
03	Mould Room - (Located at ground floor)	a. Table with drawers – 5'(W)x3'(D) –2 b. One standard table for patient mould preparation. c. Executive revolving chair with half backrest – 6 d. Customized wall cabinet of at least 20'(W)x4'(H)x3'(D) with lock and key facility e. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 2 g. Dustbin – 3 h. 4 bed mats i. Smoke exhaust system.	Necessary plumbing works to be done.
04	Inside LINAC room -LINAC bunker	a. Customized cupboards for storing immobilization devices / machine accessories/Daily QA equipments – at least 60'(W)x6'(H)x3'(D) in parts. b. Patient changing area with chair, full length curtains, mirror, small rack / drawer for keeping belongings of patient. c. Table with drawers - 5'(W)x3'(D) d. Trolly for carrying dosimetry devices. e.Sky lighting.	ForLINAC room

05	LINACconsole	a. Longtailoredmadetable20' (W) x 3' (D) for keeping LINAC console workstations, printers etc b. Executive revolving chair with full backrest – 2 c. Executive revolving chair with half backrest – 6 d. Customized wall cabinet of at least 20'(W)x3'(H)x3'(D) with lock and key facility e. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key g. Dustbin – 4	For LINAC console
06	Physicist cum RSO room. (Seating arrangement with 4 separate office cubicles for minimum 4 Physicists)	a. Table with drawers – 5'(W)x3'(D) – 4 b. Computer Table- 5 c. Executive revolving chair with full backrest – 5 d. Executive revolving chair with half backrest – 8 e. Customized wall cabinet of at least 6'(W)x4'(H)x3'(D) with lock and key facility-4 f. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 4 g. Dustbin – 4 h. Desktop Computer with latest configuration for e- LORA and other official work along with A4 scanner, LASER Printer and UPS. –4 i. One Dell Precision 5470 workstation with highest configurations, preloaded with all licenses, operating system, antivirus, essential office applications and software with minimum 3 years warranty and supports- for Dosimetric data evaluation and software QA, research simulation. j. Office cubicles by wooden and glass separation covering area 6025 mm x 6000 mm. – 4 nos	Office room accessories for Physicist cum Radiation Safety Officers' rooms. The specifications of the desktop mentioned in point number "h" are given below: 1. 16GB RAM ddr4 Seagate 2. 1TB internal HDD seagate 3. 512 gb Seagate ssd 4. Windows 11 OS 5. Activated MS Office with latest version 6. Intel i7 10th generation processor 7. 2GB radeon Graphics card
07	Patient Examination Room	. Table with drawers – 5'(W)x3'(D) – 2 . Executive revolving chair with full backrest – 2 . Executive revolving chair with half backrest – 4 . Patient's examination table with step tool-2 . Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 1 . X-Ray viewer with digital backlight (4 plates) . Dustbin- 2	Doctors room
08	Technologist's room	a. Table with drawers – 5'(W)x3'(D) – 3 b. Executive revolving chair with half backrest – 10 c. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 2 d. Computer table-1 e. Dustbin – 2	
09.	QA Analysis & Calculation Room	a. Table with drawers – 5'(W)x3'(D) – 1 b. Executive revolving chair with full backrest – 2	

		c. Executive revolving chair with half backrest – 4 d. Customized Cabinet/ Steel Almirah of standard size with lock and key-2 e. Computer table- 1 f. dustbin-1	
09	Nurse's Station (Upper basement)	a. Table with drawers – 5'(W)x3'(D) – 2 b. Executive revolving chair with half backrest – 4 c. Steel Almirah/ Cabinet with lock and key-3 d. dustbin-2	
10	Patient's waiting Area	Sitting arrangement for sixty patients.	3 seater chair
11	Physics accessories Room	a. Table with drawers – 5'(W)x3'(D) – 2 b. Executive revolving chair with full backrest – 2 c. Executive revolving chair with half backrest – 4 c. Customized Cabinet/ Steel Almirah of standard size with lock and key-2	
12	LEDTV48" (16hrsX7days)	1unit	Patient waiting area
13	Cartridge(black and colour) for Printersassociated with TPS andControl Computer ofLINAC	10 nos. for each Printer over a period of 5 years as and when required by the end user.	TPS room and Control Console of LINAC
14	Trolley with facility for oxygen cylinder Attachment	2	Patient Transportation
15	Wheel Chair	4	Patient Transportation
16	Vacuum Cleaner	1	For cleaning LINAC, TPS rooms etc
17	ShoeShelf(25pairs)	2	Outside LINAC room, & Outside waiting area
18	Door Mat	20	Outside waiting area & Outside LINAC room
19	Patient calling system	1 unit	For LINAC, for calling patients
20	Dehumidifier	25 litre/day for one unit. Three units covering up to console area should be provided as per machine specific requirement after proper pint calculation for room volume and relative Humidity level.	Humidity control for LINAC

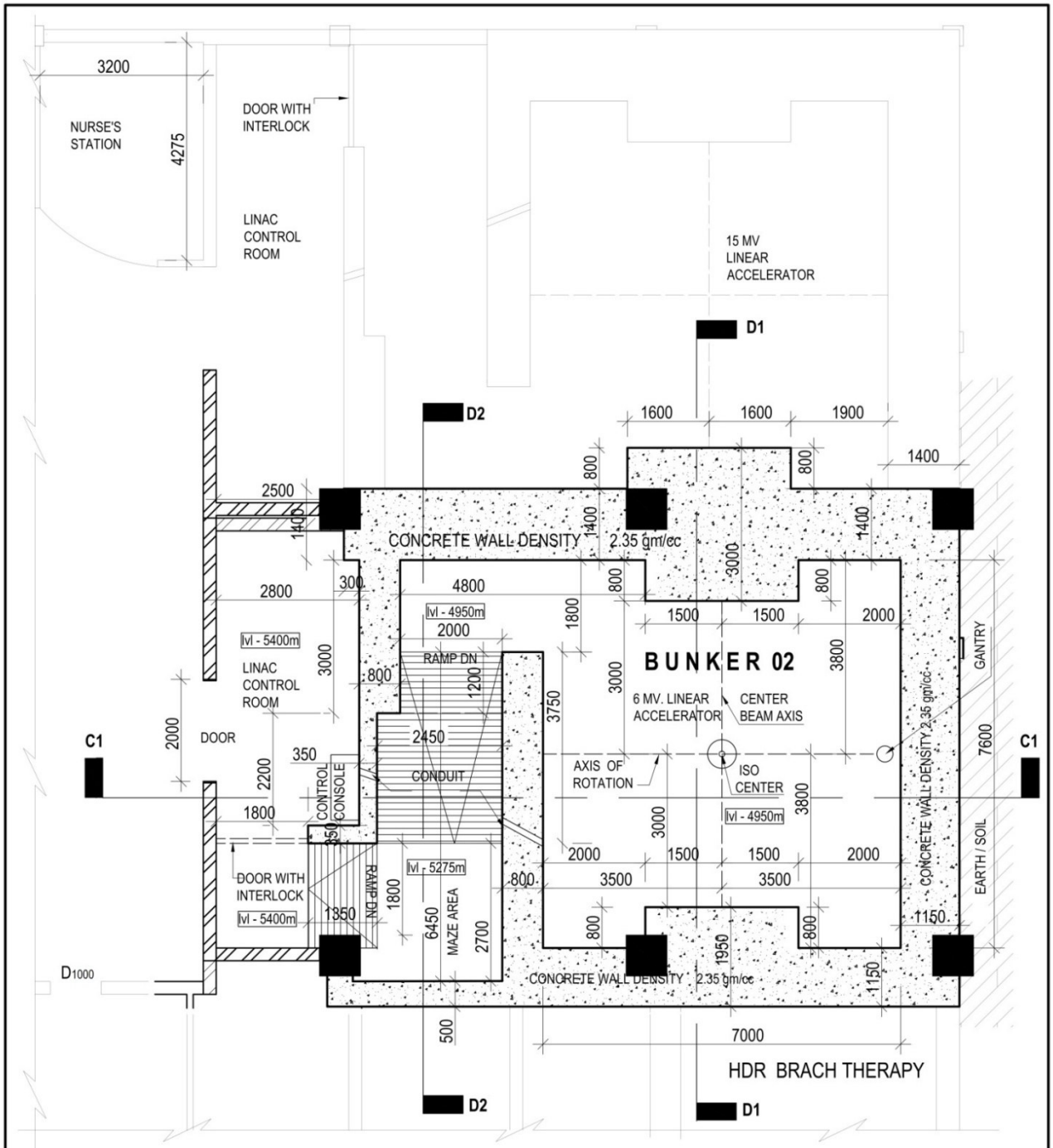
FIRE SAFETY MEASURE:

1. A fire alarm system of reputed make with smoke/heat detectors, indicator panels, call boxes, electronics sirens and wiring will be installed. Audio call bell system with intercom & remote locking /unlocking facility to be provided at the main door of the complex.

2. Supplying, installing adequate number of dry chemical type fire extinguisher of 6 kg capacity as per fire safety norms, with initial filling in brand new cylinder with power coated finish, fitted with gun metal union, high pressure carbon dioxide gas cartridge, discharge hose, wall mounting bracket etc.

m) MISCELLANEOUS:

1. **Cabling of Network (LAN)** connectivity and required switches (CISCO or of similar standard, reputed company make) for networking the LINAC, TPS, CT simulator, Brachytherapy and any other workstation used within the site. All the internal wiring including that of telephone, LAN, DICOM&PACS etc. will be of concealed variety. The internet broadband connection at a single point will be provided by hospital. The distribution of internet will be carried out by vendor only. All the necessary plug points required for installing and functioning of TPS room , Contouring room and control area should be provided by the vendor.
2. **Broadband connection** with static IP for REMOTE SERVICE of LINAC system.
3. One LCD Projector with accessories should be supplied for the facility for teaching and training purposes.
4. **One Computer Trolley** should be provided at each site by the supplier.
5. Radiation related Sign age to be provided as per requirement.
6. **Intercom system** having at least 60 channels should be provided.
7. **1 no of Digital Camera** to upload patient photo into R&V system.
8. Required **De-ionized water** supply over period of 10 years whenever required for LINAC maintenance.
9. The outdoor unit of all AC should have grill coverage to prevent theft and damage.
10. The chiller unit should have grill and asbestos coverage to prevent physical damage and theft. It should have lock and key facility.
11. Universal network booster
12. Background sound systems for LINAC 2 units
13. TPS room power and data point : extra 10 power and data points other than TPS need to be provided by vendor



NOTE :- ALL DIMENSIONS ARE IN MILLIMETER

NOTE :- THIS DRAWING SHALL SUPERSEDE CGA DRAWING NO...

ROOM PLAN OF 6 MV. LINEAR ACCELERATOR AT DOUBLE BASEMENT(LEVEL - 5400)

DEPARTMENT OF RADIOTHERAPY AT SAGAR DUTTA MEDICAL COLLEGE AND HOSPITAL. (G+3 STORIED)

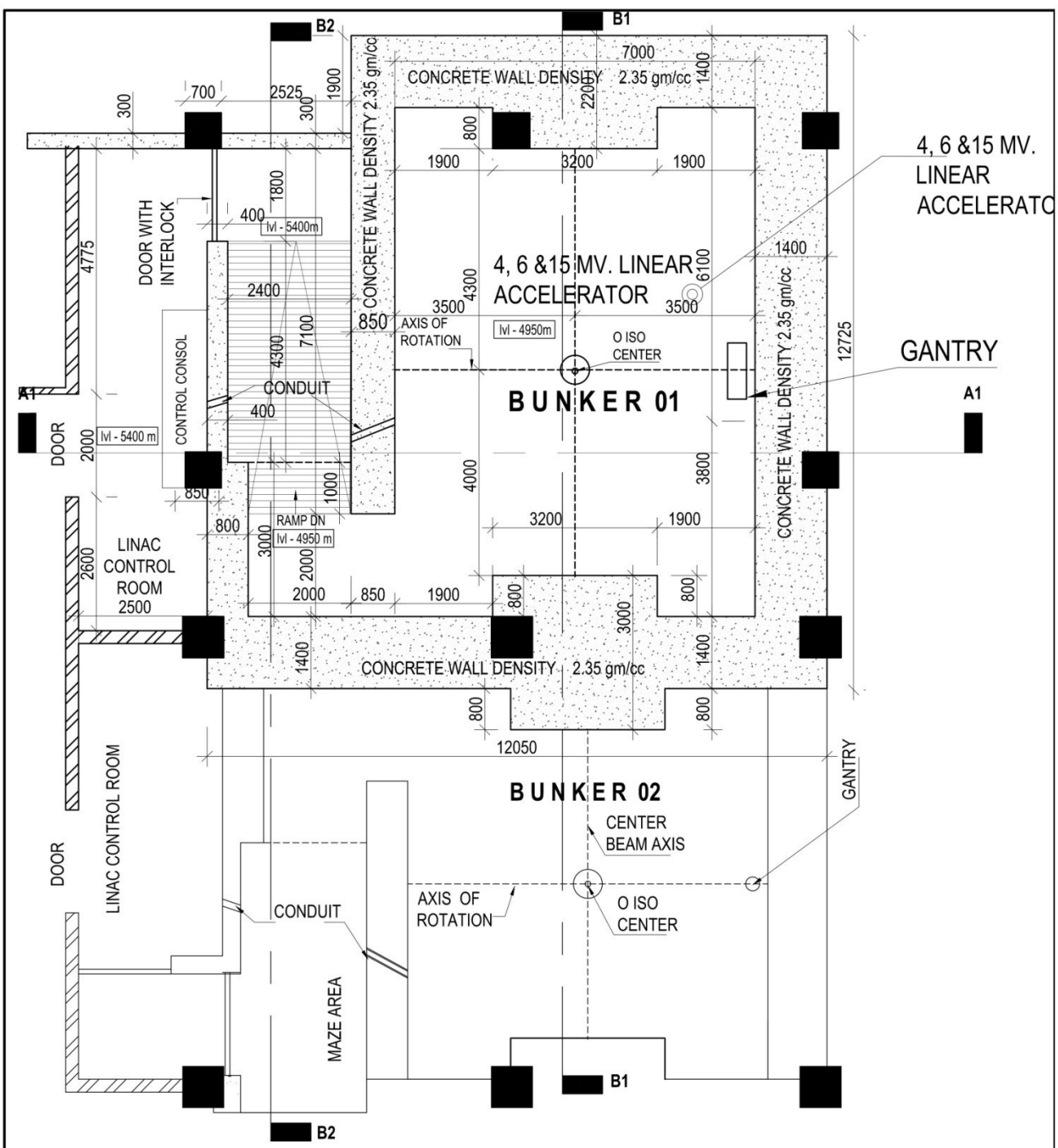
EARTH / SOIL

CONCRETE WORK DENSITY 2.35 gm/cc

BRICK WORK

OFFICE OF THE CHIEF GOVT. ARCHITECT P.W.D. (W.B.)

PROJECT :- TERTIARY CANCER CARE CENTER AT SAGARDUTTA MEDICAL COLLEGE & HOSPITAL.	DRAWING N0 :	RADIOTHERAPY ROOM PLAN . (AERB)	SUPERINTENDING ARCHITECT. P.W.D. (W.B.)
	SCALE - 1 : 50		N-LINE
	SCHEME DRAWING		
6 MV. LINEAR ACCELERATOR	ASST. ARCHITECT.	ARCHITECT.	CHINMOY GHOSH CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER P.W.D. (W.B.)



ROOM PLAN OF 4, 6 &15 MV LINEAR ACCELERATOR
AT DOUBLE BASEMENT (LEVEL. - 5400)

NOTE :- THIS DRAWING SHALL SUPERSEDE PREVIOUS CGA DRAWING BEARING DRAWING NO.....

NOTE :- ALL DIMENSIONS ARE IN MILLIMETER

DEPARTMENT OF RADIOTHERAPY AT
SAGAR DUTTA MEDICAL COLLEGE AND HOSPITAL.
(G+3 STORIED)

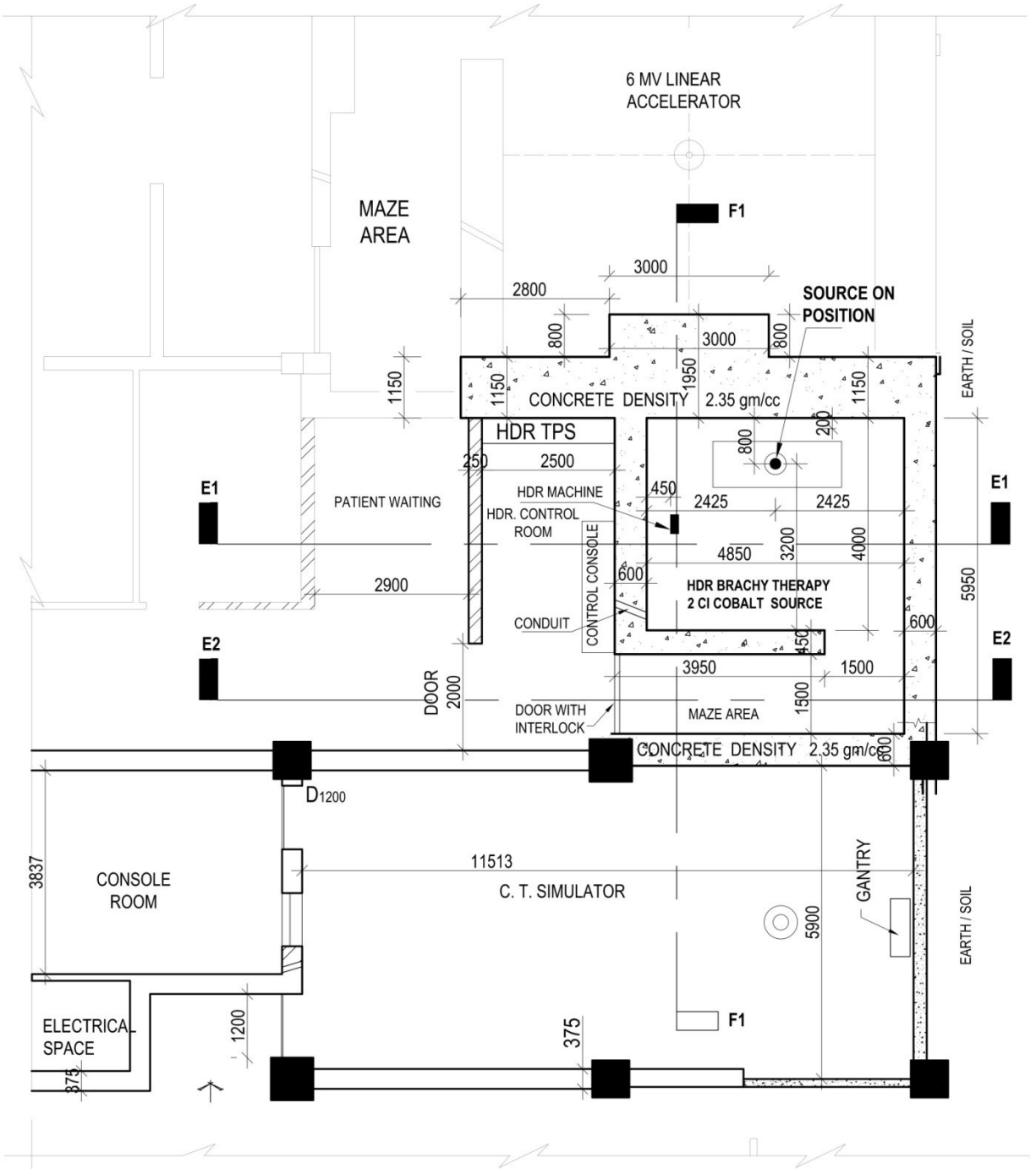
EARTH / SOIL

CONCRETE WORK
DENSITY 2.35 gm/cc

BRICK WORK

OFFICE OF THE CHIEF GOVT. ARCHITECT P.W.D. (W.B.)

PROJECT :- TERTIARY CANCER CARE CENTER AT SAGARDUTTA MEDICAL COLLEGE & HOSPITAL.	DRAWING N0 :	RADIOTHERAPY ROOM PLAN (AERB)	SUPERINTENDING ARCHITECT. P.W.D. (W.B.)
	SCALE - 1 : 50		N-LINE
	SCHEME DRAWING		
4, 6 &15 MV. LINEAR ACCELERATOR	ASST. ARCHITECT.		CHINMOY GHOSH CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER P.W.D. (W.B.)



ROOM PLAN OF HDR BRACHY THERAPY 2 CI COBALT SOURCE
AT DOUBLE BASEMENT (LEVEL. -5400)

NOTE :- ALL DIMENSIONS ARE IN MILLIMETER

NOTE: THIS DRAWING SHALL SUPERSEDE CGA DRAWING NO.

DEPARTMENT OF RADIOTHERAPY AT
SAGAR DUTTA MEDICAL COLLEGE AND HOSPITAL.
(G+3 STORIED)

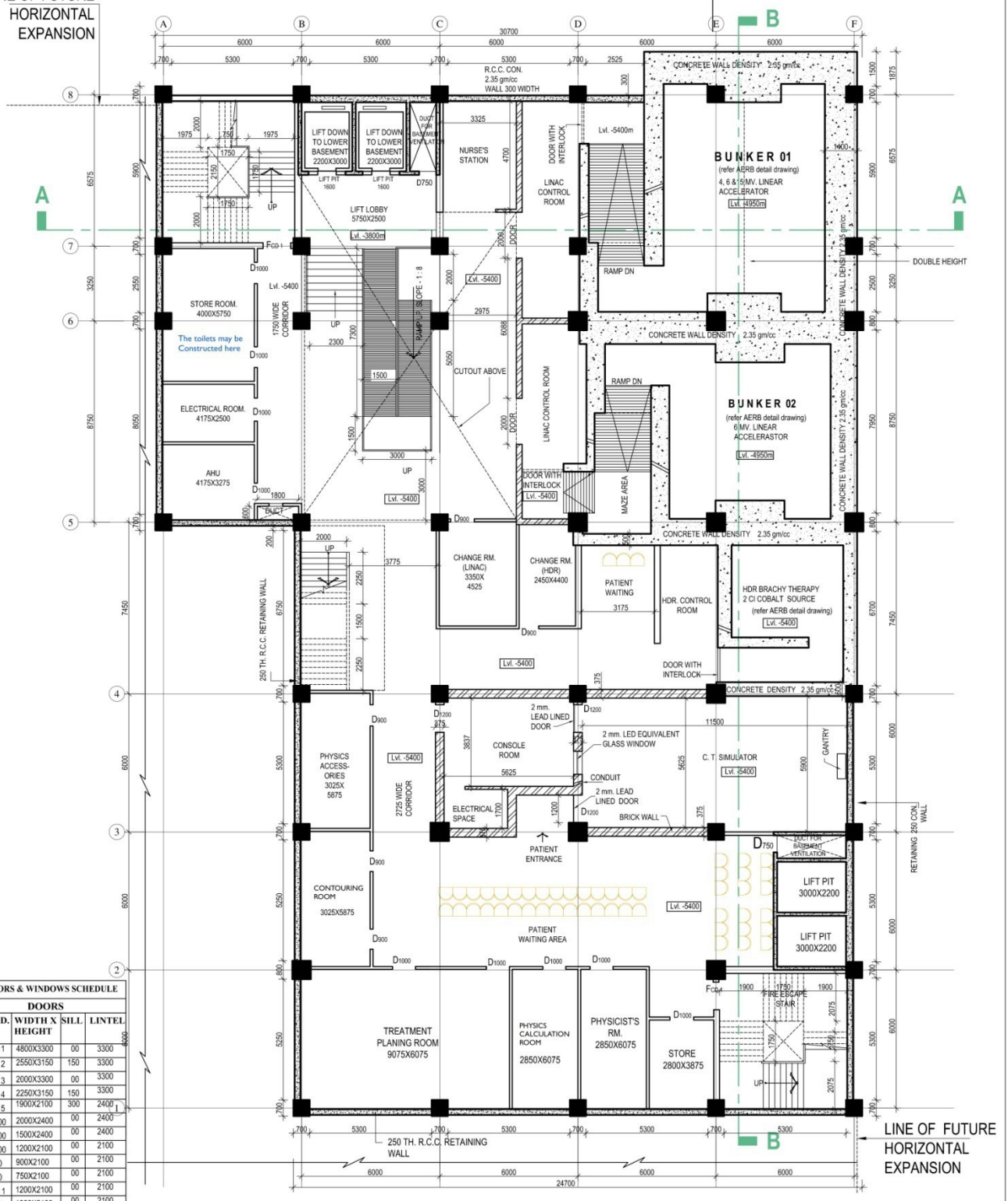
EARTH / SOIL

CONCRETE WORK DENSITY 2.35 gm/cc

BRICK WORK

OFFICE OF THE CHIEF GOVT. ARCHITECT P.W.D. (W.B.)

PROJECT :- TERTIARY CANCER CARE CENTER AT SAGARDUTTA MEDICAL COLLEGE & HOSPITAL.	DRAWING N0 :	RADIOTHERAPY ROOM PLAN (AERB)	SUPERINTENDING ARCHITECT. P.W.D. (W.B.)
	SCALE - 1 : 50		N-LINE
	SCHEME DRAWING	ASST. ARCHITECT.	
HDR BRACHY THERAPY 2 CI COBALT SOURCE	DRAWN BY- MANAS	ARCHITECT.	CHINMOY GHOSH CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER P.W.D. (W.B.)



DOORS & WINDOWS SCHEDULE			
DOORS			
MKD.	WIDTH X HEIGHT	SILL	LINTEL
GLZ 1	4800X3300	00	3300
GLZ 2	2550X3150	150	3300
GLZ 3	2000X3300	00	3300
GLZ 4	2250X3150	150	3300
GLZ 5	1900X2100	300	2400
D2000	2000X2400	00	2400
D1500	1500X2400	00	2400
D1200	1200X2100	00	2100
D900	900X2100	00	2100
D750	750X2100	00	2100
FCD 1	1200X2100	00	2100
FCD2	1800X2100	00	2100
W1	1500X1500/ 1500X400	900/ 2600	2400/ 3000
W2	1000X1500/ 1000X400	900/ 2600	2400/ 3000
W3	600X2100	900	3000
WT1	1800X750	2250	3000
WT2	600X900	900	2100

NOTE: THIS DRAWING HAS BEEN REVISED AS PER LETTER NO.

NOTE: THIS DRAWING SHALL SUPERSEDE CGA DRAWING .....

LOWER BASEMENT PLAN

(LEVEL. - 5400)

AREA - 1235.34 SQ.M

NOTE:- REFER A.E.R.B DRAWINGS FOR BUNKER WALL AND CEILING STRUCTURAL DETAILS

NOTE:- FOUNDATION FOR G+9 STORIED BUILDING WITH DOUBLE BASEMENT

OFFICE OF THE CHIEF GOVT. ARCHITECT P.W.D. (W.B.)

DRAWING N0 : | SCALE - 1 : 150 | DRAWN BY-

PROJECT :-
TERTIARY CANCER CARE CENTER AT COLLEGE OF MEDICINE OF SAGORE DUTTA HOSPITAL, KAMARHATI

N-LINE

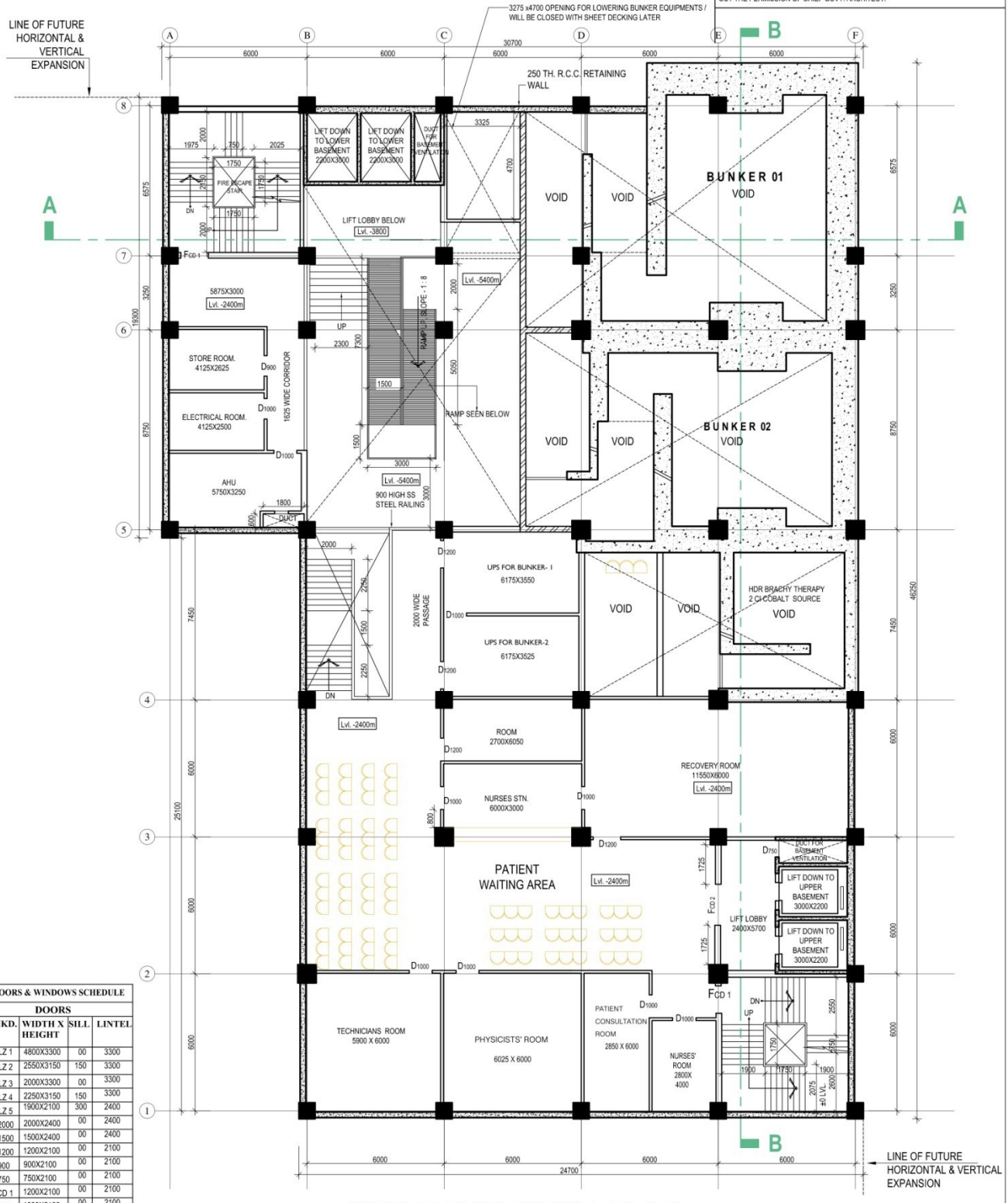
LOWER BASEMENT PLAN | WORKING DWG. -PHASE 1

SUPERINTENDING ARCHITECT. P.W.D.

ASST. ARCHITECT.

ARCHITECT.

CHINMOY GHOSH
CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER P.W.D. (W.B.)



DOORS & WINDOWS SCHEDULE			
DOORS			
MKD.	WIDTH X HEIGHT	SILL	LINTEL
GLZ 1	4800X3300	00	3300
GLZ 2	2550X3150	150	3300
GLZ 3	2000X3300	00	3300
GLZ 4	2250X3150	150	3300
GLZ 5	1900X2100	300	2400
D2000	2000X2400	00	2400
D1500	1500X2400	00	2400
D1200	1200X2100	00	2100
D900	900X2100	00	2100
D750	750X2100	00	2100
FCD 1	1200X2100	00	2100
FCD2	1800X2100	00	2100
W1	1500X1500/ 1500X400	900/ 2600	2400/ 3000
W2	1000X1500/ 1000X400	900/ 2600	2400/ 3000
W3	600X2100	900	3000
WT1	1800X750	2250	3000
WT2	600X900	900	2100

UPPER BASEMENT PLAN

(LEVEL. - 2400)

AREA - 680 SQ.M.(approx.)

NOTE: THIS DRAWING HAS BEEN REVISED AS PER LETTER NO.

NOTE: THIS DRAWING SHALL SUPERSEDE CGA DRAWING .....

NOTE:- REFER A.E.R.B DRAWINGS FOR BUNKER WALL AND CEILING STRUCTURAL DETAILS

NOTE:- FOUNDATION FOR G+9 STORIED BUILDING WITH DOUBLE BASEMENT

OFFICE OF THE CHIEF GOVT. ARCHITECT P.W.D. (W.B.)

DRAWING N0 :

SCALE - 1 : 150

DRAWN BY-

PROJECT :-
TERTIARY CANCER CARE CENTER AT COLLEGE OF MEDICINE OF SAGORE DUTTA HOSPITAL, KAMARHATI

N-LINE

UPPER BASEMENT PLAN | WORKING DWG. -PHASE 1

SUPERINTENDING ARCHITECT. P.W.D.

ASST. ARCHITECT.

ARCHITECT.

CHINMOY GHOSH
CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER P.W.D. (W.B.)

The Scope of Work for Turnkey–for IPGME&R and SSKM Hospital (High Energy LINAC)

GENERAL

1. The prospective bidders shall inspect the proposed site for HIGH ENERGY LINAC (2 No) bunker at IPGME&R/SSKM HOSPITAL, KOLKATA. Tenderer's are advised to acquaint themselves with access to site, location of work, and any other matter relating to availability and carriage of construction materials. The concrete shell of the Bunker (2 LINAC ROOM) is under construction. The turnkey work shall include all other site preparation work required the installation and functioning of HIGH ENERGY LINAC at the proposed site. The bidders are required to submit the plan for the HIGH ENERGY LINAC Centre on a turnkey basis. The bidders shall submit 3D view of the interior work to be under taken for approval of WBMSCL.

Along with interior works as specified in details, the scope of work on Turnkey shall also include the following,

a) After completing the civil work by PWD (As LINAC bunker is under construction), the remaining work will be for the vendor.

b) Electrical, Plumbing, Furnishing, Air Conditioning, Fire Fighting Works

c) Necessary Heavy Duty **wooden door** (at entrance of LINAC treatment room) and **aluminium panel glass door (at the entry of the control console room)** along with lead shielding if necessary to be provided.

d) The entire complex will be made rodent/pest proof.

e) Temperature management (Sufficient AC machines with 100% back up) and relative humidity (Sufficient Dehumidifier) management as per maintenance specifications of the concerned LINAC Machine should be done by LINAC vendor company for the LINAC room as well as console area.

f) All further core cutting needed through walls and ceilings other than existing should be done by vendor.

g) The outdoor unit of AC should have grill coverage with lock and key facility to prevent theft and damage. The water drainage storage and pumping management system for the AC units should be arranged by Vendor.

h) The chiller system, if placed outside of the building, the vendor should make necessary arrangements like shades above, grill around with lock and key facility for the same to ensure physical safety and security.

i) Vacuum Cleaner

The AERB approved drawings of the LINAC building is attached herewith.

2. While preparing the plan,the following aspects have to be addressed,

a) Easy movement of the patient stretchers/trolleys through corridors and doors

b) Adequate Radiation Shielding as per AERB norms, if necessary

c) Supply of furniture like desk, chairs, shelves, locker etc.

d) Supply of Patient stretchers and other furniture/accessories to make the LINAC functional.

3. The intending bidders are to calculate the cost of necessary turnkey job (site preparation, interior works, and Furniture and office accessories) based on the area as demarcated in the site wise drawings attached with the tender document.

a) Construction / modification work including construction of brick wall (if any), plastering, flooring as per the approved plan and equipment layout plan.

b) Construction of renovation / modification demolition, exaction, filling work including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contractor without any extra cost.

c) Making surface good for floor modification for installing the LINAC.

d) Platform for unloading if necessary.

e) Cable tray, trench & channel – necessary trenches, cable tray and channels at required locations.

f) Anti-termite treatment and pest control should be done in and around the facility once in a year. The entire complex will be made rodent/pest proof.

g) Core cutting in the ceiling of LINAC console room for electrical mains cable if required. (Dimension: approx. 6 inches of 4 no's).

h) Necessary waterproofing of LINAC bunkers before installation of LINAC machines to be done by vendors.

4. Specification of Materials:

a) **Flooring:**

Granite- 2400 x 800 mm or bigger good quality heavy duty hard Granites of 18 mm thick

Walls:

Premier Tiles- 800 x 800 mm mirror polished premier quality double charged joint less vitrified tiles

b) **False Ceiling**: Mineral fiber / Metal board with powder coated GI grid at LINAC room, control console room.

5. PLUMBING WORK

All necessary plumbing work to install LINAC and Chiller piping work should be done by vendor.

6. ELECTRICAL WORK

1) The supplier should be required to specify the total load requirements for LINAC including the load of air conditioning, room lighting and for the accessories, if any. The supply line will be provided by the Institute up to one point within the LINAC centre. Few lights in each room shall be connected to the UPS to provide emergency lighting.

2) The electrical work shall include the following:

Wiring – Wiring with color code for all types of points and plugs etc. All interior electrical wiring – with main distribution panel board, necessary vertical TPNMCBDBs to control MCCBs, TPNMCBDBs and SPNMCBDB if any necessary. Every point should be wired with both neutral and phase and earth separately from the copper link bar of phase, neutral and earth. Copper link Bar should be housed into the switch board on 1.1 KV grade insulators. There should not be any joint in between of any two terminals of all the installations. The 3 wires system shall be of copper wire (minimum 1.5 Sq-mm) of different capacity as per the load and should be of renowned make as listed below.

All the internal wiring including that of telephone, LAN, DICOM & PACS etc. will be of concealed variety.

a) **Earthing**: Double earthing with copper plate for the LINAC and all accessories should be as per ISO rule.

b) Switches light and power points should be of modular type and of standard make as listed below.

c) General lights – LED Lights of 400 LUX.

d) Sky Light should be in the ceiling of LINAC rooms. All wires used must be FRLS (Fire Retardant with low smoke) type only.

7. AIR CONDITIONING:

All rooms (LINAC Room along with Control Console Room) need to be air-conditioned. Ductable central AC for LINAC room should be used according to room requirement and suitability. Humidity control should be provided to effectively eliminate moisture condensation on the equipment. The Air conditioning system should be designed with standby provision to function 24 x 7. The outdoor units of AC should have grill coverings to prevent theft and damage.
Requirement of AC Machine :

Sites	**No of AC machine required**
Two LINAC Bunker (LINAC 1 & LINAC 2) and Two Console room(LINAC 1 & LINAC 2)	Vendor should be provided according to machine requirement
LINAC UPS Room (Ground Floor& First Floor)	Vendor should be provided according to machine requirement
RSO Room(Ground Floor)	1.5 T X 1 no
TPS Room(First Floor)	1.5 T X 2 nos
Contouring Room(First Floor)	2 T X 1 no
Physicist Room(Second Floor)	1.5 T X 2nos
Brachy TPS(Ground Floor)	2 T X 1 no

8. ENVIRONMENT SPECIFICATIONS:

a) **Humidity range**: Relative humidity 60% and 80% in all areas except equipment room which shall be as per requirement of the equipment.
b) **Temperature ranges**: 22 +/- 2° C in all areas throughout the year, except equipment room which shall be as per requirement of the equipment.
c) **Air conditioning load**: The heat load calculations and maintaining the desired temperature and humidity shall be the responsibility of the supplier.

9. PAINTING:

Two coat plastic emulsion paint over two coats of wall putty including primer in all area except LINAC room. LINAC room walls- High quality high density vitrified tiles clad on the side walls up to false ceiling.

FURNITURE REQUIREMENT (FOR FUNCTIONING OF LINAC AND PATIENT BENEFIT): LINAC

IPGME&R/SSKM HOSPITAL			
Sl. No.	**Rooms**	**Required facilities**	**Remarks**

01	TPS room(First Floor)	a. Customized table tops along three sides of the room with a depth of 2.5' with drawers for installing 8-9 computers, 2 printers etc. b. Executive revolving chair with full backrest – 6 c. Executive revolving chair with half backrest – 6 d. Customized wall cabinet along 2 sides of the room with at least 30'(W) x 3'(H) x 2' (D) with lock and key facility. e. Steel almirah/cabinet of standard size 6'(H)x2'(D) with lock and key – 3 f. X-Ray viewer with digital backlight (4 plates) – 1 g. Dustbin – 2 h. CPU trolleys/ UPS trolleys as needed i. Polycarbonate based suitcase with wheels (Air cabin luggage size) for ion chamber calibration purposes -2 such	Treatment planning Stations Room
02	Contouring Room(First Floor)	a. Long tailor-made table tops along 3 sides of the room for installing 4-5 workstations with a depth of 2.5' with drawers. b. Executive revolving chair with full backrest – 4 c. Executive revolving chair with half backrest – 6 d. Customized wall cabinet along two side of the room of approx. 20' (W) x 3'(H) x 2'(D) with lock and key facility e. X-Ray viewer with digital backlight (4 plates) – 2 f. Dustbin – 2 g. CPU trolleys/ UPS trolleys as needed h. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 1	Doctor's Contouring Station room
03	Mould Room (First floor)	a. Table with drawers – 5'(W)x3'(D) –2 b. One standard table for patient mould preparation. c. Executive revolving chair with half backrest – 6 d. Customized wall cabinet of at least 20'(W)x4'(H)x3'(D) with lock and key facility e. Steel almirah/cabinet of standard size 6'(H)x2'(D) with lock and key – 2 f. Dustbin – 3 g. 4 bed mats h. Smoke exhaust system. i. One Wash basin with large sink	Necessary plumbing works to be done.

		j.One Equipment Table	
04	Inside LINAC room -2 LINAC bunkers	a. Customized cupboards for storing immobilization devices / machine accessories/Daily QA equipments – at least 60'(W)x6'(H)x3'(D) in parts. b. Patient changing area with chair, full length curtains, mirror, small rack / drawer for keeping belongings of patient. c. Table with drawers - 5'(W)x3'(D) d. Trolly for carrying dosimetry devices. e. Sky lighting.	For both the LINAC rooms -2 LINAC rooms- (2 sets)
05	LINAC console-2 (two) no of consoles	a. Long tailored made table 20' (W) x 3' (D) for keeping LINAC console workstations, printers etc b. Executive revolving chair with full backrest – 2 c. Executive revolving chair with half backrest – 6 d. Customized wall cabinet of at least 20'(W)x3'(H)x3'(D) with lock and key facility e. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key f. Dustbin – 4	For both the LINAC console (2 sets)
06	Physicist cum RSO room for eLORA (Seating arrangement with 6 separate office cubicles for minimum 6Physicists) (Second Floor)	a. Table with drawers – 5'(W)x3'(D) – 6 b. Computer Table- 5 c. Executive revolving chair with full backrest – 4 d. Executive revolving chair with half backrest – 8 e. Customized wall cabinet of at least 6'(W)x4'(H)x3'(D) with lock and key facility-6 f. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 5 g. Dustbin – 4 h. Desktop Computer with latest configuration for e- LORA and other official work along with A4 scanner, LASER Printer and UPS. – 4 i. One Dell Precision 5470 workstation with	Office room accessories for Physicist cum Radiation Safety Officers' rooms The specifications of the desktop mentioned in point number "h" are given below: 1. 16GB RAM ddr4 Seagate 2. 1TB internal

		highest configurations, preloaded with all licenses, operating system, antivirus, essential office applications and software with minimum 3 years warranty and supports- for Dosimetric data evaluation and software QA, research simulation. j. Office cubicles by wooden and glass separation covering area 6025 mm x 6000 mm.- 8 nos.	HDD seagate 3. 512 gb Seagate ssd 4. Windows 11 OS 5. Activated MS Office with latest version 6. Intel i7 10th generation processor 7. 2GB radeon Graphics card
07	Patient Examination Room(Ground floor)	a. Table with drawers – 5'(W)x3'(D) – 2 b. Executive revolving chair with full backrest – 2 c. Executive revolving chair with half backrest – 4 d. Patient's examination table with step tool-2 e. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 1 f. X-Ray viewer with digital backlight (4 plates) g. Dustbin- 2	Doctors room
08	Technologist's room(First Floor)	a. Table with drawers – 5'(W)x3'(D) – 3 b. Executive revolving chair with half backrest – 12 c. Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 2 d. Computer table-1 e. Dustbin – 2	
09	Dosimetry/Physics accessories Room(Ground floor)	a. Table with drawers – 5'(W)x3'(D) – 2 b. Executive revolving chair with full backrest – 2 c. Executive revolving chair with half backrest – 4 d. Customized Cabinet/ Steel Almirah of standard size with lock and key-4	
10	Nurse's Station (Ground Floor)	a. Table with drawers – 5'(W)x3'(D) – 2 b. Executive revolving chair with half backrest – 4 c. Steel Almirah/ Cabinet with lock and key-3 d. dustbin-2	
11	Patient's waiting Area	Sitting arrangement for Forty Patients.	3 seater Steel chair
12	LED TV 48"	1 Unit	Patient waiting area

	(16hrsX7days)		
13	Cartridge (black and colour) for Printers associated with TPS and Control Computer of LINAC	10 nos. for each Printer over a period of 5 years as and when required by the end user.	TPS room and Control Console of LINAC
14	Trolley with facility for oxygen cylinder Attachment	2	Patient Transportation
15	Wheel Chair	4	Patient Transportation
16	Vacuum Cleaner	1	For cleaning LINAC, TPS rooms etc
17	Shoe Shelf (25 pairs)	2	Outside LINAC room, & Outside waiting area
18	Door Mat	20	Outside waiting area & outside LINAC room
19	Patient calling system	2 unit	For LINAC
20	Dehumidifier	2 units	25 litres capacity per day for LINAC
21	Smart Projector – Interactive smart board with short throw projector bundle.	1 unit	For onsite training and teaching purpose.

FIRE SAFETY MEASURE:

1. A fire alarm system of reputed make with smoke / heat detectors, indicator panels, call boxes, electronic sirens and wiring will be installed. Audio call bell system with intercom & remote locking /unlocking facility to be provided at the main door of the complex.

2. Supplying, Installing adequate number of Dry chemical power type fire extinguisher of 6 kg capacity as per fire safety norms, with initial filling in brand new cylinder with power coated finish, fitted with Gun metal union, high pressure CO2 gas cartridge, discharge hose, wall mounting bracket etc.

MISCELLANEOUS:

1. **Cabling of Network (LAN)** connectivity and required branded switches for networking the LINAC, TPS, CT simulator, Brachytherapy and any other workstation used within the site.
2. **Broadband connection** with static IP for REMOTE SERVICE of LINAC system Land line based Broad Band internet connection will be procured by the Hospital Authority & the bill for the broadband should be paid by the supplier.
3. **One Computer Trolley** should be provided at site by the supplier.
4. **Radiation related Signage** to be provided as per requirement.

5. **Intercom system** having at least60 channels should be provided.
6. **1 no of Digital camera** to upload patient photo into R&V system.
7. Required **De-Ionized water** supply over period of 10 years whenever require for LINAC maintenance.
8. Required **Ionization Chamber and Dosimeter calibration** over period of 10 years whenever required for the LINAC dosimetric measurement.
9. **The outdoor unit of all AC should have grill coverage to prevent theft and damage.**
10. The **chiller unit** should have grill and asbestos coverage to prevent damage and theft. It should have lock and key facility.
11. Required Two Water Purifier (One for Patient and Another for Staff) with 5 years periodic maintenance warranty.
12. Universal network booster
13. Background sound systems for LINAC 4 units
14. TPS room power and data point : extra 10 power and data points need to be provided by vendor

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/BRANDS		
Sl. No.	**ITEMS**	**PREFERRED MAKES**
A	**CIVIL**	
	Granite	Thar Marble/GCL India Pvt. Ltd.
1	**TILES**	Kajaria, Johnson, Restile
2	**PAINT**	Dulux, Asian Paints, Nerolac
3	**PLUMBING**	Kohler, Jaguar, Grohe, Roca
4	**SANITARY ITEMS**	CERA, Hindware, Parryware
B	**ELECTRICAL**	
1	**CABLES**	Finolex, Havells, V-Guar
2	**SWITCHES**	Legrand, L&T, Crabtree
3	**DISTRIBUTION BOX, MCB**	Legrand, L&T, Siemens
4	**LIGHTFITTINGS - (LED light)**	Philips, Crompton, Wipro.
C	**AIR CONDINTIONING (Copper Condensing unit)**	Mistubishi, Hitachi, Daikin, Carrier
D	**FURNITURE**	Godrej, Hermen Miller, Featherlite, Damro
E	**SKYLIGHT**	Reputed company

The Scope of Work for Turnkey–for IPGME&R and SSKM Hospital (4D CT Simulator)

GENERAL

1. The prospective bidders shall inspect the proposed site for 4D CT SIMULATOR bunker at I.P.G.M.E&R/SSKM HOSPITAL, KOLKATA. Tenderer's are advised to acquaint themselves with access to site, location of work, and any other matter relating to availability and carriage of construction materials. The concrete shell of the Bunker (4D CT Simulator) is under

construction. The turnkey work shall include all other site preparation work required for the installation and functioning of 4D CT SIMULATOR at the proposed site. The bidders shall submit 3D view of the interior work to be undertaken for approval of WBMSCL.

Along with interior works as specified in details, the scope of work on Turnkey shall also include the following,

a) After completing the PWD civil work (As 4D CT SIMULATOR bunker is under construction), the remaining work will be completed for the vendor.

b) Temperature management (Sufficient AC machines with 100% back up) and relative humidity (Sufficient Dehumidifier) management as per maintenance specifications of the concerned CT Machine should be done by vendor for the CT room as well as console area.

C) All further core cutting needed through walls and ceilings other than existing should be done by vendor.

d) The outdoor unit of AC should have grill coverage with lock and key facility to prevent theft and damage. The water drainage storage and pumping management system for the AC units should be arranged by Vendor.

The AERB approved drawings of the 4D CT SIMULATOR building is attached herewith.

2. While preparing the plan, the following aspects have to be addressed,

a) Easy movement of the patient stretchers/trolleys through corridors and doors

b) Adequate Radiation Shielding as per AERB norms, if necessary

c) Supply of furniture like desk, chairs, shelves, locker etc. as mentioned in the **Serial No-11**.

d) Supply of Patient stretchers and other furniture/accessories to make the 4DCTSIMULATOR functional.

3. The intending bidders are to calculate the cost of necessary turnkey job (site preparation, interior works, and Furniture and office accessories) based on the area as demarcated in the site wise drawings attached with the tender document.

a) Construction / modification work including construction of brick wall (if any), plastering, flooring as per the approved plan and equipment layout plan.

b) Construction of renovation / modification demolition, exaction, filling work including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contractor without any extra cost.

c) Making surface good for floor modification for installing the 4D CT SIMULATOR.

d) Platform for unloading and if necessary.

e) Cable tray, trench & channel – necessary trenches, cable tray and channels at required locations.

f) Anti-termite treatment and pest control should be done in and around the 4D CT facility once in a year.

g) Core cutting in the ceiling of CT SIMULATOR console room for electrical mains cable if required.

4. Specification of Materials:

a) **Floor**: Floor (except of CT room) should be of premier quality double charged joint less vitrified mirror polished tiles. Granite floor for CT room.

b) **Ceiling**: Ceiling should be of Mineral fiber board with aluminum grid. 2/3 coats of distemper on true ceiling.

c) **Wall**: Walls should be of premier quality double charged joint less vitrified mirror polished tiles up to false ceiling. Wall specification should be as per AERB norms.

d) **Door**: (One Patient entry door and one console to CT room entry door)

i) **CT Scan room**: Both door should be Double leaf door lined with 2.0 mm lead equivalence so that radiation level outside the door should be within permissible limit as per AERB norms.

ii) **Main Entry to the unit**: First quality seasoned shagoon wooden door of minimum 40 mm thick double leaf of width 1500 mm with 150 mm X 150 mm vision panel, viewing window, plastic kicking plate fixed with headless screw, high gloss wax polish. The door should be fitted with proper locking arrangement, door closure, handle and stopper. Wooden frame from 125 mm x 100 mm of good quality Shal / Shagoon wooden block.

iii) **Other**: Good quality Flush Door with / viewing window

e) **Paint**: 2 coats synthetic enamel paints over 2 coats primer over wall putty (if required).

f) **Viewing Window**: 2ft x 4ft of 2 mm lead equivalence lead glass.

5. Air-conditioning machine:

The total carpet area mentioned has to be properly air-conditioned @ 750 cu ft. for one ton. In the CT Scan additional AC to be considered depending on the heat dissipation by the machines. Split / Ductable Split type AC machines having appropriate rating to bring down and maintain room temperature to be 20° ± 2° celsius.

There should be sufficient number of the AC machines to run the service round the clock (i.e. 100 % backup). The service should be uninterrupted in case of breakdown of any of the AC machine(s).

A/C ducting to be prepare, if required. Humidifier and Dehumidifier should be provided to maintain the humidity level at 40 - 60 % at Gantry room and in other area(s), if technically required.

6. High quality room lighting (LED up to 400 LUX of illuminance)

7. Necessary power supply points for the followings should be provided in addition to standard power supply points:

a. Vac. Lock System
b. Digital water bath for thermoplastic precuts
c. Heat gun

8. The bidders to submit drawing layout plan of the interior. At least 15 -20 patient holding positions has to be mentioned in the drawing layout plan. Sufficient furniture to be supplied for the console room.

9. Wiring System:

a) Light, Fan, 5 Amp Plug: 3 X 1.5 sq. mm copper conductor FRLS wire should be provided.
b) Power Plug (15 Amp): 2 X 2.5 + 1 X 1.5 sq. mm copper conductor FRLS wire should be provided.
c) Split/ Ductable AC wiring: 2 X 4 + 1 X 2.5 sq. mm / suitable gauge copper conductor FRLS wire should be provided.

Earthing: Two nos. Copper plate earthing as per PWD schedule

10. Furniture item to be supplied:

Racks and platforms for keeping mould room accessories should be provided.

i) Executive revolving chair with arm rest: 6 Nos. (Godrej / Featherlite or equivalent)
ii) Storage Cupboard: 3 Nos. high quality customized Wall mounted
iii) Shoe Rack: 1 No
iv) Corner Table: 2 Nos. (Godrej / Featherlite or equivalent)
v) Change room with Mirror
vi) 2 Kg Fire extinguisher cylinder: 4 Nos.
vii) Console Table from OEM
viii) Workstation table 1200 x 600 mm: 1 No. (Godrej / Featherlite or equivalent)
ix) Emergency Crash Cart in the CT room for storage of emergency medicines, medical equipment, true cut biopsy needles etc. – (Godrej / Janak)
x) LED view box for four films
xi) Patient trolley with mattress side rails, oxygen cylinder and fluid stand attachment: 2 Nos.
xii) Dehumidifier - 22 Liters: 2 Nos.
xiii) Patient waiting chair 3-seater: - 3 Nos.
xiv) One flat top table for patient.

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/BRANDS		
Sl. No.	**ITEMS**	**PREFERRED MAKES**
A	**CIVIL**	

	Granite	Thar Marble/GCL India Pvt. Ltd.
1	**TILES**	Kajaria, Johnson, Restile
2	**PAINT**	Dulux, AsianPaints, Nerolac
3	**PLUMBING**	Kohler, Jaguar, Grohe, Roca
4	**SANITARY ITEMS**	CERA, Hindware, Parryware
B	**ELECTRICAL**	
1	**CABLES**	Finolex, Havells, V-Guar
2	**SWITCHES**	Legrand, L&T, Crabtree
3	**DISTRIBUTION BOX, MCB**	Legrand, L&T, Siemens
4	**LIGHT FITTINGS-(LED Light)**	Philips, Crompton, Wipro.
C	**AIR CONDINTIONING(Copper Condensing unit)**	Mistubishi, Hitachi, Daikin, Carrier
D	**FURNITURE**	Godrej, Hermen Miller, Featherlite, Damro
E	**SKYLIGHT**	Reputed company

The Scope of Work for Turnkey–for IPGME&R and SSKM Hospital (Brachytherapy Unit)

GENERAL

The prospective bidders shall inspect the proposed site for BRACHYTHERAPY bunker at I.P.G.M.E&R/SSKM HOSPITAL, KOLKATA. Tenderers are advised to acquaint themselves with access to site, location of work and any other matter relating to availability and carriage of construction materials. The construction of the concrete shell of the Bunker (BRACHYTHERAPY ROOM) is under construction. The turnkey work shall include all other site preparation work required for installation and functioning of the BRACHYTHERAPY at the proposed sites. The selected bidder shall submit 3D view of the interior work to be under taken for approval of WBMSCL.

Along with interior works as specified in details, the scope of work for Turnkey shall also include the following,

a) After completing the PWD civil work (As BRACHYTHERAPY bunker is under construction), the remaining work will be completed for the vendor.

b) Electrical, Plumbing, Furnishing, Air-conditioning, Fire fighting works, Sky light.

c) Necessary Heavy Duty wooden door at the treatment room and aluminum panel glass door at the entry of the control console to be provided at BRACHYTHERAPY such that radiation level within the limit as per AERB Protocol.

d) Temperature management (Sufficient AC machines with 100% back up) and relative humidity (Sufficient Dehumidifier) management as per maintenance specifications of the concerned BRACHYTHERAPY Machine should be done by BRACHYTHERAPY Vendor Company for the BRACHY room as well as console area.

e) Audio visual devices with high resolution camera with viewing monitor and with dual speaker for patient communication during treatment.
The drawings of the proposed BRACHYTHERAPY building layout are attached herewith.

While preparing the plan, the following aspects have to be addressed,

1. Easy movement of the patient stretchers/trolleys through corridors and doors.
2. Adequate Radiation shielding as per AERB norms, if necessary.
3. Supply of furniture like desk, chairs, shelves, locker, etc.
4. Supply of Patient stretcher and other furniture/accessories to make the BRACHYTHERAPY functional.
5. Log book, CPU Trolly, 1 meter metal scale, scientific calculator, Graph Papers, Gap Chromic Film for brachytherapy dosimetry etc.
6. The intending bidders are to calculate the cost of necessary Turnkey job (site preparation and interior works) based on the area as demarcated in the site wise drawings attached with the tender document.

CIVIL WORK:

1. Construction / modification work including construction of brick wall if any, plastering, flooring as per the approved plan and equipment layout plan.
2. Construction of renovation/modification demolition, exaction, filling working including construction of full or half brick wall if required, plastering, flooring as per the approved plan and equipment layout plan.
3. Necessary openings/ niches/ cut-outs, wherever required as per drawings and asked for by WBMSCL, shall be provided by the contract or without any extra cost.
4. Making surface good for floor modification for installing the BRACHYTHERAPY.
5. Platform for unloading and shifting the BRACHYTHERAPY if necessary.
6. Cable tray, trench & channel–necessary trenches, cable tray and channels at required locations.
7. **Anti-termite treatment and pest control** should be done in and around the facility once in a year. The entire complex will be made rodent/pest proof.

Specification of materials

a) **Flooring:**
Enhancement of thickness of floor as per AERB layout should be constructed by vendor considering cable pit.
Granite – 2400x800 mm or bigger good quality heavy duty hard Granites of 18mm thick

b) **Walls:**
Premier Tiles- 800x800 mm mirror polished premier quality double charged joint less vitrified tiles

c) **False Ceiling:** Mineral fibre board with powder coated GI grid at BRACHYTHERAPY room, control room.

PLUMBING WORK

All necessary plumbing work to install Brachytherapy. Chiller piping work should be done by vendor.

ELECTRICALWORK:

The supplier shall be required to specify the total load requirements for the BRACHYTHERAPY bunker and console including the load of air conditioning, room lighting and for the accessories if any. The supply line will be provided by the Institute up to one point within the BRACHYTHERAPY centre. Few lights in each room shall be connected to the UPS to provide emergency lighting.

The electrical work shall include the following:

a) **Wiring**–Wiring with colour code for all types of points and plugs etc. All interior electrical wiring – with main distribution panel board, necessary vertical TPNMCBDBs to control MCCBs, TPNMCBDBs and SPNMCBDB if any necessary. Every point should be wired with both neutral and phase and earth separately from the copper link bar of phase, neutral and earth. Copper link Bar should be housed into the switch board on 1.1 KV grade insulators. There should not be any joint in between of any two terminals of all the installations. The 3 wires system shall be of copper wire (minimum 1.5 Sq.-mm) of different capacity as per the load and should be of renowned make as listed below.

   All the internal wiring including that of telephone, LAN, DICOM & PACS etc. will be of concealed variety. The internet broadband connection at a single point will be provided by hospital. The distribution of internet will be carried out by vendor only.

b) **Earthing:** Double earthling with copper plate for the BRACHYTHERAPY and all accessories should be as per ISO rule

c) Switches light and power points should be of modular type and of standard make as listed below.

   General lights– LED Lights of 400 LUX (BRACHYTHERAPY Room along with Control-Console room)

d) Sky Light should be in the ceiling of BRACHYTHERAPY room. All wires used must be FRLS (Fire Retardant with lows make) type only

e) **AIRCONDITIONING:** All rooms (BRACHYTHERAPY Room along with Control-Console room) need to be air-conditioned. Ductable central AC for BRACHYTHERAPY room and control room and should be used according to room requirement and suitability. Humidity control should be provided to effectively eliminate moisture condensation on the equipment. The Air conditioning system should be designed with standby provision to function 24x7. The outdoor units of AC should have grill coverings to prevent theft and damage.

f) **Dehumidifier:** 22 litter per day one no. at BRACHYTHERAPY should be provided.

g) **Environment specifications:**(BRACHYTHERAPY Room along with Control-Console room)

h) Humidity range: Relative humidity 60% and 80% in all areas except equipment room which shall be as per requirement of the equipment.

i) **Temperature ranges:** 22+/-2°Cin all areas through out the year, except equipment room which shall be as per requirement of the equipment.

j) **Air conditioning load:** The heat load calculations and maintaining the desired temperature and humidity shall be the responsibility of the supplier.

k) **Painting:** (BRACHYTHERAPY room along with Control Console) Two coat plastic emulsion paint over two coats of wall putty including primer in all area of BRACHYTHERAPY room and control console room.

FURNITURE AND OTHER ACCESSORIES REQUIREMENT:

l) BRACHYTHERAPY with Control -Console Room

Furniture Requirement:		
01	HDR Brachytherapy console	Long L shaped tail or made table for HDR control console Executive revolving chair with half backrest – 8 Customized L Shaped wall cabinet of at least 20'(W)x4'(H)x3'(D) with lock and key facility Patient treatment Bed - 1 Steel almirah / cabinet of standard size 6'(H)x2'(D) with lock and key – 2 Dustbin – 2
02	Brachytherapy Procedure Room	Wooden cabinet with glass door 2m. (H) x 1m. (W) x 1m. (D)
03	Brachytherapy Minor OT	Table – 1, Chair – 2, OT Table – 1, OT Stool – 4, Steel Cabinet – 2, Dustbin - 2
04	Trolley with facility for oxygen cylinder attachment	01 (For Patient transportation)
05	Wheel Chair	05
06	Shoe Shelf/ Rack for Brachytherapy, TPS	02
07	Microphone	01 unit for Patient Calling
08	Cartridge for Printers associated with TPS and Control Computer of BRACHY and Control console computer	Printer cartridge over a period of 10 years as and when required by the end user.
09	Dustbin	05

FIRE SAFETY MEASURE:

1) A fire alarm system of reputed make with smoke / heat detectors, indicator panels, call boxes, electronic sirens and wiring will be installed. Audio call bell system with intercom & remote locking/unlocking facility to be provided at the main door of the complex.

2) Supplying, Installing adequate number of Dry chemical power type fire extinguisher of 6 kg capacity as per fire safety norms, with initial filling in brand new cylinder with power coated finish, fitted with Gun metal union, high pressure CO2 gas cartridge, discharge hose, wall mounting bracket etc.

MISCELLANEOUS:

a) Cabling of Network (LAN): connectivity and required branded switches for networking the BRACHYTHERAPY, TPS and any other workstation used within the site.

b) The internet broadband connection at a single point will be provided by hospital. The distribution of internet will be carried out by vendor only and one router should be provided for machine maintenance and engineer service.

c) Broadband connection with static IP for REMOTE SERVICE of BRACHYTHERAPY.

d) One Laptop with standard specification for **Brachy QA as per AERB Protocol**.

e) External HDD'S for Brachy patient back up.

f) Radiation related Signage to be provided as per requirement.

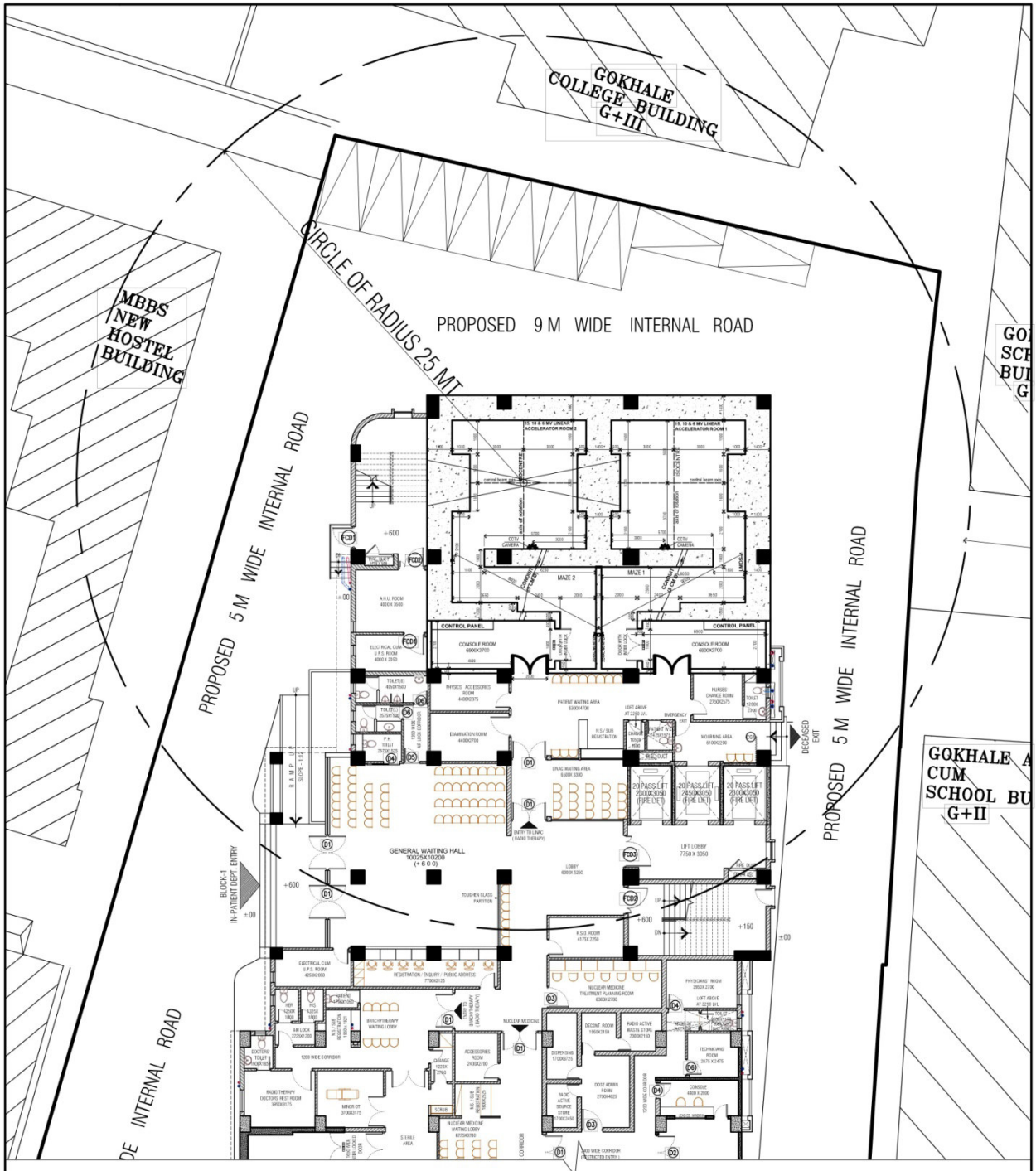
g) Intercom system should be provided.

h) The out door unit of all AC should have grill coverage to prevent theft and damage.

i) Necessary power supply plug point should be provided at BRACHYTHERAPY machine room, BRACHYTHERAPY control console room.

j) Patient change area with full length curtain, small rack/drawer for keeping belongings.

LIST OF ITEMS AND SUGGESTED MANUFACTURERS/BRANDS		
Sl. No.	**ITEMS**	**PREFERRED MAKES**
A	**CIVIL**	
	Granite	Thar Marble/GCL India Pvt. Ltd.
1	**TILES**	Kajaria, Johnson, Restile
2	**PAINT**	Dulux, Asian Paints, Nerolac
3	**PLUMBING**	Kohler, Jaguar, Grohe, Roca
4	**SANITARY ITEMS**	CERA, Hindware, Parryware
B	**ELECTRICAL**	
1	**CABLES**	Finolex, Havells, V-Guar
2	**SWITCHES**	Legrand, L&T, Crabtree
3	**DISTRIBUTION BOX, MCB**	Legrand, L&T, Siemens
4	**LIGHT FITTINGS-(LED light)**	Philips, Crompton, Wipro.
C	**AIR CONDINTIONING (Copper Condensing unit)**	Mistubishi, Hitachi, Daikin, Carrier
D	**FURNITURE**	Godrej, Hermen Miller, Featherlite, Damro
E	**SKYLIGHT**	Reputed company



LEGEND

CONCRETE (DENSITY 2.35 GM/CC)

BRICK WALL

SITE LAYOUT PLAN AT GROUND FLOOR LEVEL, 6MV,10MV AND 15MV LINAC FACILITY ROOM 2 AT GROUND FLOOR LEVEL

NOTE : CONDUIT HAS 50 MM DIA. AND 200 MM HEIGHT FROM FL. LEV. IN TREATMENT ROOM. AND ANGLE OF 35° WITH FLOOR.

OFFICE OF THE CHIEF GOVT. ARCHITECT (P.W.D.) W.B.

PERMANENT ADDRESS:
I.P.G.M.E & R/ SSKM HOSPITAL
244 A.J.C.BOSE ROAD,
KOLKATA- 700020

SITE ADDRESS:
1, HARISH MUKHERJEE ROAD,
KOLKATA - 700020

PROPOSED G+2 STORIED LINAC BUILDING AT 1, HARISH MUKHERJEE ROAD, KOLKATA.

SCHEMATIC DRAWING

SITE LAYOUT PLAN
AT GROUND FLOOR LEVEL, 6MV,10MV AND 15MV LINAC FACILITY ROOM 2 AT GROUND FLOOR LEVEL

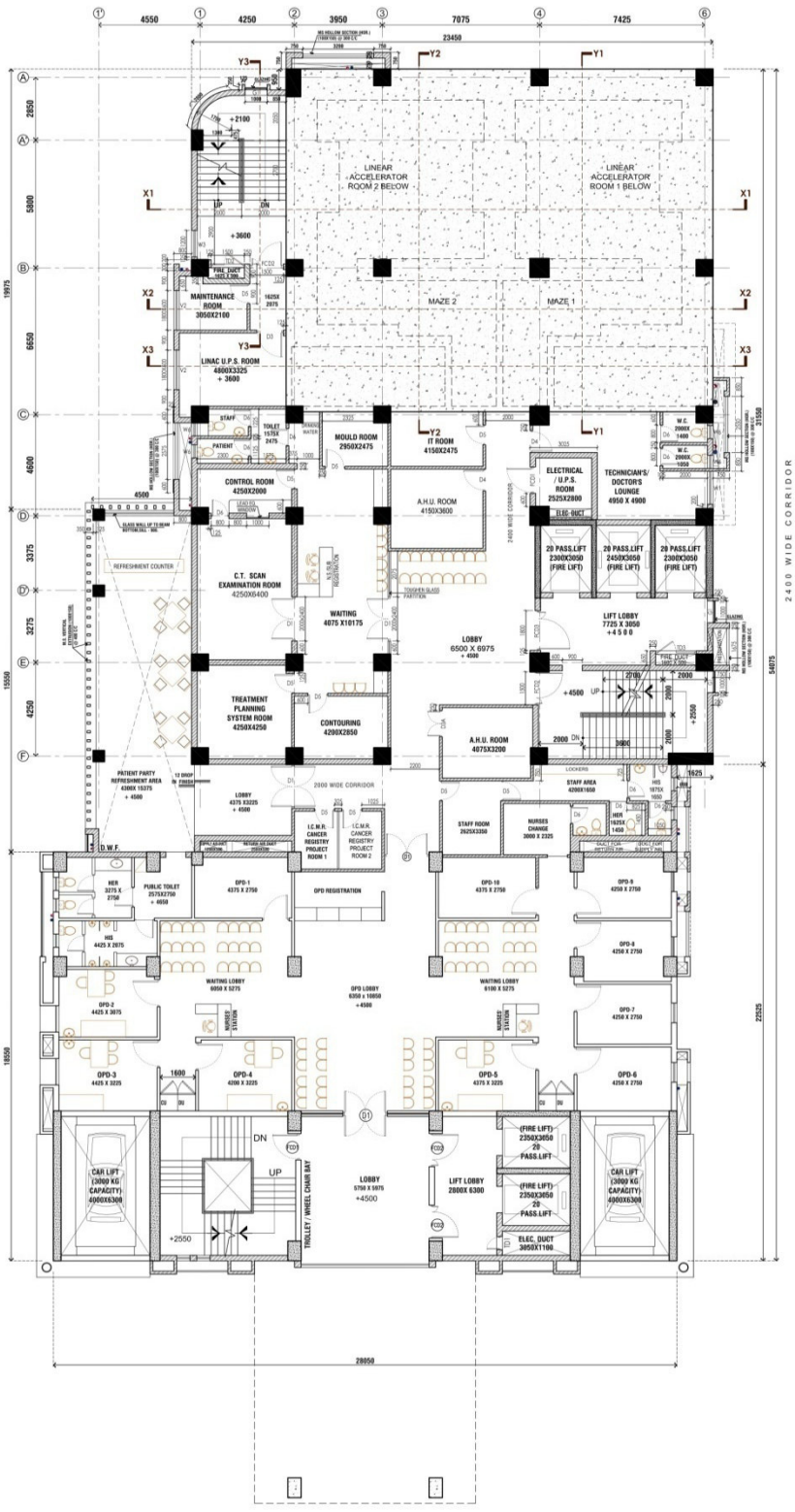
DRG. NO. -

SCALE-1:200

ARCH. ASST.

ABHIJIT GHOSH
ASST. ARCHITECT, P.W.D. (W.B)

VINEET GUPTA
CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER IN-CHARGE, P.W.D.(W.B.)



NO.	REVISION	DATE
2)		
1)	INTERNAL LAYOUT	11.01.2023

NOTES :

1. ALL DIMENSIONS ARE IN M.M. UNLESS OTHERWISE MENTIONED.
2. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
3. ANY EXISTING LEVEL, POSITION OF WALL, OPENING SIZES TO BE CHECKED AT SITE.
4. IN CASE OF ANY DISCRIPANCY IN DRAWING REFER TO CGA'S OFFICE.
5. ORIENTATION OF BUILDING AND NORTH LINE TO BE CHECKED AT SITE.
6. 6. ALL EXTERNAL WALLS ARE 250 MM THK. & ALL INTERNAL WALLS ARE 125 MMTHK. UNLESS OTHERWISE MENTIONED.

OFFICE OF THE CHIEF GOVT. ARCHITECT (P.W.D.) W.B.

PROPOSED HORIZONTAL AND VERTICAL EXTENTION OF LINAC BUILDING (G+2) AT 1, HARISH MUKHERJEE ROAD, KOLKATA.

DRG. NO.

SCHEMATIC DRAWING

First Floor Plan

SCALE-1:200

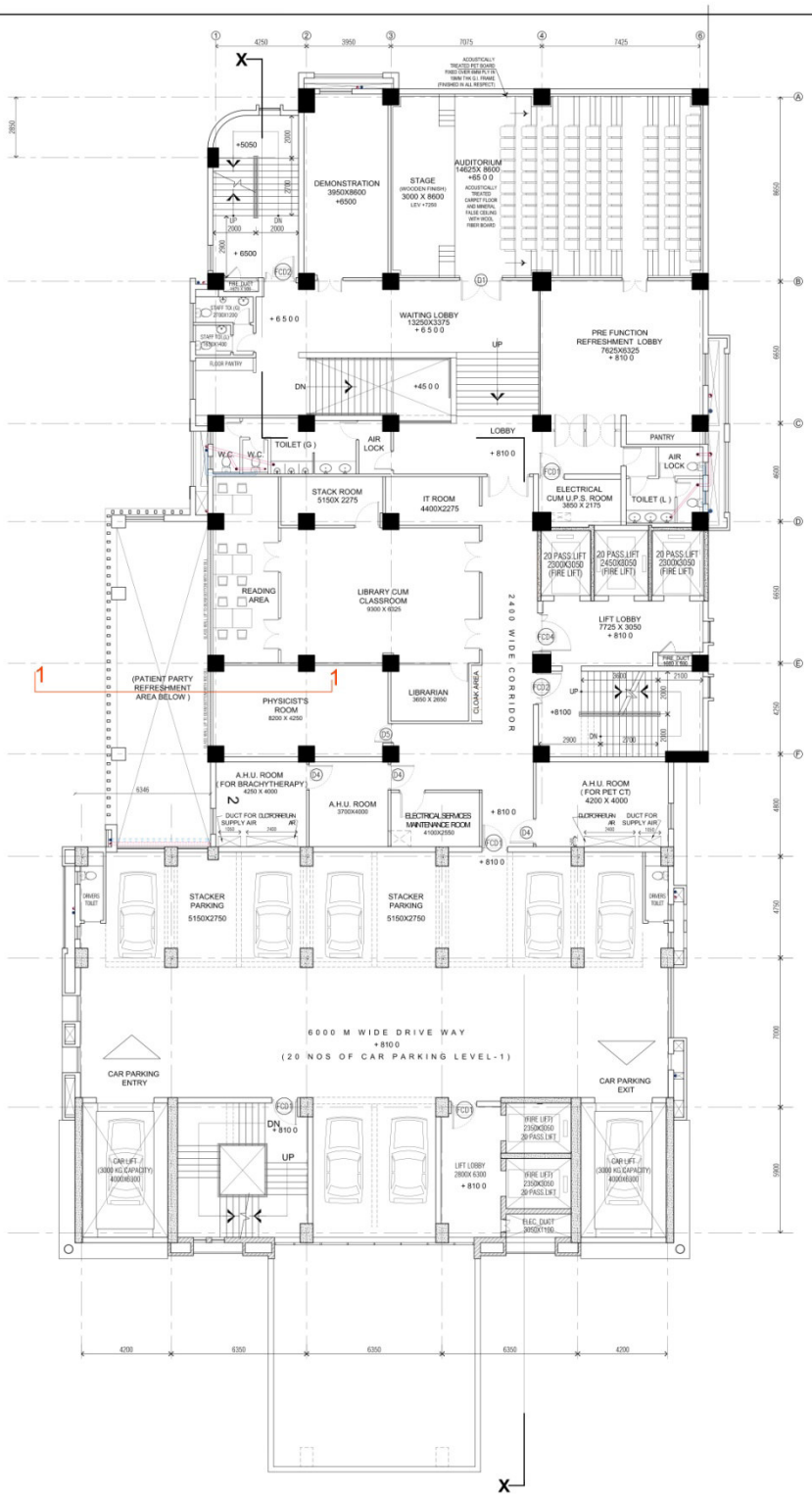
ARCH. ASST. Sonali Das Chowdhury

ABHIJIT GHOSH
ASST. ARCHITECT, P.W.D. (W.B)

ARCHITECT, P.W.D. (W.B)

SUPERINTENDING ARCHITECT, P.W.D. (W.B.)

VINEET GUPTA
CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER IN-CHARGE, P.W.D.(W.B.)



NO.	REVISION	DATE
2)		
1)		

COPY RIGHT :

THIS DRAWING MUST NOT BE TRACED, REPRODUCED OR ALTERED WITHOUT THE WRITTEN PERMISSION OF THE C.G.A.

NOTES :

1. ALL DIMENSIONS ARE IN M.M.,UNLESS OTHERWISE MENTIONED.
2. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
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OFFICE OF THE CHIEF GOVT. ARCHITECT (P.W.D.) W.B.

PROPOSED HORIZONTAL AND VERTICAL EXTENTION OF LINAC BUILDING (G+2) AT 1, HARISH MUKHERJEE ROAD, KOLKATA.

DRG. NO.

SCHEMATIC DRAWING

Second Floor Plan

SCALE-1:200

ARCH. ASST. Sonali Das Chowdhury

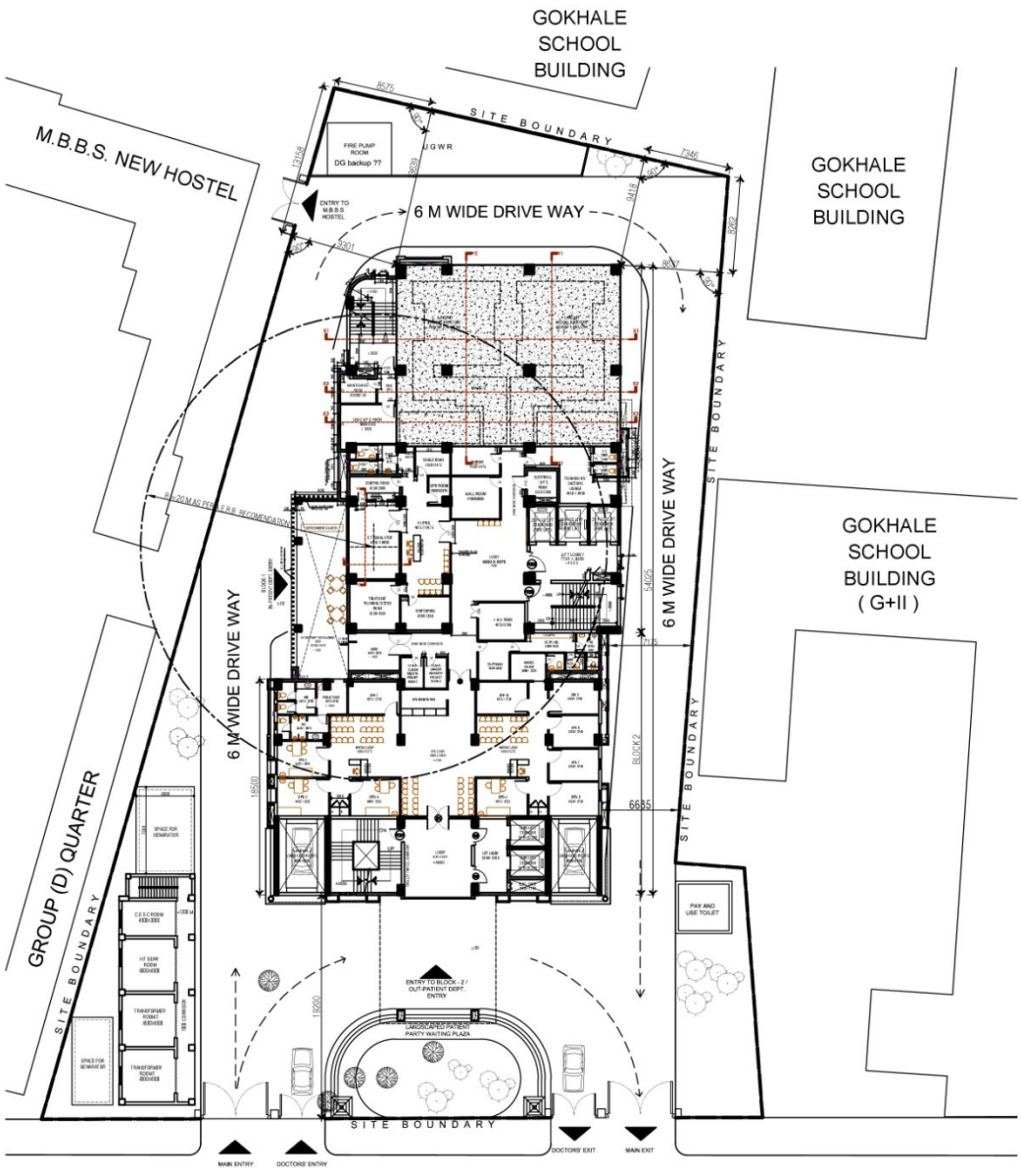
ABHIJIT GHOSH
ASST. ARCHITECT, P.W.D. (W.B)

ARCHITECT, P.W.D. (W.B)

SUPERINTENDING ARCHITECT, P.W.D. (W.B.)

VINEET GUPTA
CHIEF GOVT. ARCHITECT & EX-OFFICIO CHIEF ENGINEER IN-CHARGE, P.W.D.(W.B.)

E:\Dwg \ Abhijit GA\20A_SSKM LINAC BUILDING AT 1 HARISH MUKHERJEE ROAD,LINAC BUILDING WORKING.dwg



18.5M WIDE HARISH MUKHERJEE ROAD

ALL DIMENSION IS IN MM.

BRICK WALL

CONCRETE (Density 2.35 Gm/CC)

NOTE :- CONDUIT HAS 50 MM DIA. AND 200 MM HEIGHT FROM FL. LVL. IN TREATMENT ROOM. AND ANGLE OF 35° WITH FLOOR.

OFFICE OF THE CHIEF GOVT. ARCHITECT (P.W.D.) W.B.

PROPOSED HORIZONTAL AND VERTICAL EXTENTION OF LINAC BUILDING (G+2) AT 1, HARISH MUKHERJEE ROAD, KOLKATA.

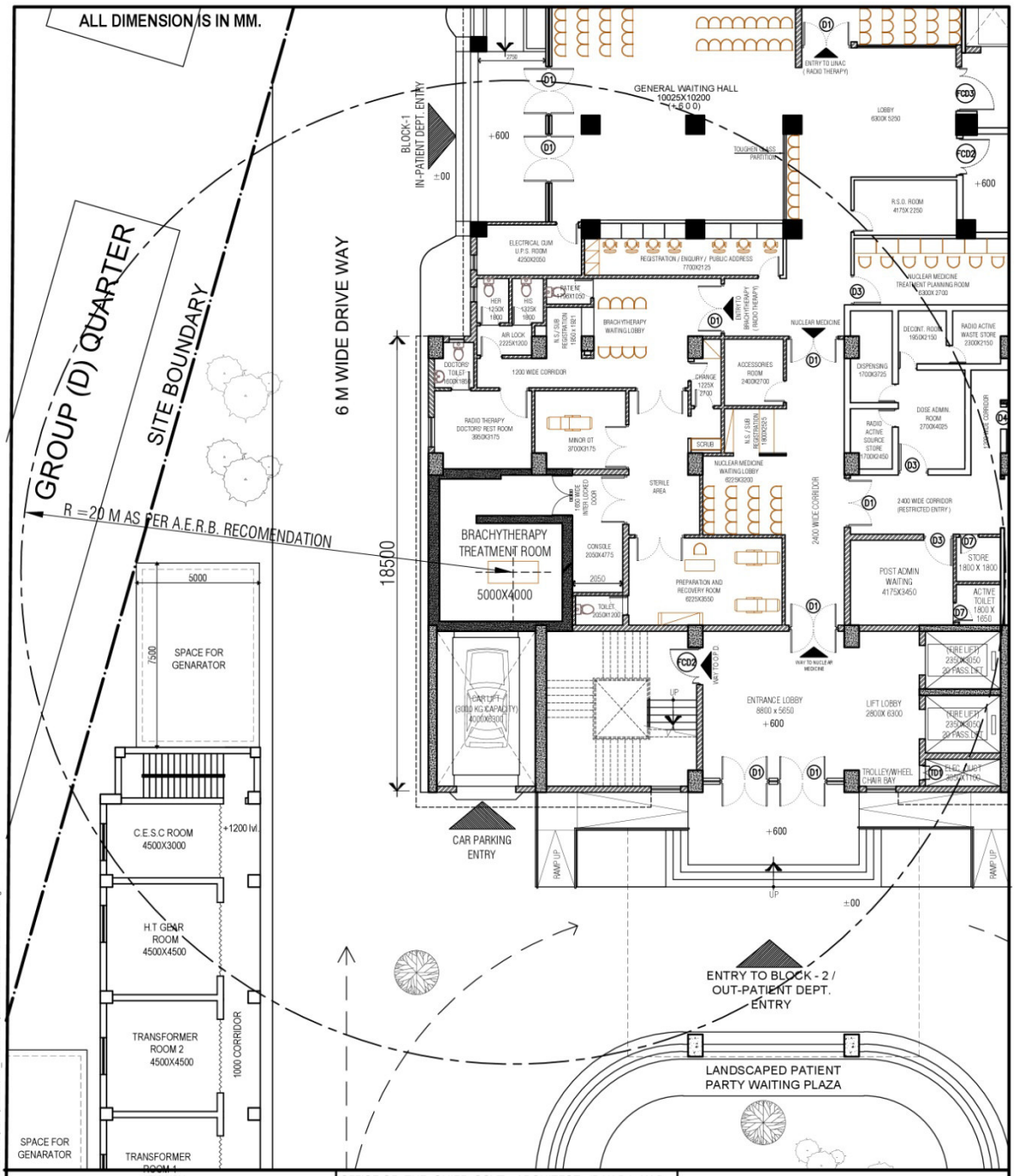
DRG. NO.

ABHIJIT GHOSH
ASST. ARCHITECT, P.W.D. (W.B)

PERMANENT ADDRESS	SITE ADDRESS	DRAWING TITLE	SCALE-1:500
I.P.G.M.E & R/SSKM HOSPITAL , 244 A.J.C. BOSE ROAD, KOLKATA - 700020	1, HARISH MUKHERJEE ROAD, KOLKATA - 700020	SITE LAYOUT PLAN AT FIRST FLOOR LVL , CT SIMULATOR	ARCH. ASST. Sonali Das Chowdhury

VINEET GUPTA
CHIEF GOVT. ARCHITECT &
EX-OFFICIO CHIEF ENGINEER IN-CHARGE, P.W.D.(W.B.)

E:\Onal\Abhijit dA\20A_SSKM LINAC BUILDING AT 1 HARISH MUKHERJEE ROAD\LINAC BUILDING AERB.dwg



BRICK WALL

CONCRETE (Density 2.35 Gm/CC)

NOTE :- CONDUIT HAS 50 MM DIA. AND 200 MM HEIGHT FROM FL. LVL. IN TREATMENT ROOM. AND ANGLE OF 35° WITH FLOOR.

OFFICE OF THE CHIEF GOVT. ARCHITECT (P.W.D.) W.B.

PROPOSED HORIZONTAL AND VERTICAL EXTENTION OF LINAC BUILDING (G+2) AT 1, HARISH MUKHERJEE ROAD, KOLKATA.

DRG. NO.

ABHIJIT GHOSH
ASST. ARCHITECT, P.W.D. (W.B)

PERMANENT ADDRESS	SITE ADDRESS	DRAWING TITLE	SCALE-1:200
I.P.G.M.E & R/SSKM HOSPITAL , 244 A.J.C. BOSE ROAD, KOLKATA - 700020	1, HARISH MUKHERJEE ROAD, KOLKATA - 700020	SITE LAYOUT PLAN AT GROUND FLOOR LVL , BRACHYTHERAPY UNIT	ARCH. ASST. Sonali Das Chowdhury

VINEET GUPTA
CHIEF GOVT. ARCHITECT &
EX-OFFICIO CHIEF ENGINEER IN-CHARGE, P.W.D.(W.B.)

E:\s\Onal\Abhijit da\20A_SSKM LINAC BUILDING AT 1 HARISH MUKHERJEE ROAD SEMT\2022.09.06_arch DWGS\LINAC BUILDING AERB DWGS.dwg

Amendment-VI
Section IV. Schedule of Requirements

4. List of related services

III. Training

- LINAC

The Vendor shall arrange for training at an appropriate facility for at least 3 Medical Physicists and 2 Radiation Oncologists from centre where machine to be installed for at least three working weeks for Linac (Off site Training at specialized training centre) by trained personnel for the seamless functioning of the entire system.

In addition to that, the vendor should provide all necessary on-site training at the Centre for Radiation Oncologists, Medical Physicists and Radiotherapy Technologists of the Department for a period of not less than Two working weeks by trained personnel for the seamless functioning of the entire system.

The vendor/company must depute the expert to acquire the requisite AERB data at the site of installation from the procurement to installation.

- Brachytherapy

The Vendor shall arrange for training at an appropriate facility for at least 3 Medical Physicists and 2 Radiation Oncologists and 1 Radiotherapy Technologist from centre where machine to be installed for at least 2 weeks(On site + off site)) for Brachytherapy by trained personnel for the seamless functioning of the entire system . The vendor/company must depute the expert to acquire the requisite AERB data at the site of installation from the procurement to installation.

- Dosimetry

all necessary training for Dosimetry /QA system for the Medical Physicists(onsite) by trained personnel for the seamless functioning of the entire system .

The vendor/company must depute the expert to acquire the requisite AERB data at the site of installation from the procurement to installation.

- 4D CT simulator.

The Vendor shall arrange for training at an appropriate facility for at least 3 Medical Physicists and 2 Radiation Oncologists and 4 Radiotherapy Technologists from the

centre where machine to be installed for at least 2 weeks(On site + off site) for 4DCT by trained personnel for the seamless functioning of the entire system .

The vendor/company must depute the expert to acquire the requisite AERB data at the site of installation from the procurement to installation.

- Patient Immobilization Device

The Vendor shall arrange for training at an appropriate facility for All Radiotherapy Technologists from the centre where machine to be installed for at least 2 weeks (On site + off site) for Immobilization Devices by trained personnel for the seamless functioning of the entire system .
All necessary training should be provided by the vendor or company