Dear Team,

Next point of discussion

1. Water tank
2. Position for our door chiller
3. The MRI UPS position
4. Delivery route inspection by Manal team.
5. Discussion with SOH Electrical team.
6. Discussion with SOH internal infrastructure team.
7. Floor strength
8. Quench pipe and emergency quench route, since it will pass thru a slab.
9. Internet structure and route.
10. Lead glass dimension for CT and Xray

1. CT
2. Lead glass window (FRAME IS 130 x 100 CM)
3. Finial floor and anchoring
4. Floor levelling

**Point discussed**

 NIGERIA NUCLEAR REGULATORY AND AUTHORITY: Kindly secure and share with me copy of NNRA premises authorization, premises permit is required for equipment delivery.

* Premises registration approval.
* Radiation assessment report
* License to operate

**Power reequipment for SOH to share with GE project Manager**

1. Power design
2. Generator size and capacity
3. AVR for MRI of 100Kva
4. Plan to achieve clean power
5. Earthing, < 2ohms

**Inspector Tool & Connectivity** - Suggested schematic attach

**MRI SYSTEM**

**Civil**

1. Structural integrity report is required for the ground floor slab in the proposed CT and MRI area. This is to validate the slab strength to support the equipment weights.
2. Platforms should be prepared for the equipment delivery as it will be indicated in the final drawing.
3. I advise that the access doors to the MRI rooms should be swing doors to ensure no radiation leakage. However, there is a door delivered with the RF cage.
4. The area where the magnet will sit should have the floor made up of a 300mm-400mm depth of just concrete (measured from the finish floor). Reinforcement can only be used underneath the 300mm-400mm depth of concrete. Please, kindly note that, a structural engineer should determine if the flooring can hold the weight of the magnet (approximately 6tonnes). Please, remember to refer to the steel mass content table.
5. Door to the exam room should be 1300mm (W)  x 2200mm (H). design will be stated on the RF cage design.
6. Control room window should be 1200mm (W) x 1000mm (H). design will be stated on the RF cage design - optional depend on design and space on site
7. Other openings required in the exam room will be detailed in the RF Cage drawing
8. Door to the Technical room should be minimum of 1300mm (W) x 2400mm(H)
9. Lighting layout in the MRI exam room should be removed as the RF cage comes with in-built lighting system
10. MRI uses Ducted HVAC system and should be designed/installed to meet the specifications in the drawing by the customer.
11. MRI has an outdoor chiller. Location for the chiller installation to be decided on site
12. A water tap outlet (chiller backup) is required in the technical room as it will be indicated in GE drawing
13. outlet for back up water in case of MRI Chiller failure
14. The driveway should be at least 15m away from the MRI building.
15. MRI head room should by at least 33000mm
16. Internet provision and cabling should be ready on site and stated on the design.
17. Inspector tool design and cabling – See design attach.
18. Water bypass – installation of iron tower and 200litres of tank and connect to external chiller.

**Flooring**

Exam/Magnet room:

1. The flooring should have +/-1 levelling throughout the room.
2. The exam room floor will be recessed at -60mm from the outer finished floor level (specifics on RF cage drawings attached.
3. Head room i.e. Finish floor to slab (drop beam) should be 3.3M minimum

 Control and Technical/Equipment room:

1. The flooring should also be levelled. The final finishing used is dependent on the customer.

**Walls**

Exam room:

1. No finishing is required on this wall as the RF cage will cover it all up.

Control and Technical/Equipment room:

1. The final finishing used is dependent on the customer.

**Power**

Cable routing and grounding/earthing:

1. Attached a schematic to guide you and your electrical team are responsible for the electrical activities.
2. All our systems require a dedicated grounding/earthing with resistance to earth of less than 2ohms.
3. A minimum of a 95mm single core earth cable will run from the exponential copper bar at the earth pit to another exponential copper bar in the technical room. From the exponential copper bar in the technical room 95mm single core earth cables can then be routed to the gear switches (200amps minimum), AVR (100kva), the UPS and the PDB. This depend customer electrical expert analysis.
4. A minimum of a 95mm 4-core (3 phase + neutral) armored cable will run from the main power panel (PHCN and generator) to the 1st 200amp (minimum) gear switch. A 95mm 4-core flexible cable will then run from the gear switch to the AVR (100kVA) . Another 95mm 4-core flexible cable will then run from the AVR to the UPS. Another 95mm 5-core flexible cable will then run from the UPS to the 2nd 200amps gear switch. Finally, another 95mm 4-core (3 phase + neutral) flexible cable will run from the 2nd gear switch to the PDB.
5. Please, note that, the facility main power panel will be grounded from an earth pit with resistance to earth of less than 2ohms.
6. Power cable routing from UPS room to each exam rooms to be reviewed on site
7. Provisions should be made for the connectivity requirements specified  in the drawing
8. Cabling for the inspector tool should be provided on site.
9. MRI system requires 24hrs power availability daily upon delivery to site. We recommend that 120KVA dedicated generator should be provided to serve as backup for the facility power supply to the MRI.
10. Dedicated 100KVA AVR should be installed for the MRI.
11. Suggestion on Power design will be shared.
12. Control system.

UPS and PDB:

1. The system will be delivered with a UPS (80kva, three phase) and a PDB.

**HVAC**

On the question of whether it is okay to use the return air from the magnet room to cool the technical, yes, it is. However, it is important that, the return air is cool enough to maintain the temperature range specified for the technical room (15˚C to 21˚C).

Temperature (Storage):

1. 34˚C to 60˚C.

Temperature (In-Use):

Exam/Magnet room: 15˚C to 21˚C.

Control room: 15˚C to 32˚C.

Technical/Equipment room: 15˚C to 21˚C.

Cooling:

Exam/Magnet room: At least a 5HP concealed ceiling-duct air-conditioning unit to be installed for the exam

Control room: At least one 1.5HP air-conditioning units to be installed in the control room.

Technical/Equipment room: At least two 2HP air-conditioning units to be installed in the technical/equipment room.

Humidity (Storage):

0% to 90% (non-condensing).

Humidity (In-Use):

Exam/Magnet room: 30% to 60% (non-condensing).

Control room: 30% to 75% (non-condensing).

Technical/Equipment room: 30% to 75% (non-condensing).

 Steel Mass Table for MRI

|  |  |  |
| --- | --- | --- |
| Limits Of Steel Mass lbs/ft2 | Distance Below Top Surface Of |  |
|  |
| 0 (0) | 0-3 (0-76) |  |
| 2 (9.8) | 3-5 (76-127) |  |
| 3 (14.7) | 5-10 (127-254) |  |
| 8 (39.2) | 10-13 (254-330) |  |
| 20 (98.0) | 13+ (330+) |  |

**CT**

**Civil works**

* Ceiling high should be 3.3M  minimum
* Structural integrity report is required for the ground floor slab in the proposed CT area. This is to validate the slab strength to support the equipment weights
* I advise that the access doors to the CT rooms should be swing or sliding doors due it should well fixed to ensure no radiation leakage. Door to the exam room should be 15000mm (W)  x 2500mm (H). Check the design
* Control room window should be 1300mm (W) x 1000mm (H). Check the final design for details.
* Prepare floor duct as stated in the final drawing for each equipment.
* Ceiling support for the Monitor. As specified in GE final design

**HVAC**

* Exam room: At least two1.5HP air-conditioning units to be installed in the exam room.
* Control room: At least two 1.5 HP air-conditioning units to be installed in the control room.
* UPS & Battery room: At least two 1.5 HP air-conditioning units to be installed in the UP & Battery room.
* A dehumidifier
* Delivery route review with the team as stated in the design
* An AVR is the power in the facility is not stable.

**Electrical / Cabling Requirements:** Please take note of the following site preparations/requirements that should be met prior to equipment delivery and installation of the equipment:

**Power**

**Cable routing and grounding/earthing:**

* All our systems that are to be connected to a power source require a grounding/earthing with resistance to earth of less than 2ohms.
* A 95mm 5-cored (3 phase + neutral + ground) armored cable will run from the main power source (PHCN and generator) to the 1st 120amp (minimum) gear switch.
* A 95mm 5-core flexible cable will then run from the gear switch to the UPS.
* Another 95mm 5-core flexible cable will then run from the UPS to the 2nd 120amps gear switch.
* Finally, another 95mm 5-core flexible cable will run from the 2nd gear switch to the Power Distribution Board (PDB).
* Installation of warning lights, emergency stop switches, ON/OFF remote control switch
* Provision of raceway in the X-ray
* UPS and PDB: The system will be delivered with a UPS (120kva, three phase) and a PDB.

**HVAC**

* Exam room: At least two1.5HP air-conditioning units to be installed in the exam room.
* Control room: At least two 1HP air-conditioning units to be installed in the control room.
* UPS & Battery room: At least one 1HP air-conditioning units to be installed in the UP & Battery room

**Broadband Connectivity**

* All our digital systems require broadband Internet connection to provide our engineers access to the system for monitoring and on the spot repairs remotely. The position of the data ports in the rooms will be defined in the final drawings.

**XR575**

**Civil**

* Ceiling high should be 2.9  minimum.
* Structural integrity report is required for the ground floor slab in the proposed XRay  area. This is to validate the slab strength to support the equipment weights.
* Door to the exam room should be 1500mm (W)  x 2400mm (H). design will be stated on the RF cage design
* Control room window should be 1300mm (W) x 900mm (H). design will be stated on the RF cage design
* A ceiling rail structure is required and should be prepared according to the GE final

**Flooring**

* The flooring should have +/-1 levelling throughout the room.

**Power**

* All our systems require a dedicated grounding/earthing with resistance to earth of less than 2ohms.
* A minimum of a 70mm single core earth cable will run from the exponential copper bar at the earth pit to another exponential copper bar in the technical room. From the exponential copper bar in the technical room 70mm single core earth cables can then be routed to the gear switches (150Aamps minimum), the UPS and the PDB.
* A minimum of a 70mm 4-core (3 phase + neutral) armored cable will run from the main power panel (PHCN and generator) to the 1st 150amp (minimum) gear switch. A 70mm 4-core flexible cable will then run from the gear switch.. Another 70mm 5-core flexible cable will then run from the UPS to the 2nd 150amps gear switch. Finally, another 70mm 4-core (3 phase + neutral) flexible cable will run from the 2nd gear switch to the PDB.
* XRay will be directly connected to the dedicated earth pit of less than 2ohms
* Power cable routing from UPS room to each exam rooms to be reviewed on site
* Provisions should be made for the connectivity requirements specified  in the drawing
* Customer will be responsible for the installation of the PDB to be supplied by GE

 UPS and PDB:

* The system will be delivered with a UPS (80kva, three phase) and a PDB.

**Mammo**

**Civil**

* Ceiling high should be 2.9  minimum.
* Structural integrity report is required for the ground floor slab in the proposed XRay  area. This is to validate the slab strength to support the equipment weights.
* Door to the exam room should be 1200mm (W)  x 2400mm (H). design will be stated on the RF cage design
* A ceiling rail structure is required and should be prepared according to the GE final

**Flooring**

* The flooring should have +/-1 levelling throughout the room.

**Power**

* All our systems require a dedicated grounding/earthing with resistance to earth of less than 2ohms.
* A minimum of a 16mm single core earth cable will run from the exponential copper bar at the earth pit to another exponential copper bar in the technical room. From the exponential copper bar in the technical room 16mm single core earth cables can then be routed to the gear switches (63Aamps minimum), the UPS and the PDB.
* A minimum of a 16mm 2-core (Single phase + neutral) armored cable will run from the main power panel (PHCN and generator) to the 1st 63 amp (minimum) gear switch. A 16mm 2-core (Single phase + neutral) flexible cable will then run from the 63 Amp Gear switch to a 63 Amp Breaker (Isolator) located inside the Mammo Room. This is then interconnected by another 16mm 2-core (Single phase + neutral ) cable to the UPS and outgoing to another / 2nd 63 Amp Breaker and then to the PDB.
* Mammo will be directly connected to the dedicated earth pit of less than 2ohms
* Power cable routing from UPS room to each exam rooms to be reviewed on site
* Provisions should be made for the connectivity requirements specified  in the drawing
* Customer will be responsible for the installation of the PDB to be supplied by GE

 UPS and PDB:

* The system will be delivered with a UPS (10kva, Single Phase) and a PDB.

**Regards,**

**Efosa Amayo**

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