PART 3

DETAIL SPECIFICATION FOR THE ELECTRICAL INSTALLATION

3.1 GENERAL

This specification covers the Supply and Installation including delivery, commissioning and handover of the entire Electrical Installation for the Works as specified and as indicated on the drawings for the Proposed **NEW PYSCHIATRIC WARD** at the existing **PORT SHEPSTONE REGIONAL HOSPITAL**.

3.2 PROJECT PROGRAMME and PRELIMINARY INFORMATION

It is brought to the attention of the Contractor that there are specific activities that must take place at the initial stage of the Contract.

Note well:

The contractor must take note of the project programme, i.e. the work to be carried out at the initial stage of the contract, which has been included in the preambles, and the electrical work associated with the building work to be done as part of these initial works, must be carried out as a priority to the project.

The builders work to be carried out as a priority consists of works to be undertaken in order to make provision for the commencement of building work for the New Psychiatric Ward building.

Although not necessarily limited to the list below, the following will require works to be carried out by the Electrical Contractor and Associated Contractors and supported by builders work, as stated at the initial stage of the contract:

A. The Electrical Installation works associated with the Demolishment and/or removal of Existing Buildings .

B. The works to be carried out by the associated contractors in respect of the removal and repositioning of the existing buildings..

C. The removal and new installation of the Oxygen storage facility.

D. The Supply cable and Connection of the Proposed new Site Office to serve the New Psychiatric Ward Building Project.

E. The Alterations and Additions as specified for both the Main Transformer and and West Wing Sub Station

F. The Site Kiosk situated west of the existing Main Core Block and as specifically indicated on the Site Plan drawing SL 231 – SP1

The contractor must however ensure that all the preparation work possible to limit the time of work to be done as a result of the project programme is carried out with no delay. Any works deemed practically possible must be completed in preparation to avoid any delays in completing and finalizing the project.

Allowance must be made in the Bills of Quantities under the heading Project Programme to allow for the cost of any works to be undertaken by the Contractor in this regard, and as specified to take into account the full extent of the Project Programme..

The Contractor is also to take into account the full Scope of the project programme as per the information in this regard forming part of the Contractual and Conditions of Contract.

3.3 SITE CONDITIONS

All materials and equipment shall be suitable for the general conditions on the site situated in Port Shepstone.

The site is at sea level, situated adjacent to the ocean and consequently subjected to typical harsh coastal weather conditions.

3.4 DRAWINGS

The specification and drawings generally show the character and extent of the proposed work, and shall not be held as showing every minute detail of the work to be executed.

Refer to the drawings all identified under Schedule of Drawings in the Table of contents.

3.5 BALANCING OF LOADS

The Contractor is required to balance the load as equally as possible over the multi-phase supply. (Refer to Part 2 of this specification)

3.6 LABELLING OF LIGHTING SWITCHES, SOCKET OUTLETS AND ALL POWER OUTLETS

All cover plates where practicable to be plastic.
The relevant DB and circuit number designation is to be engraved on cover plates, including light switch socket outlets, plug/socket outlets and including all other isolator outlet cover plates. In the case where metal cover plates are utilised these to be provided with engraved ivorine labels screwed onto the plate. The use of “Dymo” Tape or any other form of adhesive tape labels will not be accepted.

Lettering shall be a minimum of 6mm high and 2mm wide font size. The lettering shall be BLACK in colour against a white background for NON-ESSENTIAL power outlets, RED on WHITE labels on cover plates for ESSENTIAL power outlets, BLUE for UPS power outlets and / or other engraved colour in accordance with the applicable service requirements.

3.7 SETTING OUT OF THE WORKS AND ERECTION OF EQUIPMENT

3.7.1 Setting Out of the Works

The Contractor shall be responsible for marking and setting out of all items of Electrical Equipment and plant. The positions of items of Electrical Equipment and plant indicated on the drawings are to be taken as approximate. The exact positions shall be obtained by site measurements and by means of the Room Data sheets if supplied, all as an integral part of information provided for the Contract. In case of doubt, decisions shall be obtained from the Engineer, Department or their Representative.

3.7.2 Erection of Equipment

The Contractor shall be responsible for the care and maintenance of all electrical equipment after erection is complete until the taking over of the specific section of works by the Department's Representative. The Contractor shall ensure that the proper enclosure of all equipment is maintained at all times, that access doors and covers are opened only when necessary to work on the equipment and replaced afterwards, that the paint finish on all items is effectively protected and that all cable and conduit entries are effectively sealed.

3.8 CABLE PIPES and MANHOLES

The main large cable entry pipes and manholes must be supplied and installed by the Contractor.

It is the Contractors responsibility to ensure that the correct size of pipes have been provided and that the pipes are installed correctly.

All the cable pipes must be provided with strong galvanised steel draw wires, and if cables are installed additional draw wires for future.

The Manholes are to be constructed in accordance with the detail drawing provided.

3.9 MAIN POWER SUPPLY TO THE NEW HOSPITAL

THE FOLLOWING ADDITIONS and ALTERATIONS to be carried out, considered <u>SUB STATION WORKS.</u>

3.9.1 THE MAIN TRANSFORMER SUB STATION (East Block Building Sub)

The Following alterations to be carried out on the MAIN LOW TENSION SWITCHBOARD

Noted that the MAIN LOW TENSION SWITCHBORD is the Main Switchboard fed From the Two Main 1000kVA Transformers and incorporates a BUS COUPLING SYSTEM that under controlled conditions could be operated by The Hospital Technical Personnel and Technical Staff representative of the Port Shepstone Municipality.

1. REMOVE THE EXISTING CIRCUIT BREAKERS
Remove the existing 800Amp 3-phase and 400Amp 3-phase Moulded Case ACB`s, feeding the **Existing Main Low Tension Switchboard** in the West Sub Station and the **Main Board** in the Existing Laundry Building,respectively from the existing MAIN LOW TENSION SWITCHBOARD,.also refer para 5 below

2. SUPPLY and INSTALL a NEW AIR CIRCUIT BREAKER
Supply and installation a New 2000A Rated 3 phase adjustable Air Circuit Breaker Incorporating 1600Amp rated settings with the appropriate CT`s and Bus Bar Main Connections to feed the Existing Main Low Tension Switchboard in the West Sub Station.

Refer New Main Supply Air Circuit Breaker and installation of The New overhead Bus Bar Run Below …para. 3.9.2.

The Supply and Installation to take into account that the existing Main Supply Cables and the Supply cables are to be disconnected, The Mains Cables are to be replaced with a New 2000 Amp Three Phase and Neutral including Earth conductor, Bus Bar Run, and the and the Cable feed to the Laundry rerouted for connection to a Circuit Breaker to be installed into the Main Switchboard situated in the West Sub Station

3. REMOVE the EXISTING FEEDER CABLES to WEST SUB
Remove the existing two 240mm2 Main Feeder cables between the above Main Low Tension Switchboard and The Existing Main Low Tension Switchboard situated in the West Sub Station, in to be replaced with the overhead Bus Bar run as stated above.

To be noted that these cables are to be reinstalled as Supply and return feed to and New proposed Standby Set Control panel, specified for the Existing West Side Sub Station.

4. THE EXISTING 400AMP CIRCUIT BREAKER FEEDING THE LAUNDRY

Also note that the Existing 400 Amp Circuit breaker feeding the Laundry is to be recovered and reinstalled into the New Panel extension specified for the existing Main West Sub Station Main Low Tension Switchboard.

5. NEW MAIN SUPPLY AIR CIRCUIT BREAKER

Allow to supply and install a New 2000 Amp Triple Pole 50 kA rated Air Circuit Breaker for the Main Supply to the Existing Main Low Tension Switchboard.situated in the Existing West Sub Station. The Breaker is to be set at 1600Amps.

The Air Circuit Breaker shall be **MITSUBISHI Type AE 2000-SS** or other approved type.

The circuit breaker is to be built into the Existing Main Low Tension Switchboard.

The existing 800 Amp moulded case type Circuit Breaker is to be removed and handed to the Hospital Personnel responsible for Technical Services. A signed and dated receipt is to be received from the personnel and a copy is to be submitted to the Consulting Electrical Engineers for record purposes.

The New Circuit Breaker is to be built in and secured on to the existing chassis of the switchboard.

Allow to supply and install 2000 Amp bus bars between the existing switchboard bus bars and the supply terminals on the New Circuit Breaker and to extend and connect with the overhead bus bars to the load terminals.

Allow to supply and install a 2000 A rated bus bar section from the existing neutral bus bar in the board to the overhead neutral bus bar.

The bus bar run shall be rated to withstand fault levels of up to 50 kA.

Allow to supply and install a suitably sized copper bus bar section between the switchboard earth bar and the new overhead bus bar earth bar. The minimum size being 20 x 6mm bolted either end by means of two 8mm diameter cadmium plated bolts, washers and nuts.

It must be noted that all the metal work alterations and prefabrication work to fit the New Circuit Breaker into position must be allowed for all as part of the contract, including the outer coverplate which will have to be replaced with a New Cover to suit the New Switchgear Switch Opening.

Allow to supply and install the labels specified, all as part of the General Specification for Distribution Boards included as part of this specification.

3.9.2. NEW MAIN 2000Amp LOW TENSION OVERHEAD BUS BAR RUN

Allow to Supply and Install the New Main Low Tension overhead supply Bus Bar Run from the *Existing* Main LT Switchboard situated in the existing HT/ LT Switch Room to the *Existing* Main Low Tension Switchboard,situated in the West Sub Station.

Refer to the Main Sub Station drawing SITE PLAN SL 231 – ESP1S

The NEW OVERHEAD BUS BAR RUN shall consist of a 2000 Ampere 3-phase and Neutral plus earth compact and insulated bus bar Section installed overhead in air at 2800mm above the existing Sub Station floor level.

The bus bar run shall be rated to withstand fault levels of up to 50 kA.

The bus bar run shall be Telemacanique, GEC or other approved type.

The bus bar run is to be installed from the existing Switchboard through the division wall between the existing HT/LT Switch room and up to high level between the two existing sub station walls via the adjacent Existing Passage way West entering the West Sub Station, along the East wall and down to the West Sub Station Main Low Tension Switch board..

The bus bar run is to be supported throughout by means of the Unistrut truss and cantilever arms, as shown on the drawing.

The bus bar runs shall be bolted onto the switchboards and bus bar sections terminated and connected to the relevant switchgear at both ends.

The bus bar section in the overhead bus bar run and including the bus bars to be used to connect the Mains overhead to the relevant switchgear shall not be smaller than 125 x 10mm, i.e. 1250mm2.

The bus bar conductor shall consist of hand drawn copper with a density value of not less than 8,93gm /cm.

3.10 THE EXISTING WEST SUB STATION MAIN LOW TENSION SWITCHBOARD

Note Well that the existing Main LT Board is to be reconfigured in order to take into account the upgrades required to accommodate the Alterations and Additional Switchgear due to the installation of the New Standby Generator set and the requirements for switchgear to feed the New Psychiatric Ward Building.
REFER ENCLOSED DRAWING SL 231–MLSBTD

Allow to supply and install a New Panel Section onto the Existing West Sub Station Main Low Tension Switchboard

The New Panel Section is to be installed as an integral part of the Existing Switchboard in the existing Sub Station in the position indicated on the Sub Station Layout drawing.

The Panel is to be installed on the Left hand side of the Existing Switchboard as shown.

The Board is to be manufactured and equipped in accordance with the Line Diagram drawing SL 231 – ELD1

A general layout of the Board has been included on the line diagram drawing.

The Panel to be floor standing and shall an addition to the Non-Essential Power sections.

The fault levels for switchgear and busbars shall not be less than as stated on the drawings.
The Main supply to the Panel shall be by means of the New Overhead 2000 Amp 3-phase, neutral and earth bus bar run.

Allow to securely bolt the top of the bus bar run onto the top of the Panel and terminate the individual bus bars onto the appropriate terminals of the Main Low Tension switch specified.

The terminations to be carried out with bus bars of size complimentary and equal in section to the bars on both overhead bus bars and the bus bars on the Main Switch.

The size of the bus bars and connectors shall be suitably rated for a minimum of 2000 Amps 3-phase at the voltage level specified.

The Panel shall accommodate the following.

3.10.1 Non-Essential Power Section:

A Main Supply Section

ONE-	2000 Amp triple pole Isolator with a minimum fault level of 50 kA **Mitsubishi AE Super Series Type DSN AE2000-SS,** or other approved type, as the New Main Switch.Set at 1600 Amps..
ONE	Termination of the three phase and neutral plus earth overhead bus bar supply system.
FOUR	Lightning arresters suitably rated to SANS Code of Practice.
ONE SET	4 Only 125 x 10mm by provisionally 2400mm long hard drawn hard copper bus bars each mounted on two fibre glass bus bar insulators and supported with intermediate insulated bus bars as required.and adaptor bus bar section to connect onto the existing Bus Bars in the switchboard
ONE	Voltmeter scaled 0-400 Volts Elima or PCI 100 x 100mm complete with protection fuses.
ONE	Voltmeter selector switch enabling the selection of each phase to neutral, between phases, and off.
THREE	Maximum demand and instantaneous indicating ammeters, Elima 100 x 100mm scaled 0-2000 Amps (20 per cent overrun to 2000 Amps).

THREE	Current transformers ratio 2000/5 Amp 10VA burden class CM accuracy.
ONE	2000 Amp 1000mm long hard drawn copper Bus bar as the Main Non-Essential section of the Distribution Board Earth bar.

The above all to be connected with appropriately sized PVC Insulated Conductors, Colour coded Red, White and Blue for various phases and Black for neutral

The Earth conductors to be enclosed with Green adhesive Tape or Heat shrink covering

No exposed Bus Bars to remain and in addition to be protected from external access behind 6mm thick transparent Perspex

3.10.2 Main Local Non-Essential Supply Panel Section

Allow to supply and/or install the following supply switchgear all rated minimum fault level of 35kA

1. For the Main Non- Essential Supply to the New Psychiatric Wards Building One New 600 Amp Triple Pole MC CB.

2 The existing MC CB presently feeding the Existing Standby Set Control Panel to be removed, handed over to the Hospital Technical Supervisor and signed receipt obtained and submitted to the Consulting Engineers for record purposes

3. Allow to recover and reinstall for Supply to the Existing Laundry Building Previously stated the 400 Amp Triple Pole MC CB
The above recovered from the Main Low Tension Switchboard in the Transformer Room Sub Station

4. The existing Change Over Isolating Switch and presently feeding the Standby Set Control Panel is to be removed, handed over to the Hospital Technical Supervisor and signed receipt obtained and submitted to the Consulting Engineers for record purposes

5. Supply and Install a new 800Amp Triple Pole MC CB for supply to the New Essential Power Main Standby Control Panel

Allow to supply and install the switchgear consisting of Circuit Breakers of sizes shown for the Non-Essential Sub Mains and Sub Circuits, also shown on the proposed Detail Line Diagram Drawing SL231 - MLTSB.

3.10.3 Essential Power Supply Section

Allow to supply and/or install the following supply switchgear all rated minimum fault level of 35kA

Allow to Supply and Install the following

FOUR	Lightning arrestors suitably rated to SANS Code of Practice.
ONE SET	4 Only 63 x 6,3mm by provisionally 2400mm long hard drawn hard copper bus bars each mounted on two fibre glass bus bar insulators and supported with intermediate insulated bus bars as required.
ONE	Voltmeter scaled 0-400 Volts Elima or PCI 100 x 100mm complete with protection fuses.
ONE	Voltmeter selector switch enabling the selection of each phase to neutral, between phases, and off.
THREE	Maximum demand and instantaneous indicating ammeters, Elima 100 x 100mm scaled 0-1000 Amps (20 per cent overrun to 1000 Amps).
THREE	Current transformers ratio 1000/5 Amp 10VA burden class CM accuracy.
ONE	1000 Amp 1000mm long hard drawn copper Bus bar as the Main Distribution Board Earth bar.

Allow to supply and install the following switchgear:

.1. New Main Isolator for the Main Essential Power Supply from the New Standby Set Control Panel as follows

One New 1000Amp 3phase and Neutral 35kA Isolator as Main Switch for the Essential Power Supply. The existing changeover to be removed.

2 For the Main Essential Power Supply to the New Psychiatric Wards Building

One New 150 Amp Triple Pole 25kA CB .

3. The Main Supply to the Existing Laundry

One New 40 Amp Triple Pole 25kA CB

Allow to supply and install the switchgear consisting of circuit breakers of sizes as shown for the essential section of the Sub Mains and Sub Circuits, also shown on the proposed Detail Line Diagram Layout Drawing SL 231 - MLTSB.

General

The board is to be fixed to the floor of the cupboard by means of 8 x 10mm dia. rawl bolts.

The Switchgear shall be installed in dedicated compartments for both power supplies, mechanically separated from each other.

The removable front cover panels for the Non-Essential and Essential compartments shall be painted Electric Orange and ASignal Red respectively.

Internally the board is to be painted Gloss White In addition to the above cover panel specification, the board is to be painted as described in the General Detail Requirements for Distribution Boards Specification.

The equipment to be provided as specified and indicated on the Line Diagram drawing.

Allow to supply and install Lightning Surge Arresters - 4 (four) for each of the incoming supply Non-Essential and Essential Power sections.

Allow to supply and install labels - white engraved with black/red lettering 20mm high and 2mm thick indicating the name of the board, i.e. *Main Switchboard* and both *Non-Essential Power* and *Essential Power* respectively.
Also refer to the labelling specification as detailed under General for Distribution Boards.

3.11 SUB MAINS : CABLES IN THE SUB STATION

The cables to be installed in the sub stations are to consist of cables to be extended from the existing old LT Board and the new Sub Mains runs cables to be installed.

New Sub Mains runs shall be installed as indicated on the Main Riser diagram drwg. SL138.MRD

Cables to be extended shall be disconnected, and a length joined sufficiently long enough to be laid in the existing and new sections of trench to the New Position≅ of the New Main Low Tension Switchboard.

he cables are to be made off and connected to the New Switchgear specified.

Earth conductors are also to be extended and connected to the Main Earth Bar on the New Main Low Tension Sub Station.

The earth conductors shall be joined by means of suitably sized mechanically crimped ferrules.

Cables to be extended therefore as follows:

Note: The size of Circuit Breakers is the size of the switchgear on the New Main LT Board. All switchgear is triple pole and current rating as specified under Size of Circuit Breaker.

3.12 EXISTING KIOSK to be REPLACED

NOTE THAT BEFORE ANY OF THE WORKS COMENCES regarding the replacement of the KIOSK, all of the Hospital Staff concerned and Personnel in charge and/or associated with the buildings that are being fed from the Kiosk must be informed of the switching off and duration of the disruption to the supply must be informed timeously,

3.12,1 The EXISTING KIOSK is to be replaced. The position of the KIOSK and new position is shown on the Site Plan Drawing SL 231 – ESP 1

The existing Kiosk is a Floor Standing Unit, housing Switchgear feeding the buildings and Facilities all situated on the West side of the Main Core Block.

The existing Switchgear and Feeder cables are all to be identified in order to a be replaced and reconnected respectively.

To be noted that of the buildings being fed from the Kiosk are to be demolished and Noted that these buildings must be identified and as a result do not require connection.

NOTE WELL
The REPLACEMENT PROCESS must be well co-ordinated and carried out in the least amount of time. In order to limit the duration of replacement. The New Kiosk will have to be installed prior to the Isolation/Disconnection so that immediate reconnection and Power Supply can be restored. This requirement is essential as of the buildings are of critical importance.

3.12.2 The NEW KIOSK is to be Built into the Wall as shown. All of the Existing cables that have been identified for supply to buildings are to be if required extended with Joint boxes and reconnected onto the Switchgear in the New Kiosk.

The Specification for the New Kiosk as follows:

1. The Kiosk shall consist of a Rigid Outdoor Fibre Glass Unit complete with Drip Tray And Door with hinges on the right-hand side, fitted with a Pad Lock locking mechanism and Pad Lock .(Two Keys to be provided to the Hospital Staff, signed for and Recorded in the Site Handover Manuals)

2. The Switchgear mounted on a 3cr12 metal epoxy covered White panel, to consist of the following:

   A, One 200Amp 3phase 15kA Isolator as Main Switch.
   B, Four 60Amp 3phase 10kA CB`s.
   C. Four 30Amp 3phase 10kA CB`s
   D. Two 30Amp Single Pole and Neutral 5kA units
   E. One 60Amp SP&N 5kA Earth Leakage unit.
   F. Two 20Amp SP 5kA Circuit breakers

   Provide 4 off each 800mm long 200Amp Phase and Neutral Bus Bars mounted on suitably selected Fibre Glass stand-off Bus Bars.
   indicated

3. Allow to extend the existing cables all PVC SWA PVC ECC (alternatively allow the Earth Wires below: NOTE THAT CABLES etc ALLOWED FOR IN THE BOQ
   A) 70mm2 4-core 10meters long cable and a single joint Kit
   B) 25mm2 4-core 40meters long cable and 4 joint Kits
   C) 16mm2 4-core 20meters long cable and 2 joint Kits
   D) 6mm2 2-core 40meters long cable and 4 joint Kits

4. Earth Conductors to be allowed for the above cables:
   A) 35mm2 30metrs for the Main cable and for connection to Earh Rods
   B) 16mm2 20metrs for sub mains cables
   C) 6mm2 40metrs for sub mains cables

Noted that the Main Supply Cable consists of a 70mm2 4 - core PVC SWA PVC ECC Cable (and 70mm2 Earth) to be fitted with a Joint Kit and Reconnected to the New Main Switch all as indicated above,

The new Kiosk is to be tested and a valid COC form provided and included as per the requirements for all distribution boards.

Demolishment and reconstruction work to be allowed for all as follows:

A) The Concrete Roof consisting of a 100mm slab approx.800mm deep and1400mm wide to be removed and disposed of.
B) The Two sides and back 230mm wide approx..1200mm high brickwork Similarly removed.
C) Break up and replacement of 100mm thick steel reinforced concrete Slab approx..6 square meters
D) Install 6x100mmDia.RIGID PVC cable pipes each 8meters long
E) Allow for the trenching of 8 cubic meters including back-fill consisting of 8 cubic meters of River Sand

Note Well: The entire Works Area is to be provide with a 2-meter-high protective fence/Barricade at least 2 metres clear of the construction work at hand.

3.13 RELOCATION of the EXISTING OXYGEN TANK

Allow to engage fully regarding the relocation process.

The New and Existing positions have been indicated on the SITE PLAN drawing:
SL 231 – ESP1.

The relocation process to include the following: Introductory Phase, Identification of the existing Electrical Installation all related to the Oxygen Facility and the New intended location, the removal of the Existing Electrical related Components and the intended Reinstallation, the Switchboard to be relocated, The Supply and Control Cables to be Extended, the installation work iro reconnection including provisions for cable in ground, earthing requirements, completion and Handover, and Certification required all as Part of the OHS Act and Inflammable Substances/Chemical By-Laws.

1. IDENTIFICATION
   Familiarise with the Existing OXYGEN Facility and Engage with the Main Building Contractor and Contractor appointed to Relocate the Oxygen Tank including all associated components and all other Disciplines that have been assigned to the process.

2. REMOVAL and REINSTALLATION
   Allow to Remove and Reinstall the Existing Sub DB. The DB Switchgear consisting of a 60Amp TP 5kA Main switch, 60A TP E/L unit and 45Amp DP 5kA CB.and the Associated Control Panel (Dimensions approx.. 100mm high x 600mm wide and 140mm deep.)

3. CABLE to be EXTENDED
   Allow to Install new cable consisting of the Main Supply cable (a) and Control cable(b) as follows: a) 16mm2 4-core PVC SWA ECC and b) 4mm2 4-core PVC SWA ECC. Each of the cables to be fitted with appropriate sized cable joints and extended to the new Location.

4. CABLE INSTALLED via Existing and new Concrete and Roadways as indicated on the relevant drawing. Allow to install a 100mm Diam. Cable pipe below the existing Concrete slab and Roadway to accommodate the cables indicated above. The approx. distance 50metres.

5. EARTHING REQUIREMENTS
   Allow to Supply and install Earth Conductors liked to the Earth Terminals in each of the Supply DB and Control Panel to a CROWS FOOT TYPE EARTHING system in the ground .located adjacent to the New Installation.

6. COMPLETION and HANDOVER
   On completion of the Electrical Installations allow to Test and Commission in favour of the Hospital. The hand over in conjuction with the Oxygen Installation contractor directed for the benefit of the applicable Technical Hospital Personal. The hand over to include the issuing of an Installation certificate for the relevant installations.

7. The Final Certification must be in accordance with the Requirements of the OHS ACT and must be provided by a Registered Master Electrician. The Certificate is to be included into the Main Contract File for the Project.

3.12 THE NEW SUB-MAINS RUNS

Allow to supply and install the Sub-Mains Runs≅ consisting of cables and/or PVC conductors in conduits.

The Sub Mains Supplies to the Distribution Boards and Control Panels have been indicated on the accompanying drawing SL231 - MRD.

Also refer to the Site Plan Cable Layout drawing SL 231 - ESP1 and Floor Layout drawings for the exact routes to be followed.

Allow to terminate the cables and to connect the conductors to the appropriate switchgear.

Cables shall be terminated by means of SANS approved mechanical cable glands complete with rubber shrouds, Pratley or equal and approved.

Conductors in conduit shall consist of conduit runs installed into concrete floor slabs, ceiling voids and brick walls.

Conduits shall be arranged that Sub-Mains≅ in switchboards are to terminate in compartments specifically allocated for Sub-Mains

3.13 INSTALLATION OF CABLES

3.13.1 General

The Contractor is to allow for the supply and complete installation of all distribution cables as indicated on the drawings. All cables must comply with the General Electrical Specification as given in Part 2.

Generally, the cables to be installed in the New Psychiatric Wards Building are to be installed direct in ground, in cable pipes and cable ladders installed in suspended ceilings.

Cables in ground shall be laid at a depth of not less than 600mm below ground level and also not to exceed 800mm below ground level.

Preliminary routes of cables are as indicated on drawings. The exact routes and positions must be determined on site in collaboration with the Departments Representative.

3.13.2 Cable Ladders

Allow to supply and install the Cable Ladder systems below concrete ceiling slabs and ceiling voids above the suspended ceilings in the New Psychiatric Building.

The Cable Ladders are to be installed in continuous runs with sections bolted together in ceiling voids and below concrete ceiling slabs.

The Cable Ladders to be installed shall consist of a 310mm, 155mm and 100mm wide ladder. The 310mm wide ladder to accommodate the Low Tension cables and the 155mm and 100mm ladders, the Telephone and Public Address System cables.

The ladders shall consist of 2,0mm thick slatted hot dipped O-line OL76 or equal and approved galvanised steel with 76mm high vertical side sections.

The Cable Ladders shall be bolted to the roof structure by runs of 6mm diameter galvanised steel, screws, nuts and washers and / or similar 6mm diameter brass screws.

Each section of cable ladder shall be joined to the adjacent run by means of similar steel splicing plates the same width as the applicable cable ladder and in addition a pair of vertical 75mm high sides for the upright sections.

The splicing sections shall each be fixed by means of four bolts (as described previously for fixings to angle iron frame), i.e. two bolts on each end for each plate.

Allow to supply and install 310mm,150mm and 100mm wide T sections and 90° bends to be installed in positions indicated.

3.14 EARTHING SYSTEMS

Allow to supply and install Earthing Systems as specified with the following maximum resistivity values:

a.	The Computer Earth System	-	1 ohms
b.	The Mains Earth System	-	4 ohms
c.	The Lightning Protection Earth System	-	25 ohms

3.14.1 The Computer Earthing System

Allow to supply and install a Computer Earth System

The most advantageous position is to be established for the system.

A 70mm² PVC insulated conductor is to be installed between the Main Earth position and via the cable pipes indicated to the Main Earth Bar in the New Main Distribution Board.

Allow to supply and install a stand off insulated terminal block on each level for computer conductors.

3.14.2 Earthing of the Buildings

The installation shall be earthed in full accordance with South African Bureau of Standards Code of Practice for the wiring of Premises SANS 10142-1, SANS 10292 and the requirements of the Local Supply Authority.

Allow to conduct the Earth Resistivity Test and submit results to determine the requirements for the installation of Mains, Computer and Lightning Protection Earthing Systems.

The Earth Tests and compilation of the results shall be conducted by a contractor experienced in the field of determining Electrical Earthing requirements for buildings.

All metal hot, cold and waste pipes and also any other exposed conductive parts, except the defined exclusions, shall be earthed by connecting them to the earth continuity conductor that, in turn, shall be connected to the existing consumers earth terminal.

All earth continuity conductors shall consist of copper or approved material.

All light and plug circuits shall include a 2,5mm² earth conductor respectively, run from the earth bar of the distribution board.

All other earthing conductors shall have a rated area in accordance with the calculated maximum permissible resistance determined for the earth conduit path.

Corrugated iron and IBR roofs including steel roof trusses (where applicable) are to be effectively earthed at a minimum of four points, and the gutters or gutter constructions and mounting supports, brackets and downpipes are all to be bonded and effectively earthed. Where a separate Lightning Protection system is provided as part of the Contract the Earthing of the roofing system will form part of the Lightning Protection System.

Allow to supply and install additional earth spikes adjacent to the various distribution boards to improve the earthing system.

Depending on the results of the Earth Continuity test additional Earthing may be required.

The earth spikes must be linked to the main earth system for supply to the New Psychiatric Ward etc. buildings Main Distribution Boards.

Earth conductors from Sub Boards shall be as specified under "Sub Mains Runs".

The armouring of cables shall be earthed by means of the relevant cable glands and glandplates.

After the entire installation is complete, allow to conduct tests in accordance with Clause 8 - "Inspection and Testing" of the SANS Code of Practice 10142 and SANS 10292 (Low Voltage Earthing Distribution Systems).

Allow to supply all the necessary test equipment required to conduct these tests.

The tests are to be conducted to the entire satisfaction in all respects as required by the Local Supply Authority.

3.15 MAIN AND SUB DISTRIBUTION BOARDS

Allow to supply and install the Main and Sub Distribution Boards in the positions as indicated in the buildings. Allow generally enclosed FABRICATION DETAIL DRAWING SL 231 – TYPDB1

The details of equipment required for the boards are all as indicated and shown on the drawings.

The fault levels for switchgear shall not be rated less than as stated on the drawings.

3.15.1 The Main Low Tension Distribution Board (MLTDB)

(Situated in the New Switch Room on the Parking Level, New Psychiatric Ward)

Refer to the accompanying Line Diagram Drawing SL 231 – ELD1.

Allow to supply and install the Main Distribution Board into the Switch Room, installed on a 50mm concrete plinth extending 50mm from all sides of the base foot print. .

The board shall consist of Non-Essential and Essential Power sections.

Non-Essential Power Section

ONE	1000 Amp Triple pole Isolator with a minimum fault level of 25 kA, CBI Type N50 DEM, or other approved type, as the Main Switch.
TWO	Mechanical cable glands suitable for 185mm² 4-core PVC SWA PVC ECC supply cables.
FOUR	Lightning arresters suitably rated to SANS Code of Practice.
ONE SET	4 Only 63 x 6,3mm by provisionally each 1600mm long hard drawn hard copper bus bars each mounted on two fibre glass bus bar insulators.
ONE	Voltmeter scaled 0-400 Volts Elima or PCI 100 x 100mm complete with protection fuses.
ONE	Voltmeter selector switch enabling the selection of each phase to neutral, between phases, and off.
THREE	Maximum demand and instantaneous indicating ammeters, Elima:100 x 100mm scaled 0-800 Amps (20 per cent overrun to 800 Amps).
THREE	Current transformers ratio 800/5 Amp 10VA burden class CM accuracy.
ONE	1000 Amp 1000mm long hard drawn copper Bus bar as Main Distribution Board Earth bar.

Allow to supply and install the switchgear for Sub Mains and Sub Circuits, also shown in the Schematic Layout Drawing SL 231 – ELD1

Essential Power Section

ONE	250 Amp Triple pole Isolator with a minimum fault level of 25 kA CBI type N50 DEM, or other approved type, as the Main Switch.
ONE	Mechanical cable gland suitable for a 95mm² 4-core PVC SWA PVC ECC supply cable.
FOUR	Lightning arrestors suitably rated to SANS Code of Practice.
ONE SET	4 Only 16,0 x4,0mm by provisionally each 1000mm long hard drawn hard copper bus bars each mounted on two fibre glass bus bar insulators.
ONE	Voltmeter scaled 0-400 Volts Elima or PCI 100 x 100mm complete with protection fuses.

ONE	Voltmeter selector switch enabling the selection of each phase to neutral, between phases, and off.
THREE	Maximum demand and instantaneous indicating ammeters, Elima 100 x 100mm scaled 0-150 Amps (20 per cent overrun to 180 Amps).
THREE	Current transformers ratio 150/5 Amp 10VA burden class CM accuracy.
ONE	600 Amp 1000mm long hard drawn copper Bus bar as Main Distribution Board Earth bar.

Allow to supply and install the switchgear for Sub Mains and Sub Circuits, also shown in the Schematic Layout Drawing PE 231 – ELD2

3.15.2 The Main Low Tension Distribution Board Detail

Allow to supply and install the switchgear for Sub Mains and Sub Circuits, also shown on the Schematic Layout Drawing SL 231 – ELD1.

Allow to supply and install a 100mm high and dimensions 50mm greater than the Length and breadth of the Board, the plinth consisting of a mesh reinforced concrete base, trolled and edged level, painted with two coats of Black sealant (ABA Product range,or equal and similar).

The Board shall be a surface, floor-standing DB without doors, installed in the Switch room in the position indicated on the layout drawings. The board is to be fixed to the plinth by means of 6 x 10mm dia.Rawl bolts.

The Switchgear shall be installed in dedicated compartments for both Non and Essential Power supplies, mechanically separated from each other.

The removable front cover panels for the Non-Essential and Essential compartments shall be painted Electric Orange and Signal Red respectively.

Internally the board is to be painted Gloss White.

In addition to the above cover panel specification, the boards are to be painted as described in the General Detail Requirements for Distribution Boards Specification.

The equipment to be provided as specified and indicated on the Line Diagram drawing.

Allow to supply and install Lightning Surge Arresters - 4 (four) for each of the incoming supply Non-Essential and Essential Power sections.

Allow to supply and install labels - white engraved with black/red lettering 20mm high and 2mm thick indicating the name of the DB, i.e. Main LTDB and both Non-Essential Power and Essential Power respectively.

Also refer to the labelling specification as detailed under General for Distribution Boards

3.15.3 The Sub Distribution Boards

Refer to the accompanying Line Diagram drawings.PE 231- ELD1 to 3

Allow to supply and install the following Sub Distribution Boards:

1. PARKING LEVEL – SL 231- ELD1

DB.PL. Flush tray Built into Brickwork and with 50mm Surface Architrave
DB.PLA, Flush tray Built into Brickwork and with 50mm Surface Architrave
DB.L. Surface on Brickwork,
Pump Set Panel Surface Panel mounted against Wall in Pump Set Room

2. GROUND FLOOR LEVEL – SL231 – ELD2

DB.G, Surface Floor Standing Built into Cupboard Space and fixed to Brick wall By means of 2 x 8mm diameter Rawlbolts
DB.GA, Surface Floor Standing Built into Cupboard Space and fixed to Brick wall By means of 2 x 8mm diameter Rawlbolts
DB.GB, Surface Floor Standing Built into Cupboard Space and fixed to Brick wall By means of 2 x 8mm diameter Rawlbolts
DB.GP , Surface Built into Cupboard Space and fixed to Brick wall By means of 2 x 8mm diameter Rawlbolts

3. FIRST FLOOR LEVEL – SL 231 – ELD3

DB.F Surface Floor Standing Built into Cupboard Space and fixed to Brick wall By means of 2 x 8mm diameter Rawlbolts
DB.FA Surface Floor Standing Built into Cupboard Space and fixed to Brick wall By means of 2 x 8mm diameter Rawlbolts
DB.FB Surface Floor Standing Built into Cupboard Space and fixed to Brick wall By means of 2 x 8mm diameter Rawlbolts
DB.FC Flush tray Built into Brickwork and with 50mm Surface Architrave

ACDB.1, Surface Floor Standing fixed to Plinth By means of 6 x 8mm diameter Rawlbolts. The Plinth consisting of 100mm in height as specified for the Main Low Tension Switchboard para 3.15.1

3.15.3.1 Sub Distribution Boards: Detail Configuration and Construction

Recessed boards shall be installed into standard pressed galvanised flush trays.

Surface boards shall be fixed by means of 4 x 10mm diameter rawl bolts.

Distribution Boards installed in cupboard spaces shall be surface floor standing without doors. The boards shall be equipped with suitable cable trays dedicated for Non-Essential, Essential & UPS cables. The boards shall be provided with 100mm high U - Section floor mounting channels, painted with Black rust proofing paint.

The boards shall accommodate both Non-Essential and Essential≅ power supply switchgear as specified.

The switchgear shall be installed in dedicated compartments for both power supplies, mechanically separated from each other.

The removable front cover panels for the Non-Essential, Essential & UPS compartments shall be painted Electric Orange, Signal Red & Medium Blue respectively.

The boards shall be installed generally at a height of 1800mm to the top of the board.

The equipment to be provided as indicated on the Line Diagram drawings.

The interior of the boards are to be painted Gloss White.

In addition to the above cover panel specification, the boards are to be painted as described in the General Detail Requirements for Distribution Boards Specification.

Allow to supply and install labels - white engraved with black/red lettering 20mm high and 2mm thick indicating both *Non-Essential Power, Essential Power* & UPS Power respectively.

Also refer to the labelling specification as detailed under General for Distribution Boards≅

3.16 GENERAL DETAIL REQUIREMENTS FOR DISTRIBUTION BOARDS

In addition to the relevant clauses in Part 1 and 2 the following shall be applicable to boards required for this service.

The Boards shall be standard floor standing, surface or flush all as specified.

Floor standing DBs shall be fabricated from 3CR12 sheet steel on an 80mm high 3CR12 steel channel frame bolted to the floor.

Surface DBs shall be fabricated from 1,6mm 3CR12 sheet steel.

Flush DBs shall be architrave type, complete with removable door frame unit installed into a flush mounted switchboard wall tray. The tray shall be 1,35mm fabricated galvanised steel. The distribution board including architrave shall be fabricated from folded and welded 3CR12 steel. The unit shall be adjustable for both the depth and level and fit hard up against the finished wall surface.

Typical details for the construction and general layout of Three Phase and Single Phase DBs including the specific provision for the Main Isolator are indicated in detail on the General Detail Information drawing. Typical Detail for Distribution Boards. The detail includes the requirement for Sub Distribution boards that require access to the Main Isolator with the door in the closed position.

The top of the boards shall be installed 1800mm above the floor level.

The boards shall comply with SANS 1765 and as generally specified for distribution boards.

Circuits shall be evenly balanced over the three phases in the boards.

The equipment specified is to be mounted on suitable chaises fabricated from 1,6mm stainless steel.

Coverplates shall be neatly slotted to allow the toggles and switches, etc. to protrude.

The boards shall be "Gamma Panels”," Switchboard Manufacturers" or Pitt Switchboards, or other equal and approved.

All circuit breakers shall be C.B.I. to sizes specified or other approved make and manufacture.

Lightning Arresters shall be suitably rated to SANS Code of Practice.

The time switches specified in Distribution Boards shall be equal or similar to CBI Cat. No. SAT-RW7- Day time switch with 72 hour spring reserve or other approved type and make.

Contactors specified shall be Three Phase panel mounting type to BS EN 60947 (Parts 4-1). The current specified shall be the minimum continuously rated for mixed inductive loads. The coils shall be unless specified, suitable for 400V supply in the case of Three Phase circuits and 230V for Single Phase circuits. Contactors shall be approved type.

Step down transformers shall be 230V / 12V 50 Hz resin encapsulated type installed on DIN Rail and to allow full heat dissipation and sized generally 16 VA or as specified..

Voltmeters shall be scaled 0-400 Volt panel mounting type 100 x 100mm complete with protection fuses, ELIMA / PCI/ or other approved type.

VS Voltmeter Selection Switches shall be panel mounting 20 Amp multi pole rotary, CABTREE/ KRAUS & NAIMER, or other approved type.

Ammeters shall be maximum demand and instantaneous indicating 100 x 100mm in size scaled depending on the specification requirements with 20 per cent over run, ELIMA /PCI /or other approved type.

Earth Contact indicator equipment shall be **ISALOC MONITOR Type 315M System** as supplied by **CBI** or other approved type.

HDHC busbars (where called for) are to be mounted on fibreglass stand-off type busbar insulators.

The chassis shall be provided with rubber grommets to protect conductors.

All wiring shall be carried out behind the removable coverplates, and shall be neatly grouped in horizontal and vertical runs bound with Surlock plastic cable ties.

Brass neutral terminal bars are to be provided, of size to permit of one way per earth conductor and as specified.

A suitable index holder, with 1,5mm perspex protective card cover shall be provided in each panel on the board and the correct information shall be provided in typed print.

All relevant Emergency information plates must be provided as required.

The boards shall be supplied with doors and locks as specified. The locks shall be Union type cupboard locks, or other approved type.

External metal work, architrave frames and doors and the interior of the boards including the chassis and internal framework must be painted with three coats of first grade gloss "White" Duco enamel interior and light beige exterior over a priming coat of self etching zinc chromate.

The coverplates over switchgear for boards containing Non-Essential Power Switchgear must be painted with three coats of first grade high gloss Duco enamel colour "Light Orange" as per SANS 1091, and/or Essential Power Supply - Signal Red and/or UPS Power Supply - Medium Blue.

Allow to supply and install a Label on the external door or architrave of each distribution board.

The Label shall be fixed to the distribution board by means of four 3mm diameter brass or aluminium plated screws, spring washers and nuts.

The following information must be engraved on the Labels:

IN CASE OF ACCIDENTAL CONTACT SWITCH OFF
MAIN SWITCH IMMEDIATELY.

Specify where the DB is fed from and the size of the feeder; eg.

FED FROM DB.A
25mm² SQ 4-CORE CABLE

or

4 x 25mm SQ CONDUCTORS IN 40mm CONDUIT

The Fault level of the DB if it exceeds 5kA; eg

THE FAULT LEVEL OF THIS DB IS 25kA

Note to indicate if a System of Cascading Switchgear is to be installed; eg.
NOTE: A SELECTION OF CASCADING SWITCHGEAR HAS BEEN USED IN THIS DISTRIBUTION BOARD.
(If not Cascading Switchgear this notice can be omitted).

The lettering shall be a minimum of 10mm high and 2mm thick, engraved on black Traffolite or Ivorine with filled-in black character.

The boards shall be rejected if they do not comply with these specifications.

Note: Three copies of the proposed distribution board drawings with full details of the construction and equipment shall be submitted to the Electrical Engineer for inspection and permission to proceed prior to the manufacturing of the boards

3.17 CONDUIT AND WIRING

All conduits are to be built in unless otherwise specified.

All conduit, regardless of the system employed, shall be installed strictly as described in the applicable clauses of Part 2 of this specification.

Conduit and conduit accessories used shall be galvanised steel type and shall be cast into concrete, built in, surface mounted or installed in roof spaces.

Note: Surface conduit runs will only be allowed where it is not possible to install flush into the Brickwork, concrete etc. Permission must be obtained prior to the installation of surface conduit runs.

Note well: **All galvanised conduit boxes installed into face brick work shall be installed so that the front of the box is flush with the front of the face brick work. In order to achieve this requirement the contractor must allow to offset the conduit runs and cut trim the face brick work accordingly**.

All galvanised sheet metal outlet boxes are to be painted with one coat of red lead or PA10 or equivalent rust preventative paint before installation.

Wiring of the installation shall be carried out as directed in Part 2 of this specification.

Conductors and cables must be of the stranded copper core type with insulation and in accordance with SANS 1507 & SANS 1574 as applicable.

Where plain ended metallic conduits are used, the appropriate connection as recommended by the manufacturer shall be used throughout the installation.

Allow to supply and install generally two 600 x 600 x 200mm galvanised steel draw boxes in the roof spaces above DBs. for the Non-Essential and Essential Sub Circuits as shown on the power layout drawing.

3.18 LIGHTING INSTALLATIONS

Allow to supply and install the lighting installations as per the layouts and as shown on the drawings and as per details indicated.

3.18.1 Light Fittings

All light fittings to be supplied by the Contractor shall have the approval of the Department's Representative.

The fittings are to be installed strictly in accordance with requirements as stated in this Specification.

Where light fittings or other equipment were specified by brand name, this shall be understood to mean that item of equipment or other approved.

All LED light Fittings shall be in accordance with SANS and INTERNATIONAL Standards and Specifications. The performance information and data requested for LED luminaires to be provided for acceptance as stated under Para. Description of Light Fittings to be Supplied and Installed.

Lamp holders for LED fittings as specified must be as required for LED **TYPE or** as specified, and must be suitably selected and be of high quality. Drivers must be Electronic and SANS approved with official markings and Lamps must be **COOL WHITE** in colour and SANS as specified.

All LED fittings shall be supplied with dedicated Driver per lamp.

3.18.2 Lighting Circuits

Allow to supply and install the lighting circuits all as indicated on the drawings.

The wiring for the lighting circuits shall be by means of 2,5mm^5 PVC insulated live conductors and 2,5mm^5 earth conductor installed in 20mm conduit.

The supply to all light fittings installed in ceilings shall be by means of 5 Amp 3-pin socket outlets. The socket outlets are to be installed into standard round conduit boxes. Supply and install 5 Amp plug tops onto 2,5mm² 3-core flexible PVC insulated Cabtyre cord of length not exceeding 1500mm for each light fitting.

The Contractor must ensure that for all the false ceiling installations, all the conduit work and wiring has been completed prior to the installation of the ceiling boards to avoid unnecessary damage.

The openings for access wiring in ceiling boards must only be of the minimum size required.

Note: Light fittings installed below ceilings must be fixed to short lengths of 20mm diameter galvanised conduits suspended from unistrut sections supported from the roof structure, fixed directly to the roof rafters or timber/steel bracing fixed to the rafters, and not to the ceiling boards.

3.18.3 Light Switches

Allow to supply and install light switches and light switch stations in the positions shown on the layout drawings.

Light switches shall be rated at a minimum of 20 A and 250 Volts to SANS code standards.

The light switch stations shall be colour coded reflecting the intended service, i.e.

Light switch stations for the **Non-Essential Power** circuits shall be fitted with White switching modules and White cover plates with engraved labelling in Black lettering.

Light switch stations for the **Essential Power** circuits shall be fitted with Red switching modules and White cover plates with engraved labelling in Red lettering.

Light switch stations for the **UPS Power** circuits shall be fitted with Medium Blue switching modules and White cover plates with engraved labelling in Medium Blue lettering.

The flush mounted light switches are to be installed in standard 100 x 50 x 50mm galvanised draw boxes, recessed flush into brickwork / concrete walls, as shown on the layout drawings

Weatherproof light switches shall be surface mounted by means of a minimum of 4 x 6mm diameter raw bolts and brass screws. The enclosures shall be fitted with appropriate weather seals to prevent the ingress of water / moisture.

Switches to be installed in partitions for offices shall be of the **MULLION** type with matching narrow cover plates. The switches shall be installed into appropriate openings cut neatly into the mullions as required.

Two way light switches shall be installed in positions shown on the layout drawings.

Dimmer switches shall be installed for circuits in positions shown on the Layout Drawings. The dimmer modules shall be of the electronic type minimum rating compatible with LED Light Fittings specified complete with a 20 Amp single lever switch. Each dimmer switch shall be installed into a separate draw box spaced no less than 100mm between draw boxes respectively.

All the metal cradle sections for the mounting of light switch modules shall be provided with earth pins for earthing conductors, ensuring earth continuity back to the earth terminals in distribution boards.

3.18.4 Outside Lights on Buildings

The positions of the outside lights and photocells have been indicated on the Site Plan, Elevation and Lighting layout drawings.

All outside light fittings shall be fixed to the conduit boxes by means of two brass screws and in addition four(4) 10mm diameter rawlbolts with cadmium plated bolts and washers.

The outside lights shall be switched either directly from a photocell unit or via a contactor controlled by a photocell unit.

The photocell unit shall be similar or equal to the NEMA socket type or National ZS 20A and shall be mounted onto a deep conduit box. The photocell and conduit box shall be installed into a bulkhead light fitting.

All outside lights are to be made waterproof and any sealing material required shall be provided for the particular light fitting, all as specified.

3.18.5 Pole Light Installations

Allow to supply and install the Pole Lights in the position shown on the Parking Level layout drawing SL 231 – EL3

Supply to the Pole Lights shall be by means of 2,5mm² 4-core PVC SWA PVC ECC cable installed from the Distribution Boards via the access cable pipes and in the ground.

The pole lights to be installed on the walkway shall be time switch controlled and pole lights to be installed in the roadway shall be photocell controlled.

A typical detail drawing of the poles and related requirements of the installations has been included.

The light fittings and poles shall be as specified under the paragraph Description of Light Fittings and Fixtures, etc - Type P`s - all as an integral part of this specification.

Allow to paint the poles and accessories with TWO full coverings of Calcium Plumbate paint and finally with two full coats of high quality gloss enamel paint. Colour to Architects choice.

The poles shall be provided with access openings approximately 800mm above ground level. The openings shall be provided with metal cover fixed to the openings by means of galvanised bolts. The cover shall be supplied with a watertight seal to prevent the ingress of water or moisture.

Allow to supply and install a 5 Amp single pole and neutral 5 kA MCB mounted onto a galvanised steel bracket inside of the access openings.

Wiring between MCBs and Luminaires shall be carried out with 2,5mm5 3-core heavy duty CABTYRE cable.

An earth stud must be provided inside each pole easily accessible via the access openings.

The supply cables must be made-off, the live conductors connected to the circuit breakers and earth conductors connected to the earth studs.

The poles must be installed vertically in the ground before the installation of the concrete plinths. The plinths to consist of 25 mPa strength concrete cast to the size indicated.

The roadway pole lights shall be switched via a contactor to be installed in DB.G Ground Floor Level

The contactor shall in turn be controlled via photocell and contactor installed in the Board.

3.18.6 Night Light Fittings : N/L Emergency/Exit Light Fittings And I/L Indicating Light Modules

Allow to supply and install Emergency/Exit Night Light Fittings and Indicating Light Modules in the positions shown.

The Night light fittings, i.e. N/L, are to be wired directly from the live side of the circuit supply.

In the case of the Emergency/Exit light fittings an additional conductor is to be installed from the live side of the individual light switches to the light fittings in order to provide continuous power for the battery charging units.

Indicating Light modules, i.e. I/L, shall be installed into flush boxes adjacent to the Light Switch. The indicating light shall be connected to the return supply terminals, i.e. to indicate that the supply to the light circuit is in the ON position.

3.18.7 Unistrut runs for supply to light fittings in suspended ceilings

Allow to supply and install the unistrut runs indicated in the suspended ceiling shown on the lighting layout drawings for all levels.

The unistrut runs shall be P2000 fully galvanised complete with galvanised steel coverplates.

The unistrut runs shall consist of two totally separated sets, the one for non-essential lighting circuits and the other for essential light circuits.

Conduit runs for supply to the light fittings and for wiring to light switches shall be connected to the unistrut runs.

The light fitting supply conduits extending to 75mm diameter conduit boxes fitted with 5 Amps unswitched socket outlets. The socket outlets to be positioned as close as possible to the light fittings.

The light fittings specification in turn allows for the provision of 5 Amp plug tops on suitable lengths of 2,5 mm^5 3-core flexible cabtyre cable in order to plug into the above socket outlets.

Note well: It must be noted that the outlet boxes housing the socket outlets for supply to light fittings must in all cases be rigidly fixed to rafters or additional timber supports installed in order to avoid any sagging of the conduit system

In all cases the Unistruts are to be installed with the opening at the top and coverplates cut as accurately as possible to cover the complete unistrut run.

The complete Unistrut installation must be enclosed including the ends with end pieces and ultimately sealed with Silicone sealer to prevent the ingress of moisture, dust particles and including entry of insects and rodents - all to prevent damage to the conductors.

3.18.8 Main EEG Room Light Fitting - TYPE PROC

3.18.8.1 General

Allow to supply and install the Main EEG Room light fitting Type PROC as specified under Description of Light Fittings and Fixtures section of the Specification.

The Main EEG light to consist of a single cluster lamp formation.

The light fitting is to be installed onto a substantial steel base plate installed rigidly onto the suspended ceiling structure..

The mains voltage shall be 230 Volt connected to Isolation Transformers.

The light fittings to be installed as described in the Detail Drwg SL 231 – EL5

Manoeuvrability of the fittings shall be via a number of rotating axis connecting linkage of swivelling and pivoting arms, each joint dampened to prevent jerky movements and to ensure that the luminaire can be adjusted to a position and retain the position accurately over the required surface.

The fitting shall be supplied with a replaceable and sterilizable handle. The handle to be robust and to withstand all standard sterilization detergents without deterioration.
.
The illumination level of the satellite is to be a minimum of 50 000 lux when measured at a distance of 1000mm.

The illumination field of the satellite must be a minimum of 1800mm.

The light head on the satellite shall be a minimum of 480mm.measured from ceiling to Light Fitting Hub

3.18.8.2 Electrical

The light fitting shall be supplied complete from the ceiling outlet.

Allow to wire individually to the light fitting direct and complete connections with 2 x 2,5mm² PVC conductors and 2,5mm earth Conductor in 20mm PVC conduit from the draw box situated in the adjacent passage and DB as indicated.

The electrical wiring is to be strictly in accordance with SANS 10142 Code of Practice for the Wiring of Premises and the OHS Act 55/1993.

3.18.9 Examination Light Fittings

Allow to supply and install the Examination Light Fittings, as described in the Description of Light Fittings and Fixtures, in the positions indicated on the Light Layout drawings.

The examination lights shall consist of **Type EXAM** to be installed against the walls by means of purposely made wall brackets as stand alone fittings. Refer mounting bracket specified .

The examination lights shall be supplied complete with standard 1200mm extension arms with friction joints. The extension arms to permit a 100 degree horizontal and rotation of the lamp head.

The examination lights to be installed against walls to be fixed onto intermediate mounting brackets.

The mounting brackets shall consist of rectangular stainless flat steel sections 120 high x 100mm wide and 10mm thick. The base of the examination light shall be fixed to the section by means of four 6mm diameter stainless steel bolts installed with stainless steel washers drilled and tapped into the section.

The section shall in turn be fixed to the walls by means of 4 x 8mm diameter rawl bolts fitted with stainless steel screws and stainless steel washers.

The supply lead shall be provided with a 16 Amp 3-pin plug top, the lead neatly looped and plugged into the adjacent socket outlet.

All examination lights shall be properly earthed and protected by earth leakage circuits

The base of the examination light and power socket outlet shall be spaced 280mm apart.

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The mounting brackets shall be of robust, durable, practical and aesthetic design.

3.19.1 The Main EEG Installations

3.19.1.1 The Isolating transformer

Allow to supply and install the Isolating Transformer consisting of a 10 kVA rated double wound 1:1 ratio 230 volt single phase air-cooled unit with a regulation of 3% of rated voltage and centre tap brought out to a separate terminal on the secondary winding.

The isolation transformer is to be installed at high level into the adjacent store room

The transformer shall be provided with an earthed electrostatic shield between the primary and secondary windings and shall have a maximum sound level of 35db and a leakage of not more than 20 micro amps.

The transformer shall each be housed in a suitably well ventilated sheet steel vermin proof housing.

The transformer shall be mounted on 32mm angle iron framing supported against the wall with 9mm dia. Rawl bolts fixed to the wall.

The isolation transformer to be supplied no less than 250 VA supplied with a minimum of 20% spare capacity.

The isolation transformer shall have a secondary voltage of 24 Volt AC which shall match the operating voltage of the lamp and control gear

Wiring from the to the transformer shall consist of 2 runs of: 2 x 16mm2 PVC insulated conductors and 1 x 10mm2 bare copper earth wire in 25mm dia. Conduits, terminating in standard round outlet boxes adjacent to primary side of transformer. Wiring from transformer to the DB shall respectively be carried out with 2 x 16mm2 PVC insulated conductors and 1 x10mm2 PVC insulated green conductor as earthwire in 25mm dia.PVC conduit. The two earth wires shall be bonded together and connected to the electrostatic shield of the transformer.

3.19.2 Earth Contact Indicator Equipment (If required)

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Allow to supply and install in DB.FP an **Isoloc Monitor Type 315M system** Insulation Resistance Indicator, or other approved type. The indicator shall be provided with a scale 0 - 50 000 OHMS, which shall be so arranged as to limit the earth fault current under any single earth fault condition to a maximum of 5 mA A.C.

An audible alarm 230 A.C. Buzzer unit with muting facility shall be provided in each board, parallel connected with the red signal indicator lamps.

Red and green indication lights specified on the DB to be operated via the indicator unit. These lights are to be wired in parallel to indicator lights to be provided in the EEG Room indicator Panel. The red lamps to be provided with flasher type control units. The red lamps and audible alarms to be triggered when the insulation resistance between the system and the patient earth point decreases below 5 000 OHMS. The audible alarm and red indicating light shall automatically reset when insulation resistance between system and patient earth point has been restored to a value exceeding 5 000 OHMS. The system insulation resistance indicator shall continuously measure and display the state of insulation resistance between system and patient earth point.

3.19.8 X-Ray Viewing Screens

Allow to provide in the Procedure Room where indicated one flush mounted X-ray viewing screen mounted 1400mm above floor to underside of box. Wiring from distribution board to viewing screen to be 2 x 2,5mm2 PVC conductors and 1 x 2,5mm2 PVC earth wire in 20mm dia. conduit routed via the 15 amp double pole switch in the EEG Room lighting switch box.

3.19.10 Earthing System

The terminal bar in DB.FP shall consist of 25mm x 6mm H.D.H.C. copper bar mounted on fibreglass stand off type insulators in the board.

The bar shall be provided with sufficient 5mm dia. brass bolt and nut terminal studs to allow for connection of earth wires specified for each of the following:

1 Patient earth point
2 The Conduit System
3 Insulated earth terminal for each socket outlet circuit
4 Bonding of terminals of gas and vacuum outlets
5 Bonding of terminals for gas pendant
6 Bonding terminal of common switch box
7 Bonding terminal of X-ray screen
8 Bonding terminal of Procedure Examination lamp

b) Allow to provide 4mm² PVC earth wires from bonding terminals of:

1 Gas and vacuum outlets
2 Terminal on switch box
3 Main lamp earth terminal routed in 20mm dia. conduit to the respective DB earth point terminal bar.

c) Conduit System

The wall tray of distribution board shall be provided with an approved copper bonding strip, fastened to the wall tray. All conduit terminations at the wall tray shall be bonded to the bonding strip by means of locknuts and bushes and the bonding strip shall be bonded to the Theatre earth point terminal busbar by means of an insulated 6mm2 PVC conductor.

Metal switch and socket outlet cover plates shall be bonded by means of the mounting screw connections to the device mounting yokes.

d) The gas and vacuum outlets shall be bonded to the gas vacuum boxes which are to be bonded to the EEG earth point terminal busbar by means of the earth wire specified.

e) Patient Earth Point - Type PEP

The patient earth point shall consist of three single pole sockets, mounted in a 100mm x 50mm x 50mm standard box with a suitable cover plate, installed at a height of 1,40m above floor level where indicated in each theatre.

The sockets shall be to Ryall Trading Co Phono Metal Shielded Cat. No. V4655 with matching plug or Protea Electro Medical 4mm Banana plug socket with matching Banana plug Cat. No. 101580, or other approved.

Three bonding leads shall be provided for bonding the EEG Table and any other mobile equipment with an independent power supply.

Each lead shall consist of 4,50m of 6mm Limpet Electrode rubber insulated cable Protea Electro Medical Cat. No. E30/341 with a plug at each end to match the socket installed in the Patient Earth Point, and a standard 25mm dia. crocodile clip on the other end of each lead.

A patient bonding lead of 6mm Limpet Electrode Cable with one end suitable for bonding to the metal frame of the EEG Table and the other end suitable for attaching to the patient shall be provided for bonding the patient to the table, i.e. strap used for bonding lead onto patient similar to that used for ECG machines, obtainable from Protea Holdings Ltd.

3.20 SWITCH SOCKET OUTLETS (16 Amp 3-pin)

3.20.1 Standard Flush Type and a Combination incorporating EURO type Modules

Allow to supply and install the switch socket outlets as shown on the layout drawing.

Switch socket outlets shall be supplied and installed for both Non-Essential, Essential and UPS power supplies with white and/or red and/or medium blue coloured switches and socket outlet modules, respectively

The White cover plates for the Non-Essential power circuits shall be engraved with Black lettering, White cover plates for Essential power circuits with Red lettering and White cover plates for UPS power circuits with Medium Blue lettering.

All power sockets must take the round earth pin - (no shaved earth pins required).

Wiring shall carried out with 2,5mm² PVC insulated conductors and 2,5mm² green PVC insulated stranded copper earth conductors in 20mm conduits, power skirtings runs as specified.

The outlets shall be generally installed 500mm above floor level, and 1400mm above floor level in wards, kitchens and other similar service areas, measurements to be taken from the floor level to the top of the outlet, and/or as stated on the Architects detailed room data sheets. In all cases the Room Data Sheets shall receive preference.

Plug socket outlets in *THE POWER SKIRTING RUNS* have been described and allowed for under the appropriate headings.

3.20.3 Floor Mounted Pedestals (Island Type)

Allow to supply and install the floor mounted pedestals (Island Type) indicated to be provided as separate service outlets. The pedestals are to be installed over flush floor mounted draw boxes with split compartments in order to accommodate the individual service conduits.

The pedestals must be suitably sealed once installed to avoid any liquids, dust particles, or insects entering.

The pedestals shall be stand alone fixed by means of 4 x 6mm diameter rawl bolts to the floor surface .

The minimum size of openings must be made through the floor coverings in order to draw conductors into the pedestal enclosures and connect to terminals.

3.20.4 Weatherproof Type

Weatherproof type switch socket outlets to be installed in splash proof enclosures equal and similar to York S15, or other approved type.

The general specification for standard flush type shall also apply.

3.21 THE POWER SKIRTING RUNS

Allow to supply and install power skirting runs at floor level along the external and partition walls in the positions shown on the Power Layout drawings for the various levels.

The power skirtings shall consist of 2 channel - 3 compartment extruded PVC trunking complete with cover plate sections over each channel.

The bottom channel must be provided with a PVC dividing carrier strip so that the conductors for two services ie. TELEPHONE and COMPUTER can be separately installed.

The power skirting and cover plates shall be fabricated from 2,5mm thick extruded PVC sections. The power skirting must be provided with two separate removable clip-in cover plates, which fit over the power channel and separately over the telephone/computer cabling channel.

The external dimensions of the power skirting shall be a minimum of 165mm high by 55mm deep ie. 2 channels of 82.5mm high each.

The power skirtings must be suitable for the installation of standard flush power skirting module type 16 Amp 3-pin switch socket outlets into the power section of the power skirting, and/or a combination of Standard Modules and EURO type outlets. .

The provision for Telephones and Computers must be by means of standard modules fitted with telephone socket jack outlets (RJ11) and data cable connector outlets (RJ45) mounted on the appropriate coverplates.

The power skirting cover plates must be installed up to the socket outlets and ends covered by the above module face plates.

Allow to supply and install the conduits between the Distribution Board and power skirting runs as shown on the drawings.

Allow to cut out access openings in the power skirting at the points where outlet boxes are to be provided for these conduits runs. All sharp edges must be removed at these points and the cut-outs must be provided with a PVC trim to prevent damage to the insulation of conductors when wiring is in progress.

Power skirting runs where indicated on division walls must be installed at the same height as on perimeter walls. Where these power skirtings join, standard T formation joiner pieces must be provided. Only standard propriety PVC extruded power skirting joiner pieces, corners, T-pieces etc., of high quality will be accepted.

Provide and install into each separate run of power skirting from the applicable Distribution Board and along the full length of the power skirting 2 x 10mm² PVC insulated stranded copper main earth conductors - for general and for computer power circuits.

The earth-pin of each socket outlet must be coupled by means of 2,5mm² stranded copper earth wire sweated to the main earth conductor.

Wiring to separate socket outlet points in the power skirting must be completed by means of 2 x 2,5mm² PVC wires routed via conduits and power skirting.

The conductors for each circuit installed into power skirting runs must be taped together at a minimum of every 2 metres along the run. The tape used must be colour coded, i.e. White tape for Non-Essential power circuits, Red tape for Essential power circuits and Blue tape for UPS power circuits.. The tape shall be applied at a minimum of two full lap layers per application.

All power skirting shall be as manufactured by Messrs STRUT AHEAD - EXECUDUCT, CABSTRUT or other approved product.

3.22 DOOR LOCK RELEASE MECHANISMS AND CONTROLS - TYPE DR, DRP AND DRK AND INTERCOM SYSTEM as specified

Allow to supply and install Door Lock Release mechanism and Door Opening Stations for the main pharmacy door. The opening stations consisting of Push Button and Key Pad types.

The Door Release mechanism units shall be 12 Volt 50 Hz AC supply.

The Transformer for supply to the units shall be accommodated in the appropriate distribution board.

Wiring shall include the supply to Release Mechanisms, Push Button and Key Pad units.

The Control Circuit shall incorporate a Timing Device to be adjustable between 1 and 10 seconds for the door lock mechanism to re-engage and re-lock the door after each push button or key pad opening signal and an audible signal indicating that the door opening mechanism has been activated.

The Lock shall be installed as an integral part of the door closing mechanism.

The Push Button and Key Pad opening units shall be installed flush into standard 100 x 50 x 50mm draw boxes, or specifically sized draw boxes, as follows:

ONE - TYPE DRP - PUSH BUTTONS - To be installed inside of Security Doors.

ONE - TYPE DRK - KEY PAD - for the Pharmacy Entrance Door

ONE - TYPE DR - RELEASE MECHANISMS - as specified

3.23 THREE PHASE AND SINGLE PHASE ISOLATOR OUTLET POINTS

Allow to supply and install the three phase and single phase isolator points shown on the layout drawings.

The coverplates shall be enamel spray finished white in colour, and depending on type of supply the switch modules shall be colour coded, ie. Non-Essential Power Supply - White; Essential Power Supply - Signal Red and/or UPS Power Supply -Medium Blue

The coverplates shall be fitted with engraved ivorine legend plates indicating the feed from the applicable distribution board, ie.

Example : DB.A and the designated circuit number in the distribution board, ie. 14 etc.

Note that the engraving can be directly scrolled on cast resin and/or plastic coverplates.

Engraving in respect of colours to be exactly as specified for Light Switches and Switch Socket Outlet Coverplates.

The final connections shall be carried out by means of a galvanised conduit run from the Isolators down, or to the nearest point of the appliance connection terminal block position and a flexible heavy duty PVC served Cabtyre type conductor fitted with compression glands and cable shrounds on each end.

Allow to finally connect to appliance/ equipment terminal by means of conductors fitted with crimped lugs or twisted conductors in screwed tight connection blocks.

3.23.1 Three Phase Outlet Points

The outlets shall consist of 60 Amp Triple Pole Isolators installed in a flush mounted galvanised steel enclosure fitted with a metal coverplate.

Wiring of outlets shall be by means of 4 x 4mm² live PVC insulated conductors and a 2,5mm² green insulated earth conductor in 25mm galvanised conduit.or as indicated on drawings.

3.23.2 Single Phase Isolator Outlet Points

The outlet points shall consist of 30 Amp Double Pole Isolators installed in a flush mounted galvanised steel enclosure fitted with a metal coverplate.

Wiring shall be by means of 2 x 4mm² live PVC insulated conductors and a 2,5mm² insulated earth conductor in 20mm galvanised conduit or as indicated on drawings..

3.24 LIFT EMERGENCY SUPPLY INDICATION/SIGNAL CABLE

Allow to supply and install an emergency supply signal cable to the Lift Control Panel.

The cable shall consist of 4mm² 4-core PVC SWA PVC cable routed via the cable trenches in the Sub Station, Cable Pipes to the New Building, Service Tunnel, Riser Duct and along cable ladder runs indicated on the layout drawings.

The cable shall be made off on either end by means of standard terminations with appropriately sized mechanical cable glands.

The connections to be carried out by the respective sub contractors, i.e. Standby Set Sub Contractor and Lift Sub Contractor.

3.25 TRAFFIC CONTROL BOOMS

Allow to supply and install automatic electronically powered Traffic Booms for the Main Road Entrances.to the building for both service lanes

The main operating mechanisms are to be housed in the Main Pedestals.

The pedestal to be manufactured from galvanised steel section clad with 3 CR12 sheet steel bolted by means of galvanised steel bolts, washers and nuts.

The mechanism shall operate on three phase 400 Volt 50 Hz power supply.

The booms shall consist of (provisionally) 5000mm long aluminium poles painted in chevron pattern - white, red and yellow stripes - and fitted with a STOP and NO ENTRY sings identifiable from both sides approaching the booms respectively..

Controls shall be by means of card and /or disc, and Remote Modules, issued by the hospital. Provide to the Hospital 50xDisc`s and 50xRemote Modules..

The complete boom installations shall be suitable for External Coastal Conditions, to operate in Extreme weather conditions, due to being very close to the sea.

3.26 EXTRACT AND TOILET FANS

3.26.1 Extract Fans

Allow to supply and install power supply and an Extract fan in the Server Room in the position shown on the layout drawing. SL 231 – EP6.

The Power Supply shall be via a 20 Amp Double Pole Isolator fitted with cord grip glands for final connections.

Wiring to outlets to be completed with 2 x 2,5mm² PVC wires and 1 x 2,5mm² PVC insulated earth wire in 20mm conduits Final connection to be completed with 2,5mm² 3-core Cabtyre cable, equipped with a

The Extract Fan shall be installed as specified.

3.26.2 Toilet Extract Fans - Type DF1

Allow to supply and install power supply to toilet extract fans and outlet points in the positions shown on the layout drawings - fans shall be by others.

Wiring to outlets to be completed with 2 x 2,5mm5 PVC wires and 1 x 2,5mm5 PVC insulated earth wire in 20mm conduits routed from the toilet lighting circuit to a 75mm diameter round box situated adjacent to the fan. Final connection to be completed with 2,5mm5 3-core Cabtyre cable, equipped with a 20 Amp Double Pole Isolator fitted with cord grip glands

3.27 HAND DRYER UNITS - TYPE HD

Allow to supply and install the hand Dryer units & outlet points in the positions indicated on the layout drawings, and as specified in the Description of Light Fittings & Fixtures.

Allow to supply and install a 20 Amp double pole isolator in a standard flush 100 x 50mm drawbox adjacent to each hand dryer unit.

Wiring to be completed with 2 x 2,5mm² PVC conductors and 1 x 2,5mm² PVC insulated copper earth wire in 20m diameter conduit terminating in a 75mm diameter round box located 1200mm above floor level.

Units to be directly connected and positioned 1200mm to centre line above floor level. by means of two 6mm Diam. Rawlbolts and Stainless Steel Bolts.

3.28 WATER BOIL UNITS AND OUTLETS (HYDRO-BOILERS) - TYPE HB

Allow to supply and install Water Boil Units and Outlet Points in the positions shown on the Power Layout Drawings.

The outlet shall consist of a 50 Amp double pole isolator complete with indicating light switch module mounted in a standard 100 x 100 x 50mm deep conduit outlet box adjacent to the unit.

Wiring shall consist of 2 x 4,0mm5 live PVC conductors and a 2,5mm5 earth conductor in 20mm conduit.

Allow to supply and install the cold water pipe supply and connections as required.

The final connection shall be carried out with 20mm flush conduit installed between the isolator and boiler unit connection terminal point.

The boilers will be fixed to the walls by means of 4 x 6mm diameter rawlbolts.

3.29 Bed Pan Washer Unit - Type BPW

Allow to supply and install power to the Bed Pan Washer units. The Units shall be supplied and installed by others.

The washer unit shall be the floor mount type fixed direct to the floor.

The power supply to be via a 60 Amp Triple Pole Isolator installed into a flush mounted 200mm high x 100mm wide x 100mm deep cast resin enclosure positioned adjacent to the unit 1400mm above the floor level.

Wiring shall be by means of 4 x 4mm2 live PVC conductors and 2,5mm2 earth conductors in 25mm diameter galvanised conduit.

The Power Supply Point for final connection shall be located behind the washer unit.

The final connection point is to be filled up with silicone sealer in order to prevent any form of moisture penetrating into the terminal connection enclosures.

3.30 CLOCK INSTALLATIONS

Allow to supply and install Clocks on wals in positions indicated on the Layout Drawings.

The Clocks are to be installed on walls fixed by means of each two 6mm dia.rawlbolts.

The clocks shall be fitted with batteries, real time set.

3.31 THE AIR-CONDITIONING and PLANT INSTALLATIONS

Allow to supply and install provision for the Air Conditioning and Plant Installation as specified and as indicated on the drawings.

3.31.1 Air Conditioning and Plant Distribution Control Panels

The following Air Conditioning Distribution Control Panels shall be supplied and Installed as part of the Electrical Installations in positions shown:

Main ACDB1	Air Conditioning Plant Room located in the First Floor Level Plant Room
Pump Room	Pump Set supply Panel for Two Pumps located on the Parkng Level

The Distribution Control Panel have been included and specified under Sub Distribution boards.

The Panel shall be manufactured to exactly the same specification as described for the Sub Distribution boards.

The balance of the A/C DB`s and Panels to be installed by the A/C and other Plant Contractors

3.31.2 Generally for the Air Conditioning and Plant Installations

Allow to supply and install the electrical power supplies and provision for the Control Circuits for the Air Conditioning and Plant Installations.

The Air Conditioning Installations and controls shall be installed by a specialist Air Conditioning contractor.

The Air Conditioning units consist of three phase and single phase supplies as specified.

Generally, unless specified, power supply for three phase units shall consist of 4 x 4mm² live PVC conductors and 2,5mm² earth conductors in 25mm diameter conduit via a 60 Amp triple pole isolator mounted in a flush type U5 York enclosure, and final connections by means of a short length (400mm long) 4mm² 5-core Cabtyre cable fitted with compression glands, one at each end.

Generally, unless specified, power supply to single phase circuits shall consist of 2 x 4mm² live PVC conductors and 2,5mm² earth conductor in 20mm conduit via a 60 Amp double pole isolator mounted in a flush type J2 York enclosure, and final connections by means of short lengths of 400mm long 4mm² 3-core Cabtyre cable fitted with compression glands, one at each end.

Allow to supply and install 20mm conduits and 75mm round boxes for the control and thermostat outlets respectively for both three-phase and single-phase units as indicated on the layout drawings.

The control conduit runs shall all be fitted with strong 1,6mm diameter galvanised steel draw wires.

3.32 CABLE LADDER RUNS FOR POWER, TELPHONE, PA SYTEM AND COMPUTER CABLING FOR BUILDINGS

Allow to supply and install a dedicated cable ladder systems for the above services as indicated on the Power,Lighting and Specialist Drawings.

The routes to be followed have been shown on the drawings

Generally the routes are to follow the passages and connecting corridors.

The cable ladder runs are intended for the following:
Power and Lighting cables
The Telephone Service Wiring
The PA System Conductors
The Computer, Fibre Optic, Cat 5E and LAN Wiring
The Fire and Evacuation Installations

The cable ladders to be bolted to the ceiling slab for the entire run.

The cable ladders are to be bolted by means of 2 x 6mm diameter rawl bolts at 1,500mm intervals.

3.33 TELEPHONE/ PABX INSTALLATIONS

3.33.1 The New Telephone Instruments

Allow to supply and install a New Telephone instrument for each outlet shown on the layout drawings.

The instruments shall be as supplied by **PLESSIS CC Type Tellamat M100** Analogue Handsets.

The Telephone/PABX cabling between the existing buildings and the New Psychiatric Building shall be via Pipes in ground as shown and installed via the cable ladder runs indicated.. The main Telephone conductors connected to the Main Hospital Telephone DP/System in the 24Hr Room situated adjacent to Bazley Street entrance.

3.33.2 General Installations

The general distribution of the Telephone/PABX Conductors shall be via conduits and power skirtings as indicated.

The telephone instruments shall be as specified and installed in positions shown on the layout drawings.

Allow to supply and install provision for the Telephone/PABX installation as shown on the layout drawings all as part of the General Electrical Installation.

The main Telephone/PABX drawboxes shall consist of a flush enclosure situated in the various rooms indicated in the New building. The enclosure shall be a 400 x 300 x 100mm York type drawboxes fitted with side hinged doors and have knockouts top and bottom. The enclosures are to be provided with a 20mm thick chip board type timber back plate.

The telephone points are to be installed in the positions indicated on the drawings. Outlets shall generally consist of 100 x 100 x 50mm flush drawboxes complete with blank coverplates.

The Telephone/PABX conduits shall be 25mm dia. galvanised steel conduits for general runs and 32mm dia. galvanised steel conduits for the Main runs all with strong galvanised steel draw wires.

3.34 PUBLIC ADDRESS INSTALLATION

Allow to supply and install a New Public Address System for the New Psychiatric Ward Facility including new Amplifier and Microphone Sets and extend the existing wiring from speakers in the building.

The Public Address shall be connected to the General Hospital PA system in the 24Hr Room Admin Building at the Bazley Street Entrance.
The new amplifier and microphone equipment is to be installed at the Security office on first floor...

New Equipment, etc. The New Equipment to be provided shall consist of the New Main Amplifier, Microphone and Speakers installed in the new building and associated wiring.

3.34.1 The Main PA System Amplifier (BS 5942 Part 6 & BS 6840 Part 3)

The Amplifier shall be installed in a suitable enclosure on the Security Desk.

The Amplifier shall be of modular design installed in a wall mounted enclosure.

The Controls of the Amplifier shall all be on the front face with power supply, input and output connections on the back of the unit.

The Amplifier shall be rated so that it can be used to drive all the speakers in the Hospital. Allow for 50 speakers and the Fire Microphone /Speaker System complete with all the auxiliary equipment.

Speakers to be fitted with 100 V transformers and taps for 1 W, 2 W & 5 W.

The output of the Amplifier shall be via a 100 V line transformer.

The Amplifier shall have a frequency response of 20 Hz - 20 kHz.

The distortion shall be less than 1% at the rated output of 1000 Hz and signal to noise ratio of not less than 60 dB.

The output of the Amplifier shall be protected by means of a rated fuse cartridge installed in a fuse cartridge holder, easily accessible in the event if replacement is necessary.

The output circuit should not be damaged if the output load is changed either open circuited, short circuited or if one of the output conductors are earthed.

The Amplifier shall be provided with a connection Input Module for a Microphone.

3.34.2 The New Microphone Unit (BS 5942 Part 5 & BS 6840 Part 4)

The Microphone Unit shall be installed adjacent to the Selector Unit.

The Microphone shall be desk mounted on a suitable desk bracket.

The Microphone shall have its own switch incorporated with the mounting bracket.

The Microphone unit shall be a paging dynamic uni-directional type, designed for the system application.

The Microphone shall ensure distortion free speech, free from any outside interference.

The Microphone shall be selected so that normal speech via the amplifier to speakers in zones shall be driven to an acceptable audio level.

3.34.3 The PA System Loudspeakers (BS 5942 Part 7 & BS 6840 Part 5)

Allow to supply and install the Loudspeakers in the positions shown on the layout drawings and to standard requirements.

The speakers shall be installed on a 110 Volt line system. Each speaker shall be equipped with a high quality 110 Volt line compatible transformer. The transformer shall have tap settings so that a selection of taps will allow the optimum sound pressure level for a given loudspeaker position.

The speakers shall have a fire rating, the cone part of the speaker shall be the *Mylar* type, or other approved fire rated type.

The Loudspeakers generally are to be installed on to suspended ceilings.

Where no ceilings exist the speakers are to be installed into surface mounted enclosures.

Loudspeakers in ceilings shall be of the ceiling mounted type installed into openings cut neatly into the tiles. Ceiling mounted speakers shall incorporate a round architrave type overlapping rim so that no side gaps or openings will be visible from bottom looking up to the speaker units.

The visible part of the speaker units shall be approximately 200mm in diameter, and made from high impact durable white plastic.

Suspended ceiling mounted speakers shall not protrude more than 200mm deep into the ceiling space.

Surface mounted speakers shall be installed in high quality timber enclosures with speakers of similar appearance to flush mounted speakers.

Surface mounted speakers shall not protrude more than 200mm below the ceiling level.

Horn Speakers shall be installed in the external and roadway areas.

The speakers selected must provide exceptional sound quality with a frequency response of not less than 130 - 12000 Hz.

The minimum allowable Sound Pressure Level shall be 92 dB at 1m.

Take note that although acceptable volume levels are between 70 to 80 dB depending on the level of background noise, the tap settings may have to be adjusted to increase the volume.

It must be noted however that depending on the design of speakers, the acoustical design of ceilings, the physical architecture and layouts as a result of client accommodation requests, the best acceptable positions for speakers may vary and that in order to achieve optimum design, re-arrangement of layouts may be necessary and must be made accordingly.

Any variations which may be forthcoming as a result of equipment to be provided must be brought to the attention of the consulting engineer, who is to be advised so that the revision can be implemented prior to installations on site.

The Loudspeakers under normal circumstances shall be driven from the Main Amplifier at the Receptionist Counter, the Hospital Pa System and if required during fire conditions, driven in each zone from individual zone amplifiers.

3.34.3.1 Structural Provisions

The basic installation shall consist of 75mm diameter round galvanised steel draw boxes and conduit runs.

The conduits shall be 20 mm diameter galvanised steel installed inside the ceiling void with outlets adjacent to each speaker position.

3.34.3.2 Cabling

Install cabling from the speakers to be installed in the New Psychitric Ward Building. The wiring to speakers in the building is to be extended and reconnected for supply to the New Amplifier.

3.35 THE CCTV INSTALLATIONS

3.35.1 General

Allow to supply and install Digital Colour CCTV Observation/Surveillance Installations for the following comprising THREE separate Systems:

A The Main Patient Observation.

B. The Surrounding Ward Circulation Areas, Ground and First Floor.

C The Security Surveillance, Parking and Externally Surrounding the Building.

Detail description of each System as follows:

3.35.1.1 The Main Patient Observation

The Main Patient Obsevation generally limited to the Psychiatric Patient Wards and Refer below related Surrounding Ward Areas all on Ground floor level

The Main Monitoring of the System to be situated in the Central Nurses Station.

The System to consist of the Main control Equipment, Two Monitors and approx.. 26 CCTV cameras

The Principle Monitor to provide cascade frame images in Picture in Picture (PIP)format.and a second monitor to capture a specific PIP /Frame when selected, which can be observed in detail, as required.

3.35.1.2 The Surrounding Ward Circulation Areas and

The Main Observation System of the Surrounding Ward Areas to be situated in the Central Nurses Station

The Main Monitoring of the System to be situated in the Central Nurses Station and a remote monitor to be provided for parallel observation on the Main Receptionist Counter at the Entrance to the Psychiatric Ward Facility

The System to consist of the Main control Equipment, Two Monitors and approx.. 14 CCTV cameras

The System monitors shall both have PIP capability controlled from both Nurses Station and/or Reception Desk

3.39.1.3 The Secuirity Surveillance Installation

The Main Security Surveillance Equipment and Monitor to be located on the Security Entrance Desk at the Entrance to the Psychiatric Ward Facility.

The Surveillance cameras shall be controlled from the Security Station.

The Cameras shall consist of 8 installed in the Parking Area and 10 installed externally on surrounding walls.

The Monitor shall have PIP capability enabling any of the selected frames to be selected.

3.39.2 The CCTV Installation Drawings

The above installations shall be installed as indicated on the CCTV Layout drawings;

a. SL231 - CCTV1 – Parking Level and External Installations

b. SL231 - CCTV2 – Ground Floor Installations

c. SL231 - CCTV3 – First Floor Installations

The Drawings generally indicating Main CCCTV Stations and CCTV Cameras

3.43.3 The CCTV Installation Power Supplies and Protection

The CCTV Installations shall be connected to the Essential Power Supply.

The Power Supply being 230Volts at 50Hz and all equipment offered shall be rated accordingly.

All equipment shall be provided with Voltage Surge Protection and Lightning Arrestor Protection Modules, detail of both shall be submitted prior to any installations on site.

3.39.4 The CCTV Equipment / Installation Standards and Quality

The equipment offered shall be in accordance with the standards and quality specified in SANS 10222-5-2 (1999) ELECTRICAL SECURITY INSTALLATIONS PART 5-2: CCTV INSTALLATIONS - Applicable Guidelines.

All the equipment offered including the selection, planning and installation of CCTV systems comprising multiple cameras, monitors, CD/Flash Drive recorders, selector panels, control and ancillary equipment shall be in accordance with the relevant SANS publications.

The systems must all be equipped for live display and recording.

3.39.5 CCTV Installations Indoor and Outdoor

3.39.5.1 Outdoor CCTV Installations

The Cameras/Equipment to be installed outdoor must be protected and be able to withstand extreme sea facing saline conditions and Particularly the Conditions prevailing at the Port Shepstone Hospital

The Cameras shall be protected by means of Stainless Steel Metal Protective Shields In order to limit Direct Sun and the Ingress of water/moisture.

The mounting brackets for Cameras, associated accessories and securing components shall be double dipped galvanized,

3.39.5.1 Indoor CCTV Installations

The positioning of the Main CCTV Equipment shall be provided in conjunction with the Architects Room Data Sheet Details.

The Installation of Indoor CCTV cameras shall in accordance with the Detail drawing SL 231 – CCTV1 for Surface ceiling slabs, and Detail Drawings on SL 231 – CCTV1 and SL 231 – CCTV3

Cameras to be installed below false ceilings must be mounted against on Unistrut structures inside the ceilings in accordance with the detail drawings indicated.

The Structures fabricated by means of P2000 galvanised unistrut

Under no circumstances may cameras be installed directly on False Ceiling Panels.

3.39.6 Detail of CCTV Equipment/Installations to be supplied.

A. The Main Patient Observation CCTV Installations

1. The Main Equipment and Monitors consisting of two (2) 80cm screens including swivel brackets suitable for wall mounting.

2. One (1) Selector Station ie.Computer Mouse modules to select each from a single to sixteen simultaneous frames (PIPS)

3. Twenty Six (26) Surveillance Cameras to be mounted on concrete ceiling slab and/or suspended type ceilings.

4. One (1) Flash Drive and CD Recorder each with dual cassette chamber/ CD Rom feed/ CD Rom capable of recording from all of the twentysix cameras.

5. One (1) Power Pack consisting of a UPS and Transformer installed in a suitably ventilated enclosure to be mounted on the walls in positions indicated.

6. Wiring of the installation and equipment in accordance with the standards specification.

   Conductors for both CCTV Camera signal and power wiring to be installed in separate harnesses/unistrut runs as specified and indicated on the drawings.

B. The Surrounding Ward Circulation Areas, Ground and First Floor CCTV Installations

1. The Main Equipment and Monitor consisting of a 80cm screen including swivel bracket suitable for wall mounting.

2. Two (2) Selector Stations ie.Computer Mouse modules to select each from a single to sixteen simultaneous frames (PIPS) for The Nurses Station and Receptionist Desks.

3. Eight (16) Surveillance Cameras to be mounted on concrete ceiling slab and/or suspended ceilings.for both Ground and First Floor Levels.

4. Two Flash Drive/ CD Unit Recorders with dual cassette chamber feeders/ CD Roms capable of recording from all of the sixteen cameras.

5. Computer and software to be included of size and extent depending on system requirements.

6. Power Pack equipment consisting of a UPS and Transformer installed in a suitably ventilated enclosure to be mounted on the wall in the position indicated.

7. Wiring of the installation and equipment in accordance with the standards specified.

The Monitoring Screen, Selector Panel, Video Cassette/ CD Recorder and Power Pack are to be installed in the Nurses and Reception Desks in the position shown on the layout drawing.

B. The CCTV Installations for the Security Surveillance, Parking and Externally Surrounding the Building.

The system is to operate and provide high quality images at an illumination intensity level of 5 lux.

1. The Main Equipment and Monitor consisting of a 80cm screen including swivel bracket suitable for wall mounting.

2. A Selector Panel to control both cameras with mounting suitable for wall mounting.

3. Eight (8) Surveillance Cameras for the Parking Area and Ten (10) cameras for the external surround of the building capable of panning through 90° both vertical and horizontal planes and zoom features - outdoor type - with fully galvanised steel outdoor brackets suitable for wall mounting. The Zoom Range shall be up to 50 metres.

4. A Flash Drive /CD unit to be installed on the Security Desk including a dual cassette chamber feed/ CD Rom capable of recording from all Eighteen Cameras. The Flash Drive/CD unit shall be capable of continuous recording of images from all Eighteen cameras.

5. Computer and software to be included of size and extent depending on system requirements.

6. Power Pack equipment consisting of a UPS including battery and transformer installed in suitably ventilated enclosure to be mounted on the wall in the position indicated.

7. Wiring of the installation and equipment in accordance with the standards specified.
   Conductors to be routed via conduits and outlets indicated on the layout drawing.

The Monitoring Screen, Selector Panel, Flash Drive/CD recorder and Power Pack is to be installed in the Main Security Duty Desk in the position indicated on the Architects Room Data Sheets.

3.39.2 Final Handover and Testing

The complete CCTV systems of all three installations to be handed over after routine testing to ensure the equipment is all functional and working as specified, a certificate of completion is to be issued confirming test results of the installations.

A complete training programme for each system in each of the departments for the benefit of appointed personnel responsible from the hospital is to be carried out in order to ensure that the equipment can be Aused successfully≅ in perpetuity, after hand over.

3.39.3 Guarantee

The three installations to be guaranteed for a period of 12 months from the date of hand over.

It must be noted that if the supplier of the equipment offers a guarantee longer than 12 months then the full guarantee period must be accepted and ceded to the owners.

All documentation in respect of the guarantees must be handed to the owners, and a signed and dated receipt must be given to the Electrical Engineer to confirm acceptance by the owner.

3.40 IT INFRASTRUCTURE and DATA CABLING INSTALLATIONS

3.40.1 INTRODUCTION

The IT IFRASTRUCTURE Installations shall provide an appropriate Network for the Provision of Computers and Associated Equipment for the New PYSCHIATRIC WARD facility.

3.40.2 SCOPE of IT INFRASTRUCTURE INSTALLATIONS

The Initial Scope commences with the Identification of the existing IT Infrastructure Installations at the Port Shepstone Hospital.

The Existing IT Infrastructure Network is all connected to the Equipment Installed in the Existing Server Room located on the lowest Level of the “West Block” situated in the Existng Hospital.

The IT Infrastructure Equipment in the Room is installed in IT Cabinets, including the MAIN CORE SWITCH (MCS) connecting all the various Existing Departments at the Hospital.

Fibre Optic Cables shall be installed between the Existing MCS and the New Psychiatric Ward Facility via SFP connecters on each end. refer para.3.40.2
Noted that Dual cables are to be installed and additional SFP connectors are to be provided.

3.40.1 IT INFRASTRUCTURE INSTALLATION

Allow to supply and install the Computer Data Infrastructure and Cabling System for Computers in the New Building in accordance with EIA TSB-67 standards.

The cabling infrastructure shall be installed by an Approved State Information Technologies Agency Contractor (SITA) and I addition the Contractor shall be registered with the Communication Cabling Association of South Africa.

The Installations to be linked to the existing network in the Hospital by means of Fibre Optic computer cable installed via the cable pipes and Service Tunnel indicated on the Site Plan Drawing SL 231 – ESP1 via a new Computer Switch Unit and the Main Computer Switch located in the Main Server Room below the West Block in the existing Hospital.

The installation shall consist of the New Fibre Optic Cables, New Main Edge Switch, Patch Panels, Cabling and Fly leads connecting computers to computer housing outlets installed against Walls or in Power Skirting Runs as required for computers and the ancillary equipment.

3.40.2 The Main Computer Connection for the New PSYCHIATRIC WARD BUILDING.

The Main Computer connection to the existing Hospital Network shall be via the Existing Main Core Switch situated in the Existing Server Room.

Allow to supply and install Dual Main Fibre Optic Cable between the Existing Main Core Switch and the proposed Edge Switch as specified for the New Psychiatric Ward Building. The Fibre Optic cable connections on both ends to be fitted with FPS connectors. ie.Two connectors for each of the two cables a total of 4 Connectors

3.40.2 The Main Computer Edge Switch to be installed in the New PSYCHIATRIC WARD building

The New Edge Switch shall consist of a 3Com 5500-S1 58 Port Unit.or equal and similar The switch shall be provided compatible with the general arrangement of the existing network. Full supportive related specification is to be provided for srutinisation and approval by the Department of Health IT INFRASTRUCTURE DEPARTMENT prior to purchase and supply to site.

Allow to supply and install a 56 port 10/100 Hubs in the Main Computer Room on First floor, new Psychiatric Ward Building:

Allow to supply and install a 58-way Patch Panel with 58 x one metre long Patch Leads. Each patch lead must be labelled end to end by the contractor.

Allow to supply and install in addition a 1U Cable Management Unit (Brush Panel).

Allow to supply and install a Freestanding Cabinet with the following specifications:

TWO	-	800mm x 600mm Racks
ONE	-	5-Way 15A Modular Power Unit
ONE	-	100mm dia. single phase 230 Volt 50 Hz Fan mounted at the back of the unit.
THREE	-	40mm Front Mount Trays
ONE	-	150mm high x 800mm x 800mm Plinth with removable sides
ONE	-	Front Laminated Glass Door fitted with Union or approved type lock.

The Unit shall be sized a minimum of 2200mm high x 800mm wide x 800mm deep.\

Noted that these dimension could be adjusted and must be verified prior to purchase and supplired to site.

3.40.3 Computer Connection Switch Hubs in Cabinets .(CCSC)

Supply and Install **Eight** (8) CCSC as follows:

A. In the Main Computer Server Room, and as shown on First Floor

B. On Ground Floor indicated in the Group Therapy Room and as indicated.

C. On First Floor Level in the Passage End Wall and as shown

D. The Parking Level Offices East Wing

The CCSC Units shall follow the same specification as described above for the Main Computer Switch and each to be equipped with Patch/Brush Panels to accommodate the Number of computers connected to the server.

3.40.4 DESK TOP TOWER COMPUTERS

Allow to Supply and Install Desk Top Tower Computers in Departments to be designated on site. The Computers are to be installed in Offices, Nurse Stations, to be determined.

The Computers shall be supplied in Framework/Cabinets measuring a minimum 170mm wide x 350mm deep and 350mm in height, manufactured from rustproof Metal fabrication.

Computer Specification

1. CPU: Latest Generation Intel i5 Processor
2. RAM: 8GB DDR RAM
3. Hard Drive: 500GB Internal Hard Drive
4. Optical Drive: Internal DVD Writer.
5. Graphics: On-board Graphics Card

Built-in / On-board

1. On-board Graphics Integrated Graphics with at least 1xVGA out port to connect Monitor.
2. At least 4xUSB ports to connect memory sticks and other devices (Ensure 2xUSB ports in the Front)
3. Integrated Sound Card with Mic and speaker in the back and on the front.

Connectivity

1. Must have built in RJ45 network port and must support 10/100/1000MB
2. Must have a built in Wireless (WIFI) card

Additional Accessories
1. USB Keyboard
2. USB Mouse

Monitor
1. Stand-alone 18 inch Flat Screen Monitor with built in Speaker

Software.
1. Must support Ms Windows 7 and Ms Office 2013 and latest versions of both.

To be noted that the Department of Health has its own Microsoft Licence Agreement and if Windows is provided to ensure that it is the Windows "Professional" Version.

The Cabinets shall be fitted with standard ON/OFF switch, On Pushbutton/Pilot Light retaining Power ON in the front, Power Pack Supply Unit 230V AC input to the required DC Voltages.

The Computers must all be supplied with a minimum of three Cooling Fans, the one dedicated for the Mother Board and two for the internal content of the Cabinet.

In addition the Cabinets must be supplied with side panels fixed with non-tampering screw types, and a steel wire cable connection point to prevent removal from Desk Tops once installed.

3.40.5 PRINTERS TO BE PROVIDED

Allow to Supply and Install Printers in conjunction with Desk Top Computers as follows:

All Printers shall be Standard Black and White, Fast High Quality cost efficient LaserTechnology, including flexible paper handling and flexible connectivity options.
To be noted that the specifications are the minimum standards and if any of the criteria is not forthcoming the printers will not be accepted.

General
1. The maximum print speed shall be 42ppm Black.
2. Duplex printing
3. Maximum Print Resolution: up to 1200 x 1200 dpi
4. First Time to Print: Less than 8 sec.
5. CPU Processor Speed: Min. 800MHz
6. Standard memory: Min 256MB
7. Toner Save Mode
8. Max. Monthly Duty Cycle to exceed 50,000 pages.
9. Recommended Monthly Print Volume: Up to 3,500 pages

Paper Handling
1. Standard paper Capacity: 250 sheet input capacity
2. Output paper Capacity: 150 sheets
3. Paper Handling Size – Paper Tray: Letter, Legal, Executive, A4, A5, A6

Connectivity and Compatibility.
1. Standard Interfaces: Wireless 802.11b/g/n, Ethernet (RJ45) and Hi-Speed USB 2.0

The following to be included:
1. CD-ROM and Drivers.
2. AC Power Cord
3. Quick Setup Guide
4. 2m USB printing cable
5. Toner.
6. Drum Kit

All printers shall have compatible software and all instructions, installation information including supporting literature to be provided.

3.7 LABELS and MARKINGS and SECURITY MEASURES

All cable ends are to be marked with Information Labels, the information is to be recorded, documented and submitted in a manner that will allow subsequent identification for sustainable management of the IT Installations
All Servers/Hobs located in the entire Hospital are to be provided with suitable Labels, suitably marked, recorded and information submitted to the Hospital, and included as part of the As Built documentation for Final Handover to the DOH

All of the Servers/Hobs are to be provided with suitable locking devices. The Keys are to be handed over to the Representive Member for It Infrastructure at the Hospital.

A register to identify each Server/Hob shall be compiled and include as an integral part of this Handover procedure

3.40.6 SOFTWARE TO BE INSTALLED

The Software must be in accordance with standards, compatible and acceptable to the Department of Heath IT Infrastructure requirements.

Allow to Install the required Software to enable the Functionality of the Hospital Computer system to operate and provide the intended service.

Each Departments specific requirements are to be taken into account.

The software must include allowance to backup Data ie. all documentation required to be backed up by the Hospital, and stored to the satisfaction of the Hospital

The Software is to provide all the required Firewalling to enable information to be screened and channeled accordingly

The Software is to allow for the all dedicated Land Line and Aerial Connections for External Communication Systems required by the Hospital

To be noted that the Department of Health has its own Microsoft License Agreement. If Windows is provided, ensure that it is the Windows "Professional" version.

3.40.5 Cabling

Allow to Supply and Install Cabling consisting of The Main Fibre Optic Cable and the Computer Cables connecting the Individual Computer Stations CCSC units to the New Main Computer Switch.

The Fibre optic cable to be Rated for external and multi transmission communication Computers from the New Psychiatric Building to be Main Server located in the Existing Hospital as stated.

The Cabling to be installed to link computers to the New Switch Unit shall comply with Category 5 Enhanced Cabling standards.

The Fibre Optic Linking Cable shall be installed via. Cable pipes and on existing Cable Trays situated in the service tunnel in the exsiting hospital and Cat 5E cables in conduits, in Power Skirting runs and on cable trays below Ceiling Slabs as indicated on the Site plan Layout Drawing and Floor Layout drawings respectfully.

The conduit runs have been indicated as Data/Computer conduits.
The exact number of conduits for each service shall be allocated depending on specific requirements prior to installation.

3.40.6 Computer Outlets

Supply and install Dedicated Computer Outlets in Walls, Power Skirtings and/or stand alone Pedestals for the stations, as indicated on the drawing.

The outlets shall be single housing type fitted with MPS modules suitable for the connecting of computer plug leads.

Supply and install 3 metre long Fly Leads with R145 connections on each end for linking modules to computers.

3.40.7 Final Handover And Testing

The complete installation is to be handed over after routine testing to ensure the cabling and connection continuity has been tested and that a certificate of completion issued confirming test results of the circuits installed.

3.40.8 Guarantee

The complete installations to be guaranteed for a period of 12 Months from the date of Handover.

It must be noted that if the supplier of the equipment offers a guarantee longer than 12 months then the full guarantee period must be accepted and ceded to the owners.

All documentation in respect of guarantees must be handed to the owners, and a signed and dated receipt must be given to the Electrical Engineer to confirm acceptance by the owner.

3.40.9 TRAINING

A suitable qualified person, preferably one who has been involved with a similar installation, or the installation on site and who is conversant with Hospital IT Infrastructure employed by the Administration in operating the installation.

Such a person shall be available to instruct and train the persons involved by means of lectures and practical instructions on site for a period of one day minimum, commencing two days before the commissioning and handing over of the installation.

The Contractor shall supply full details of the proposed training to be given on all hardware and software as specified in this specification and detailed in the bills of quantities.

He shall also indicate the duration of the course and course outline.

Irrespective of the above, the Contractor shall perform revision training of the technical personnel six months after acceptance of the installation and the first training session. The Contractor shall determine whether the personnel are familiar with and adequately trained to utilize the installation fully and submit a report after this revision training to the Administrations representative.

The Contractor shall supply full details of the proposed technical training to be given on all hardware detailed in the bills of quantities.

He shall indicate the duration of the course and course outline.

The technical and operational manuals to be supplied by the Contractor must be explained fully to the personnel.

If any questions or problems are experienced relevant to the technical side of the installation, the Contractor shall assist in sorting out the problem to ensure a working installation, including the providing of additional software support, etc.

The Contractor shall provide to the Department confirmation of the Training Programme, listing the personnel that received training, the duration of training, a brief description of the programme and finally a certificate signed and dated by the Supervisors of the relative departments and institutions. Training of personnel shall include actual representation of the Security Department, Maintenance, Workshops and the applicable Administration staff personnel.

3.41 UNINTERRUPTED POWER SUPPLY (UPS)

Allow to supply and install an Uninterrupted Power Supply for the Psychiatric Ward. The UPS Equipment is to be installed in the UPS Room on the First floor..

The UPS to consist of the Main Control Unit and separate Battery storage. The Main control Unit and Battery storage are to be Housed in two totally separate cabinets.

The UPS Supply shall power the Main Computer Switch Unit and all the stand alone Computers and the P A System for the Facility

3.41.1 General

Allow to supply and install an Uninterrupted Power Supply Unit (UPS) in accordance with SANS 1474 and SANS 62040 Parts 2 & 3.

The units shall be installed onto suitable free-standing trays supported on 50mm diameter Castors. The units no less than 100mm above floor level. The cabinets provided with free ventilation openings to allow for free flow of air and easy cleaning of the floor.

3.41.2 UPS Equipment Specification

The UPS shall consist of a 10 kVA capacity unit and supply output at 0,7 Ind PF to provide 60 minutes standby at full load.

The units shall operate from a Three Phase Input Supply≅ and provide Three Phase 400 V 50 Hz Output Supply

The input supply shall be 400 Volt 3-phase 50 Hz.

The rated output voltage shall be 400 Volt Three Phase.

The input to output efficiency at full load shall not be less than 90%.

The UPS unit shall be supplied with maintenance free sealed Lithium Ion batteries with an anticipated life span of not less than FIVE years.

The unit shall be equal or similar to Eton or other approved make and manufacture.

During the 12 month guarantee period the Contractor shall maintain the units and make good any defects due to poor materials and/or workmanship,and ensure the units to be in good working order..

3.41.3 Cabling

Allow to supply and install the Main Supply Cable to the UPS and Sub Mains feed to the UPS Distribution Board.

The cable sizes have been specified under Mains and Sub Mains Supply.

3.41.4 Main Control Cabinet

The UPS shall be housed in a compact self-contained rigid cabinet installed onto suitably selected vibration mountings.

The cabinet shall be structurally sound with no visible distortion while lifting the unit including the internal equipment.

The cabinet shall allow access for ease of maintenance.

The cabinet shall be provided with a digital display panel.

3.41.5 Operation

The operation shall comprise of a conventional double conversion design.

The mains input is to be converted to DC power via a rectifier/charger circuit and the DC in turn converted back to AC via an inverter.

The battery is to be connected to the DC line and kept charged via the rectifier/charger unit.

During normal operation the output from the unit is to provide a clean and regulated supply.

During Mains Failure power is to be supplied from the battery via the inverter providing an uninterrupted power supply.

During Mains Failure supply conditions, the output shall contain the same characteristics as the normal power supply.

The output voltage during mains failure to remain sinusoidal with minimum harmonic content.

At the stage when Mains are restored the system is to return to normal and battery bank recharged.

3.41.6 Bypass Operation

Allow to Supply and Install a BY PASS switch on the wall adjacent to the Unit.

The unit shall be supplied with Off/On modes and By Pass Mode to allow for Maintenance and or Removal of the UPS Unit if under circumstances repairs/replacement is to be carried out without any undue interruption to the supply.

Should UPS failure occur or when the load is measured to beyond the designed and adjusted maximum output, a static bypass is to transfer the load back to the Mains Supply without interrupting the critical load.

After switching to bypass operation the UPS system is to automatically monitor the critical load until conditions return to normal and subsequently return to mains operation.

The bypass function shall also operate if the output voltage falls to below a pre-set level by transferring the load back to the Mains.

3.41.7 Protection Circuits

The UPS unit shall be fully protected against internal and external faults by means of circuit breakers and fast acting fuses.

The battery shall be protected against overcharging by a DC detection circuit that isolates the charger circuit should the DC voltage exceed a certain critical safety level.

The following switchgear shall be provided:

Input circuit breaker,output isolator, bypass switch and fused isolator for batteries.

3.41.8 Digital Display

The digit display shall consist of a 20 character, 2-line digital display providing simultaneous information for input voltage, output current, output frequency and DC voltage.

The display shall indicate and incorporate an alarm if a fault has been detected.

The alarms to be monitored shall be as follows:

High - DC shutdown
UPS Overload
Battery discharging
Low DC shutdown
Battery critical
Load on bypass
Over temperature
Input out of limits

3.41.9 Remote Monitoring

The following voltage free contacts shall be provided for connection to a remote alarm panel: Located at the Security Desk

Remote - DC shutdown
UPS overload
Battery discharging
Low DC Shutdown
Battery critical
Load on bypass
Over temperature

3.41.10 Maintenance Free Batteries

Maintenance free sealed batteries shall be installed as an integral part of the Cabinet and installation.

The basic battery specification will comprise of the following:

10 kVA	-	32 x 12 Volt Batteries: 192 cells
V Float	-	432 V
V Min	-	336 V
Maximum DC discharge current	-	22.6 A
Maximum DC Power	-	7.6 kW
Maximum charging	-	2.0 A

3.41.11 Lightning Protection

The Lightning Protection Specification shall include that the UPS is designed to withstand standard test pulses of up to 6 kV.

3.41.12 Commissioning and Handover

Allow to commission and handover for the benefit of the client.

3.41.13 Service Manuals

Four complete sets of operating instructions and maintenance manuals must be provided for the UPS, as well as for the Power Supply and Backup Batteries.

3.41.14 Maintenance

Maintenance instructions for all components of the UPS including trouble shooting guide, part numbers of all replacement items, etc.

3.41.15 Guarantee

The Contractor must allow to service and maintain the installation for a period of 12 months. During the 12 month guarantee period the Contractor shall make good any defects due to inferior materials and workmanship and maintain all equipment in perfect working order.

3.42 SECURITY INSTALLATIONS

3.42.1 General

Allow to supply and install Security Installations for the Facility as specified.

The Security Installations shall be undertaken and installed by a Security Specialist.

The Security Installations to comply with SANS10222 - Security Systems In Buildings (as applicable) and SANS 2220 Part 1.1 to 1.8 - Security Systems & Alarms (as applicable).

The complete installations are measured in the accompanying Bills of Quantities.

All conduits and outlets have been measured as part of the Electrical Installation.

Conduits are to be provided with strong draw wires in preparation for the installation of conductors by the Specialist Contractor.

A complete set of layout drawings for the installation of the Security Systems have been included as part of the documentation.

3.42.2 Basic Systems

The basic Security System shall consist of the Main Control Panels installed in the Ceiling Void or adjacent Store Room.as shown.

The Security Devices shall consist of all the components as specified, all as part of the requirement list.

The requirements for the systems as follows:

TWO	-	Main Control Units
TWO	-	Transformers, Battery Chargers
TWO	-	Controlling key pads
FORTY SIX	-	PIR Detectors
TWELVE	-	Panic Button Stations
TWO	-	External Sound Bombs
FIVE	-	Internal Sound Bombs
FOUR	-	Magnetic Door Sensors
SECURITY CABLE	-	1,0mm^5 4 pair Security Cable.

No armed response will be required as part of the contract.

3.42.3 Lightning Protection

The Lightning Protection Specification shall include that the Security System is designed to withstand standard test pulses of up to 6kV and that a Lightning Protection Device be supplied in addition to provide the Main Power Supply.

3.42.4 Service Details

3.42.4.1 Service Manuals

Four complete sets of operating instruction and maintenance manuals must be provided for the Security Installation including Manufacturers Catalogue Details.

3.42.4.2 Maintenance

Maintenance instructions for all components of the Security Installation including trouble shooting guide, part numbers of all replacement items, etc.

3.42.4.3 Guarantees

The entire installation must be covered by a twelve month guarantee from the time and date of final commissioning.

4.43 TELEVISION SETS, SATELLITE DISH and CONNECTIONS

4.43.1 Television Sets

Allow to Supply and Install the Television Installations consisting of the supply and installation of Television Sets, satellite Dish Cable and connections as follows.

Three Television sets shall be installed, at the entrance waiting area and in each of the Male and female dinning /Lounge areas as indicated on the layout Drawing SL 231 – EP4

The Sets shall be a minimum of 1480mm Units, Measured Diagonally across the Screen, and matching Satellite Dish (refer Below)

The Television Sets shall be of High Quality and reputable make with standard Yellow/White/Red –Video/LMono/RRadio HDMI and USB Inputs/outputs on the rear and at the back of the unit.

The Sets are to be installed against the walls in the positions Shown.

The Installation of the Sets shall be in accordance with the Manufacturers details

Allow to Supply and Install Co-Axial cable as may be required from the Dish to the Sets

The Sets shall be installed into suitable galvanized steel enclosures, with Doors and lockup padlock facilities

4.43.2 The Satellite Dish

The Dish is to be fixed to the wall projecting above the roof in the position shown on the drawing. (NOTE: Depending on field strength tests an alternative position for the aerial may have to be determined)

The dish is to be manufactured from rust proof aluminum, suitably anodized complete with LMG receiver module.

Allow to supply and install the outlets and conduit runs as shown on the layout drawing.

The Television Dish must be suitable for the reception providing Television coverage of TV1, TV2, TV3 and ETV and installed as per SANS 061 - Part 1 & 2.

The Contractor must ensure that Field strength Frequency Tests are conducted in order to position and direct the aerial and that the information is also submitted to the Consulting Engineer to maintain a record of the information received.

Allow to supply and install the appropriate co-axial cable and Lightning Protection Earth Spikes all as required to form a complete Television Dish Installation.

The outlets shall consist of standard 100 x 100 x 50mm flush draw boxes installed at 2400mm above floor level.

The draw boxes shall be provided each with TV outlets mounted onto white cover plates Conduit runs shall be 25mm in diameter.

The entire installation shall comply with SANS 10061-1 & 2, SANS 1584-1 to 3, SANS 1252 and SANS 1611.

3.48 MICROPHONE AND LOUDSPEAKER SYSTEM

3.48.1 General

Allow to supply and install Microphone and Loudspeaker system for the ward round room:

The System shall consist of the Main Amplifier Microphone and Four Speakers.

The systems shall be in accordance with the requirements of SANS 0201, 1066 and CKS 335

The system shall be driven by Amplifiers installed below the counter tops in the positions shown.

The amplifiers shall be standard Public Address type 100 Watt with built in cassette players.

The Microphone sets shall consist of Electronic Uni-directional type.

The speakers shall be minimum 36 Watt column mounted pattern complete with strong mounting brackets suitable for ceiling slab and/or wall mounting.

The installations shall consist of the structural provisions, ie. Draw boxes, conduits and outlets, the installation of the amplifiers, Microphones and speakers and associated cabling.

3.48.2 Structural Provisions

The basic installations shall consist of 75mm diameter round draw boxes and conduit runs.

The conduits shall be 20mm diameter installed via the ceiling/roof with outlets for the amplifiers, Microphones and speakers.

The Microphones must be installed above the desks and the speakers shall be ceiling and/or wall type as specified.

3.48.3 Cabling

Allow to supply and install the cable specified into all the conduit runs.

The cable shall consist of 0,10mm5 4-pair PVC insulated SANS approved cable.

3.49 NURSE CALL SYSTEMS

3.49.1 General

Allow to supply and install Nurse Call Systems, SANS 9000 compliant for the Procedure rooms and the main Nurses station Desk

The Control Panel shall be installed in the Nurses Station Room linking outlets in the Procedure rooms.

A. The Nurses station

The Main Panel to consist of Six Way Station Call and Receive Unit

Panel shall be supplied with a static Legend to identify receiving Caller Location.

B. The Procedure Rooms

Each of the rooms forming part of the Procedure Room Section shall be provided with call and Cancellation features

3.49.2 Wireways and Wiring

Wiring shall be carried out in 20 mm conduiting as shown on the layout drawing.

Wiring shall be by means of 1,0mm 4-pair PVC Teledac conductor in 20mm conduit and trunking systems as specified.

3.49.3 Switched Socket Outlets

Switched socket outlets shall be installed for supply to the Main Control Panel.

The outlet shall be on Essential Power Supply.

3.49.4 Documentation

Four copies of the documentation on the installations shall be provided.

The documentation shall cover system operation, description of the systems, a component list and wiring schedules.

3.49.5 Compliance Certificates

Where applicable, the contractor shall issue an electrical compliance certificate for any electrical work forming part of the installation.

3.49.6 Testing and Commissioning

The contractor shall test and commission the installation. As part of the commissioning the contractor shall train nursing staff to operate the system.

3.49.7 First Delivery

It shall be noted that first delivery of the installation will not be taken until the testing and commissioning has been completed, and until the documentation and compliance certificate (if applicable) has been submitted.

3.49.8 Guarantee

The complete installation is to be guaranteed for a period of twelve months from date of first delivery for the benefit of the Department.

3.50 THE LIGHTNING PROTECTION INSTALLATION

Allow to supply and install the Lightning Protection Installation as specified under Part 4 of this documentation.

Provisional quantities for the installation have been allowed for in the Bills of Quantities.

The Lightning Protection Installation must be carried out by a registered Specialist in the field of Lightning Protection.

3.51 THE FIRE DETECTION AND EVACUATION INSTALLATIONS

Allow to supply and install the Fire Detection and Evacuation installations as specified under Part 5 of this documentation.

The Fire Detection and Evacuation Installations must be carried out by a registered Specialist in this field.

3.52 MAKING GOOD

The Contractor will be responsible for making good any damage to buildings or other services which he or his employees may have caused during the construction of this part of the works.

The Contractor will be responsible for keeping the site clean and tidy and shall remove from the site all rubble and litter resulting from the Electrical Installation part of the construction work.

3.53 TESTING OF THE COMPLETE ELECTRICAL INSTALLATION

All tests shall be made in accordance with the requirements detailed below. On completion of these tests the Contractor shall supply, in terms of clause 178 of the Occupational Health and Safety Act of 1993 (as amended), to the Department=s Representative a completed and signed **ACERTIFICATE OF COMPLIANCE FOR ELECTRICAL INSTALLATIONS**

3.53.1 Insulation Resistance Tests

Insulation tests shall be carried out on all cables between cores, and to earth after terminations have been made and before the cores are connected to the equipment, and records of these kept.

Tests shall also be made on complete circuits for lighting, socket outlets, etc. between poles and poles to earth shall include associated switches and distribution switchgear.

3.53.2 Earth Continuity Tests

Continuity tests shall be made for each item of electrical equipment, lighting fittings, switch and socket outlets to the main earthing connections for the installation. This shall be the point where the main bonding conductor to the earth electrode system is connected to the main earthing terminal on the Main LT switchboard.

3.53.3 Earth Leakage Test

Earth leakage tests are to be made by the Contractor with an approved manufacturers instrument to prove that the earth leakage unit operates within the limits laid down by the SANS on each socket outlet so protected.

3.53.4 Earth Loop Impedance Tests

Earth loop impedance tests shall be made for all socket outlets in the installation and shall show the complete earth loop impedance from the socket outlet to the sub-distribution board.

3.53.5 Earth Electrode Tests

The resistance of all earth electrodes provided for main electrical earthing, shall be measured, recorded and test certificates submitted.

TESTING	MINIMUM REQUIREMENTS
Insulation resistance	Whole installations; better than 1megohm
LT installation	Each sub-distribution section: better than 5 megohm.
	Each intermediate cable; better than 5 megohm
	Earth Leakage on socket outlets
	Better than 30 milli amp
Earth Continuity	Better than 0,5 ohm
Earth Loop Impedance	Better than 0,5 ohm
Earth Electrode Resistance	Better than 1.0 ohm

All test instruments and labour are to be provided by the Contractor.

3.54 FIRST DELIVERY AND AS BUILT DRAWINGS

Pre-First delivery inspection by the Representative shall commence once all testing and snagging by the Contractor have successfully been completed. The following shall all be undertaken prior to first delivery:

The Contractor must note that **NO** First Delivery will be taken unless the As Built Drawings and the Electrical Installation Test Certificates including the Lightning Test Compliance Certificates, etc., have been handed over before such first delivery.

The Contractor shall submit a set of "as built" drawings for the completed Electrical Installation, certified and signed as correct, when the installation is completed a set of paper prints will be supplied to the Contractor to attend to any final adjustments if required.

All Test Certificates and a completed "As built" drawing showing the basic conduit installations shall be handed to the Department's Representative before "First Delivery" can be taken.

3.55 GUARANTEE AND MAINTENANCE

Guarantee and maintenance for the complete installation including fittings, fixtures, materials and Workmanship for a period of TWELVE MONTHS after date of completion and handover.

It must be noted that if the supplier of the equipment offers a guarantee longer than 12 months then the full guarantee period must be accepted and ceded to the owners.

All documentation in respect of guarantees must be handed to the owners, and signed and dated receipt must be given to the Electrical Engineer to confirm acceptance by the owner.

3.56 DESCRIPTION OF LIGHT FITTINGS AND FIXTURES to be Supplied and Installed ETC.

Note: Samples of all Light Fittings (LF) shall be provided for approval prior to procurement, one of each approved LF shall be handed over to the Electrical Engineer as a sample , no deviations after approval will be entertained, the fittings shall be returned timeously before completion of the contract.

All light fittings and fixtures shall comply with the SANS and or Stringent International codes and standards, including manufacturing specifications if made in RSA carry the SANS stamp of approval.

Where no SANS stamp of approval exists for light fittings and fixtures specified, the SANS criteria for design and quality will nevertheless still be applied.

All materials and products shall comply with the relevant quality standard as specified.

All Light fittings shall comply with the Rated IP specified and the supply voltage of 230Volts

Noted that for all LED LGHT FITTINGS and PRIOR to Installation full performance details are to be provided, including the following;

1. The Input Power in Watts
2. The LED consumption Power in Watts
3. The Light Output in Lumens
4. The System Efficacy in %per light output Watts
5. The Rated Life Output before deterioration in Hours
6. The Colour Temperature in K
7. The Colour Rendering in Ra
8. The Beam Angle in degrees
9. The UGR in Numerals

Where brand names are used, this shall mean brand or other approved prior to closing of Tenders .

The following Electrical and Physical features of each Light Fitting is to be provided

1. The supply Voltage in Volts
2. The Operating frequency parameters in Hz
3. The Forward Current Ma
4. The Forward Voltage V
5. The Power Factor ±Unit Factor
6. The Input Current in Amps
7. The Total Harmonic Distortion Unit%

In addition the Physical Data of each Light Fitting is to be provided:

1. The Lens Type
2. The Main Body Materials . eg: Aluminium, Polycarbonate, Galvanised Steel etc.
3. The Ingress Protection Details ie. IP Rating
4. Operating Temperature
5. Colour of Light Fitting
6. The Dimensions and Mass

3.56.1 Light Fittings Specifications

The type and description as per Legends on Layout Drawings

TYPE	DESCRIPTION
A	15W LED Surface mounted round slimline Bulkhead type Light Fitting Rated IP66 with polycarbonate base and diffuser, vandal proof, Colour white, Enlite Cat No EN-BH15/40, or equal and approved.
B	25W LED Surface mounted Utility Round Polycarbonate Bulkhead type light Fitting Rated IP66, Enlite Cat No EN-BH25/40, or equal and approved.
C	30W LED Surface mounted Floodlight type Light Fitting Rated IP65, adjustable, Enlite Cat No ENFL30B/40, or equal and approved..
CO	25W LED Surface mounted Utility Round Polycarbonate Bulkhead light type Light Fitting Rated IP65, Enlite Cat No EN-BH25/40, or equal and approved, mounted onto a YORK type Raised Lid Box, RL45/P, 350x250x120mm, comprising a PolyGlass Reinforced Polyesters Enclosure. Refer detail on Drawing SL 231 – EL3 ,and or equal and approved..
C1	4W LED Recessed Downlight (Body White Cast Aluminium) type Light Fitting, in cast into slab 140mm square by 125mm high IP66 Slab box, Swanlite SLS-ACC/AO – Budbox/GRP, or equal and approved..
D	13W LED GIZA EYELID Surface mounted Bulkhead Light Fitting, Rated IP65, LM6 die cast aluminium housing, with UV stabilized opal acrylic Diffuser, Black powder coated, with tamper proof stainless steel screws. Regent Cat No. ZHAGA BOARDS, or equal and approved.

D1 10W LED Dimmable Recessed round Downlighter type Light Fitting Rated IP 44 with integrated driver, Colour White, Enlite Cat No EN-DDL 10 / 40, or equal and approved.

D2 15W LED Dimmable Surface mounted round Downlighter type Light Fitting Rated IP54 with integrated driver, Colour white, Enlite Cat No EN-DLSMR15T/40, or equal and approved.

DS Daylight Switch comprising NATIONAL Type in enclosure Typical to SPAZIO Split type Light Fitting IP54 Coastal quality (without LED Lamp etc.) or equal and approved

E 7W LED Wall mounted 3 hours Maintained aluminium Emergency EXIT Light Fitting, Enlite Cat No EN – EMLED22 including Legend in Green and White EN – LG2D, or equal and approved.

EC 14W LED ECLIPSE Wall mounted Bulkhead Light Fitting. Rated IP54, LM 6 die cast and extruded aluminium housing, with UV stabilized satin acrylic Diffuser, Black Powder coated Finnish, with tamper-proof stainless-steel screws. Regent Cat. No. Samsung 2835, or equal and approved.

G 18W LED GIZA Wall mounted Bulkhead Light Fitting. Rated IP65, LM 6 die cast aluminium housing, with UV stabilized high impact opal acrylic Diffuser, Black Powder coated Finnish, with tamper proof stainless steel screws. Regent Cat. No. LED Samsung 2835, or equal and approved.

H 18W LED GIZA PLATEAU Wall mounted Bulkhead Light Fitting. Rated IP65, LM 6 die cast aluminium housing, with UV stabilized high impact opal acrylic Diffuser, Black Powder coated Finnish, with tamper proof stainless steel screws. Regent Cat. No. LED ZHAGA BOARDS, or equal and approved.

TB 25W Surface Bulkhead Type Light Fitting, Rated IP 65, with IK 10 Polycarbonate Body and Diffuser, white in colour, for Maximum Vandal Resistance fitted with Allen Type Stainless Steel Screws Enlite Cat No EN-BH25, or equal and approved.

WD 3W LED DICHROIC White Recessed Downlight Type Light Fitting in Cast INTO Slab 140mm Square by 125mm IP55 Slab Box fitted with cover secured with 4 x Allen Key screws, or equal and approved.

FT 1,12W LED Recessed Foot Light Fitting Rated IP 54, Stainless Steel Frame and Perspex Diffuser Spazio Cat No. 4474/3038, or equal and approved.

IL 1W LED Indicating light Fitting, Enlite Cat No EN-WU104 marker light, mounted into an extra deep round galvanised steel conduit box and fitted with a Red Lens, complete with a 350mA Driver installed into a surface enclosure with ventilation slots to enable free air flow, or equal and approved.

ENT 2x25W LED Wall mounted up and down Light Fitting Rated IP44 with Stainless Steel Body, Spazio Cat No Paulie DY/5024/39 or equal and approved.

SH 2 x 17W LED SHUTTLE Wall mounted Up and Down Light Fitting, Rated IP65, LM 6 die cast aluminium and extruded aluminium housing, with 4mm Opti glass diffuser, with High Efficiency reflector, Black powder coated, Regent Cat No COB CRI 80, or equal and approved..

PROC 14W LED Ceiling mounted Medical Procedure Light Fitting, Hutz Medical Product Code:L200 Solaris 11 LED 2000, Luminance Output 50,000 Lux at 1000mm, or equal and approved.

EXAM 12W LED Wall mounted Medical Examination Light Fitting Rated IP 54 Colour White Hutz Medical Product Name: HUGO LED-W, supplied with 1500mm flexible cable fitted with Standard SANS 3-pin Plug Top, or equal and approved.fixed on wall via a Flat 120x100x10mm stainless steel mounting Plate fitted to wall by means of 2x6mm Diameter Rawlbolts, the base of the Examination Light to be secured to the Plate In accordance with manufacturers fixing specifications.
or equal and approved

F2 40W LED 1500mm long Surface type Light fitting, Rated IP 65, Anti-Corrosive Vandal Proof, Polycarbonate housing and Opal diffuser, Impact Rating IK08, Rated surge protection 1,5kV, Enlite Cat No EN-ANT1558/40, or Equal and approved.

F3 50W LED 1200x600mm Recessed Flat Panel type Light Fitting, complete with condensate sealant applied to the perimeter to avoid ingress of moisture, suitable for Sluice Room Environment, Enlite L70 50,000 Hours Cat No EN – FPRO1260/40, non-Dimmable, or equal and approved including Flat Panel for recess ceiling mount Enlite Cat No EN-CRM1260.

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F4 50W LED 1200x600mm Surface Flat Panel type Light Fitting, Enlite L70 50,000 Hours Cat No EN – FPRO1260/40, non-Dimmable or equal and approved. including Flat Panel for surface mount Enlite Cat No EN-SM106B

F5 50W LED 1200x600mm Recessed Flat Panel type Light Fitting, Enlite L70 50,000 Hours Cat No EN – FPRO1260/40,non - Dimmable or equal and approved. including Flat Panel for recess ceiling mount Cat No EN-CRM1260A, complete with 5 Amp 3-pin Plug Top fitted to 3-core flexible 3 metre long cabtyre cable

F6 50W LED 1200x600mm Surface Flat Panel type Light Fitting, Enlite L70 50,000 Hours Cat No EN – FPRO1260/40, non – Dimmable or equal and approved. including Flat Panel for surface mount Cat No EN- SM106B with sealant to prevent ingress of moisture applied to perimeter of fitting.

F7 50W LED 1200x600mm Recessed Flat Panel type Light Fitting, Enlite L70 50,000 Hours Cat No EN – FPRO1260/40EM, non – Dimmable or equal and approved including Flat Panel for recess ceiling mount Cat No EN- CRM1260A, Fitted with 3hour battery emergency option supplied with battery pack, complete with 5 Amp 3-pin Plug Top fitted to 3-core flexible 3 metre long cabtyre cable

F8 50W LED 1200x600mm Surface Flat Panel type Light Fitting, Enlite L70 50,000 Hours Cat No EN – FPRO1260/40EM, non – Dimmable or equal and approved. including Flat Panel for surface mount Cat No EN-SM106B, Fitted with 3hour battery emergency option, supplied with battery pack,

F9 30W LED 600x600mm Recessed Flat Panel type Light Fitting, Enlite L70 50,000 Hours Cat No EN – FPRO6060/40 non - Dimmable, or equal and approved. including Flat Panel for recess ceiling mount Cat No EN-CRM6060A, complete with 5 Amp 3-pin Plug Top fitted to 3-core flexible 3 metres long cabtyre cable

F10 30W LED 600x600mm Surface Flat Panel type Light Fitting, Enlite L70 50,000 Hours Cat No EN – FPRO6060/40, non – Dimmable, or equal and approved including Flat Panel for Surface mount Cat No EN- SM103B.

F11 30W LED 600x600mm Recessed Flat Panel type Light Fitting, Enlite L70 50,000 Hours Cat No EN – FPRO6060/40, non - Dimmable or equal and approved. including Flat Panel for recess ceiling mount Cat No EN-CRM6060, complete with 5 Amp 3-pin Plug Top fitted to 3-core flexible 3 metre long cabtyre cable with sealant to prevent ingress of moisture applied to the perimeter of the fitting

PI 30W LED Post Mounted Luminaire Regent Cat No. ILANGA Black outer colour. Colour temperature 4000K. Rated IP 65 Including 4 800mm long tubular steel pole with access window containing Driver control gear and 5Amp Single Pole and Neutral Circuit Breaker protection and Brass Earth Stud combination of luminaire and pole light. The tubular steel pole shall be installed in Concrete Base complying with SANS 657 - grade 250 Mpa with ultimate tensile strength of 400 mPa. Fabrication of the pole shall comply with the relevant specification - SANS 14713 and Hot Dip galvanising to SANS 32 and SANS 121. The final finish of the pole to be Charcoal in colour.

P2 54W LED Post Mounted Luminaire Regent Cat No. KHANYA ISTRA Black outer colour. Colour temperature 4000K. Rated IP 66. All Housing components consisting of Powder coated stainless steel to coastal region standards, Complete with Polycrystalline Solar Panel Rated output 275W. Supplied with rechargeable maintenance free Li-ion 40Ah battery sets. The luminaire mounted on adjustable and Roto modular brackets for optimum sun path adjustment. The Luminaire complete with Victron Smart Solar Charge Controller to maximise energy harvest. Including 4 800mm long tubular steel pole combination of luminaire and pole light. The tubular steel pole shall be installed in Concrete Base complying with SANS 657 - grade 250 Mpa with ultimate tensile strength of 400 mPa. Fabrication of the pole shall comply with the relevant specification - SANS 14713 and Hot Dip galvanising to SANS 32 and SANS 121. The final finish of the pole to be Charcoal in colour.

3.56.2 FIXTURES and FITTINGS

HD 2000 Watt minimum, Surface-mounted Hand Dryer with Infra Red Proximity switch fabricated from 2mm pressed steel covered with white vitreous china equal and approved.similar to **World Dryer Model No. DXA 54 A4/PWHC** or **ECODRY Code 19330**,.

DS Daylight Switch in a Surface External Bulkhead type mounted aluminium base and polycarbonate Diffuser IP66 Light Fitting

Fixtures/Appliances

Procedure Room Earth Fault Indicating Lights:

TIL Red Flashing 5W LED lamp and Green 5W LED lamp, Crabtree Cat. No. 15081 , housed in flush mounting sheet steel box with satin chrome 200x100mm cover plate.

TLN Indicator Light Panel in Nurses Duty Room, consisting of parallel red and green lights, as for Type TIL above for each theatre.

PEP Patient Earth Point, consisting of 3 x single pole sockets, mounted in a 100mm x 50mm x 50mm standard box 1,40m above floor level as indicated for each theatre, Ryall Trading Co Phono Metal Shielded Cat. No. V4655 with matching plug or Protea Electro Medical 4mm Banana plug socket with matching Banana plug Cat No.101580 or equal and approved,complete with bonding leads, as per detail specification.

Viewing Screens:

XR4 Surface mounted X-Ray Viewing Screen - three plate viewing, size 1260 x 430mm, as described in the specification, to be supplied with an internally mounted switch module, HUTZ HU-XRU-03/RC/SW or equal and approved. Refer detail drwgs.

Door Mechanisms / Buzzers, etc:

DR Flush-mounted Door Latch Release designed to operate with normal door locks. The hatch release is to have an open-hold catch mechanism so that the door can remain closed until actually opened. On re-closing the latch is to lock the door. The latch shall be for use with door closer springs. Operating Voltage shall be12 volts AC. The Transformer to be Sesco plug-in model 3358, make and model, and shall be supplied complete with audible signal module (buzzer) including push-button or key pad station, as specified.

DRP 20 Amp ON-OFF Push Button Station installed into surface mounted durable plastic drawbox, as specified.

DRK Wall mounted 12 digit programmable Release Key Pad Station installed into a flush drawbox, including 2 intercom stations, as specified

DRR 12 Volt Ring Tone Unit including intercom units, as specified

DRD 12 Volt Ding Dong Tone Unit as specified.

DRB 12 Volt Buzzer Tone Units including intercom units, as specified

BZ Buzzer Unit for Electric Door Latch release including 2 intercom stations, as specified.

TCB Automatic Electrical Powered Traffic Control Booms for both entrance and exit , consisting of the Main Pedestals and locating pedestal on the opposite lane end, operating 4000 long red/white/yellow spiral painted booms, fitted with a stop sign identifiable from approaching sides. Controlled from Card/disc readers on Pedestals and remote pushbuttons. Each lane fitted with an induction loop installed below roadway all as shown on layout Drawing SL 231-EP4. Also refer to the Detail Specification.

Clocks:

CT Surface mounted Clocks, battery operated, 254mm Round dial, with numeric black numbers on White shield, as per detail specification.

Miscellaneous Fixtures:

HB 1,5 kW 10 litre Wall-mounted Hydro Boil Unit, fabricated from stainless steel and covered with durable white polyester powder coated finish, complete with thermostat. The unit shall conform to SANS specifications, to ZIP Hydroboil available from City Metal Products (DBN), make and model.

3.57 ABBREVIATIONS

Abbreviations used in specifications, on Line Diagrams and drawings.

DB	Distribution Board
ISOL	Isolator
CB	Circuit Breaker
MCB	Miniature Circuit Breaker
SP	Single Pole
DP	Double Pole
TP	Triple Pole
N	Neutral
IP	Single Phase
3P	Three Phase
PVC SWA	PVC insulated and Steel Wire Armoured Cable
ECC	Earth Conductors included in Armouring of cable
E/L	Earth Leakage Unit
PC	Photocell in Daylight Switch
CONT	Contractor
TS	Time Switch

END OF SPECIFICATION