

**NATIONAL HEALTH LABORATORY SERVICE (NHLS)  
LABORATORY AT MANAPO HOSPITAL**

**DETAIL**

**ELECTRICAL TECHNICAL SPECIFICATIONS**

**JANUARY 2026**

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# 1 NOTES TO TENDERERS

## 1.1 ELECTRICAL INSTALLATION

The proposed repairs and upgrade of existing Manapo NHLS Laboratory: Free State Province for the Manapo Hospital at the following location.

NHLS Laboratory, at the Hospital in Phuthaditjhaba, in the Free State., and located at the following coordinates 28°32'10.6"S 28°48'14.5"E

This document explains the detailed electrical specifications for the tenderer.

The tenderer is also hereby informed that the attached bill of quantities shall be regarded as re-measurable.

The following are the returnable documents for the tender.

- Manapo NHLS Laboratory Electrical Bill of Quantities
- List of material supplier return sheet

## 1.2 SCOPE OF WORKS

The scope of electrical works for the Manapo NHLS Laboratory comprises the following.

Supply and installation of:

### **Section No. 1:**

- Supply and installation of interior lighting
- Supply and installation of electrical wiring for internal lights
- Supply and installation of power points for computers and normal power points
- Supply and installation power points for the new HVAC system
- Supply and installation of Access control and CCTV cameras as shown.
- Supply and installation of wireways for Telephone communication as per layout requirements
- Supply and installation of cabling as shown on reticulation layouts
- Supply and installation of Lightning Protection system
- Supply and installation of Intercom & PA system
- Supply and installation of Intruder Alarm System
- Supply & Install New Distribution Board for the NHLS Laboratory

Should any part of the specification or drawings not be clear, the Engineer should be contacted for clarification.

## 1.3 DRAWINGS

The following drawings are relevant to this contract and are attached to this document.

Power Layout	B1620E-EL-001-Rev B	D 20-01- 2026
Lighting Layout	B1620E-EL-002-Rev B	D 20-01- 2026
Site Security Layout	B1620E-EL-003-Rev B	D 20-01- 2026
DB Schematic Layout	B1620E-EL-004-Rev B	D 20-01- 2026

## 1.4 STANDARDS

The latest edition of the following specifications and Codes of Practice shall be read in conjunction with the section:

SANS 164-1 to 6	:	Plugs and socket outlet systems for household and similar purposes for use in South Africa
SANS 156	:	Moulded-case circuit-breakers
SANS 556-1	:	Low-voltage switchgear – Part 1: Circuit breakers
SANS 767-1	:	Earth leakage protection unit
SANS 950	:	Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations
SANS 1085	:	Wall outlet boxes for the enclosure of electrical accessories
SABS 1092	:	Contactors
SANS 1195	:	Busbars
SANS 1213	:	Mechanical glands
SANS 1239	:	Plugs, socket outlets and couplers for industrial purposes
SANS 1473-1	:	Low voltage switchgear and control gear assemblies - Part 1: Type tested, partially type tested and specially tested assemblies with a rated short circuit that withstands strength above 10kA.
SANS 1507-1 to 6	:	Electric cables with extruded solid dielectric insulation for fixed insulation (300/500 V to 1 900/3 300V) – Parts 1 to 6.
SANS 1765	:	Low-voltage switch gear assemblies (distribution boards) with a rated short-circuit withstand up to and including 10kA.
SANS 1777	:	Photoelectric control units for lighting
SANS 1973-1	:	Low voltage and control gear ASSEMBLIES – Part 1; type-tested ASSEMBLIES with stated deviations and a rated short-circuit withstand strength above 10kA.
SANS 1973-3	:	Low voltage and control gear ASSEMBLIES – Part 3; Safety of ASSEMBLIES with a rated short-circuit withstand strength above 10 kA.
SANS 1973-8	:	Low voltage and control gear ASSEMBLIES – Part 8; Safety of minimally tested ASSEMBLIES with a rated short-circuit withstand strength above 10kA and a rated busbar current of up to and including 1 600 A a.c. and d.c.
SANS 1 0142-1	:	The wiring of premises
SANS 10222-3	:	Electrical security installations – Part 3: Electric security fences (non-lethal)
SANS 10292	:	Earthing of low voltage distribution system
SANS 60309-1/IEC60269-1	:	Plugs, socket-outlets and couplers for industrial purposes – Part 2: Dimensional interchange ability requirements for pin and contract-tube accessories.
SANS 60309-2/IEC60269-2	:	Plugs, socket-outlets and couplers for industrial purposes – Part 2: General requirements.
SANS 60439-1/IEC60439-1	:	Low-voltage switchgear and control gear Part 1: Type-tested and partially type-tested assemblies.

SANS 60309-2/IEC60269-2	:	Plugs, socket-outlets and couplers for industrial purposes – Part 2: Particular requirements for assemblies for busbar trunking systems.
SANS 60309-5/IEC60269-5	:	Plugs, socket-outlets and couplers for industrial purposes – Part 5: Particular requirements for assemblies for power distribution in networks.
SANS 60669-1/IEC60669-1	:	Switches for household and similar fixed electrical installations – Part 1: General requirements.
SANS 60947-2/IEC60947-2	:	Low voltage switchgear and control gear – Part 2: Circuit breakers.
SANS 60947-3/IEC60947-3	:	Low voltage switchgear and control gear - Part 3: Switches, disconnectors, switch – disconnectors and fuse combination units.
SANS 60947-6.1/IEC60947-6.1	:	Low voltage switchgear and control gear – Part 6: Multiple function equipment – Transfer switching equipment.
SANS 61084-1/IEC61084-1	:	Cable trunking and ducting systems for electrical installations – Part 1: General requirements.
SANS 61312-3/IEC61312-3	:	Protection against lightning electromagnetic impulse – Part 3: requirements of surge protective devices.
SANS 61386-1/IEC61386-1	:	Conduit systems for electrical installations – Part 1: General requirements.
SANS 61643-12/IEC61643-12	:	Low voltage surge protection devices – Part 12 surge protection devices connected to low voltage power distribution systems – Selection and application principles.
SANS 62305 1/IEC 62305-1	:	Protection against lightning – Part 1: General principles.
SANS 62305 2/IEC 62305-2	:	Protection against lightning – Part 2: Risk management.
SANS 62305 3/IEC 62305-3	:	Protection against lightning – Part 1: Physical damage to structures and life hazard.
SANS 62305 4/IEC 62305-4	:	Protection against lightning – Part 1: Electrical and electronic systems within structure.
BS 387	:	Specification for miniature and moulded case circuit breakers.
BS 5419	:	Specification for air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination units for voltages up to and including 1000 volt a.c. or 1200 volt d.c.
IEC 157	:	Low voltage switchgear and control gear.
IEC 408	:	Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination unit.
SABS ISO 1461	:	1999 Hot dip (galvanized) zinc coating.
BS 159	:	Busbars and busbar connections.
BS 731	:	Flexible steel conduits for cable protection and flexible steel tubing to enclose flexible drives.
BS 1433	:	Specification for copper for electrical purposes – Rod and bar.
IEC 439	:	Low voltage switchgear and control gear
SANS 10139	:	Fire detection and alarm systems for buildings – System design, installation and servicing
SANS 475	:	Luminaires for interior lighting, street lighting and floodlighting – Performance and requirements
SANS 10114-1	:	Interior lighting part 1: Artificial lighting of interiors

SANS 10114-2	:	Interior lighting part 2: Emergency lighting
SANS 60598-1	:	Luminaires part 1: General requirements and tests
SANS 60598-2.1	:	Luminaires part 2: Particular requirements section 1 – Fixed general purpose luminaires.
SANS 60598-2.2	:	Luminaires part 2: Particular requirements section 2 – Recessed luminaires.
SANS 60598-2.3	:	Luminaires part 2: Particular requirements section 3 – Luminaires for road and street lighting.
SANS 60598-2.5	:	Luminaires part 2: Particular requirements section 5 – Flood lighting.
SANS 61347-1 to 13	:	Lamp control gear
SANS 62031	:	LED modules for general lighting – Safety specifications
SANS 62384	:	DC or AC supplied electronic control gear for LED modules – Performance requirements.
SANS 62560	:	Self-ballasted LED lamps for general lighting services with supply voltages > 50V – Safety specification.
SANS 62612	:	Self-ballasted LED lamps for general lighting services with supply voltages > 50V – Performance requirements
EN 55015	:	Limits and methods of measurement of radio disturbance of electrical lighting or equipment.
EN 61000-3.2	:	Electromagnetic compatibility (EMC) limits for harmonic current emissions.
EN 61000-3.3	:	Electromagnetic compatibility (EMC) limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems.
EN 61547	:	Equipment for general lighting purposes: EMC immunity requirements.
IEC-EN 62471	:	Photo biological safety of lamps and lamp systems for LEDs
IES LM-79-08	:	Approved method: Electrical and photometric measurement of solid-state lighting products.
IES LM-80	:	Approved method: Measuring lumen maintenance of LED light sources

## 2 CONTRACTOR'S RESPONSIBILITY

The Contractor shall, as specified in all the relevant sections of this document, take full responsibility of the following:

1. Providing time/activity mini-programmes, to arrange for the shut-down, interconnection to and re-energizing of all existing and new networks, to ensure proper testing, safety under all conditions and a minimum disruption of service to all consumers. These programmes shall be approved in writing by the Engineer before being implemented by the Contractor.
2. Arranging with local authorities for all stoppages, shut-downs and for all switching of networks.
3. Liaising with other contractors (civil, HVAC etc.) regarding all relevant interfaces.
4. Ensuring that all parts of the Works shall at all times be safe to the public and to his own personnel and those of the Employer.
5. Arranging all testing and commissioning prior to handing over of any portion of the Works.
6. Submission of manuals complete with equipment specifications, and instructions, "as-built" drawings, test certificates, certificates of compliances for the electrical installation and handing over certificates at the completion of the contract.
7. The Contractor is made aware of the fact that materials and equipment shall when required be ordered well in advance as late deliveries will be his sole responsibility. If for some reason late deliveries are found to be to the advantage of the Client or are to be postponed by the Contractor then prior approval shall be obtained from the Engineer.

### **3 POWER SUPPLY**

The Contractor will be responsible for the supply and installation of the supply cable from the Main DB to DB-LAB. The size and length of the cable is listed in the Schedule of Cables and measured in the Bills of Quantities.

The supply cables are listed in the Schedule of Cables and measured in the Bills of Quantities.

### **4 ELECTRICAL MATERIAL**

The electrical material and equipment which are to be used shall be of the best quality throughout and shall where applicable bear the mark or comply with the relevant SABS, BS, and IEC Standards.

If any doubt as to the quality of material exists, this matter shall be referred to the Engineer.

### **5 LOW VOLTAGE CABLE INSTALLATION**

The low voltage distribution cables shall comprise 4 core, copper conductor, PVC insulated, steel wire armoured, PVC sheathed 600/1000volt cables.

Supply, install and connect the following cable, conduit and wiring:

The supply cables are listed in the Schedule of Cables and measured in the Bills of Quantities.

### **6 SOCKET AND POWERPOINT INSTALLATION**

All recessed socket outlets and isolators (except for weatherproof socket outlets) shall be fitted with steel faceplates.

Socket outlets for weatherproof sockets shall be fitted with a plastic faceplate.

### **7 LIGHTING INSTALLATION**

The Contractor shall submit for approval samples of all the light fittings before orders are placed with the manufacturers. Only light fittings specified will be accepted for tendering purposes, alternative fittings have to be tendered for separately.

All emergency type light fittings to be of the self-diagnostic type and be wired with a non-switched live feeding the emergency section.

All recessed light switches shall be fitted with steel faceplates.

The following table lists the luminaires that will be applicable to the lighting installation

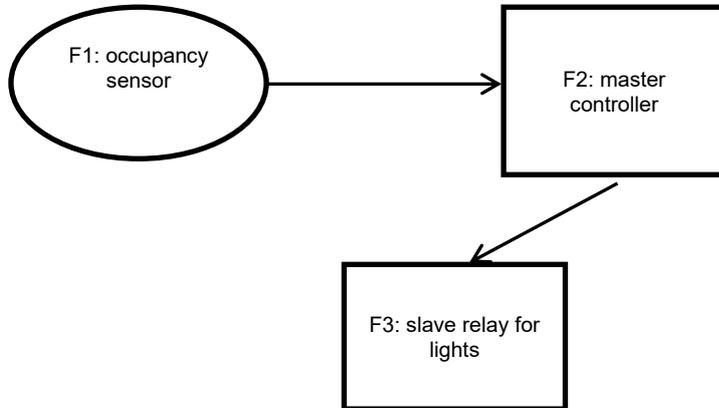
TYPE	DESCRIPTION	TYPICAL PHOTO	AREA/LOCATION
P1	36W LED Panel Light Fitting Recessed with Opal Diffuser 600mm x 600mm, 4656lm, Cr>80, 4000k White Trim Ring, Powder Coated. Complete with 1,5m cord and 5A plug top. Similar or equal and approved		Offices, Passage
B1	15W LED Bulkhead Light Fitting with Diffuser Ip 65 Round, 2190lm, Cr>70, 4000k. Similar or equal and approved		Ablutions
F1	24W LED, 4000K Surface 580mm Luminaire. Complete with 1,5m cord and 5A plug top(NASA), Similar or equal and approved		Store rooms and sluice room
R1	70W, 4000K Surface Trunking 1705mm Luminaire. R-LINE. Complete with 1,5m cord and 5A plug top & Trunking Module Connectors, Similar or equal and approved		Laboratories, microbiology, haematology, biochemistry

Circuits for interior light fittings (except bulkheads and light fittings surface mounted to walls or concrete soffit) in the building, shall be reticulated in galvanized trunking and terminated onto 5A round three-pin unswitched socket outlets installed in wiring channel.

## 8 OCCUPANCY CONTROLLER FOR LIGHT AND AIR-CONDITIONING UNITS

### 8.1 SCHEMATIC DIAGRAM

The following figure illustrates a functional diagram of the system.



### 8.2 SYSTEM REQUIREMENTS

#### 8.2.1 F1: Occupancy sensor

Note that the occupancy sensor does not form part of the system. The occupancy sensor shall incorporate a dry contact that closes when an occupant has been detected.

#### 8.2.2 F2: Master controller

- Power supply: 230 VAC.
- Controller must be able to interface with the occupancy sensor by means of a dry contact.
- Controller must be able to interface with slave relay units to command when relays must be energized.
- The controller must be fitted with manually adjustable timers to be able to independently switch the relay slave units for lights and air-conditioning units. The timing must be adjustable between 1 to 60 minutes. The following are the typical delay timing requirements for each unit after the occupant has left the room.
  - Relay slave unit for lights: 30 minutes
  - Relay slave unit for air-conditioning units: 60 minutes

#### 8.2.3 F3: Slave relay for lights

- Power supply: 230 VAC.
- Slave relay unit for lights must be able to interface with the master controller (controller must command unit when to open and close relay contact).
- Relay contact:

- Voltage: 230 VAC
- Current: minimum 10A

#### **8.2.4 F4: Slave relay for air-conditioning units**

- Input voltage: 230 VAC.
- Slave relay unit for air-conditioning must be able to interface with the master controller (controller must command unit when to open and close relay contact).
- Relay contact:
  - Voltage: 230 VAC
  - Current: minimum 15A

#### **8.2.5 Details of offered units**

Full details of the units offered in the Pricing Document shall be submitted with the Pricing Document.

Details shall include but not limited to:

- Name of manufacturer of controller/relay units
- Datasheets and manuals of all units
- Product guarantees

### **9 CONDUIT INSTALLATION**

The Contractor must plan and coordinate the installation of conduit together with the Building Contractor before construction starts to ensure that all conduit is chased, built, or cast, and not surface mounted.

Surface mounted conduit shall only be allowed if written approval has been given by the Engineer. Where surface mounted conduits are installed, only hot dipped galvanized steel conduit will be allowed.

### **10 WIRING CHANNELS**

Where wiring channels are specified and indicated on the drawings, the channels shall be hot dipped galvanized steel channels. The trunking shall be supplied complete with galvanized cover plates.

For lighting, provision shall be made for 5A single unswitched socket outlets installed in P9000 wiring trunking for the connection of the luminaire by means of a 5A 3 pin plug.

### **11 WIRING INSTALLATION**

The various circuits shall be wired with PVC insulated conductors in the following sizes:

#### **General lighting**

LED, fluorescent, and CFL	:	2.5 mm <sup>2</sup>
Earth wires	:	2.5 mm <sup>2</sup> bare copper earth wire

#### **General socket outlets**

Standard 16A outlets (3 pin)	:	2.5 mm <sup>2</sup>
Earth wires	:	2.5 mm <sup>2</sup> bare copper earth wire
<b>Ovens and boiling pots</b>		
Standard 60A 3-pole isolators	:	6 mm <sup>2</sup>
Earth wires	:	4 mm <sup>2</sup> bare copper earth wire

For other conductor sizes refer to distribution board schematics.

## 12 DISTRIBUTION BOARDS

The low voltage circuit breakers to be installed will be such that the necessary discrimination and cascading between the circuit breakers is obtained. The Contractor will provide the Engineer with documentation to prove that the discrimination and cascading requirements have been met.

All distribution boards shall comply with the latest version of SANS 10142-1. The Contractor will provide test certificates for the distribution boards offered with his tender confirming the fault level capabilities of the distribution boards offered.

Allowance must be made for additional conduits/ducting from distribution boards to ceiling voids for future use. Allowance must be made for 25% unequipped spare capacity on all distribution boards.

The design requirements for the distribution boards are indicated on the distribution kiosk and Main DB admin ground floor schematic drawings:

The front panels of normal supply, standby power, and no-break supply sections shall be painted in distinctive colours as follows:

Normal supply :	Light Orange, colour B26 of SANS 1091.
Standby power :	Signal Red, colour A11 of SANS 1091.
No-break supply:	Dark Violet, colour F06 or Olive Green, Colour H05 of SANS 1091.

Indicated is the probable fault level rating (kA) of the busbars. Refer to the Summary of Switchgear and Circuits for the minimum fault level rating of specified equipment.

BOARD	TYPE	PANEL	FAULT LEVEL
MAIN DISTRIBUTION BOARD (DB-LAB)	Recessed/Surface	Normal power & Essential power	5

***The Contractor shall ensure that all labelling and numbering of distribution boards shall adhere to SANS 10142-1.***

## 13 LIGHTNING PROTECTION

A lightning protection Specialist Contractor shall be appointed for the installation of the lightning protection system. The Contractor shall be entitled to profit and attendance fees on the lightning protection installation.

Earth resistivity tests shall be done at an early stage of the construction to determine the lightning protection requirements of the building. Before the installation of the lightning protection system, the Specialist Contractor shall issue the Engineer with the following documents for approval before installation commences.

- Earth resistivity test results.
- A design drawing of the lightning protection installation.
- A priced bill of quantities for the lightning protection system.

Only after approval of these documents from the Engineer, the installation can commence.

On completion of the installation, the Specialist Contractor shall provide a Certificate of Compliance to SANS 62305 as well as a drawing (in .dwg format) of the as-built lightning protection system.

## 14 TELEPHONE, DATA, CCTV, ACCESS CONTROL, AND RADIO INSTALLATION

The Contractor shall only be responsible for the installation of wire ways for the telephone, data, CCTV, access control, and radio installations. In addition, the Contractor shall also install the DATA (RJ45) and telephone points (RJ11) in the power skirting as per the drawings. Cabling will be done by others.

### General requirements:

The luminaire shall be suitable for operation with mid-power LEDs. **Note that no LED tubes are allowed to be used.**

The luminaire shall be suitable for operation on a 230V single phase 50Hz mains supply.

Power factor capacitors shall be supplied to correct the power factor to at least 0.95 or higher.

The luminaire shall be marked with identification labels stating the brand name and model and shall bear the SANS approval mark.

The driver shall comply with IEC 61347-1 and IEC 61347-2B as applicable and shall be suitable for operation on 230V +/-10%, 50Hz single phase system and it must be insured that harmonics filter is provided as per SANS 61000-3-2. The drivers and LED circuitry shall be protected against lightning and power surges. Suitable surge arrestors with a 10kA rating shall be provided for indoor installations and 20kA for outdoor installations.

Colour rendering (Ra) shall be not less than 80 and lumen depreciation of not more than 30% L70 at 50 000 hours @ Tq 25°C. Colour temperature of the LED lamp shall be 4000K, unless otherwise stated.

### Thermal requirements:

The luminaire must be able to withstand an ambient temperature of 35°C. Storage temperature of this luminaire should be able to handle  $-40^{\circ}\text{C} < T < 60^{\circ}\text{C}$ .

To this end internal electrical and mechanical components shall not be allowed to exceed their maximum temperature ratings of 75°C. Test reports from an independent authorised testing facility proving this requirement shall be made available on request.

Noise requirements:

The noise level emitted from the luminaire shall be kept as low as possible. Drivers/electronic components shall therefore fully comply with the latest edition of SANS 55015.

**= END OF SPECIFICATION =**

**PART 4: BILLS OF QUANTITIES**

**Bills of Quantities are included in part C of the tender document.**

**PART 5: ELECTRICAL WORK MATERIAL SCHEDULE**

The Contractor shall complete the following schedules and submit them to the Electrical Engineer within 21 days of the date of the acceptance of the tender.

The schedules will be scrutinised by the Electrical Engineer and should any material offered not comply with the requirements contained in the specification, the Contractor will be required to supply material in accordance with the contract at no additional cost.

**NB:**                    Only one manufacturer's name to be inserted for each item.

Item	Material	Manufacture	Make or trade name	Country of origin
1.	Distribution boards			
2.	Circuit breakers 1P, 2P, 3P			
3.	On load isolators without trips			
4.	Contactors 1P, 2P, 3P			
5.	Earth leakage relays 1 & 3 phase			
6.	H.R.C. fuse switches			
7.	Kilowatt hour meter			
8.	Current transformers			
9.	Voltmeter			
10.	Maximum demand ammeter			
11.	Daylight sensitive switch			
12.	Time switch			
13.	Conduit			
14.	Conduit boxes			
15.	Power skirting			
16.	Surface switches			
17.	Watertight switches			
18.	16A flush socket outlets			
19.	16A surface socket outlets			
20.	16A watertight socket outlets			
21.	luminaires			
22.	Type P1			
	Type B1			
	Type R1			
	Type F1			
	Etc.			
23.	Bulkhead fittings: Type B1			
24.	PVCA cable			
25.	Cable trays			

**PARTICULARS OF ELECTRICAL CONTRACTOR**

The tenderer to include details of the electrical contractor:

Name of Electrical Contractor:

Department of Labour Registration number:

Wiremans License Number:

COIDA Registration number:

UIF Registration Number: