



# Provisional Bills of Quantities for the Proposed Refurbishment of Trans Kalahari Border to a One Stop Border Post, at Buitepos, in Omaheke Region

for

**NAMIBIA REVENUE AGENCY**

Bid No.: \_\_\_\_\_

## ANNEXURE II: ELECTRICAL INSTALLATION WORKS

Name of Bidder: \_\_\_\_\_

Bid Price (N\$-Incl. VAT): \_\_\_\_\_

### PROJECT TEAM

Client	Architect	Electrical/Mechanical Engineer	Structural/Civil Engineer	Quantity Surveyor
NAMRA - Namibia Revenue Agency	Chigama Architects	DEKA Consulting Engineers	DEKA Consulting Engineers	Jordan Oosthuysen Nangolo QS
Windhoek, Namibia	Windhoek, Namibia Tel: 061-259 125	Windhoek, Namibia Tel: 061- 220 959	Windhoek, Namibia Tel: 061- 220 959	Windhoek, Namibia Tel: 061-22 0081

**JANUARY 2024**

# EMPLOYER'S REQUIREMENTS

## A. SCOPE OF WORKS, SPECIFICATIONS AND PERFORMANCE REQUIREMENTS

1. STANDARD ELECTRICAL SPECIFICATIONS  
AND REQUIREMENTS
2. SCHEDULE OF QUANTITIES
3. DRAWINGS

SCOPE OF PROJECT SPECIFICATIONS .....	5
STATUS OF PROJECT SPECIFICATIONS .....	5
PORTION 1: THE WORKS.....	5
PS 1 GENERAL DESCRIPTION OF THE WORKS .....	5
PS 2 DESCRIPTION OF THE SITE AND ACCESS .....	5
PS 3 NATURE OF GROUND AND SUBSOIL CONDITIONS.....	6
PS 4 DETAILS OF THE CONTRACT .....	6
PS 5 SITE FACILITIES AVAILABLE.....	6
PS 6 SITE FACILITIES REQUIRED.....	7
PS 7 SITE MEETINGS.....	7
PS 8 NOTICE BOARD.....	7
PS 9 APPLICABLE STANDARD SPECIFICATIONS .....	7
PS 10 PAYMENT CLAUSES .....	8
PS 11 QUALITY ASSURANCE SYSTEMS .....	8
PORTION 2: AMENDMENTS AND ADDITIONS .....	10
1 MINIMUM REQUIREMENT FOR THE INSTALLATIONS .....	10
2 REGULATIONS .....	10
THE RELEVANT LOCAL BY LAWS AND REGULATIONS OF THE ELECTRICITY SUPPLY AUTHORITY .....	10
3 MAIN SUPPLY NETWORK .....	10
4 GENERAL.....	10
5 CABLE ROUTES AND POSITIONING.....	11
6 HANDLING AND LAYING OF CABLES.....	11
7 TRENCHING.....	11
8 BACKFILLING .....	12
9 PROTECTION OF CABLES .....	12
10 ROAD CROSSINGS .....	13
11 OPENING UP OF EXISTING CABLES.....	13
12 SLEEVES/CABLE DUCTS .....	13
13 CAPACITY OF CABLE CONDUITS (SLEEVES).....	13

14	CABLE MARKERS .....	14
15	DETAIL SPECIFICATIONS FOR LOW VOLTAGE CABLES:.....	14
16	CABLE JOINTS AND TERMINATIONS.....	15
17	LV CABLES AND CONDUCTOR ACCESSORIES.....	15
18	CABLE TERMINATION LUGS .....	16
19	INSTALLATION OF EARTHING SYSTEMS FOR LOW VOLTAGE UNDERGROUND CABLES. ....	16
20	CONSUMER DISTRIBUTION STUBBIES.....	16
21	BALANCING OF LOAD .....	18
22	DISTRIBUTION CIRCUIT BREAKERS.....	18
23	MOULDED CASE CIRCUIT BREAKERS .....	19
24	CIRCUIT BREAKER ACCESSORIES .....	19
25	BUSBARS .....	20
26	STREETLIGHTING.....	21
27	STREET LIGHTING POLES .....	22
28	TREE CUTTING.....	25
29	BUILDING INSTALLATIONS .....	25
30	INFORMATION, DIAGRAMS, DRAWINGS AND MANUALS TO BE SUBMITTED.....	28
31	APPROVED MATERIAL.....	29
32	COMPLETENESS OF BID.....	29
33	RESPONSIBILITY OF THE CONTRACTOR.....	29
34	INSPECTIONS AND TESTS .....	29
35	COMMISSIONING.....	30
36	HANDING OVER.....	31
37	“AS-BUILT” DRAWINGS .....	31
	PORTION 3: FORMS TO BE COMPLETED BY BIDDERS .....	32
	PORTION 4: PRICED ACTIVITY SCHEDULE .....	38
	PORTION 5: DRAWINGS.....	39

## SCOPE OF PROJECT SPECIFICATIONS

The Project Specifications consist of two Portions:

- PORTION 1** Covers a general description of the Works, Site, circumstances, site facilities available and aspects requiring specific attention and requirements to be met by the Contractor.
- PORTION 2** Electrical Specifications covering amendments and additions to the SABS/SANS Standardised Specifications, applicable to this Contract.

## STATUS OF PROJECT SPECIFICATIONS

The Project Specifications form an integral part of the Contract Document and shall be deemed to be included in and form part of the Specifications. In case of any discrepancy or conflict with any parts of the Standardised Specifications or the Drawings, the Project Specifications shall take precedence and shall govern.

## PORTION 1: THE WORKS

### PS 1 GENERAL DESCRIPTION OF THE WORKS

The contract covers all the Site Works required for the construction of Medium Voltage, Low Voltage and Building Electrical infrastructure for the Transkalahari Border One Stop Border Post, Omaheke Region, Namibia, The works include the upgrade of a 50 KVA Transformer to 200 KVA, underground feeder cables, distribution kiosks, streetlights, building distribution boards and building receptacles.

The Site Works would include:

- Establishment of necessary camp, personnel, plant and equipment on site;
- Setting out of Works;
- Locate, expose, protect and survey of existing services;
- Accommodation of traffic in road reserves, access to erven, facilitation of road crossings as and where necessary during the execution of the Works;
- Ensuring and maintaining site safety at all time during the construction of the Works for all site personnel, motorists, pedestrians and the general public in accordance with the applicable safety rules and regulations;
- Clearing and grubbing of site areas as required for the construction of the Works only;
- Construction of services;
- Testing of all works;
- Additional work as instructed by the Engineer;
- Finishing and trimming of the site.

The description serves to outline the extent of the Works, but does not limit the amount of work, which may be required by the Contractor under this contract. Approximated quantities are stated.

The Contractor is responsible for protecting his Works against damages by the general public during construction. Damage can largely be prevented by not letting incomplete works remain open for long periods of time.

### PS 2 DESCRIPTION OF THE SITE AND ACCESS

The site is located at the "Kalahari" border Post, 110 km east from the Town of Gobabis in the Omaheke Region outside Gobabis. Approximate GPS Coordinates:

Latitude: 22°16'30.43"S  
Longitude: 19°59'22.54"E

### PS 3 NATURE OF GROUND AND SUBSOIL CONDITIONS

No subsoil investigation was conducted. The Tenderer should familiarise himself with the site and the nature of the ground and sub-surface conditions. Based on visual inspections it appears as if the top section of the ground surface is covered with loose sandy material.

### PS 4 DETAILS OF THE CONTRACT

This Contract covers all the work for the construction of bulk electrical services in Buite Pos Extension 8. Although this description serves to outline the extent of the Works, it does not limit the amount of work which may be required to be carried out by the Contractor under this Contract. Approximate quantities for the work to be carried out in accordance with these Contract Documents are listed in the Schedule of Quantities for this Contract (Part D).

#### PS 4.1 General

The general items of work to be executed under this contract include the following:

- Establishment on site of Contractor's construction camp and the moving of his plant, materials and personnel to the Site. The Contractor is obliged to remove all these items upon completion of the Contract;
- Provision of services required for construction;
- Setting out of the Works;
- Maintenance and protection of the Works under construction;
- Accommodation of traffic;
- All responsibility pertaining to the safety on site;
- Testing of materials and control over the quality of workmanship;

#### PS 4.2 Upgrading and Alterations of Existing Services

Care to be taken by Contractor not to damage existing services (refer to PSA 5.4).

Alterations to existing services shall only be implemented as indicated on the Drawings or as indicated by the Engineer.

Service departments of the Council and Telecom must complete alterations to their relevant services within a period of 30 days, after having been reasonably requested as such by the Contractor.

#### PS 4.3 Maintenance

The construction area will be handed over to the Contractor by the Employer upon the commencement of the Contract. During the construction period the Contractor will be responsible for the traffic accommodation, site safety as well as all other temporary works.

After completion of the Works, maintenance shall be as specified in the General Conditions of Contract.

### PS 5 SITE FACILITIES AVAILABLE

#### PS 5.1 Services

The Contractor shall make his own arrangements for the acquisition of water, power and all other services for construction purposes and shall be responsible for the cost thereof. The Contractor must ascertain the position of the nearest available municipal services to the Site, from the Council.

The water used for the mixing of concrete or slurry shall be to the satisfaction of the Engineer.

#### PS 5.2 Camp Site

Areas that could be used for the possible establishment of the Contractor's camp will be pointed out by the Client during the official tender site inspection. Staff will not be allowed to overnight on site, except for two security guards.

PS 5.3 Survey Beacons, Bench Marks and Reference Pegs

Benchmarks with co-ordinates and levels will be indicated on the construction drawings. The Contractor is responsible for the setting out of the Works and should include it in the tendered sum in Section 1 of the Schedule of Quantities/ Priced Activity Schedule. The Contractor is also responsible to see that no reference/bench marks, beacons and erf pegs are covered up or disturbed. Should the Contractor's Surveyor identify vertical or horizontal alignment discrepancies of the design with regard to the erven and accesses, or any of the services to be constructed, he must report this to the Engineer well in advance of the commencement construction. Under this contract, the Contractor will set out the entire Works including levels and compare the data to that given as part of the design and indicated on the design drawings. The Contractor shall report any discrepancies to the Engineer well in advance of the commencement of construction.

**PS 6** **SITE FACILITIES REQUIRED**

PS 6.1 Laboratory Facilities

An approved laboratory shall carry out the Contractor's process control tests. The Contractor shall liaise with the Engineer on the testing procedures that are to be followed. The approved laboratory will not be the same as the laboratory used for the Engineer's Control Testing as per PS 6.2 below.

PS 6.2 Control Testing by the Engineer

Control Testing shall be carried out as instructed by the Engineer, or as amended by Notice afterwards. The Contractor shall arrange payment of such laboratory, upon clearance of such payment by the Engineer. The cost for such testing as well as a 10% handling-fee shall be paid to the Contractor under this item in the Bill of Quantities.

PS 6.3 FACILITIES FOR ENGINEER

The Contractor shall make provision for a room furnished with a table and chairs to accommodate 10 people, suitable for site meetings, and which shall be at the Engineer's disposal at any time.

The Contractor shall make provision for a measuring wheel, electrical multimeter and 100m measuring tape to be on site and which shall be at the Engineer's disposal at any time.

PS 6.4 Sanitary Facilities

The Contractor shall provide adequate toilet facilities for all personnel on site. The facilities should be kept clean and be properly maintained for the duration of the project. Under no circumstances would the Contractor or his personnel be allowed to dump or dispose of any effluent on site.

**PS 7** **SITE MEETINGS**

Monthly site meetings, or more regularly if required, shall be held and attended by an authorised representative of the Contractor with delegated authority to take contractually binding decisions. The meetings will be held at the site offices of the Contractor.

**PS 8** **NOTICE BOARD**

One notice board, with Employer, Contractor's and Engineer's details shall be erected. Refer to the applicable drawings for details of the notice board.

**PS 9** **APPLICABLE STANDARD SPECIFICATIONS**

All material and equipment supplied and/or installed under this contract shall be new and the best of their respective kinds and shall comply with the requirements laid down in the latest editions of the relevant SABS or BS and their amendments (if any) and the requirements of this Specification.

In event of items bearing the SABS mark being available in respect of the materials and equipment required, only items bearing this mark will be acceptable.

The workmanship under this contract shall be of a high standard and to the satisfaction of the Engineer.

The work shall be carried out in accordance with the General Technical Specification laid down in Section 2 of this Specification.

These Standardised Specifications are not issued with the Contract Documents.

#### PS 10 PAYMENT CLAUSES

SABS/SANS payment clauses not shown in the Schedule of Quantities will not be applicable to this contract.

Only payment clauses shown in the Schedule of Quantities will prevail and the Contractor must make provision in his rates to cover all incidentals required as per the drawings to perform the task to the satisfaction of the Engineer.

#### PS 11 QUALITY ASSURANCE SYSTEMS

The Quality Assurance Systems shall consist of procedures, checks and balances to ensure compliance with all requirements of the Contract inclusive of the requirements to Tender: "Minimum Requirements for Contractors Quality Assurance System". Such procedures, checks and balances shall be documented in a manual for the implementation by all key staff members of the Contractor. The Contractor shall ensure that all key staff members are trained and equipped to implement the Quality Assurance System.

The Quality Assurance System shall address all requirements of the Contract, but particularly:

- Minimum requirements;
- Quality control system;
- Measurement system;
- Approval system;
- Site administration

Which sections shall all be divided into "general" and "project specific" parts. The "general" part shall contain the Contractor's standard best practice. The "project specific" part shall contain project specific requirements, especially with regard to Quality Control Systems, which shall reflect the requirements of the Standard and Project Specifications.

The Quality Assurance Manual shall further contain an Appendix, showing the responsibilities of all site staff, relating to quality control. Name, designation, experience and qualifications, as well as function and responsibility for the quality of each listed staff member shall be included.

The Quality Assurance Manual shall be kept in the site office, and shall be available to all staff members who are involved in quality assurance. Proof of relevant training of listed staff and their familiarity with the content of the manual must be provided upon notice by the Engineer.

The Contractor will be required to provide as full time on site a Site Agent dedicated only to this project for the entire duration of the project. The Site Agent should have a minimum of 5 years' experience in the Electrical Construction industry with specific reference to MV/LV Cable terminations, Laying of MV/LV cables, Kiosks installation including wiring, Streetlight installation, applicable earthworks and the setting out of electrical lines. The Site Agents appointment to the project will be subject to the Engineers approval.

The Site Agent will under no circumstances be allowed to be absent from the site without the written approval of the Engineer. Should this approval be granted the Contractor will be required to provide an equally or better qualified replacement for the duration of the Site Agents absence from the site.



A detailed Curriculum Vitae of the Contractors proposed Site Agent should be attached to Schedule 4 (Schedule of Personnel Offered) and submitted with the tender documents.

Should the Contractor fail to comply with this sub-clause, Preliminary and General payments will be withheld until such time that the Contractor does comply to the above provisions.

## PORTION 2: AMENDMENTS AND ADDITIONS

### 1 MINIMUM REQUIREMENT FOR THE INSTALLATIONS

- 1.1 MV Wiring Licence from the Supply Authority or Trade Licence
- 1.2 Referenced Proof of at least Three completed similar projects
- 1.3 CV of Competent and Qualified Electrician with Minimum of three Years Working Experience

### 2 REGULATIONS

The work shall be carried out strictly in accordance with and all material and equipment supplied shall comply with the following laws and regulations where applicable.

- a) The latest edition of the "Code of Practice for the Wiring of Premises", SANS 10142 (1993 as amended);
- b) The "Electricity Supply By-Laws and Regulations" of the Supply Authority;
- c) The Machinery and Occupational Safety Act No. 6 of 1983 and the relevant regulations as amended.
- d) The selection, handling and installation of electric power cables of rating not exceeding 33kV. SABS 0198: 1988.
- e) The Protection of Structures against Lightning - SANS 10313 of 2005 as amended.
- f) Protection of Structures against Lightning Part 1: General principles - SANS 61024-1 of 1990 as amended.
- h) Protection of Structures against Lightning Part 1: General principles Section 1: Guide A - Selection of protection levels for lightning protection systems - SANS 61024-1-1 of 1993 as amended.
- i) Protection of Structures against Lightning Part 1-2: General principles - Guide B - Design, installation, maintenance and inspection of lightning protection systems - SANS 61024-1-2 of 1998 as amended.
- j) The Design and Installation of earth electrodes - SANS 10199 of 2004 as amended.  
Labour Act: 2007 Regulation relating to the Health and Safety of Employees at Work, [newest edition].

The relevant local by laws and regulations of the electricity supply authority

### 3 MAIN SUPPLY NETWORK

The MV system operating conditions and parameters are:

Fed From	Existing MV Supply
Voltage	11 kV
Frequency	50Hz $\pm$ 2.5%
No. Of Phases	Three
System Earthing	Transformer Neutral Earthed

The LV system operating conditions are as follows:

Operating Voltage	415V/240V $\pm$ 10%
Operating Frequency	50Hz $\pm$ 5%

### 4 GENERAL

Cable work shall be done in accordance with SANS 10198 and to the satisfaction of the Client and the Engineer. The storage, transportation, handling and laying of underground cables shall conform to SANS 10198 and to BS 6004, and the Contractor shall have adequate and suitable equipment (SANS 10142) and labour to ensure that no damage is done to cables during such operations. Twisted or kinked cables, or cables damaged in any other way, will be rejected.

## 5 CABLE ROUTES AND POSITIONING

The contractor shall follow the routes indicated on the specification drawings as accurately as possible. Deviations from the routes laid down shall not be made without the engineer's approval. The final position of cable relative to kerbs, boundaries, and other services shall, where necessary, be indicated to the contractor by the engineer on site and shall be strictly adhered to. The cable route drawings issued with the inquiry documents are for bid purposes only and the routes may be amended before work on any particular section of the route commences. In general, where obstacles not provided for in the specification drawings are encountered, cables shall circumvent such obstacles by being laid in as smooth a path as possible around the obstacles and by retaining maximum separation between cables. Laying depths of cables specified are to final levels of the streets and sidewalks. All levels shall be obtained by the contractor from the Local Authority.

## 6 HANDLING AND LAYING OF CABLES

The contractor must satisfy himself that the levels of the trenches excavated are suitable and are wide enough to enable him to carry out the work in accordance with SANS 10198-8. The contractor shall be responsible to draw in, lay, thread through pipes, circumvent obstacles, fix in position clamp and saddle where required to walls, poles or switch gear all cables set out in the contract. Best accepted practice is to be adopted in the handling and laying of cables and the work shall be carried out by persons experienced in the class of work. In particular, attention is drawn to the following:

- (a) Cable drums shall not be dropped off transport vehicles but shall be hoisted off with approved equipment.
- (b) Cable shall be rolled off drums in the indicated direction, the drums being supported on approved equipment.
- (c) When cables are laid out, it shall be supported at points at such a distance apart that the cable is not dragged along the ground and that it is not kinked.
- (d) Cables shall be drawn into position or laid, using a sufficient number of rollers and suitable equipment, for negotiating corners to avoid excess bending or damage to the cable.
- (e) Cables shall be drawn through cable pipe sleeves so as to ensure minimum damage to cables. Approved equipment, including suitable cable harnesses, shall be used.
- (f) Cables shall not be bent in any event to radii smaller than 15 times the overall diameter of the cable.

Cables shall be rolled off drums in the same direction, to prevent corresponding phase cores being crossed at joints.

## 7 TRENCHING

11kV cables shall generally be laid at a minimum depth of 1000mm below ground level. Main LV feeder cables, unless otherwise instructed, shall be laid at a minimum depth of 750mm below ground level. Trenches shall not be less than 300mm wide for single and multiple LV service connection cables, and the trench width shall be increased where more than two LV feeder or service connection cables are laid together so that the cables may be placed at least 150mm apart throughout the run. Streetlight cables buried in trenches under un-tarred roads shall be buried in a trench with minimum depth of 600mm and 300mm wide. Trenches under tarred roads shall be buried a minimum of 500mm deep, and normally in HDPE corrugated sleeving of applicable size, quantity and required spare quantities. Where the nature of the ground does not permit the excavation of the cable trenches to the specified depth, the engineer may authorize trenches not less than 500mm deep. Such authority shall be given in writing. The Contractor must take all the necessary precautions to prevent trenching work

being in any way a hazard to the public, and to safeguard all structures, roads, railways, sewer works or other property from any risk of subsidence and damage. Soil type shall be graded by the engineer. The engineer's decision shall be final. The following table represents the minimum standards to be applied in respect of 11, 22 and 33kV, 400V feeder, 400V Street light and 230V service connection cables.

	TRENCH DEPTH	TRENCH WIDTH	Width between 11,22,33kV Cable	Width between 400V Cable
Single 11,22,33kV	900mm	450mm	n/a	n/a
2 Parallel 11,22,33kV	900mm	800mm	600mm	n/a
3 Parallel 11,22,33kV	900mm	1400mm	600mm	n/a
Single 400V Feeder	900mm	450mm	n/a	n/a
2 parallel 400V Feeder	900mm	450mm	n/a	150mm
3 parallel 400V Feeder	900mm	600mm	n/a	150mm
Single/multiple service connections	600mm	300mm	n/a	None
Streetlight– Un-tarred	700mm	300mm	n/a	None
Streetlight– Tarred	600mm	300mm	n/a	None
Combination of Multiple Cables	900mm	1200mm	500mm	150mm
Combination of single cables	900mm	700mm	n/a	150mm

**TABLE: TRENCH DETAIL FOR CABLE SETUP NEEDED**

## **8 BACKFILLING**

Backfilling after bedding is to be carried out with a proper grading of the material to ensure settling without voids, and the material is to be tamped down after the addition of every 150mm. The surface is to be made good as required.

## **9 PROTECTION OF CABLES**

- (a) Danger tape to specification shall be placed 400mm above all MV and main feeder cables along the entire length of the trench. Where so directed by the Engineer, a concrete layer shall be placed over the bedding layer in order to give the cable additional protection.
- (b) At road crossings, cable sleeves shall be installed at a minimum depth of 1000mm, and as instructed by the Engineer.
- (c) The danger tape shall be 150mm wide yellow plastic with lightning flash printed onto the tape at intervals.
- (d) The tape shall comply with SANS 1091.

## 10 ROAD CROSSINGS

Cable sleeves for road crossings shall not be installed less than 1000mm below the final street level. Unless otherwise specified two additional sleeves all of the same size shall be installed for future use at each road crossing. Galvanized steel draw wire, 2.0mm in diameter shall be installed in all sleeves and shall protrude 1500mm on each side of the sleeve. On completion of the installation of sleeves all ends shall be sealed to prevent the ingress of dirt and moisture, after installation of the cables the sleeves shall be resealed. After installation of the sleeves the trench shall be backfilled and tamped down in layers of 50mm to achieve a density of 95% modified AASHTO. Sleeve end positions shall be marked with an approved cable marker, a letter "E" shall be cut on either side of the road on the kerbstones where these are in existence.

## 11 OPENING UP OF EXISTING CABLES

Where it is necessary to expose existing buried cables for any purpose, or when excavating in the vicinity of existing buried cables, pipes, etc., every care is to be exercised and only labourers experienced in such work, and duly warned by the Contractor, shall be employed thereon. The Contractor shall be responsible for making good any damage caused by his work.

## 12 SLEEVES/CABLE DUCTS

- (a) uPVC Class 6 pipes shall be used as sleeves/cable ducts, for example under roads.
- (b) The pipe shall be supplied in 6m lengths.
- (c) One end of each pipe and bend shall be fluted to form a female coupling so that pipes can be easily joined.

One spare sleeve per cable duct is to be installed and plugged with PVC sheeting.

Where cables cross under roadways, other services and where cables enter buildings, the cables shall be installed in asbestos-cement pipes, earthenware or high-density polyethylene pipes. The ends of all sleeves shall be sealed with a non-hardening watertight compound after the installation of cables. All sleeves intended for future use shall likewise be sealed.

Where cables are cut and not immediately made off, the ends are to be sealed without delay.

## 13 CAPACITY OF CABLE CONDUITS (SLEEVES)

Where cables are to be drawn into sleeve pipes separate cable conduit runs are to be provided for each main distribution cable. The maximum number of cable to be accommodated in a single cable conduit shall be 3 plus the trench earth i.e. 3 service cables or main cable plus street lighting and/or service cable. Bare copper earth wire is to be run with all underground cables constituting part of a low voltage distribution system. The BCEW shall have a cross sectional area equal to at least half that of one phase conductor of the cable, but shall not be less than 10mm<sup>2</sup>. A single earth conductor shall be used as earth continuity conductor for two or more cables run together, branch earth wires being brazed on where required. The earth continuity conductor is to be bonded to the cable armouring at each termination of the cable, as well as to local earth bars. At road crossings, cable sleeves shall be installed at a minimum depth of 1000mm, and as instructed by the Engineer. Coastal or corrosive environments may require stainless steel rod together with multiple point earthing distribution points. Contractors should contact the supply authority in coastal areas or corrosive areas in order to enquire about the earthing requirements.

## 14 CABLE MARKERS

Cable route markers of approved manufacture shall be provided at each end of an underground cable route and at all points where such routes deviate from a straight line. Joints in the cable shall be marked and the maximum distance between route markers shall not exceed 100m. The cable markers shall be tapered blocks cast from concrete in accordance with approved detail drawings. Each cable marker shall be buried with its upper face 100mm above the natural ground level. Marking of cable markers shall also be in accordance with approved detail drawings.

The cable markers shall be tapered blocks cast from concrete in accordance with approved detail drawings. Each cable marker shall be buried with its upper face 100mm above the natural ground level. Marking of cable markers shall also be in accordance with approved detail drawings.

## 15 DETAIL SPECIFICATIONS FOR LOW VOLTAGE CABLES:

### APPLICABLE STANDARDS FOR LOW VOLTAGE CABLES:

- (a) NRS 034: Guidelines for the provision of electrical distribution networks in residential areas.
- (b) SANS 1411: Low voltage (600/1000 V) cable systems for underground electrical distribution.
- (c) SANS 1507: Electric cables with extruded solid dielectric insulation for fixed installations 300/500V to 1900/3300V)
- (d) SANS 10198: The selection, handling and installation of electric power cables of rating not exceeding 33KV
- (e) BS 6004: Electric cables. PVC insulated, non-armoured cables for voltages up to and including 450/750 V, for electric power, lighting and internal wiring.
- (f) IEC 60189: Low Frequency Cables and wires with PVC Sheath.
- (g) IEC 60055: Paper Insulated Metal-Sheathed Cables for Rated Voltages up to 36kV.
- (h) IEC 60227: Polyvinyl chloride insulated cables of rated voltages up to and including 1kV.
- (i) IEC 60228: Conductors of insulated cables.
- (j) IEC 60502: Power cables with extruded insulation and their accessories for rated voltages from 1kV up to and including 36kV.

### ARMOURED 4-CORE LV CABLES

Cables shall be manufactured in accordance with SANS 1507 and shall be constructed as follows:

- (a) Armoured cables: PVC-insulated/PVC-bedded/steel wire armoured/black extruded PVC onto sheath (PVC/PVC/SWA/PVC).
- (b) The PVC insulation and covering shall be ultra violet stabilized and manufactured to SANS 1411 Part 2.
- (c) The insulation shall be general purpose PVC, 600/1000V grade.

(d) The bedding shall consist of a continuous impermeable sheath of PVC extruded to fit the core or cores closely and in the case of multi-core cables, to fill the interstices between cores.

(e) Armouring shall consist of one layer of galvanized steel wire in the case of multi-core cables and shall conform to SANS 1411 Part 6.

#### **PVC SWA PVC GRADE TO SANS 1507 - 2007 AND SANS 1574 – 2008:**

- (a) 6 mm<sup>2</sup> x 2 and 4 core
- (b) 10 mm<sup>2</sup> x 2 and 4 core
- (c) 16 mm<sup>2</sup> x 2 and 4 core
- (d) 25 mm<sup>2</sup> x 4 core
- (e) 35 mm<sup>2</sup> x 4 core
- (f) 50 mm<sup>2</sup> x 4 core
- (g) 70 mm<sup>2</sup> x 4 core
- (h) 95 mm<sup>2</sup> x 4 core

### **16 CABLE JOINTS AND TERMINATIONS**

Joints in underground cables, and terminations, shall be made by means of approved epoxy-resin pressure type jointing kits or products equally approved by the Engineer. Joints must be made by competent cable jointers and entirely in accordance with the manufacturer's instructions using only the materials stipulated in such instructions. Each end of the cables to be jointed must have a minimum of 1000mm of slack disposed in a loop without stress. Backfilling under joints must be firmly tamped to prevent any subsequent settling. LV cables shall be made off with sealing glands and materials specially designed for this purpose in compliance with SANS 10198-9. LV cables shall be properly terminated inside panels, cubicles and kiosks by means of suitably sized armour-clamping glands fixed to gland plates drilled to suit cable. Tails shall be of sufficient length for easy and unstrained connection to the required terminals. Joints will not be permitted in cable tails.

### **17 LV CABLES AND CONDUCTOR ACCESSORIES**

#### CABLE GLANDS FOR ARMOURED CABLE:

- (a) Glands to be used for terminating PVC/PVC/SWA/PVC cables shall be of the adjustable type.
- (b) Glands shall be suitable for general purpose 600/1000V grade 4-core cable with steel armouring.
- (c) The glands shall be made of nickel-plated bronze.
- (d) The glands shall consist of a barrel carrying a cone bush screwed into one end and a nickel-plated brass nipple carrying a nickel-plated brass or a heavy galvanized steel locknut screwed into the other end. The galvanizing shall comply with SANS 121.
- (e) Non-watertight glands must be easily converted to watertight glands by means of a waterproofing shroud and inner seal kit. On the cable entry side of the barrel a concave groove shall be provided to accommodate the top rim of the waterproofing shroud.
- (f) The shrouds shall be made of non-deteriorating neoprene or other synthetic rubber, and shall be resistant to water, oil and sunlight. The shrouds shall fit tightly around the glands and cable.
- (g) Glands shall be provided with ISO threads and shall be suitable for the specified cable sizes.

- (h) Glands shall be brands approved by the engineer in accordance with SANS 1213: 2002.
- (i) Each gland shall be supplied with a shroud and water-proofing kit.

## **18 CABLE TERMINATION LUGS**

Termination lugs shall be tinned copper brand for copper conductors, approved by the engineer. All cable lugs and ferrules shall comply with NRS 028 and IEC 61238.

## **19 INSTALLATION OF EARTHING SYSTEMS FOR LOW VOLTAGE UNDERGROUND CABLES.**

### **BARE STRANDED COPPER CONDUCTOR**

- (a) Bare stranded copper conductors shall be used as earth continuity conductors.
- (b) The conductors shall be of hard drawn stranded copper compliant to SANS 182: 2001.
- (c) The bare stranded copper conductors shall be supplied and delivered in rolled lengths.

### **EARTHING REQUIREMENTS**

Refer to SANS 10198-7 for earthing requirements regarding the following cable components: Metal Sheaths – Multi Core Cables Metal Screens Armour Cross Bonding Refer to SANS 10198-7 for requirements regarding Protective Multiple Earthing Cables as well as Combined / Neutral Cables.

## **20 CONSUMER DISTRIBUTION STUBBIES**

### **GENERAL**

The consumer distribution stubbies shall be of adequate size to accommodate the distribution cables and outgoing circuits specified. Bidders are to submit detailed manufacturer's drawings showing the units offered. Where the dimensions of the units offered differ from the standard dimensions as shown in the drawings supplied with the bid documents, Bidders are to clearly indicate these differences on the manufacturer's drawings.

### **FABRICATION**

The consumer distribution stubbies shall be of the following measurements:

12-way: - 1500mm high x 330mm wide x 295mm deep

18-way: - 1500mm high x 470mm wide x 295mm deep, and shall be suitable for planting directly in the ground. The top lid of the consumer distribution stubby shall slide upwards for easy access to the equipment. Guides shall be welded to the shell of the consumer distribution stubby and the lid to prevent any contact with live terminals when the top lid is moved. Hinged panels shall be provided below the lid at the front and the rear of the consumer distribution stubby for easy access to connect the incoming and outgoing cables. The lid shall overlap the hinged panels when in position. Ventilation of the consumer distribution stubby shall be provided by means of holes in the roof return of the consumer distribution stubby lids. A mounting panel shall be positioned in the center of the consumer distribution stubby for the mounting of the specified equipment.

### **EQUIPMENT INSTALLED IN CONSUMER DISTRIBUTION STUBBIES**

The following equipment shall be installed in the consumer distribution stubbies:



- (a) 80 ampere 5kA curve 1 type single pole circuit breakers.
- (b) P1000 Unistrut rail with K clamps to connect the incoming and outgoing cables.
- (c) Three tinned copper busbars for the phase connections. The busbars shall be of sufficient length to accommodate three 12mm brass bolts for the connection of distribution cables and four 8mm bolts for consumer connections per phase.
- (d) A 25mm x 6mm tinned copper neutral bar.
- (e) A 25mm x 6mm tinned copper earth bar.
- (f) Provision shall be made for suitable shrouds to cover all live terminals in the consumer distribution stubby so that no live parts are exposed when the lid of the consumer distribution stubby is moved into the open position.

#### **WIRING OF THE CONSUMER DISTRIBUTION STUBBIES**

The internal wiring in the consumer distribution stubby shall be done with 16mm<sup>2</sup> PVC insulated copper conductors in accordance with SANS 1507-3. Each circuit breaker shall be individually wired. Connections to busbars and terminals shall be done by means of cable lugs crimped in an approved manner to the conductor ends and in accordance with NRS 028 and IEC 61238. Connections to the busbars shall be made by means of cadmium plated high tensile steel bolts and nuts with locking washers. The busbars shall be predrilled with holes for the connection of the distribution cables and service connection cable conductors. Only one conductor shall be corrected to a bolt. The steel wire armoring of each of the cables shall be bonded to the earth bar.

#### **LABELS**

The consumer distribution stubbies shall be supplied with the following labels:

- (a) A traffolyte label with 40mm high letters and numeral indicating the consumer distribution stubby number fitted to the side facing the oncoming traffic.
- (b) Engraved traffolyte labels with 6mm high numerals under each circuit breaker, meter, and terminal on the terminal block indicating the consumer stand number.

The labels shall have a white background and black letters. The 40mm labels shall be fixed by means of rivets and the 6mm high labels shall be inserted in 25mm wide aluminium label holders mounted at the bottom of the relevant equipment.

#### **DANGER SIGNS**

The requirements of Regulation C-52 of the Machinery and Occupational Safety Act No. 6 of 1983 shall be complied with. All doors shall be fitted with a 150 x 100mm Danger sign.

#### **FINISHING**

- (a) Post-weld cleaning and passivation of 3CR12 Post-weld cleaning shall be undertaken on all welded areas. One of the following cleaning methods may be used to remove all surface discolouration and scale from welded areas.
- (b) Wire brushing: Where it is possible to remove the discolouration and detritus from weld areas by brushing, stainless steel wire brushes that have not been used on other material other than 3CR12 may be used.

(c) Grinding: Dedicated grinding wheels and discs based on alumina shall be used for the dressing of welds. The use of silicon carbide wheels and discs shall not be used.

(d) Abrasive blast cleaning: The abrasive used shall be washed silica sand or alumina totally free of metallic iron, iron oxides or chlorides.

#### **CHEMICAL CLEANING (PICKLING)**

The pickling of 3CR12 shall be carried out using formulations based on nitric (HNO<sub>3</sub>) and hydrofluoric (HF) acid. Formulations based on hydrochloric acids shall not be used. Acids used shall conform to commercial purity standards. Where proprietary pickling formulations are used, the manufacturer's discretion concerning the application procedures shall be strictly adhered to.

#### **PASSIVATION**

The passivation of the 3CR12 shall be carried out as soon as possible after the post-weld cleaning has taken place. A solution made up of nitric acid shall be used for the passivation of the 3CR12. The solution shall be generously applied to the steel by brush, cloth, spray or dipping. Care shall be taken that the solution does not dry on the steel surface. The steel shall be thoroughly washed with clean cold water to remove all traces of the acid used.

#### **GENERAL**

The entire process of cleaning, pickling, passivation and neutralization shall be completed in one working day. Details of the post weld process intend to be used shall be approved by the Engineer and in accordance with SANS 10044.

#### **DRAWINGS AND INFORMATION**

Full details of the consumer distribution stubby offered will be approved by the Engineer:

- A drawing indicating all dimensions of the consumer distribution stubby.
- A drawing indicating the general internal equipment layout of the consumer distribution stubby.

A schematic wiring diagram of the consumer distribution stubby, as wired and colour coded shall be submitted to the client at the completion of the contract.

#### **21 BALANCING OF LOAD**

The Contractor is required to balance the load as equally as possible over the multiphase supply.

#### **22 DISTRIBUTION CIRCUIT BREAKERS**

#### **CONNECTION**

The supply end connections to equipment will be at the top end and load end connections at the bottom.

## 23 MOULDED CASE CIRCUIT BREAKERS

### GENERAL

- (a) This section covers single- or multi-pole moulded case circuit breakers for use in power distribution systems, suitable for panel mounting, for rating up to 1000A, 600V, 50Hz.
- (b) The circuit-breakers shall comply with SANS 156.
- (c) The continuous current rating, trip rating and rupturing capacity shall be as specified.
- (d) The contacts shall be silver alloy and shall close with a high-pressure wiping action.
- (e) Where specified, the circuit breaker shall be capable of accommodating factory fitted shunt trip or auxiliary contact units or similar equipment.
- (f) The operating handle shall provide clear indication of "ON", "OFF" and "TRIP" positions.
- (g) The mechanism shall be of the TRIP-FREE type preventing the unit from being held in the ON position under overload conditions.
- (h) All moulded-case circuit breakers in particular installation as far as practical are to be supplied by a single manufacturer.
- (i) The incoming terminals of single-pole miniature circuit breakers shall be suitable for connection to a common busbar. The circuit breaker shall have a rating plate indicating the current rating, voltage rating and breaking capacity.

### LARGE FRAME CIRCUIT BREAKERS (300A – 600A)

- (a) Triple pole current limiting circuit breakers shall be supplied where the rating specified is above 250A.
- (b) Each circuit breaker shall be supplied with a complete set of cable clamp terminals and 2 x terminal covers for both the load and line side.

### LARGE FRAME CIRCUIT BREAKERS (60A – 250A)

- (a) Triple pole circuit breakers shall be supplied and installed complete with phase barriers and terminal covers for both the line and load sides.
- (b) Each breaker shall also be supplied and installed complete with 4 x brass screws M6 x 70mm. Each brass screw shall be complete with 1 x flat washer, 1 x spring washer, 2 x nuts. The nuts and washers shall also be brass.

### INDUSTRIAL PANEL BOARD CLIP-IN CIRCUIT BREAKERS (10A – 100A)

SF range, tripping curve 2, or similar circuit breakers shall be supplied and installed.

## 24 CIRCUIT BREAKER ACCESSORIES

### CIRCUIT BREAKER SHROUDS

5kA SF range circuit breakers shall be supplied and installed. Two types of shrouds are required:

- (a) for 5kA SF single-pole circuit breaker: 1 / 2 shroud
- (b) for 5kA SF triple-pole circuit breaker: 5/6 shroud

### **CIRCUIT BREAKER MOUNTING RAILS**

When a brand of circuit breaker is installed, the appropriate “mini-rails” shall be supplied and installed with the approval of the engineer.

## **25 BUSBARS**

### **MATERIAL**

Busbars shall be manufactured of solid high conductivity tinned copper with rectangular cross-section in accordance with SABS 1195, BS 159 and BS EN 13601, where applicable.

### **VOLTAGE RATING**

The busbars shall be designed to withstand a test voltage of 2.5kV for one minute.

### **CURRENT RATING**

- (a) The maximum allowable temperature of busbars (including joints) carrying full load current in an ambient temperature as specified shall not exceed 80°C. An ambient temperature is 40°C shall be assumed with a maximum temperature increase of 45°C.
- (b) The size of the busbars shall be 25mm width x 6.3mm thickness (rating approx. 470 amps) where the distance between the phase busbars shall be at least the distance of the longer side of the cross section with a minimum spacing of 50mm. It is however essential that the manufacturer shall make due allowance for the “proximity and skin” effects, the effect of ventilation, etc. for the arrangement used.
- (c) Manufacturers shall, where requested, prove that the busbar rating and enclosure design comply with the temperature rise specified above. The busbars can also be rated to DIN 43671 for unpainted busbars.
- (d) Busbars may not be tapered. The rating of the bars shall be equal to the incoming current rating of 750 Amps.

### **MOUNTING**

Busbars shall be supported on resin insulators. Porcelain insulators are not acceptable. The rating and fixing of busbars shall be designed to withstand mechanical and temperature stresses during fault conditions. Minimum clearance as specified in SANS 1195 for system voltages up to 600V is 10mm and shall be strictly maintained. Busbar insulators of various colours complete with M8 bolt, M8 stud, washers, spring washers and nuts shall be supplied.

### **NEUTRAL BUSBAR**

- (a) The neutral busbar shall have a cross-sectional area equal to that of a phase busbar. The neutral bar shall be

insulated from earth.

(b) Each neutral bar shall be supplied with 5 x 25mm<sup>2</sup> and 2 x 10mm<sup>2</sup> terminal blocks complete with thermoplastic mounting bracket.

### **STREET LIGHTING BUSBARS**

The street lighting busbar shall have a cross-sectional area equal to that of a phase busbar. The busbar shall be of standard mounting and insulated.

### **BUSBAR CONNECTIONS**

Conductor ends will be terminated with crimped lugs which will be bolted to the busbar in accordance with NRS 028 and SANS 1213. Each busbar shall be installed pre-drilled with the following holes: 4 off 7mm diameter holes and 6 off 11mm diameter holes. An additional 4 off 11mm holes must be allowed for.

### **SCREWS, BOLTS AND NUTS**

- (a) All bolts and screws supplied shall be cadmium plated yellow passivated stainless-steel grade 304 to BSS standards.
- (b) All nuts and washers shall be electro-plated.
- (c) Coach screws shall be electro-plated galvanized.
- (d) All bolts etc. shall have ISO threads.
- (e) The largest possible size bolt that will fit into holes in lugs and fixing holes of equipment shall be used.
- (f) Bolts shall be of sufficient length so that at least two but not more than five threads protrude beyond the nut.

## **26 STREETLIGHTING**

### **GENERAL**

As a rule of thumb, streetlights shall be installed on every second pole in built-in areas.

- a) Streetlight poles shall be planted not less than 1m away from the erf boundary towards the street, along streets with a servitude width of up to 15 meters.
- b) Streetlights shall be mounted on straight galvanised poles with a total length of 9m, and a mounting height of 7.5 meters from ground level.
- c) Streetlight poles shall be planted not more than 30m apart from each other in urban areas.
- d) Streetlight poles shall be planted with a minimum depth of 1.5m in the ground.
- e) Streetlight poles along main road shall be planted not less than 5m from the edge of the road.
- f) Streetlights installed in main roads shall have a protruding arm of not less than 3m.
- g) Street light constructions in urban areas shall contain a cantilever for an epoxy tar coating.
- h) Street lighting in urban area shall also have its own metering point and a number of street lights can be fed from the

street light circuit situated in the miniature substation and therefore controlled by one daylight switch.

All metering requirement should be applied for at the supply authority.

## **POLE PLANTING**

The contractor shall be responsible for setting out the pole positions. Approval of the positions shall be obtained from the Engineer before the holes are excavated. Excavation depths for planting poles shall be as stipulated for the poles. The pole holes shall be suitably sized to allow for working in the hole. Street lighting poles shall be planted vertical in all directions and in positions indicated on the specification drawings. Terminal poles of all straight runs of poles shall be planted first after which intermediate poles shall be planted to line up accurately with the terminal poles. Care shall be taken that the mounting height of all luminaires above final street level is equal and as required by SANS 1277. After the pole has been located in its hole backfilling shall take place in stages. Each layer not exceeding 300mm shall be well tamped before the next layer is applied. Where the excavated material consist of broken rock, shale or loose sand is not suitable for backfill the contractor shall be responsible and shall import soil for backfill to the approval of the Engineer and which consolidates perfectly. Surplus backfill shall be removed from site to a point approved by the Engineer.

## **27 STREET LIGHTING POLES**

### **FOR ROAD SERVITUDES WITH A SERVITUDE WIDTH UP TO 15 METRE AND WIDER:**

The straight steel pole shall be continuously or stepped tapered and of oval or circular cross-section with a 75mm diameter top. Overall length of the pole shall be 9m, with a mounting height of 7.5m and a planting depth of 1.5m. Each pole shall have two cable entries (opposite) 450 mm below ground level. The slot shall measure 100 x 50 mm. The access opening shall be 600 mm above ground level with backboard for the mounting of a 5A G.E.C moulded H.R.C. fuse carrier (or circuit breaker). A 30-amp neutral bar shall be fixed internally opposite the access door. An earth terminal, 12 mm in diameter, shall be provided within the access opening. The removable gland plate will be drilled with 2 x 25 mm holes in the lug to terminate entering cables. All poles must be fitted with a corrosion sleeve. These poles should be installed along street with a servitude width of not more than 15m.

The poles should comply with the following specifications:

- (a) Design and Construction to SANS 10225-1991 (2002-04-12).
- (b) All tubing to SANS 657-1: 2005 – grade 250 Mpa. Ultimate tensile strength 450 Mpa
- (c) Fabrication of poles to SABS 0214-1987. Design, fabrication and inspection on articles for hot dip galvanizing to SABS 763.
- (d) The pole shall sustain, in addition to other dead loads, a maximum wind loading of 3-second gust wind at not less than 120 km/h on the exposed surface of the complete lighting installation.
- (e) The maximum permissible deflection at the top of the pole shall not exceed one fortieth (1/40) of the height of the pole.
- (f) The weight of the lantern that will be mounted is 20 kg with a vertical projected area of 0.33 m<sup>2</sup>.
- (g) There is no spigot required on the end of the pole.
- (h) The dimension of the pole offered shall be as follows:
 

Mounting height	7.5m
Planting depth (not less than)	1.50m
Minimum wall thickness at swages	3.00mm

Access door to control gear	300mm x 127mm
Height of access door above ground level	1,370m
Base plates (not less than)	400mm x 400mm x 6mm

- (i) The door shall be fitted with a waterproof cover plate to be secured by a recessed seven-sided nut. Ventilation apertures shall be provided in the cover plate and shall be vermin and weatherproof.
- (j) All sections, parts etc. shall be hot-dipped galvanized after manufacture to SABS 763 specification and shall be of pleasing aesthetic appearance.
- (k) The planting depth, plus 450 mm of the pole, shall be painted with two coats of durable epoxy tar paint after galvanizing.
- (l) The Bidder shall submit with his bid detailed engineering drawings together with a copy of the relevant test certificate and shall give proof of the safety factor applied.
- (m) The pole shall be delivered complete with base plate, access door cover, fixing screws and hook-bolts.
- (n) Luminaire to be mounted onto the poles will be of the High-pressure Sodium Vapour, Side entry and Bottom entry, 100W and to take an E40 Base lamp which complies to IP65 Rating for lamps and control gear compartments to SABS 1222 and 098 part 1 of 1990.

#### **FOR ROAD SERVITUDES WITH A SERVITUDE WIDTH 20M AND WIDER:**

The single cantilever steel pole shall be continuously or stepped tapered and of oval or circular cross-section with a 75mm diameter top. Mounting height of the pole shall be 10.6m, with a planting depth of not less than 1.8m. Each pole shall have two cable entries (opposite) 450 mm below ground level. The slot shall measure 100 x 50 mm. The access opening shall be 600 mm above ground level with backboard for the mounting of a 5A G.E.C moulded H.R.C. fuse carrier (or circuit breaker). A 30 Amp neutral bar shall be fixed internally opposite the access door. An earth terminal, 12 mm in diameter, shall be provided within the access opening. The removable gland plate will be drilled with 2 x 25 mm holes in the lug to terminate entering cables. All poles must be fitted with a corrosion sleeve. These poles should be installed along street with a servitude width of 20m and wider and shall be spaced at not more than 50m apart.

The poles should comply with the following specifications:

- (a) Design and Construction to SANS 10225-1991 (2000-12-13).
- (b) All tubing to SANS 657-1: 2005 – grade 250 Mpa. Ultimate tensile strength 450 Mpa.
- (c) Fabrication of poles to SABS 0214-1987. Design, fabrication and inspection on articles for hot dip galvanizing to SABS 763.
- (d) The pole shall sustain, in addition to other dead loads, a maximum wind loading of 3-second gust wind at not less than 120 km/h on the exposed surface of the complete lighting installation.
- (e) The maximum permissible deflection at the top of the pole shall not exceed one fortieth (1/40) of the height of the pole.
- (f) The weight of the lantern that will be mounted is 20 kg with a vertical projected area of 0.33 m<sup>2</sup>.
- (g) There is no spigot required on the end of the pole.

(h) The size and length of the open-ended spigot required on the end of the cantilever is 43.5mm O.D unthreaded pipe, 150mm long.

(i) The dimension of the pole offered shall be as follows:

Mounting height	10.6m
Planting depth (not less than)	1.80m
Outreach	3.00m
Rake Angle – after mounting luminaire	5°
Radius of rake	3.00m
Minimum wall thickness at swages	3.00mm
Access door to control gear	300mm x 127mm
Height of access door above ground level	1,370m
Base plates (not less than)	600mm x 600mm x 6mm

(j) The door shall be fitted with a waterproof cover plate to be secured by a recessed seven-sided nut. Ventilation apertures shall be provided in the cover plate and shall be vermin and weatherproof.

(k) All sections, parts etc. shall be hot-dipped galvanized after manufacture to SABS 763 specification and shall be of pleasing aesthetic appearance.

(l) The planting depth, plus 450 mm of the pole, shall be painted with two coats of durable epoxy tar paint after galvanizing.

(m) The Bidder shall submit with his bid detailed engineering drawings together with a copy of the relevant test certificate and shall give proof of the safety factor applied.

(n) The pole shall be delivered complete with base plate, access door cover, fixing screws and hook-bolts.

Lanterns to be mounted onto the poles will be of the High-pressure Sodium Vapour, Side entry and Bottom entry, 150W and to take an E40 Base lamp which complies with IP65 Rating for lamps and control gear compartments to SANS 1250: 1979 (2001-12-06) and 1266: 2007.

#### **STREETLIGHT BRACKETS**

For mounting the luminaire, a side entry hot dip galvanized bracket in accordance with SANS 121 (150mm short), no outreach required shall be clamped to the top of the pole providing a 15-degree rake angle for the luminaire. **Care shall be taken that the luminaire is fixed properly and that the axis of the luminaire is vertical to the line of the street.**

#### **STREETLIGHT JUNCTION BOX**

A mounting plate suitable for mounting equipment shall be fixed to the pole on the inside of the access opening and shall be mounted 1370mm above ground level against the pole suitable to take the street lighting cable to be looped into at each pole and the luminaire supply cable. 60 A terminal blocks for terminating the street lighting cables and a 5A HRC fuse for individual control of the light shall be provided on the mounting plate on the inside of the access compartment.

#### **SUPPLY CABLE TO LUMINAIRE**

The supply cable to the luminaire shall be 4 core 10mm<sup>2</sup> PVC SWA PVC cable terminated at the junction box and run along the pole through the bracket to the luminaire. The cable shall be neatly saddled in a straight run onto the pole. The street



lighting cable shall be looped into each pole. The cable ends shall be made off inside the junction box to be provided on 5 terminal blocks. From the junction box mounted against the pole the luminaire shall be supplied by means of a 3 core 2,5mm<sup>2</sup> cable (phase, neutral, earth). A 10A miniature circuit breaker for the individual control of the luminaire shall be installed either inside the junction box at the bottom of the pole or the luminaire as agreed to by the engineer or inside the miniature substation control board. All streetlights to be connected to a single street lighting feeder shall be distributed equally over the three phases and the expected load balanced.

#### **STREET LIGHTING LUMINAIRE**

The street lighting luminaires shall be of the side entry type suitable to be mounted onto the bracket mentioned above at a rake angle of 15°. The luminaires shall be supplied complete with ballast, power factor correction gear, etc.

#### **STREETLIGHT SUPPLY CIRCUIT**

##### Contractor:

The street lighting control contactor C1 shall have 3 N/O contacts rated 60A. The contactor shall be mounted in a separate dustproof box and shall be positioned easily accessible for maintenance purposes. The control wiring shall be as schematically indicated on the drawing and shall provide C1 to be energized by the photo electric relay. Circuit breakers for controlling the individual streetlight circuits, the photo electric relay and contractor coil and to provide a bypass for the contractor shall be circuit breakers having a rupturing capacity of 5kA and in accordance with SANS 152 and SANS 156. Photo electric relay bypass switch a 5A switch in accordance with BS 2631 shall provide for manually bypassing the photo electric relay.

#### **DAYLIGHT SWITCH / PHOTOCCELL**

A Photocell suitable for mounting on the kiosk, rated for 220 V a/c, 10 A shall be installed. One photo electric relay shall be supplied loose with each substation. The contactor shall be rated 5A and all switching shall be time delayed for a period of 30 to 60 seconds.

#### **EARTHING OF STREET LIGHT POLE**

Streetlight POLES and any other metal part shall be bonded to the earth wire in accordance with SANS 10292.

### **28 TREE CUTTING**

- a) A tree shall only be cut with the landowner as well as the Ministry of Environment's approval.
- b) All cut ends of branches or trunks on the standing tree shall be treated with a sealing compound as soon as possible after the cut has been made.
- c) All cut-offs shall be properly removed from site.

### **29 BUILDING INSTALLATIONS**

#### **LIGHTING**

All light switches shall be of Clipsal series or equal approved, colour white, and mounted 1200mm above finished floor level. Where existing conduit work is in place, outlets shall be flush type, where new wiring is required, outlets shall be surface type using steel conduit.

All light circuits shall be wired using 2,5mm<sup>2</sup> conductors. All earth wire is to be bare copper earth wire. All light fittings shall be supplied with electronic control gear for energy efficiency. All ballasts shall be marked with the CELMA EEI classification. Only class A1, A2 and A3 electronic ballasts will be acceptable.

All photo switches shall be fitted in a bulkhead fitting for protection.

#### **SWITCHES, OCCUPANCY AND LIGHT SENSORS**

All light switches shall be rated to carry 16A, except for the light and occupancy sensor switches. All light switches shall be flush-mounted and of the same approved manufacturer and shall be fitted with suitable, approved cover plates. Mounting heights for switches shall be 1200mm AFFL. unless otherwise indicated on the drawings. The "Clipsal" range of light switches is commercially available and will be an acceptable standard.

All light level, light sensitive and occupancy sensors shall be rated to carry 10A. All sensors shall be flush or wall mounted and of the same approved manufacturer. The "Province", "Merlin Gerin" and "Clipsal" ranges of light level, light sensitive and occupancy sensors (respectively) are commercially available and will be an acceptable standard.

#### **ALL ALTERNATIVE TYPES OF SENSORS MUST BE APPROVED BY THE ENGINEER PRIOR TO PLACING ORDERS / INSTALLATION.**

##### Socket Outlets

Mounting heights for outlets sockets and clusters shall be either 300 mm AFFL. or 1200 mm AFFL. unless otherwise indicated on drawings. All socket outlets shall be flush-mounted and of the same approved manufacturer, fitted with suitable, approved cover plates. Power outlets installations shall be in accordance with Part 4 - standard specifications herein.

20A, switched socket outlets shall be wired from the main and sub distribution boards via conduit recessed in brickwork or power skirting where necessary. The socket outlets shall be of the German Standard type with 2 poles and an earth, 20A - 250V.

32A, switched industrial socket outlets shall be wired in the same manner from the main distribution boards. Industrial socket outlets shall be of the European Standard 5 pin, 3P + N + E, 32A, 400V electrically interlocked surface mount socket outlets.

#### **POWER TRUNKING**

The Contractor shall be responsible for the supply and installation of all power trunking complete with corner pieces, end pieces, junction pieces, supply conduits, cover plates and power outlets as specified and indicated on the drawings (if applicable).

The power trunking must comply with SABS 1197. The Contractor must ensure that the power trunking is installed to satisfaction of the Engineer before commencing with the wiring of the power trunking.

#### **HOT WATER CYLINDERS (SOLAR WATER HEATING SYSTEMS)**

The supply and installation of hot water cylinders does not form part of this contract. However, provision of electrical supply connections to these cylinders, does, and shall be carried out in accordance with Standard Specification, Part IV of this document, with the exception of sprague tubing which is to be "Kopex" or equal approved flexible conduit and glands. The Electrical Contractor shall liaise closely with the Plumbing or Solar Water Heating System Sub-contractor as to the exact

position of each isolator in relation to the cylinder. These isolators will be of the rotary with ratings as indicated below. The Plumbing or Solar Water Heating System Sub-contractor will be responsible for the connecting up his plant to this isolator. The "Clipsal 56 Series" range of isolators is commercially available and will be an acceptable standard. Samples of the Isolators to be installed shall be submitted to the Engineer for approval prior to placing order / installing.

The geyser isolators shall have the following ratings:

- No. of Phases: 1 Phase or 3 Phase
- Voltage: 230 or 400V
- Rating: 16 or 32A
- IP Rating: IP 56

#### **FINAL CONNECTIONS TO OUTDOOR AIRCON UNITS**

The Bidder must make provision for the installation of air-con compressor unit feeder cables from the distribution boards to the outdoor isolators / maintenance switches. The feeders shall terminate onto a local, wall mounted, isolator adjacent to each compressor. These isolators will be of the rotary, lockable type with ratings as indicated on the drawings. The air-conditioning installation Contractor will be responsible for the connecting up his plant to this isolator. The "Gewiss" range of isolators is commercially available and will be an acceptable standard. Samples of the Isolators to be installed shall be submitted to the Engineer for approval prior to placing order / installing.

#### **EARTHING AND BONDING**

##### Bonding

All exposed metal parts including roofs, gutters, down pipes, waist pipes etc. shall be bonded in accordance with SANS 10142 as amended.

##### Building Earths

One earth rod 1,8m long of solid drawn copper with minimum diameter 16mm shall be driven into the ground at each building such that the top of the rod shall be 600mm below ground level. The rods shall be connected to the roof steel structure using a minimum of 10 mm<sup>2</sup> for the houses and 35mm<sup>2</sup> BCEW for the rest of the buildings.

Where necessary, the Bidder shall be requested to appoint a specialist contractor for the design and installation of a complete lightning protection system to comply with SANS 10313 - Protection of Structures against Lightning and SANS 10199 of 2004 as amended - The design and installation of Earth Electrodes.

#### **RADIO- AND TV-INTERFERENCE**

All equipment installed under this contract shall comply with the Government Notice No. 2246 and any other applicable rules and regulations in respect of radio- and TV-interferences. Any equipment found producing interference subsequent to commissioning, shall be suppressed or replaced to the satisfaction of the Engineer without any additional cost.

## **TELECOMMUNICATION SYSTEM**

The Bidder shall supply and install a Telecom distribution board in the position as indicated on the relevant layout Board sizes shall be 300 x 300 x 160 mm with a draw tray and wooden backboard. From the distribution board as shown on the relevant drawings, the Bid shall supply and install 25mm diameter conduits unless otherwise indicated, to the telephone outlets and draw boxes as shown. All conduits shall be PVC (in concrete) and a rust free, steel draw wire shall be installed in each conduit. Draw boxes and cover plates shall be supplied by the Electrical Contractor. The telephone installation (wiring) shall be done by others. Provision, however, for telephone wireways and boards forms part of this contract. All Telecoms cabling shall be of grey colour.

## **ELECTRONIC SYSTEMS**

The Bidder shall supply and install all draw boxes for electronic equipment in the positions as indicated on the relevant layout drawings. The Bidder shall also supply and install 25mm diameter conduits unless otherwise indicated, to the electronic receptacles and draw boxes as shown. All conduits shall be PVC (in concrete) and a rust free, steel draw wire shall be installed in each conduit. Draw boxes and cover plates shall be supplied by the Bidder. The electronics installation (wiring and receptacles) shall be done by others. However, provision for electronic wire ways forms part of this contract.

## **30 INFORMATION, DIAGRAMS, DRAWINGS AND MANUALS TO BE SUBMITTED**

As part of his bid and subsequent contract, it will be required from the Bidder to submit certain documents, in accordance with the following programme:

### **WITH THE BID (AT CLOSING DATE):**

- Marked-up copies of all drawings indicating in red all required alterations to the concrete, brickwork or whatever other aspect falling outside the scope of his contract;
- Manufacturer's pamphlets and/or brochures illustrating all equipment offered;
- Sketches/rough drawings showing the principle of the design in general and specifically where it deviates from the proposed layout and details given by the Engineer. Attention should be given to space requirements, ease of maintenance, practical problems during installation, etc. in drawing up sketches. If no such sketches are submitted or if any aspect of the design is not specifically detailed or highlighted, it will be assumed that the Engineer's proposal is acceptable, practical and economical;
- Any other information that the Bidder regards necessary to clarify his offer.

### **WITHIN 30 DAYS AFTER AWARD OF THE CONTRACT:**

- Working drawings of all electrical boards showing layouts, equipment used and dimensions of boards for approval;
- A work programme as specified herein.

### **ON COMPLETION:**

- A complete set of "As-Built" drawings;
- Final resistance test certificates;
- Continuity measurement results to be conducted on the completed sections of the installation;
- Cable schedule indicating sizes, lengths of all LV cables installed;
- A certificate of acceptance by the Employer;
- Complete set of maintenance/operating manuals.

All certificates shall be completed in an orderly and logical manner, and shall be bound in booklet form with a protective cover. The text of instructions, diagrams and drawings shall be "English".

### 31 APPROVED MATERIAL

In the Bill of Quantities, the material is set out in detail to assist the contractor. The preferred manufacturer and code/type are indicated in Part C2. If the materials of other manufacturers are offered, these materials have to be approved by the Engineer.

All inferior work or work containing inferior material, shall be rejected by the Engineer at his discretion, where upon the Electrical Contractor shall immediately remove and rectify the works as required and bear all costs in connection therewith.

### 32 COMPLETENESS OF BID

The Bidder shall allow in his bid price for all material, labour, supervision, transport, tests and all other items necessary to complete the contract in its entirety and to the satisfaction of the Engineer.

In the event where the supply and/or installation of any item, material or equipment does not form part of this Contract, it will be specifically indicated as such in this specification and/or on the accompanying drawings.

### 33 RESPONSIBILITY OF THE CONTRACTOR

Until the Contract Works have been completed or deemed to have been completed the Contractor shall be responsible (subject to the Memorandum of Agreement and the Conditions of Contract), for the Contract Works, where under construction, during tests, or in use by the Employer.

**The Contractor shall nominate a full-time contract manager, with a minimum of an electrical artisan's qualification, properly introduced and approved by the Engineer to manage the contract for the full duration of the contract.**

During the period of maintenance, the Contractor shall make such arrangements as to ensure the attendance on Site within twenty-four hours of his being called upon to do so, of a competent representative for the purpose of carrying out any work or maintenance for which the Contractor shall be liable, and during such part of parts of the said period as the Engineer may deem it necessary the said representative shall be continuously available on the Site.

Work onsite shall be carried out at such times and during such hours as the Engineer may require.

### 34 INSPECTIONS AND TESTS

All equipment will be inspected and tested, both in the factory during manufacturing and on-site during installation. The tests required are prescribed in the standard and detail specification. The engineer will do all inspections accompanied by the contractor and the contractor shall perform all tests with the engineer as witness. The engineer will require seven (7) days notification to avail himself for any tests or inspection. The contractor shall arrange for the maximum number of tests and inspections to be done on the same day.

The contractor shall provide all testing facilities and instruments and all equipment and labour required for a test or inspection. All instruments shall be adequately scaled for the application. All testing facilities and instruments remain the property of the contractor.

All instruments used shall have a valid test certificate issued by an accepted testing authority. The engineer reserves the right to call for a calibration test on any instruments used during the test.

The contractor shall record all results of the tests done on a test certificate, of which the engineer must receive two (2) copies.

The contractor shall ensure that the equipment is ready for testing or inspection and that the equipment conforms to the specifications before the engineer is requested to witness tests or inspections. Should it be found that the equipment or contract works is not ready for testing/inspection, or does not conform to the specification, the client reserves the right to charge the contractor for any re-tests or subsequent costs.

### **35 COMMISSIONING**

The Contractor shall be responsible for commissioning all sections of the works and shall perform the tasks set out below:

- a) Prior notice of and proper arrangements for the commissioning shall be made with the Employer, Engineer, Supply Authority, and all contractors and suppliers of equipment which will be affected by the commissioning operation.
- b) If plant and equipment which has been supplied by others has to be commissioned, the supplier's specific permission thereto, together with any specific requirements relating to commissioning shall be obtained prior to commissioning.
- c) All sections of the works shall be carefully inspected by a responsible representative of the Contractor to ensure that all construction and installation work has been properly completed.
- d) In particular the following pre-commissioning checks shall be done:
  - circuit breaker, fuse, cable and protective device settings and ratings
  - wiring connections
  - earthing conductors, connections and terminations
  - removal of transport clamps and supports
  - identification of all equipment
- e) During commissioning the following shall be checked and the results entered into a written report, which shall be handed to the Engineer within 7 days from completion of commissioning of any section of the works:
  - equipment nameplate details including serial numbers, kVA rating, voltage rating, current rating, frequency, full load current and number of phases.

The Contractor shall carry out the test specified in the Manufacturer's Works, on the site or elsewhere in accordance with the conditions thereof and such additional tests as in the opinion of the Engineer necessary to determine that the Contract Works comply with the conditions of this Specification, where under test or ordinary working conditions.

All materials used shall also be subjected to and shall withstand satisfactorily such routine tests as are customary in the manufacture of the types of plant or material included in the Contract Works.

Where, at the direction of the Engineer, tests and/or analyses are effected elsewhere than at the Works of the Contractor or a Sub-Contractor, or on the Site the costs incurred will be borne by the Employer should such tests prove satisfactory, but the Contractor will be called upon to pay all expenses incurred by the Employer in respect of any work or materials found to be defective, or of inferior quality, adulterated or otherwise unacceptable.

The Engineer shall be given two weeks written notice of tests.

All tests shall be carried out in the presence of, and to the satisfaction of the Engineer and at such times as they may require. The Contractor shall supply suitable test pieces of all materials as required by the Engineer.

All labour, materials, fuel, stores, apparatus, instruments and connections required for the above tests shall be provided by the Contractor. All apparatus and materials supplied under the Contract are subject to inspection by the Engineer, who shall be notified 14 days in advance when the material is ready for inspection.

Tests to be carried out on site:

- Such other tests as are required by the Engineer to prove compliance with the Specification independently of any test which may already have been carried out at the Manufacturer's Works, or elsewhere.
- Such tests as may be required by the Engineer to prove the load bearing capacity of foundations and stay anchors.
- Soil resistivity test
- Insulation resistance test
- Continuity test
- Polarity test
- Voltage test

### **36 HANDING OVER**

The handing over of completed sections of the works to the employer and the energising/putting into operation of the completed sections of the works will only take place once the following documents and drawings have been submitted to the engineer:

- a certificate of compliance in terms of the relevant Act applicable
- a certificate issued by the contractor that the installation complies with the contract and specifications
- a certificate of acceptance which shall be specified and signed by the employer after the inspection, acceptance and approval of the completed sections of the works has taken place
- "as-built" drawings of the installation on 0,08 mm thick polyester film
- written application to energise the completed sections of the works.

The contractor shall be responsible for timeously arranging for all tests and inspections with the employer and engineer, submitting the necessary documents and drawings to the engineer and applying for the energising of the completed sections of the works.

### **37 "AS-BUILT" DRAWINGS**

On completion of the contract, all drawings required for the manuals shall be prepared and included in the manuals as specified in hard copy as well as electronic copy. In addition, a set of drawings on 0,08-mm-thick polyester film, as well as spanning sheets for the MV lines, shall be handed to the engineer to form the "as-built" records. The "as-built" drawings must also be submitted in AutoCad format, version 2016 or as specified by the engineer.

## PORTION 3: FORMS TO BE COMPLETED BY BIDDERS

## 3.1 SPECIFICATIONS AND COMPLIANCE SHEET

*[Bidders should complete columns C and D with the specification and performance of the Works offered. Also, state "comply" or "not comply" and give details of any non-compliance/deviation to the specification required. Attach detailed technical literature if required. Authorise the specification offered in the signature block below]*

<b>Item No</b>	<b>Specifications and Performance Required</b>	<b>Compliance of Specifications and Performance Offered</b>	<b>Details of Non-Compliance/ Deviation (if applicable)</b>
<b>A*</b>	<b>B*</b>	<b>C</b>	<b>D</b>
1	Overhead Conductor		
2	Transformer 200 KVA		
3	Armoured MV Cable	N/A	
4	Kiosks		
5	Distribution Boards		
6	Armoured LV Cables		
7	Switchgear		
8	Light Fittings Type A Type B Type C Type D Type E Type F		
9	Light Switches and Sensors		
10	Earth Rods		
11	Socket Outlets and Building Receptacles		



**3.2 SCHEDULE OF WORK EXECUTED BY BIDDER**

The bidder shall insert in the spaces provided below; a list of work completed by his firm during the past five (5) years under construction by his firm. Contact names at the various Employers and Consultants must be provided. Additional project sheets with the required information may be inserted.

EMPLOYER (NAME, TEL. NO)	CONSULTING ENGINEER (NAME, TEL. NO)	DESCRIPTION OF WORK	VALUE OF WORK	YEAR OF COM- PLETION

**3.3 SCHEDULE OF WORK CURRENTLY BEING EXECUTED BY BIDDER**

The bidder shall insert in the spaces provided below work at present under construction by his firm. Contact names at the various Employers and Consultants must be provided. Additional project sheets with the required information may be inserted.

<b>EMPLOYER (NAME, TEL. NO)</b>	<b>CONSULTING ENGINEER (NAME, TEL. NO)</b>	<b>DESCRIPTION OF WORK</b>	<b>VALUE OF WORK</b>	<b>YEAR OF COM- PLETION</b>

**3.4 SCHEDULE OF CONSTRUCTION EQUIPMENT**

The Bidder must state below which construction equipment will immediately be available for this contract, which construction equipment will be available from outstanding orders and which additional construction equipment will be acquired or hired for the work if the contract is awarded to him.

After the award of the Contract, the contractor must satisfy the Engineer that all equipment listed hereunder is available on the site when required. The Contractor must maintain the equipment in good working order for the duration of the Contract.

(a) CONSTRUCTION EQUIPMENT WHICH IS IMMEDIATELY AVAILABLE

DESCRIPTION	TYPE/ MODEL	POWER	MASS	CAPACITY	QUAN-TITY

CONSTRUCTION EQUIPMENT WHICH WILL BE BOUGHT OR HIRED FOR THE CONTRACT

(Statements must reflect particulars of delivery arrangements)

DESCRIPTION	DELIVERY DATE	TYPE/ MODEL	POWER	MASS	CAPACITY	QUAN- TITY

---

### 3.4 BID CHECKLIST SCHEDULE

*[Public Entity to update this Checklist to ensure that it contains the documents required from Bidders for the specific procurement]*

Description	Attached (please tick if submitted and cross if not)
Priced Activity Schedules	
Specification and Compliance Sheet	
Eligible or have a valid Registration Certificate with Electricity Service Provider authorising the bidder to operate up to 400V	
Form A: Schedule of Work executed by Bidder	
Form B: Schedule of Work currently being executed by Bidder	
Form C: Schedule of Construction Equipment	

**Disclaimer:** *The list defined above is meant to assist the Bidder in submitting the relevant documents and shall not be a ground for the bidder to justify its non-submission of major documents for its bid to be responsive. The onus remains on the Bidder to ascertain that it has submitted all the documents that have been requested and are needed for its submission to be complete and responsive.*

**PORTION 4: PRICED ACTIVITY SCHEDULE**

The quantities in this Bill of Quantities are provisional and shall be measured as executed and paid for according to prices in the Bill of Quantities and any unexpended amounts shall be deducted from the amount of the contract sum.

The quantities in this Bill of Quantities are not to be used for ordering materials.

The Bill of Quantities form part of and must be read in conjunction with the specification, which document contains the full description of the work to be done and material and equipment to be used and unless otherwise described in the Bill of Quantities, reference should be made to the specification for the full meaning or description of work to be done and materials and equipment to be used in this service.

The total bid price on the bidder form shall constitute the contract price of the successful bidder. bidders are advised to check their item extensions and total additions, as no claim for arithmetical errors will be considered.

No alteration, erasure or addition is to be made in the text of the Bill of Quantities. Should any alteration or erasure be made, it will not be recognized but the original wording of the Bill of Quantities will be adhered to.

The priced Bill of Quantities of the successful bidder will be checked and the Engineer reserves the right to call for adjustment to any individual price and to rectify the discrepancy.

Variations in the scope and extent of the work included in the Bill shall be allowed to meet the employer's requirements and shall be measured and costed at rates entered in the Bill, where appropriate, and shall form additions to or deductions from the total of the Bill.

Any items or variations for which rates have not been included in the Bill shall be agreed and priced as non-scheduled items in accordance with the provisions of the contract.

The rules covering the extent and costing of the variation shall be those provided for in the form of conditions of contract.

Unless a separate rate for the supply and for the installation of any item is specifically called for, the supply and installation cost of any item shall be fully included in the unit price.

The description of each item shall, unless otherwise stated herein, be held to include making, conveying and delivering, unloading, storing, unpacking, hoisting, waste, patterns, models and templates, plant, temporary works, return of packing, establishment charges, profit and all other obligations arising out of the conditions of contract.

All fittings and accessories always include the connections thereto. All measurements are nett, unless otherwise stated, and bidders must allow in their rates for wastage.

The quantities and rates included for daywork shall form part of the bidder price, but bidders shall note that this item must be regarded as provisional and will only be payable to the contractor if and when a written order to this effect has been issued. All provisional sums shall be expended as directed by the Engineer and any balance remaining shall be deducted from the amount of the contract sum

---

PORTION 5: DRAWINGS



Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
1	<p><b>SECTION A1 : PRELIMINARY AND GENERAL</b>  Bidders shall allow for all preliminary and general expenses and items not covered in the provisional Schedule of Quantities whatever cost they may consider necessary for carrying out and observance of the items - such as: compliance to General Conditions of Contract, Special Conditions of Contract, attendance, supervision &amp; travelling, establishment of site, storage and clearing, workshop drawings where applicable, drawings for approval, temporary power and accommodation, administrative costs, transport, performance guarantee, commissioning, attendance of site meetings and ad-hoc meetings, etc.</p> <p><b>The Bidder acknowledges by submission that the Employer reserves the right to adjust the scope of work to any degree, without recourse for renegotiation of rates (however, the Employer also reserves the right negotiate the rates in case of a variation)</b></p> <p><b>Fixed Charged Items:</b></p>						
1.1	Compliance: General and Special Conditions, Technical Spec.	Sum	1				
1.2	Performance guarantee / surety	Sum	1				
1.3	Programing of work	Sum	1				
1.4	Transport	Sum	1				
1.5	Site Establishment	Sum	1				
1.6	Setting Out & Survey (line routes, pole positions, kiosks, manholes, Distribution boads, electrical receptacles and etc. to verify position on planning and avoid conflicts with other services)	Sum	1				
1.7	Progress Meetings	Sum	1				
1.8	Attendance at Site Meetings and for Measurement	Sum	1				
1.9	Site Supervision: during operations the contractor shall have on site a suitably experienced and qualified technician who shall supervise the works. Details of the site supervisor shall be submitted to the Engineer for approval prior to his assumption.	Sum	1				
1.10	Test and inspection prior to completion	Sum	1				
1.11	Marking-up of record drawings	Sum	1				
1.12	Insurance (theft, damage, liability, etc.)	Sum	1				
1.13	Certificates & Payment.	Sum	1				
1.14	Tools & Equipment including Megger, Meters, earth leakage tester to conduct commissioning at practical completion.	Sum	1				
1.15	A Minimum of Four Free Maintenance Visits during the 12 month guarantee period	Sum	1				
1.16	Co-ordination with Land Lord / Power Utility at tie-in and as required by the Engineer.	Sum	1				
	<p><b>Time Related Items: Quantities for the following items shall be as per the Bidder's proposed contract completion period.</b></p>						
1.17	Office & Storage facilities.	Month	4				
1.18	Living Accommodation, Ablution & Latrine facilities	Month	4				
1.19	Tools & Equipment	Month	4				
1.20	Water supplies, Electrical Power, Communications & access.	Month	4				
1.21	Supervision	Month	4				
1.22	Company & Office overhead costs	Month	4				
1.23	Transport	Month	4				
	Bidder to specify and price other relevant items						
	<b>Total for section carried to Summary</b>						



Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
1	<b>SECTION B1: EXCAVATION, BUILDERS &amp; SITE</b>						
1.1	EXCAVATION						
1.1.1	SANS 1200 Excavation in soft / pickable soil for <b>MV cable/sleeve trenches</b> , select materials, backfill, compact (To min 95% MOD AASHTO), and dispose of surplus and unsuitable material. Trenches 1000mm wide and 1000mm deep (1m long trench excavation per 1m <sup>3</sup> ).	m	0				Rate Only
1.1.2	Extra over item 1.1.1, but for soft rock (i.e. Jack-hammer, mechanical excavator etc.)	m	0				Rate Only
1.1.3	Extra over item 1.1.1, but for hard rock (i.e. blasting etc.)	m	0				Rate Only
1.1.4	SANS 1200 Excavation in soft / pickable soil for <b>LV cable/sleeve trenches</b> , select materials, backfill, compact (To min 95% MOD AASHTO), and dispose of surplus and unsuitable material. Trenches 900mm wide and 750mm deep (1.48m long trench excavation per 1m <sup>3</sup> ).	m	1750				
1.1.5	Extra over item 1.1.4, but for soft rock (i.e. Jack-hammer, mechanical excavator etc.)	m	0				Rate Only
1.1.6	Extra over item 1.1.4, but for hard rock (i.e. blasting etc.)	m	0				Rate Only
1.1.7	SANS 1200 Excavation in soft / pickable soil for <b>LV / Telecom cable/sleeve trenches (only)</b> , select materials, backfill, compact (To min 95% MOD AASHTO), and dispose of surplus and unsuitable material. Trenches 600mm wide and 750mm deep (2.22m long trench excavation per 1m <sup>3</sup> ).	m	1000				
1.1.8	Extra over item 1.1.7, but for soft rock (i.e. Jack-hammer, mechanical excavator etc.)	m	0				Rate Only
1.1.9	Extra over item 1.1.7, but for hard rock (i.e. blasting etc.)	m	0				Rate Only
1.2	PLASTIC WARNING TAPE						
1.2.1	BS EN 50520 150mm wide to SABS standard installed in all electrical cable trenches on blinding layer 200mm above cables	m	2750				
1.3	WET WORK						
1.3.1	SANS 1200 <u>Mini-substation plinth</u> Excavate to relevant depth (as per detail) and cast 3x 500x500x1400mm concrete plinths, to 25MPa, on back-filled, compacted soil, spaced over 3.3m	Item	0				Rate Only
1.3.2	SANS 1200 Construct 7MPa single leaf brick wall, plasterred to top level of plinth, from min 250mm b.n.g.l., with 200x300mm 7MPa concrete strip footing	m <sup>2</sup>	0				Rate Only
1.3.3	Supply deliver and lay 19mm crushed, washed stone for making neat	m <sup>3</sup>	0				Rate Only
1.3.4	SANS 1200 <u>Kiosk plinth (electrical)</u> Excavate to relevant depth (as required for type of kiosk) and cast 25MPa plinth at/around the mounting base for permanent fixing of kiosk (as required for specific type of kiosk or as directed on site), with lead-in sleeves (50mm/110mm Ø) as required.	No.	0				Rate Only
1.3.5	SANS 1200 <u>Kiosk plinth (telecom stubbie)</u> Excavate to relevant depth (as per detail) and cast 400x400x400mm (LxWxD) plinth with square 200x200x400mm (LxWxD) hole at centre, with fixing bolts/straps, with lead-in sleeves (110mm Ø x4) on each side of plinth to centre hole. <u>Concrete cable manhole (telecom / electrical)</u> <u>Excavate and build</u>	Item	0				Rate Only
1.3.6	SANS 1200 Excavate to relevant depth ±1000x1000mm drawhole, 1000mm deep (invert level) unless otherwise specified, complete (using 25MPa concrete and 14MPa brick work; as per detail), excluding manhole cover	Item	8				
1.3.7	SANS 1200 Excavate to relevant depth (as per detail) and construct Jointing pit with concrete base, brickwork to height required, manhole cover (measured elsewhere), concrete cover and plaster, as per detail.	Item	0				Rate Only
	Pre-fabricated manhole, waterproof fibre-cement chamber & base plate, complete with cable slack brackets, canter rails, holes drilled & capped (110mm, 50mm, 40mm Ø as required) - excavated, installed on compacted base, complete for:						
	<u>Supply manhole cover, only</u>						
	SANS 558 800x600mm double lip seal, iron cover, highly trafficable (heavy duty)	No	8				
	TN Telecom Namibia approved, round 600mm Ø cover	No	0				Rate Only
	SANS 1882 Type 2A 600mm Ø polymer concrete manhole cover & frame, highly trafficable (heavy duty, min 100kN). Colour blue/black. Type Maverick, National Manhole Covers or similar and approved	Item	0				Rate Only
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	<b>Total from previous page</b>						
	<b>SLEEVES AND BENDS IN / UNDER BUILDINGS</b>						
1.3.8	SANS 1200 Diameter 1000mm, height 1000mm; fitted with polymer manhole cover (as listed elsewhere)	Item	0				Rate Only
1.3.9	SANS 1200 Diameter 600mm, height 1000mm; fitted with polymer manhole cover (as listed elsewhere)	Item	0				Rate Only
	Class 9 uPVC sleeves, buried at 600 to 1000mm below n.g.l., including galvanised draw wire installed as well as end caps where required, excluding trenching and back fill:						
	<u>Electrical</u>						
1.3.9	110mm Ø	m	200				
1.3.10	110mm Ø bend (0-180°)	item	0				Rate Only
	50mm Ø	m	25				
	50mm Ø bend (0-180°)	m	10				
	<u>Telecom</u>						
1.3.11	50mm Ø	m	0				Rate Only
1.3.12	50mm Ø	m	0				Rate Only
1.3.13	110mm Ø	m	1750				
1.3.14	50mm Ø bend (0-180°)	item	0				Rate Only
1.3.15	110mm Ø bend (0-180°)	item	0				Rate Only
1.4	<b>OTHER</b>						
	<u>Precast concrete cable/sleeve marker</u>						
1.4.1	SANS 1200 / BS 1881 Concrete cable marker to 200x200x200mm to 300x300x200mm (LxWxD) of 25MPa concrete (min) with indent in top for 101x76mm lead plaque insert, labelled as per details.	Item	25				
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
	<b>Total from previous page</b>						
2	<b>SECTION B2: MEDIUM VOLTAGE</b>						
2.1.1	200 kVA miniaturre substation One(1). complete with T3 - Off ring main unit. 2 load break isolator. 1 fused isolator. transformer. LV compartment with LV main breakers. busbars. mounting rails. excluding external LV feeders but including all switchgear as per drawing	Sum	0				Rate Only
2.1.2	Concrete plinth suitable for mounting a miniature substation	Sum	0				Rate Only
2.1.3	Miniature Substation Identification plates / tags	Sum	0				Rate Only
2.2	200 kVA Pole mounted Transformer complete with all accesorries.	Sum	1				
	<b>MINIATURE SUBSTATION EARTHING</b>						
2.2.1	Supply & install a complete miniature substation earthing system complete including earthmat & earthfault conductors as specified in the technical specifications to yield maximum 20 OHM impedance per point & 5 OHM overall.	Sum	0				Rate Only
2.3	<b>COMBINATION UNIT</b>						
	<i>Supply and install the following concrete plinth mounted Combination Unit, excluding the plinth structure.</i>						
2.3.1	33kV Outdoor T3-Off Oil-filled ring main and metering combination unit with 1 loadbreak isolator and 2 fused isolator complete, excluding concrete mounting support structure.	Sum	0				Rate Only
2.3.2	Concrete plinth suitable for Mounting the Combination Unit	Sum	0				Rate Only
2.3.3	Combination Unit Identification plates / tags	Sum	0				Rate Only
2.4	<b>COMBINATION UNIT EARTHING</b>						
2.4.1	Supply & install a complete Combination Unit earthing system complete including earthmat & earthfault conductors as specified in the technical specifications to yield maximum 20 OHM impedance per point & 5 OHM overall.	Sum	0				Rate Only
2.5	<b>33 kV CABLES</b>						
	Rates to include for the supply. delivery. installation in trenches. sleeves. but excluding trenching. termination. joints and and cable supports for Type A. XLPE insulated. steel wire armoured. PVC sheathed. starnded Cu. 33kV cables.						
2.5.1	35mm <sup>2</sup> x 3c	m	0				Rate Only
2.5.2	70mm <sup>2</sup> x 3c	m	0				Rate Only
2.5.3	95mm <sup>2</sup> x 3c	m	0				Rate Only
2.6	<b>CABLE TERMINATIONS</b>						
	33kV Heat shrink terminations for Type A. XLPE insulated. steel wire armoured. Cu. 33kV Cables. including armour glands. shrouds. lugs & connections.						
	Indoor [minisubs + ring main units]						
2.6.1	35mm <sup>2</sup> x 3c	No	0				Rate Only
2.6.2	70mm <sup>2</sup> x 3c	No	0				Rate Only
2.6.3	95mm <sup>2</sup> x 3c	No	0				Rate Only
2.7	<b>WARNING TAPE</b>						
2.8	Yellow cable warning tape installed 200mm above cable	m	0				Rate Only
2.8.1	Excavation of trenches for 33kV MV cables: Provision of suitable bedding material for 300(w) x 900mm (d) trench in pickable soil. including compaction & backfilling.						
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
	<b>Total from previous page</b>						
2.9.1	Pickable Soil	m	0				Rate Only
2.9.2	Soft rock	m	0				Rate Only
2.9.3	Hard Rock	m	0				Rate Only
<b>2.10</b>	<b>LABELLING</b>						
	Miniature Substation labels + danger signs complete as per NamPower standard	Sum	0				Rate Only
2.10.1							
2.10.2	Cable Markers	No	0				Rate Only
<b>2.11</b>	<b>TESTING AND COMMISSIONING</b>						
	Test and commission the complete installation, including provision of as built information	Sum	1				
2.11.1							
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	<b>Total from previous page</b>						
3	<b>SECTION B3: KIOSKS &amp; LV DISTRIBUTION BOARDS</b>						
3.1	<b>KIOSKS</b> Supply, delivery and installation of distribution pillars, to local Supply Authority requirement & specification and approval of Engineer, complete with panel, bus bars, doors, legend card holder, labels, switch gear as per relevant drawings; with concrete strip footing / plinth (measured elsewhere)						
	Steel pillar Epoxy powder coated electric orange, light grey or olive						
3.1.1	24-meter way double door enclosure - Kiosk 1, As per drawing	Item	0				Rate Only
3.1.2	12-meter way double door enclosure - as per single line diagram drawing	Item	0				Rate Only
	Glass reinforced polyester  Electric orange, light grey or olive						
3.1.10	12-meter way double door enclosure, excluding Switchgear as per drawing of Kiosk-1	Item	1				
3.1.10	12-meter way double door enclosure, excluding Switchgear as per drawing of Kiosk-2	Item	1				
3.1.11	24-meter way double door enclosure, excluding Switchgear as per drawing	Item	0				Rate Only
	<b>DISTRIBUTION BOARDS</b>  Supply, delivery and installation of distribution board complete with tray, architrave / frame, chassis & rails for DIN gear; earth, neutral & bus bars; covers, doors (with locking mechanisms), blank inserts, labelling & legend card holders etc.; excluding switch gear, for:  <u>Surface mounted, weather proof, steel</u>  Meterboard, 18x12x9, IP65, padlockable, electric orange powder coated. Type Waco or similar approved.						
		Item	0				Rate Only
3.2	<b>LABELLING</b>						
3.2.1	Labels with 10mm high black letters on a white	Item	3				
3.2.2	Labels with 5mm high red letters on a white background as "LOCAL MAIN-SWITCH OFF IN CASE OF	Item	3				
3.2.3	Labels with 5mm high black letters on a white background as "SUPPLY FROM XXX WITH YYY + ZZZ" where XXX is the cable origin, YYY is the size and type of supply cable and ZZZ is the size and type of earth conductor.	Item	3				
3.2.4	Labelling strips as per drawings below switchgear with neat laminated drawing in door holder	Item	3				
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
	<b>Total from previous page</b>						
4	SANS 10198 <b>SECTION B4: WIRES AND CABLING</b> NOTE: a) Rates shall allow for supply, delivery, handling, transporting, inserting and laying the cables in prepared trenches, threading through sleeves, draw-in, saddling, cutting, laying on cable trays, but shall exclude trench excavations, preparation of trenches and backfilling, wire ways, terminations etc. which are measured elsewhere. b) Allow also for fixing of cables to trunking with cable clamps in vertical service duct at 2000mm intervals, fixing onto cable trays with cable ties at 500mm intervals and saddling of surface mounted cables at 500mm centres, where relevant. c) Cables shall be measured linearly over all lengths as laid or built-in from gland to gland.						
4.1	<b>ARMOURED CABLES</b> Copper conductor PVC PVC SWA PVC cabling, number of cores as shown (to SANS 0150)						
4.1.1	95mm <sup>2</sup> , 4 core	m	0				Rate Only
4.1.4	70mm <sup>2</sup> , 4 core	m	245				
4.1.5	50mm <sup>2</sup> , 4 core	m	350				
4.1.7	35mm <sup>2</sup> , 4 core	m	0				Rate Only
4.1.8	25mm <sup>2</sup> , 4 core	m	125				
4.1.9	16mm <sup>2</sup> , 4 core	m	0				Rate Only
4.1.10	16mm <sup>2</sup> , 2 core	m	0				Rate Only
4.1.11	6mm <sup>2</sup> , 4 core	m	0				Rate Only
4.1.12	10mm <sup>2</sup> , 2 core	m	0				Rate Only
4.1.13	6mm <sup>2</sup> , 2 core (Area Lights)	m	0				Rate Only
4.1.14	4mm <sup>2</sup> , 2 core	m	0				Rate Only
4.2	<b>EARTH CONTINUITY CONDUCTOR</b> Bare stranded copper earth continuity conductor laid and buried in trenches and wireways to run with all cables distribution routes.						
4.2.1	50mm <sup>2</sup>	m	160				
4.2.4	35mm <sup>2</sup>	m	245				
4.2.5	25mm <sup>2</sup>	m	0				Rate Only
4.2.4	16mm <sup>2</sup>	m	350				
4.2.4	10mm <sup>2</sup>	m	125				
4.2.5	6mm <sup>2</sup>	m	0				Rate Only
4.2.4	4mm <sup>2</sup>	m	0				Rate Only
4.2.9	Green/yellow PVC insulated stranded copper earth continuity conductor laid and buried in trenches and wireways to run with all cables distribution routes.						
4.2.10	4mm <sup>2</sup>	m	0				Rate Only
4.2.7	2.5mm <sup>2</sup>	m	0				Rate Only
4.3	<b>CABLE TERMINATION</b> Cable termination (weather and water proof) for copper conductors PVC PVC SWA PVC cables including termination lugs, CCG or equal gland kit with shrouds, locknut earth tag etc., making off, bonding and connections; gland size:						
4.3.1	Size 5 (95-120mm <sup>2</sup> 4C)	Item	4				
4.3.2	Size 4 (50-70mm <sup>2</sup> 4C)	Item	6				
4.3.3	Size 3 (16-35mm <sup>2</sup> 4C)	Item	0				Rate Only
4.3.5	Size 1 (4-6mm <sup>2</sup> 4C)	Item	0				Rate Only
4.3.5	Size 2 (6-16mm <sup>2</sup> 2C)	Item	0				Rate Only
4.4	<b>CABLE JOINT</b> <b>All joints only to be installed with prior approval of Engineer</b> Cable joint (weather and water proof, IP68 min.) for copper conductors PVC PVC SWA PVC cables including ferrules, inner & outer sheaths, armour continuity connection, jacketing sleeve casing and resin etc. as required for a weatherproof IP67/8-equivalent joint; cable size:						
4.4.1	Size 7 (95-150mm <sup>2</sup> 4C)	Item	4				
4.4.2	Size 5 (25-70mm <sup>2</sup> 4C)	Item	4				
4.4.3	Size 2 (1.5-6mm <sup>2</sup> 4C)	Item	0				Rate Only
4.4.4	Cable joint for bare copper conductor (including earth conductors) including non-insulating ferrule. For cable sizes: 25-70mm <sup>2</sup>	Item	0				Rate Only
4.4.5	4-10mm <sup>2</sup>	Item	0				Rate Only
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
	<b>Total from previous page</b>						
5	<b>SECTION B5: SWITCH GEAR</b>						
5.1	SANS 10142 SWITCH GEAR						
5.2	SANS 60947 NOTES: a) All switch gear to have minimum 5kA rupture capacity. b) All switch gear to be rated for 240/415V operating, unless stated otherwise. <b>Note:</b> Tenderer to specify exact make of switch gear offered (tenderer shall note restrictions on brands as per tender. Use of multiple brands is forbidden, unless specific items of equipment are not available from the main proposed brand)  <b>VERY IMPORTANT:</b> Contractor is to submit documentary proof before installation substantiating switchgear coordination / discrimination as indicated on drawings						
5.3	ISOLATORS						
5.3.4	25-60A, three pole, 5kA	Item	0				Rate Only
5.3.5	25-60A, single pole, 5kA	Item	0				Rate Only
5.4	TRIPLE POLE MOULDED CASE CIRCUIT BREAKER Rupture capacity as shown						
5.4.1	500A, 65kA, air circuit breaker with electronic trip unit. Type equivalent to ABB Emax E2 S-A	Item	0				Rate Only
5.4.2	250A, 65kA, Thermal-magnetic, adjustable. Type equivalent to ABB Tmax 4H	Item	2				
5.4.3	250A, 25kA, Thermal-magnetic, adjustable. Type equivalent to ABB Tmax 4N	Item	0				Rate Only
5.4.4	200A, 35kA, Thermal-magnetic, adjustable. Type equivalent to ABB Tmax 4N	Item	2				
5.4.5	150A, 35kA, Thermal-magnetic, adjustable. Type equivalent to ABB Tmax 4N	Item	2				
5.4.7	80A, 25kA, Thermal-magnetic, adjustable. Type equivalent to ABB Tmax 1C	Item	3				
5.4.8	60A, 25kA, Thermal-magnetic, adjustable. Type equivalent to ABB Tmax 1C	Item	0				Rate Only
5.5	TRIPLE POLE MINIATURE CIRCUIT BREAKER Rupture capacity as shown, DIN-mounted						
5.5.1	200A, 10kA, C-curve	Item	0				Rate Only
5.5.2	150A, 10kA, C-curve	Item	4				
5.5.3	125A, 10kA, C-curve	Item	0				Rate Only
5.5.4	100A, 10kA, C-curve	Item	0				Rate Only
5.5.5	25-50A, 5kA, C-curve	Item	0				Rate Only
5.5.6	32A, 10kA, C-curve. Type equivalent to ABB S200	Item	2				
5.5.7	5-20A, 10kA, C-curve. Type equivalent to ABB S200	Item	0				Rate Only
5.6	DOUBLE POLE MINIATURE CIRCUIT BREAKER Rupture capacity as shown, DIN-mounted						
5.6.1	5-20A, 10kA, C-curve. Type equivalent to ABB S202	Item	0				Rate Only
5.7	SINGLE POLE MINIATURE CIRCUIT BREAKER Rupture capacity as shown, DIN-mounted						
5.7.1	60A, 10kA, D-curve. Type equivalent to ABB S200	Item	0				Rate Only
5.7.2	5-20A, 10kA, C-curve. Type equivalent to ABB S200	Item	0				Rate Only
5.8	RESIDUAL CURRENT DEVICE 30mA min. sensitivity, without overload and short circuit protection, AC, G (time), DIN mounted						
5.8.1	63A Triple Pole	Item	2				
5.8.2	63A Double Pole	Item	0				Rate Only
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
	<b>Total from previous page</b>						
5.9	CONTACTOR AC-3 utilisation category, rating and number of poles as shown						
5.9.1	32A, 4 pole	Item	0				Rate Only
5.10	TIMER						
5.10.1	24 hour / 7 day timer with minimum 24 hour reserve. Type ACDC TH-857-2 or similar	Item	0				Rate Only
5.10.2	Multifunction DIN rail timer adjustable to 10hrs. Type Alan Bradley 700-FE DIN	Item	0				Rate Only
5.11	METER						
	To Supply Authority requirements						
5.11.1	3-Phase consumption meter (kWh), Time of Use capable, direct connected. Type as per Supply Authority (or Elster / Landis & Gyr)	Item	1				
	3x CTs (including manual motor starter to 2.5A) - at specified ratio (or 200:5)	Item	1				
5.11.1	1-Phase pre-paid meter. Type as per Supply Authority (or Elster / Landis & Gyr)	Item	0				Rate Only
	Test block	Item	1				
5.12	DISTRIBUTION TERMINAL BLOCK						
	DIN mounted						
5.12.1	1 connection - 2 wires for 0.5mm <sup>2</sup> to 6mm <sup>2</sup> rigid / flexible wires, including cable markers and labels, complete	Item	0				Rate Only
<b>6</b>	<b>SECTION B6: WIRE WAYS</b>						
6.1	SLEEVES AND BENDS IN / UNDER BUILDINGS Upvc / HDPE sleeves and bends buried in the ground, cast-in or chased in. Allow for plugging of spare sleeves. All bends shall be long radius bends, 1.2mm diameter galvanized mild steel draw-in wire to be installed in all sleeves and conduits						
6.1.1	50mm Ø sleeve	m	50				
6.1.2	32mm Ø sleeve	m	0				Rate Only
6.1.3	25mm Ø conduit	m	0				Rate Only
6.1.4	50mm Ø bends	No	0				Rate Only
6.1.5	32mm Ø bends	No	0				Rate Only
6.1.6	25mm Ø bends	No	0				Rate Only
	<b>Total carried to next page</b>						



Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
	<b>Total from previous page</b>						
7	<b>SECTION B7: EARTHING AND LIGHTNING PROTECTION</b>						
7.1	<b>TRANSFORMER EARTHING</b> Note: excavations not accounted for elsewhere - tenderer to include cost and allow for over-excavation necessary for specified depth(s); this will not be treated as an extra.						
7.1.1	SANS 10199 lead-in connections of 4000mm each of copper bar, installed at depth of main grid, including excavations.	Item	1				
7.1.2	SANS 1063 1500mm 16/17.2mm Ø copper-coated steel earth rod, installed to full depth as required, including excavations.	Item	1				
7.1.3	70mm <sup>2</sup> G/Y ICEW bonded to grid and fixed to earth bar (excluded here) in [mini]substation or kiosk via proper termination (lugs, bolts, nuts, spring washers etc.), including excavations & penetrations, enclosed in GMS conduit where exposed and neatly saddled.	m	1				
7.1.4	BS EN 62305 Joints at all connecting points by exothermic welding process (cad-weld; stranded:flat, flat:flat, flat:rod)	Item	1				
7.1.5	Installation of earth bar for substation as specified on drawings, as 50x6mm hard drawn copper bar with brass M10 stud assemblies (including insulator offset posts on wall mounting plate, complete):	Item	1				
7.2	SANS 61312 <b>LIGHTNING PROTECTION</b>						
7.2.1	Surge arrestors with flag indication 50/100kA DEHNbock 230/400, single pole	Item	1				
7.2.2	25/40kA DEHNguard 230/400, 4 pole	Item	1				
7.2.3	10kA surge arrestors, single pole 275V withstand	Item	1				
7.2.4	Single module DIN-rail fuse holder and fuse assembly, with indication, with 200A, fast acting (gL/gG) fuse	Item	1				
7.2.5	125A, fast acting (gL/gG) fuse Tenderer may offer multi-module units rather than single units, and shall divide the cost per multi-module unit by the number of modules and enter such single-unit price here.	Item	0				Rate Only
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
	<b>Total from previous page</b>						
<b>8</b>	<b>SECTION B8: LIGHTING</b>						
8.1	<b>Poles</b> Streetlight Pole, made of GRP, complete with gland plate for 3x 6mm <sup>2</sup> PVCA 4-core cables, mounting plate, bottom of pole to be painted with Bitumen from and including base plate up to 400mm above finished ground level or encased inside a fibreglass sleeve, complete with 5A SP circuit breaker, removable neutral link and an earth stud near the gland plate, for (height above n.g.l.)						
8.1.1	Highmast lighting on GRP 9m pole, Street light pole	No	0				Rate Only
8.1.2	PVC covered 2.5mm <sup>2</sup> Cu conductors from luminaire to the CB	No	0				Rate Only
8.1.3	Termination of incoming/outgoing PVCA feeder cables, complete including mechanical clamps, lugs and corrosion proof bolts, washers, spring washers and nuts, glands etc.	No	0				Rate Only
8.2	<b>Poles</b> Streetlight Pole, made of GRP, complete with gland plate for 2 x 6mm <sup>2</sup> PVCA 2-core cables, mounting plate, bottom of pole to be painted with Bitumen from and including base plate up to 400mm above finished ground level or encased inside a fibreglass sleeve, complete with 5A SP circuit breaker, removable neutral link and an earth stud near the gland plate, for (height above n.g.l.)						
8.2.1	GRP 3m pole , area light pole	No	0				Rate Only
8.2.2	PVC covered 2.5mm <sup>2</sup> Cu conductors from luminaire to the CB	Item	0				Rate Only
8.2.3	Termination of incoming/outgoing PVCA feeder cables, complete including mechanical clamps, lugs and corrosion proof bolts, washers, spring washers and nuts, glands etc.	Item	0				Rate Only
8.3	<b>Luminaires</b>						
8.3.1	Bekaway Classic Post Top Luminaire Range 3m above Natural Ground Level. IP65	No	0				Rate Only
8.3.2	Bekalsla complete with switchgear, housing, UV resistant polycarbonate diffusor and 70W MH lamp etc., side entry or bottom entry	No	0				Rate Only
	<b>TYPE R</b> Solar Flood Lights complete with poles and accessories	Item	15				
	<b>TYPE P</b> Solar Streetlights complete with poles and accessories	Item	10				
	Bidder to specify and price other relevant items						
	<b>Total for section carried to Summary</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
1	<b>SECTION C1: COMMERCIAL TERMINAL - POWER DISTRIBUTION</b>						
1.1	SANS 10142-1 LV DISTRIBUTION BOARDS AND ACCESSORIES Supply, delivery, off load, storage on site, and installation of flush-mounted distribution boards including busbars, frames, sub-frames, blank covers and engraved labelling rivetted in place. Boards shall be epoxy powder coated sheet metal with top-hung doors & padlockable latches as specified with all the equipment fitted.						
1.1.1	MDB-B1 as per relevant SANS standards and equipped with equipment as per drawing.	No	1				
1.1.1	SDB-B1 as per relevant SANS standards and equipped with equipment as per drawing.	No	1				
1.1.1	SDB-B2 as per relevant SANS standards and equipped with equipment as per drawing.	No	1				
1.1.1	SDB-B3 as per relevant SANS standards and equipped with equipment as per drawing.	No	1				
1.2	<b>CABLING SUPPORT</b> Cable Ducts installed in concrete, brickwork and or ceiling space suitable for the laying of electrical and electronic services and supported at regular intervals not exceeding 1.5m. 1.2mm diameter galvanized mild steel draw-in wire to be installed in all sleeves and conduits						
	P2000 Galvanised Trunking complete with snap-in covers	m	33				
1.2.1	P9000 Galvanised Trunking for Electrical Connections	m	67				
1.2.2	P8000 Galvanised Trunking for A/C services	m	33				
1.2.3	300mm wide Galvanized Wire Mesh for Telecommunications Installations	m	50				
	150mm width wire mesh/basket cable tray for electronics	m	50				
1.2.4	165 mm wide x 19mm Medium Duty Cable Tray for main supply cable support	m	0				Rate Only
1.2.5	50mm Ø sleeve	m	0				Rate Only
1.2.6	32mm Ø sleeve	m	0				Rate Only
1.2.7	50mm Ø bends	No	0				Rate Only
1.2.8	32mm Ø bends	No	0				Rate Only
1.3	<b>EARTHING OF STRUCTURES</b>						
1.3.1	Earthing of building roof structure shall be done using a 16/17.2mm Ø, 1500mm long copper coated steel earth rod driven-in with top at minimum 500mm below normal ground level and connected to the roof structure with 50mm <sup>2</sup> green PVC insulated copper wire. All elements in ground to be encased in conductive concrete	No	9				
	Earth mat for main distribution board, or Kiosk consisting of 4x1000mm long 25x3mm flat bar, arranged as square (1000x1000mm and cad welded at each intersection.	Item	1				
	Earth mat for sub distribution board, consisting of a 16/17.2mm Ø, 1500mm long copper coated steel earth rod driven-in with top at minimum 500mm below normal ground level and connected to the sub DB earth bar with 50mm <sup>2</sup> green PVC insulated copper wire.	Item	3				
	Equipotential bonding for complete building: This item shall include the earthing and bonding of all down pipes, gutters, waste pipes, cold and hot water pipes, sinks, floor, ect. and all metals and equipment to be earthed throughout an entire building installation.	Item	1				
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	<b>Total from previous page</b>						
2	<b>SECTION C2: COMMERCIAL TERMINAL - SMALL POWER</b>						
2.1	<b>SOCKET OUTLETS</b> Supply, deliver and install flush mounted, 16A, three phase switched socket outlet [SSO] on a round drawbox, including 4 x 4mm <sup>2</sup> [live+neutral (red/black)], PVC insulated copper wiring between outlet and distribution board as well as 2.5mm <sup>2</sup> PVC insulated yellow/green earthwire. . Complete with Ø25mm pvc conduiting in ceiling space, concrete, brickwall (chased in), bends, round looping boxes, couplers, chasing and saddles. Allow adequate conduiting, wiring and accessories for each SSO as per relevant drawing. Type " Clipsal" or Similar.						
2.1.1	Single flush mounted socket, complete	No	2				
	Supply, deliver and install flush mounted, 16A,switched socket outlet [SSO] on a 100x100x50mm recessed drawbox, with 100x100mm coverplate and including 2 x 4mm <sup>2</sup> [live+neutral (red/black)], PVC insulated copper wiring between outlet and distribution board as well as 2.5mm <sup>2</sup> PVC insulated yellow/green earthwire. . Complete with Ø25mm galvanised steel and/or pvc conduiting in ceiling space, concrete, brickwall (chased in), bends, round looping boxes, couplers, chasing and saddles. Allow adequate conduiting, wiring and accessories for each SSO as per relevant drawing. Type " Clipsal" or Similar.						
2.1.2	16A Switched Single Socket Outlet With Safety Shutters 250V. 2P + Earth With Side Contacts. Flush mounted @ 300mm AFFL	No	6				
2.1.3	16A Switched Twin Socket Outlet With Safety Shutters 250V. 2P + Earth With Side Contacts. Flush mounted @ 300mm AFFL	No	6				
2.1.4	16A Switched Twin Socket Outlet With Safety Shutters 250V. 2P + Earth With Side Contacts. Flush mounted @ 1200mm AFFL	No	2				
2.1.5	RSA Standard 16A Switched Twin Socket Outlet With Safety Shutters 250V. 2P + Earth With Side Contacts. Flushed Mounted on Power Skirting	No	25				
	Supply, deliver and install powerskirting against brickwork, complete with end caps, bends, snap on covers, joint covers, cable retaining brackets and accessories. Type "O-Line 801/803" or similar. Colour: Grey						
2.1.6	2 Compartment Power Skirting	m	85				
2.1.7	3 Compartment Power Skirting	m	0				Rate Only
	Supply, deliver and install power pole from ceiling space to floor level complete with end caps, snap on covers, joint covers and accessories. Type "O-Line 801/803" or similar						
2.1.8	2 Compartment Power Pole	No	0				Rate Only
2.1.9	4 Compartment Power Pole	No	0				Rate Only
	Outlet cluster type A mounted on Power Skirting with 2 X RSA Standard 16A Socket Outlet + 1 X RJ45 Data / Computer Network point, shielded. Suitable for Category 6, for 10/250MB fast ethernet networks + 1 X RJ45 Telephone Socket + 1 X RSA Standard 16A Switched Dedicated Socket Outlet, PS with Safety Shutters 250V.	No	54				
	Workstation consisting of: (Normal Socket outlet 16A, 2 x RSA & 1x USB, Red Dedicated Socket outlet 16A, 2 x RSA & 1x USB, 1x RJ 11, 1 x RJ45) in Legrand Ysalis, Colour: Champagne. - <b>(WSD)</b>	Item	0				Rate Only
	Workstation consisting of:(1 x Normal SSO, 1 x Red dedicated SSO, 1 x RJ 11, 1 x RJ45) as Legrand Ysalis, Colour: Champagne. - <b>WSE</b>	Item	0				Rate Only
	Three phase switched socket outlet, complete with cover/extension box, surrounds and accessories for wall mounting, IP55/56. Type: Gewiss or Schneider Electric						
	32A, 3P+N+E, 380-415V (with protection)	Item	3				
	Floor Plug Double	Item	5				
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	<b>Total from previous page</b>						
2.1.10	Outlet cluster type A mounted on power skirting with 2 X RSA Standard 16A Socket Outlet + 1 X RJ45 Data / Computer Network Point, Shielded, Suitable for Category 6, for 10/100MB Fast Ethernet Networks + 1 X RSA Standard 16A Switched Dedicated Socket Outlet, with Safety Shutters 250V.	No	10				
2.1.11	Recessed Floor of Desk Socket Cluster with 4 X RSA Standard 16A Socket Outlet + 2 X RJ45 Data / Computer Network Point, shielded, Suitable for Category 6A, for 10/100MB fast Ethernet Networks + 1 X RJ45 Telephone Socket + 1 X RSA Standard 16A Switched Dedicated Socket Outlet, PS with Safety Shutters 250V.	No	0				Rate Only
2.2	<b>ISOLATORS</b> Supply, deliver and install toggle lever isolators complete with drawbox, Ø25mm pvc conduiting as well as [live+neutral (red/black)], PVC insulated copper wiring and PVC insulated yellow/green earthwire between the outlet and the power distribution board in ceiling space, concrete, brickwall (chased in), as well as bends, round looping boxes, couplers, chasing, saddles and other accessories for each complete Isolator Installation.						
2.2.1	63A, three pole, 5kA with 4 x 10mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 6mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	6				
2.2.2	32A, three pole, 5kA with 4 x 6mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 6mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	2				
2.2.3	16A, three pole, 5kA with 4 x 4mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 6mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	16				
2.2.4	32A, double pole, 5kA with 2 x 6mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 4mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	4				
2.2.5	20A, double pole, 5kA with 2 x 4mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 2.5mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	2				
	45A single pole isolator, recessed mount, weather proof (IP55), with cable grip glands and 2x10mm <sup>2</sup> PVC + 6mm BCEW wiring, for UPS Isolator (refer to Wiring diagram and layout drawing)	Item	6				
	Stove isolator	Item	0				Rate Only
2.3	<b>ELECTRONICS</b>						
2.3.1	Supply, deliver and install intercom cable wireway 60mm roundbox @ 2300AFFL	No	0				Rate Only
2.3.2	Supply, deliver and install drawbox at 1400mm AFFL	No	0				Rate Only
2.3.3	Supply, deliver and install, 100x100x50mm Galvanized steel drawboxes with ø20 conduit to ceiling space	No	0				Rate Only
2.3.4	Supply, deliver and install, pvc round box with with ø20 conduit to ceiling space	No	0				Rate Only
2.3.5	Supply, deliver and install PVC conduit in concrete, brickwall (chased in) and/or ceiling space, including saddles, bends, couplers, chasing and making good by others	m	0				Rate Only
2.3.6	24Vdc Bell (85dB) Wall Mounted @ 2200mm AFFL on Dia 65mm Drawbox	No	0				Rate Only
2.3.7	Supply and install RJ45 category 5 telephone jack mounted @ 300mm AFFL.	No	20				Rate Only
	<b>ACCESSORIES</b>						
	<b>OUTLETS POINTS</b> <b>(Assume average distance of 25m)</b>						
	Drawbox for Telecom consisting of 50mm Ø outlet boxes with blank covers installed flush in walls with 25mm Ø PVC conduit complete with GMS draw-in wire.	Item	5				
	Drawbox for Fire consisting of 50mm Ø outlet boxes with blank covers installed flush in walls with 25mm Ø PVC conduit complete with GMS draw-in wire.	Item	5				
	Drawbox for Security consisting of 50mm Ø outlet boxes with blank covers installed flush in walls with 25mm Ø PVC conduit complete with GMS draw-in wire.	Item	5				
	Telephone outlets (R111) for 100x100x50mm outlet box	Item	20				
	Telephone outlets (R111) for power skirting	Item	26				
	Data outlets (R145) for 100x100x50mm outlet box	Item	5				
	Data outlets (R145) for power skirting	Item	26				
	Cover plates for 100x100x50mm outlet box for Telephone and Data combo outlets	Item	25				
	Cover plates for Telephone and Data combo outlet in power skirting	Item	0				Rate Only
	TV Point	Item	3				
	Access Control Point	Item	4				
	Alarm Point	Item	8				
	CCTV Point	Item	12				
	Fire Point	Item	24				
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	<b>Total from previous page</b>						
<b>3</b>	<b>SECTION C3: COMMERCIAL TERMINAL - LIGHTING</b>						
3.1	<b>LIGHT SWITCHES</b> Supply, deliver and install a 16A light switch recessed in brickwall including epoxy coated coverplate complete with 2 x 2.5mm <sup>2</sup> [live+neutral] PVC insulated copper wiring between the light point(s) and the switch as well as 2.5m <sup>2</sup> PVC insulated yellow/green earthwire, Ø20mm galvanised steel and/or pvc conduiting in ceiling space, concrete, brickwall (chased in), bends, round looping boxes, draw boxes, couplers, chasing, and saddles. Type "Clipsal" or similar.						
3.1.1	Single lever, one way 16A light switch on 100x50x50mm galvanised steel drawbox. Recessed in brickwall including epoxy coated coverplate.	No	41				
3.1.2	Single lever, two way 16A light switch on 100x50x50mm galvanised steel drawbox. Recessed in brickwall including epoxy coated coverplate.	No	14				
3.1.3	220V, 16A Illuminated Toggle One Lever One way Light Switch in 100x100x50mm Flush Steel Drawbox. Complete with all accessories mounted @ 1200mm AFFL.	No	1				
3.1.4	Two lever, one way 16A light switch on 100x50x50mm galvanised steel drawbox. Recessed in brickwall including epoxy coated coverplate.	No	0				Rate Only
3.1.5	Two lever, two way 16A light switch on 100x50x50mm galvanised steel drawbox. Recessed in brickwall including epoxy coated coverplate.	No	0				Rate Only
3.1.6	220V, 16A Four Lever two-way light switch in 100x50x50mm flush steel drawbox complete with all accessories mounted at 1200mm AFFL.	No	0				Rate Only
3.1.7	Key Switch	Item	1				
	<u>Occupancy Sensor</u>	No	0				Rate Only
	360 Deg Schneider motion sensors	Item	18				
	360 Deg Province lighting motion sensor with 10m height coverage	Item	4				
3.1.8	Photo sensitive light switch (Photo-cell) on dia 65mm steel outlet box,	No	2				
3.2	<b>LIGHT FIXTURES</b>						
3.2.1	Supply, deliver and install a lightpoint on dia 65mm steel outlet box complete including, including 3 x 2.5mm <sup>2</sup> [live+neutral+switch] PVC insulated copper wiring between outlet and distribution board as well as 2.5m <sup>2</sup> PVC insulated yellow/green earthwire, 100x100mm coverplate, galvanised steel and/or pvc conduiting, saddles complete. Allow a minimum of 15mm per light point for conduiting + wiring. Light points shall be on either ceiling, wall or exposed roof.	No	275				
3.2.2	Supply, deliver and install, 5A, single phase unswitched socket outlet [USO] on a 100x50x50mm drawbox, affixed to the power trunking or conduit for light circuits and indoor air conditioning, Crabtree or Similar Approved.	No	16				
3.2.3	<b>TYPE A</b> Recessed monuted aether LED with 2x35W "cool white" includes 3m cabtyre and 5Amp plugtop, IP20, 600x600mm.	No	113				
3.2.4	<b>TYPE G</b> FALCON High Bay light fittings including 6m cord, with 92W LED, Cool white, 4000K color temp, suitable for Warehouse applications, IP67.	No	0				Rate Only
3.2.5	<b>TYPE B</b> Recessed monuted aether LED with 2x35W "cool white" includes 3m cabtyre and 5Amp plugtop, IP20, 600x600mm with diffuser for Kitchen or Preparation Area	No	0				Rate Only
3.2.6	<b>TYPE C</b> Recess mounted Despina LED, color: silver, 12W with 75mm diameter cut-out	No	78				
3.2.7	<b>TYPE D</b> Recessed downlighter, 4000K Colour Temp, 20W	No	43				
3.2.8	<b>TYPE E</b> Wall / Surface mounted 28W fallon laarge LED lum with aluminium body frame colour: black, face option: plain control gear complete & IP54 rating.	No	31				
3.2.9	<b>TYPE F</b> Metropolis vapour proof suspended LED polycarbonate housing powder coated steel plate with electronic control gear and 39W lamps.	No	4				
3.2.10	<b>TYPE T</b> Berne LED floodlight, wall mounted LED luminaire, Aluminium, clear tempered glass, IP65, frame colour: black, 70W	No	6				
3.2.11							
3.2.12							
3.2.13							
3.2.14							
3.2.15							
3.2.16							
3.2.17							
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	Total from previous page						
	<p><b>SECTION C4: COMMERCIAL TERMINAL - UNINTERRUPTABLE POWER SUPPLY (UPS)</b></p> <p>All rates shall include equipment, all accessories for mounting of equipment, wiring to distribution board etc.)  <b>IMPORTANT: Manuals of all offered equipment to be included with submission of bid and quality of product offered will be a determining factor upon evaluation</b></p> <p><b>6kVA Single Phase UPS and 10kVA Three Phase UPS both with a minimum running time of 30 minutes</b></p> <p>Eaton 6kVA 1-Phase In 1-Phase Out online UPS, complete with all accessories</p> <p>Eaton 10kVA 3-Phase In 3-Phase Out online UPS, complete with all accessories</p> <p><b>Other general items not mentioned: Please specify</b></p> <p><b>Testing and Commissioning</b>  Testing of the entire system as listed below to be functional and compliant with relevant standards</p> <p><b>Training</b>  Price for training allocated staff (Maximum 5 ) on using the different systems and general maintenance etc. Training shall be signed of by trainees as proof of adequate understanding. Item will only be paid once proof is received by the Engineer</p> <p><b>Operation Manuals</b>  Allow for the supply of complete comprehensive operating manuals (5 sets Maximum) for all systems to be issued to the Engineer at practical completion. Language to be English</p> <p><b>Maintenance</b>  Allow for the maintenance and technical support of the specified and installed equipment for a 12 month period after practical completion (quarterly maintenance visits and support as needed). The maintenance shall allow for the replacement of any spare parts or other wear and tear parts. Rate to include all necessary transport and accommodation if needed.</p>	No	0				Rate Only
		No	1				
		Sum	0				Rate Only
		Sum	1				
		Sum	1				
		Sum	1				
		Sum	1				
4	<b>SECTION C5: COMMERCIAL TERMINAL - MISCELLENEOUS</b>						
4.1	Supply, deliver and install 600 x 500 mm x 120 mm Telephone Distribution Board complete with architrave tray & hardwood back board.	No	1				
4.5	Provide 3 Sets of operation and maintenance manuals	Sum	1				
4.6	Provide 3 sets of "As-Built" drawings in A3 format.	Sum	1				
	Bidder to specify and price other relevant items						
	Total for section carried to Summary						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
1	<b>SECTION D1: PASSENGER TERMINAL - POWER DISTRIBUTION</b>						
1.1	SANS 10142-1 LV DISTRIBUTION BOARDS AND ACCESSORIES Supply, delivery, off load, storage on site, and installation of flush-mounted distribution boards including busbars, frames, sub-frames, blank covers and engraved labelling rivetted in place. Boards shall be epoxy powder coated sheet metal with top-hung doors & padlockable latches as specified with all the equipment fitted.						
1.1.1	MDB-B1 as per relevant SANS standards and equipped with equipment as per drawing.	No	1				
1.1.1	SDB-B1 as per relevant SANS standards and equipped with equipment as per drawing.	No	1				
1.1.1	SDB-B2 as per relevant SANS standards and equipped with equipment as per drawing.	No	1				
1.1.1	SDB-B3 as per relevant SANS standards and equipped with equipment as per drawing.	No	1				
1.2	<b>CABLING SUPPORT</b> Cable Ducts installed in concrete, brickwork and or ceiling space suitable for the laying of electrical and electronic services and supported at regular intervals not exceeding 1.5m. 1.2mm diameter galvanized mild steel draw-in wire to be installed in all sleeves and conduits  P2000 Galvanised Trunking complete with snap-in covers						
1.2.1	P9000 Galvanised Trunking for Electrical Connections	m	33				
1.2.2	P8000 Galvanised Trunking for A/C services	m	67				
1.2.3	300mm wide Galvanized Wire Mesh for Telecommunications Installations  150mm width wire mesh/basket cable tray for electronics	m	50				
1.2.4	165 mm wide x 19mm Medium Duty Cable Tray for main supply cable support	m	0				
1.2.5	50mm Ø sleeve	m	0				Rate Only
1.2.6	32mm Ø sleeve	m	0				Rate Only
1.2.7	50mm Ø bends	No	0				Rate Only
1.2.8	32mm Ø bends	No	0				Rate Only
1.3	<b>EARTHING OF STRUCTURES</b>						
1.3.1	Earthing of building roof structure shall be done using a 16/17.2mm Ø, 1500mm long copper coated steel earth rod driven-in with top at minimum 500mm below normal ground level and connected to the roof structure with 50mm <sup>2</sup> green PVC insulated copper wire. All elements in ground to be encased in conductive concrete  Earth mat for main distribution board, or Kiosk consisting of 4x1000mm long 25x3mm flat bar, arranged as square (1000x1000mm and cad welded at each intersection.  Earth mat for sub distribution board, consisting of a 16/17.2mm Ø, 1500mm long copper coated steel earth rod driven-in with top at minimum 500mm below normal ground level and connected to the sub DB earth bar with 50mm <sup>2</sup> green PVC insulated copper wire.  Equip-potential bonding for complete building: This item shall include the earthing and bonding of all down pipes, gutters, waste pipes, cold and hot water pipes, sinks, floor, ect. and all metals and equipment to be earthed throughout an entire building installation.	No	16				
		Item	1				
		Item	4				
		Item	1				
	<b>Total carried to next page</b>						



Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	<b>Total from previous page</b>						
2	<b>SECTION D2: PASSENGER TERMINAL - SMALL POWER</b>						
2.1	<b>SOCKET OUTLETS</b> Supply, deliver and install flush mounted, 16A, three phase switched socket outlet (SSO) on a round drawbox, including 4 x 4mm <sup>2</sup> [live+neutral (red/black)], PVC insulated copper wiring between outlet and distribution board as well as 2.5mm <sup>2</sup> PVC insulated yellow/green earthwire. . Complete with Ø25mm pvc conduiting in ceiling space, concrete, brickwall (chased in), bends, round looping boxes, couplers, chasing and saddles. Allow adequate conduiting, wiring and accessories for each SSO as per relevant drawing. Type " Clipsal" or Similar.						
2.1.1	Single flush mounted socket, complete  Supply, deliver and install flush mounted, 16A,switched socket outlet [SSO] on a 100x100x50mm recessed drawbox, with 100x100mm coverplate and including 2 x 4mm <sup>2</sup> [live+neutral (red/black)], PVC insulated copper wiring between outlet and distribution board as well as 2.5mm <sup>2</sup> PVC insulated yellow/green earthwire. . Complete with Ø25mm galvanised steel and/or pvc conduiting in ceiling space, concrete, brickwall (chased in), bends, round looping boxes, couplers, chasing and saddles. Allow adequate conduiting, wiring and accessories for each SSO as per relevant drawing. Type " Clipsal" or Similar.	No	2				
2.1.2	16A Switched Single Socket Outlet With Safety Shutters 250V. 2P + Earth With Side Contacts. Flush mounted @ 300mm AFFL.	No	8				
2.1.3	16A Switched Twin Socket Outlet With Safety Shutters 250V. 2P + Earth With Side Contacts. Flush mounted @ 300mm AFFL.	No	6				
2.1.4	16A Switched Twin Socket Outlet With Safety Shutters 250V. 2P + Earth With Side Contacts. Flush mounted @ 1200mm AFFL.	No	2				
2.1.5	RSA Standard 16A Switched Twin Socket Outlet With Safety Shutters 250V. 2P + Earth With Side Contacts. Flushed Mounted on Power Skirting  Supply, deliver and install powerskirting against brickwork, complete with end caps, bends, snap on covers, joint covers, cable retaining brackets and accessories. Type "O-Line 801/803" or similar. Colour: Grey	No	25				
2.1.6	2 Compartment Power Skirting	m	125				
2.1.7	3 Compartment Power Skirting  Supply, deliver and install power pole from ceiling space to floor level complete with end caps, snap on covers, joint covers and accessories. Type "O-Line 801/803" or similar	m	0				Rate Only
2.1.8	2 Compartment Power Pole	No	0				Rate Only
2.1.9	4 Compartment Power Pole	No	0				Rate Only
	Outlet cluster type A mounted on Power Skirting with 2 X RSA Standard 16A Socket Outlet + 1 X RJ45 Data / Computer Network point, shielded. Suitable for Category 6, for 10/250MB fast ethernet networks + 1 X RJ45 Telephone Socket + 1 X RSA Standard 16A Switched Dedicated Socket Outlet, PS with Safety Shutters 250V.	No	68				
	Workstation consisting of: (Normal Socket outlet 16A, 2 x RSA & 1x USB, Red Dedicated Socket outlet 16A, 2 x RSA & 1x USB, 1x RJ 11, 1 x RJ45) in Legrand Ysalis, Colour: Champagne. - <b>(WSD)</b>	Item	0				Rate Only
	Workstation consisting of:(1 x Normal SSO, 1 x Red dedicated SSO, 1 x RJ 11, 1 x RJ45) as Legrand Ysalis, Colour: Champagne. - <b>WSE</b>	Item	0				Rate Only
	Three phase switched socket outlet, complete with cover/extension box, surrounds and accessories for wall mounting, IP55/56. Type: Gewiss or Schneider Electric						
	32A, 3P+N+E, 380-415V (with protection)	Item	3				
	Floor Plug Double	Item	5				
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	<b>Total from previous page</b>						
2.1.10	Outlet cluster type A mounted on power skirting with 2 X RSA Standard 16A Socket Outlet + 1 X RJ45 Data / Computer Network Point, Shielded, Suitable for Category 6, for 10/100MB Fast Ethernet Networks + 1 X RSA Standard 16A Switched Dedicated Socket Outlet, with Safety Shutters 250V.	No	10				
2.1.11	Recessed Floor of Desk Socket Cluster with 4 X RSA Standard 16A Socket Outlet + 2 X RJ45 Data / Computer Network Point, shielded, Suitable for Category 6A, for 10/100MB fast Ethernet Networks + 1 X RJ45 Telephone Socket + 1 X RSA Standard 16A Switched Dedicated Socket Outlet, PS with Safety Shutters 250V.	No	0				Rate Only
2.2	<b>ISOLATORS</b> Supply, deliver and install toggle lever isolators complete with drawbox, Ø25mm pvc conduiting as well as [live+neutral (red/black)], PVC insulated copper wiring and PVC insulated yellow/green earthwire between the outlet and the power distribution board in ceiling space, concrete, brickwall (chased in), as well as bends, round looping boxes, couplers, chasing, saddles and other accessories for each complete Isolator Installation.						
2.2.1	63A, three pole, 5kA with 4 x 10mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 6mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	6				
2.2.2	32A, three pole, 5kA with 4 x 6mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 6mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	2				
2.2.3	16A, three pole, 5kA with 4 x 4mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 6mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	16				
2.2.4	32A, double pole, 5kA with 2 x 6mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 4mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	4				
2.2.5	20A, double pole, 5kA with 2 x 4mm <sup>2</sup> [live+neutral (red/black)] PVC insulated copper wiring + 2.5mm <sup>2</sup> PVC insulated yellow/green earthwire between the distribution board and the outlet.	Item	2				
	45A single pole isolator, recessed mount, weather proof (IP55), with cable grip glands and 2x10mm <sup>2</sup> PVC + 6mm BCEW wiring, for UPS Isolator (refer to Wiring diagram and layout drawing)	Item	6				
	Stove isolator	Item	0				Rate Only
2.3	<b>ELECTRONICS</b>						
2.3.1	Supply, deliver and install intercom cable wireway 60mm roundbox @ 2300AFFL	No	0				Rate Only
2.3.2	Supply, deliver and install drawbox at 1400mm AFFL	No	0				Rate Only
2.3.3	Supply, deliver and install, 100x100x50mm Galvanized steel drawboxes with ø20 conduit to ceiling space	No	0				Rate Only
2.3.4	Supply, deliver and install, pvc round box with with ø20 conduit to ceiling space	No	0				Rate Only
2.3.5	Supply, deliver and install PVC conduit in concrete, brickwall (chased in) and/or ceiling space, including saddles, bends, couplers, chasing and making good by others	m	0				Rate Only
2.3.6	24Vdc Bell (85dB) Wall Mounted @ 2200mm AFFL on Dia 65mm Drawbox	No	0				Rate Only
2.3.7	Supply and install RJ45 category 5 telephone jack mounted @ 300mm AFFL.	No	20				Rate Only
	<b>ACCESSORIES</b>						
	<b>OUTLETS POINTS</b> <b>(Assume average distance of 25m)</b>						
	Drawbox for Telecom consisting of 50mm Ø outlet boxes with blank covers installed flush in walls with 25mm Ø PVC conduit complete with GMS draw-in wire.	Item	5				
	Drawbox for Fire consisting of 50mm Ø outlet boxes with blank covers installed flush in walls with 25mm Ø PVC conduit complete with GMS draw-in wire.	Item	5				
	Drawbox for Security consisting of 50mm Ø outlet boxes with blank covers installed flush in walls with 25mm Ø PVC conduit complete with GMS draw-in wire.	Item	5				
	Telephone outlets (R111) for 100x100x50mm outlet box	Item	20				
	Telephone outlets (R111) for power skirting	Item	26				
	Data outlets (R145) for 100x100x50mm outlet box	Item	5				
	Data outlets (R145) for power skirting	Item	26				
	Cover plates for 100x100x50mm outlet box for Telephone and Data combo outlets	Item	25				
	Cover plates for Telephone and Data combo outlet in power skirting	Item	0				Rate Only
	TV Point	Item	3				
	Access Control Point	Item	4				
	Alarm Point	Item	8				
	CCTV Point	Item	12				
	Fire Point	Item	24				
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	<b>Total from previous page</b>						
<b>3</b>	<b>SECTION D3: PASSENGER TERMINAL - LIGHTING</b>						
3.1	<b>LIGHT SWITCHES</b> Supply, deliver and install a 16A light switch recessed in brickwall including epoxy coated coverplate complete with 2 x 2.5mm <sup>2</sup> [live+neutral] PVC insulated copper wiring between the light point(s) and the switch as well as 2.5m <sup>2</sup> PVC insulated yellow/green earthwire, Ø20mm galvanised steel and/or pvc conduiting in ceiling space, concrete, brickwall (chased in), bends, round looping boxes, draw boxes, couplers, chasing, and saddles. Type "Clipsal" or similar.						
3.1.1	Single lever, one way 16A light switch on 100x50x50mm galvanised steel drawbox. Recessed in brickwall including epoxy coated coverplate.	No	46				
3.1.2	Single lever, two way 16A light switch on 100x50x50mm galvanised steel drawbox. Recessed in brickwall including epoxy coated coverplate.	No	16				
3.1.3	220V, 16A Illuminated Toggle One Lever One way Light Switch in 100x100x50mm Flush Steel Drawbox. Complete with all accessories mounted @ 1200mm AFFL.	No	1				
3.1.4	Two lever, one way 16A light switch on 100x50x50mm galvanised steel drawbox. Recessed in brickwall including epoxy coated coverplate.	No	0				Rate Only
3.1.5	Two lever, two way 16A light switch on 100x50x50mm galvanised steel drawbox. Recessed in brickwall including epoxy coated coverplate.	No	0				Rate Only
3.1.6	220V, 16A Four Lever two-way light switch in 100x50x50mm flush steel drawbox complete with all accessories mounted at 1200mm AFFL.	No	0				Rate Only
	Key Switch	Item	2				
3.1.7	<b>Occupancy Sensor</b> 360 Deg Schneider motion sensors	No	0				Rate Only
	360 Deg Province lighting motion sensor with 10m height coverage	Item	12				
3.1.8	Photo sensitive light switch (Photo-cell) on dia 65mm steel outlet box,	No	3				
3.2	<b>LIGHT FIXTURES</b>						
3.2.1	Supply, deliver and install a lightpoint on dia 65mm steel outlet box complete including, including 3 x 2.5mm <sup>2</sup> [live+neutral+switch] PVC insulated copper wiring between outlet and distribution board as well as 2.5m <sup>2</sup> PVC insulated yellow/green earthwire, 100x100mm coverplate, galvanised steel and/or pvc conduiting, saddles complete. Allow a minimum of 15mm per light point for conduiting + wiring. Light points shall be on either ceiling, wall or exposed roof.	No	350				
3.2.2	Supply, deliver and install, 5A, single phase unswitched socket outlet [USO] on a 100x50x50mm drawbox, affixed to the power trunking or conduit for light circuits and indoor air conditioning, Crabtree or Similar Approved.	No	16				
3.2.3	<b>TYPE A</b> Recessed mounted aether LED with 2x35W "cool white" includes 3m cable and 5Amp plugtop, IP20, 600x600mm.	No	78				
3.2.4	<b>TYPE G</b> FALCON High Bay light fittings including 6m cord, with 92W LED, Cool white, 4000K color temp, suitable for Warehouse applications, IP67.	No	0				Rate Only
3.2.5	<b>TYPE B</b> Recessed mounted aether LED with 2x35W "cool white" includes 3m cable and 5Amp plugtop, IP20, 600x600mm with diffuser for Kitchen or Preparation Area	No	0				Rate Only
3.2.6	<b>TYPE C</b> Recess mounted Despina LED, color: silver, 12W with 75mm diameter cut-out	No	187				
3.2.7	<b>TYPE D</b> Recessed downlighter, 4000K Colour Temp, 20W	No	38				
3.2.8	<b>TYPE E</b> Wall / Surface mounted 28W fallon laarge LED lum with aluminium body frame colour: black, face option: plain control gear complete & IP54 rating.	No	25				
3.2.9	<b>TYPE F</b> Metropolis vapour proof suspended LED polycarbonate housing powder coated steel plate with electronic control gear and 39W lamps.	No	16				
3.2.10	<b>TYPE T</b> Berne LED floodlight, wall mounted LED luminaire, Aluminium, clear tempered glass, IP65, frame colour: black, 70W	No	6				
3.2.11							
3.2.12							
3.2.13							
3.2.14							
3.2.15							
3.2.16							
3.2.17							
	<b>Total carried to next page</b>						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (NS)
	Total from previous page						
	<p><b>SECTION D4: COMMERCIAL TERMINAL - UNINTERRUPTABLE POWER SUPPLY (UPS)</b></p> <p>All rates shall include equipment, all accessories for mounting of equipment, wiring to distribution board etc.)  <b>IMPORTANT: Manuals of all offered equipment to be included with submission of bid and quality of product offered will be a determining factor upon evaluation</b></p> <p><b>6kVA Single Phase UPS and 10kVA Three Phase UPS both with a minimum running time of 30 minutes</b></p> <p>Eaton 6kVA 1-Phase In 1-Phase Out online UPS, complete with all accessories</p> <p>Eaton 10kVA 3-Phase In 3-Phase Out online UPS, complete with all accessories</p> <p><b>Other general items not mentioned: Please specify</b></p> <p><b>Testing and Commissioning</b>  Testing of the entire system as listed below to be functional and compliant with relevant standards</p> <p><b>Training</b>  Price for training allocated staff (Maximum 5 ) on using the different systems and general maintenance etc. Training shall be signed of by trainees as proof of adequate understanding. Item will only be paid once proof is received by the Engineer</p> <p><b>Operation Manuals</b>  Allow for the supply of complete comprehensive operating manuals (5 sets Maximum) for all systems to be issued to the Engineer at practical completion. Language to be English</p> <p><b>Maintenance</b>  Allow for the maintenance and technical support of the specified and installed equipment for a 12 month period after practical completion (quarterly maintenance visits and support as needed). The maintenance shall allow for the replacement of any spare parts or other wear and tear parts. Rate to include all necessary transport and accommodation if needed.</p>	No	0				Rate Only
		No	1				
		Sum	0				Rate Only
		Sum	1				
		Sum	1				
		Sum	1				
		Sum	1				
4	<b>SECTION D5: PASSENGER TERMINAL - MISCELLANEOUS</b>						
4.1	Supply, deliver and install 600 x 500 mm x 120 mm Telephone Distribution Board complete with architrave tray & hardwood back board.	No	1				
4.5	Provide 3 Sets of operation and maintenance manuals	Sum	1				
4.6	Provide 3 sets of "As-Built" drawings in A3 format.	Sum	1				
	Bidder to specify and price other relevant items						
	Total for section carried to Summary						

Item	Description	Unit	QTY	Labour Rate	Material Rate	Total Rate	Amount (N\$)
1	<b>SECTION E1: PROVISIONAL SUMS</b> <b>NOTE: Sub-contractors to provide for profit and attendance on all provisional items below and will be adjusted accordingly on the final cost of each item</b>						
1.1	MAIN ELECTRICAL SUPPLY APPLICATION						
1.1.1	Provisional sum for liaising with, coordinating and payment of Network Contribution and main electrical supply (cabling, transformer and metering and consumer meters etc.) with local supply authority (NamPower)	Prov	1				600,000.00
1.1.2	Allow for profit , if required	Item	0%				-
1.1.3	Allow for attendance	Item	0%				-
	Bidder to specify and price other relevant items						
	<b>Total for section carried to Summary</b>						<b>600,000.00</b>

**PROJECT NAME: REFURBISHMENT OF TRANSKALAHARI BORDER TO A ONE STOP BORDER POST**

**PROJECT NO.: D0121**

**CLIENT: NAMRA**

**CONSULTANT: DEKA CONSULTING ENGINEERS**

			<b>SUMMARY OF SECTIONS</b>
	SECTION	DESCRIPTION	AMOUNT N\$
		<b>BILL A: PRELIMINARY AND GENERAL</b>	
	A	PRELIMINARY AND GENERAL	
	B	SITE ELECTRICITY	
	C	COMMERCIAL TERMINAL	
	D	PASSENGER TERMINAL	
	E	PROVISIONAL SUMS (MAIN POWER APPLICATION & NETWORK CONTRIBUTION FEE)	600,000.00
	Bidder to specify and price other relevant items		
		<b>SUB TOTAL 1</b>	
		Contingencies - Add 5% to be spent with authorisation of Engineer	
		<b>TOTAL BID PRICE (EXCL. VAT)</b>	

Priced Activity Schedule Authorised By:

Name:		Signature:
Position:		Date:
Authorised for and on behalf of:		Company:

Note: All figures are exclusive of 15% VAT. This will be added on the final Summary