INVITATION TO BID

BID NUMBER:	EKZNW 05/2023/24
DESCRIPTION OF GOOD/SERVICE/WORK REQUIRED:	Appointment of an electrical contractor for refurbishment and repairs of electrical infrastructure at Queen Elizabeth Park Offices.
REQUIRED CIDB GRADING:	It is estimated that tenderers should have a CIDB contractor grading of **6EB or higher**.
COMPULSORY SITES BRIEFING SESSIONS DATE & ADDRESS:	Date: 13 December 2023 Time: **11:00am** Venue: Queen Elizabeth Park, 1 Peter Brown Drive, Montrose, Pietermaritzburg, 3201, **Theatre Room**
CLOSING DATE AND TIME:	17 January 2024 11:00am
BID VALIDITY PERIOD:	120 calendar days (commencing from the Closing Date)
BID DOCUMENTS DELIVERY ADDRESS:	Ezemvelo KZN Wildlife, Head Office Queen Elizabeth Park No. 1 Peter Brown Drive Montrose, Pietermaritzburg 3202 **NB: Bidders must submit both hard copies and electronic documents in the form of a USB.**

NAME OF BIDDER:	
BID PRICE IN RSA CURRENCY WITH ALL APPLICABLE TAXES INCLUDED:	**R**
BID PRICE IN WORDS	…… …… ……
BIDDERS SIGNATURE:	

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SPECIAL INSTRUCTIONS AND NOTICES TO BIDDERS REGARDING THE COMPLETION OF BIDDING FORMS

PLEASE NOTE THAT THIS BID IS SUBJECT TO TREASURY REGULATIONS 16A ISSUED IN TERMS OF THE PUBLIC FINANCE MANAGEMENT ACT, 1999, THE KWAZULU-NATAL SUPPLY CHAIN MANAGEMENT POLICY FRAMEWORK, EZEMVELO KZN WILDLIFE SUPPLY CHAIN MANAGEMENT POLICY AND ALL OTHER PRESCRIPTS THAT REGULATE PUBLIC PROCUREMENT IN THE REPUBLIC OF SOUTH AFRICA.

1. Unless inconsistent with or expressly indicated otherwise by the context, the singular shall include the plural and visa versa and with words importing the masculine gender shall include the feminine and the neuter.
2. Under no circumstances whatsoever may the bid forms be retyped or redrafted. Photocopies of the original bid documentation may be used, but an original signature must appear on such photocopies.
3. The bidder is advised to check the number of pages and to satisfy himself that none are missing or duplicated.
4. **Bids submitted must be accurately completed. Bidders must ensure that all questions are answered. If questioned are "not applicable", bidders must ensure that "N/A" is indicated in the relevant space. It is not permissible to leave blank spaces or unanswered questions. Bidders will only be considered if the bid document is accurately completed and accompanied by all relevant certificates and other necessary applicable information. Original signature must appear on all relevant Sections of the bid document. Failure to comply with the same will invalidate your bid.**
5. Bids shall be lodged at the address indicated not later than the closing time specified for their receipt, and in accordance with the directives in the bid documents.
6. Each bid shall be addressed in accordance with the directives in the bid documents and shall be lodged in a separate sealed envelope, with the name and address of the bidder, the bid number and closing date indicated on the envelope. The envelope shall not contain documents relating to any bid other than that shown on the envelope. If this provision is not complied with, such bids may be rejected as being invalid.
7. All bids received in sealed envelopes with the relevant bid numbers on the envelopes are kept unopened in safe custody until the closing time of the bids. Where, however, a bid is received open, it shall be sealed. If it is received without a bid number on the envelope, it shall be opened, the bid number ascertained, the envelope sealed and the bid number written on the envelope.
8. A specific box is provided for the receipt of bids, and no bid found in any other box or elsewhere subsequent to the closing date and time of bid will be considered.
9. No bid sent through the post will be considered if it is received after the closing date and time stipulated in the bid documentation, and proof of posting will not be accepted as proof of delivery.
10. No bid submitted by telefax, telegraphic or other electronic means will be considered.
11. Bidding documents must not be included in packages containing samples. Such bids may be rejected as being invalid.
12. Any alteration made by the bidder must be initialed.
13. Use of correcting fluid is prohibited.
14. Bids will be opened in public as soon as practicable after the closing time of bid.
15. Where practical, prices are made public at the time of opening bids.
16. If it is desired to make more than one offer against any individual item, such offers should be given on a photocopy of the page in question. Clear indication thereof must be stated on the schedules attached.
17. Bidder must initial each and every page of the bid document.
18. **For compulsory briefing sessions - Bidders must ensure that during a briefing session, the certificate is stamped and signed, also ensure that the attendance register is signed. Failure to comply with any of these will result to disqualification.**

REGISTRATION ON THE CENTRAL SUPPLIERS DATABASE

1. In terms of the National Treasury Instruction Note, all suppliers of goods and services to the State are required to register on the Central Suppliers Database.

2. Prospective suppliers should self-register on the CSD website www.csd.gov.za

3. If a business is registered on the Database and it is found subsequently that false or incorrect information has been supplied, then the Ezemvelo KZN Wildlife may, without prejudice to any other legal rights or remedies it may have;

   3.1 cancel a bid or a contract awarded to such supplier, and the supplier would become liable for any damages if a less favorable bid is accepted or less favorable arrangements are made.

4. The same principles as set out in paragraph 3 above are applicable should the supplier fail to request updating of its information on the Central Suppliers Database, relating to changed particulars or circumstances.

5. IF THE SUPPLIER IS NOT REGISTERED AT THE CLOSING TIME OF BID, THE SUPPLIER WILL BE DISQUALIFIED AT THE BID EVALUATION PROCESS.

THIS IS TO CERTIFY THAT I (name of bidder/authorized representative) …….....,

WHO REPRESENTS (state name of bidder) …….....CSD Registration

Number.....

AM AWARE OF THE CONTENTS OF THE CENTRAL SUPPLIER DATABASE WITH RESPECT TO THE BIDDER'S DETAILS AND REGISTRATION INFORMATION, AND THAT THE SAID INFORMATION IS CORRECT AND UP TO DATE AS ON THE DATE OF SUBMITTING THIS BID.

AND I AM AWARE THAT INCORRECT OR OUTDATED INFORMATION MAY BE A CAUSE FOR DISQUALIFICATION OF THIS BID FROM THE BIDDING PROCESS, AND/OR POSSIBLE CANCELLATION OF THE CONTRACT THAT MAY BE AWARDED ON THE BASIS OF THIS BID.

.....
SIGNATURE OF BIDDER OR AUTHORISED REPRESENTATIVE

DATE: .....

OFFICIAL BRIEFING SESSION/SITE INSPECTION CERTIFICATE

N. B.: THIS FORM IS ONLY TO BE COMPLETED WHEN APPLICABLE TO THE BID.

Site/Building/Institution Involved: _____

BID No: EKZNW 05/2023/24.

Service: Appointment of an electrical contractor for refurbishment and repairs of electrical infrastructure at Queen Elizabeth Park Offices.

This is to certify that (bidder's representative name) _____

On behalf of (company name) _____

Visited and inspected the site on ___/___/_____ (date) and is therefore familiar with the circumstances and the scope of the service to be rendered.

_____
Signature of Bidder or Authorized Representative
(PRINT NAME)

DATE: ___/___/_____

_____
Name of Public Entity Representative
(PRINT NAME)

Official stamp with signature

PART A
INVITATION TO BID

YOU ARE HEREBY INVITED TO QUOTE FOR REQUIREMENTS OF THE EZEMVELO KZN WILDLIFE					
BID NUMBER:	**EKZNW 05/2023/24**	**CLOSING DATE:**	**17 January 2024**	**CLOSING TIME:**	**11:00**
DESCRIPTION	**APPOINTMENT OF AN ELECTRICAL CONTRACTOR FOR REFURBISHMENT AND REPAIRS OF ELECTRICAL INFRASTRUCTURE AT QUEEN ELIZABETH PARK OFFICES.**				

BID RESPONSE DOCUMENTS MUST BE DEPOSITED AT THE FOLLOWING ADDRESS:
Ezemvelo KZN Wildlife, Head Office
Queen Elizabeth Park
No. 1 Peter Brown Drive, Montrose
Pietermaritzburg, 3202

BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO		TECHNICAL ENQUIRIES MAY BE DIRECTED TO:	
CONTACT PERSON	Mr Sthabiso. Sithole	CONTACT PERSON	Ms Bongiwe Mazibuko
TELEPHONE NUMBER	033 845 1225	TELEPHONE NUMBER	033 845 1912
FACSIMILE NUMBER		FACSIMILE NUMBER	
E-MAIL ADDRESS	Sitholes@kznwildlife.com	E-MAIL ADDRESS	mazibukb@kznwildlife.com

SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
SUPPLIER COMPLIANCE STATUS	TAX COMPLIANCE SYSTEM PIN:		**OR**	CENTRAL SUPPLIER DATABASE No:	MAAA
B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE	TICK APPLICABLE BOX] ☐ Yes ☐ No		B-BBEE STATUS LEVEL SWORN AFFIDAVIT	[TICK APPLICABLE BOX] ☐ Yes ☐ No	

[A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE/ SWORN AFFIDAVIT (FOR EMES & QSEs) MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE]

ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?	☐Yes ☐No [IF YES ENCLOSE PROOF]	ARE YOU A FOREIGN BASED SUPPLIER FOR **THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES, ANSWER THE QUESTIONNAIRE BELOW]

QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?	☐ YES ☐ NO
DOES THE ENTITY HAVE A BRANCH IN THE RSA?	☐ YES ☐ NO
DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?	☐ YES ☐ NO
DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?	☐ YES ☐ NO
IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?	☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER.3 BELOW.

PART B
TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:
1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED– (NOT TO BE RE-TYPED) OR IN THE MANNER PRESCRIBED IN THE BID DOCUMENT.**
1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.
1.4. **THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (SBD7).**
2. TAX COMPLIANCE REQUIREMENTS
2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VERIFY THE TAXPAYER'S PROFILE AND TAX STATUS.
2.3 APPLICATION FOR TAX COMPLIANCE STATUS (TCS) PIN MAY BE MADE VIA E-FILING THROUGH THE SARS WEBSITE WWW.SARS.GOV.ZA.
2.4 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
2.5 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
2.6 WHERE NO TCS PIN IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.
2.7 NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE."

NB: FAILURE TO PROVIDE / OR COMPLY WITH ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

SIGNATURE OF BIDDER: ……

CAPACITY UNDER WHICH THIS BID IS SIGNED: ……
(Proof of authority must be submitted e.g. company resolution)

DATE: ……...

BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest1 in the enterprise, employed by the state? **YES/NO**

2.1.1. If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	**Identity Number**	**Name of State institution**

2.2. Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES/NO**

2.2.1. If so, furnish particulars:
……
……

2.3. Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract? **YES/NO**

2.3.1 If so, furnish particulars:
……
……

1 the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

3 DECLARATION

I, the undersigned, (name)…… in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

3.1 I have read and I understand the contents of this disclosure;

3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;

3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium2 will not be construed as collusive bidding.

3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.

3.5 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

3.6 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.

3.7 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.
I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

…… Signature	…… Date
…… Position	…… Name of bid der

2 Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022

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1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to invitations to tender:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 **To be completed by the organ of state**

(*delete whichever is not applicable for this tender*).

a) The applicable preference point system for this tender is the 80/20 preference point system.

b) 80/20 preference point system will be applicable in this tender. The lowest/ highest acceptable tender will be used to determine the accurate system once tenders are received.

1.3 Points for this tender (even in the case of a tender for income-generating contracts) shall be awarded for:

(a) Price; and

(b) Specific Goals.

1.4 **To be completed by the organ of state:**

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	80
SPECIFIC GOALS	20
Total points for Price and SPECIFIC GOALS	**100**

1.5 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.

1.6 The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

2. DEFINITIONS

(a) **"tender"** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;

(b) **"price"** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;

(c) **"rand value"** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;

(d) **"tender for income-generating contracts"** means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and

(e) **"the Act"** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1. POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20 **or** **90/10**

$$Ps = 80\left(1 - \frac{Pt - P\,min}{P\,min}\right) \quad \text{or} \quad Ps = 90\left(1 - \frac{Pt - P\,min}{P\,min}\right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

3.2. FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

3.2.1. POINTS AWARDED FOR PRICE

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20 **or** **90/10**

$$Ps = 80\left(1 + \frac{Pt - P\,max}{P\,max}\right) \quad \text{or} \quad Ps = 90\left(1 + \frac{Pt - P\,max}{Pmax}\right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmax = Price of highest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

4.1. In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:

4.2. In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—

(a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or

(b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,

then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

Table 1: Specific goals for the tender and points claimed are indicated per the table below.

***80/20 preference point system is applicable, corresponding points must also be indicated as such. Note to tenderers: The tenderer must indicate how they claim points for each preference point system.*)**

The specific goals allocated points in terms of this tender	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (80/20 system) (To be completed by the tenderer)
51% Black owned enterprise	**8**	
51% owned by Black people who are women	**4**	
51% owned by Black people who are youth	**4**	
51% owned by Black people who are military veterans	**4**	

DECLARATION WITH REGARD TO COMPANY/FIRM

4.3. Name of company/firm…….

4.4. Company registration number: ……...

4.5. TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
- ☐ One-person business/sole propriety
- ☐ Close corporation
- ☐ Public Company
- ☐ Personal Liability Company
- ☐ (Pty) Limited
- ☐ Non-Profit Company
- ☐ State Owned Company

[TICK APPLICABLE BOX]

4.6. I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

i) The information furnished is true and correct;

ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;

iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;

iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –

(a) disqualify the person from the tendering process;

(b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;

(c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

(d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and

(e) forward the matter for criminal prosecution, if deemed necessary.

…… **SIGNATURE(S) OF TENDERER(S)** **SURNAME AND NAME**: …… **DATE:** …… **ADDRESS**: …… ……

GENERAL CONDITIONS OF BID

Unless inconsistent with or expressly indicated otherwise by the context, the singular shall include the plural and vice versa and words importing the masculine gender shall include the feminine and the neuter.

1. Definitions and Interpretations

1.1 "Employer" shall mean The KwaZulu Natal Nature Conservation Board (Herein after referred to as the Board)

1.2 Employer's representative shall be: - Mr. Sihle Mkhize – Acting Chief Executive Officer, Telephone No. - (033) 845 1511.

2. Issuing of Documents and Cost of Bidding

The Employer will not reimburse bidders for any expenses incurred in the preparation of the bids and submission of a bid offer, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements.

3. Bid validity period

Unless a longer period is stipulated, all bids must remain binding for a minimum period of (120) calendar days the date of the bid closing date.

4. Submission of Bids

The bid shall be signed by a person duly authorized to do so. Bids submitted by Joint Ventures of two or more firms shall be accompanied by the document of formation of the Joint Venture, authenticated by a notary public or other official deputed to witness sworn statements, in which is defined precisely the conditions under which the Joint Venture will function, its period of duration, the persons authorized to represent, the participation of the several firms forming the Joint Venture, and any other information necessary to permit a full appraisal of its functioning. It shall state which of the signatories the lead partner is and whom the employer shall hold liable for the purpose of the bid offer.

A Bid submitted by:

a) A registered Company may not be considered unless accompanied by a resolution of a Board of Directors of the Company authorizing the Bid to be made and the signatory to sign the bid on the Company's behalf;
b) A registered Close Corporation may not be considered unless accompanied by written authority from all the signatory members of the Close Corporation authorizing the bid to be made and the signatory to sign the bid on the Close Corporation's behalf;
c) A Partnership may not be considered unless duly signed by all partners or more parties duly authorized thereto to Power of Attorney by the parties, copy of which should accompany this bid document;
d) A trust may not be considered unless duly signed by all trustees authorizing the bid to be made and the signatory to sign the bid on the Trust's behalf.

Bids are to be submitted in a sealed envelope addressed to the Supply Chain Manager and must be placed in the bid box. This envelope should be endorsed with the following:

- **Bid Number: EKZNW 05/2023/24.**
- **Description of Services:** Appointment of an electrical contractor for refurbishment and repairs of electrical infrastructure at Queen Elizabeth Park Offices.
- **Closing date: 17 January 2024**

The employer shall not assume any responsibility for the misplacement or premature opening of the bid offer if the outer package is not sealed and marked as stated.

Failure to identify the envelope with the relevant and individual bid reference number may lead to the bid being disregarded. The envelope shall not contain documents relating to any bid other than that shown on the envelope.

No bid submitted by post, fax or other electronic means will be considered. Bids sent, via courier services will only be accepted if placed into the Bid Box. It is the Bidder's responsibility to ensure that this is done.

A specific bid box is provided for the receipt of bids, and no bid found in any other box or elsewhere subsequent to the closing date and time of bid will be considered.
The employer shall return bid offer received after the closing time stated in the advertisement, unopened, (unless it is necessary to open a bid submission to obtain a forwarding address), to the bidder concerned.
Bids must be submitted on the documentation provided by the Ezemvelo KZN Wildlife (original bid documents). Submitting a copy of the original bid document will invalidate your bid.

5. Notices to Bidders

Prior to the date for submission of bids, the Employer's Representative may issue notices to bidders in the form of circulars/addenda or modify the bid documents. A copy of each notice will be issued to every Bidder, who shall duly acknowledge receipt thereof. The "Notice to Bidder" circulars shall become part of the bid documents and shall be signed by the Bidder and submitted with other bid documents.

6. Amendments to Bid by Employer

The Employer will adjust arithmetical errors in the extension of rates and totals in the bid and the Bidder will be informed of the effect of any corrections on its bid sum prior to the award of the contract. In such cases the unit will be taken as being correct.

7. Bidder to satisfy itself as to Conditions and Circumstances of Bid

The Bidder shall be deemed to have satisfied itself as to all the conditions and circumstances affecting the bid, **including the physical aspects of working areas,** and by the submission of a bid will confirm acceptance of the conditions and circumstances applicable to any subsequent contract.
Bidders are advised to check the number of pages and to satisfy themselves that none are missing or duplicated. No liability whatsoever will be recognized by KZN Wildlife in regard to any claim thereof.

8. Alternative Bids

Bidders who submit alternative bids may do so only after having submitted bids strictly in accordance with the Technical Specification, Scope of Work and Price Schedule. Should the Bidders wish to offer any alternative it shall state such alternative fully in covering documentation attached to its bid. Such documentation shall include a fully priced Price Schedule and precise details of such offer and any change in financial, constructional, maintenance or other risk between the base offer and the alternative.

9. Qualification of Bids

Bids which are qualified may be rejected and all other things being equal, will lead to rejection of the qualified bid in favor of any other non-qualified bid.

10. Offering of a Commission or Gratuity

If the Bidder, or any employee, is found to have either directly or indirectly offered, promised or given to any office bearer of the Employer any commission, gratuity, gift or other consideration, the Employer shall have the right to disqualify the bid and cancel any existing contracts without paying any compensation to the Bidder.

11. Method of Award

The Employer may award any contract to any one or more Suppliers at its discretion. The basis for any adjudication will be on consideration of a combination of the price/rates offered, functionality/technical and commercially acceptable bid(s). Black Economic Empowerment Achievements will also be taken into account.

12. Acceptance of Bid

The lowest, or any bid will not necessary be accepted and the Employer reserves the right to accept any bid either in whole, or in part or to withdraw.
Notification of acceptance of bid (an award of a contract) will be in writing signed by or on behalf of the Chief Executive Officer of the KZN Wildlife. Oral advice on the acceptance of a bid will not constitute any obligation towards, nor a contract between, a bidder and KZN Wildlife.

13. Rejection of Bids

Any bid which does not comply with the Conditions of Bid may be regarded as incomplete and may be rejected.

14. Ownership of Documentation

All documents relating to the bid remain the property of the Employer and a copy of the contract will be sent to the successful Bidder.

15. Undertaking in Event of Withdrawal of Bid.

Should the Bidder withdraw its bid during the specified period for which it holds good, or if when notified that its bid has been accepted, fails to provide the security required under this contract within the period stipulated in the contract, it shall pay to the Employer upon demand any increased amount between the breached bid and the bid that the Employer finally accepts, without prejudice to any other rights which the Employer may have in law against the Bidder.

The Employer shall have the right to recover such sums by set-off against any money which may be due or become due to the Bidder, under any other contract, or against any guarantee or deposit which may have been furnished by or on behalf of the Bidder for the due fulfillment of any other Contract between the Employer and the Bidder. Pending the ascertainment of the amount of the Bidder's liability to the Employer in terms of this Conditions of Bid, the Employer may retain such monies, guarantee or deposit as security for any loss which the Employer may sustain by reason of the Bidder's default.

16. Precedence of Documentation

Should there be a conflict within the contract documentation, the following shall be order of precedence: -

1. Form of Agreement (Contract)
2. Technical Specification/Terms of Reference
3. Price Schedule
4. Special Conditions of Contract
5. General Conditions of Contract
6. General Conditions of Bid

17. Alterations or Corrections

No unauthorized alteration or addition shall be made to the Agreement, Price Schedule, or any portion of the original text in the Bid Documents. If such addition or alteration is made, or if the Price Schedule is not properly completed, the Bid may be rejected.

Any amendment or correction in the Bid document of bided amount/sum/rate or other entry must be affected only by deleting the incorrect entry and writing the correct amount/sum/rate/entry just above it in **INK**. Each and every amendment/correction must be initialed by all signatories to the Bid.

The use of "TIPPEX" correcting fluid or any other similar substance to make corrections and/ or alterations **ANYWHERE** in the Bid Document is **NOT** permitted and any Bid altered/amended in such a manner may be declared invalid. The use of any erasable ink i.e., pencil will invalidate your bid.

18. Confidentiality of Bid Documents

All recipients of the bid documents shall, whether a bid is submitted or not, treat the details of the document as private and confidential and the general content shall not be disclosed or discussed with third parties without the prior approval of the Employer.

19. Copyright

No part of this document and any document enclosed with this enquiry may be copied, photographed or repeated in any manner or by any process without the written consent of the Employer. Copyright is reserved on specifications, system and processes contained in the document. Any person, firm, body or consultant shall be responsible jointly and severally, in their personal and corporate capacities, for any contravention of this requirement for bidding and/ or any copyright clauses contained in the document.

20. False Declarations

All information requested in this document and provided by the Bidder is accepted in good faith as being true and accurate. Any false declaration or intentional omission of relevant facts will be viewed in a serious light by The Board, and should the true facts be established, that may disqualify the Bidder concerned.

21. Consent to Risk Analysis and Access to Information

The Bidder agrees that the Employer may use the services and records of specialists or a registered credit bureau and other suppliers for information required in the original and future assessment risk, both technical and

commercial.

If the Bidder is a private or unlisted public company, close corporation, or other artificial person, then it undertakes to advise the Employer immediately in writing of any agreement concluded for the change of its shareholding, membership or ownership. In such event (or if the Bidder fails to advise the Employer as required in terms hereof), the Employer reserves the right to re-assess any risk.

22. Prices quoted in bid documents

All prices quoted in bid documents must be in South African currency and be inclusive of Value-Added Tax. Unless the price is broken down into separate components of (a) net price, (b) total price,(c) total price (i.e. including the tax consideration), the price quoted on a document will be DEEMED inclusive of value – Added Tax. No bid document which has not been priced (i.e., Bid prices not inserted in the spaces on the form/s provided therefore) will be admitted.

23. Compulsory meeting (If applicable)

Confirmation of attendance of compulsory inspection will be recorded on site. Non-attendance of compulsory site inspection/information/clarification meeting will invalidate your bid. Late entries will not be allowed. Bidder must be represented at the meeting by a person who is suitably qualified and experienced to comprehend the implications of the work.

24. Tax Clearance Certificate

A Valid Original Tax Clearance Certificate (or in the case of a Joint Venture, of all partners in the Joint Venture) must be submitted with the bid document.
Please note that your Tax Clearance Certificate will be verified with SARS prior to the award of this bid, you are therefore requested to ensure that your Tax Clearance Certificate is valid until the finalization.

25. Certificates

The following certificates must be provided with the bid document. If they are not provided the bidder's offer may be considered as non-responsive:

1. Company/CC/Trust/Partnership/Co-operative registration certificates
2. Joint Venture Agreement and Power of attorney in case of Joint Ventures
3. ID certificates in case of one-man concerns

26. Eligibility

A bidder will not be eligible to submit a bid if:

1. the bidder submitting the bid is under restrictions or has principals who are under restriction to participate in the Employer's procurement due to corrupt of fraudulent practices;
2. the bidder submitting the bid is insolvent, bankrupt, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceeding in respect of the foregoing;
3. the bidder does not comply with the legal requirements stated in the Employer's procurement policy;
4. the bidder cannot demonstrate that he possesses the necessary professional and technical qualifications and competent, financial resources, equipment and other physical facilities, managerial capacity, personnel, experience and reputation to perform the contract.

27. Arithmetical errors

Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern.

28. Submitting a bid offer

Bidder must submit one bid only, either as a single bidding entity or as a member in a Joint Venture to provide the whole of works, services or supply identified in the contract data and described in the scope of works, unless stated otherwise in the tender data. The bid must be only in the original bid document as obtained from Ezemvelo KZN Wildlife. Copied bid document will be disregarded.

AUTHORITY TO SIGN A BID

The bidder must indicate the enterprise status by signing the appropriate box hereunder.

(I) CLOSE CORPORATION	(II) COMPANIES	(III) SOLE PROPRIETOR	(IV) PARTNERSHIP	(V) CO-OPERATIVE	(VI) JOINT VENTURE / CONSORTIUM	
					Incorporated	
					Unincorporated	

I/We, the undersigned, being the Member(s) of Cooperative/ Sole Owner (Sole Proprietor)/ Close Corporation/ Partners (Partnership)/ Company (Representative) or Lead Partner (Joint Venture / Consortium), in the enterprise trading as:

.....

hereby authorise Mr/Mrs/Ms .....

acting in the capacity of .....

whose signature is .....

to sign all documents in connection with this bid and any contract resulting therefrom on behalf of the enterprise.

NAME	ADDRESS	SIGNATURE	DATE

(if the space provided is not enough please list all the director in the resolution letter)

Note:

The following document must be attached to this form according to the status of the enterprise, in the form of a resolution authorising the signatory to sign all documents in connection with this bid and any contract resulting therefrom on behalf of the enterprise, and **such resolution shall include a specimen signature of the signatory.**

Co-operative:	Resolution letter from the directors
Close Corporation:	Resolution letter from the directors
Company:	Resolution letter from the director/s
Sole Proprietor:	Resolution letter from the director
Partnership:	Resolution letter from the director
Joint Venture / Consortium:	Resolution/agreement passed/reached' signed by the authorised representatives of the enterprises

Note: Director/s may appoint themselves if they will be the one signing all documents in connection with this bid and any contract resulting therefrom on behalf of the enterprise.

Failure to complete, sign and date this form or failure to provide the certificate(s) in the form of a resolution as described above shall result in the tender being considered non-responsive and rejected.

SPECIAL CONDITIONS OF CONTRACT

1. INTRODUCTION

This bid is subject to the Preferential Procurement Policy Framework Act and the 2022 Preferential Procurement Regulations and the following Special Conditions of Contract.

2. NATIONAL TREASURY CENTRAL SUPPLIER DATABASE

Tenderers who are not registered on the National Treasury Central Supplier Database at close of tender, shall submit a copy of their application of registration, with their tender submission. Tenders received from such tenderers who have not submitted proof of their registration within 21 days after the closing date for tender submissions, will not be considered.

3. TAX MATTERS

It is a condition of this bid that the tax matters of a successful bidder must be in order, or that satisfactory arrangements have been made with South African Revenue Services (SARS) to meet the bidder's obligation.

The Tax Compliance status requirements are also applicable to foreign bidders/individual who wish to submit bids.

Bidder must be registered on the Central Supplier Database (CSD) and provide its CSD number.

When a Consortium, Joint Venture, Sub-contractors is involved, each party must be registered on the CSD and their tax compliance status will be verified through the Central Supplier Database.

The bid will be awarded to the bidder who is tax compliant.

4. DECLARATION OF INTEREST (SBD 4)

A bidder or his/her authorized representative is required to declare if the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest has any interest(s) in any other related enterprise whether or not they are bidding for this contract. The Bidder's Disclosure (SBD 4) must be completed fully and if disclosure is found not to be true and complete in every respect the bidder will be disqualified.

5. SPECIFIC GOALS FOR THE TENDER AND POINTS CLAIM (SBD 6.1)

The tenderer must indicate how they claim points for specific goals and substantiate by submitting proof/ documentation stated in the conditions of this tender. Failure on the part of a tenderer to submit proof or documentation required in terms of this tender for specific goals will be interpreted to mean that preference points are not being claimed. The failure by the tenderer to indicate the points claimed will also result in points not being allocated.

6. HEALTH AND SAFETY FILE

Health and Safety file is to be submitted within 14 days from the date that the Agreement, made in terms of the Form of Offer and Acceptance comes into effect.

7. EVALUATION CRITERIA

The evaluation process will be conducted in phase as follows:

7.1. Phase 1: Compliance and completeness screening

- The bidder must be fully registered on the National Treasury Central Supplier Database (CSD) at the closing time of the bid.
- Bid documents must be properly received on the bid closing date and time specified on the invitation.
- Bidder must ensure compliance with their tax obligations. No tender may be awarded to any tenderer whose tax matters have not been declared by the SARS to be in order.
- In bids where consortia / joint ventures / sub-contractors are involved; each party must submit a separate TCS.
- The bid document must be fully completed, dated, signed and initial every page of the bid.
- The bidder or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector.
- The bidder or any of its directors/shareholders are not restricted from doing business with government in terms of SCM Practice Note 05 of 2006.
- The bidder has made the necessary disclosures on SBD4.

7.2. Phase 2: Mandatory requirements

a. Wireman's License

The tenderers must submit information of the person who will be issuing the compliance certificate (COC) who holds an active wireman's license issued by the Department of Labour.

b. CIDB registration

Only those tenderers who are registered with the CIDB or are capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered, or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations, for a **6 EB** class of construction works are eligible to have their tenders evaluated.

Joint ventures are eligible to submit tenders provided that:

i. every member of the joint venture is registered with the CIDB;
ii. the lead partner has a contractor grading designation in the **6 EB** class of construction works; and
iii. the combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for a **6 EB** class of construction works or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations

7.3. Phase 3: Functionality Evaluation

The Bid functionality will be evaluated out of 100 percent (%) by using the following points weight categories. All Bids that scored below the **55%** will be eliminated and not considered for further evaluation. The final percentage score of the bidders will be calculated as follows: points scored divided by 70 multiply by 100 (Ps/70*100).

	Evaluation Criteria	Deliverables	Points	Sub-Points		Sub-Criteria
1.	**Competency, Experience and Resource Capacity**		**40 Points**			
	Tenderer to demonstrate their competency and capacity to undertake the project	List of 3 or more projects of R 3,0 million or higher within the last 5 years. List per project must be supported by: i. Signed letters of appointments. ii. Practical/Completion certificate signed by the awarding institution. iii. Reference letter from the institution for all the above listed projects stating the tenderers workmanship, technical skills, time/programme management.	**40**	40 of 40	Sub-points	4 set of documents
				30 of 40	Sub-points	3 set of documents
				20 of 40	Sub-points	2 set of documents
				10 of 40	Sub-points	1 set of documents
2.	**Tenderer's Project Management Structure and Organogram and Experience of Resources Proposed for the Project**		**30 Points**			
	Demonstration of the tenderer's human resource capacity and technical competency for the project - Contracts Manager - Site foreman - Safety officer	Contracts Manager: • relevant qualification • minimum 5 years of experience	10	5	Sub-points	NQF level 6 qualification in the built environment or higher.
				5	Sub-points	1-2 years =2 pts 3-4 years =3 pts 5 years = 5 pts
	Detailed proposed project team organogram that sets out the roles and responsibilities of each proposed team member, which is backed up by their	Site Foreman •relevant qualification •minimum 5 years of experience	10	5	Sub-points	NQF level 4 qualification in the electrical trade or higher.
				5	Sub-points	5 - 6 years = 2pts 7 - 8 years =3 pts 9+ years = 5 pts

	curriculum vitae; demonstrating extensive experience in projects in the Built environment.	Safety Officer • Relevant qualification • minimum of 5 years' experience	10	5	Sub-points	NQF level 5 qualification in the built environment or higher.
				5	Sub-points	1-2 years =2 pts 3-4 years =3 pts 5 years = 5 pts
TOTAL POINTS		**70**				

7.4. Phase 3: 80/20 Preference points system

- The applicable preference point system for this tender is the 80/20 preference point system.
- Points shall be awarded for price is (80) and (20) for specific goals.
- The specific goals for the tender and points claimed are indicated per the table below:

POINTS FOR PRICE	SPECIFIC GOALS AND POINTS		PROOF TO BE ATTACHED TO SUBSTANTIATE POINTS
$$Ps = 80\left(1 - \frac{Pt - P\,min}{P\,min}\right)$$ Where: Ps = Points scored for price of tender under consideration Pt = Price of tender under consideration Pmin = Price of lowest acceptable tender	51% Black owned enterprise	8	B-BBEE certificates indicate the percentage of ownership.
	51% owned by Black people who are women	4	B-BBEE certificates indicate the percentage of ownership.
	51% owned by Black people who are youth	4	B-BBEE certificates indicate the percentage of ownership.
	51% owned by Black people who are military veterans	4	A letter from the department of military veteran with a reference number which confirms your company registration on their database.

THE CONTRACT

C: The Contract

Part C1: Agreement and contract data

C1.1 - FORM OF OFFER AND ACCEPTANCE

OFFER

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of :

APPOINTMENT OF AN ELECTRICAL CONTRACTOR FOR REFURBISHMENT AND REPAIRS OF ELECTRICAL INFRASTUCTURE AT QUEEN ELIZABETH PARK OFFICES.

The Tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and Addenda thereto as listed in the Returnable Schedules, and by submitting this Offer has accepted the Conditions of Tender.

By the representative of the Tenderer, deemed to be duly authorized, signing this part of this Form of Offer and Acceptance, the tenderer offers to perform all of the obligations and liabilities of the Contractor under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the Conditions of Contract identified in the Contract Data.

THE OFFERED TOTAL OF THE PRICES INCLUSIVE OF VALUE ADDED TAX IS:

Amount (in words):	
Amount in figures:	**R**

This Offer may be accepted by the Employer by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document to the Tenderer before the end of the period of validity stated in the Tender Data, whereupon the Tenderer becomes the party named as the Contractor in the Conditions of Contract identified in the Contract Data.

Signature (s)				
Name (s)				
Capacity				
For the tenderer				
	(Name and address of tenderer)			
Name and signature of witness			**Date**	

ACCEPTANCE

By signing this part of this Form of Offer and Acceptance, the Employer identified below, accepts the Tenderer's offer. In consideration thereof, the Employer shall pay the Contractor the amount due in accordance with the Conditions of Contract identified in the Contract Data. Acceptance of the Tenderer's offer shall form an agreement between the Employer and the Tenderer upon the terms and conditions contained in this Agreement and in the contract that is the subject of this Agreement.

The terms of the contract, are contained in:

Part C1	Agreement and Contract Data, (which includes this agreement)
Part C2	Pricing data
Part C3	Scope of work.
Part C4	Site information and drawings and documents or parts thereof, which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the tender data and any addenda thereto as listed in the returnable schedules as well as any changes to the terms of the offer agreed by the tenderer and the employer during this process of offer and acceptance, are contained in the schedule of deviations attached to and forming part of this form of offer and acceptance. No amendments to or deviations from said documents are valid unless contained in this schedule.

The tenderer shall within two weeks after receiving a completed copy of this agreement, including the schedule of deviations (if any), contact the employer's agent (whose details are given in the contract data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the contract data. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy of this document, including the schedule of deviations (if any). Unless the tenderer (now contractor) within five (5) working days of the date of such receipt notifies the employer in writing of any reason why he/she cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the parties.

Signature (s)			
Name (s)			
Capacity			
For the employer			
	(Name and address of employer)		
Name and signature of witness			

Schedule of Deviations

Notes:
1. The extent of deviations from the tender documents issued by the employer before the tender closing date is limited to those permitted in terms of the conditions of tender.
2. A tenderer's covering letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid, become the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here.
3. Any other matter arising from the process of offer and acceptance either as a confirmation, clarification or change to the tender documents and which it is agreed by the Parties becomes an obligation of the contract shall also be recorded here.
4. Any change or addition to the tender documents arising from the above agreements and recorded here, shall also be incorporated into the final draft of the Contract.

1.1.1.	**Subject:**
Details:	

1.1.2.	**Subject:**
Details:	

1.1.3.	**Subject:**
Details:	

1.1.4.	**Subject:**
Details:	

By the duly authorised representatives signing this agreement, the employer and the tenderer agree to and accept the
foregoing schedule of deviations as the only deviations from and amendments to the documents listed in the tender data and addenda thereto as listed in the returnable schedules, as well as any confirmation, clarification or changes to the terms of the offer agreed by the tenderer and the employer during this process of offer and acceptance.
It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this agreement.

C1.2 CONTRACT DATA

General Conditions of Contract for Construction Works, Third Edition (2015)

PRO FORMA
CONTRACT DATA

REFERENCE	CONTRACT SPECIFIC DATA PROVIDED BY THE EMPLOYER
1.	**GENERAL**
Clause 1.1.1.13:	The Defects Liability Period is 12 months for the whole of the works.
Clause 1.1.1.14:	The time for achieving Practical Completion is **10 months** from the CommencementDate, including non-working days and special non-working days.
Clause 1.1.1.26:	Pricing Strategy: The Contract is to be a Re-measurement Contract.
Clause 1.1.1.15:	**Name of Employer:** Ezemvelo KZN Wildlife
Clause 1.2.1.2:	**Address of Employer:** Physical: Ezemvelo KZN Wildlife Queen Elizabeth Park No. 1 Peter Brown Drive Montrose, Pietermaritzburg 3201 E-mail: mazibukb@kznwildlife.com Telephone No: 033 845 1912 Postal: Ezemvelo KZN Wildlife P O Box 13053 Cascades 3202
Clause 1.1.1.16:	**Name of Employer's Agent:** Malta Consulting (Pty) Ltd
Clause 1.2.1.2:	**Address of Employer's Agent:** Physical: Suite 16, Corporate Park 9 Sinembe Park, La Lucia Ridge Office Estate 4051 E-mail: deon@maltaeng.com Telephone No: 031 566 2800/ 082 799 5501 Postal:

REFERENCE	CONTRACT SPECIFIC DATA PROVIDED BY THE EMPLOYER
5.	**TIME AND RELATED MATTERS**
Clauses 5.3.1 and 5.3.2:	Where the Employer **is not required** to apply for a permit to do construction work in terms of Construction Regulation 3(1), the following documentation is to be submitted within 14 days from the date that the Agreement comes into effect: The documents required before commencing to carry out the Works: • Health and Safety Plan (refer to Clause 4.3) • Initial Programme (refer to Clause 5.6) • Security (refer to Clause 6.2) • Insurance (refer to Clause 8.6)
Clauses GCC 5.3.1 and GCC 5.3.2:	Where the Employer **is required** to apply for a permit to do construction work in terms of Construction Regulation 3(1), the following documentation is to be submitted within 14 days from the date that the Agreement, made in terms of the Form of Offer and Acceptance, comes into effect: The documents required before commencing to carry out the Works: • Health and Safety Plan (refer to Clause 4.3) • Initial Programme (refer to Clause 5.6) • Security (refer to Clause 6.2) • Insurance (refer to Clause 8.6)

REFERENCE	CONTRACT SPECIFIC DATA PROVIDED BY THE EMPLOYER
Clause 5.8.1:	The non-working days are Sundays. The special non-working days are the construction industry year end break, and all Nationally Recognized Public Holidays. First Year end break - commences **15-Dec-23 ends on 15-Jan-24** Second Year end break – commences 17 Dec 2024 ends on 15 Jan 2025
Clause 5.13.1:	The penalty for failing to complete the Works is **0,04%** of the Contract Sum per day.
Clause 5.16.3:	The latent defects period is 5 years.
Clause 6.2.2:	Replace the following "..it shall be deemed that the Contractor has selected a security of ten percent retention of the value of the Works." with "..it shall be deemed that the Contractor has selected a security of a bank or insurance guarantee of 5% of the value of the Works and a payment reduction of 5% of the value certified in the payment certificate excluding value added tax."

REFERENCE	CONTRACT SPECIFIC DATA PROVIDED BY THE EMPLOYER
6.	**PAYMENT AND RELATED MATTERS**
Clause 6.8.1 Clauses 6.8.2	Notwithstanding anything to the contrary contained in the General conditions of Contract and Preliminaries, this contract could only, when the construction period exceeds 6 months and the contract exceeds R1,000,000.00, be subject to a Contract Price Adjustment Factor.
GCC 6.8.2 and 6.8.3:	Clause 6.8.2 the last part of the sentence saying "calculated according to the formula and the conditions set out in the Contract Price Adjustment Schedule." must be replaced by "calculated according to the Contract Price Adjustment Provisions (CPAP) Indices Application Manual for use with P0151 indices (Revised 1 January 2018)" as published by Statistics South Africa. The Contract Price Adjustment Provision (CPAP) will be subject to the most recently released indices by Statistic South Africa. Bidders are advised that with reference to Clause 3.4.6 of the Contract Price Adjustment Provisions (CPAP) Indices Applications Manual, the Head: Public Works will not accept the submission by Bidders of lists of additional items."
Clause 6.10.1.5:	The percentage advance on materials not yet built into the Permanent Works is 80%.
8.	**RISKS AND RELATED MATTERS**
Clause 8.6.1.1.2:	The value of Plant and materials supplied by the Employer to be included in the insurance sum is NIL.
Clause 8.6.1.1.3:	The amount to cover professional fees for repairing or reinstatement of damage to the Works to be included in the insurance sum is 10% of project value
Clause 8.6.1.2:	Special Risks Insurance issued by SASRIA is required.
Clause 8.6.1.3:	The limit of indemnity for liability insurance is R15 000 000,00 (Fifteen million Rand only) for any single liability claim. Liability insurance shall include spread of fire risk.
10.	**CLAIMS AND DISPUTES**
Clause 10.5.3:	The number of Adjudication Board Members to be appointed is
Clause 10.7.1:	one. Unresolved disputes shall be referred to arbitration only.

C1.2.2: CONTRACT DATA

(i) PART B: DATA PROVIDED BY THE CONTRACTOR

The following contract specific data are applicable to this contract.

REFERENCE	CONTRACT SPECIFIC DATA PROVIDED BY THE CONTRACTOR
1.	**GENERAL**
Clause 1.1.1.9:	**Name of the Contractor**: ……
Clause 1.2.1.2:	…… …….. **Address of the Contractor**: Physical: Postal: ....
6.	**PAYMENT AND RELATED MATTERS**
Alternative A:	Payment Of Preliminaries (Clause 6.7, 6.8, 6.10 and 6.11) For the adjustment of Preliminaries both the Contract Sum and the Contract Value (including tax) shall exclude the amount of Preliminaries, all Contingency Sum(s) and any provision for Cost Price Adjustment Provisions: - - An amount which shall not be varied. - An amount varied in proportion to the contract value as compared to the Contract Sum. - An amount varied in proportion to the Construction Period as compared to the initial Construction Period (excluding revisions to the Construction Period to which the Contractor is not entitled) to adjustment of the Contract Value in terms of the agreement. The Contractor shall provide a breakdown of charges (including tax) within 15 working days of the date of acceptance of tender and, where applicable, an apportionment of Preliminaries per section If the Contractor and the Principal Agent cannot agree, within ten (10) Working Days from the Commencement Date, on such a division then the Principal Agent shall make a division of the Preliminaries to be incorporated in the valuations for each monthly payment certificate as follows:

	0% of the amount shall not be varied 10% of the amount shall not be varied 15% varied in proportion of the Contract Value to the Contract Sum 75% varied in proportion to the revised Construction period compared with the initial Construction Period Sectional Completion: Subdivision of Preliminaries Costs For the adjustment of preliminaries for sections of the work the value of fixed, value, and time related amounts of the preliminaries for each section is required. The contractor is to provide such information within fifteen (15) working days of taking possession of the site, failing which the categorised preliminaries amounts shall be prorated to the value of each section. The above shall apply equally for projects where sectional completion was not contemplated at tender stage but subsequently occurred on an ad hoc basis during construction of the works as agreed between the client and the employer. The original priced categorized amounts for fixed, value, and time related amounts shall be prorated to the value of each section.
Alternative B:	When an extension of time has been granted in terms of the GCC and the preliminaries require to be adjusted accordingly, the pertinent sectional (subdivided) categorised preliminaries amounts shall be utilised, where applicable and not the overall preliminary amounts.
Guarantee Options:	Where sectional completion is required in terms of the agreement, the Contractor shall provide the Principal Agent with the division of the above categorized amounts into sections. Should the Contractor fail to provide such information within the period stipulated the categorized amounts shall be prorated to the value of each section. The Contractor shall within 15 working days of the date of possession of the site provide the Principal Agent with a detailed breakdown of Preliminaries amounts for the works as a whole, or per section where applicable, including administrative and supervisory staff charges and for the use of construction equipment in terms of the programme. (Not Applicable). The contractor is informed that only option 'A' shall apply The Bidder agrees to provide a bank or insurance guarantee in accordance with clause 6.2.3 of the Conditions of the GCC 2015 Contract within the period stated in the Contract Data. This guarantee shall be for a sum equal to an amount stated in the Contract Data. Guarantees submitted must be issued by either an insurance company duly registered in terms of the Insurance Act (Long Term Insurance Act No 52 of 1998 or Short-Term Insurance Act No 53 of 1998) or by a bank duly registered in terms of the Banks Act No 94 of 1990, on the pro-forma referred to above. No alterations or amendments of the wording of the pro-forma will be accepted.

"the Bidder accepts that in respect of contracts up to R1 million, a payment reduction of 5% of the contact value will be applicable and will be reduced by the Employer in terms of the applicable conditions of contract.
"

Type of security	**Contractor's choice** *(Indicate "Yes" or "No")*
Cash deposit of 10% of the Contract Sum.	
Fixed Performance Guarantee of 10% of the Contract Sum.	
Cash deposit of 5% of the Contract Price and a payment reduction of 5% of the value certified in the payment certificate (excluding VAT).	
Bank or insurance guarantee of 5% of the Contract Price and a payment reduction of 5% of the value certified in the payment certificate (excluding VAT).	

NOTE: Where the Bidder has not selected one of the guarantee options above, the default option will be as if the Bidder has selected a security of a bank or insurance guarantee of 5% of the value of the Works and a payment reduction of 5% of the value certified in the payment certificate excluding value added tax. - See GCC 2015 clause 6.2.2 as amended in Contract Data.

Appendix 3

General Conditions of Contract for Construction Works, Third Edition (2015)

PERFORMANCE GUARANTEE

For use with the General Conditions of Contract for Construction Works, Third Edition (2015).

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means: ……..

Physical address: ……

"Employer" means: Ezemvelo KZN Wildlife

"Contractor" means: ……

"Employer's Agent" means: Ezemvelo KZN Wildlife

"Works" means:

"Site" means: Queen Elizabeth Park Offices

"Contract" means: The Agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contract as may be agreed in writing between the parties.

"Contract Sum" means: The accepted amount inclusive of tax of R …….

Amount in words: ……...

"Guaranteed Sum" means: The maximum aggregate amount of R ……

Amount in words: ……

Type of Performance Guarantee: Fixed

"Expiry Date" means: Practical Completion date or any other later date set by the Contractor and/or Employer provided such instruction is received prior to the Expiry Date as indicated here.

CONTRACT DETAILS

Employer's Agent issues: Interim Payment Certificates, Final Payment Certificate and the Certificate of Completion of the Works as defined in the Contract.

1. FIXED PERFORMANCE GUARANTEE

1.1 Where a Fixed Performance Guarantee has been selected, the Guarantor's liability shall be limited to the amount of the Guaranteed Sum.

1.2 The Guarantor's period of liability shall be from and including the date on which the Performance Guarantee is signed, up to and including the Expiry Date, or the date of issue by the Employer's Agent of the Certificate of Completion of the Works, or the date of payment in full of the Guaranteed Sum, whichever occurs first.

1.3 The Employer's Agent and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.

2. CONDITIONS APPLICABLE TO VARIABLE AND FIXED PERFORMANCE GUARANTEES

2.1 The Guarantor hereby acknowledges that:

2.1.1 Any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship.

2.1.2 Its obligation under this Performance Guarantee is restricted to the payment of money.

2.2 Subject to the Guarantor's maximum liability referred to in 1.1 or 2.1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 3.2.1 to 3.2.3:

2.2.1 A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Employer's Agent in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 3.2.2.

2.2.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 3.2.1 and the sum certified has still not been paid;

2.2.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum certified in 3.2.

2.3 Subject to the Guarantor's maximum liability referred to in 1.1 or 2.1, the Guarantor undertakes to pay to the Employer the Guaranteed Sum or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor at the Guarantor's physical address calling up this Performance Guarantee, such demand stating that:

2.3.1 the Contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 3.3; or

2.3.2 a provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 3.3; and

2.3.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.

2.4 It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 3.2 and 3.3 shall not exceed the Guarantor's maximum liability in terms of 1.1 or 2.1.

2.5 Where the Guarantor has made payment in terms of 3.3, the Employer shall upon the date of issue of the Final Payment Certificate submit an expense account to the Guarantor showing how all monies received in terms of this Performance Guarantee have been expended and shall refund to the Guarantor any resulting surplus. All monies refunded to the Guarantor in terms of this Performance Guarantee shall bear interest at the prime overdraft rate of the Employer's bank compounded monthly and calculated from the date payment was made by the Guarantor to the Employer until the date of refund.

2.6 Payment by the Guarantor in terms of 3.2 or 3.3 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.

2.7 Payment by the Guarantor in terms of 3.3 will only be made against the return of the original Performance Guarantee by the Employer.

2.8 The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may consider fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.

2.9 The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.

2.10 This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 1.1.2 or 2.2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.

2.11 This Performance Guarantee, with the required demand notices in terms of 3.2 or 3.3, shall be regarded as a liquid document for the purposes of obtaining a court order.

2.12 Where this Performance Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrates' Courts Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at ……

Date ……..

Guarantor's signatory (1) ……

Capacity……

Guarantor's signatory (2) ……..

Capacity ……..

Witness signatory (1) ……

Witness signatory (2) ……

C1.3 HEALTH AND SAFETY SPEC

PRE-CONSTRUCTION HEALTH AND SAFETY SPECIFICATION

Project:

TABLE OF CONTENTS Pages

1. INTRODUCTION AND BACKGROUND

1.1 Background to the Pre-construction Health and Safety Specification

The Construction Regulations (2014) place the onus on the Client to prepare a pre-construction health & safety specification, highlighting all risks not successfully eliminated during design.

1.2 Purpose of the Pre-construction Health and Safety Specification

To assist in achieving compliance with the Occupational Health & Safety Act 85/1993 and the now promulgated Construction Regulations (2014) in order to reduce incidents and injuries. This pre-construction specification shall act as the basis for the drafting of the construction phase health & safety plan.

The pre-construction specification sets out the requirements to be followed by the Principal Contractor and other Contractors so that the health & safety of all persons potentially at risk may receive the same priority as other facets of the project e.g. cost, programme, environment, etc.

1.3 Implementation of the Pre-construction Health and Safety Specification

This specification forms an integral part of the contract, and the Contractor is required to use it at pre-tender phase when drawing up its project-specific construction phase health & safety plan. The Principal Contractor shall forward a copy of this specification to all Contractors at their bidding stage so that they can in turn prepare health & safety plans relating to their operations.

2. PRE-CONSTRUCTION HEALTH AND SAFETY SPECIFICATION

2.1 Scope

This Specification covers the requirements for eliminating and mitigating incidents and injuries on the particular project

The scope also addresses legal compliance, hazard identification and risk assessment, risk control, and promoting a health and safety culture amongst those working on the project. The specification also makes provision for the protection of those persons other than employees.

2.2 Interpretations

2.2.1 Application

This specification is a compliance document drawn up in terms of South African legislation and is therefore binding. It must be read in conjunction with relevant legislation as noted previously.

2.2.2 Definitions

The definitions as listed in the Occupational Health & Safety Act 85/1993 and Construction Regulations (2014) shall apply.

2.3 Minimum Administrative Requirements

2.3.1 Notification of Intention to Commence Construction Work

The Contractor shall notify the Provincial Director of the Department of Labour in writing before construction work commences. A copy of this notification must be forwarded to the Client on appointment.

2.3.2 Assignment of Contractor's Responsible Persons to Supervise Health and Safety on Site

The Contractor shall submit supervisory appointments as well as any relevant appointments in writing (as stipulated by the OHSA and Construction Regulations), prior to commencement of work. Proof of competency must be included. See annexure B.

2.3.3 Competency for Contractor's Appointed Competent Persons

Contractors' competent persons for the various risk management portfolios shall fulfil the criteria as stipulated under the definition of Competent in accordance with the Construction Regulations (2014). Proof of competence for the various appointments must be included.

2.3.4 Compensation of Occupational Injuries and Diseases Act 130 of 1993 (COIDA)

The Principal Contractor shall submit a letter of good standing with its Compensation Insurer to the Client as proof of registration. Contractors shall submit proof of registration to the Principal Contractor before they commence work on site.

2.3.5 Occupational Health and Safety Policy

The Principal Contractor and all Contractors shall submit a Health and Safety Policy signed by their Chief Executive Officer. The Policy must outline objectives and how they will be achieved and implemented by the Company / Contractor.

2.3.6 Health and Safety Organogram

The Principal Contractor and all Contractors shall submit an organogram, outlining the Health and Safety Site Management Structure including the relevant appointments/competent persons. In cases where appointments have not been made, the organogram shall reflect the intended positions. The organogram shall be updated when there are any changes in the Site Management Structure.

2.3.7 Preliminary Hazard Identification and Risk Assessment and Progress Hazard Identification and Risk Assessment

The Contractor shall cause a hazard identification to be performed by a competent person before commencement of construction work, and the assessed risks shall form part of the construction phase health and safety plan submitted for approval by the Client. The risk assessment must include;

a) A list of hazards identified as well as potentially hazardous tasks;
b) A documented risk assessment based on the list of hazards and tasks;
c) A set of safe working procedures (method statements) to eliminate, reduce and/or control the risks assessed;
d) A monitoring and review procedure of the risks assessment as the risks change.

The Principal Contractor shall ensure that all Contractors are informed, instructed and trained by a competent person regarding any hazards, risks and related safe work procedures before any work commences and thereafter at regular intervals as the risks change and as new risks develop.

The Principal Contractor shall be responsible for ensuring that all persons who could be negatively affected by its operations are informed and trained according to the hazards and risks and are conversant with the safe work procedures, control measures and other related rules (tool box talk strategy to be implemented).

2.3.8 Health and Safety Representative(s)

The Principal Contractor and all Contractors shall ensure that where required Health and Safety Representative(s) are appointed under consultation and trained to carry out their functions. The appointment must be in writing. The Health and Safety Representative shall carry out regular inspections, keep records and report all findings to the Responsible Person forthwith and at health & safety meetings

2.3.9 Health and Safety Committees

The Principal Contractor shall ensure that project health and safety meetings are held monthly and minutes are kept on record. Meetings must be organised and chaired by the Principal Contractor's Responsible Person. All Contractors' Responsible Persons and Health & Safety Representatives shall attend the monthly health & safety meetings. Contractors shall also have their own internal health & safety committees in accordance with the OHS Act 85/1993 and minutes of their meetings shall be forwarded to the Principal Contractor on a monthly basis.

2.3.10 Health and Safety Training

2.3.10.1 Induction

The Principal Contractor shall ensure that all site personnel undergo a risk-specific health & safety induction training session before starting work. A record of attendance shall be kept in the health & safety file. **A suitable venue must be supplied to house this training.**

2.3.10.2 Awareness

The Principal Contractor shall ensure that, on site, periodic toolbox talks take place at least once per week. These talks should deal with risks relevant to the construction work at hand. A record of attendance shall be kept in the health & safety file. All Contractors have to comply with this minimum requirement.

2.3.10.3 Competency

All competent persons shall have the knowledge, experience, training, and qualifications specific to the work they have been appointed to supervise, control, carry out. This will have to be assessed on a regular basis e.g. periodic audits by the Client, progress meetings, etc. The Principal Contractor is responsible to ensure that competent Contractors are appointed to carry out construction work.

2.3.11 General Record Keeping

The Principal Contractor and all Contractors shall keep and maintain Health and Safety records to demonstrate compliance with this Specification, with the OHS Act 85/1993; and with the Construction Regulations (2014). The Principal Contractor shall ensure that all records of incidents/accidents, training, inspections, audits, etc. are kept in a health & safety file held in the site office. The Principal Contractor must ensure that every Contractor opens its own health & safety file, maintains the file and makes it available on request.

2.3.12 Health & Safety Audits, Monitoring and Reporting

The Client shall conduct monthly health & safety audits of the work operations including a full audit of physical site activities as well as an audit of the administration of health & safety. The Principal Contractor is obligated to conduct similar audits on all Contractors appointed by it. Detailed reports of the audit findings and results shall be reported on at all levels of project management meetings/forums. Copies of the Client audit reports shall be kept in the Primary Project Health & Safety File while the Principal Contractor audit reports shall be kept in their file, a copy being forwarded to the Client. Contractors have to audit their sub-contractors and keep records of these audits in their health & safety files, available on request.

2.3.13 Emergency Procedures

The Principal Contractor shall submit a detailed Emergency Procedure for approval by the Client prior to commencement on site. The procedure shall detail the response plan including the following key elements:

- List of key competent personnel;
- Details of emergency services;
- Actions or steps to be taken in the event of the specific types of emergencies;
- Information on hazardous material/situations.

Emergency procedure(s) shall include, but shall not be limited to, fire, spills, accidents to employees, use of hazardous substances, bomb threats, major incidents/accidents, etc. The Principal Contractor shall advise the Client in writing forthwith, of any emergencies, together with a record of action taken. A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc) must be maintained and available to site personnel.

2.3.14 First Aid Boxes and First Aid Equipment

The Principal Contractor and all Contractors shall appoint in writing First Aider(s). The appointed First Aider(s) are to be sent for accredited first aid training. Valid certificates are to be kept on site. The Principal Contractor shall provide an on-site First Aid Station with first aid facilities, including first aid boxes adequately stocked at all times. All Contractors with more than 5 employees shall supply their own first aid box. Contractors with more than 10 employees shall have a trained, certified first aider on site at all times.

2.3.15 Accident / Incident Reporting and Investigation

Injuries are to be categorised into first aid; medical; disabling; and fatal. The Principal Contractor must stipulate in its construction phase health & safety plan how it will handle each of these categories. When reporting injuries to the Client, these categories shall be used. All injuries shall be investigated by the Principal Contractor, with a report being forwarded to the Client forthwith. All Contractors have to report on the 4 categories of injuries to the Principal Contractor at least monthly. The Principal Contractor must report all injuries to the Client in the form of a detailed injury report at least monthly.

2.3.16 Hazards and Potential Situations

The Principal Contractor shall immediately notify other Contractors as well as the Client of any hazardous or potentially hazardous situations that may arise during performance of construction activities.

2.3.17 Personal Protective Equipment (PPE) and Clothing

The Principal Contractor shall ensure that all workers are issued and wear hard hats, safe footwear and overalls. The Principal Contractor and all Contractors shall make provision and keep adequate quantities of SABS approved PPE on site at all times. The Principal Contractor shall clearly outline procedures to be taken when PPE or Clothing is:

- Lost or stolen;
- Worn out or damaged.

The above procedure applies to Contractors and their Sub-contractors, as they are all Employers in their own right.

2.3.18 Occupational Health and Safety Signage

The Contractor shall provide adequate on-site OHS signage. Including but not limited to: 'no unauthorised entry', 'report to site office', 'site office', 'beware of overhead work', 'hard hat area'. Signage shall be posted up at all entrances to site as well as on site in strategic locations e.g. access routes, stairways, entrances to structures and buildings, scaffolding, and other potential risk areas/operations.

2.3.19 Permits

Permits may include the following:

- Use of Explosives and Blasting
- Work for which a fall prevention plan is required
- Use of cradles

2.3.20 Contractors and Sub-contractors

The Principal Contractor shall ensure that all Contractors under its control comply with this Specification, the OHS Act 85/1993, Construction Regulations (2014), and all other relevant legislation that may relate to the activities directly or indirectly. The Contractor, when appointing other Contractors as 'Sub-contractors', shall mutatis mutandis ensure compliance.

2.3.21 Incentives and Penalties

Certain incentives will be provided for ongoing compliance to the provisions of the construction phase health & safety plan submitted by the Principal Contractor.

Penalties will be implemented for ongoing non-compliance to the provisions of the construction-phase health & safety plan as submitted by the Principal Contractor.

2.4 Physical Requirements

2.4.1 Demolition Work

Prior to any demolition work being carried out, the Principal Contractor shall submit a safe working procedure and a detailed engineering survey for approval by the Client. Acceptance will then be issued to the Principal Contractor to

proceed with the demolition work. The Principal Contractor shall ensure that demolition work complies with the Construction Regulations (2014).

2.4.2 Excavations, Shoring, Dewatering or Drainage

The Principal Contractor and any relevant Contractors shall make provision in their tender for shoring, dewatering or drainage of any excavation as per this specification.

The Contractor shall make sure that:

a) The excavations are inspected before every shift and a record is kept;
b) Safe work procedures have been communicated to the workers;
c) The safe work procedures are enforced and maintained by the Contractor's Responsible Persons at all times;
d) The requirements as per section 13 of the Construction Regulations are adhered to.

2.4.3 Edge Protection and Penetrations

The Principal Contractor must ensure that all exposed edges and openings are guarded and demarcated at all times until permanent protection has been erected. The Principal Contractor's risk assessment must include these items. E.g. protection of decking edges, finished floor slab edges, stairways, floor penetrations, lift shafts, and all other openings and areas where a person may fall.

2.4.4 Explosives and Blasting

The Principal Contractor shall ensure that the use of explosives and blasting (where required) be undertaken by a competent Contractor. A Safe Work Procedure (SWP) must be submitted to the Client for approval before commencement of blasting work. The Client will issue a permit to authorise the operation.

2.4.5 Piling

The Contractor shall ensure that piling is undertaken by a competent Contractor. A SWP shall be submitted to the Client for approval before commencement of this work.

2.4.6 Stacking of Materials

The Principal Contractor and other relevant Contractors shall ensure that there is an appointed staking supervisor and all materials, formwork and all equipment is stacked and stored safely.

2.4.7 Speed Restrictions and Protection

The Principal Contractor shall ensure that all persons in its employ, all Contractors, and all those that are visiting the site are aware and comply with the site speed restriction(s),especially in big 5 game reserves. Separate vehicle and pedestrian access routes shall be provided, maintained, controlled, and enforced.

2.4.8 Hazardous Chemical Substances (HCS)

The Principal Contractor and other relevant Contractors shall provide the necessary training and information regarding the use, transport, and storage of HCS. The Principal Contractor shall ensure that the use, transport, and storage of HCS is carried out as prescribed by the HCS Regulations. The Contractor shall ensure that all hazardous chemicals on site have a Material Safety Data Sheet (MSDS) on site and the users are made aware of the hazards and precautions that need to be taken when using the chemicals. The First Aiders must be made aware of the MSDS and how to treat HCS incidents appropriately.

2.4.9 Asbestos

Not applicable

2.5 Plant and Machinery

2.5.1 Construction Plant

“Construction Plant” includes all types of plant including but not limited to, cranes, piling rigs, excavators, road vehicles, and all lifting equipment.

The Principal Contractor shall ensure that all such plant complies with the requirements of the OHS Act 85/1993 and Construction Regulations (July 2014). The Principal Contractor and all relevant Contractors shall inspect and keep records of inspections of the construction plant used on site. Only authorised/competent persons are to use machinery under proper supervision. Appropriate PPE and clothing must be provided and maintained in good condition at all times.

2.5.2 Pressure Equipment Regulations and Gas Bottles

The Principal Contractor and all relevant Contractors shall comply with the Vessels under Pressure Regulations, including:

- Providing competency and awareness training to the operators;
- Providing PPE or clothing;
- Inspect equipment regularly and keep records of inspections;
- Providing appropriate fire fighting equipment (Fire Extinguishers) on hand.

2.5.3 Fire Extinguishers and Fire Fighting Equipment

The Principal Contractor and relevant Contractors shall provide adequate, regularly serviced fire fighting equipment located at strategic points on site, specific to the classes of fire likely to occur. The appropriate notices and signs must be posted up as required.

2.5.4 Hired Plant and Machinery

The Principal Contractor shall ensure that any hired plant and machinery used on site is safe for use. The necessary requirements as stipulated by the OHS Act 85/1993 and Construction Regulations (2014) shall apply. The Principal Contractor shall ensure that operators hired with machinery are competent and that certificates are kept on site in the health & safety file. All relevant Contractors must ensure the same.

2.5.5 Scaffolding / Working at Heights

Working at heights includes any work that takes place in an elevated position. The Contractor must submit a risk-specific fall prevention plan in accordance with the Construction Regulations (2014) before this work is undertaken. The fall prevention plan must be approved by the Client before work may commence, and a permit to operate will be issued.

2.5.6 Formwork and Support work for Structures

The Principal Contractor shall ensure that the provisions of section 10 of the Construction Regulations (2014) are adhered to. These provisions must include but not be limited to ensuring that all equipment used is examined for suitability before use; that all formwork and support work is inspected by a competent person immediately before, during and after placement of concrete or any other imposed load and thereafter on a daily basis until the formwork and support work has been removed. Records of all inspections must be kept in a register on site.

2.5.7 Lifting Machines and Tackle

The Principal Contractor and all Contractors shall ensure that lifting machinery and tackle is inspected before use and thereafter in accordance with the Driven Machinery Regulations and the Construction Regulations (section 22). There must be a competent lifting machinery and tackle inspector who must inspect the equipment daily or before use, taking into account that:

- All lifting machinery and tackle has a safe working load clearly indicated;
- Regular inspection and servicing is carried out;
- Records are kept of inspections and of service certificates;
- There is proper supervision in terms of guiding the loads that includes a trained banksman to direct lifting operations and check lifting tackle;
- The tower crane bases have been approved by an engineer;

- The operators are competent as well as physically and psychologically fit to work and in possession of a medical certificate of fitness to be available on site.

2.5.8 Ladders and Ladder Work

The Principal Contractor shall ensure that all ladders are inspected monthly, are in good safe working order, are the correct height for the task, extend at least 1m above the landing, fastened and secured, and at a safe angle. Records of inspections must be kept in a register on site. Contractors using their own ladders must ensure the same.

2.5.9 General Machinery

The Principal Contractor and relevant Contractors shall ensure compliance with the Driven Machinery Regulations, which include inspecting machinery regularly, appointing a competent person to inspect and ensure maintenance, issuing PPE or clothing, and training those who use machinery

2.5.10 Portable Electrical Tools and Explosive Powered Tools

The Contractor shall ensure that use and storage of all explosive powered tools and portable electrical tools are in compliance with relevant legislation. The Contractor shall ensure that all electrical tools, electrical distribution boards, extension leads, and plugs are kept in safe working order. Regular inspections and toolbox talks must be conducted to make workers aware of the dangers and control measures to be implemented e.g. personal protection equipment, guards, etc.
The Contractor shall consider the following:

- A competent person undertakes routine inspections and records are kept;
- Only authorised trained persons use the tools;
- The safe working procedures apply;
- Awareness training is carried out and compliance is enforced at all times; and
- PPE and clothing is provided and maintained.
- A register indicating the issue and return of all explosive round;
- Signs to be posted up in the areas where explosive powered tools are being used.

2.5.11 High Voltage Electrical Equipment

No high voltage electrical equipment is present on, under or above the construction area.

2.5.12 Public and Site Visitor Health & Safety

The Principal Contractor shall ensure that every person working on or visiting the site, as well as the public in general, shall be made aware of the dangers likely to arise from site activities, including the precautions to be taken to avoid or minimise those dangers. Appropriate health and safety notices and signs shall be posted up, but shall not be the only measure taken.

Both the Client and the Principal Contractor have a duty in terms of the OHS Act 85/1993 to do all that is reasonably practicable to prevent members of the public and site visitors from being affected by the construction activities.

Site visitors must be briefed on the hazards and risks they may be exposed to and what measures are in place or should be taken to control these hazards and risks. A record of these ‘inductions’ must be kept on site in accordance with the Construction Regulations.

2.5.13 Night Work

The Principal Contractor must ensure that adequate lighting is provided to allow for work to be carried out safely.

2.5.14 Transport of Workers

The Principal Contractor and other Contractors shall not:

- Transport persons together with goods or tools unless there is an appropriate area or section to store them;

- Transport persons in a non-enclosed vehicle, e.g. truck; there must be a proper canopy (properly covering the back and top) with suitable sitting area. Workers shall not be permitted to stand or sit at the edge of the transporting vehicle.
- Transport workers in bakkies unless they are closed/covered and have the correct number of seats for the passengers.

2.6 Occupational Health

2.6.1 Occupational Hygiene

Exposure of workers to occupational health hazards and risks is very common in any work environment, especially in construction. Occupational exposure is a major problem and all Contractors must ensure that proper health and hygiene measures are put in place to prevent exposure to these hazards. Prevent inhalation, ingestion, absorption, and noise induction. Site-specific health risks are tabled in Annexure C e.g. cement dust, wet cement, wood-dust, noise, etc.

2.6.2 Welfare Facilities

The Principal Contractor must supply Sufficient toilets (1 toilet per 30 workers), showers (1 for every 15 workers), changing facilities, hand washing facilities, soap, toilet paper, and hand drying material must be provided. Waste bins must be strategically placed and emptied regularly. Safe, clean storage areas must be provided for workers to store personal belongings and personal protective equipment. Workers should not be exposed to hazardous materials/substances while eating and must be provided with sheltered eating areas.

2.6.3 Alcohol and other Drugs

No alcohol and other drugs will be allowed on site. No person may be under the influence of alcohol or any other drugs while on the construction site. Any person on prescription drugs must inform his/her superior, who shall in turn report this to the Principal Contractor forthwith. Any person suffering from any illness/condition that may have a negative effect on his/her safety performance must report this to his/her superior, who shall in turn report this to the Principal Contractor forthwith. Any person suspected of being under the influence of alcohol or other drugs must be sent home immediately, to report back the next day for a preliminary inquiry. A full disciplinary procedure must be followed by the Contractor concerned and a copy of the disciplinary action must be forwarded to the Principal Contractor for his records.

Project name:
Date:

PRE-CONSTRUCTION HEALTH AND SAFETY SPECIFICATION (HSS)
Project:

ANNEXURE A

The Principal Contractor and Contractors must submit proof of compliance with Annexure A with the construction phase H&S plan where applicable.

HSS Item No.	Requirement	OHSA Requirement	Submission Date
2.3.1	Notification of Intention to Commence Construction / Building Work	Complete Schedule 1 (Construction Regulations)	Before commencement on site
2.3.2	Assignment of Responsible Person to Supervise Construction Work	All relevant appointments, as per OHS Act and Construction Regs.	Before commencement on site
2.3.3	Competence of Responsible Persons	Client Requirement & OHS Act	Together with H&S plan
2.3.4	Compensation of Occupational Injuries and Diseases Act (COIDA) 130 of 1993	COIDA Requirement	Together with H&S plan
2.3.5	Occupational Health and Safety Policy	OHS Act	Together with H&S plan
2.3.6	Health and Safety Organogram	Client Requirement	Together with H&S plan
2.3.7	Initial Hazard Identification and Risk Assessment based on the Client's assessment	Construction Regs.	Together with H&S plan
2.3.8	Health and Safety Representative	OHS Act	Submit as soon as there are more than 20 employees on site
	Other		

ANNEXURE B

The Principal Contractor shall make the following appointments according to the initial risk assessment: (further appointments could become necessary as project progresses)

Appointment	OHSA Reference	Requirement
CEO Assignee	Section 16(2)	A competent person to assist with the on-site H&S overall responsibility – Contractor's Responsible Person
Construction Work Supervisor	CR 8.7	A competent person to supervise and be responsible of Health & Safety related issues on site. The person is appointed to assist the CEO with his/ her overall duties.
Subordinate Construction Work Supervisors	CR 8.8	A competent person to assist with daily supervision of construction / building work. The person assists the Construction Work Supervisor.
Health & Safety Representative(s)	Section 17	A competent person(s) to inspect H&S in reference to plant, machinery and Health & Safety of persons in the workplace.
Health & Safety Committee Member(s)	Section 19	A competent person(s) representing the employer to assist with the onsite Health & Safety matters.
Incident Investigator	GAR 8	A competent person to investigate incidents / accidents on site and could be: • The employer • H&S Representative • Designated person • Member of the H&S Committee
Risk assessment co-ordinator	CR 9	A competent person to co-ordinate all risk assessments on behalf of the Principal Contractor. The same applies to Contractors.
Fall protection plan co-ordinator	CR 10	A competent person to prepare & amend the fall protection plan.
First Aiders	GSR 3	A qualified person to address all on site first aid cases.
Machinery Inspector	GSR 2.1	A competent person to supervise machinery.
Lifting machine & equipment inspector	DMR 18	A competent person to inspect lifting machines, equipment & tackle.
Scaffolding Inspector	SABS 085	A competent person to inspect scaffolding before use and every time after bad weather, etc.
Scaffolding erector	GSR 13D	A competent person to erect scaffolding.
Scaffolding supervisor	SABS 085	A competent person to supervise scaffolding.
Formwork & support work inspector	CR 12	A competent person to inspect formwork & support work.

Excavation Inspector	CR 13	A competent person to inspect excavation work and ensure that approved safe working procedures. Are followed at all times.
Ladder Inspector	GSR 13A	A competent person to inspect ladders daily and ensure they are safe for use, keeping monthly record.
Stacking Supervisor	CR 28	A competent person to supervise all stacking and storage operations.
Explosive powered tools inspector/supervisor	CR 21	A competent person to inspect & clean the tool daily and controlling all operations thereof.
Temporary electrical installations supervisor	CR 24	A competent person to control all temporary electrical installations.
Fire-fighting equipment inspector	CR 29	A competent person to inspect fire-fighting equipment.

OTHER REQUIREMENTS
Project:

ANNEXURE C

The Principal Contractor shall comply but not be limited to the following requirements: report on these to the Client at progress meetings or at least monthly whichever is sooner.

What	When	Output	Accepted by Client & date
Induction training	Every worker before he/she starts work.	Attendance registers	
Awareness Training (Tool Box Talks)	At least weekly	Attendance registers	
Health & Safety Reports	Monthly	Report covering: • Incidents / accidents and investigations • Non-conformances by employees & contractors • Internal & External H&S audit reports	
Emergency procedures	Ongoing evaluation of procedure	Table procedure in writing as well as tel. numbers	
Risk assessment	Updated and signed off at least monthly	Documented risk assessment	
Safe work procedures	Drawn up before workers are exposed to new risks	Documented set of safe work procedures (method statements), updated and signed off.	
General Inspections	Weekly & daily	Report OHS Act compliance: • Scaffolding • Excavations • Formwork & support work • Explosive tools	
General Inspections	Monthly	• Firefighting equipment • Portable electrical equipment • Ladders • Lifting equipment/slings	
List of contractors	List to be updated weekly	Table list, number of workers and Company tel. numbers	
Workman's Compensation	Ongoing	Table a list of Contractors' workman's compensation proof of good standing.	
Construction site rules & Section 37.2 Manadatary Agreement	Ongoing	Table a report of all signed up Mandataries.	

C 1.4 CONTRACTOR'S HEALTH AND SAFETY DECLARATION

In terms of Clause 5 (h) of the OHSA 1993 Construction Regulations 2014 (referred to as "the Regulations" hereafter), a Contractor may only be appointed to perform construction work if the Employer is satisfied that the Contractor has the necessary competencies and resources to carry out the work safety in accordance with the Occupational Health and Safety Act No 85 of 1993 and the OHSA 1993 Construction Regulations 2014

To that effect a person duly authorised by the Tenderer must complete and sign the declaration hereafter in detail.

Declaration by Tenderer

1. I the undersigned hereby declare and confirm that I am fully conversant with the Occupational Health and Safety Act No 85 of 1993 (as amended by the Occupational Health and Safety Amendment Act No181 of 1993), and the OHSA 1993 Construction Regulations 2014.
2. I hereby declare that my company has the competence and the necessary resources to safely carry out the construction work under this contract in compliance with the Construction Regulations and the Employer's Health and Safety Specifications.
3. I propose to achieve compliance with the Regulations by one of the following:

a) From my own competent resources as detailed in 4(a) hereafter: ……*__Yes/No__

b) From my own resources still to be appointed or trained until competency is achieved, as detailed in 4(b) hereafter: ……. __*Yes/No__

c) From outside sources by appointment of competent specialist subcontractors as detailed in 3(c) hereafter: …… __*Yes/No__

(*= delete whatever is not applicable)

4. Details of resources I propose:
   (Note: Competent resources shall include safety personnel such as a construction supervisor and construction safety officer as defined in Regulation 8, and competent persons as defined in the OHSA 1993 Construction Regulations 2014, as applicable to this contract)

a) Details of the competent and qualified key persons from my company's own resources, who will form part or the contract team:

NAMES OF COMPETENT PERSONS	POSITIONS TO BE FILLED BY COMPETENT PERSONS

b) Detail of training of persons from my company's own resources (or to be hired) who still have to be trained to achieve the necessary competency:

(i) By whom will training be provided?……

(ii) When will training be undertaken? .....

(iii) List the positions to be filled by persons to be trained or hired: ……

……
……

(c) Details of competent resources to be appointed as subcontractors if competent persons cannot be supplied from own company:

Name of proposed subcontractors:

……
……
……

5. I hereby undertake, if my tender is accepted, before commencement of the works under the contract, a suitable and sufficiently documented Health and Safety Plan in accordance with Regulation 7(1) of the Construction Regulations, which plan shall be subject to approval by the Employer.

6. I confirm that copies of my company's approved Health and safety plan, the employer's safety specifications as well as the OHSA 1993 Construction Regulations 2014 will be provided on site and will at all times be available for inspection by the contractor's personnel, the Employer's personnel, the Engineer, Visitors, and officials and inspectors of the Department of Labour.

7. I hereby confirm that adequate provision has been made in my tendered rates and prices in the schedule of quantities to cover the cost of all resources, action, training and all health and safety measures envisaged in the OHSA 1993 Construction Regulations (Regulation 33) for failure on the Contractor's part to comply with the provisions of the Act and the Regulations.

8. I agree that my failure to complete and execute this declaration to the satisfaction of the employer will mean that I am unable to comply with the requirements of the OHSA 1993 Construction Regulations 2014 and accept that my tender will be prejudiced and may be rejected at the discretion of the Employer.

SIGNATURE: …… DATE: ……

(Of person authorised to sign on behalf of the Tenderer)

C.1.5 RESERVE RULES FOR CONTRACTORS

1. No person may leave or enter the Protected Area after set Gate closing hours without authorisation from the Officer in Charger or responsible Park Manager (OIC) of the Protected Area. The Gate opening and closing times may be seasonal and must be strictly adhered to.

2. No person may enter or exit the Protected Area except through an agreed designated point but, irrespective of whether or not a designated point is used the person will be bound by these Rules.

3. Should the Contractor wish to enter the Protected Area for business purposes after hours, this must be pre-arranged with the OIC of the Protected Area and the necessary authority obtained in advance. There shall be no after-hours access for private purposes.

4. Night driving in the Protected Area is prohibited unless on official business with appropriate prior authority from the OIC of the Protected Area.

5. No vehicle may leave the designated roads without the express permission of the OIC of the Protected Area.

6. Access to the Protected Area and construction sites within the Protected Area shall be by official work vehicles. No children shall be permitted entry to the construction areas.

7. All construction related activities must be conducted in accordance with the Reserve Rules, applicable legislation and the care due to a Protected Area.

8. All Reserve Rules must be adhered to by contractors, subcontractors and staff (this includes behaviour, disturbance and access). The lead contractor will be held responsible for subcontractors and their staff, although this does not prevent legal action being taken directly against the perpetrators.

9. Staff and subcontractors may be refused entrance from the Protected Area should they fail to comply with the EMPr, Reserve Rules or relevant legislation.

10. The principle of Minimum Tools applies within Protected Areas, both during construction work and rehabilitation work. Essentially this requires that the tools used are those that have the least impact on the environment. The contractor must designate a list of materials and tools/equipment/machinery/vehicles to Ezemvelo prior to starting work on site.

11. It must be clearly understood that the National Road Traffic Act applies to the Protected Area roads and will be enforced where necessary, in particular:
    - Non-licensed drivers will not be tolerated.
    - No person shall enter, drive or operate in the Protected Area, a motor vehicle that is not lawfully registered and licensed, in terms of the National Road Traffic Act (NRTA).

12. No person shall enter with or operate any vehicle other than a vehicle that conforms to the dimensions and other requirements prescribed by Ezemvelo. Special permission is required for construction type vehicles and the route to be followed may be specified in order to protect roads or avoid disturbance to visitors or particular species.

13. Drive, park or stop in such a manner that it constitutes a nuisance, disturbance, inconvenience or danger to any other person, causes an obstruction, blocks the pathway of an emergency vehicle or causes damages of any kind including damage to plants.

14. Tourists have right of way and every effort should be made not to inconvenience them by inconsiderate driving or speeding. Tourists reporting such incidents will have their complaints fully investigated and offenders will be held accountable.

15. The maximum speed limit in the Reserve is 40 km/h unless indicated as a slower speed.

16. No-one is permitted to damage or potentially damage any road or property within the Protected Area without prior permission from the OIC of the Protected Area.

17. No one may damage, hurt or endanger any animal, human being, plant or property of Ezemvelo KZN Wildlife. No animal or plant may be disturbed, removed or harmed. No rocks may be defaced. It is forbidden to feed the animals.

18. Any person who causes any damage to any property within the Protected Area or to any animal or plant in the Protected Area shall be liable for the costs or repair or replacement of such property or the costs of treatment of such animal or plant. In addition the offending person may be prosecuted.

19. Littering and pollution is prohibited. No person may discard any article, including cigarette ends, or refuse of whatever nature, except in receptacles and containers provided specifically for this purpose. All other refuse or litter must be kept and removed from the Protected Area.

20. Designated toilets must be provided and only these may be used for ablutions.

21. No one may discard any burning object in any place where it may set fire to any other object or otherwise act in a manner likely to cause a fire other than where the making of a fire is specifically permitted. No open fires are permitted and the use of gas must be by prior arrangement with the OIC of the Protected Area.

22. No firearms will be permitted into the Protected Area. Any person wishing to bring a firearm into the Protected Area or construction site must make prior arrangement with the OIC of the Protected Area.

23. No animals are to be brought to site or into the Protected Area. No pets are permitted.

24. The consumption of alcohol is prohibited in all areas except booked accommodation and the designated, demarcated contractor's accommodation units.

25. Advertising or trading within the Protected Area is not allowed.

26. Any person to whom special permission of any nature whatsoever may be granted to enter into or reside in the Protected Area shall, in addition to the provisions of the Act, the regulations and these rules, observe all instructions which the OIC may deem fit to issue in connection with such permission.

27. Noise levels are to be kept to approved limits. Machinery must use appropriate silencers and must be well maintained to reduce pollution.

28. Night lighting must be appropriate and directed towards the construction works.

29. No person shall stay or overnight in any part of the Protected Area at any place other than a resort or any other place designated by the Authority for such stay.

30. Overnight security must be with the prior arrangement with the OIC of the Protected Area.

31. Contractors and their staff and sub-contractors must remain within the designated construction sites and access routes at all times.

32. No person shall fail to comply with a lawful instruction issued by the Authority or an officer while inside the Protected Area.

33. Any person who persists in causing a nuisance to any other user of the Protected Area or who persists in disregarding the applicable regulations, rules, notices or lawful instructions of an officer may be required to leave the Protected Area and may be prohibited from re-entering the Protected Area.

Part C2: Pricing data

C2.1 Pricing Instructions

1. The Bills of Quantities have been drawn up in accordance with the Standard System of Measuring Building Work (as amended) published and issued by the Association of South African Quantity Surveyors (Seventh Edition (Revised)), 2015. Where applicable the:

a. Civil engineering work has been drawn up in accordance with the provisions of the latest edition of SANS 1200 Standardized Specifications for Civil Engineering Works.

b. Mechanical work has been drawn up in accordance with the provisions of the Model Bills of Quantities for Mechanical Work, published by the South African Association of Quantity Surveyors, July 2005).

c. Electrical work has been drawn up in accordance with the provisions of the Model Bills of Quantities or Electrical Work, published by the South African Association of Quantity Surveyors, (July, 2005).

2. The agreement is based on the SAICE GCC 2015 3rd Edition

3. Preliminary and general requirements are based on the various parts of SANS 1921, Construction and management requirements for works contracts. The additions, deletions and alterations to the various parts of SANS 1921 as well as the contract specific variables are as stated in the Specification Data in the Scope of Work. Only the headings and clause numbers for which allowance must be made in the Bills of Quantities are recited.

4. It will be assumed that prices included in the Bills of Quantities are based on Acts, Ordinances, Regulations, By-laws, International Standards and National Standards that were published 28 days before the closing date for tenders. (Refer to www.stanza.org.za or www.iso.org for information on standards).

5. The prices and rates in these Bills of Quantities are fully inclusive prices for the work described under the items.

6. Such prices and rates cover all costs and expenses that may be required in and for the execution of the work described in accordance with the provisions of the Scope of Work, and shall cover the cost of all general risks, liabilities, and obligations set forth or implied in the Contract Data, as well as overhead charges and profit. These prices will be used as a basis for assessment of payment for additional work that may have to be carried out.

7. 3 sets of drawings and 1 copy of the Bills of Quantities will be provided to the contractor during the site handover meeting.

8. Reference to any particular trademark, name, patent, design, type, specific origin or producer is purely to establish a standard for requirements. Products or articles of an equivalent standard may be substituted.

Except materials indicated on Addendum C2.1.1 – Material specifications.

9. The rates contained in the Bill of Quantities will apply irrespective of the final quantities of the different classes and kinds of work actually executed.

10. Rates for work of similar description occurring in different sections of the Bill of Quantity shall be identical.

11. An item against which no price is entered will be considered to be covered by the other prices or rates in the Bills of Quantities. A single lump sum will apply should a number of items be grouped together for pricing purposes.

12. Where any item is not relevant to this specific contract, such item is marked N/A (signifying “not applicable”)

13. The Contract Data and the standard form of contract referenced therein must be studied for the full extent and meaning of each and every clause set out in Section 1 (Preliminaries) of the Bills of Quantities.

14. The Bills of Quantities is not intended for the ordering of materials. Any ordering of materials, based on the Bills of Quantities, is at the Contractor's risk.

15. The amount of the Preliminaries to be included in each monthly payment certificate shall be assessed as an amount prorated to the value of the work duly executed in the same ratio as the preliminaries bears to the total of prices excluding any contingency sum, the amount for the Preliminaries and any amount in respect of contract price adjustment provided for in the contract.

16. Where the initial contract period is extended, the monthly charge shall be calculated on the basis as set out in 10 but taking into account the revised period for completing the works.

17. The amount or items of the Preliminaries shall be adjusted to take account of the theoretical financial effect which changes in time or value (or both) have on this section. Such adjustments shall be based on adjustments in the following categories as recorded in the Bills of Quantities:

    a. an amount which is not to be varied, namely Fixed (F)

    b. an amount which is to be varied in proportion to the contract value, namely Value Related (V); and

    c. an amount which is to be varied in proportion to the contract period as compared to the initial construction period excluding revisions to the construction period for which no adjustment to the contractor is not entitled to in terms of the contract, namely Time Related (T).

18. Where no provision is made in the Bills of Quantities to indicate which of the three categories in 12 apply or where no selection is made, the adjustments shall be based on the following breakdown:

    a. 10 percent is Fixed;

    b. 15 percent is Value Related

    c. 75 percent is Time Related.

19. The adjustment of the Preliminaries shall apply notwithstanding the actual employment of resources in the execution of the works. The contract value used for the adjustment of the Preliminaries shall exclude any contingency sum, the amount for the Preliminaries and any amount in respect of contract price adjustment provided for in the contract. Adjustments in respect of any staged or sectional completion shall be prorated to the value of each section.

BILL NO. 1,1					
PRELIMINARY AND GENERAL					
	NOTES	UNIT	QUANTITY	RATE	AMOUNT
i)	The agreement is to be the General Conditions of Contract for Works of Civil Engineering Construction (2015) (Third Edition), published by the S.A. Institution of Civil Engineering				
ii)	The Preliminaries are to be the Construction and management requirements for works contracts - Part 1: General engineering and construction works (SANS 1921-1: 2004 Edition 1) prepared by Standards South Africa and shall be deemed to be incorporated herein.				
iii)	Tenderers are referred to the abovementioned documents for the full intent and meaning of each clause thereof (hereinafter referred to by heading and clause number only) for which such allowance must be made as may be considered necessary.				
iv)	Where standard clauses or alternatives are not entirely applicable to this contract such modifications, corrections or supplements as will apply are given under each relevant clause heading.				
v)	Where any item is not relevant to this specific contract such item is marked N/A (signifying "not applicable").				
vi)	Adjustment of the preliminaries: each item priced, is to be allocated to one or more of the three categories, where "F" denotes a fixed amount (amount not to be varied), "V" denotes an amount variable in proportion to value and "T" denotes an amount in proportion to time.				
vii)	Time (T) related Preliminaries will only be adjusted for omissions or additions, issued by the Employer, or delays caused by the Employer, for which variation and extension of time has been granted.				
	SECTION A: GENERAL CONDITIONS OF CONTRACT				
A1	General (clause 1) F:..... V:..... T:.....	Item			
A2	Basis of Contract (clause 2) F:..... V:..... T:.....	Item			
A3	Employer's Agent (clause 3) F:..... V:..... T:.....	Item			
A4	Contractor's General Obligation (clause 4) F:..... V:..... T:.....	Item			
	Carried forward to collection			**R**	

BILL NO. 1,1					
PRELIMINARY AND GENERAL					
	NOTES	UNIT	QUANTITY	RATE	AMOUNT
A5	Time and Related Matters (clause 5) - As referred to in the Contract Data under Special Condition of Contract. The Contract Period shall be deemed to include all Non – Working Days, Special Non – Working Days and the year-end Builders Annual Industry Holiday Periods. F:..... V:..... T:.....	Item			
A6	Payment and Related Matters (clause 6) F:..... V:..... T:.....	Item			
A7	Quality and Related Matters (clause 7) F:..... V:..... T:.....	Item			
A8	Risks and Related Matters (clause 8) F:..... V:..... T:.....	Item			
A9	Termination of Contract (clause 9) F:..... V:..... T:.....	Item			
A10	Claims and Disputes (clause 10) F:..... V:..... T:.....	Item			
	SECTION B: SANS 1921-1:2004 (Edition 1): CONSTRUCTION AND MANAGEMENT REQUIREMENTS FOR WORKS CONTRACTS: PART 1 **Refer to the SCOPE OF WORK for detail requirements:**				
B1	Scope F:..... V:..... T:.....	Item			
B2	Normative references F:..... V:..... T:.....	Item			
B3	Definitions F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

BILL NO. 1,1					
PRELIMINARY AND GENERAL					
	NOTES	UNIT	QUANTITY	RATE	AMOUNT
B4	**Requirements for construction and management** F:..... V:..... T:.....	Item			
B4.1	General F:..... V:..... T:.....	Item			
B4.2	Responsibilities for design and construction F:..... V:..... T:.....	Item			
B4.3	Planning, programme and method statements F:..... V:..... T:.....	Item			
B4.4	Quality assurance F:..... V:..... T:.....	Item			
B4.5	Setting out F:..... V:..... T:.....	Item			
B4.6	Management and disposal of water F:..... V:..... T:.....	Item			
B4.7	Blasting F:..... V:..... T:.....	Item			
B4.8	Works adjacent to services and structures F:..... V:..... T:.....	Item			
B4.9	Management of the Works and site F:..... V:..... T:.....	Item			
B4.10	Earthworks F:..... V:..... T:.....	Item			
B4.11	Testing F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
B4.12	Materials, samples and fabrication drawings F:..... V:..... T:.....	Item			
B4.13	Equipment F:..... V:..... T:.....	Item			
B4.14	Site establishment F:..... V:..... T:.....	Item			
B4.15	Survey control F:..... V:..... T:.....	Item			
B4.16	Temporary works F:..... V:..... T:.....	Item			
B4.17	Existing services F:..... V:..... T:.....	Item			
B4.18	Health and safety F:..... V:..... T:.....	Item			
B4.19	Environmental requirements F:..... V:..... T:.....	Item			
B4.20	Alterations, additions, extensions and modifications to existing works F:..... V:..... T:.....	Item			
B4.21	Inspection of adjoining structures, services, buildings and property F:..... V:..... T:.....	Item			
B4.22	Attendance on nominated and selected subcontractors F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	SECTION C: SCOPE OF WORK in accordance with SANS 10403 *(The reference to Clauses refer to Table B.1 of SANS 1921-1:2004)*				
C1	Certification by recognised bodies - CLAUSE 4.4 F:..... V:..... T:.....	Item			
C2	Agrément certificates - CLAUSE 4.5 F:..... V:..... T:.....	Item			
C3	Other services and facilities - CLAUSE 4.8 F:..... V:..... T:.....	Item			
C4	Recording of weather - CLAUSE 5.2 F:..... V:..... T:.....	Item			
C5	Management meetings - CLAUSE 5.3 F:..... V:..... T:.....	Item			
C6	Daily records CLAUSE 5.6 F:..... V:..... T:.....	Item			
C7	Bond and guarantees - CLAUSE 5.7 F:..... V:..... T:.....	Item			
C8	Permits - CLAUSE 5.9 F:..... V:..... T:.....	Item			
C9	Proof of compliance with the law - CLAUSE 5.10 F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	SECTION D: SPECIFICATION DATA ASSOCIATED WITH SANS 1921-1:2004 (Table A.1)				
D1	Requirements for drawings, information and calculations for which the contractor is responsible CLAUSE 4.1.7 F:..... V:..... T:.....	Item			
D2	The responsibility strategy assigned to the contractor for the works CLAUSE 4.2.1 F:..... V:..... T:.....	Item			
D3	The planning, programme and method statements - CLAUSE 4.3 F:..... V:..... T:.....	Item			
D4	Samples of materials, workmanship and finishes - CLAUSE 4.12.1 F:..... V:..... T:.....	Item			
D5	Fabrication drawings that the contractor is to provide and deliver to the employer - CLAUSE 4.12.2 F:..... V:..... T:.....	Item			
D6	Office for the foreman CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
D7	Telephone - CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
D8	Office for inspector of works - CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
D9	Telephone in office for inspector of works - CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
D10	Sheds - CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
D11	Provision and erection of signboards - CLAUSE 4.14.6 F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
D12	Termination, diversion or maintenance of existing services - CLAUSE4.17.1 F:..... V:..... T:.....	Item			
D13	Services which are known to exist - CLAUSE 4.17.3 F:..... V:..... T:.....	Item			
D14	Detection apparatus - CLAUSE 4.17.4 F:..... V:..... T:.....	Item			
D15	Additional health and safety requirements - CLAUSE 4.18 F:..... V:..... T:.....	Item			
	SECTION E: SPECIFIC PRELIMINARIES Section E contains Specific Preliminary items which apply to this contract except where "N/A" (Not Applicable) appears against the item.				
E1	**PROPRIETARY BRANDED PRODUCTS** The contractor shall take delivery of, handle, store, use apply and/or fix all proprietary branded products in strict accordance with the manufacturers' instruction after consultation with the manufacturer's authorised representative. F:..... V:..... T:.....	Item			
E2	**OVERTIME** Should overtime be required to be worked for any reason whatsoever, the costs of such overtime are to be borne by the Contractor unless the Engineer/Principal Agent has specifically authorised in writing, prior to the execution thereof, that costs for such overtime are to be borne by the Employer. F:..... V:..... T:.....	Item			
E3	**AS BUILT DRAWINGS** The position of construction breaks and the extent of individual concrete pours are to be recorded by the Contractor on the Structural Engineer's drawings and are to be submitted to the Engineer/Principal Agent and the Structural Engineer for their records. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	SECTION E: SPECIFIC PRELIMINARIES	UNIT			
E4	**SITE INSTRUCTIONS** Site Instructions issued on site are to be recorded in triplicate in a Site Instruction book which is to be maintained on site by the Contractor. F:..... V:..... T:.....	Item			
E5	**LABOUR RECORD** At the end of each week the Contractor shall provide the Engineer/Principal Agent with a written record, in schedule form, reflecting the number and description of tradesmen and labourers employed by him and all sub-contractors on the works each day. F:..... V:..... T:..... *<u>Note</u>: In the event that the contractor fails to satisfy the requirements of this specification, the Employer may apply any of the sanctions provided in the contract. Sanctions may include the application of a financial penalty of .4% of the Contract Sum per calendar day of which the required report has not been submitted.*	Item			
E6	**PLANT RECORD** At the end of each week the Contractor shall provide the Engineer/Principal Agent with a written record, in schedule form, reflecting the number, type and capacity of all plant, excluding hand tools, currently used on the works. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
E7	**NON CESSION OF MONIES** The Contractor shall not cede nor assign his rights or claims to any monies due or to become due under this contract. F:..... V:..... T:.....	Item			
E8	**SECTIONAL COMPLETION** When it is required that the contract be executed in sections or portions, the tenderer shall allow for all costs in this regard as no claim for additional costs will be entertained. F:..... V:..... T:.....	Item			
E9	**LOCAL LABOUR** It is a general requirement of this contract that persons normally resident in the locality of the works (Local Labour) be given preference for employment on the contract. Provided, however, that should adequate and appropriate Labour not be available within the locality, others may be employed subject to satisfactory proof being provided that every reasonable endeavour has been made to employ Local Labour. F:..... V:..... T:.....	Item			
E10	**IMPORT PERMITS AND DUTIES** The responsibility for obtaining the necessary import permits shall rest with the successful Tenderer. No foreign exchange will be arranged or provided by the Administration. Tenderers are to allow in their tenders and pay the ordinary levy imposed on imported items in terms of item 196.10 of Part 8 of Schedule No. 1 of the Customs and Excise Act, 1964 with effect from 1 October 1989. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

BILL NO. 1,1

PRELIMINARY AND GENERAL

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
E11	**CONTRACT PRICE ADJUSTMENT PROVISIONS (CPAP)** Notwithstanding anything to the contrary contained in the GCC for Construction Works 2015 3rd Edition, this Contract shall only when the Construction Period exceeds 6 months and the Contract sum exceeds R1,000,000,00 be subject to the Contract Price Adjustment Provisions Indices Application Manual for use with P0151 indices (CPAP) (Revised 1 January 2018) as published by Statistics South Africa. Tenderers are advised that with reference to Clause 3.4.6 of the Contract Price Adjustment Provisions (CPAP) Indices Applications Manual, the Employer ***will not accept the submission by Tenderers of lists of additional items.*** Where this contract is a Lump Sum contract, the contract will be subject to Contract Price Adjustment Provisions (CPAP) only where the contract period equals or exceeds 6 calendar months. The applicable work group shall be WG 180 for domestic buildings or WG 181 for commercial and industrial buildings. F:..... V:..... T:.....	Item			
E12	**EPWP CONDITIONS AND SPECIFICATIONS** **12.1 EMPLOYMENT TARGETS** E12.1 a Employment Targets The contractor needs to provide a realistic estimate on the number of jobs that the project has the potential to create throughout the project duration as the project will be implemented using labour intensive construction methods on elements where it is No of jobs to be created = ……. *[Contractor to fill in an estimated number.* F:..... V:..... T:..... E12.1 b Employment requirements Tenderers are advised that this contract will be subject to the Expanded Public Works Program (EPWP) aimed at alleviating and reducing unemployment. Tenderers must allow for any costs for the employment of unskilled labour as per the requirements of the EPWP program;	Item			
	Carried forward to collection			R	

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	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	1. 55% of unskilled labour to be women 2. 55% of unskilled labour to be youth aged between 18 and 35 years 3. 2% of unskilled labour to be people living with disability 4. 100% Unskilled labour utilised must reside within the boundaries of the Municipality Ward where this contract is executed, with preference to the local community closest or at the walking distance to the contract site. Wherever possible local skilled tradesmen F:..... V:..... T:..... <u>E12.1 c Labour rate and payment intervals</u> The contractor should ensure that labour rate paid to unskilled local labour is commensurate to the daily task. When determining the rate, consideration should be given to that EPWP beneficiaries are mostly bread winners in their families, as the program Contractors should make endeavours to ensure that labourers, particularly unskilled are remunerated on fortnight basis and prior notification be made should there be a shortfall on their wages. The labour rate for local unskilled shall also be determined in consideration of the location of the project, i.e. for projects implemented in urbanized municipalities will not be the same as that for rural municipalities. F:..... V:..... T:.....	Item Item			
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	12.2 LABOUR INTENSIVE CONSTRUCTION METHOD E12.2 a Labour-Intensive Construction (LIC) method On site there must a person(s) having competency in managing and implementing LIC methods. *Foreman @ NQF Level 4 the Unit Standard on Implementing LIC methods on site. *Site Agent/ Managers @ NQF level 5 the Unit Standard on Manage Labour-Intensive Skills Programme both must be CETA accredited F:..... V:..... T:.....	Item			
	E12.2 b Labour Intensive Construction Method Those parts of the contract to be constructed using Labour Intensive methods will be marked in the BoQ with letter LI (indicating Labour Intensive) against every item so designated. Such works will only be constructed using method so indicated. Reference to be made to Guidelines for the implementation of Labour-Intensive Infrastructure projects under EPWP. "Scope of Work in Respect of Work Relating to the Expanded Public Works Programme (EPWP)" F:..... V:..... T:.....	Item			
	E12.3 RECORD KEEPING 12.3.1 Every employer must keep in the project site office the following minutes of site progress minutes; contractors' monthly site progress reports; accurately recorded attendance register; proof of payment as means to verify authenticity of data in th F:..... V:..... T:.....	Item			
	12.3.2 The employer must keep this record for a period of at least three (3) years after the completion of the project in his/her office as the project site office would have been relocated. This should be safely kept for job creation data verifications and periodical audits on projects conducted by National and Provincial Department of Public Works after one (1) or two (2) quarters of submitting captured EPWP Data to the National EPWP coor F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

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	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	At the end of each month as part of site progress report and to be attached to every contractor's progress payment certificate; the contractor shall provide the principal agent & Public Works with a written records, as per EPWP data form; which will be re F:..... V:..... T:.....	Item			
	E12.5 EPWP PROMOTION <u>12.5.1 EPWP signage board</u> EPWP Program at the project level shall always be promoted through have the projects signage board that embrace EPWP logo at the bottom, correct measurement for this signage board will be provided by the project leader during the site handing over meeting F:..... V:..... T:.....	Item			
	<u>12.5.2 Branding of labour apparel</u> Contractor & Sub-contractors' labourers shall be provided with EPWP branded Personal Protective Equipment (PPE), reflector vest with EPWP wording at the back is an ideal and cost effective means of promoting program on site. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	E12.6 COMMUNITY LIAISON OFFICER (CLO) UTILISATION OF A COMMUNITY LIAISON OFFICER In addition to the requirements of Clause E9, contained in this document; The Contractor shall allow for and pay any and all costs necessary for the engagement of the services of a Community Liaison Officer (CLO) for the full duration of this contract In the interest of providing a sound service to both the community and the Contractor, a CLO may only manage one project at a given time. A CLO will be identified by the local structures of the ward areas and appointed following fair and transparent interviewing process, to be conducted in the presence of local structures and the contractor representative, in order to assist the Contractor **Key Responsibilities of the CLO are envisaged to include and not necessary be limited to:** 1. Assisting local leadership in conducting skills and resources audit which facilitates sourcing labour from within the ward or targeted areas for employment, as required by contractor. 2. Assisting in sourcing labour-only domestic sub-contractors and the procurement of materials from local resources, as required by the contractor. 3. Assisting the contractor by identifying areas of potential conflict and or threats to the project or to stakeholders in the project and recommend appropriate action to the contractor. 4. Assisting contractor and stakeholders in the project in the resolution of any conflict which may arise. 5. Establishing and ensuring that sufficient and open communication channels between the contractor and the work force are maintained. 6. Establish and ensuring that efficient and open communication channels between the contractor and the community are maintained 7. Identifying and reporting to the Contractor regarding issues where communication between stakeholder is necessary, recommend courses of action and facilitate such communications				
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	8. Assisting the Contractor and the work force in the establishment of grievance procedures and necessary recommendation to the Contractor regarding the grievances and solution thereto. 9. Attending to site meetings and project implementation meetings as required by the Contractor and prepare periodic reports as may be required by the Contractor from time to time. 10. Attending to such other duties which are consistent with the functions of a CLO, as may be required by the Contractor from time to time. Tenderers are to price twice the rate of unskilled local labour rate against this item for any and all costs arising out of compliance with the foregoing and in the event of a Tenderer failing to price against this item or making inadequate financial prov F:..... V:..... T:.....	Item			
	E12.7 SKILLS DEVELOPMENT ON SITE Contractor in conforming to the object of EPWP that its beneficiaries need to be capacitated with skills that will render them employable in the future. It is then the responsibility of the Contractor that mandatory life skills are provided to 100% of wor Contractor should also make provision for the possibility that there might be local youth that will need to be placed on the project with an intention to be provided support towards improving their level of competency and productivity. Contractor shall also provide all necessary on-the-job training to targeted labour to enable such labour to master and advance on techniques required to undertake the work in accordance with requirements of the contract in a manner that does not compromis F:..... V:..... T:.....	Item			
	E12.8 LABOUR ONLY Subcontracting for local emerging enterprises Tenderer's are advised that this contract is subject to the Expanded Public Works Programme (EPWP) and the following criteria will apply:				
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PRELIMINARY AND GENERAL

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	<u>African Equity Ownership</u> a) The Tenderer is to allow for 5% of the total value of works to be undertaken by a Priority Population Group. This percentage excludes the costs of employing local unskilled labour. The allocation of this percentage from the Project, the screening b) The Priority Population Group consists of women, youth and disabled people. c) The Contractor is to give first option for prospective PPG's from the surrounding areas of the Project. Should there be insufficient suitable people fitting the criteria of PPG's, the Contractor may hire people from further afield. This is to be d d) A Mentor is to be employed by the Contractor, in consultation with the Department of Works for the purposes of quality control and liaison between the Contractor and the selected PPG's on site. The mentor will be responsible for ensuring an accept In so far as possible, the Contractor is encouraged to expand the PPG's skills, knowledge and performance levels. F:..... V:..... T:.....	Item			
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	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	TENDERER'S TO NOTE CONDITIONS a) The contract to be entered into between the Contractor and the PPG's will be a LABOUR ONLY sub-contract. b) The Contractor will be responsible for ensuring that all materials for use by the PPG's in the works are to be on site timeously. The Contractor shall liaise with The Mentor and PPG to determine the nature and extent of materials required and the lead c) The Contractor shall be responsible for the overall programming of the Works and he is to allow for monitoring the PPG's programme and progress. d) In conjunction with the Mentor, he is to allow for the supervision and mentoring (where necessary) of the PPG to ensure quality and adherence to standard building practice e) The Contractor is to allow for extra storage facilities on site for the PPG's tools and equipment. f) Basic tools shall be provided by the PPG's and where these are not available; the Contractor will supply him with the necessary tools and equipment and deduct the costs thereof from the interim claims made by the PPG. g) Work requiring specialized tools will be provided free of charge by the Contractor with the provision that these be returned upon completion of the Work. CO-ORDINATION The Contractor is to co-ordinate the work of all the PPG's, Sub-Contractors and Nominated Sub-Contractors appointed direct by the Employer in such a manner and at all times as will suit the building programme and he is to allow adequate access, for the P F:..... V:..... T:..... ATTENDANCE The Contractor may allow for attendance upon the PPG's concerned to execute the work. The Contractor is to allow the PPG's the use of any scaffolding belonging to him while it remains so erected on the site. Where scaffolding is necessary for the use by any PPG and the Contractor has not erected any for his own use or has removed same after his own use, the Contractor shall supply sufficient scaffolding to the PPG to be erected and dismantled by the PPG and r	Item			
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	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	This attendance upon PPG's to execute the work is to include for the scaffolding provisions as aforesaid and, in addition, is to include for co-operating to the fullest extent with all the parties, attending on off-loading materials, providing suitable st F:..... V:..... T:.....	Item			
	E12.9 EPWP CONTRACT FOR LABOUR It is compulsory that shortly after the contractor and or sub-contractor has appointed local labour, the employment contract should be signed by both parties, prior to commencement with works on site. The employment contract forms part of the Ministerial F:..... V:..... T:.....				
	E12.10 EPWP SCOPE of WORK **Note:** Contractors are to price any item on the Bill of Quantities having below, bearing in mind that they are regarded as main sources of job creation, whether sub contracted or undertaken by the main contractor. Elements on the scope of work where application of Labour Intensive Construction methods as will indicated with letters (LI) are regarded feasible are as follows; i) Excavating trenches for foundations and any other civil works with the depth not more than 1.5 m ii) All masonry works which include concrete mixing on site; brickwork; plastering; screed works; jointing; etc. iii) Painting, Plumbing, Ironmongery; roof cladding; glazing; tilling; carpentry; flooring; waterproofing; etc. F:..... V:..... T:..... **Note:** It is a general requirement of this contract that persons normally resident in the ward of the works (local labour) be given preference for employment on the contract. Provided, however, that should adequate and appropriate labour not be available within	Item			
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	NOTES	UNIT	QUANTITY	RATE	AMOUNT
	Payment for the labour-intensive component of the works Payment for works identified in the Scope of Work as being labour-intensive shall only be made in accordance with the provisions of the Contract if the works are constructed strictly in accordance with the provisions of the Scope of Work. Any non-payment for such works shall not relieve the Contractor in any way from his obligations either in contract or in delict. Linkage of payment for labour-intensive component of works to submission of project data The Contractor's payment invoices shall be accompanied by labour information for the corresponding period in a format specified by the employer. If the contractor chooses to delay submitting payment invoices, labour returns shall still be submitted as per frequency and timeframe stipulated by the Employer. The contractor's invoices shall not be paid until all pending labour information has been submitted. Applicable labour laws The current Ministerial Determination (also downloadable at www.epwp.gov.za) Expanded Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of Labour in Government Notice, shall apply to works described in the scope of work as being labour-intensive and which are undertaken by unskilled or semi-skilled workers. F:..... V:..... T:.....				
E13	**HIV/AIDS AWARENESS** Tenderers are to price against the following items for compliance with the SPECIFICATION FOR HIV/AIDS AWARENESS bound into this document (The clauses referred to are those of the Specification for HIV/AIDS)				
E13.1	Provide and maintain a condom dispenser in terms of Clause 5.1a) F:..... V:..... T:.....	Item			
E13.2	Provide and maintain HIV/AIDS awareness posters terms of Clause 5.1b) F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

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PRELIMINARY AND GENERAL

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
E13.3	HIV /Aids Awareness Programme on Site for not less than 90% of workers inclusive of all direct and indirect costs; Engage a qualified service provider as described in the scope of works to conduct an HIV Awareness Programme in terms of Clause 5.2.1a) F:..... V:..... T:.....	Item			
E13.4	Arrange for workers to attend the HIV Awareness Programme in terms of Clause 5.2.1b) F:..... V:..... T:.....	Item			
E13.5	**Reporting** Prepare and attach to claims for payment a brief report in terms of Clause 5.3 (see also HIV/STI Compliance Report included with this document). F:..... V:..... T:..... ***Note: In the event that the contractor fails to satisfy the requirements of this specification, the employer may apply any of the sanctions provided for in the contract. Sanctions may include the application of a financial penalty of 0.04% of the Contract Sum per calendar day of which the required reports has not been submitted.***	Item			
E14	**OCCUPATIONAL HEALTH AND SAFETY ACT NO. 85 OF 1993** Tenderers are to allow for costs in providing a project specific ' Construction Phase Safety, Health and Environmental Plan' in accordance with "Section 2 - Specification Data associated with SANS 1921-1:2004" clause C4.18 in "Part C3 - Scope of Work" F:..... V:..... T:.....	Item			
E15	**NOTICE BOARD, SITE OFFICE, ETC.** Bidders are to allow for the provision and removal of a project notice board and a site office in accordance with the Principal Agent's requirements. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

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PRELIMINARY AND GENERAL

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
E16	**IMPORTED MATERIALS AND EQUIPMENT** Where imported items are listed in the tender documents, the tenderer shall provide all information called for, failing which the price of any such item, material or equipment shall be excluded from currency fluctuations. (***Refer to T2.14 - Schedule of Imported Materials and Equipment***. F:..... V:..... T:.....	Item			
E17	**CONTRACT DOCUMENTS** The drawings issues with these Bid documents do not comprise the complete set but serves as a guide only for Biding purposes and for indicating the scope of works to enable the Bidder to acquaint him with the nature and extent of the works and the manner in which they are to be executed. Should any part of the drawings not be clearly legible to the Bidder he shall, before submitting his Bid, obtain clarification in writing from the principal agent. F:..... V:..... T:.....	Item			
E18	**GENERAL PREAMBLES** The Document Preambles will be the "ASAQS General Preambles for Trades – 2017" and shall be read in conjunction with the Bills of Quantities and be referred to for the full descriptions of work to be done and materials to be used. F:..... V:..... T:.....	Item			
E19	**TRADE NAMES** Wherever a Trade Name for any product has been described in the Bills of Quantities the Bidder's attention is drawn to the fact that any other product of equal quality may be used subject to the written approval of the Principal Agent being obtained prior to the closing date for submission of Bids. F:..... V:..... T:.....	Item			
E20	**EXISTING PREMISES OCCUPIED** Refer to Scope of Works Part C3 of this Bid Document for information on the occupation of existing buildings. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
E21	**INACCURATE AND DEFECTIVE WORK EXECUTED UNDER PREVIOUS CONTRACT** The contractor shall, after taking possession of the site and before commencing the work, check all levels, liners, profiles and the like and satisfy himself as to the dimensional accuracy of all work executed under the previous contract which may affect his work. Should any inaccurate or defective work be found, the contractor shall immediately notify the principal agent in writing requesting his instructions with regard thereto and afford every facility to those rectifying such inaccurate or defective work. F:..... V:..... T:.....	Item			
E22	**VIEWING THE SITE IN SECURITY AREAS** If the site is situated in a security area and the Bidder must arrange with the Authorities to obtain permission to enter the site for Bidding purposes. F:..... V:..... T:.....	Item			
E23	**COMMENCEMENT OF WORKS IN SECURITY AREAS** If the works falls within a security area, the contractor must arrange with the Authorities and give the necessary notices before commencement of the works. Should the contractor fail to make such arrangements, admission to the site may be refused and any additional costs will be for the contractor's account. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

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PRELIMINARY AND GENERAL

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
E24	**ENTRANCE PERMITS TO SECURITY AREAS** If the works fall within a security area, the contractor shall obtain entrance permits for his personnel and workmen entering the area and shall comply with all regulations and instructions which may be issued from time to time regarding the protection of persons and property under control of the Authority. F:..... V:..... T:.....	Item			
E25	**SECURITY CHECK OF PERSONNEL** The principal agent may require the contractor to have his personnel and workmen, or a certain number of them, security classified. In the event of the principal agent requesting the removal of a person or persons from the works for security reasons, the contractor shall do so forthwith and shall thereafter ensure that such person or persons are denied access to the works and the site and/or to any document or information relating to the works. F:..... V:..... T:.....	Item			
E26	**PROHIBITION ON TAKING PHOTOGRAPHS** In terms of article 119 of the Defence Act, 44 of 1957, it is prohibited to sketch or to take photographs of any military site or installation or any building or civil works thereon or to be in possession of a camera or other apparatus used for taking photographs, except when authorised thereto by or on behalf of the Minister. The same prohibition is also applicable to all Correctional Institutions in terms of article 44.1(e) of the Correctional Services Act 8 of 1959. F:..... V:..... T:.....	Item			
E27	Management of Water Water for Construction purposes must be obtained from alternative water sources (i.e. supply other than water that is produced and distributed by a regulated water service authority from a licenced water treatment works for human consumption), eg dams, rivers, boreholes, springs, rainwater harvesting, recycled sewerage water, etc. The alternative water source shall not be of an inferior quality / standard than that required for construction purposes. The client reserves the right through his agents to test such supplies or request certificates confirming the grade and nature of the water supply. Relevant knowledge of the respective area will be an advantage.				
	Carried forward to collection			R	

SECTION 1

SUMMARY – PRELIMINARY & GENERAL

Collection	**Page No.**	**Amount**	
	59	R	
	60	R	
	61	R	
	62	R	
	63	R	
	64	R	
	65	R	
	66	R	
	67	R	
	68	R	
	69	R	
	70	R	
	71	R	
	72	R	
	73	R	
	74	R	
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Section No. 1
Preliminary & General
Summary

SECTION 1

SUMMARY – PRELIMINARY & GENERAL

Collection	**Page No.**	**Amount**	
	75	R	
	76	R	
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	78	R	
	79	R	
	80	R	
	81	R	
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Section No. 1
Preliminary & General
Summary

		Tender	
	ELECTRICAL BILL NO. 1.2 **EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1** **ELECTRICAL INSTALLATION - LV NETWORK**	**Rate**	**Amount**
1	**LV NETWORK**		
	Existing Main Switchboard in LV room Electrical contractor to rewire,refurbish, neaten & test existing distribution board. The contractor is to make the existing electrical installation safe to obtain a certificate of compliance for the exisitng installation.		
A	Test the existing electrical installtion and provide detailed report indicating items to be repaired to ensure the certicate of compliance can be issued once repairs have been implemented **No. 1**		
	Existing SUB-DISTRIBUTION BOARDS Electrical contractor to rewire,refurbish, neaten & test existing distribution board. The contractor is to make the existing electrical installation safe to obtain a certificate of compliance for the exisitng installation.		
B	Test the existing electrical installtion and provide detailed report indicating items to be repaired to ensure the certicate of compliance can be issued once repairs have been implemented **No. 25**		
2	**SWITCHGEAR:**		
	Switchgear in existing switchboards Supply and install switchgear in existing switchboard/ kiosk. DP/SP/TP CB's to be of the normal thermal magnetic type with adjustable trip unit where applicable.		
A	650A/15kA TP MCb **No 1**		
B	400A/15kA TP MCb **No 1**		
C	250A/15kA TP MCb **No 2**		
D	150A/15kA SP MCb **No 2**		
E	100A/10kA TP MCb **No 5**		
F	80A/10kA TP MCb **No 8**		
G	60A/10kA SP MCb **No 8**		
3	**POWER QUALITY ANALYSIS**		
A	CONDUCT A POWER QUALITY ANALYSIS FOR A PERIOD OF 7 DAYS AT EACH DISTRIBUTION BOARD.THE ANALYSIS SHALL RECORD AND PROVIDE A DETAILED TEST REPORT INDICATING THE FOLLOWING CURRENT, CURRENT HARMONICS,KVA,KVAr,POWER FACTOR,KW **No. 15**		
	Carried to Collection	R	

				Tender	
				Rate	**Amount**
4	**TRACE EXISTING CABLES**				
A	TRACE ALL EXISTING CABLES EMINATING FROM MAIN LV PANEL AND TERMINATING AT DB'S LOCATED WITHIN QUEEN ELIZABETH PARK AND PROVIDE AS-BUILT DRAWING				
		Item	**1**		
5	**REPLACEMENT OF CEILING TILES**				
A	PROVISONAL SUM FOR REPLACMENT OF CEILING TILES				
		Sum	**1**	R 10 000,00	R 10 000,00
5	**SAFE DISPOSAL OF EXISTING LIGHT FITTINGS AND FLOURSCENT LAMPS**				
A	REMOVE ALL EXSITING LIGHT FITTINGS AND LAMPS FROM SITE AND DISPOSE OFF IN A SAFE REGULATED MANNER THEREAFTER PROVIDE CERTIFICATE TO PROVE THAT THE EQUIPMENT WAS DISPOSED OFF IN A SAFE MANNER				
		Item	**1**		
3	**LV CABLES:**				
	600/1000V grade PVCA + ECC (ARMORED) stranded copper cables laid in open, trench, drawn in sleeve or fixed to surface: Cable terminations to include glands, shrouds, lugs, connections,commissioning & Heat Shrinks. All cables & Heat Shrinks to be SABS approved.				
	120 mm² 4-core -				
I	Supply				
		m	**75**		
J	Install in sleeves and trench				
		m	**75**		
K	Terminate				
		No	**4**		
L	Join				
		No	**1**		
D	**70 mm² 4-core -**				
1	Supply				
		m	**50**		
2	Install in trench				
		m	**50**		
3	Terminate				
		No	**2**		
4	Join				
		No	**1**		
	Carried to Collection			R	

				Tender	
				Rate	**Amount**
5	**LV EARTH CABLES:**				
	600/1000V insulated & sheathed copper grade stranded copper cables laid in open, trench, drawn in sleeve or fixed to surface: Cable terminations to include glands, shrouds, lugs, connections,commissioning & Heat Shrinks. All cables & Heat Shrinks to be SABS approved.				
	50 mm²				
A	Supply	**m**	**75**		
B	Install in sleeves and trench	**m**	**75**		
C	Terminate	**No**	**4**		
D	Join	**No**	**1**		
	25 mm²				
A	Supply	**m**	**75**		
B	Install in sleeves and trench	**m**	**75**		
C	Terminate	**No**	**4**		
D	Join	**No**	**1**		
4	**TESTING:**				
A	Test each plug point and provide detailed report	**No**	**550**		
B	Test each light point and provide detailed report	**No**	**39**		
5	**EXISTING INSTALLATION:**				
A	Remove all redundant existing switchboards and any redundant cabling, wiring,electrical equipment,light fittings & plug points and handover back to department.	**Item**	**1**		
6	**TESTING AND COMMISSIONING :**				
A	Test and commission complete electrical distribution and cabling installation as specified. Including all electrical certificates of compliance	**Item**	**1**		
	Carried to Collection			R	

		Tender	
	ELECTRICAL BILL NO. 1.2 **EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1** **ELECTRICAL INSTALLATION - LV NETWORK** **COLLECTION**	**Rate**	**Amount**
		Page No	
	Total brought forward from page	54	
		55	
		56	
	Carried to Summary	**R**	

			Tender	
	ELECTRICAL BILL NO. 1.3 **EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1**		**Rate**	**Amount**
1	**WIREWAYS AND ACCESSORIES :** **Conduit -** Supply and install conduit placed in position for casting into concrete or screed, for building-in or chased into concrete or brickwork and for surface mounting in ceiling or other surfaces including bending, jointing draw boxes, couplings and saddles. All conduit and assessories to be SABS Approved. Metal conduit and assessories to be hot dip galvanized			
A	20 mm diameter galvanized metal	**m 0**		
B	20 mm diameter PVC	**m 11000**		
C	20 mm diameter flexi PVC	**m 150**		
D	25 mm diameter PVC	**m 250**		
	Conduit boxes - Supply and install round conduit boxes placed in position for casting into concrete, building or chased into brickwork, surface mounted or mounted flush in ceilings including locknut and bushes. Metal conduit and assessories to be hot dip galvanized			
E	50 mm deep metal for 20 diameter conduit	**No 0**		
F	50 mm deep PVC for 20 diameter conduit	**No 85**		
2	**CONDUCTORS AND CABLES:** Supply and install 600/1000V grade PVC insulated stranded copper conductors drawn in conduit, trunking or powerskirting. All conductors to be SABS Approved.			
	Conductors-			
A	2,5 mm²	**m 750**		
B	6 mm²	**m 350**		
	Earth wire -			
C	2,5 mm²	**m 925**		
D	6 mm²	**m 175**		
		Carried to Collection	R	

				Tender	
				Rate	Amount
3	**POWER SKIRTING - Galvanized metal, powder coated** 3 compartment 2 tier cover, powder coated galvanized steel, power skirting complete with end stops, duct dividers, elbows and all other required material. **Powerskirting with covers-**				
A	Supply	**m**	**150**		
B	Install	**m**	**150**		
	Bends-internal & External				
C	Supply	**No**	**25**		
D	Install	**No**	**25**		
	End caps-				
E	Supply	**No**	**45**		
F	Install	**No**	**45**		
4	**APPLIANCES :** Supply and install appliances complete with cover plates fixed in flush boxes, powerskirting or in surface boxes as applicable, complete with all accessories, fixings and labels. Boxes are measured separately. All applliances below to be SABS Approved. **Switched Sockets Outlets (SANS type) -**				
A	SANS 164-1 & SANS 164-2 Combination plug, 250 V, 16 A in flush 100x100x50 box - Type PP1	**No**	**120**		
C	SANS 164-1, 250 V, 16 A Plug in Metal Power Skirting power skirting - Type PP3	**No**	**350**		
D	SANS 164-2, 250 V, 16 A Plug in Metal Power Skirting power skirting - Type PP4	**No**	**250**		
E	SANS 164-4, 250 V, 16 A, Red Dedicated Plug in Metal Power Skirting power skirting - Type PP5	**No**	**350**		
	Un-switched Sockets Outlets (SANS type) - 6A, 250V, 3-pin SO in round PVC conduit outlet box	**No**	**1250**		
	Isolators-				
G	20A, 250V, DP in flush 100x100x50 box - Type 'Ip1'	**No**	**30**		
H	30A, 250V, DP in flush 100x100x50 box - Type 'Ip2'	**No**	**10**		
I	20A, 250V, TP in flush 100x100x50 box - Type 'Ip1'	**No**	**10**		
J	30A, 250V, TP in flush 100x100x50 box - Type 'Ip2'	**No**	**10**		
		Carried to Collection		R	

			Tender	
			Rate	Amount
	Light Switches (SANS type) -			
K	16A, 250V 1 lever, 1-way in surface 100x50x50 box	**No 370**		
L	16A, 250V 2 lever, 1-way in surface 100x50x50 box	**No 20**		
M	16A, 250V 3 lever, 1-way in surface 100x50x50 box	**No 35**		
5	**OCCUPANCY SENSORS -**			
	Motion detection sensors with high range detection (Minimum - 8 Meter Radius) and handle electrical load 2000w (LED fittings). Sensors to be Dual Technology type - PIR & Ultrasonic/Microwave with ajustable time delay up to 30 min. Installation to include all fixings, brackets, supports, connectors and wiring.			
A	Supply	**No 350**		
B	Install	**No 350**		
6	**LIGHT FITTINGS**			
	Light fittings installed over round boxes in brickwork or ceiling, fixed to surface including all fixings, brackets, supports, connectors, wiring, flexible cable, connections and installation of lamps as specified. All light fittings to be SABS Approved			
	Type 'D1'			
A	Supply	**No 16**		
B	Install (N.B. - IP integrity to be maintained)	**No 16**		
	Type 'E1'			
A	Supply	**No 10**		
B	Install (N.B. - IP integrity to be maintained)	**No 10**		
	Type 'F1'			
A	Supply	**No 35**		
B	Install (N.B. - IP integrity to be maintained)	**No 35**		
	Type 'B1'			
A	Supply	**No 109**		
B	Install (N.B. - IP integrity to be maintained)	**No 109**		
		Carried to Collection	R	

			Tender	
			Rate	**Amount**
	Type 'B2'			
A	Supply			
		No 20		
B	Install (N.B. - IP integrity to be maintained)			
		No 20		
	Type 'R1'			
A	Supply			
		No 129		
B	Install (N.B. - IP integrity to be maintained)			
		No 129		
	Type 'R2'			
A	Supply			
		No 15		
B	Install (N.B. - IP integrity to be maintained)			
		No 15		
	Type 'R3'			
A	Supply			
		No 39		
B	Install (N.B. - IP integrity to be maintained)			
		No 39		
	Type 'S1'			
A	Supply			
		No 587		
B	Install (N.B. - IP integrity to be maintained)			
		No 587		
	Type 'S2'			
A	Supply			
		No 120		
B	Install (N.B. - IP integrity to be maintained)			
		No 120		
	Type 'S3'			
A	Supply			
		No 20		
B	Install (N.B. - IP integrity to be maintained)			
		No 20		
	Type 'S4'			
A	Supply			
		No 67		
B	Install (N.B. - IP integrity to be maintained)			
		No 67		
		Carried to Collection	R	

			Tender	
			Rate	**Amount**
	Type 'S5'			
A	Supply			
		No 20		
B	Install (N.B. - IP integrity to be maintained)			
		No 20		
	Type 'S6'			
A	Supply			
		No 14		
B	Install (N.B. - IP integrity to be maintained)			
		No 14		
	Type 'S7'			
A	Supply			
		No 5		
B	Install (N.B. - IP integrity to be maintained)			
		No 5		
7	**EARTHING AND BONDING**			
A	Allow for earthing and bonding as required by the applicable Supply Authority and Regulations			
		Item 1		
8	**EXISTING INSTALLATION:**			
A	Remove and make safe all redundant existing switchboards and any redundant cabling, wiring,lighting,plugs and electrical equipment, cables and handover back to department.			
		Item 1		
9	**ATTIC STOCK**			
A	Contractor to allow for 10% of LIGHT FITTINGS as attic stock			
		Item 1		
10	**Labelling**			
A	Contractor to allow for labelling and waring signs for MAIN LV panel			
		Item 1		
11	**Provisional amount**			
A	provisional amount to be used at engineers discretion			
		Item 1	R 350 000,00	R 350 000,00
11	**Provisional amount for sub-station metal door**			
A	provisional amount to be used at engineers discretion			
		Item 1	R 45 000,00	R 45 000,00
		Carried to Collection	R	

		Tender	
	ELECTRICAL BILL NO. 1.3 **EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1** **ELECTRICAL INSTALLATION** **COLLECTION**	**Rate**	**Amount**
	Total brought forward from page	58	
		59	
		60	
		61	
		62	
	Carried to Summary	R	

				Tender	
	ELECTRICAL BILL NO. 1.4 **EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1** **FIRE DETECTION**			**Rate**	**Amount**
	FIRE DETECTION AND ALARM SYSTEM:				
	Complete Fire Detection and Alarm (FDA) installation including all equipment and materials as indicated.				
	Fire Detection and Alarm Control Panels -				
A	Main indication panel, in existing building complete with all accessories.				
1	Supply	**No**	**1**		
2	Install	**No**	**1**		
B	Local Control Panel, in existing building complete with all accessories.				
1	Supply	**No**	**12**		
2	Install	**No**	**12**		
C	RS 485 PH Cabling	**m**	**1 500**		
D	Interface between control panels	**Item**	**13**		
E	Network Communication Cards to mimic panels				
1	Supply	**No**	**13**		
2	Install	**No**	**13**		
	Addressable Detectors -				
F	Optical Smoke detectors mounted on flush mounted round conduit boxes in Ceiling				
1	Supply	**No**	**576**		
2	Install	**No**	**576**		
J	Heat detectors mounted on flush mounted round conduit boxes.				
1	Supply	**No**	**40**		
2	Install	**No**	**40**		
	Manual Call Points -				
H	Manual call points (break glass units - BGU) mounted over flush mounted conduit boxes.				
1	Supply	**No**	**250**		
2	Install	**No**	**250**		
			Carried to Collection	R	

				Tender	
				Rate	**Amount**
	Audible Alarm Sounders -				
A	Alarm sounder incorporated with detectors.				
1	Supply				
		No	**75**		
2	Install				
		No	**75**		
B	External weatherproof IP54 alarm siren.				
1	Supply				
		No	**15**		
2	Install				
		No	**15**		
	Loop Isolators				
A	**Loop isolators inserted in loop at regular intervals.**				
1	Supply				
		No	**65**		
2	Install				
		No	**65**		
B	**Labelling**				
1	Supply				
		No	**982**		
2	Install				
		No	**982**		
	Cabling -				
A	**Heat resistant PH120 fire alarm cabling installed in conduit**				
1	Supply				
		m	**16 830**		
2	Install				
		m	**16 830**		
	Interfacing -				
	Supply and installation of other equipment fixed in flush or surface enclosures or on surface as applicable, complete with all accessories, fixings, connections, labelling and commissioning as specified.				
A	Interface signal to Public Address system amplifier for generating of evacuation control message, including cabling and all the necessary accessories.				
		Item	**1**		
B	Interface signals to lifts for shutting down lifts in the event of a fire alarm condition, including all the necessary equipment cabling and all the necessary accessories.				
		Item	**1**		
C	Interface signal to Access Control System in the event of a fire alarm condition for releasing electric door locks, including all the necessary equipment, cabling and accessories.				
		Item	**1**		
			Carried to Collection	R	

				Tender	
				Rate	**Amount**
D	Interface signal to MECHANICAL System in the event of a fire alarm condition for releasing electric door locks, including all the necessary equipment, cabling and accessories. I/O units for shutdown of mechanical installations	**Item**	**1**		
	Other -				
A	All other minor materials **not measured but necessary** for completing the Fire Detection and Alarm installation.	**Item**	**1**		
B	Remove all exsiting cabling and FDA panels and handover to client	**Item**	**1**		
C	PROVISONAL ALLOWANCE - GSM WARNING SYSTEM TO ALERT A DESIGNATED PERSONAL VIA CELL PHONE IN THE CASE OF A FIR	**Item**	**1**	R 50 000,00	R 50 000,00
D	LINE RELAYS	**No.**	**75**		
	TESTING AND COMMISSIONING :				
A	Test and commission complete Fire Detection installation as specified.	**Item**	**1**		
	'AS-BUILT' RECORD DRAWINGS:				
A	Provide marked-up copy of "As-Built" record drawings of the Fire Detection installation as installed on site, as specified.	**Item**	**1**		
	OPERATING AND MAINTENANCE MANUAL:				
A	Provide complete operating and maintenance manuals of complete Fire Detection installation as specified, including CD's.	**No**	**3**		
	TRAINING:				
A	Present training course for Fire Detection installation, including course sylabus and certificates as specified.	**Item**	**1**		
	GUARANTEE AND MAINTENANCE:				
A	Guarantee and free maintenance for the complete Fire Detection installation, including fittings, materials and workmanship for a period of TWELVE MONTHS after the date of final completion and handover.	**Item**	**1**		
			Carried to Collection	R	

		Tender	
	ELECTRICAL BILL NO. 1.4 **EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1** **FIRE DETECTION** **COLLECTION**	**Rate**	**Amount**
	Total brought forward from page	64	
		65	
		66	
	Carried to Summary	R	

			Tender	
	ELECTRICAL BILL NO. 1.5 **EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1** **LIGHTNING PROTECTION & EARTHING**		**Rate**	**Amount**
	LIGHTNING PROTECTION & EARTHING : All equipment & cabling to be SABS Approved **Contractor to be a registered installer with the relevant association such as - ELPA** (Earthing & Lightning Proctection Association) Contractor to ensure Lighting Protection and Earthing installation is to fully comply with the latest revision of SANS 62305 - 1207, SANS 10313 AND SANS 10142. Complete Lightning Protection installation including all equipment and materials as specified and as indicated on the drawings. All metals including fixings to be non-corrosive.			
1	**CONDUCTORS** **Down Conductors-** Supply and install, fixing on surface in an approved manner of aluminium conductor as specified, including all fixing accessories, such as insulating sleeves and stand-off brackets, but not including terminations. Rates quoted shall allow for wastage, off-cuts and joints.			
A	50mm² insulated aluminium conductor	**m 950**		
B	Termination of aluminium conductor to metal roof as specified including lugs and making off of the ends etc.	**No 65**		
C	Terminate 50 mm^2 Aluminium Down Conductor in Test joint box including lugs and fixings	**No 65**		
	Earthing Conductors- Supply and laying in the ground and in conduits of copper earth wire as specified excluding terminations. Rates quoted shall allow for wastage, off-cut and joints.			
C	70mm² Green PVC insulated copper conductor	**m 220**		
D	Terminate 70 mm^2 Green PVC insulated copper conductor in Test joint box including lugs and fixings	**No 65**		
E	Terminate 70 mm^2 Green PVC insulated copper conductor to Earth Electrode including lugs and fixings	**No 65**		
2	**EARTH ELECTRODES** Supply and install 'Cadweld' 16 mm diameter copper earth electrodes driven in ground, including 'Cadweld' joining sleeves and including drilling			
A	3600 mm long electrodes- Supply	**No 144**		
B	Install first electrode in ground	**No 60**		
C	Install second electrode (extension) in ground	**No 50**		
D	Supply and install 'Cadweld' joining sleeve	**No 40**		
	Carried to Collection		R	

				Tender	
				Rate	**Amount**
3	**ENCLOSURES**				
	110 x 110 x 110 deep GRP enclosure for housing test joint.				
A	Supply	**No**	**24**		
B	Install on surface infront of flush terminal	**No**	**24**		
C	Label test joint box	**No**	**24**		
4	**EXCAVATIONS-**				
	Excavate for trench for earth conductor - 1000mm(D)x300mm(W)x300mm(L) - including backfilling andcompacting as specified.				
A	Excavation in soft material and re-instatement of trench for cables and sleeves	**m^3**	**86**		
B	Extra over on item (B) for excavation in intermediate material	**m^3**	**20**		
5	**OTHER EQUIPMENT:**				
	Supply and installation of other equipment fixed in flush or surface enclosures or on surface as applicable, complete with all accessories, fixings, connections, labelling and commissioning as specified.				
	20 mm diameter pvc conduit on surface of brick work				
A	Supply	**m**	**491**		
B	Install on surface	**m**	**491**		
6	**GENERAL EARTHING & BONDING FOR ENTIRE INSTALLATION**				
A	Bonding of metal drainage down pipes,metal tanks, water pipes, equipotential bonding between electrical earth and lightning protection system per building, metal roof continuity per building and items per building required as per latest SANS Code- SANS 62305-107, SANS 10313 and SANS 10142	**Item**	**1**		
7	**TESTING OF LIGHTNING PROTECTION INSTALLATION**				
	Supply and testing apparatus and testing in accordance with SANS Code, provide test and compliance certificates per building. All resistance and continuity values to be compliant as per latest SANS Code- SANS 62305-107, SANS 10313 and SANS 10142. Testing of joint, continuity, Testing of lightning protection system, Testing of earthing points, soil resistivity test and report per building to be included.				
	BLOCK A-				
A	Testing as specified	**Item**	**1**		
			Carried to Collection	R	

				Tender	
				Rate	**Amount**
B	Testing results/readings & compliance certificate	**Item**	**1**		
C	Soil resistivity test and report	**Item**	**1**		
	Block B				
D	Testing as specified	**Item**	**1**		
E	Testing results/readings & compliance certificate	**Item**	**1**		
F	Soil resistivity test and report	**Item**	**1**		
	Block C-				
G	Testing as specified	**Item**	**1**		
H	Testing results/readings & compliance certificate	**Item**	**1**		
I	Soil resistivity test and report	**Item**	**1**		
	Block D- EXISTING GENERATOR AND LV ROOOM				
J	Testing as specified	**Item**	**1**		
K	Testing results/readings & compliance certificate	**Item**	**1**		
L	Soil resistivity test and report	**Item**	**1**		
	Block E- RESERVATIONS				
M	Testing as specified	**Item**	**1**		
N	Testing results/readings & compliance certificate	**Item**	**1**		
O	Soil resistivity test and report	**Item**	**1**		
8	**EARTHING** All metal fixings to be non-corrosive	**Item**	**1**		
	Bonding Cables- Supply and Install				
A	35mm² bare copper earth wire conductor	**m**	**245**		
B	Terminations	**No**	**48**		
			Carried to Collection	R	

				Tender	
				Rate	**Amount**
	Sleeves -SABS Approved				
A	50mm diameter PVC sleeves	**m**	**100**		
	Earth Mat-				
	Supply and install earth mat around **EXISTING LV AND GENERATOR** .				
A	95mm² bare copper earth wire conductor	**m**	**60**		
B	95mm² Green PVC insulated copper conductor	**m**	**20**		
C	Terminate 95mm² BCEW copper conductor to Earth Electrodes	**No**	**8**		
D	Terminate 95mm² Green PVC insulated copper conductor to Earth Electrodes and main earth bar & GENERATOR including lugs and fixings	**No**	**4**		
	Earth Electrodes				
	Supply and install 'Cadweld' 16 mm diameter copper earth electrodes driven in ground, including 'Cadweld' joining sleeves				
E	3600 mm long electrodes- Supply	**No**	**48**		
F	Install first electrode in ground	**No**	**24**		
G	Install second electrode (extension) in ground	**No**	**24**		
H	Supply and install 'Cadweld' joining sleeve	**No**	**24**		
	Excavations-				
	Excavate for trench for earth mat /bonding conductor - 1000mm(D)x300mm(W)x10000mm(L) - including backfilling and compacting as specified.				
I	Excavation in soft material and re-instatement of trench for cables and sleeves	**m^3**	**10**		
J	Extra over on item (B) for excavation in intermediate material	**m^3**	**5**		
9	**TESTING OF EARTH MAT INSTALLATION**				
	Supply and testing apparatus and testing in accordance with SANS Code, provide test and compliance certificates per building. All resistance and continuity values to be compliant as per latest SANS Code- SANS 62305-107, SANS 10313 and SANS 10142. Testing of joint, continuity, Testing of earth mat, Testing of earthing points, soil resistivity test and report per building to be included.				
A	Testing as specified	**Item**	**1**		
			Carried to Collection	R	

		Tender	
		Rate	**Amount**
B	Testing results/readings & compliance certificate **Item 1**		
C	Soil resistivity test and report **Item 1**		
11	**'AS-BUILT' RECORD DRAWINGS:**		
A	Provide copy of "As-Built" record drawings of the Lightning protection and Earthing installation as installed on site . (1 copy per handover file) **Item 1**		
12	**OPERATING AND MAINTENANCE MANUAL:**		
A	Provide complete operating and maintenance manuals of complete Lightning installation and Earthing System installation as specified, including CD's, all certificates and drawings. **No 3**		
13	**GUARANTEE AND MAINTENANCE:**		
A	Guarantee and free maintenance for the complete lightning protection and earthing installation, including fittings, materials and workmanship for a period of TWELVE MONTHS after the **date of final completion and handover.** **Item 1**		
14	**OTHER:**		
A	All other materials necessary for completing the lightning protection & earthing installation. **Item 1**		
15	**TRAINING:**		
A	Present training course for the complete lighthning protection and earthing installation **Item 1**		
	Carried to Collection	R	

		Tender	
	ELECTRICAL BILL NO. 1.5 **EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1** **LIGHTNING PROTECTION & EARTHING** **COLLECTION**	**Rate**	**Amount**
	Total brought forward from page	68	
		69	
		70	
		71	
		72	
	Carried to Summary		

		Tender	
	ELECTRICAL SUMMARY **EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1**		**Amount**
Bill No.	**Description**	**Page No.**	
1.1	P&G's		
1.2	ELECTRICAL INSTALLATION - LV NETWORK	57	
1.3	EZEMVELO WILDLIFE - QEP BUILDING - PHASE 1	63	
1.4	FIRE DETECTION	67	
1.5	LIGHTNING PROTECTION & EARTHING	73	
1.6	CONTINGENCIES		R 400 000,00
1.7	CPAP		R 400 000,00
	TOTAL Ex Vat	R	
	VAT	15%	
	TOTAL Incl Vat	R	

Part C3: Scope of Work

PHASING OF WORK

This report outlines the details, on which the scope for the proposed refurbishment and replacement to the existing electrical infrastructure to the various buildings and external distribution network located at Queen Elizabeth Park (QEP) with the result being the issuing of certificate of compliances for all the distribution boards and external kiosks, in a phased approach and in accordance with the latest revision of the SANS 10142-1 wiring codes.

1. PHASE 1 – Testing

1.1 SCOPE

The contractor to test the following items but not limited too with the intent to provide a detailed report of findings once testing has been concluded per distribution board and external kiosk inclusive of the Main Low voltage panel located in a separate building.

- All electrical circuits
- Earthing and bonding
- All plug points.
- All lighting points.
- The Distribution Board is labelled correctly.
- The correct sized conductor has been used.
- The correct breaker size has been used in the Distribution Board for all circuits.
- Sufficient breaker protection has been used.
- All breakers have their ratings visible.
- The earth leakage is in working order.
- The stove is cabled up correctly.
- The stove has an accessible isolator.
- All socket outlets, switches and light fittings are secured.
- All socket outlets, switches and light fittings are earthed.
- All socket outlets are in working order.
- The satellite and TV antenna is earthed and bonded.
- The geyser water pipes are earthed and bonded.
- The geyser cover is secure and has a gland.
- The following portable appliances must be fitted with an isolator within 1.5m of the appliance: Geyser, gate motor, garage door motor, extractor fans, ceiling fans, air-con units, water feature, and any pump if applicable.
- The correct cable size and colour has been used for the various applications.
- Light fittings being used are rated for the specific areas.
- That there is no exposed house wiring.
- No open joints or broken conduit.
- All conductive parts of the installation shall be earthed and bonded and be the same electrical potential as the supply authority earthing.
- Certificate valid for 2 years from date of issue (If the installation has not been amended).

Once the testing phase has been completed the electrical contractor to provide an electrical report to reveal if any of the electrical circuits or equipment are overloaded, find any potential electric shock risks and fire hazards, identify any defective electrical work, and highlight any lack of earthing or bonding in a logically format.

2. PHASE 2 – Work to be undertaken to enable the issuing of a certificate of compliance per distribution board and External kiosk

2.1 SCOPE

- Following phase 1, the engineer and contractor will discuss the report provided by the contractor and identify items that are of necessity to ensure a certificate of compliance can be issued per distribution board and external kiosk.
- All lights fittings to be replaced with new energy efficient lighting.
- All plug points to be replaced with new regulation type plug points.
- Installation of fire detection system and associated conducting, and isolators
- Installation of lightning & earthing system

SPECIFICATION FOR THE ELECTRICAL INSTALLATION

INDEX **PAGE NO.**

SPECIFICATION FOR ELECTRICAL WORK

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SPECIFICATION FOR ELECTRICAL WORK

PART 1 - GENERAL

CONTENTS

PART 1 - GENERAL

1. INTRODUCTION

(a) These Standard Specifications cover the general technical requirements for the equipment, materials, installation, testing, commissioning and maintenance of electrical installations for the Department. This specification shall be read in conjunction with the relevant, Bills of Quantities and General/Standard specification for this installation.

(b) "Document" shall mean the complete set of contract documents, including the Department's Tender Conditions, Tender Qualifications, the Standard Specification and the Detail Technical Specification including variation orders issued in terms of the contract.

(c) "Contractor" shall mean the person, partnership, company or firm appointed for the supply, installation, testing, commissioning and maintenance of the Electrical Installation. In the case of the Electrical Installation being a sub-contract, nominated in terms of the Main Contract or otherwise, the word "Contractor" shall also mean "Sub-Contractor" in terms of the Sub-Contract Conditions for the specific installation. Where applicable the Builder or Principal Contractor shall be referred to as "Main Contractor".

2. INSTALLATION WORK

(a) The complete installation shall comply with the requirements of this Specification. Should any discrepancies or contradictions exist between this specification and the Detail Technical Specification for the specific installation, then the latter shall take precedence.

In the event of discrepancies between, specifications and bill of quantities the Client shall decide whether the work as executed shall be re-measured on site or whether re-measurement shall be efected.

The main contractor shall appoint an electrical contractor timeously, no unnecessary chasing will be allowed.

(b) The Department's authorised representative will inspect the installation from time to time during the progress of the work. Discrepancies will be pointed out to the Contractor and these shall be remedied at the Contractor's expense. Under no circumstances shall these inspections relieve the Contractor of his obligations in terms of the Documents.

(c) The Contractor shall notify the Client timeously when the installation reaches important stages of completion (e.g. before closing cable trenches, before casting concrete, etc.) so that the Department's authorised representative may schedule his inspections in the best interest of all parties concerned.

3. SITE CONDITIONS

Tenderers are advised to visit the site and acquaint themselves with all local conditions pertaining to the execution of the installation before tender closing date. No claims from the Contractor which may arise from insufficient knowledge of site access, type of site, labour conditions, establishment space, transport and loading/unloading facilities, power and water supply, etc. will be considered after submission of tenders

4. WORKMANSHIP AND STAFF

The electrical installation shall be carried out by an electrical contractor whom is registered with the Department of Labour and be in possession of a valid wireman’s licence in order to issue valid electrical certificate of compliance certificates for both single and three phase electrical installations.

The workmanship shall be of the highest grade and to the satisfaction of the Employer.

All inferior work shall, on indication by the Employer’s inspecting officers, immediately be removed and

rectified by and at the expense of the Contractor.

5. MAINTENANCE OF INSTALLATIONS

With effect from the date of the Practical completion Certificate the Contractor shall at his own expense undertake the regular servicing of the installation during the maintenance period and shall make all adjustments necessary for the correct operation thereof.

If during the said period the installations is not in working order for any reason for which the Contractor is responsible, or if the installations develops defects, he shall immediately upon being notified thereof take steps to remedy the defects and make any necessary adjustments.

Should such stoppages however be so frequent as to become troublesome, or should the installations otherwise prove unsatisfactory during the said period the Contractor shall, if called upon by the Principle Agent/Electrical Engineer or the Employer, at his own expense replace the whole of the installations or such parts thereof as the Principal Agent/Electrical Engineer or the Employer may deem necessary with apparatus specified by the Principal Agent/Electrical Engineer or the Employer.

6. REGULATIONS (TO BE OF THE LATEST REVISION)

The installation shall be erected and tested in accordance with the Acts and Regulations as indicated in the scope of works. The installation shall be erected and tested in accordance with the following (but not limited to) National Standards:

a)	SANS 10142	Code of Practice for the Wiring of Premises
b)	SANS 10313	Code of Practice for the Protection of Structures against Lightning
c)	SANS 156	Moulded Case Circuit Breakers
d)	SANS 164-1	Plugs and Socket Outlets for Household and similar purposes
e)	SANS 767	Earth Leakage Protection units
f)	SANS 1091	National Colour Standards
g)	SANS 1065	Metal Conduits and fittings
h)	SANS 1213	Mechanical Cable Glands
i)	SANS 60439	Low Voltage Switchgear and Control Assemblies
j)	SANS 60669	Switches for household and similar fixed electrical appliances
k)	SANS 60947	Low Voltage Switchgear and Control gear
l)	SANS 61058	Switches for Appliances
m)	SANS 61386	Conduit System for Cable Management

n) The Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended,

o) The Local Government Act 1998 (Act 10 of 1998 (Gauteng)) as amended and the municipal by-laws and any special requirements of the local supply authority.

p) The Fire Brigade services Act 1993 Act 2000 (Act 14 of 2000) as amended,

q) The National Building Regulations and Building Standards Act 1996 (Act 29 of 1996) as amended,

r) The Post Office Act 1998 (Act 124 of 1998) as amended,

s) The Electricity Act 1996 (Act 88 of 1996) as amended and

t) The Regulations of the Local Gas Board where applicable.

Where reference is made to any Code of Practice or Standard Specification in this document the latest edition or amendment shall be applicable, except where specified to the contrary.

7. NOTICES AND FEES

The Contractor shall give all notices required by and pay all necessary fees, including any connection fees or inspection fees, which may be due to the local Supply Authority.

On production of the official account, only the net amount of the fee charged by the Supply Authority for connection of the installation to the supply mains, will be refunded to the Contractor by the Employer.

The Contractor shall issue all notices and pay all the required fees in respect of the installation to the authorities, and shall exempt the Client from all losses, claims, costs or expenditures which may arise as a result of the Contractor's negligence in complying with the requirements of the regulations.

8. SCHEDULE OF FITTINGS

N/A

9. QUALITY OF MATERIALS

Only materials of first-class quality shall be used and all materials shall be subject to the approval of the Employer. Departmental specifications for various materials to be used on this Contract are attached to and form part of this specification. All materials shall be suitable for the conditions under which the materials are installed and used.

Materials manufactured in South Africa shall as far as possible be used and where applicable shall bear the SABS mark. Imported materials shall comply with the requirements of the appropriate B.S. or I.E.C. specification.

10. CONDUIT AND ACCESSORIES

The type of conduit and accessories required for the service, i.e. whether the conduit and accessories shall be of the screwed type, plain-end type or of the non-metallic type and whether metallic conduit shall be black enamelled or galvanised, is specified in Part 2 of this specification.

Unless other methods of installation are specified for certain circuits, the installation shall be in conduit throughout. No open wiring in roof spaces or elsewhere will be permitted.

The conduit and conduit accessories shall comply fully with the applicable SANS specifications as set out below and the conduit shall bear the mark of approval of the South African Bureau of Standards.

a) Screwed metallic conduit and accessories: SANS 61386-1 and 21.

b) Plain-end metallic conduit and accessories: SANS 61386-1 and 21.

c) Non-metallic conduit and accessories: SANS 61386-1 and 21.

All conduit fittings except couplings, shall be of the inspection type. Where cast metal conduit accessories are used, these shall be of malleable iron. Zinc base fittings will not be allowed.

Bushes used for metallic conduit shall be brass and shall be provided in addition to locknuts at all points where the conduit terminates at switchboards, switch-boxes, draw-boxes, etc.

Draw-boxes are to be provided in accordance with the “Wiring Code” and wherever necessary to facilitate easy wiring.

For light and socket outlet circuits, the conduit used shall have an external diameter of 20mm. In all other instances the sizes of conduit shall be in accordance with the “Wiring Code” for the specified number and size of conductors, unless otherwise directed in part 2 of this specification.

Only one manufactured type of conduit and conduit accessories will be permitted throughout the installation.

Running joints in screwed conduit are to be avoided as far as possible and all conduit systems shall be set or bent to the required angles. The use of normal bends must be kept to a minimum with exception of larger diameter conduits where the use of such bends is essential.

All metallic conduit shall be manufactured of mild steel with a minimum thickness of 1,2mm for plain-end conduit and 1,6mm in respect of screwed conduit.

Under no circumstances will conduit having a wall thickness of less than 1,6mm be allowed in screed laid on top of concrete slabs**.**

Bending and setting of conduit must be done with special bending apparatus manufactured for the purpose and which are obtainable from the manufacturers of the conduit systems. Damage to conduit resulting from the use of incorrect bending apparatus or methods applied must on indication by the Department's inspectorate staff, be completely removed and rectified and any wiring already drawn into such damaged conduits must be completely renewed at the Contractor's expense.

Conduit and conduit accessories used for flame-proof or explosion proof installations and for the suspension of luminaires as well as all load bearing conduit shall in all instances be of the metallic screwed type.

All conduit and accessories used in areas within 50 km of the coast shall be galvanised to SANS 32 and SANS 121.

Tenderers must ensure that general approval of the proposed conduit system to be used is obtained from the local electricity supply authority prior to the submission of their tender. Under no circumstances will consideration be given by the Client to any claim submitted by the Contractor, which may result from a lack of knowledge in regard to the supply authority's requirements.

11. CONDUIT IN ROOF SPACES

Conduit in roof spaces shall be installed parallel or at right angles to the roof members and shall be secured at intervals not exceeding 1,5m by means of saddles screwed to the roof timbers.

Nail or crampets will not be allowed.

Where non-metallic conduit has been specified for a particular service, the conduit shall be supported and fixed with saddles with a maximum spacing of 450 mm. The Contractor shall supply and install all additional supporting timbers in the roof space as required.

Under flat roofs, in false ceilings or where there is less than 0,9m of clearance, or should the ceilings be insulated with glass wool or other insulating material, the conduit shall be installed in such a manner as to allow for all wiring to be executed from below the ceilings.

Conduit runs from distribution boards shall, where possible terminate in fabricated sheet steel draw-boxes installed directly above or near the boards.

12. SURFACE MOUNTED CONDUIT

Wherever possible, the conduit installation is to be concealed in the building work; however, where unavoidable or otherwise specified under Part 2 of the specification, conduit installed on the surface must be plumbed or levelled and only straight lengths shall be used.

The use of inspection bends is to be avoided and instead the conduit shall be set uniformly and inspection coupling used where necessary.

No threads will be permitted to show when the conduit installation is complete, except where running couplings have been employed.

Running couplings are only to be used where unavoidable, and shall be fitted with a sliced couplings as a lock nut.

Conduit is to be run on approved spaced saddles rigidly secured to the walls. Alternatively, fittings, tees, boxes, couplings etc., are to be cut into the surface to allow the conduit to fit flush against the surface. Conduit is to be bedded into any wall irregularities to avoid gaps between the surface and the conduit. Crossing of conduits is to be avoided, however, should it be necessary purpose-made metal boxes are to be provided at the junction. The finish of the boxes and positioning shall be in keeping with the general layout.

Where several conduits are installed side by side, they shall be evenly spaced and grouped under one purpose-made saddle.

Distribution boards, draw-boxes, industrial switches and socket outlets etc., shall be neatly recessed into the surface to avoid double sets.

In situations where there are no ceilings the conduits are to be run along the wall plates and the beams.

Painting of surface conduit shall match the colour of the adjacent wall finishes.

Only approved plugging materials such as aluminium inserts, fibre plugs, plastic plugs, etc., and round-head screws shall be used for fixing saddles, switches, socket outlets, etc., to walls, wood plugs and the plugging in joints in brick walls are not acceptable.

13. CONDUIT IN CONCRETE SLABS

N/A

14. WIRING

Except where otherwise specified in Part 2 of this specification, wiring shall be carried out in conduit throughout. Only one circuit per conduit will be permitted.

No wiring shall be drawn into conduit until the conduit installation has been completed and all conduit ends provided with bushes. All conduits to be clear of moisture and debris before wiring is commenced.

Unless otherwise specified in Part 2 of this specification, the wiring of the installation shall be carried out in accordance with the “Wiring Code”. Further to the requirements concerning the installation of earth conductors to certain light points as set out in the “Wiring Code”, it is a specific requirement of this document that where plain-end metallic conduit or non-metallic conduit has been used, earth conductors must be provided and drawn into the conduit with the main conductors to all points, including all luminaires and switches throughout the installation.

Wiring for lighting circuits is to be carried out with 2,5mm² conductors and a 2,5mm²-earth conductor. For socket outlet circuits the wiring shall comprise 4mm² conductors and a 2,5mm²-earth conductor. In certain instances, as will be directed in Part 2 of this specification, the sizes of the conductors may be increased for specified circuits. Sizes of conductors to be drawn into conduit in all other instances, such as feeders to distribution boards, power points etc., shall be as specified elsewhere in this specification. Sizes of conductors not specified must be determined in accordance with the “Wiring Code”.

<u>The loop-in system shall be followed throughout, and no joints of any description will be permitted.</u>

The wiring shall be done in PVC insulated 600/1000 V grade cable to SANS 1507.

Where cable ends connect onto switches, luminaires etc., the end strands must be neatly and tightly twisted together and firmly secured. Cutting away of wire strands of any cable will not be allowed.

Wiring shall only be carried out after the conduit or trunking installation and plaster work is completed, but before painting has commenced. No conductors shall be installed before the conduits have been cleaned of all debris and moisture.

Conductors that are connected to different switchboards, shall not be installed in the same conduit or

trunking.

The wiring of one circuit only will be allowed in 20mm diam. conduit except for the wiring between switchboards and fabricated sheet metal boxes close to switchboards in which case more than one circuit will be allowed.

All wiring shall be carried out according to the loop-in system. If a conductor joint is found necessary in an isolated case, jointing will only be accepted in trunking and not in conduits. Conductor jointing shall be executed by approved ferruling, properly covered with heat shrink sleeving.

The number of conductors that may be drawn through a conduit, shall comply with the requirements of the SANS 10142. The total cross-sectional area of the conductors (including insulation) in trunking or power skirting shall not exceed 40% of the cross-sectional area thereof.

In cases where the conductors of more than one circuit are installed in trunking or power skirting, the conductors of each separate circuit (earth conductor inclusive) shall be taped at intervals of one metre with PVC insulation tape. The conductors of different circuits shall however remain separate in order that any given circuit can be withdrawn. Conductors entering switchboards or control boards shall be grouped and bound by means of plastic binding.

When conductors are drawn through conduit, care shall be taken that they are not kinked or twisted. Care shall also be taken that the conductors do not come into contact with materials or surfaces that may damage or otherwise adversely affect the durability of the conductor.

With the exception of three phase outlets, circuits of different phases shall not be present in lighting, switch or socket outlet boxes.

Conductors installed in vertical conduit or trunking shall be secured at intervals not exceeding 15m to support the mass of the conductors. Clamps shall be provided in suitable draw boxes for this purpose.

The insulation of conductors shall only be removed over the portion of the conductors which enter the terminals of switches, plugs or other equipment. When more than one conductor enters a terminal, the strands shall be securely twisted together.

When earth continuity conductors are looped between terminals or equipment, the looped conductor ends shall be twisted together and then soldered or ferruled to ensure that earth continuity is maintained when the conductors are removed from a terminal.

Cutting away of conductor strands will not be allowed.

The colours of conductor insulation for wiring purposes shall comply with the wiring regulations. The colours of conductors for sub-circuits shall as far as possible correspond with the colour of the supply phase. The colours of conductors for wiring to two-way and intermediate switches shall differ from phase conductors.

Single pole switches shall be connected to the phase conductor and not to the neutral conductor.

The connection to stoves or similar appliance unless specified to the contrary, shall consist of 10mm2 insulated conductors and a 10mm2 bare copper earth wire in a 25mm conduit.

A 60A double pole microgap isolator shall be flush mounted in a wall outlet box behind or adjacent to the stove or appliance in the run of the conduit at least 1350mm but not more than 1700mm above the finished floor level. The cover plate shall either fall entirely within the tiles surface or entirely within the plastered surface.

The conduits shall terminate 450mm above the floor behind the stove or appliance with the end set out of the wall pointing downwards.

The connection from the conduit end shall be by means of flexible conduit of sufficient length to enable the stove or appliance to be moved 600mm from its normal position for cleaning of maintenance purposes.

Crimped lugs shall be provided on all conductors or cable cores for connections to stoves or appliances. Soldered lugs may not be used. Each stove or similar appliance shall be connected to a separate circuit and each shall have a separate earth conductor.

When earth continuity conductors are looped between terminals of equipment, the looped conductor ends shall be twisted together and then soldered or ferruled to ensure that earth continuity is maintained when the conductors are removed from a terminal. The installation shall be earthed to comply with SANS 10142.

15. SWITCHES AND SOCKET OUTLETS

All switches and switch-socket outlet combination units shall conform to the Client Quality Specifications, which form part of this specification.

No other than 16 A 3 pin sockets are to be used,

Switches SABS IEC 60669 as applicable and socket outlets SABS IEC 60884 as applicable shall be of the most modern manufacture and bear the SABS mark.

Switches shall comply with SABS 163. The sockets shall comply with SABS 164.

Flush switch and plug cover plates shall, unless otherwise specified, be of anodized aluminium of thickness not less than 0,9 mm, satin or other approved finish as directed and otherwise to be fully in accordance with SABS IEC 1084 for cover plates and SABS 1085 for wall boxes.

Except where otherwise specified, lighting switches are to be installed 1, 4 m above finished floor level.

Except where otherwise specified, socket outlets are to be installed 0, 450 m above finished floor level.

All mounting heights specified are to be measured from finished floor level to the bottom of the outlet box.

Where the lower portion of the wall consists of face brickwork and the upper portion of plastered finish, switches and socket outlets are to be mounted in the plastered surface, provided that the lower edge of the plasterwork does not exceed a height of 1, 5 m above finished floor level in which case the switches or socket outlets are to be installed in the face brick dado.

Where socket outlet and switch boxes have been installed with fixing lugs below finished wall surface, only approved distance pieces required to compensate for the recess shall be used. The lengths of distance pieces are not to exceed 15 mm.

Unless otherwise approved, light switches adjacent to doors are to be installed at the lock side of the door. Where the lock position is not indicated, its position shall be ascertained before the switch box is installed. Switches are to be installed 150 mm from the reveal, or centrally if there is a fitting near the door.

All switch and socket outlet boxes shall be installed plumb and built into the wall with a 1:1 mixture of cement and sand.

Industrial type switches and socket outlets shall be neatly recessed into the surface of plastered walls to avoid sets or alternatively spacer bar saddles may be used.

Deep type boxes may be used where switches or socket outlets are back-to-back, but where one side only is to be utilized at the time and the other is for future use, the side for future use shall be suitably covered with a metal cover plate.

All accessible current carrying parts, busbars, connecting strips, collector bars, etc., are to be adequately insulated in phase colours and suitably braced to withstand projected fault currents.

Connecting strips and collector bars must be of sufficient cross-sectional area to carry full rated current of the switches served, irrespective of the fuse of trip rating.

The complete distribution board including busbars must be suitably constructed to withstand fault currents specified.

Connections to busbars are to be made by means of lugs suitably bolted and locked with high tensile bolts and connections to lugs must be effected by means of a crimping tools. Incoming and outgoing bus-bar studs, where required, must be suitably insulated where they pass through panels of the board, and firmly supported within the board.

Where applicable, incoming and outgoing collector bars for cables in parallel must so arrange that the multiple cable ends can be connected to the bars with reasonably short tails which do not have to cross.
Cable supports must be placed at suitable heights having regard to the bending radius of the cables concerned and convenience in making off.

Wall-mounting and floor-standing back to wall type boards must be provided with full easy access to all equipment and wiring without any necessity of disconnecting or removing of any of the equipment mounted in the board.

Clear visible indication of all switch positions must be provided, and the switches must be clearly labelled.

16. SWITCHGEAR

Switchgear, which includes circuit breakers, iron-clad switches, interlocked switch-socket outlet units, contactors, time switches, etc., is to be in accordance with the Departmental Quality Specifications which form part of this specification and shall be equal and similar in quality to such brands as may be specified.

For uniform appearance of switchboards, only one approved make of each of the different classes of switchgear mentioned in the Quality Specifications shall be used throughout the installations.

Circuit breakers shall be of the size and type as directed and specified for the service. They shall comply with SABS Specification 156 and SABS IEC 60947-2.

All distribution boards & switchgear shall comply with the quality specification in Part 3 of this specification, and be approved by the Employer's Electrical Engineer.

17. SWITCHBOARDS

All boards shall be in accordance with the types as specified, be constructed according to the detail or type and must be approved by the Employer before installation.

In all instances where provision is to be made on boards for the supply authority's main switch and/or metering equipment the contractor must ensure that all requirements of the authorities concerned in this respect are met.

Any construction or standard type aboard proposed, as an alternative to that specified must have the prior approval of the Employer.

All busbars, wiring, terminals, etc., are to be adequately insulated and all wiring is to enter the switchgear from the back of the board. The switchgear shall be mounted within the boards to give a flush front panel. Cable and boxes and other ancillary equipment must be provided where required.

Clearly engraved labels are to be mounted on or below every switch. The working of the labels in English, or as directed by the Electrical Engineer and must be confirmed on site.

All distribution boards & switchgear shall comply with the quality specification in Part 3 of this specification and be approved by the Employer's Electrical Engineer.

18. TESTS

After completion of the works and before practical completion is achieved, a full test will be carried out on the installation for a period of sufficient duration to determine the satisfactory working thereof. During this period the installations will be inspected and the Contractor shall make good, to the satisfaction of the Principle Agent/Electrical Engineer or the employer, any defects which may arise.

The Contractor shall provide all instruments and equipment required for testing and any water, power and fuel required for the commissioning and testing of the installations at completion.

19. VERIFICATION AND CERTIFICATION OF ELECTRICAL INSTALLATION (CERTIFICATE OF COMPLIANCE AND TEST REPORT

On completion of the service, a certificate of compliance must be issued to the Principal Agent/Electrical Engineer or Employer in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) in the format as set out in SANS 10142-1 & 2 as revised.

20. EARTHING OF INSTALLATION

This section covers the earthing of electrical installations in buildings or other structures. The total earthing system of any electrical installation shall be in complete accordance with SANS 10142.

1. GENERAL RECOMMENDATIONS ON THE PRACTICAL INSTALLATION OF EARTH ELECTRODES

1.1 REQUIREMENTS OF AN EFFECTIVE EARTH

1.1.1 An effective earth must prevent dangerous over voltages arising between metallic structures, frames, supports or enclosures of electrical equipment and the ground during fault conditions.

1.1.2 An effective earth must be able to permit fault currents of sufficient magnitude to flow so as to operate protective devices to isolate the fault before damage can occur.

1.1.3 The ohmic resistance of an effective earth must be low enough to ensure that the step potential on the ground in the vicinity of the earthing point is within safe limits under fault conditions i.e. a voltage gradient not exceeding 40 V/m for fault durations exceeding 1s.

1.2 TYPES OF EARTH ELECTRODES

Three types of earth electrodes are suitable:

1.2.1 Trench Earths

Trench earths comprise a bare copper or galvanised iron conductor laid at a minimum of 800mm below ground level, usually when underground cables are installed. This type of earth electrode provides a relatively large contact area between electrode and surrounding ground, makes contact with a variety of types of soil and soils of varying moisture content and route and is economical to install.

1.2.2 Spike Earths

Spike earths comprise rods of bare copper, copper-coated steel, stainless steel or galvanised steel designed for the purpose of penetrating ground to depths of up to several metres. A low resistance earth may sometimes be obtained by driving multiple spikes at some distance from each other in order to provide parallel paths.

In hard or rocky ground, it is usually necessary to drill holes into which earth spikes are inserted and then packed with soft soil.

1.2.3 Foundation Earths

Foundation earths comprise bare copper or galvanised iron conductors laid under the foundations of buildings, miniature substations, distribution pillars, bases of wooden, concrete or steel poles and structures. Because soil under foundations usually retains moisture, foundation earths are located to take advantage of this favourable condition. Furthermore, they are economical to install.

1.3 MATERIALS FOR EARTH ELECTRODES

1.3.1 Bare copper, either in stranded, strip or rod form, is considered the most suitable general-purpose material for earth electrodes. Its main disadvantage is its cost and susceptibility to theft.

1.3.2 Bare galvanised iron and steel, either in stranded, strip or rod form, has a satisfactory record of survival in non-aggressive soils and is more economical than copper.
1.3.3 Bare aluminium is unsuitable as electrode material.

1.4 CORROSION

Because galvanised ferrous metals corrode sacrificially to copper, galvanised iron and steel electrodes should not be buried in close proximity to bare copper.

2. TECHNICAL REQUIREMENTS OF NEUTRAL EARTHING

The following relevant aspects have been extracted from the "AMEU CODE OF PRACTICE FOR THE APPLICATION OF NEUTRAL EARTHING ON LOW VOLTAGE DISTRIBUTION SYSTEMS."

2.1 DISTRIBUTION SYSTEMS

Multiple Earthed Neutral (MEN) and Protective Multiple Earthing (PME) systems.

Distribution equipment associated with transformer substations that are either ground mounted or pole mounted and fed by underground cable or overhead line, with or without an earth continuity conductor, (ECC), should be installed, connected and earthed in accordance with the following requirements:

(a) Where the resistance to earth of the HV equipment earth is 1 ohm or less, it is permissible to earth the LV neutral to the HV earth electrode.

(b) Where the HV equipment earth exceeds 1 ohm the LV neutral shall be earthed at a minimum distance of 6m from the HV equipment earth (i.e. 6m from the HV electrode/s and also from any earthed metalwork connected thereto).

(c) Notwithstanding the requirements of (a) above, where transformers are associated with HV overhead lines, it is considered good practice to separate the HV and LV earth electrodes. The minimum earth separation should be 6m or one LV span.

(d) The overall resistance to earth of the neutral of an LV distributor or distribution system must not exceed 1 ohm.

(e) The LV neutral may be connected to other supply neutrals, earth electrodes, cable sheaths and armouring and these connections used to obtain the required earthing value of 1 ohm or less specified in par. (d). above.

(f) The neutral of underground and overhead LV distributors must be earthed at the remote ends of each distributor.

(g) Where the overall resistance to earth of the neutral of the distribution system exceeds 1 OHM, the neutral shall be earthed at intermediate positions on the distributor/s to reduce its resistance to earth to below this limit.

(h) The cross-sectional area of the neutral of all LV distributors must not be less than that of a phase conductor.

(i) No circuit-breakers, isolators, fuses, switches or removable links shall be installed in the neutral between the transformer star point and the remote end of any LV distributor or service connection.

(j) All metallic sheathing and armouring of cables and all metalwork associated with meter cabinets, fuse pillars, etc., supporting or enclosing LV cables shall be bonded to the distributor neutral conductor.

(k) Where a Separate Neutral Earth (SNE) cable is part of an MEN or PME system, the armouring and/or metallic sheath and any ECC shall be bonded to the neutral at the supply end of the cable.

(l) To ensure the integrity of the neutral, it is recommended that all connections and joints on or to overhead line conductors be made by compression fittings or, alternatively double bolted connectors.

(m) MEN or PME may be applied to any single LV distributor without alterations to other LV distributors supplied from the same transformer.

2.2 PROTECTIVE NEUTRAL BONDING (PNB) SYSTEM

Since the neutral is earthed at one point only, the question of multiple earthing does not arise and there is therefore no necessity to meet the MEN/PME technical requirements.

2.3 SERVICE CONNECTIONS

2.3.1 MEN System

The following conditions apply to consumers' service connections as well as service connections to traffic signals, road signs, street lighting and other power-consuming equipment installed in public places:

(a) All service connections must be by means of cable with an insulated phase, an insulated neutral conductor and an ECC.

(b) A single-phase service connection comprises a live, a neutral and an ECC.

(c) A polyphase service connection comprises two or three phase conductors, a neutral and an ECC.

(d) The service neutral and ECC must be solidly and separately connected to the distributor neutral at the tee-off point.

(e) The consumer's earthing lead is connected to the Supply Authority's earth terminal which is in turn connected to the ECC in the service cable at the consumer's supply point.

(f) The neutral must not be connected to earth at the consumer's supply point.

(g) If required by the Supply Authority, and earth electrode must be installed at the consumer's supply point.

(h) In a service connection to streetlight and other power-consuming equipment installed in public places, such equipment is earthed to the ECC of the service connection.

2.3.2 PME System

(a) All service connections must be by means of a cable with an insulated phase and an insulated neutral conductor.

(b) A single-phase service comprises a live conductor and a neutral.

(c) A polyphase service connection comprises two or three phase conductors and a neutral.

(d) The consumer’s earthing lead is connected to the supplier's neutral and to a mandatory earth electrode at the consumer's supply point.

(e) A label must be attached at the consumers supply point on his premises indicating that the installation is part of a PME system.

Note: It is not recommended that the PME system be applied to supply traffic signals, street signs or other power-consuming equipment installed in public places, because the PME system is inherently unsafe under "broken-neutral" conditions.

3. SUBSTATION EARTHING

In order to comply with the requirements of par. 1 and 2 above, an earth resistivity measurement shall be undertaken at the site of a new substation or miniature substation, preferably be a specialist firm. The contractor shall then submit to the Client details of a proposed substation earth indicating whether a trench earth, spike earth or foundation earth is intended and the proposed interconnections with the installation.

4. FENCES OF OUTDOOR SUBSTATIONS

In cases where substations contain transformers or switchgear installed outdoors, the compulsory fence shall be earthed as follows, if no other method is specified:

(a) A 70mm² earth wire shall be installed 400mm below ground level and 500mm from the fence on the outside of the sub-station along the entire length of the fence. This earth wire shall be earthed at each corner by means of a 1,8m earth rod and the rod and earth wire bonded to the fence. The earth wire shall also be bonded, at least at two points, to the main earthing system.

(b) A 70mm² earth wire shall also be buried at a depth of 400mm around each transformer and switch and bonded to the main earthing system.

5. EARTHING OF A GENERAL ELECTRICAL INSTALLATION

The installation shall be effectively earthed in accordance with the relevant sections of the SANS Code of Practice 10142 and the requirements of the Supply Authority.

The type of main earthing must be as required by the supply authority if other than the Employer, and in any event as directed by the Principal Agent/Electrical Engineer, who may require additional earthing to meet test standards.

Where required an earth mat shall be provided, the minimum size, unless otherwise specified, being 1,0m x 1,0m and consisting of 4mm diameter hard-drawn bare copper wires at 250mm centres, brazed at all intersections.

Alternatively or additionally earth rods or trench earths may be required as specified or directed by the Electrical Engineer.

Installations shall be effectively earthed in accordance with the “Wiring Code” and to the requirements of the supply authority. All earth conductors shall be stranded copper with or without green PVC installation.

Connection from the main earth bar on the main board must be made to the cold water main, the incoming service earth conductor, if any and the earth mat or other local electrode by means of 12mm x 1, 60 mm solid copper strapping or 25 mm² stranded (not solid) bare copper wire or such conductor as the Department’s representative may direct. Main earth copper strapping where installed below 3m from ground level, must be run in 20 mm diameter conduit securely fixed to the walls.

All other hot and cold-water pipes shall be connected with 12mm x 1.5mm solid copper strapping (not conductors) to the nearest switchboard. The strapping shall be fixed to the pipework with brass nuts and bolts and against walls with brass screws at 150-mm centres. In all cases where metal water pipes, down pipes, flues, etc., are positioned within 1,6m of switchboards an earth connection consisting of copper strapping shall be installed between the pipework and the board. In vertical building ducts accommodating both metal water pipes and electrical cables, all the pipes shall be earthed at each distribution board.

Roofs, gutters and down pipes

Where service connections consist of overhead conductors, all metal parts of roofs, gutters and down pipes shall be earthed. One bare 10mm² copper conductor shall be installed over the full length of the ceiling void, fixed to the top purlin and connected to the main earth conductor and each switchboard. The roof and gutters shall be connected at 15m intervals to this conductor by means of 12mm X 1.5 mm copper strapping (not conductors) and galvanised bolts and nuts. Self-tapping screws are not acceptable. Where service connections consist of underground supplies, the above requirements are not applicable.

Sub-distribution boards

A separate earth connection shall be supplied between the earth busbar in each sub-distribution board and the earth busbar in the Main Switchboard. These connections shall consist of a bare or insulated stranded copper conductors installed along the same routes as the supply cables or in the same conduit as the supply conductors. Alternatively armoured cables with earth continuity conductors included in the armouring may be

utilised where specified or approved.

Sub-circuit

The earth conductors of fall sub-circuits shall be connected to the earth busbar in the supply board in accordance with SANS 10142.

Ring Mains

Common earth conductors may be used where various circuits are installed in the same wire way in accordance with SANS 10142. In such instances the sizes of earth conductors shall be equivalent to that of the largest current carrying conductor installed in the wire way, alternatively the size of the conductor shall be as directed by the Engineer. Earth conductors for individual circuits branching from the ring main shall by connected to the common earth conductor with T-ferrules or soldered. The common earth shall not be broken.

Non-metallic Conduit

Where non-metallic conduit is specified or allowed, the installation shall comply with the Department's standard quality specification for "conduit and conduit accessories".

Standard copper earth conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including metal switch boxes, socket-outlet boxes, draw-boxes, switchboards, luminaires, etc. The securing of earth conductors by means of self-threading screws will not be permitted.

Flexible Conduit

An earth conductor shall be installed in all non-metal flexible conduit. This earth conductor shall not be installed externally to the flexible conduit but within the conduit with the other conductors. The earth conductor shall be connected to the earth terminals at both ends of the circuit.

Connection

Under no circumstances shall any connection points, bolts, screws, etc., used for earthing be utilised for any other purpose. It will be the responsibility of the Contractor to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided.

Unless earth conductors are connected to proper terminals, the end shall be tinned and lugged.

21. MOUNTING AND POSITIONING OF LUMINAIRES

The Contractor is to note that in the case of board and acoustic tile ceilings, i.e. as opposed to concrete slabs, close co-operation with the building contractor is necessary to ensure that as far as possible the luminaires are symmetrically positioned with regard to the ceiling pattern.

The layout of the luminaires must be adhered to as far as possible and must be confirmed with the Department's representative.

Luminaires installed against concrete ceilings shall be screwed to the outlet boxes and in addition 2 x 6mm expansion or other approved type fixing bolts are to be provided. The bolts are to be ¾ of the length of the luminaires apart.

Luminaires to be mounted on board ceilings shall be secured by means of two 40mm x No. 10 round head screws and washers. The luminaires shall also be bonded to the circuit conduit by means of locknuts and brass bushes. The fixing screws are to be placed ¾ of the length of the fitting apart.

Earth conductors must be drawn in with the circuit wiring and connected to the earthing terminal of all fluorescent luminaires as well as other luminaires exposed to the weather in accordance with the "Wiring Code".

Incandescent luminaires are to be screwed directly to outlet boxes in concrete slabs. Against board ceilings the luminaires shall be secured to the brandering or joists by means of two 40mm x No. 8 round head screws.

PART 2: DETAILSPECIFICATION & INSTALLATION DETAILS

CONTENTS

PART 2: DETAIL SPECIFICATION & INSTALLATION DETAILS

1. CABLE SLEEVE PIPES

Where cables cross under roadways, other services and where cables enter buildings, the cables shall be installed in 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.

2. NOTICES

N/A

3. ELECTRICAL EQUIPMENT

All equipment and fittings supplied must be in accordance with the attached quality specification (Part 3 of this document), suitable for the relevant supply voltage, and frequency and must be approved by the Employers Electrical Engineer. The electrical contractor is to provide samples of all electrical equipment for approval by the consulting engineer and the department's engineer. All samples are to be approved prior to any bulk purchase.

4. DRAWINGS

N/A

5. BALANCING OF LOAD

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

6. SERVICE CONDITIONS

All plant shall be designed for the climatic conditions appertaining to the service.

7. SWITCHES AND SOCKET OUTLETS

The installation of switches and socket outlets must conform to relevant clause of Part 1 of this specification.

Isolators shall be 2-pole or 3-pole of the no-load type as required, and be suitably rated for the load to be connected. Externally mounted isolators shall be enclosed in suitable weatherproof glass-reinforced polyester (GRP) enclosures with sliding lids. All connections from isolators have been measured in the Bills of Quantities.

Indoor light switches and socket outlets shall be installed in flush wall mounted boxes. The switch cover plates shall be white PVC with chrome-plated fixing screws as applicable.

Outdoor socket outlets shall be installed in suitable GRP boxes with sliding lid, which are either flush or surface mounted.

Outdoor light switches shall be of the water tight surface mounted type with metal body and rotary switch rated at 16 A, as per 'WACO' type NS3500 or similar and approved.

Labels shall be provided on the inside of all switches and power outlet cover plates.

Light sensitive (daylight) switches shall be equal and approved to "NATIONAL" or "ROYCE Thompson" and shall be installed in an approved bulkhead fitting for the control of outside lights. The daylight switch shall be of the fail-safe type and shall comprise a photo-electric cell, thermal actuator and a change-over switch rated at 15A, 230v. The Contractor shall ensure that the operation of the daylight switch is not affected by nearby light fittings.

8. LIGHT FITTINGS AND LAMPS

The installation and mounting of luminaires must conform to relevant clause of Part 1 of this specification.

All fittings to be supplied by the Contractor shall have the approval of the Employer.

The light fittings must be of the type specified in the Schedule of Light Fittings.

All equipment and fittings supplied must be in accordance with the attached quality specification (Part 3 of this document), suitable for the relevant supply voltage, and frequency and must be approved by the Employers Electrical Engineer.

Lamps and electrical components used in fittings shall comply with the relevant SANS standard and wherever possible shall bear the SABS mark or alternatively shall indicate compliance with the equivalent IEC standard. No-name brands are not acceptable.

All emergency lighting luminaries shall comply with SANS 10114-2. Unless otherwise specified, emergency lighting battery units installed within or adjacent to the luminaries shall be of the maintained mode type and are capable of operating one lamp at 20% light output for 60 minutes. The unit shall have a self-testing facility that constantly monitors the status of the unit and discharges the nickel-cadmium batteries on a regular basis. An LED status indication lamp shall be provided in a clearly visible position in/on the fitting.

Low voltage (12V) halogen “Dichroic” lamps shall be of the type rated at 4000 hrs and shall be as per “OSRAM TITAN” or other approved.

All lamps supplied with the light fittings shall be from a reputable manufacturer, such as the following:
‘GE’, ‘OSRAM’, ‘PHILIPS’ or ‘SYLVANIA’.

The Contractor shall where necessary make allowance for additional fixing members, such as timber battens in suspended ceilings, in order to provide for the number of light points called for in this specification

As a minimum, all light fittings surface mounted against standard round conduit boxes shall be fixed with at least two (2) non-rust screws such as brass or stainless steel.

All light fittings recessed in suspended ceilings with removable tiles shall be connected by means of flexible cable, plug and socket arrangement. The flexible cable shall be a minimum of 1.5mm² PVC insulated and shall not exceed 3m in length.

Sockets installed within ceilings voids beneath reinforced concrete slabs shall be securely fixed against ceiling slab or suspended trunking and shall accessible from below the ceiling. In situations like in roof structures or in ceilings where the voids are excessive, the socket outlets shall be fixed to rigid roof structure members or to a rigid wireway system to the approval of the Engineer.
The Contractor shall maintain close liaison with the ceiling specialist when installing recessed fittings.

Fittings mounted against suspended board ceilings shall, in addition to being fixed to the conduit outlet box, be fixed at two points using 50mm No.10 round head brass screws and oversize washers. Fittings mounted against concrete or brick surfaces shall be fixed with at least two No 8 plastic anchors and 50mm No10 round head screws and oversize washers. Fender washers shall be used when fixing fluorescent fittings. Fittings may only be fixed direct onto conduit boxes if additional fixings are provided.
Fittings mounted against steel trunking shall be fixed with “P2540” hollow brass adapters. Fittings mounted against steelworks shall be fixed with approved galvanised steel brackets. Drilling of steelworks for fixing purposes may only be done with the approval of the Structural Engineer.

High-bay fittings suspended from roof trusses shall be fixed by means of galvanised steel chain having links of not less than 5mm diameter. Each fitting shall be suspended with two (2) separate steel chains utilising “CADDY” clips or other approved fixing devices.

Outdoor mounted fittings exposed to the weather shall suitably sealed to prevent ingress of moisture into the fittings or conduit boxes.

The connection to outdoor floodlights or equipment using a similar flexible connection shall be carried out with uv-resistant neoprene cable of suitable cross-section.

Supply of light fittings

The sub-contractor shall allow in the tender for the cost of administration, offloading on site, storage, handling, installation, cleaning and commissioning of all indoor and outdoor light fittings, The contractor shall be held liable for any damage to luminaires from the date of receipt until the date of handover to the Employer.

Installation of light fittings

In all cases where luminaires are fixed to ceilings, the Contractor shall ensure that the ceiling is capable of carrying the weight of the luminaires before commencing installation. Should any doubt exist in this regard, the matter shall be referred to the CLIENT. All additional required supports to be included within the installation rate of the specific light fitting.

(a) Positions

The mounting positions of light fittings shall be verified on site. All fittings shall be placed symmetrically with respect to ceiling panels, batons, beams, columns or other architectural features of the space. Should the Domestic Sub-Contractor neglect to refer any discrepancies to the Engineer, cost incurred as a result of subsequent alterations to suit the architectural features will be to the Domestic Sub-Contractor's account.

(b) Hangers and supports

Where provision has not been made for the support of fittings, the Domestic Sub-Contractor shall supply the necessary supports, hangers, conduit extensions, angle brackets or any fixing method approved by the Engineer.

(c) Ceilings

In all cases where light fittings are installed in ceilings, the ceiling shall be capable of carrying the weight of the fittings. Ceilings shall either be of the concealed 'T' acoustic tile or plaster board type. When installing fluorescent fittings in ceilings, a gap shall not be visible between the fitting and the ceiling. Fittings shall be constructed for installation from below.

(d) Continuous rows of light fittings

In cases where fluorescent fittings are installed in tandem, only one connection point need to be supplied per circuit. All fittings shall be coupled to one another by means of nipples or bushes and lock nuts to ensure that the wiring is not exposed and that earth continuity is maintained. Fittings on the same circuit may be wired through the channel formed by the fitting canopies. In this case silicon-rubber insulated conductors shall be used and internal connections shall be made at terminal blocks, Screw connectors are not acceptable. The wiring for any other circuits or outlets, even though these may be in the same row may not be installed through the fitting canopies. The Domestic Sub-Contractor shall ensure that continuous rows are straight and parallel to the relevant building lines.

(e) Recessed light fittings

Where recessed light fittings are indicated the Domestic Sub-Contractor shall maintain close liaison with the Ceiling Contractor. In the case of tiled ceilings, the fittings shall be installed while the metal supports are being installed and before the tiles are place in position. The Contractor shall ensure that the ceiling is capable of carrying the weight of the luminaires before commencing installation.

The Domestic Sub-Contractor shall be responsible for the co-ordination of the cutting of ceiling tiles or plasterboard with the Ceiling Contractor. All mounting rings and other accessories shall fit closely into cut-outs to ensure a proper finish.

(f) Waterproof light fittings

Waterproof and flameproof fittings shall be screwed directly to the conduit end. Draw boxes that may be required must be approved by the Engineer beforehand.

(g) Bulkhead fittings

Surface mounted bulkhead fittings shall not be screwed directly to conduit ends. The conduit shall terminate in a round draw box at the back of the fitting. The PVC insulated conductors shall terminate in a porcelain terminal block in the draw box. Asbestos or silicon-rubber insulated conductors shall be used from the terminal block to the fitting lamp holder. Screw connectors will not be allowed.

(h) Luminaires fixed to Ceilings

In all cases where luminaires are fixed to false ceilings, the Contractor shall ensure that the ceiling is capable of carrying the weight of the luminaires before commencing installation. Should any doubt exist in this regard, the matter shall be referred to the Department.

In cases where the weight of the luminaire is not carried by the ceiling but by a support or other suspension method, provision shall be made to prevent relative movement between the ceiling and luminaire, ceiling rose or connection point.

Surface mounted fluorescent luminaires shall fit firmly against the ceiling brandering without leaving gaps between luminaire and ceiling. The luminaire shall be fixed directly to the ceiling by means of brass plated round-head wood screws and washers or butterfly screws.

In case of tiled ceilings with exposed or concealed T-section supports, surface mounted luminaires shall be fixed only to the tiles by means of butterfly screws. The tiles shall be suitably reinforced. Luminaires may alternatively be fixed to metal cross-pieces resting in the ceiling tees.

Drilling of holes in ceiling tees to support luminaires will not be allowed. Luminaires shall be fixed in neat relation to the ceiling lay-out.

(i) Type of Conductor

PVC insulated conductors, unless protected by an approved heat-resistant sheathing, shall not be used where the temperature of the insulation is likely to exceed 700C. In unventilated luminaires or luminaires capable of housing incandescent laps over 60W, the interconnecting wiring from the lamp holder to the circuit wiring shall consist of silicon-rubber insulated conductors. Silicon-rubber insulated conductors shall be used exclusively in the case of high bay fittings.

9. EARTHING AND BONDING

The Contractor will be responsible for all earthing and bonding of the building and installation. The earthing and bonding is to be carried out strictly as described in clause 20 of Part 1 of this specification and to the satisfaction of the Employer/s Electrical Engineer.

The resistance of the main electrical earth shall be not less than 1 ohm.

10. MAINTENANCE OF ELECTRICAL SUPPLY

All interruptions of the electrical supply that may be necessary for the execution of the work, will be subject to prior arrangement between the Contractor and the Client and the Employer’s Electrical Engineer.

11. WIREWAYS

All conduits, regardless of the system employed, shall be installed strictly as described in the applicable paragraphs of Part 1 of the specification. The wiring of the installation shall be carried out as directed in part 1 of this specification.

Where plain end conduit is offered all switches and light fittings must be supplied with a permanent earth terminal for the connection of the earth wire.

Lugs held by switch fixing screws or self-tapping screws will not be acceptable.

PVC conduit is to be utilized in when recessed in brick work or cast in concrete. Hot Dip Galvanized metal conduit to be utilized where conduit is to be installed outdoors & within all roof spaces. All conduits to be SABS approved.

The Contractor shall ensure that all wireways are completed timeously, so as not to delay building operations, and shall advise the Department's Representative, in good time, of such intended completion, so that it may be inspected prior to being covered up. The Contractor shall be in attendance when the Department's Representative carries out all such inspections.

The cut ends of all galvanised steel wireways shall be painted with zinc-rich cold galvanizing paint.

The various wireways used shall be as follows:

a) CONDUIT

Unless otherwise specified, all conduit concealed in floor slabs, walls & building structure shall be PVC. No surface mounted PVC conduit shall be permitted.

The tubing shall enable the loop-in wiring system to be followed throughout the installation. The Contractor shall allow 25% spare conduit between all flush mounted distribution boards and ceiling spaces.

Where conduit outlet boxes or draw boxes are mounted on finished surfaces, the Contractor shall ensure that such outlets are mounted symmetrically.

Drawboxes with blank covers shall be allowed for, in the conduit runs as necessary. Drawboxes with sliding conduit shall be installed where conduit crosses expansion joints. Galvanised draw-wire of 1,6mm diameter shall be drawn in all conduit provided for other services.

Conduit in roof spaces must be installed neatly and must wherever possible run along and/or at right angles to roof trusses and must not cross-over.

At building expansion joints, all the conduits must be provided with conduit expansion joints with a positive earth wire connection.

'Kopex' or other approved flexible conduit shall be used to connect movable appliances using approved connectors, etc. Earth conductors shall be installed together with PVC conductors in flexible conduit to ensure earth continuity.

Where plain-end hot dipped galvanized conduit is specified all switches and light fittings must be supplied with a permanent earth terminal for the connections of the earth wire.

b) CONDUIT OUTLET BOXES

Round conduit boxes shall be not less than 50mm deep PVC with brass screw inserts. Outlet boxes for switches and power points shall be 100 x 50 mm and 100 x 100mm galvanised steel. PVC outlet boxes will be permitted in open semi-exposed areas as directed by the Department's Representative.

c) 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

The power trunking must comply with SANS 61084. The Contractor must ensure that the power trunking is installed to satisfaction of the Employer's Electrical Engineer before commencing with the wiring of the power trunking.

All trunking and trunking accessories shall be similar or equal to O-Line Support Systems and both shall be hot dip galvanized to SANS 32. Trunking shall be installed complete with clip-on galvanized metal covers. Adjoining lengths shall be correctly aligned and securely joined by means of connection pieces that are pop-rivetted to both abutting sections. All adjoining sections shall be of identical rectangular section and shall butt tightly. Covers shall fit tightly across the joint.

Trunking shall be installed open end up wherever possible, but where it is installed on its side or in vertical runs all conductors shall be retained by means of metal clips or metal spacer bars at not less than 1m centres. All trunking shall be vermin proof after installation. All holes shall be covered by metal plugs or by means of metal strips that are pop-riveted to the channel.

Electrical and mechanical continuity shall be maintained throughout the trunking installation. A tinned copper bonding strip shall be installed across each joint and secured to both adjoining lengths by means of brass bolts, nuts and washers. The trunking shall be bonded to the earth bar of the associated switchboard.

All bends shall be of easy sweep design with 45° cornices. Burrs and sharp edges shall be removed and the inside edges of all joints shall be lined with silicon or other suitable rubberised compound to prevent conductor insulation laceration.

Trunking shall be large enough to ensure that the combined total cross-sectional area (including insulation) of all conductors does not exceed 40% of the cross-sectional area of the trunking.

The Contractor shall supply and install all hangers, supports or fixings required for the trunking. Trunking up to 127mm x 75mm shall be supported at maximum intervals of 1500mm and where trunking is suspended from roof structures this shall be done using CS3300 and threaded galvanized rods. Trunking runs shall be carefully planned to avoid clashes with other services and to ensure that all covers can be removed after completion of the entire installation.

All conduit connections shall be terminated by means of a female bush. All holes which conductors pass through shall be equipped with grommets.

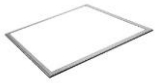
d) POWERSKIRTING

The powerskirting shall come complete with purpose made accessories. Conduit access to the powerskirting shall be via flush mounted 100 x 50 steel boxes set behind the trunking. Slots cut/punched into the trunking for wiring purposes shall be free of sharp edges.

Where powerskirting is interrupted by doorways etc., conduit of not less than 32mm diameter shall be provided to bridge the break in each compartment. Where continuous powerskirting runs through walls a small section of powerskirting with cover shall be built-in the wall.

Power skirting is be of the powder coated galvanized metal type. All plug points installed to be screwed on. Colour to be confirmed by Architect.

Power skirting in all areas to be earthed as per SANS 10142.

TYPE	WATT	DESCRIPTION	PICTURE	MAKE & CAT. No.
R2	1x40w	IP20,Aluminium Frame,Power Factor >0,9,230V,50Hz,SABS Approved,2kV Surge Protection,non discolouring Flicker free Driver, CRI>80,CCT 4000K, Lumen Output 4000Lumens		Lihlelight RE 40w 600 x 600 LED with cordset
R3	1x60w	IP20 LED Panel,Aluminium Frame,Power Factor >0,9,230V,50Hz,SABS Approved,2kV Surge Protection,non discolouring Flicker free Driver, CRI>80,CCT 4000K, Lumen Output - 6000 Lumens, 30 % light output for 2 hour emergency Back-up		Lihlelight Emergency RE 60w 1200 x 600 LED with cordset
		SURFACE		
S1	1x45w	SABS Approved, LED, IP20,2kV surge Potection, Cold rolled mild steel with white epoxy coated finish,aluminium extruded frame with opal diffuser inside of frame,flicker free driver,Lumen Output - 4000k,230V,50Hz,CRI>80		Lihlelight 45W SM 1500 x 254 LED with Cordset
S2	1x45w	SABS Approved, LED, IP20,2kV surge protection, Cold rolled mild steel with white epoxy coated finish,aluminium extruded frame with opal diffuser inside of frame,flicker free driver,Lumen Output - 4000k,230V,50Hz,CRI>80, Emergency Back-up 30% light output for 2 hour duration		Lihlelight 45W SM emergency 1500 x 254 LED with Cordset
S3	1x60w	IP 20, LED panel,230V,50Hz,Flicker free driver,2kV surge protection,CCT 4000k,Aluminium Frame,CRI > 80, Emergency Back-up with 30% light output for a 2 hour duration, Lumen Output - 6000 Lumens		Lihlelight Emergency SM 60w 1200 x 600 LED with Cordset
S4	1x60w	IP 20, LED panel,230V,50Hz,Flicker free driver,2kV surge protection,CCT 4000k,Aluminium Frame,CRI > 80		Lihlelight SM 60w 1200 x 600 LED with Cordset
S5	1x49w	LED,SABS Approved,IP 65,IK08,230v,50Hz,10kA,4000K,colour rendering >80,high impact polycarbonate,with two stainless stell mounting clips.Lumen Output 7353 lumens,5ft. 6 A plug top with 3m Cabtyre,		VLN LINEAR 178 LED 49 4000K 1500MM
S6	2x6w	SABS Approved,IP65 ,230V,50hZ, flicker free driver,LM 6 die cast aluminium,GU10 Lamps,black finish,stainless steel screws,1kV surge Protection		Lihlelight 2 x 6w Up Downlights
S7	19,29w/m	LED Continuous Light,IP20,2kV Surge Protection,Extruded Aluminium,powder coated black finish,ceiling mounted,CCT 4000K, CRI > 80,Flicker free driver , Lumen output 3702 Lumens per Metre		Lihlelight Linear 15m
Notes:				
1.	Alternative makes of luminaires will only be considered in terms of the Detailed Specification in Part 2 of the tender document.			
2.	Similar or Equal Approved			

The powerskirting compartments shall be utilised as follows:

Upper compartment - Power

Centre compartment - Data

Lower compartment - Telephone

e) FLOOR BOXES

N/A

f) CABLE TRAY / LADDER

The Contractor shall supply and install all cable trays or ladders required for electrical cables as well as all wire mesh trays required for electronics services cables and the necessary supports, clamps, hangers, fixing materials, bends, angles, junctions, reducers, T-pieces, etc.

Tray type

Unless otherwise specified, all cable trays shall be medium duty type perforated hot dip galvanized (to SANS 32) cable trays**.** All supports, hangars and accessories to be hot dip galvanized (to SANS 32).

Wire mesh trays

Wire mesh trays shall be medium duty hot-dipped galvanized type.

Supports

Cable tray supports shall consist of two steel hangar rods, at least 10mm in diameter, on both sides of the tray with a substantial steel cross-member on the underside of the tray and bolted to the rods. Alternatively, cable trays may be cantilevered from walls on suitable brackets.

Trays and ladders shall be supported at maximum intervals of 900mm. In addition trays and ladders shall be supported at each bend, off-set and T-junction.

Joints

Joints shall be smooth without projections or rough edges that may damage the cables. The Domestic Sub-Contractor will be required to cover joints with silicon or other hardening rubberised or plastic compounds if in the opinion of the Engineer joints may damage cables. Joints shall as far as possible be arranged to fall on supports. Where joints do not co-coincide with supports, joints shall be made by means of wrap- around splices of the same thickness as the tray and at least 450mm long.

The two cable tray ends shall butt tightly at the centre of the splice and the splice shall be bolted to each cable tray by means of at least 8 round head bolts, nuts and washers. Splices shall have the same finish as the rest of the tray.

Fixing to the supports

Trays shall be bolted to supports by at least two round head bolts per support. Bolts shall be securely tightened against the tray surface to avoid projections which might damage cables during installation.

Fixing of the structure

The supports for cable trays and ladders shall in all cases be securely fixed to the structure by means of heavy duty, expansion type anchor bolts. It is the responsibility of the Contractor to ensure that adequate fixing is provided since cable trays and ladders that work loose shall be rectified at his expense.

Accessories

Purpose-made horizontal and vertical bends, T-junctions and cross connections shall be supplied by the Domestic Sub-Contractor. The dimensions of these connections shall correspond to the dimensions of the linear sections to which they are connected. The inside dimensions of bends shall be large enough to ensure that the

allowable bending radius of the cables is not exceeded. Sharp angles shall have a 45° cornice. All accessories shall be galvanized.

Installation of cables

Electrical cables shall be installed by the Domestic Sub-Contractor adjacent and parallel to each other on the trays. Horizontal trays and ladders shall in general be installed 450mm below slabs, ceilings, etc. to facilitate access during installation.

Data/telephone cables shall be supplied and installed by others.

Earthing

Metal trays and ladders shall be bonded to the "Building" Earth bar of the switchboard to which the cables are connected. Additional bare copper stranded conductors or copper tape shall be bolted to the tray or ladder where the electrical continuity cannot be guaranteed.

Painting

No painting of trays or ladders shall be required.

12. WIRING

Wiring of the installation shall comply with General Specification Part 1 for Electrical Installations.

No open wiring nor the drawing of mixed circuits nor the drawing of more than two circuits of the same type of load per conduit will be permitted

All wiring of individual circuits installed in trunking or power skirting shall be harnessed together to facilitate the ease of identification of such circuits.

The wiring in roof spaces above ceilings with removable suspended tiles shall be wired via a wireway system of galvanised steel trunking and PVC conduit that provides maximum flexibility. The wireway system shall be to the approval of the Department's Representative. The final connection to recessed light fittings shall be via 6 A socket outlets which are within arm's reach of the fitting.

All wiring installed in conduit concealed within hard board ceilings shall be accessible from below the ceiling for re-wiring purposes. The final connection to recessed light fittings in hard board ceilings shall be via 6 A socket outlets in round conduit boxes that are connected to flexible PVC conduit. The flexible conduit shall be of sufficient length to enable the light fitting supply lead to be plugged into the socket outlet from below the ceiling. The wireway system employed in hardboard ceilings shall be to the approval of the Department's Representative.

13. POWER POINTS

Allow for the installation of power points and equipment as listed in the schedule.

Details of the power outlets for the various type of equipment to be connected shall be as follows:

1. Air Conditioning Units

   Isolators for indoor air conditioning units, wall mounted at low level, shall be rated at not less than 20 A with cord grip outlet and flush mounted in power skirting adjacent to the connection point of the unit. The final connection to the unit shall be with suitably rated white PVC flexible cable.

   Isolators for indoor air conditioning units, wall mounted at high level, shall be rated at not less than 20 A with cord grip outlet installed in suitable flush mounted box adjacent to the connection point of the unit. The final connection to the unit shall be with suitably rated white PVC flexible cable.

Isolators for air conditioning units mounted externally or in ceiling voids, shall be rated at not less than 20 A and installed in suitable GRP box with sliding lid mounted adjacent to the connection point of the unit. The final connection to all external units shall be with suitably rated black uv-resistant neoprene flexible cable.

2. Hot Water Heaters

Isolators for instant hot water heaters shall be 50 A, 2-pole with neon indication light flush wall-mounted adjacent to the heater. A flush round conduit box shall be provided behind the heater for the electrical connection and shall be linked to the isolator with 25mm conduit.

NOTE: The hot water installation must be approved by the Employers Electrical Engineer. Detail with regard to the size and type of water heaters that must be provided must be obtained from the Architect.

14. EXCAVATION AND CABLE SLEEVES

The Contractor shall acquaint himself with the position of existing services such as storm water pipes, water mains, power cables, telephone cables, etc. and take the necessary precautions before commencing excavations to prevent disruption of these services. Any damage caused by the Contractor to these services shall be repaired at his cost.

The Contractor shall take the necessary precautions and provide the necessary warning signs and/or lights to ensure that the public and/or employees on site are not endangered.
The Contractor shall take the necessary precautions to safeguard existing structures, sewerage works, water reticulation works, roads or other property on the site from any damage or risk of subsidence.
Cable trenches for underground LV cables installed in general areas shall be excavated to a depth of not less than 750mm below ground level and the width shall not be more than 400mm for one or two cables. The minimum cover from the top of the cables to finished ground level shall not be less than 600mm for LV cables and 1000mm for MV cables.

Cable trenches for underground LV cables installed under roads and load bearing areas shall be excavated to a depth of not less than 950mm below ground level and the width shall not be more than 450mm for one or two cables. The minimum cover from the top of the cables to finished ground level shall not be less than 800mm.

The width shall be increased where more than two cables are laid together so that the cables may be spaced at least 150mm apart throughout the run. The bottom of the trench shall be level and clear and the bottom sides free from rocks or stones liable to cause damage to the cables.

Cable trenches may not be backfilled before the cables laid on the bedding have been inspected and the cables have been tested. Cable trench shall be backfilled and properly compacted in layers with suitable hand tampers or mechanical stampers to ensure that there is no subsidence. During compaction the soil may have to be moistened to an optimum moisture content to attain an adequate compaction density. If suitable backfill material is not available at the trenches, the Contractor shall obtain it elsewhere at no additional cost.

All surplus ground and rocks shall be removed from the site of works and this cost be included in the Contractor's tender price.

Tenderers must base their cost of trenching in soft or hard material on the total quantities as indicated in the Bill of Quantities. The actual quantities, based on the applicable number of cables to be laid, will be measured on site during the course of the service and adjustments made according to the price per cubic metre as inserted in the Bill of Quantities by the Tenderer. Payment for the trenching having a greater volume than that specified for the purpose will not be considered except where extra excavations are necessary to by-pass obstacles such as water pipes, drains, large boulder etc. In all such instances the amount of the extra excavations must be agreed upon on site between the Engineer and the Contractor.

The tendered rate shall include full compensation for clearing and grubbing the trench areas and the temporary removal of improvements from the line of the trench, for excavating the trench, preparing the bottom of the trench, separating material unsuitable for backfill, keeping the excavations safe, dealing with any surface or subsurface water, measuring, classification and keeping of all records and for separating topsoil and selected backfill material where necessary.

The rate shall furthermore cover the costs of installing the sand bed and sand cover, backfilling, compacting and disposing of the surplus material.

The materials excavated shall be classified as follows for payment purposes:

Hard material:
Material which cannot be excavated efficiently except with the use of pneumatic tools, blasting or wedging and splitting, and shall include boulders exceeding 0, 15 m^3 in volume.

Soft material:
All material not classified as hard material. Notwithstanding the above classification, all material previously constructed fills, embankments, pavement layers and from above existing services shall be classified as soft material.

The decision of the Department's Representative as to the classification of the material shall be final and binding and any objection as to the classification shall be made before the excavation has been backfilled.

The measured items shall include any or all of the following classes of material, which shall be as specified in the Preambles to all Trades:

(1) Excavate in soft material for trenches, backfill, compact and dispose surplus material.

(2) Extra over on item (1) for excavating in intermediate material, compact and dispose surplus Material

(3) Extra over on item (1) for excavating in hard rock and dispose surplus material.

(4) Extra over on item (1) for using backfill material obtained from sources provided by the Contractor.

All underground sleeves shall, unless where otherwise specified, comprise uPVC pipes.
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.

Suitable large radius or easy bends shall be allowed where sleeves are to terminate in distribution boards or draw boxes. Sleeves terminating in manholes are to be positioned to provide maximum cable bending radius.

The top of all underground sleeves, which are installed in general areas other than roadways and load bearing areas, shall be not less than 600mm below finished ground level. PVC warning tape shall be installed 300 below finished ground level directly above the sleeves.

Where cables cross under roadways or other load bearing areas the cables shall be installed in asbestos-cement pipes, earthenware or high-density polyethylene sleeves. In all such cases the top of the sleeves shall be not less than 800 mm below the finished level of the road surface for LV cables and 1000mm for MV cables.

Before backfilling, the ends of all used and unused sleeves shall be sealed with paper and weak cement mix or a suitable non-hardening watertight compound. Suitable nylon draw cords shall be installed in all unused sleeves.

15. CABLES

1000 volt PVC SWA/ECC and 110 Volt ECC cable and accessories shall be in accordance with the relevant SABS specifications to SABS 1507. Copper cables are to be utilized unless otherwise stipulated.

The storage, transportation, handling and laying of the cables shall be according to first class practice, and the contractor shall have adequate and suitable equipment and labour to ensure that no damage is done to cables during such operations.

The cable-trenches shall be excavated to a depth of 0,6m deep below ground level and shall be 450mm wide for one to three cables, and the width shall be increased where more than three cables are laid together so that the cables may be placed at least two cable diameters apart throughout the run. The bottom of the trench shall be level and clean and the bottom and sites free from rocks or stones liable to cause damage to the cable.

The Contractor must take all necessary precautions to prevent the trenching work being in any way a hazard to the personnel and public and to safeguard all structures, roads, sewage works or other property on the site from any risk of subsidence and damage.

In the trenches the cables shall be laid on a 75mm thick bed of earth and be covered with a 150-mm layer of earth before the trench is filled in.

All joints in underground cables and terminations shall be made either by means of compound filled boxes according to the best established practice by competent cable jointers using first class materials or by means of approved epoxy-resin pressure type jointing kits. Epoxy-resign joints must be made entirely in accordance with the manufacturer's instructions and with materials stipulated in such instructions. Low tension PVCA cables are to be made off with sealing glands and materials designed for this purpose which must be of an approved make. Where cables are cut and not immediately made off, the ends are to be sealed without delay.

The laying of cables shall not be commenced until the trenches have been inspected and approved. The cable shall be removed from the drum in such a way that no twisting, tension or mechanical damage is caused and must be adequately supported at intervals during the whole operation. Particular care must be exercised where it is necessary to draw cables through pipes and ducts to avoid abrasion, elongation or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after drawing in of the cables.

Backfilling (after bedding) of the trenches 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.

On each completed section of the laid and jointed cable, the insulation resistance shall be tested to approval with an approved "Megger" type instrument of not less than 500 V for low tension cables.

Earth continuity conductors are to be run with all underground cables constituting part of a low tension distribution system. Such continuity conductors are to be stranded bare copper of a cross-sectional area equal to at least half that of one live conductor of the cable, but shall not be less than 4mm² or more than 70mm². A single earth wire may be used as earth continuity conductor for two or more cables run together, branch earth wires being brazed on where required.

15.1 LAYING, JOINTING AND MAKING OFF OF ELECTRICAL CABLES

[The requirements specified hereafter, are aimed essentially at high tension cable but are also valid for low tension cable, where applicable.]

1. The use of the term "Inspector", includes the engineer or inspector of the Client or an empowered person of the concerned supervising consulting engineer's firm.

2. No cable is to be laid before the cable trench is approved and the soil qualification of the excavation is agreed upon by the Contractor and inspector.

3. After the cable has been laid and before the cable trench is back-filled the inspector must ensure that the cable is properly bedded and that there is no undesirable material included in the bedding layer.

4. All cable jointing and the making off of the cables must only be carried out by qualified experienced cable jointers. Helpers of the jointers may not saw, strip, cut, solder, etc. The cable and other work undertaken by them must be carried out under the strict and constant supervision of the jointer.

5. Before the Contractor allows the jointer to commence with the jointing work or making off of the cable (making off is recognized as half a joint) he must take care and ensure:

5.1 That he has adequate and suitable material available to complete the joint properly and efficiently. Special attention must be given to ensure the cable ferrules and cable lugs are of tinned copper and of sufficient size. The length of the jointing lugs must be at least six times the diameter of the conductor,

5.2 That the joint pit is dry and that all loose stones and material are removed,

5.3 That the walls and banks of the joint pit are reasonable firm and free from loose material which can fall into the pit,

5.4 That the necessary coffer-dams or retaining walls are made to stop the flow of water into the joint pit,

5.5 That the joint pit is provided with suitable groundsheets so that the jointing work is carried out in clean conditions,

5.6 That the necessary tents or sails are installed over the joint pit to effectively avert unexpected rainfall and that sufficient light or lighting is provided,

5.7 That the necessary means are available to efficiently seal the jointing or cable end when an unexpected storm or cloudburst occurs, regardless of how far the work has progressed,

5.8 That the cables and other materials are dry, undamaged and in all respects are suitable for the joint work or making off,

5.9 That the heating of cable oil, cable compound, plumbers metal and solder is arranged that they are at the correct temperature when required so that the cable is not unnecessary exposed to the atmosphere and consequently the ingress of moisture (care must be taken of overheating)

Flow temperatures of cable oil and compound must be determined with suitable thermometers**.** Cable oil and compound must not be heated to exceed the temperatures given on the containers and precaution must be taken to ensure that the tin is not overheated in one position. The whole mass must be evenly and proportionally heated.

(Temperatures of solder and plumbers metal may be tested with brown paper (testing time: 3 seconds). The paper must colour slightly - not black or burnt).

6. Before the paper-insulated cables are joined, they must be tested for the presence of moisture by the cable jointers test. This consists of the insertion of a piece of unhandled insulated impregnated paper tape in warm cable oil heated to a temperature of 130 ± 5°C.

Froth on the surface of the oil is an indication that moisture is present in the impregnated insulation and the amount of the froth gives an indication of the moisture present.

7**.** If the cable contains moisture or is found to be otherwise unsuitable for jointing or making of the inspector is to be notified immediately and he will issue the necessary instruction to cope with the situation.

8. The joint or making off of paper insulated cables must not be commenced during rainy weather.

9. Once a joint is in progress the jointer must proceed with the joint until it is complete and before he leaves the site.

10. The jointer must ensure that the material and his tools are dry at all times, reasonably clean and absolutely free from soil.

11. Relating to the jointing of the cable the following requirements apply:

11.1 All jointing must be carried out in accordance with recognized and tried techniques and comply strictly with the instructions given by the supplier of the jointing kit.

11.2 The cables must be twisted by hand so that the cores can be joined according to the core numbers. If necessary the cable is to be exposed for a short distance to accomplish this. Under no circumstances may the cores in a joint be crossed so as to enable cores to be joined according to the core numbers. If it is not possible to twist the cables so that the preceding requirements can be met, then cores are to be joined in the normal way without any consideration of the core numbers.

11.3 Normally the cables will have profile conductors. The conductors shall be pinched with gas pliers to form a circular section, bound with binding wire so that they do not spread, and then tinned before jointing.

11.4 Jointing ferrules, the length of which are at least 6 times the diameter of the conductors, must be slid over the conductor ends to be joined and pinched tightly. Then they are soldered by means of the ladle process whilst being pinched further closed.

Use resin only as a flux. The slot opening in the ferrule must be completely filled, including all depressions.

Remove all superfluous metal with a cloth dipped in tallow. Work during the soldering process must be from top to bottom. Rub the ferrule smooth and clean with aluminum oxide tape after it has cooled down to ensure that there are not any sharp points or edges.

NB: The spaces between the conductor strands must be completely filled by soldering process and must be carried out quick enough to prevent the paper insulation from burning or drying out unnecessarily.

11.5 After the ferrules have been rubbed smooth and clean, they and the exposed cores must be treated with hot cable oil (110°C) to remove all dust and moisture. These parts are to be thoroughly basted with the oil.

11.6 The jointer must take care that his hands are dry and clean before the joint is insulated. Also the insulating tape which is to be used must first be immersed in warm cable oil (110°C) for a sufficient period to ensure that no moisture is present.

11.7 After the individual cores have been installed they must be well basted with hot cable oil and again after the applicable separator and/or belt insulation tape is applied before the lead joint sleeve is placed in position.

11.8 The lead joint sleeve must be thoroughly cleaned and prepared before it is placed on the cable and must be kept clean during the whole jointing process. Seal the filling apertures of the sleeve with tape until the sleeve is ready for compound filling.

11.9 The plumbing joints employed to solder the joint sleeve to the cable sheath, must be cooled off with tallow and the joint sleeve is to be filled with compound while it is still warm. Top up continuously until the joint is completely filled to compensate for the compound shrinkage.

11.10 The outer joint box must be clean and free from corrosion. After it has been placed in position it must be slightly heated before being filled with compound. Top up until completely full.

12. As far as cable end boxes are concerned the requirements as set out above are valid where applicable.

15.2 FIXING OF CABLES TO TRAYS OR STRUCTURES

1 Installation

Cables may be installed in one of the following ways:

(a) On horizontal cable trays.
(b) Against vertical cable trays with suitable clamps.
(c) Against horizontal or vertical metal supports or brackets with suitable clamps.
(d) On clamps which are fixed to the structure.

2 Clamps

Suitable clamps (cleats) which will secure cables without damage shall be used. Metal clamps or drilled hard wood blocks shall be used. Clamps shall consist of adjustable metal wings which clamp to a metal support, or consist of two halves that are bolted together. The correct clamp size to fit the cable shall be used. Cables of different sizes nay only be fixed by a common clamp when the clamp is specially made to accommodate the various cables.

3 Spacing of Supports

Two methods of supporting cables are found in practice. The most generally known method is the restrained installation where the distance between supports is small enough to prevent any noticeable sag in the cable. The alternative method is the unrestrained installation where the distance between supports should be great enough to ensure that there will be obvious sag in each span between supports.

4 Spacing of Supports of Unrestrained Cables

Large single core cables shall always be installed according to this method. Generally, single core cables with conductors exceeding a cross sectional area of 185mm² should be supported at spacings in excess of 2m since the sag between supports will safely accommodate any thermal expansion.

Reducing the spacing between the supports to 1,5m or less shall be avoided at all costs, as expansion cannot be taken up by a change of sag and chances of sheath failure become considerable.

5 Spacing of Supports of Restrained Cables

Additional cleats shall be installed at each bend or offset in the cable run. The maximum distance between supports or cleats for multi-core control cables shall be 20 times the outside diameter of the cable with a maximum spacing of 550mm for unarmoured cables and 30 times the outside diameter of the cable with a maximum spacing of 900mm for armoured cables. Spacing of supports for cables for high voltage lighting shall be in accordance with Table 8 of SANS 10142. A minimum of 20mm ventilation clearance shall be maintained between cables and the wall to which they are cleated.

16. IDENTIFICATION

Labels indicating the circuit number shown on the ‘As-built’ records shall be provided on all cover plates. The label shall be permanently fixed and shall indicate the dB from which it is fed and the circuit number i.e. dB - 1/L2.

All isolators, dedicated socket outlets, telephone and TV outlet boxes and junction/terminal boxes shall be labelled using engraved plastic sandwich type labels fixed by means of epoxy adhesive.

All cables shall be labelled using approved durable labels. Labels shall be provided at the distribution boards as well as on both sides of underground sleeves crossing roadways and hardened areas.

Fixing equipment and materials shall be selected and engineered to suit the climatic and environmental conditions found on site. Wherever possible, special precautions shall be taken to avoid contact between dissimilar metals in order to prevent corrosion. Stainless steel fixings in aluminium housings shall be by means of special stainless steel ‘helicoil’ inserts to prevent corrosion and the screw from being fastened to the housing. Contact between aluminium and concrete surfaces shall also be avoided.
Light weight equipment mounted against walls or concrete ceilings may be installed with suitable wall plugs to the approval of the Engineer. Holes in joints between brick walls will not be permitted. The depth of the hole shall be equal to the length of the plug plus the thickness of the plaster.
Mounting of equipment against wood shall be done by means of appropriately sized greased screws and against board ceilings inaccessible from the back with toggle screws.

All heavy weight equipment shall be fixed to brick or concrete by means of expansion bolts. All exposed parts of the bolts shall be painted to have the same colour finish as the equipment. All expansion bolts used outdoors

shall be hot dip galvanised or stainless steel. Electro-plated galvanised expansion bolts will not be permitted outdoors.
All mounting brackets for outdoor use shall be hot dip galvanised steel after manufacture. All fixings used outdoors shall be hot dip galvanised, stainless steel or brass as appropriate. No electro-plated galvanised steel fixings shall be used outdoors. The Contractor shall adequately label all switches, socket outlets, isolators, telephone and TV outlet boxes and all junction/terminal boxes using engraved plastic sandwich type labels fixed by means of epoxy adhesive.

17. COMPLETION OF WORKS

Completion of works will occur and delivery shall be given only after the following procedure has been certified by the Department's Representative as having been carried out in accordance with the Specification:

1. After the defects are made good and approval of the Department's Representative is obtained, physical completion has been reported to the Department's Representative by the Contractor and the Department's Representative has given approval for "start-up".
2. "Start-up" has taken place.
3. Commissioning and testing has taken place as specified and test results have been witnessed (where required), recorded and finally approved by the Department's Representative.
4. Spares as specified have been handed over to the Department's Representative.
5. Three copies of indexed loose leaf manuals containing complete Operating Instructions and Maintenance Manuals have been furnished to the Department's Representative after approval by the Department's Representative, for all mechanical and electrical systems, equipment and controls for all equipment or systems specified under this Contract.

18. TESTING, COMMISSIONING & INSPECTIONS

On completion of the entire installation or any particular section thereof, as may be decided by the Engineer, tests shall be carried out in full accordance with the current edition of the SANS 10142 "Code of Practice for the Wiring of Premises", in the presence of the Engineer or his authorized Representative.

The Contractor should note that where applicable at least the following tests (but not limited to) must be carried out:

1. Insulation test
2. Continuity test
3. Loop Line Earth Impedance test
4. Polarity test
5. Earth Leakage Circuit Breaker test
6. Any further test to meet the local Supply Authority requirements or as deemed necessary by the Engineer.
7. Earth termination test

Note:

- All instrumentation necessary for testing shall be provided by the Electrical Sub-Contractor.
- The results of the above tests must be clearly recorded, signed and handed to the Engineer.
- Once the Engineer has inspected the complete installation and satisfied himself that all testing has been completed and the Contract is complete in all respects, may the Engineer be approached in writing with the above documentation with a view to arranging a hand- over date.
- On completion of the Contract, the Electrical Sub-Contractor shall provide the Engineer with a completed and signed Certificate of Compliance for Electrical Installations for all distribution boards as required by the Occupational Health and Safety Act as amended.
- **Inspections by the Engineer will take place on a sampling basis only. The Engineer is not responsible to ensure that the Contractor meets with the requirements of the Specification, but will assist the Contractor in an effort to identify problem areas at an early stage. At no time will an inspection by the Engineer alleviate the Contractor of his responsibility to provide the Employer with a Contract Works which conforms in all respects with the requirements of the Specification.**
- The Contractor is required to balance the load as equally as possible over multi-phase supplies.
- The mandatory "Certificate of Compliance" shall be issued by the Contractor to the Supply Authority, with a copy to the engineer prior to first delivery being taken.

- The installation shall be tested by the Contractor as the service progresses or as required by the Head: Works and upon completion, for earth continuity and insulation. The final test before the taking over of the installation shall be made in the presence of the engineer.
- On all completed new work or where specifically called for in the Tender Document, the Contractor shall, on completion of the works, submit to the Client representative, a marked up site plan indicating the exact underground cable reticulation. Upon successful completion of all testing the Contractor shall submit a fully completed test report together with a Certificate indicating that the installation fully complies with the Specification and all relevant statutory requirements.

19. TRAINING

After successfully testing and commissioning the installation, the Contractor will be required to thoroughly train and instruct at least two Operators/Supervisors designated by the school in the correct use, operation and supervision of the Electrical installation, School Siren installation, Generator installation, Lightning Protection installation and Intruder Alarm installation. The Contractor shall allocate a competent member of his staff for this purpose and shall allow adequate time for this in his price.

A comprehensive operator-training programme shall be provided, and shall cover all aspects of the installations so as to provide a first line local support to the staff, both operational and managerial. The training sessions shall comprise lectures and on-site (hands-on) demonstrations, and shall conduct over a minimum 2-day period. The Contractor shall provide a training plan and syllabus to the Department's Representative for approval. Approval of the training plan and syllabus shall be a condition for issue of a Certificate of Practical Completion for the installation. No training shall commence without the Department's Representative's approval of the final draft Operating and Maintenance Manual for the installation. Training registers are to signed by all members receiving training and a copy of all signed registers are to be included in the respective handover files.

The training shall include the following topics as a minimum:

1. Hardware-
(a) Overview and functioning of system and equipment.
(b) Network and cabling.
(c) Components and field replacement.
(d) System maintenance and specific tasks related to preventative maintenance.
(e) Interpretation and understanding of the Operating and Maintenance Manuals, with specific reference to requirements in cases of corrective and breakdown maintenance.

2. Support-
(a) Trouble shooting problems /queries.
(b) Support programme and procedures.
(c) Support communications.

Training certificates shall be issued at the end of the training, when the Contractor is satisfied that the persons trained have an adequate understanding of how the system functions, and are able to operate the system effectively. Copies of the certificates shall be included in the operating and maintenance manual.

20. OPERATING, MAINTENANCE AND INSTRUCTION MANUALS

The Contractor shall be responsible for the compilation of a complete set of Operating, Maintenance and Instruction Manuals for the entire Electrical installation, Intruder Alarm installation, Generator installation, Lightning Protection installation and School Siren installation.

The manual shall be bound in hardcover plastic-coated A4 lever-arch files as per 'Bantex' or similar and approved. Sections of the manuals shall be clearly partitioned using labelled coloured plastic sheets. Pamphlets, bound leaflets/booklets. And drawings shall be placed in clear plastic pockets.

The manual shall contain at least the following headings:

1. Introduction
   (a) Scope of the manual
   (b) General arrangement of the manual
   (c) Description of installation
   (d) Specification

2. Schedule of equipment installed with pamphlets, names of Agents and Suppliers.
3. Parts and components list
4. Operating procedures
5. Maintenance
   (a) Purpose of maintenance
   (b) Preventative maintenance
   (c) Trouble-shooting
   (d) Planned service maintenance programme

6. Breakdown maintenance and repair, and name, address and telephone number of Contractor and after hours service.

7. Appendices including testing, commissioning data and training registers.

8. Drawings and diagrams

A draft copy of each Operating, Maintenance and Instruction Manual shall be submitted to the Department's Representative for approval. The manual will be reviewed and checked by the Department's Representative and returned to the Contractor with comments, where necessary. The Contractor shall make the necessary changes and amendments to the manual to incorporate the Department's Representative's comments.
The final draft copy of each Operating, Maintenance and Instruction Manual shall be submitted to the Department's Representative at least one week prior to commencement of testing on commissioning. This set of manuals will not be accepted without the Contractor's verification of the information contained in the manuals and the professional language editing thereof. The Department's Representative shall return the manual to the Contractor, who shall make the final corrections.

The Contractor shall include all test certificates and all details of the Electrical installation. All such information and certificates shall be to the approval of the Department's Representative. Electronic copies of the final manual shall be handed over to the department's Representative upon approval of the Operation, Maintenance and Instruction Manual.

Approval of final Operating, Maintenance and Instruction Manual shall be a prerequisite for issuing of a Certificate of Practical Completion for the installation.

PART 3: QUALITY SPECIFICATION FOR MATERIALS AND EQUIPMENT OF ELECTRICAL INSTALLATIONS

CONTENTS

PART 3: QUALITY SPECIFICATION FOR MATERIALS AND EQUIPMENT OF ELECTRICAL INSTALLATIONS

1 SWITCHGEAR

a) GENERAL

Switchgear, which includes circuit breakers, iron-clad switches, interlocked switch-socket outlet units, contactors, time switches, etc., is to be in accordance with the Departmental Quality Specifications which form part of this specification and shall be equal and similar in quality to such brands as may be specified.

For uniform appearance of switchboards, only one approved make of each of the different classes of switchgear shall be used throughout the installations.

Circuit breakers shall be of the size and type as directed and specified for the service. They shall comply with SABS Specification 156 and SABS IEC 60947-2.

Switchgear manufactured in South Africa shall be given first preference and far as possible be used. Switchgear where applicable shall bear the SABS mark and comply with the requirements of the appropriate B.S. or I.E.C. specification and applicable standards below.

Imported materials shall comply with the requirements of the appropriate B.S. or I.E.C. specification and applicable standards below.

Circuit breakers and all switchgear shall be approved by the Department's Representative. Boards with fault level ratings less than 10 kA shall comply with SANS 1765 and fault levels equal to or greater than 10 kA with SANS 60439-1. Surge arresters for use in distribution boards shall comply with SANS IEC 61643-1.

b) APPLICABLE STANDARDS

Number	Title	Use
IEC/EN – 60947 - 2	Low-voltage switchgear and controlgear – Part 2: Circuit-breakers	Applies to circuit-breakers, the main contacts of which are intended to be connected to circuits, the rated voltage of which does not exceed 1 000 V a.c. or 1 500 V d.c.
IEC/EN 60364	Low-voltage electrical installations	
IEC/EN 61643-1	Low-voltage surge protective devices	This part of IEC 61643 is applicable to devices for surge protection against indirect and direct effects of lightning or other transient overvoltages.
IEC/EN – 61643-11	Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods	
IEC/EN – 60 898	Circuit breakers for over current protection for household and similar installations.	Double standard conformity
IEC/EN – 61008-1	Residual current operated circuit-breakers without integral over current protection for household and similar uses	
IEC/EN 60479-1	Effects of current on human beings and livestock Part 1: General aspects	
IEC/EN 61000-4-5	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test Reference	
IEC/EN 60755	General requirements for residual current operated protective devices	
IEC/EN 61009-1	Residual current operated circuit-breakers with integral over current protection for household and similar uses (RCBOs).	

c) PROTECTIVE DEVICES CHARACTERISTICS

The breaking devices must be capable of heavy-duty operation and to that end; the manufacturer shall guarantee the following performance levels:

- Suitability for isolation
- Positive contact indication through a green strip indicator operating independently to the toggle position
- Rated insulation voltage: 500 V (visisafe)
- Pollution degree: 3
- Rated impulse-withstand voltage: 6 kV (visisafe)

They will also provide, on their front face, an integrated indication of welding contacts.

To ensure the longest possible service life, switching mechanisms shall be designed to make the contact-closing speed totally independent of the operator's action. (Fast closing)

Contact positions, for breakers and residual current devices, shall be clearly indicated on the front of devices and marked:

- "I - ON", standing for device contacts closed, circuit energised,
- "O - OFF" with a green background, standing for device contacts open, circuit disconnected.

The breakers and residual current devices shall all provide a dedicated and integrated indication, enabling to identify a fault-driven tripping. (Visitrip)

For safety insurance, accessible parts of the devices, when installed in a suitable enclosure, shall feature:

- degree of protection IP40
- Insulation class II.

d) BREAKERS GENERAL CHARACTERISTICS AND OPERATION

Circuit breakers characteristics:

Circuit breakers shall comply with international standards IEC/EN 60898 and IEC/EN 60947-2
Compliance with these standards shall be certified by an independent organisation and its quality mark shall be visible on the devices.

Circuit Breakers Operation:

Circuit breakers shall be capable of operation under ambient temperature up to 50 °C, without de-rating of their overload tripping threshold with respect to their rated operating current.
Where the line supplying the switchboard is protected by a circuit breaker rated 125 Amps or more, the protection provided by this one shall be totally selective with respect to circuit breakers located in the switchboard (up to 63 A, type B or C).

e) RESIDUAL CURRENT DEVICES GENERAL CHARACTERISTICS

RCCB general characteristics:

RCCBs shall comply with international standard IEC/EN 61008.
Compliance with the standard shall be certified by an independent organization and its quality mark shall be visible on the devices.
The rated making and breaking capacities shall be at least equal to 1.5 kA both for fault currents between live conductors (Im) and for earth-fault currents (IΔm).
The rated conditional short-circuit currents (Inc and IΔc) shall be greater than or equal to the prospective short-circuit current at the point of installation (Isc as per IEC 60364). The manufacturer shall guarantee these values do not differ from the rated breaking capacity of the circuit breaker providing short-circuit protection of the RCCB.

RCBO general characteristics:

RCBOs shall comply with international standard IEC/EN 61009.
Compliance with the standard shall be certified by an independent organisation and its quality mark shall be visible on the devices.

The RCBOs shall provide 2 integrated fault indications: one to indicate a tripping due to overload or short circuit and one to indicate a tripping due to residual current.

RCD with reinforced immunity:

RCDs located upstream of the following loads shall have a reinforced immunity to restrict power outages to the strict minimum required for user safety:
- Sets of fluorescent lighting, halogen lighting supplied with LV or ELV power,
- Groups of PCs and work stations,
- Motors driven by single-phase variable-speed drives…

The reinforcement in performance means that the RCDs shall not trip in the following situations:
- Continuous 1 kHz leakage current, 8 times higher than the rated tripping threshold
- Leakage currents and transient over voltages due to lightning strikes, switching, decoupling capacitance discharges, etc.:
- 5 kV peak voltage for a 1.2/50 µs wave (IEC/EN 61000-4-5),
- 3 kÂ leakage current for an 8/20 µs wave (IEC/EN 61008),
- 400 Â leakage current for a damped sinusoidal 0.5 µs / 100 kHz ring wave (IEC/EN 61008),
- residual current equal to 5 times the rated residual operating current for a duration less than or equal to 10 ms,
- Very high-frequency inducted or conducted disturbances (starting at 150 kHz).
  The RCDs must trip for fault currents with a DC component (type A as per IEC 60755).
  The same is required for residual current devices located downstream of UPSs.

f) SURGE ARRESTERS CHARACTERISTICS AND OPERATION

Protection of loads against destruction by lightning shall be implemented in final distribution switchboards: each load shall be protected by a surge arrester

Therefore, final distribution switchboard shall embed a surge arrester compliant with IEC 61643-1 / EN 61643-11 standard. Compliance shall be proved by a quality label printed on the device.

Type 1 SPD (Class 1)
When a Type 1 is required the value of Iimp shall not be less than 50kA for each mode of protection [IEC60364-5-534].
Type 2 SPD (Class 2)
When a Type 2 is required, the nominal discharge current In shall not be less than 20kA for each mode of protection [IEC 60364-5-534]
Note: Where Class 1 & Class 2 combination is used, Class 1 shall be 50kA/(10/350µs) and Class 2 shall be 50kA/(8/20µs)
Type 3 SPD
An additional SPD is required when the length between the Type 2 and the sensitive electrical equipment is higher than 10 meters. The Open circuit Voltage Uoc value preferred is 10kV

Surge arresters operation
Its operating voltage Uc will not be less than 340 V between live and earth as well as phase to neutral.
It will be made of withdrawable cartridges, with rated maximum discharge capacity 8 kA.
The surge arrester will be set so as to ensure the distance between its earth terminal and the incoming earth terminal block not to be more than 15 cm.

Surge protection out of order (missing cartridge, replacement required) will be:
- Notified by an indicator on front
- Reported to Supervision centre by means of an indication switch.

According to IEC 61643-1 / EN 61643-11, the surge arrester shall be associated with a dedicated disconnector, the opening of which will not disturb or turn off power supply to any downstream located load. This disconnector will be made of a circuit-breaker, compliant with IEC / EN 60 898 standard. Disconnecting circuit-breaker shall be integrated with the surge arrester: in case of trip, it will be possible to reset it only once all required cartridges have been replaced.

g) PROTECTIVE DEVICES MAINTENANCE

RCDs shall be tested every 6 months using the test button. When conditions are extreme (saline environment, chlorine, high level of dust), it is recommended that testing be done every 3 months.

h) SUSTAINABLE DEVELOPMENT

Production site organisation shall comply with the requirements of the ISO 9002 and ISO 14001 standards.
For the devices, the manufacturer should be able to provide following arguments:

- Hazardous substances content (RoHS conformity declaration & REACH assessment referring to last update of SVHC candidate list).
- Environmental impacts characterized by several indicators (through Life Cycle Analysis & Product Environmental Profile) with at least:
- Raw material depletion
- Energy depletion
- Global warming / carbon footprint
- Water depletion
- Recyclability information (Product Environmental Profile / End of Life Instruction).
  The devices shall be delivered in packaging compliant with European Directive 2004/12/CE

2 LUMINAIRES

LED LIGHTS

All Light fittings installed for this project is to be of the LED type, unless otherwise stated.

The following international standard specifications and South-African Bureau of Standards shall apply to the LED luminaire specification as revised:

SANS 475	Luminaires for interior lighting, street lighting and floodlighting – Performance and requirements
SANS 10114-1	Interior lighting part 1: Artificial lighting of interiors
SANS 10114-2	Interior lighting part 2: Emergency lighting
SANS 60598-1	Luminaires part 1: General requirements and tests
SANS 60598-2.1	Luminaires part 2: Particular requirements section 1 – Fixed general purpose luminaires.
SANS 60598-2.2	Luminaires part 2: Particular requirements section 2 – Recessed luminaires.
SANS 60598-2.3	Luminaires part 2: Particular requirements section 3 – Luminaires for road and street lighting.
SANS 60598-2.5	Luminaires part 2: Particular requirements section 5 – Flood lighting.
SANS 61347-1 to 13	Lamp control gear
SANS 62031	LED modules for general lighting – Safety specifications
SANS 62384	DC or AC supplied electronic control gear for LED modules – Performance requirements.
SANS 62560	Self-ballasted LED lamps for general lighting services with supply voltages > 50V – Safety specification.
SANS 62612	Self-ballasted LED lamps for general lighting services with supply voltages > 50V – Performance requirements
EN 55015	Limits and methods of measurement of radio disturbance of electrical lighting or equipment.
EN 61000-3.2	Electromagnetic compatibility (EMC) limits for harmonic current emissions.
EN 61000-3.3	Electromagnetic compatibility (EMC) limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems.
EN 61547	Equipment for general lighting purposes: EMC immunity requirements.
IEC-EN 62471	Photo biological safety of lamps and lamp systems for LEDs
IES LM-79-08	Approved method: Electrical and photometric measurement of solid-state lighting products.
IES LM-80	Approved method: Measuring lumen maintenance of LED light sources.

General requirements:

The luminaire shall be suitable for operation with mid-power LEDs.

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

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

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

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

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

Thermal requirements:

The luminaire must be able to withstand an ambient temperature of 35°C. Storage temperature of this luminaire should be able to handle -40°C < T < 60°C.

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

Noise requirements:

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

3 EARTHING ELECTRODES

1. GENERAL

This section covers uncoated, coated and metal clad circular rod electrodes intended to provide an earth in soil for electrical and lightning arrestor systems.

2. CATEGORY AND TYPE

2.1 Only the following type of earth rods shall be used: (Type to be approved by Client Representative)

1(a) - Solid copper.

1(b) - Solid stainless steel.

2 (a) - Solid steel with bonded copper protection.

2 (b) - Solid steel with plated copper protection.

2 (c) - Solid steel with a shrunk-on copper jacket.

3 - Solid steel with a shrunk-on stainless steel jacket.

4 - Galvanised steel.

2.2 Bare aluminium is not acceptable as an electrode material.

2.3 All rods shall be solid and of circular cross section with length as specified in the Detail Technical Specification.

2.4 The nominal diameter of the earthing rods shall not be less than 16mm unless the rods are specified for placing in pro-drilled holes in which event the minimum nominal diameter shall not be less than 12mm.

3. COUPLINGS AND CONDUCTOR CLAMPS

3.1 Earthing electrodes shall be provided with (n-1) couplings where n = number of rods supplied.

3.2 Rods designed for coupling by means of external sleeves shall be provided with an adequate quantity of hydrocarbon or silicon grease to be applied to the coupling before the joint is made.

3.3 Rods designed for coupling by means of internal pins or splines shall be provided with thin-walled tubes and hydrocarbon or silicon grease to seal the joint.

3.4 Conductor clamps shall be provided to suit the type and size of rods provided and the type and size of conductor specified in the Detail Technical Specification.

3.5 The material of the clamps shall be electrolytically compatible with the rod and conductor materials.

3.6 Where brazed or welded connections are specified, the supplier of the rods shall stipulate at least two types of metals which are compatible with the rod and conductor materials.

3.7 An adequate number of driving caps or bolts shall be supplied with the rods to protect the ends of the earthing rods whilst being driven into hard soil.

PART 4: LIGHTNING PROTECTION SPECIFICATION

CONTENTS

PART 4: LIGHTNING PROTECTION SPECIFICATION

1. GENERAL

This specification shall be read in conjunction with the relevant, Bills of Quantities and General/Standard specification for this installation.

The following general requirements shall also apply:

- The work shall at all times be carried out under the supervision of a competent Representative of the Contractor, who will be able and authorized to receive and carry out instructions on behalf of the Contractor.
- Rates shall include all anti-vibration equipment necessary to ensure that the installation is acceptable to the Secretary of Works.
- The complete installation must be guaranteed against defective parts and workmanship for a period of twelve months after the date of issue of the Completion Certificate. This period shall run concurrently with the maintenance period.
- Rates shall include commissioning and testing of the complete installation and handing over in working order to the satisfaction of the Secretary for Works.
- Rates shall include all equipment, electrical wiring and controls necessary to complete the installation as specified.
- All work shall be carried out by competent workmen skilled in their trade. All workmanship will be subject to the approval of the Secretary of Works.
- All apparatus, component parts, fittings and materials employed in the execution of the Contract shall be new and unused and shall be the latest type or pattern of the particular manufacture employed. S.A.B.S. mark bearing items shall be used wherever possible.
- **The Specification identify the system concepts and standards of performance and quality required, but do not purport to identify all problem areas and their solution, which shall be the responsibility of the Contractor.**
- **By submitting a tender, the tenderer warrants that it is competent in the construction of works of the type specified, and that all work will be suitable for the intended purpose and complying with all relevant statutory regulations.**
- **The Contractor shall be responsible for identifying any ambiguity or incompleteness in the Contract Documents, and obtaining clarification instructions prior to proceeding with any work that may be affected by the ambiguity or incompleteness.**

2. SCOPE OF WORK

The lightning protection specialist contractor is to be a registered installer with the relevant installation body such as ELPA – Earthing and Lightning Protection Association.

The successful contractor, shall be required to provide the complete lightning protection installation for the works.

The work covered by this specification comprises the Lightning Protection installation,manufacture, supply, installation, connection, testing and commissioning and handing over to the client of the complete installation in an approved and satisfactory working order, the installation described herein, in such a manner that the whole forms a complete working system with the rest of the engineering services without any additional material or equipment being required. It includes the provision of record documentation for the installation of the following as specified:-

- Lightning protection installation for buildings
- All conductors and junction boxes
- Trenching and backfilling
- Testing and commissioning of the complete installation and ensuring **all required bonding** as per SANS 10313 and SANS 62303-1 to SANS 62305-3.
- Issue certificate of compliance for each building in accordance with the relevant SANS and IEC codes of practise - not limited to - SANS 10313 and SANS 62303-1 to SANS 62305-3.
  The Specialist Contractor shall be responsible for the detailing, checking and ensuring that all work, as specified in this specification both intended and implied, fully conforms to SANS 10313 and SANS 62303-1 to SANS 62305-3.

3. WORK UNDERTAKEN BY OTHERS

The following particulars do NOT form part of the works to be provided under his installation: -

- Making good of chases in walls and floors after the installation of conduit, conduit outlet boxes and other accessories;

4. PARTICULAR REQUIREMENTS OF EQUIPMENT, MATERIALS AND INSTALLATION:

4.1 INSTALLATION

The Contractor shall prepare and submit the following documentation to the Department's Representative for reviewing:

- Testing and commissioning data.
- Operating, Maintenance and Instruction Manuals.
- Inspection Record Checklists.

4.2 SPECIALIST CONTRACTOR

The Contractor shall note that only Specialists in Lightning and Earthing Protection may undertake this work and shall produce proof of previous work completed to SANS 10313 and SANS 62303-1 to SANS 62305-3 standards. The specialist contractor is to review the design and advise on any short comings which prevent conformity to the above standards.

The lightning protection specialist contractor is to be a registered installer with the relevant installation body such as ELPA – Earthing and Lightning Protection Association.

4.3 CONTACT BETWEEN DISSIMILAR METALS

Precautions and steps shall be taken to prevent electrolysis from occurring due to the use and connection of dissimilar metals. Where necessary the joint between dissimilar metals shall be sealed with a suitable waterproof material or compound to prevent the ingress of water into the joint. The material or compound used shall be to the approval of the Department's Representative.

4.4 COMPLETION OF WORKS

Completion of works will occur and delivery shall be given only after the following procedure has been certified by the Department's Representative as having been carried out in accordance with the Specification:

After the defects are made good and approval of the Department's Representative is obtained, physical completion has been reported to the Department's Representative by the Contractor and the Departments Representative has given approval.

Commissioning and testing has taken place as specified and test results have been witnessed (where required), recorded and finally approved by the Department's Representative.

4.5 TESTING AND COMMISSIONING

Each earth point shall be tested for resistance to earth readings. These readings shall be logged and the actual method of test shall be recorded in detail so that future test may be carried out under similar conditions. A copy of all logged readings shall be forwarded to the Department's Representative for approval and record.

On completion the Contractor shall be required to carry out testing in accordance with SANS Code of Practice 03, and provide a set of marked-up 'As-Built' record drawings to the Department's Representative.

Copies of all the test certificates shall be included.

5. GENERAL INSTALLATION SPECIFICATION

- 5.1 SATISFACTORY INSTALLATION

The whole of the installation shall be carried out in accordance with:

(a) The latest S.A.B.S. Code of Practice for the Protection of Structures against Lightning - S.A.B.S. 03 ; SABS IEC 61024 (1) , 61024 (1 -1); SABS IEC 61312 (1) ; SABS IEC 61662 & NRS 042 and including - SANS 10313 and SANS 62303-1 to SANS 62305-3.

(b) The Municipal By-Laws and any other special requirements as deemed necessary by the Local Supply Authority;

(c) Local Fire Regulations.

5.2 S.A.B.S. APPROVED DRAWINGS

SABS Approved drawings are not required for this project.

5.3 TEST ON COMPLETION

Upon completion of the lightning protection system, the following tests shall be witnessed by an appointed representative of the Employer. The results shall be recorded on suitable test certificates which must be signed by both the Contractor and the Employers representative. A sketch must be included on each test certificate indicating the positions of each earth electrode in relation to some permanent reference point. It must also indicate the positions at which tests were carried out, the type of test and the results of these tests.

5.3.1 Earth Resistance Test

The Earth Resistance Test shall involve measuring the resistance to earth of each rod-type electrode, or group of rod-type electrodes, or trench earth which would normally be connected to one down-conductor or earth terminal. This test must be made with the electrodes completely disconnected from any part of the structure or lightning protection system.

5.3.2 Electrical Continuity Tests

(a) External Down-Conductors

Electrical continuity between the lower ends of external down-conductors which must all be dis- connected from the earthing system during the test shall not exceed 1 (one) ohm.

(b) Metallic Services

Electrical continuity between any metallic structures of services (e.g. rainwater pipes) which form an integral part of the lightning protection system shall not exceed 1 (one) ohm. These tests should be carried out with all other components of the lightning protection system disconnected from the component being tested.

5.4 DESCRIPTION OF MATERIAL

5.4.1 Air Terminals and Down-conductors

All conductors must be in accordance with the requirements of BSS 1474 or American Standards Specification 6063. All aluminium conductors shall have a cross-section area of not less than 50 mm^2 or 70 mm^2 for all other applications.

5.4.2 Conductor Guides

The conductor must be mounted in aluminium alloy guides conforming to the material specification given in 4.1 above. The guides must allow for free longitudinal movement of the conductor to cater for expansion and contraction of the system caused by temperature variation. The minimum thickness of any part of the guide shall not be less than 3 mm. The guides must be securely attached to the structure using two stainless steel screws and plugs, the use of plated screws is not permitted.

The conductor system shall be supported in guides so that an air gap exists at all times between the aluminium and the surface of the structure, the guides being seated upon plastic or other similar insulating material. Should conductors be installed directly upon the surface of concrete or cement plaster, an insulating strip is to be installed over its whole length to prevent contact between the two surfaces. Guides shall be installed to support the conductor at intervals not exceeding 1, 2 metres horizontally or 1, 5 metres vertically.

N.B.: No part of an aluminium conductor system must be allowed to come into direct contact with concrete or cement plaster as this may cause the aluminium to corrode.

5.4.3 Expansion Loops

Where conductors are installed horizontally without deviation from a straight line over long distances, expansion loops must be provided at distances not exceeding 30 metres. These expansion loops must have a cross-sectional area which is at least equal to that of the conductor.

5.4.4 Protection of Down-conductors

Where external down-conductors are installed in areas which are readily accessible to the public, the lower ends of the conductors shall be enclosed in a semi-rigid insulating material. In the case of a circular section conductor this shall comprise a 2 metre length of 20 mm diameter P.V.C. conduit. This conduit shall be securely attached to the wall by means of galvanized steel saddles fixed with stainless steel screws and plugs, spaced at intervals not exceeding 1 m. Where a flat section conductor is used this shall be covered by a similar length of 25 mm P.V.C. conduit. The lower end of the conduit shall be positioned as close as practicable to ground level, i.e. immediately above an aluminium to copper joint. The ends of the conduit shall not be sealed.

5.4.5 Earthing Electrodes

Earthing electrodes must consist of either copper-clad steel rods not less than 12 mm in diameter and having a minimum copper thickness of 0,20 mm driven into the ground, or a 70 mm2 bare copper conductor buried in a trench, or a combination thereof. Where copper clad steel electrodes are used they must have a suitable bond between the steel core and copper exterior to prevent moisture ingress between the two metals. Where it is necessary to extend earth rods, an electrolytically compatible corrosion resistant, coupling device, which prevents ingress or moisture into the joint shall be used. The copper conductor below the down-conductor joint shall be covered by a semi-rigid P.V.C. conduit for a distance of approximately 200 mm above ground and 400 mm below ground.

5.4.6 Joints above Ground

Circular section aluminium conductors shall be joined by aluminium ferrules or lugs which are securely crimped into place. Aluminium lugs must be bolted together using 10 mm diameter aluminium bolts and washers. The material specification for these components must conform to that laid down in paragraph 4.1. Alternatively heavily tinned copper lugs and ferrules may be used. The lugs should be joined together by means of 10 mm diameter copper, brass or bronze bolts and washers. Care should be taken to inhibit corrosion where dissimilar metals are used by thoroughly cleaning the surfaces of the metal before assembly and subsequently sealing the joint with an inert tenacious compound or tape.

Flat section aluminium conductors shall be joined by double riveting, using aluminium rivets which comply with the material specification laid down in 4.1. Alternatively 2 x 6 mm diameter stainless steel bolts, nuts and washers may be used. Fold over type bends will not be permitted.

Down-conductors are to be terminated approximately 200 mm above finished ground level. Circular section aluminium is to be jointed to a 70 mm2 stranded copper conductor by securely crimping in place two heavily tinned lugs and bolting these together using 10 mm diameter copper, brass or bronze nuts, bolts and washers.

N.B.: Under no circumstances shall aluminium conductors be buried in the ground.

5.4.7 Joints below Ground

A joint in the stranded copper conductor which forms part of the earthing system must be made by using a crimped copper ferrule clamping (not lugs) using two copper line taps of suitable dimensions, or exothermic welding. The copper earth conductor must be joined to an earth rod by either clamping, using a standard earth rod clamp or copper line tap or by exothermic welding. Joints which are made between dissimilar metals (i.e. copper conductor to galvanized steel water main), must be thoroughly cleaned before assembly. They shall be rendered watertight using waterproof adhesive tape on a suitable compound for a minimum distance of 200 mm in all directions from the joint.

5.4.8 Bonds

Where it is necessary to bond the aluminium conductor to any other metallic surface, this must be done by bolting or riveting. When attaching aluminium to a dissimilar metal the joints are to be thoroughly cleaned and sealed to prevent corrosion.

5.5 GENERAL INSTALLATION SPECIFICATION

5.5.1 Air Terminals for Non-metallic Pitched Roofs

Aluminium conductors are to be installed along all ridges of roofs and projections such as dormer windows, etc., terminating at the ends with conductors running downwards over the surface of the roof and the eaves. Non-metallic chimneys must be protected by means of a finial of sufficient length to cover the chimney within a 45° angle struck downwards from its point. Alternatively it should have a conductor installed in the form of a closed loop upon the upper surface. The conductors are to follow the outer contour of the stack and must be bonded at a convenient point to the nearest component of the air terminal system.

N.B.: This bond may run in a horizontal or downward direction, but under no circumstances must any part of it run above horizontal.

Conductors may be dead-ended (i.e. have one end free and unbonded), providing that the length of such a conductor does not exceed 10 metres and that the unbonded end is either at the same level or higher than the bonded end. This technique may be used where ridge conductors are installed over dormer windows, etc.

In all cases where metallic gutters have been installed along the eaves of a pitched roof, these must be bonded to the air terminal system. Where metallic gutters do not exist, however, a conductor must be installed over the surface of the roof at eaves level to which the remainder of the air terminal system is to be bonded, with the following exceptions:

(a)Where the maximum distance from the ground level to the eaves of the building is less than 4 metres and the pitch of the roof is more than 1 in 2 (27°from the horizontal).

(b)Where the maximum distances from ground level to the eaves is less than 7 metres and the pitch of the roof is more than 1 in 1,5 (34°from the horizontal).

(c)Where the distance from the ground level to the eaves is more than 7 metres and the pitch of the roof is more than 1 in 1 (i.e. the included angle at the apex of the roof is less than 90°).

Under these circumstances eaves conductors need not be installed.

Any non-metallic objects which protrude above the general roof lines, such as Cape Dutch gable ends, must be protected as described above with a suitable air terminal system. Any metallic objects which protrude above the general roof line, such as hot water expansion pipes must be bonded as directly as possible to the nearest eaves conductor, gutter or other part of the lightning system.

N.B.: These bonding conductors must run in a horizontal or preferably a downward direction, from the vent pipe, etc., to the lightning protection system.

5.5.2 Air Terminals for Metallic Pitched Roofs

Buildings with roofs covered with electrically continuous metal sheets do not require separate air terminals but must be earthed via down conductors generally as described in 5.6 and 5.7. Any non- metallic objects projecting above the general roof line must be separately protected as described in 5.1 and bonded to the metal roof covering.

5.5.3 Air Terminals for Non-metallic flat or Mono-pitched Roofs

For flat or mono pitched roofs of non-metallic construction the air terminal system must consist of aluminium alloy conductors installed around the outer perimeter of each section of the roof structure. These conductors must be installed on top of parapet walls if these exist. Lift motor rooms, tank rooms, penthouses, etc., which protrude above the general roof line must have air terminal conductors installed around the outer perimeter of each roof slab or parapet wall. Any metallic objects which protrude above the roof line, such as expansion pipes, signs, flag poles, handrails, etc., must be bonded directly to the nearest component of the lightning protection system as described in 5.1.

N.B.: It is not permissible for the ends of conductors to be bonded directly to the perimeter air terminal system if the latter is installed upon a parapet wall having a height exceeding 500 mm above roof slab level. In these circumstances the conductors are to be bonded directly to the down conductors.

5.5.4 Air Terminals for Metallic flat or Mono Pitched Roofs

Metallic flat or mono pitched roofs do not require separate air terminal conductors, providing that there is electrical continuity between the metallic roofing sheets, (see 5.2). A metallic roof surrounded by a non-metallic parapet wall shall have conductors installed at the top of the parapet wall and these must be bonded to the metallic roof at intervals not exceeding 20 metres. If the parapet wall is clad with metal over its upper surface or a handrail is installed which affords good electrical continuity, separate air terminal conductors need not be installed. Under these circumstances the metal handrail or cladding must be bonded to the metal roof covering at intervals not exceeding 20 metres.

All non-metallic covering such as slates, tiles, asbestos cement sheeting, etc., supported by a steel structure being electrically continuous throughout may be treated as being of a complete metal construction. In these circumstances no separate air terminal system need be installed providing the steel roof structure is bonded to earth at intervals given in 5.5.

5.5.5 Down Conductors for Non-metallic Structures

Down conductors must be installed at regular intervals around structures and to run as directly as possible between the air terminal and earthing system. They must, where practicable, be positioned at the external corners of the structure. The maximum separating distance between down conductors around the perimeter of the structure must not exceed 30 metres. In the case of very tall buildings having a slender base (i.e. chimney stacks, water towers, etc.), a minimum of two down conductors must be installed.

The lower ends of down conductors are to be terminated and bonded to the earthing system approximately 200 mm above finished ground level. Under no circumstances must aluminium conductors be buried underground. Test joints must be provided between the down conductors and earthing system. Down conductors must run vertically between the air terminal and earthing systems. Where this is impracticable, their course may be deviated to run at any angle up to and including horizontal.

Where it is necessary to run conductors horizontally over the upper surface of a structural protrusion, such as an exposed concrete slab, the conductor may run down vertically over the edge of the slab and return to the main structure, so that the distance between the upper and lower conductors exceeds one third of the length of the horizontal run. Looped down conductors are not permitted. Down conductors must not run over the underside of large overhangs which are less than 6 metres above ground level, or other areas where people are likely to be present during a thunderstorm.

External or internal metallic rainwater pipes may be used as down conductors providing these are of substantial section and are joined by screwing one length into another or welding. Thin gauge galvanized steel pipes whose sections are held together by friction, rivets or screws must not form part of a lightning protection system.

5.5.6 Down conductors for reinforced concrete framed structures

The steel reinforcement of this type of structure may be used in place of down conductors. Where the reinforcing system is used, the air terminal system must be bonded to it at a maximum of 30 metre intervals using steel clamps. This bond may be achieved by clamping, with a steel clamp, a steel conductor to a selected reinforcing bar, the opposite end of this conductor must terminate at a corrosion resistant metallic terminal such as Grade 316 stainless steel.

The reinforcing system of prefabricated concrete buildings must not be used unless special provision is made for bonding the various prefabricated sections together.

The terminals should be mounted flush with the face of the concrete. An aluminium alloy bond must then be taken from the air terminal system and be connected to the stainless steel terminal by means of a heavily tinned crimp lug for circular section aluminium, or a suitable bi-metallic joint in the case of flat section aluminium. A similar system must be used to bond the reinforcing system at ground level to the earthing system at points directly below the air terminal bonds. Here copper conductors must be used as the external bonding material.

Under no circumstances must copper, or other non-ferrous material be allowed to come into contact with steel reinforcing bars, as this may cause severe corrosion and subsequent structural damage. The lightning protection system must not be bonded to any part of the structure which is electrically isolated from the remainder of the building, i.e. cantilevered sections. In these circumstances, or where it is otherwise impracticable to use the reinforcing system, external down conductors must be installed as described in 5.5.

5.5.7 Down conductors for steel framed structures

Where the framework of a building is constructed of structural steel columns, these may be used in place of down conductors providing the separating distance between them does not exceed 30 metres. The upper ends of the columns must be bonded to the air terminal systems and the lower ends to the earthing system.

5.5.8 Earthing by means of vertically installed rod type electrodes

Rod-type electrodes must be driven into the ground at a position directly below each down connector. The maximum earthing resistance of each electrode or number of electrodes bonded to any one down conductor shall not exceed N X 30 ohms, where N equals the total number of down conductors which are bonded to a common air terminal system, or 200 ohms whichever is the lower value.

The minimum horizontal separating distance between rod-type electrodes bonded together must not be less than their installed depth. The upper ends of installed rod-type electrodes are to be terminated approximately 500 mm below finished surface level. A 50 mm2 copper bonding conductor must be installed to run between each earthing electrode system and the lower ends of the adjacent down conductors. A joint is to be made between each of these bonding conductors and the down conductors at a position approximately 200 mm above finished ground level. These bonding conductors must be installed in P.V.C. conduit securely affixed to the wall (see 3.4). The length of this P.V.C. conduit must be approximately 600 mm and must be installed so that approximately 200 mm protrudes above ground level, the remainder being buried into the soil.

5.5.9 Earthing by means of metallic water mains

Where two or three down conductors are installed the water mains may serve as an earth terminal for one of these. Where three of more down conductors are installed the water mains may serve as an earth terminal for two of these. Regardless of whether the water mains are used as an earth terminal or not, the incoming metal water pipe must be bonded to the lightning protection earthing system underground.

5.5.10 Earthing by means of trench type electrodes

Where the soil conditions prevent the satisfactory installation of rod-type electrodes, a trench earth system must be installed. This method is to comprise a 50 mm^2 stranded copper conductor installed horizontally into a trench at a depth of 500 mm below finished ground level. The conductor is to follow the general outline of the structure to be protected and be installed 1 metre away from the outside walls. Where the building stands on rocky ground, the trench earth may be attached to the lower part of the wall in areas where rock protrudes through the soil. The conductor must, however, be buried wherever possible as described above.

Each down conductor must be bonded to the trench earth system as directly as possible by means of a copper conductor.

Trench earth systems must have a maximum earth resistance of 1 ohm. An isolated length of trench earth mat must be bonded to the down conductor system in such a way as to reduce the length of dead-ends to the minimum.

Should trench earths be installed beneath pathways where people are likely to be present during a thunderstorm, a plastic, bitumastic or ceramic pipe must be installed having a length similar to the width of the pathway and the trench earth conductor run inside it.

N.B.: The maximum useful length of a dead-ended trench earth is 80 metres.

PART 5: FIRE DETECTION

PART 1

STANDARD SPECIFICATION FOR FIRE DETECTION AND ALARM INSTALLATION

INDEX

CLAUSES PAGE

1.1 GENERAL

This section of the Specification covers the standards of materials, equipment and workmanship and general methods and procedure to be employed in the execution of the Fire Detection and Alarm installation as indicated in the Detailed Specification in Part 3B.

1.2 STANDARDS AND REGULATIONS

When a Standard or Code of Practice is quoted, the latest issue of that standard or code shall be followed, unless otherwise specified. SANS standards shall take precedence over similar overseas standards.
The Fire Detection and Alarm installation shall comply with the relevant requirements of the following standards:

SANS 10139	Fire detection and alarm systems for buildings – System design, installation and servicing
SANS 50054-1	Components for automatic fire detection systems Parts1 - Introduction
SANS 50054	Fire detection and fire alarm systems (Parts 2,3,4,5,7,11)
SANS 10142-1	The Wiring of Premises – Low voltage installations
SANS 1574	Electric cables - Flexible cords and flexible cables.
SANS 950	Unplasticized PVC rigid conduit and fittings for use in electrical installations.

The following regulations shall also apply:

ACT 6 of 1983 Machinery and Occupational Safety Act as amended.
ACT 103 of 1977 National Building Regulations Act as amended

1.3 APPROVED EQUIPMENT

All equipment supplied shall comply with the requirements of one of more of the following bodies unless otherwise specified in Section B:

(a) VDS (the German Underwriters Association).

(b) The Fire Officer's Committee of the United Kingdom.

(c) The National Board of Fire Underwriters of the USA.

(d) The Underwriters Laboratory of the USA.

(e) The Council of Fire Insurance Companies of South Africa.

(f) Any similar recognised bodies.

Where samples have been submitted and subsequently approved by the Director, equipment installed shall, in all respects, agree with the approved samples.

Preference shall be given to equipment from a Manufacturer's current standard range, the design and performance of which has been proved in practical application.

Spares for equipment offered shall be readily available from reputable sources.

1.4 INFORMATION AND DRAWINGS

The Contractor shall be required to provide the following information to the Client's Representative for reviewing prior to the supply and installation of the fire detection and alarm system.
(a) Complete working drawings
(b) Electrical input and output requirements

(c) Installation instructions
(d) Operating instructions
(e) System and equipment descriptions
(f) Routine testing information and requirements

1.5 PROTECTION OF EQUIPMENT

The Contractor is solely responsible for the protection of all equipment during installation and until such time as first delivery to the Client's Representative has taken place.

1.6 CO-ORDINATION OF WORKS

The Contractor shall co-ordinate all aspects of the Contract to ensure that material is ordered and installed timeously, and that clash's do not occur with other trades. Where conflicts may occur, the Contractor shall request clarification from the Client's Representative.

1.7 CONTROL CENTRES

(1) **Cabinets**: All cabinets shall be constructed of folded sheet steel with a minimum thickness of 1,6mm or a structural steel framework with sheet steel enclosures. All metal work and welds shall be ground smooth and rendered free from blemishes. Self threading screws may not be used in the construction of the panels nor for the fixing of any panels. Exposed styles of width not less than 15mm shall be used between panels. Wall panels shall be suitably painted to prevent corrosion. Unless otherwise specified in Section B, all panels shall comply with the following painting Specification.

Note: The painting procedure shall always comply with the paint Supplier's instructions and recommendations.

(a) Surface Preparation: After fabrication, all metalwork other than flush mounted trays, shall be cleaned of slag and welding impurities, derusted and degreased with an approved solvent and dipped in a phosphate solution.

(b) Paint Finishes: Either of the two paint finishes below may be used:

(i) Baked Enamel Finish: Within 48 hours of phosphating, a high quality zinc chromate primer shall be applied followed by a coating of high quality baked enamel to provide a minimum paint thickness after baking of 0,06mm. The paint shall have an impact resistance of 5,65 J on cold rolled steel plate and a scratch resistance of 2kg. In coastal areas, the dry film thickness shall be increased to at least 0,1mm.

(ii) Powder Coated Finish: Immediately after cleaning the metal part shall be preheated and then covered by a micro structured paint powder applied electro statically. The paint shall be baked on and shall harden within 10 minutes at a temperature of 190^{o}C. The minimum paint thickness after baking shall be 0,05mm. The dry film thickness shall be increased to 0,07mm for coastal areas. The paint cover shall have an impact resistance of 5,65J on cold rolled steel plate and a scratch resistance of 2kg.

(c) Colours: Unless otherwise specified, the colours of finish of the Fire Detection Control Panel shall be to the approval of the Client's Representative.

Special indications shall be clearly visible from outside the cabinets, without first having to open a door or panel. All manual controls which can be adjusted and could jeopardise or prevent correct operation of the equipment shall be so located as to be only accessed by first releasing a locking devise.

The cancellation of the internal audible central station alarm shall be possible from the outside of the cabinets and shall be by means of a non-locking pushbutton.

The design of the control panel shall be modular such that the system can be extended when required.

All cabinets shall be naturally ventilated and cable entries and ventilation holes shall be vermin proofed.

(2) **Circuit Design**: Control and indicating equipment shall operate safely within a supply voltage range of 200 to 240 volts. The equipment shall operate at 24V DC and shall be backed-up by a suitably rated standby battery. Circuits shall be so designed that:

(a) Faults in the transmission path serving signals and controls shall not affect other such transmission paths;

(b) Faults in external devices or their connections shall not affect the control and indicating functions of the central equipment;

(c) Non-current limiting circuits shall be properly protected. All wires and cables shall be adequately rated;

(d) The use of the standardised circuitry on PCBs designed and manufactured for general applications shall be preferred to "special customer designed" PCBs. Should non-standard boards be required for the execution of this Contract, the Supplier shall detail this in his offer with the cost prices for such boards such that the necessary spares can be obtained with the original Contract.

(3) **Component Ratings**: All components shall operate within the limits as specified by the Manufacturer/Supplier. If there is any doubt during supply, installation and commissioning that this has not been complied with, the Contractor shall be required to have the equipment tested at a recognised test laboratory. The Contractor shall afford reasonable facilities for such access and tests.

All components shall be sturdily and neatly mounted. All holes shall be neatly drilled and all equipment and wiring shall be easily accessible to facilitate maintenance and replacement thereof.

1.8 OPERATION FEATURES AND FACILITIES

(1) **Conventional (Non-Addressable) System**: All types of detectors as specified shall be able to be coupled to a central control station which shall be capable of providing adequate power for the detectors and alarm circuits and receiving and transmitting "fire" and "fault" conditions and be self monitoring against equipment failure.
The control unit shall be fully automatic and shall incorporate the following items of equipment and facilities:

(a) Red and Amber "FIRE" and "FAULT" zone indication lamps respectively.

(b) Back-up light emitting diodes for the main zone "FIRE" and "FAULT" indicators.

(c) One Red general "FIRE" warning flashing lamp.

(d) One Green "MAINS ON" lamp.

(e) One Amber "BATTERY FAULT" lamp.

(f) Lamp test switch.

(g) Alarm silence switch.

(h) Zone isolating switches.

(i) An electronic power circuit to provide a stabilised DC supply to the detector circuits with an output voltmeter.

(j) A battery float and trickle charger circuit with a digital charging meter giving indication of the charging voltage and current.

(k) A Fire Brigade signalling relay transmitting "FIRE" and "FAULT" signals to a remote position if required.

(l) An automatic module to monitor:

(i) The standby power system "HIGH", "LOW" and "NO VOLTAGE" conditions.

(ii) Charger mains supply for failure conditions.

(m) A fault in either (i) or (ii) above shall automatically light the "BATTERY FAULT" lamp and sound a local alarm in the main panel.

(n) It must be possible to sound the audio alarms from the panel via a total evacuate switch.

(o) The transparent door of the control unit shall be secured by a lock, and the finish shall be such as to reduce reflection from external lights.

(p) It shall be possible to silence the audible alarms without affecting the light signalling facilities and the Fire Brigade signalling circuits.

(q) The control unit must incorporate the necessary features to signal "FIRE" or "FAULT" for each zone as well as common "FIRE" or "FAULT" signals for all zones.

(2) **Self-Addressable System**: In addition to that specified in Clause A10.1 the Self-Addressable polling type system shall incorporate the following features:

(a) Communication Circuit: A 2-wire circuit is to be used for power and communication between the panels and the various detectors and shall be able to be coupled to detector devices as specified.

(b) Device Monitoring: The system shall be broken down into clearly devisable detection zones which shall have the facility for the monitoring of fire alarm conditions either from a manual or automatic detection. The alarm thresholds of each detector shall vary in accordance with their idle states and this variance shall be stored and continually updated by the central control station. The actual alarm thresholds of any detectors shall not be able to be manually set. In addition, each element within an alarm circuit shall be continually and automatically monitored. Any changes to the ambient value of the element shall be updated and stored by the central control station. When this value reaches a level at which it will no longer perform its desired function, a "FAULT" signal shall be given at the central station.

In addition to device monitoring all circuits shall be continually and automatically monitored for open circuit, short circuit, earth leakage and detector removal.

(c) Device Address: Each device in a circuit shall have a unique address which may be set either centrally or by means of a local dip switch at the detector. Removal of a detector head from its base shall not cause the detector address to be removed from the system memory.

(d) Alarm/Detection Circuits: Alarm/detection circuits may have a capacity of detectors or elements as decided on by the Manufacturer. The detectors shall be freely distributable over any one or individual alarm zone. There shall be no limit to the number of devices which may alarm simultaneously within a circuit.

A triggered detector/element shall not cause any other detectors on that particular circuit to cease monitoring. Any particular detector may be removed from an alarm without effecting the operation of the remaining detectors within that circuit or raising a fire alarm. However, this particular condition must be indicated at the central control station.

(e) Alarm Zones: An alarm zone may extend over a single fire zone and quick and precise identification of the position of the fire shall be possible. Alarm zones shall not extend beyond one floor except in the case of stairwells or lift shafts.

(f) Display: The type, calibration, sensitivity and status of each alarm/element within a control circuit must be able to be displayed at the central control panel.

1.9 DETECTORS / DEVICES

(1) **General**: It shall be possible to couple the following types of detectors / devices to circuits within the alarm system:

Ionisation Smoke Detectors
Optical Smoke Detectors
Heat Detectors - fixed temperature 58^{o}C
Heat Detectors - rate of rise : 58^{o}C
Linear (Beam type) smoke detectors
Manual "Breakglass" Units
Conventional Detectors
Addressable Relays
Addressable Sounders
Remote Addressable Control Units
Control Devices for Automatic Fire Protection Equipment eg Halon or CO_2

Bases for ionisation, optical and heat detectors shall be capable of interchanging detectors of the different types and shall be designed for mounting on a standard round galvanised electrical outlet box having a diameter of 76mm.

Detectors requiring windshields to eliminate false alarms from adverse wind or air movements shall not be acceptable.
Detector sensitivity shall be adjustable on site and operation shall be satisfactory over a voltage range of 20 to 27 volts unless the system is designed for another approved voltage range.

(2) **Ionisation Detectors**: These shall be dual chamber type sensitive to visible and invisible combustion of products, and shall operate satisfactorily under the following conditions:

Temperature	:	0^{o}C to 50^{o}C
Humidity	:	20% to 90% RH
Air Velocity	:	up to 1 m/s

An alarm indicator lamp shall be built into the unit, and provision shall be made for connection of a remote indicating lamp if required.

The supplier shall indicate the radiation level of the radio-active source.

(3) **Heat Detectors**: These shall be of the dual action type responding to both rate of rise and fixed temperature, and shall respond to either or both of the following:

(a) Temperature rise of more than 8,3^{o}C/min.
(b) Temperature in excess of 58^{o}C.

(4) **Manual Alarm Units**: Manual alarm units shall be of the "breakglass" type to give an alarm when activated. The unit shall be of the resettable type.

Units shall be suitable for either surface or flush mounting as specified, of red moulded plastic, and permanently marked "FIRE", "BREAK GLASS".

Screw terminals shall be provided for connecting wires. Unless otherwise specified, the alarm unit shall be mounted at a height of 1400mm from finished floor level to underside of the break glass unit.

(5) **Audible Alarms**: Audible alarms shall be for 24V DC operation.

Three types are generally acceptable:

(a) 150mm bell
(b) two-tone warbler
(c) siren

(6) **Extended Alarm Indicators**: All detectors mounted in remote positions, eg under floors or in ceiling voids shall be provided with remote indication lamps. These extended indicator lamps shall be in neat approved metal boxes, to the specified finish.

1.10 SIGNALLING AND ANNUNCIATION

(1) **General**: Fire, fault, maintenance, and pre-alarm signals shall be indicated visually and audibly in the control unit.
The indications must be arranged so that the different warnings are clearly distinguishable.
The internal audible signal device may be the same for all alarms.
Outputs shall be provided for audible alarms, control functions, remote mimics and connection for computers and printers.

(2) **Zoning:** The panel shall have 3 LED's per zone on the front panel. Two LED's are to indicate a "Fire" condition and the other a "Fault" condition.
The zones must be software defined, and it must be possible to allocate any addressable device to any zone on a random basis.

(3) **Panel Indicators:** All visual indicators shall be LEDs and no incandescent lamps are to be used.

The following LED display must be provided :

1 x zone fault LED per zone
1 x supply healthy LED
1 x supply faulty LED
1 x common alarm LED
1 x pre-alarm LED
1 x common fault LED
1 x maintenance LED
1 x processor failed LED

(4) **Panel Display:** The panel shall incorporate a LED numeric display to indicate alarm count and device number in the event of an alarm.

This display is also to be used for maintenance and commissioning information.

It must be possible to call-up the display information relating to device type, sensitivity and status for each addressable line device. Access must be random, and it must not be necessary to page through all prior addresses to reach a required address.

(5) **Panel Controls:** The panel is to incorporate a keyboard and pushbuttons with the following functions :

Numeric Keyboard
System Reset Button
Alarm Accept Button
Alarm Sound Button

Lamp Test Button
Function Buttons for Maintenance and Commissioning

(6) **Alarm Outputs (Fire):** The panel must incorporate 2 monitored alarm outputs for switching bells or electronic sounders "ON". These outputs must be monitored for open and short circuit.

Each output must be rated for 0,75A and 24V dc or as approved by the Director.

(7) **Alarm Contacts (Fire):** One voltage free changeover contact must be provided. This must operate on a "fire" condition and is to remain "ON" until the system is reset.

The contacts are to be rated for 2A at 24V dc or as approved by the Director.

(8) **Alarm Contacts (Fault):** One voltage free changeover contact must be provided. This must operate on a "fault" or "maintenance" condition and is to remain "ON" until the system is reset.

The contacts are to be rated for 2A at 24V dc or as approved by the Director.

(9) **Remote Panel Outputs (Common Function Panel):** Outputs and inputs shall be provided for operating a remote alarm panel as follows:

Fire Output
Fault Output
Audible Buzzer Output
Remote "Alarm Accept" Input
Remote "System Reset" Input

(10) **Optional Switched Outputs:** The panel must be able to accept up to 20 additional relays, which must be able to be programmed for operation.

(12) **Data Outputs:** The panel shall have full communication capability with other micro-processor-based equipment.

Communication protocol shall incorporate handshaking, confirmation, and error checking by means of the Cyclic Redundancy Clerk (CRC) method or as approved by the Director.

The communication system must be bi-directional, and have re-transmission facilities in the event of any incorrectly received message.

All panel and detector facilities must be accessible via the communication ports, and it must be possible to operate the system remotely if required.

The communication system must operate independently of the detection polling system, and must not in any way delay or inhibit the fire detection system.

Two data outputs must be provided. These are RS232C for short distance communication and RS422 for long distance communication.

1.11 ALARM MANAGEMENT

The annunciation and signalling outputs must be field programmable as described below :

(a) Annunciation Zones: It shall be possible to randomly allocate any zone annunciator to any detection device or devices, in any sequence.

(b) Control Outputs: Optional control outputs or relays shall be available.

These outputs shall be able to be randomly allocated for operation by any line detection device or devices in any sequence.

The control outputs must be able to be allocated in a different grouping or the same grouping as the zones.

(c) Addressable Relays: The system must be able to accept addressable relays for connection to the detection line.

These relays shall be able to be randomly allocated for operation by any line detection device, or devices in any sequence.

It must be possible to allocate the addressable relays in the same or a different, grouping to either the zones or control outputs.

(d) Input / Output Limits: The panel shall accept a maximum of 90 output devices. This represents the total of control outputs and addressable relays.

It shall be possible to allocate up to 15 addressable line devices or zones to operate each control output or addressable relay.

(e) Double-Knock Operation: It shall be possible to programme any of the control outputs or the addressable relays for "double-knock" operation.

In this mode, the relay must only operate upon an alarm from any 2 detectors in the programmed group.

(f) Silencing Operations: It shall be possible to programme any of the control outputs or addressable relays to operate in either "silencing" mode or "non-silencing" mode.

In "silencing" mode the relay or outputs shall de-activate when the "Alarm Accept" button is pressed, or when the "Reset" button is pressed.

In "non-silencing" mode the relay or output shall be de-activated only when the "Reset" button is pressed.

(g) Activation Delay: It shall be possible to programme any of the control outputs or addressable relays to activate after a delay period from receipt of the control signal.

This delay shall be 0-10 minutes, in 10 second increments.

(h) Software Control: All the above functions shall be under software control, and programmed through the panel's keyboard.

1.12 SYSTEM MAINTENANCE

(1) **General:** The system shall be, as far as possible, self-testing and maintenance free.

The control unit shall continually update the idle state of each detector, and indicate a "Maintenance Required" signal in the event that a detector sensitivity is too high or too low.

(2) **Control Unit Test:** The control unit shall have a test facility for the following:

(a) Simulation of short circuit, open circuit and fire alarm for each zone individually.

(b) General simulation of earth leakage.

(c) LED test for all panel and zone LED's.

The control unit shall have the facility for printing out, upon demand, the idle status of each detector on a line. This facility shall only apply to panels fitted with the optional printer.

(3) **Field Tests** (Detector Tests)**:** The control unit shall allow for detector tests and inspection by a single person.

The test alarms triggered on each detector by the inspecting person shall be indicated on the detector by a **RED LED**, and shall be automatically reset by the control unit. Alerting shall not take place.

Zones which are not switched to "inspection" mode shall remain ready for normal alarm procedure.

(4) **Alarm Tests:** The control unit shall allow for the testing of all audible and visual alarm devices and control relays, to check correct functioning of these devices.

(5) **Acceptable Tests:** These shall be specified in the Detailed Specification.

1.13 POWER SUPPLY

The system supply shall be provided from two independent sources, ac mains supply and a standby battery.

No component in the alarm system is to be adversely affected by spikes or surges in the power supply, and the central control unit shall be protected against reverse polarity on the voltage supply side.

(a) Mains Power Supply :

(i) A positive earth dc system is required.

(ii) The output of the power supply must be capable of sustaining an alarm signal from all the connected alarm lines simultaneously.

(iii) In the event of a failure of the mains supply there must be an automatic switch over to the standby battery supply without any interruption of the load and without activating a fire alarm.

(iv) The power supply unit shall maintain the battery in the fully charged state and be capable of recharging the battery, discharged to cut-off voltage at the rate discharge current, to 80% of the achievable rated battery capacity within a period of 24 hours, besides supplying the power requirement of the alarm system.

(b) Standby Battery: Minimum battery capacity shall be sufficient to provide quiescent operation without mains power for:

(i) 48 hours ;

(ii) an additional 30 minutes total alarm load, including power for "Exit" sign operation if these are specified and included in the alarm contract.

No additional battery capacity is required for the operation of electromagnetic door release units. Batteries shall be sealed lead acid type, suitable for operation without damage with continuous floating or trickle charging.

(c) Battery Charger: Battery charging equipment shall be solid state rectifier type. A certificate shall be furnished from the battery Manufacturer stating that the battery charger offered is acceptable to the battery Manufacturer for use with the batteries offered.

In operation the battery shall act as a floating load on the charger, which shall be automatically self-regulating with charger output automatically controlled to maintain the battery in a fully charged state under normal operating conditions, and to restore the battery to a fully charged state after a period of discharge.

The battery shall be restored to 80% of fully charged capacity within 24 hours.

Overcharging of the batteries even under fault conditions shall not be possible.

The charger shall have a dc voltmeter and a centre zero ammeter connected to the battery circuit.

Polarity on all circuit terminals shall be clearly and indelibly marked.

1.14 WIRING

All wiring and connections shall be in accordance with the latest Rules of the Fire Offices Committee for Automatic Fire Alarm Installations, unless otherwise specified.

For addressable element systems, braided screened cable shall normally be used.

Should unscreened cable be used, the Contractor shall be responsible for ensuring the trouble free operation of the alarm system, and shall replace unscreened cable with screened cable if deemed necessary by the Director, at the Contractor's expense.

Conductors shall be adequately sized to cater for distance, voltage drops and equipment requirements involved.

As far as is practicable, junction boxes must not be used. However, where the use of junction boxes is unavoidable, the junction box must be located in an accessible position and must be clearly indicated on the "as built" drawings.

Cable terminations must be made by means of suitable crimped insulation lugs, which are to be connected to suitable connection blocks securely fixed in the junction box, or system components.

All wiring must be looped and with isolators.

1.15 GAS PROTECTION SYSTEMS

Where protection by means of gas extinguishing systems is called for these systems shall comply in all respects with the following latest standards:

(a) NFAP - Standard pm Carbon Dioxide Extinguishing Systems.

(b) BS5306 - Section 5.1 - Code of Practice for Fire Extinguishing Installations and Equipment on Premises. Standards specified in the respective Detailed Specification for gas extinguishing systems.

1.16 MIMIC / BLOCK PLANS

An approved block plan indicating the various zones as per the corresponding reference numbers of the zone indication lights on the main control panel shall be mounted next to the main control panel and all repeater panels capable of zone indication.

Details of the proposed block plans shall be furnished to the Client’s Representative for reviewing prior to manufacture. Block plans shall have a professional appearance, engraved on Perspex, photo-etched on aluminium or some other permanent form.

If sufficient space is available, the block diagram may be incorporated into the face of a control panel or console in the form of a mimic diagram capable of easy updating in the event of modifications or extensions to the alarm installation.

1.17 TEST AND INSPECTION

The Contractor shall at his own cost make all necessary arrangements and provide all necessary facilities, tools and equipment, for tests and inspections of the installation by any Authorities concerned and by other relevant parties as approved by the Client's Representative.

The execution of these tests shall be to the complete satisfaction of the inspecting authorities.

1.18 COMMISSIONING

All systems shall upon completion be thoroughly tested to ensure conformity with the Specification.

Testing and adjustments shall be done by an experienced competent Commissioning Engineer/Technician outfit with all electrical and mechanical aspects of the works in conjunction with a Commissioning Engineer representing the Fire Detection Equipment Supplier. The same person(s) shall be available on site to demonstrate the correct operation of the plant system at take-over and instruct the representatives of the Client in the operating of the plant system.

Prior to the pre-take-over inspection, the Contractor shall submit to the Client's Representative copies of such measurements recorded during the commissioning (preliminary tests) of the plant as specified herein or required by the Director to satisfy himself that the plant system has been properly commissioned. The date on which the measurements were made as well as the name(s) of the person(s) who carried out the test(s) shall be included.
A pre-take-over inspection attended by the Contractor and the Client's Representative shall be carried out at least one week prior to the official take-over.

The Director reserves the right to deduct from the Contract amount, any costs reasonably incurred by himself and/or his agent(s) arising out of any additional pre-take-over and/or take-over visits, needs to repeat inspections cancelled because of defects, incorrect commissioning or non-attendance at appointments properly made for the purpose.

The Director will not certify completion of the Contract works until all contractual obligations required in terms of this Contract, excluding those on-going requirements during the guarantee period, have been fulfilled by the Contractor.

This includes submission of an approved Operating and Maintenance Manual and "as-built" drawings, these to be handed to the Client's Representative at least one week prior to official take-over.

1.19 OPERATING AND MAINTENANCE MANUALS

The Contractor shall supply the Client's Representative prior to or at the take-over inspection three copies of the Operating and Maintenance Instructions. A CD containing all "As built" documents, not manufacturer's documents, must be provided.

A draft copy of the manual shall be submitted to the Client's Representative for reviewing before the final instruction manual is typed and bound.

The following items shall be included in the instruction book :

(a) Description of plant and systems

(b) Operation of plant

(c) Schedule of equipment installed

(d) Spare parts list

(e) Copies of final commissioning data

(f) Pamphlets and information relating to the equipment installed, with names of agents and suppliers

(g) Complete set of adequate drawings, with all wiring diagrams

(h) Routine testing information and requirements

(i) Name, address and telephone number of Contractor and after-hours service.

PART 2

DETAILED SPECIFICATION FOR FIRE DETECTION AND ALARM INSTALLATION

INDEX

CLAUSES PAGE

2.1 GENERAL

The general/standard technical specification in Parts (1) and (2) of this document shall apply unless otherwise indicated in this specification.
Should there be any conflict between any parts of this document then sections shall be considered in the following order of priority:
Detail Specification (Part 2) and,
Bills of Quantities,

The following general requirements shall also apply:

1. The entire Ancillary Systems installations shall conform fully to the requirements of the Occupational Health and
   Safety Act № 85 of 1993, as amended.

- The work shall always be carried out under the supervision of a competent Representative of the Contractor, who will be able and authorized to receive and carry out instructions on behalf of the Contractor.
- All apparatus, component parts, fittings and materials employed in the execution of the Contract shall be new and unused and shall be the latest type or pattern of the manufacture employed. S.A.B.S. mark bearing items shall be used wherever possible.
- Rates shall include all anti-vibration equipment necessary to ensure that the installation is acceptable to the Secretary of Works.
- The complete installation shall be maintained for a period of twelve (12) months after acceptance in writing by the Secretary for Works.
- The complete installation must be guaranteed against defective parts and workmanship for a period of twelve months after the date of issue of the Completion Certificate. This period shall run concurrently with the maintenance period.
- Rates shall include commissioning and testing of the complete installation and handing over in working order to the satisfaction of the Secretary for Works.
- Rates shall include all equipment, electrical wiring and controls necessary to complete the installation as specified.

9. All work shall be carried out by competent workmen skilled in their trade. All workmanship will be subject to the approval of the Secretary of Works.

By submitting a tender, the Tenderer warrants that it is competent in the construction of works of the type specified,and that all work will be suitable for the intended purpose and complying with all relevant statutory regulations.

2.3 SCOPE OF WORK

The successful Contractor, shall be required to provide the complete Fire Detection and Alarm (FDA) installation for the works to be provided for:-
Replacement of the fire detection system

The works in general consists of:-
- Safe removal of the existing fire detection system
- Installation of new fire detection system inclusive of mimic panels

The building is an existing concrete and brick structure with mezzanine floors.

The work covered by this specification and drawings comprises the FDA installation, which will include the preparation of shop drawings, manufacture, supply, installation, connection, testing and commissioning and handing over to the client the complete installation in an approved and satisfactory working order, the installation described herein, in such a manner that the whole forms a complete working system with the rest of the engineering services without any additional material or equipment being required. It includes the guarantee, warranty and maintenance of the installation and provision of record documentation for the installation of the following as specified:-

1. safe removal and disposal of existing FDA installation;
2. new FDA installation ;
3. Remote alarm and indication (mimic) panel.
4. All wiring and cabling;
5. Power supply units;
6. Radio transmitter;
7. Interfacing between existing and new FDA control panels with remote mimic panel.
8. Interfacing with other electronic and electrical systems.
9. Testing and commissioning of the complete installation;
10. Compiling a syllabus and presenting a Training course;
11. Compiling an Operating and Maintenance manual; and
13. All other materials and labour necessary for the proper completion of the FD installation.

The Contractor shall be responsible for the detailing, checking and ensuring that all work, as specified in this Specification is fully covered within the Tender.

2.4 ASSOCIATED WORK

The following work associated with the FDA installation has been specified and measured elsewhere in the electrical tender document: -

1. All wireways (conduit, trunking and cable tray) required for cabling together with draw wires;
2. Round outlet boxes;
3. Telephone outlet point; and
4. Electrical mains supply at 230V ±10% to the main control panels.
5. Provision of wireways to the remote indicating/mimic panel and existing control panels

2.5 PARTICULAR REQUIREMENTS OF EQUIPMENT, MATERIALS AND INSTALLATION:

1. INSTALLATION

The installation shall be as generally shown on the existing installation drawings and shall comply with all the relevant Specifications.

The installation comprises removal of the existing fire detection system and installation of a new updated system
Any alarm received at the mimic panel will then be relayed to the local Fire Brigade by telephone and radio.

The Contractor shall prepare and submit the following documentation to the Department's Representative

for reviewing:

- Shop drawings.
- Testing, balancing and commissioning data.
- Operating, Maintenance and Instruction Manuals.
- Inspection Record Checklists.

The number and type of devices and panels used in the various areas are as follows:

2. SPECIALIST CONTRACTOR

The Contractor shall note that only Specialists in Fire Detection and Alarm installations, who are members of the Fire Detection Installation Association, the Fire Protection Association of South Africa and SAQCC qualified, may undertake this work and shall produce proof of previous work completed of a similar nature and magnitude.

3. SYSTEM OPERATION

The system shall comprise a control/display panel, self-addressable optical ionisation type smoke detectors, self-addressable rate of rise heat detectors, break glass units, loop isolators, alarm sounders, self-diagnostic wiring loops and fire retardant cabling.

Alarm signals shall be initiated by means of the various detectors and break-glass units and shall be transmitted to the main indication and alarm control panel within the respective building. The alarm signals from these main control panels shall be relayed to a remote control (mimic and alarm) panel if applicable.
The detectors and break glass units shall be wired in loops as specified, with each loop able to handle up to 128 devices. The detectors shall have removable bases, such that when a detector is removed, they shall maintain the integrity of the loop. The loop system shall be a self-diagnostic type. Any fault in any detector shall generate an alarm but not reset the system.

The system shall be zoned so that each zone is not greater than 2000m². Where more than one (1) zone is incorporated in a particular wiring loop, isolators shall be used in the loop for isolating any zones that may become faulty. The isolation of faulty zones via loop isolators shall be done automatically from the control panel.

The system shall be interfaced with other systems such as the Access system, Ventilation system, Lift installation and the Public Address system. Interface units shall be provided to give/accept contacts from other services required to be interfaced with the FD system. The interface units shall incorporate N/O or N/C potential free contacts rated at 3A, 230V in suitable relay. The system shall automatically carry out the following actions in the event of a fire alarm condition:

Access system	- Enable the access control system to open magnetic door locks on all doors along the fire escape route in the affected area/s.
Ventilation system	-Enable the air conditioning system to shut down the air conditioning and ventilation in the affected area/s, automatically close all fire dampers and to actuate the smoke extraction system.
Lift installation	-Enable the lifts to be sent to the ground floor and the doors kept opened until the fire alarm condition has been attended to.
Public Address System	-Enable the Public Address system to be actuated for evacuation purposes.

The supply and installation of cabling, excluding wireways, from the fire detection and alarm control panels to the control panels of the various systems to be interfaced, shall form part of the FD installation.

4. CONTROL PANELS

1. Main Control Panels-
The control panel shall generally be as that specified in Part 2 of this Specification. The panel shall be a surface wall mounted architrave type located in the position as indicated on SITE

The panel shall be a fully functional, self-contained type with LCD display comprising all necessary circuitry, power supply, battery chargers and standby batteries. Suitable pre-fitted space shall be made for a 20% increase in addressable devices per panel. Allowance shall be made in each panel for one (1)
additional spare loop.

2. Remote Alarm/Mimic Panel-
A simple alarm panel indication shall be provided so that the security personnel can immediately identify that a fire alarm has been initiated. The audible alarm on this panel shall be able to be cancelled locally. This mimic panel shall, in addition to normal telephone communication, include a radio transmitter for relaying fire alarm conditions to the Fire Brigade or a surveillance company as
may be required, to achieve the highest possible degree of integrity. All the necessary modems/relays etc. shall allowed for. The panels are to be linked using RS 485 PH Cabling.

5. ALARM SOUNDERS AND SIRENS

Alarm sounders shall be installed at ceiling level in the positions and these shall be of the addressable type with an adjustable output of up to 100 dB(A) at 1m and shall be connected to dedicated sounder circuits wired from the main control panel. The sounder alarm shall preferably be of the 'Yodel' type.

Alarm sounders shall be base mounted on the detector bases and shall also incorporate the relevant smoke or heat detector. The alarm sounders shall be fully programmable from the control panel and shall incorporate an adjustable volume control. It shall be possible to programme the alarm sounders so that only the sounders in an activated zone or the sounder associated with certain detectors in a specific zone, be sounded. The noise level of the alarm sounders shall be set to suit the areas in which they are located.

The sirens shall be mounted outdoors as indicated on the layout drawings. The sirens shall be a weatherproof type with a protection rating of at least IP54 and with an output of not less than 112 dB(A) at 1m.

6. CONDUIT ROUTES AND OUTLETS

The supply and installation of all conduit routes, cable tray, outlet boxes and drawwire required for the FDA installation will be provided as part of the Electrical installation.

Any additions or changes to the locations of equipment and conduit routes shall be discussed and the best possible route will be approved by the clients representative.
The Contractor shall note that some of the detectors and cabling will be carried out within 'Rhino' board ceiling and shall take this into account when tendering. All detectors shall fixed onto round conduit outlet boxes. In the case of detectors mounted on hard board ceilings, the connection between the recessed conduit box in the ceiling slab and the detector mounted on the hardboard ceiling will be in flexible PVC conduit. The flexible conduit and conduit box will be provided as part of the Electrical Installation.

7. COMPLETION OF WORKS

Completion of works will occur and delivery shall be given only after the following procedure has been certified
by the Department's Representative as having been carried out in accordance with the Specification :

1. After the defects are made good and approval of the Department's Representative is obtained,physical
completion has been reported to the client's Representative by the Contractor and the client's Representative has given approval for "start-up".

2. "Start-up" has taken place.

3. Commissioning and testing has taken place as specified and test results have been witnessed (where required), recorded and finally approved by the Department's Representative.
4. Spares as specified have been handed over to the Department's Representative.

5. Three copies of indexed loose leaf manuals containing complete Operating Instructions and Maintenance
Manuals have been furnished to the Department's Representative after approval by the Department's Representative, for all mechanical and electrical systems, equipment and controls for all equipment or systems specified under this Contract.

8. TESTING AND COMMISSIONING

The Contractor shall test the entire installation and shall ensure that the installation is completed and commissioned in every respect and that there are no major defects prior to notifying the Engineer for the final inspection.

In addition to testing of correct functioning of all equipment installed under this Contract, the Contractor shall allow in his Tender price for smoke tests to be conducted in accordance with the recommendations of SANS 0139 (as amended).

At least one (1) test fire shall be required per zone.

The smoke tests shall only be conducted in the presence of the Department's Representative, and in those areas where normal operating conditions have been established with respect to air conditioning, ventilation, doors, windows and other factors which in the opinion of the Department's Representative would effect normal air movement.

Equipment to be provided for tests by the Contractor shall include :

1. an asbestos cement container approximately 600mm high and 300mm diameter, with ten 15 diameter holes around the perimeter, 80mm from the base;

2. a suitable heat shield to protect floors from heat generated by the test fires, e.g. an asbestos cement tray or sheet, of 1,5m² dimension;

3. means of rapid removal of hot ash from the location of the test fire; and

4. fluorocarbon or "bee-smoker" test apparatus for checking response of detectors at ceiling heights applicable.

In addition to the above testing requirements, the Contractor may be required to carry out additional random tests on the fire detection and alarm installation, as directed by the Department's Representative to verify the functioning of detection devices and equipment, during the final inspection and shall therefore provide all the necessary test equipment for this purpose.

Upon successful completion of all testing the Contractor shall submit a fully completed test report together with a Certificate indicating that the installation fully complies with the Specification and all the relevant statutory requirements, the requirements of the Building Regulations SANS 400 and the requirements of the Local Authority and the Insurers, when notifying the Engineer for a final inspection.

9. TRAINING

After successfully testing and commissioning the installation, the Contractor will be required to thoroughly train and instruct several Operators/Supervisors designated by the client in the correct use, operation and supervision of the FDA installation. The Contractor shall allocate a competent member of his staff for this purpose and shall allow adequate time for this in his price.

A comprehensive operator-training programme shall be provided and shall cover all aspects of the FDA installation so as to provide a first line local support to the client Staff, both operational and managerial. The training sessions shall comprise lectures and on-site (hands-on) demonstrations and shall conduct over a minimum 2-day period. The Contractor shall provide a training plan and syllabus to the Department's Representative for approval. Approval of the training plan and syllabus shall be a condition for issue of a Certificate of Practical Completion for the installation. No training shall commence without the Department's Representative's approval of the final draft Operating and Maintenance Manual for the installation.

The training shall include the following topics as a minimum:

1. Hardware-
   (a) Overview and functioning of system and equipment.
   (b) Network and cabling.
   (c) Components and field replacement.
   (d) System maintenance and specific tasks related to preventative maintenance.
   (e) Interpretation and understanding of the Operating and Maintenance Manuals, with specific reference to requirements in cases of corrective and breakdown maintenance.

2. Support-
   (a) Trouble shooting problems /queries.
   (b) Support programme and procedures.
   (c) Support communications.

Training certificates shall be issued at the end of the training, when the Contractor is satisfied that the persons trained have an adequate understanding of how the system functions and are able to operate the system effectively. Copies of the certificates shall be included in the operating and maintenance manual.

10. OPERATING, MAINTENANCE AND INSTRUCTION MANUAL

The Operating and Maintenance Manual shall be as specified in Part 2 of this Specification.

The Contractor shall be responsible for the compilation of a complete set of Operating, Maintenance and Instruction Manuals. A separate Operating, Maintenance and Instruction Manual for the FDA installation shall be provided and shall be part of on overall manual for the entire Electrical installation.

The manuals shall be bound in hardcover plastic-coated A4 lever-arch files as per 'Bantex' or similar and approved. Sections of the manuals shall be clearly partitioned using labelled coloured plastic sheets. Pamphlets, bound leaflets/booklets. And drawings shall be placed in clear plastic pockets.
The manual shall contain at least the following headings:

1. Introduction-
   1.1 Scope of the manual
   1.2 General arrangement of the manual
   1.3 Description of installation
   1.4 Specifications

2. Schedule of equipment installed with pamphlets and names of Agents and Suppliers.

3. Parts and components list

4. Operating procedures

5. Maintenance-
   5.1 Purpose of maintenance
   5.2 Preventative maintenance
   5.3 Trouble-shooting
   5.4 Planned service and maintenance programme

6. Breakdown maintenance and repair, and name, address and telephone number of Contractor and after hours service.

7. Appendices including testing and commissioning data.

8. Drawings and diagrams

A draft copy of each Operating, Maintenance and Instruction Manual shall be submitted to the Department's Representative for approval. The manual will be reviewed and checked by the Department's Representative and returned to the Contractor with comments, where necessary. The Contractor shall make the necessary changes and amendments to the manuals to incorporate the Department's Representative's comments.

The final draft copy of each Operating, Maintenance and Instruction Manual shall be submitted to the Department's Representative at least one week prior to commencement of testing on commissioning. This set of manual will not be accepted without the Contractor's verification of the information contained in the manual and the professional language editing thereof. The Department's Representative shall return the manuals to the Contractor, who shall make the final corrections.

The Contractor shall include all test certificates and all details of the FDA installation. All such information and certificates shall be to the approval of the Department's Representative. Electronic copies of the final manual shall be handed over to the department's Representative upon approval of the Operation Maintenance and Instruction Manual.

Approval of final Operating, Maintenance and Instruction Manual shall be a prerequisite for issuing of a Certificate of Practical Completion for the installation.

The Contractor shall include all test certificates and all details of the FDA installation in the relevant section of the comprehensive Operating, Maintenance, and Instruction Manual for the entire Electrical Installation. All such information and certificates shall be to the approval of the Department's Representative.

The Contractor shall also provide copies of CD's containing all the "As-Built" record drawings of the FDA installation.

PART 6: LIGHTING SCHEDULE
The Contractor shall ensure that the SCHEDULE he uses on site during construction are clearly marked "FOR CONSTRUCTION", and he must ensure that he works to the latest SCHEDULE issued on site

TYPE	WATT	DESCRIPTION	PICTURE	MAKE & CAT. No.
		DOWNLIGHTER		
D1	25w	IP20,Black in colour with clear perspex,,Aluminium Extrusion,surface mounted, flicker free LED driver,220V,50Hz,SABS Approved,CCT 4000K,CRI >80		Lihlelight 25w SRF LED Downlight
E1	2w	SABS Approved,LED,IP20,Single sided,230V,50Hz,3 hour emergency light duration,Flicker free driver 160 lumens, CRI 80, 6000k, manufactured from cold rolled steel powder coated white		Lihlelight LED Exit
		FLOODLIGHTS		
F1	1x55w	LED surface mount floodlight, 550 mm Length x 300 mm Width, CRI>70, Operating temperature -40 to 200 degrees Celsius, 4000k Colour Temperature, Power Factor greater than 0.9, Gaskets to be post cured silicone rubber, IP66 Rated, Electronic trip connector with 6 kV surge protection with additional removable inline surge arrester-10kV, Flicker free driver, Lumen Output - 8500 lm, Operating voltage: 230 V (+- 10%) @ 50hz, High impact acrylic diffuser , Housing – LM6 die cast aluminum end cap and extruded aluminum body, Adjustable roto bracket, Vandal resistant, 122 degree beam angle, Powder coated finish, Stainless steel 316 latches and fastners, Light fitting to have SANS/SABS approved mark.		LEDLUME XP2 30 66-9047 N 1785306 A1G DTL
		BULKHEADS		
B1	1x17w	LED surface mount dome type bulkhead, 280 mm diameter, white trim, CRI>80, Operating temperature -20 to 35 degrees Celsius, 4000k Colour Temperature, Power Factor greater than 0.9, IP65 Rated, 10kV surge protection, Silicon sponge gaskets, Flicker free/constant current driver, Lumen Output - 2620 lm, Operating voltage: 230V (+- 10%) @ 50hz, High pressure die cast aluminum base, High impact and UV resistant anti discoloring diffuser, Stainless steel 316 latches and fastners, Light fitting to have SANS/SABS approved mark.		SERIES 30 BH BLK 178 NW 15W
B2	1x17w	LED surface mount dome type bulkhead, 280 mm diameter, white trim, CRI>80, Operating temperature -20 to 35 degrees Celsius, 4000k Colour Temperature, Power Factor greater than 0.9, IP65 Rated, 10kV surge protection, Silicon sponge gaskets, Flicker free/constant current driver, Lumen Output - 2620 lm, Operating voltage: 230V (+- 10%) @ 50hz, High pressure die cast aluminum base, High impact and UV resistant anti discoloring diffuser, Stainless steel 316 latches and fastners, Light fitting to have SANS/SABS approved mark. **EMERGENCY**(2 hour Back-up)		SERIES 30 BH BLK 178 NW 13W EM1M
		RECESSED		
R1	1x60w	IP20 LED Panel,Aluminium Frame,Power Factor >0,9,230V,50Hz,SABS Approved,2kV Surge Protection,non discolouring Flicker free Driver, CRI>80,CCT 4000K, Lumen Output 6000Lumens		Lihlelight RE 60w 1200 x 600 LED with cordset

PART 7: ELECTRICAL ACCESSORIES SCHEDULE

The Contractor shall ensure that the SCHEDULE he uses on site during construction are clearly marked “FOR CONSTRUCTION”, and he must ensure that he works to the latest SCHEDULE issued on site.

REF	LOCATION	DESCRIPTION	REV
Ls	**LIGHT SWITCHES**		
Ls1	Genaral indoor, flush	16 A,1 lever, 250 V SABS in 100x50x50 steel box. Covers to be	0
Ls2	General indoor, flush	16 A,1 lever, 2-way, 250 V SABS in 100x50x50 steel box. Covers to be included	0
Ls3	General indoor, flush	16 A, 3 lever, 250 V SABS in 100x50x50 steel box. Covers to be	0
Pp	**PLUG POINTS**		
Pp1	Gen. indoor, flush SSO	16 A, 250 V SABS in 100x100x50 steel box, Combination plug point as per SANS 164-1 & SANS 164-2 - seperately switched.	0
Pp3	Gen. indoor, powerskirting SSO	16 A, 250 V SABS in metal power skirting, as per SANS 164-1 with all accessories to screw onto power skirting. Covers to be	0
Pp4	Gen. indoor, powerskirting SSO	16 A, 250 V SABS in metal power skirting, as per SANS 164-2 (Euro) with all accessories to screw onto power skirting. Covers	0
Pp5	Gen. indoor, powerskirting SSO	16 A, 250 V SABS in metal power skirting, as per SANS 164-4 (Dedicated) with all accessories to screw onto power skirting.	0
Ip	**ISOLATOR POINTS**		
Ip1	General indoor, flush	20 A, 250 V, DP/TP SABS in 100x100x50 steel box	0
Ip2	General indoor, flush	30 A, 250 V, DP/TP SABS in 100x100x50 steel box	0

Notes:

1. All accessories to be SABS approved.
2. SSO - Switched Socket Outlet & Light switches to be Crab tree classic range or Similar approved
3. Samples of equipment to be provided for client approval prior to all equipment being purchased.

Part C4: Site Information

2.2 SITE LOCATION AND CONDITIONS

Queen Elizabeth Park |1 Peter Brown Drive | Montrose | Pietermaritzburg |3201 |

GPS Co-ordinates: -29.573423, 30.326379