LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

BID NO. ACDP 21/19

BID DOCUMENT

FOR

THE DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

NAME OF BIDDER : _____

TEL NUMBER : _____

CELL NUMBER : _____

FAX NUMBER : _____

PREPARED BY:

HEAD OF DEPARTMENT
LIMPOPO DEPT OF AGRICULTURE
AND RURAL DEVELOPMENT
PRIVATE BAG X9487
POLOKWANE
0700

CLOSING DATE: 7 OCTOBER 2021

BID No: ACDP 21/19

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

TENDERER'S DETAILS

NAME OF TENDERER ……..

……..

……..

PHYSICAL ADDRESS ……..

……....

……..

POSTAL ADDRESS ……..

……..

CONTACT PERSON (NAME) ……

(SURNAME) ……

(PHONE No) ……

(CELL No) ……....

(FAX No) ……....

(E-MAIL) ……

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2

Contents

Drawings

SCHEDULE OF BID DRAWINGS

The following drawings, which are bound in, form part of this Contract in terms of Clause 1(i) (j) of the General Conditions of Contract:

DRAWING NO:	DESCRIPTION:
None	To be drawn by successful Bidder

The Bidder shall satisfy himself that the sets of drawings are complete in accordance with the schedule (at quotation stage), and if any are found to be missing or duplicated, or the writing or figures indistinct, he shall apply to the Engineer immediately and have the discrepancy rectified. No liability whatsoever will be admitted by the Employer in respect of errors in Bids attributed to any such discrepancy.

PART T1: BIDDING PROCEDURES

TABLE OF CONTENTS

T1.1: TENDER NOTICE AND INVITATION TO TENDER

T1.1: TENDER NOTICE AND INVITATION TO TENDER

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

BID NO ACDP 21/19

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

T1.1 NOTICE AND INVITATION TO SUBMIT TENDER

Tenders are hereby invited to bid for the DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2, Polokwane, of the Limpopo Department of Agriculture and Rural Development. Tenderers should have a CIDB contractor grading of 4EB or Higher. **MUST be a QSE Service Provider.**

Tender documents will be obtainable from 3 September 2021, from the Departmental Website, on the following link: www.ldard.gov.za No payment is required to off-load the document from the Website.

Duly completed Tenders enclosed in a sealed envelope marked **"TENDER: DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2, POLOKWANE: BID NO ACDP 21/19, CLOSING DATE: 7 OCTOBER 2021"** with the name of the Contractor, shall be deposited in the clearly marked tender box provided at Limpopo Department of Agriculture, 67/69 Biccard Street, Polokwane before **11:00** on the closing date. The tenders will be opened in public.

To comply with COVID regulations, **Compulsory Briefing Session** will be conducted in the following manner. Contractors must make an appointment with the Departmental Engineer for a Briefing and site inspection. Dates for appointments are **available from 6 to 22 September 2021 and from 8:00 to 14:00 to meet the Engineer at the Security gate at 69 Biccard Street, Polokwane**. A maximum of 2 Contractors will be accommodated at a time for the Briefing and Site inspection. Bidders must sign the attendance register. Contract documentation will not be available on site.

A preferential point system shall apply whereby a contract will be allocated to a tenderer in accordance with the Preferential Procurement Policy Framework Act, Act No 5 of 2000 and as defined in the Conditions of Tender in the tender document, read in conjunction with the Preferential Procurement Policy of Limpopo Department of Agriculture & Rural Development where 90 points will be allocated in respect of price and 10 points in respect of targeted goals. Contractors must have the necessary qualifications, experience and capacity to perform the required work.

BIDDING PROCEDURE:	**TECHNICAL INFORMATION:**
Mr VS Ndlozi Limpopo Department of Agriculture and Rural Development Private Bag X9487 Polokwane, 0700 Tel: 015- 294 3564 Fax: None Email: NdloziV@agric.limpopo.gov.za	Mr MJ Gouws (Departmental Engineer) Limpopo Department of Agriculture and Rural Development Private Bag X9487 Polokwane, 0700 Tel: 015- 294 3539 Cell: 060 967 4127 Email: gouwsmj@agric.limpopo.gov.za

T1.2. BID DATA

The Conditions of Bid in the Standard Conditions of Bid as contained in Annex F of CIDB Standard Uniformity in Construction Procurement. (See www.cidb.org.za) which are reproduced without amendment or alteration for the convenience of Bidders in this Bid in the section T1.3 of the Bid Data.

The Standard Conditions of Bid make several references to the Bid Data for details that apply specifically to this Bid. The Bid Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Bid. Each item of Bid Data given below is cross-referenced to the relevant clause in the standard Conditions of Bid.

F.1.1 The Employer for this Contract is: **Limpopo Department of Agriculture and Rural Development**

F.1.2 Bid Documents

The Bid Document consists of the following:

BID

T1: Bidding Procedures
- T1.1: Tender Notice and Invitation to Tender
- T1.2: Bid Data
- T1.3: Standard Conditions of Bid

T2: Returnable Documents
- T2.1: List of Returnable Documents
- T2.2: Returnable schedules

CONTRACT

Part 1: Agreements and Contract Data
- C1.1: Form of Offer and Acceptance
- C1.2: Contract Data
- C1.3: Form of Guarantee
- C1.4: Agreement with Adjudicator
- C1.5: Agreement in terms of Section 37(2) of the Occupational Health and Safety Act (No 85, 1993)

Part 2: Pricing Data
- C2.1: Pricing Instructions
- C2.2: Bill of Quantities

Part 3: Scope of Work
- C3.1: Standard Specifications
- C3.2: Project Specifications
- C3.3: Particular Specifications

Part 4: Site Information
- C4.1: Locality Plan
- C4.2: Construction Notice Board

DRAWINGS

Drawings are bound in this document.

Tender documents shall be obtained from the Departmental Website, on the following link: www.ldard.gov.za No payment is required to off-load the document from the Website.

F.1.4 The Employer's agent is:

Name	:	MJ Gouws
Address	:	69 Biccard Street Polokwane 0699
Telephone	:	015 294 3539
E-Mail Address	:	gouwsmj@agric.limpopo.gov.za

F.1.5 The Employer's right to accept or reject any Bid Offer

The Employer may accept or reject any variation, deviation, Bid Offer, or alternative Offer, and may cancel the Bid process and reject all Bid Offers at any time before the formation of a Contract. The Employer shall not accept or incur any liability to a Bidder for such cancellation and rejection, but will give written reasons for such action upon written request to do so. The Employer will reserve the right to appoint more than one (1) bidder.

F.2.1 Eligibility

A Bidder will not be eligible to submit a Bid if:

(a) The Contractor submitting the Bid is under restrictions or has principals who are under restriction to participate in the Employer's procurement due to corrupt or fraudulent practices;
(b) The Bidder does not have the legal capacity to enter into the Contract;
(c) The Contractor submitting the Bid is insolvent, in receivership, bankrupt or being wound up, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceedings in respect of the foregoing;
(d) The Bidder does not comply with the legal requirements stated in the Employer's procurement policy;
(e) The Bidder cannot demonstrate that he possesses the necessary professional and technical qualifications and competent, financial resources, equipment and other physical facilities, managerial capability, personnel, experience and reputation to perform the Contract;
(f) The Bidder cannot provide proof that he is in good standing with respect to duties, taxes, levies and contributions required in terms of legislation applicable to the work in the Contract.
(g) Only those Bidders who have in their employ management and supervisory staff satisfying the requirements of the Scope of Work for Labour Intensive Competencies for supervisory and management staff are eligible to submit Bids.
(h) Only those Tenderers who are registered with the CIDB as defined in the Regulations (9 June 2004 and 22 July 2005), in terms of the CIDB Act No 38 of 2000, 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 for 4EB or higher class of construction work, are eligible to submit Tenders.
(i) The Contractor submitting the Bid is not registered on the Employer's Supplier Database.
(j) Joint Ventures are eligible to submit Tenders provided that:
    1. every member of the Joint Venture is registered with the CIDB;
    2. the lead partner has a Contractor grading designation in the 4EB or higher class of construction work; and
    3. 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 4EB or higher class of construction work.
    4. both bidders must submit proof of the joint calculated CIDB Grading with their Bid. Non-submission will lead to disqualification.

F.2.7 Site visit and clarification meeting

The arrangements for the compulsory briefing and clarification meeting are as follows:

Location: 69 Biccard Street, Polokwane, 0699 (**Meet the Engineer at the Security gate)**

To comply with COVID regulations, Compulsory Briefing Session will be conducted in the following manner. Contractors must make an appointment with the Departmental Engineer for a Briefing and site inspection. Dates for appointments are available from 6 to 22 September 2021 and from 8:00 to 14:00 to meet the Engineer at the Security gate at 69 Biccard Street, Polokwane. A maximum of 2 Contractors will be accommodated at a time for the Briefing and Site inspection. Bidders must sign the attendance register.

Date**:** **As per appiontment Date: To be arranged by Contractor for one of the dates from 6 to 22 September 2021**
Starting time: **As per appiontment Time: Between 8:00 to 14:00**

Enquiries may be directed to:

Limpopo Department of Agriculture and Rural Development
Name: MJ Gouws
Telephone No: 015 294 3539
Cell No: 060 967 4127
E-Mail address: gouwsmj@agric.limpopo.gov.za

F.2.10 Pricing the Bid Offer

(a) Value Added Tax
- The Valued Added Tax (VAT) rate shall be 15% or as otherwise provided for by Legislation.
- The successful Bidder shall be required to produce a VAT invoice that shall only be prepared once measurements and valuations for work done in Terms of Contract Offer have been agreed with the Employers agent and a Certificate of Payment issued.
- Payment of VAT to non-VAT vendors shall be processed from the month in which the Bidder's liability with the South African Revenue Services is effective.

F.2.11 Alterations to document

A Bid Offer shall not be considered if alterations have been made to the Forms of Bid data or Contract data (unless such alterations have been duly authenticated by the Bidder) or if any particulars required therein have not been completed in all respects.

F.2.12 Alternative Bid Offers

No alternative Offers will be considered.

F2.13 Submitting a Bid Offer

F.2.13.3 Bid Offers shall be submitted as an original only.

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.

F.2.13.5 The Employer's address for delivery of Bid Offers and identification details to be shown on such Bid Offer package are:

Location of Bid box:	Limpopo Dept of Agriculture and Rural Development
Physical address:	67/69 Biccard Street Polokwane, 0700
Identification details:	Bid Design, Supply, Installation and Maintenance of a Standby Generator and Uninterruptible Power Supply (UPS) Units at Agrivillage 1 & 2 for the Limpopo Department of Agriculture and Rural Development

Bid No: **ACDP 21/19**
Closing Date**: 7 October 2021**, at **11:00**

F.2.15 Closing Time

The closing time for submission of Bid Offers is: **11:00 on 7 October 2021** as stated in the Bid Notice and Invitation to Bid.

Telephonic, telegraphic, telex, facsimile, electronic or e-mailed Bids will not be accepted.

F.2.16 Bid Offer validity

The Bid Offer validity period is 120 days from the closing time for submission of Bids.

F.2.17 Clarification of tender offer after submission
Provide clarification of a tender offer in response to a request to do so from the employer during the evaluation of tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the total of the prices or substance of the tender offer is sought, offered, or permitted. The total of the prices stated by the tenderer shall be binding upon the tenderer.

Note: Sub-clause F.2.17 does not preclude the negotiation of the final terms of the contract with a preferred tenderer following a competitive selection process, should the Employer elect to do so, this may include negotiations for fair market related prices.

F.2.18 Provide other material

The Bidder shall, when requested by the Employer to do so, submit the names of all management and supervisory staff that will be employed to supervise the labour-intensive portion of the works together with satisfactory evidence that such staff members satisfy the eligibility requirements

F.2.19 Access

Access shall be provided for inspections and testing by personnel acting on behalf of the Employer.

F.2.20 BID EVALUATION CRITERIA

F.2.20.1 <u>Qualifying Criteria</u>

The LDARD has set minimum standards (Gates) that a tenderer needs to meet in order to be evaluated and selected as a successful tenderer. The minimum Standards consist of the following:

Pre-qualification Criteria (Gate 0)	**Technical Evaluation Criteria (Gate 1)**	**Price and B-BBEE Evaluation (Gate 2)**
Tenderers must submit all documents as outlined in T2.1: List of Returnable Documents. The Department shall examine each submission to determine whether all the returnable documents are complete and substantially responsive. **Tenderers who are QSEs and have 4EB CIDB grading are targeted for this tender. Must submit valid BBBEE Certificate and / or an Original Sworn Affidavit with the bid document**. Only tenderers that comply with ALL these criteria will proceed to Gate 1.	Bidder(s) are required to achieve a minimum of 60 points out of 100 points to proceed to Gate 2 (Price and B-BBEE).	For Gate 2, Bidder(s) will be evaluated on Price and B-BBEE claimed points.

All bidders are required to respond to the technical evaluation criteria.
Only Bidders that have met the Pre-Qualification Criteria in (Gate 0) will be evaluated in Gate 1 for

functionality and Gate 2. Functionality will be evaluated:

i. **in accordance with the Evaluation criteria for functionality listed in the table below**
ii. **out of 100 points and Tenderers are required to achieve a minimum threshold of 60 points in order to be evaluated further.**

For Gate 1, the evaluation criteria will be used. Service Providers are required to achieve 60% as a minimum to proceed to Gate 2.
The premises of all the Tenders that achieved the minimum score of 60% will be inspected.

For Gate 2, Service Providers will be evaluated on Price and B-BBEE claimed points.
As part of due diligence, LDARD may conduct a visit at a client of the Tenderer (reference) for validation of the services rendered. The choice of the visits will be at the LDARD`s sole discretion.

Gate 0: Pre-Qualification Criteria
Without limiting the generality of LDARD other critical requirements for this project, tenderer(s) must submit the documents listed in the Table below. All documents must be completed and signed by the duly authorized representative of the prospective tenderer(s). During this phase, bids will be evaluated based on compliance with the listed administration and mandatory tender requirements. The tenderer(s) Bid may be disqualified for non-submission of any of the documents.

F.2.20.2 Submission of Required Documents

Bidders will be disqualified if not meeting the following requirements:

Documents that must be submitted	Non-submission will result in disqualification	Requirement
CIDB grading certificate of **4EB**	**YES**	Bidder must submit CIDB grading certificate of 4EB or higher. In case of Joint Ventures, both bidders must submit proof of the joint calculated CIDB Grading with their Bid. Non-submission will lead to disqualification.
Compulsory attendance of the site briefing session	**YES**	Must attend a compulsory site briefing. Bidders must make an appointment for a briefing session within the specific week that will be set aside for this purpose. A maximum of 2 Companies will be accommodated at each briefing. All Bidders must sign the attendance register.
Bill of Quantity (BOQ) and Specifications sheet	**YES**	All line items of the BOQs and Specifications sheets must be fully completed with all rates and percentages where applicable and submitted with the bid by the closing date and time.
Declaration of Interest – SBD 4	**YES**	Complete and sign the supplied pro forma document
Preference Point Claim Form – SBD 6.1	**YES**	Non-claiming of points on this form will lead to zero (0) even if a B-BBEE certificate or Original Sworn Affidavit.
B-BBEE Certificate/ Sworn Affidavit	**YES**	Bidders should submit copies of valid B-BBEE status level verification certificates Accredited by SANAS or original sworn affidavit or certificate issued by Companies and intellectual Property Commission (DTI) thereof together with their tenders to substantiate their B-BBEE rating claims. Failure to submit will lead to zero (0) score on BBBEE points
Declaration of Bidder's Past Supply Chain Management Practices – SBD 8	**YES**	Complete and sign the supplied pro forma document

Certificate of Independent Bid Determination – SBD 9	**YES**	Complete and sign the supplied pro forma document
Joint Venture Agreement/ Power of Attorney in case of Joint Ventures	**YES (If applicable)**	Must submit Joint Venture Agreement or Power of Attorney in case of Joint Ventures In the case of an award, the company need to register on CSD as a JV. The process is that the service providers must register the JV at SARS then open a JV bank account. With those documents they can then register the JV on CSD. The department will only make payment to a JV account.
Workmen's Compensation Registration Certificate	**NO**	Must submit Valid copy of COIDA certificate or proof of payment thereof
Targeted Group	**YES**	Bidders who are **QSEs** are targeted for this tender. Must submit an original copy of sworn affidavit with the bid document

F.2.20.3 Technical Evaluation Criteria (Gate 1)

Responsive bids will be evaluated using a point system which awards points on the basis set out in the table below:

CRITERIA	EVIDENCE	Value	Weighting
Equipment available: Owned or leased by the Bidder **Evidence:** Bidder must submit proof of ownership or hiring/lease arrangement and photos clearly indicate registration numbers.	No evidence or not sufficient information as requested under the list of Evidence	0	15
	Have no equipment of the 2 groups: 1) Truck equipped with High-up crane 2) Fully equipped Field Service LDV	1	
	Have only equipment for 1 of the 2 groups: 1) Truck equipped with High-up crane 2) Fully equipped Field Service LDV	2	
	Have at least 1 of each of the 2 groups: 1) Truck equipped with High-up crane 2) Fully equipped Field Service LDV	3	
	Have at least 2 of each of the 2 groups: 1) Truck equipped with High-up crane 2) Fully equipped Field Service LDV	4	
	Have more than 2 of each of the 2 groups: 1) Truck equipped with High-up crane 2) Fully equipped Field Service LDV	5	
Current contractual obligations. **Evidence:** Bidder must provide list of previous and current projects with contactable references. The information must include name of project, nature, value, start and end date, contact details.	No evidence or not sufficient information as requested under the list of Evidence	0	5
	Committed for 4 months or more after closing of this bid	1	
	Committed for 3 months or more after closing of this bid	2	
	Committed for 2 months after closing of this bid	3	
	Committed for 1 months after this bid closing date	4	
	Completed all current obligations and No current obligations	5	
Program of Works **Evidence:** A detailed Execution Plan with clear	No evidence or not sufficient information as requested under the list of Evidence	0	10
	Gantt chart without activities	1	
	Gantt chart with not relevant activities.	2	
	Clear relevant activities, Gantt chart and completion	3	

activities and with a realistic cash flow.	within reasonable period.		
	Clear relevant activities, Gantt charts and completion are within the stated contract period.	4	
	Clear relevant activities, Gantt charts and completion are within the stated contract period and cash flow.	5	
Details of staff available for this Contract **Evidence** Bidder must submit CV's and certified copies of qualifications and registrations were applicable for verification. For Staff that is not fulltime employed by the bidder, Joint Venture or Sub-contractor agreements must be attached.	No evidence or not sufficient information as requested under the list of Evidence.	0	30
	Have only staff for 1 or 2 of the 4 groups of the following qualified and Experienced Staff: 1. ECSA Registered: Electrical Engineer / Electrical Engineering Technologist / Electrical Engineering Technician – 5 years relevant experience after registration. 2. Electrician / Millwright – 3 years relevant experience after trade test. 3. Mechanic – 3 years relevant experience after trade test. 4. Crane Operator – 3 years relevant experience	1	
	Have only staff for 3 of the 4 groups of the following qualified and Experienced Staff: 1. ECSA Registered: Electrical Engineer / Electrical Engineering Technologist / Electrical Engineering Technician – 5 years relevant experience after registration. 2. Electrician / Millwright – 3 years relevant experience after trade test. 3. Mechanic – 3 years relevant experience after trade test. 4. Crane Operator – 3 years relevant experience	2	
	Have at least 1 of each of the 4 groups of the following qualified and Experienced Staff: 1. ECSA Registered: Electrical Engineer / Electrical Engineering Technologist / Electrical Engineering Technician – 5 years relevant experience after registration. 2. Electrician / Millwright – 3 years relevant experience after trade test. 3. Mechanic – 3 years relevant experience after trade test. 4. Crane Operator – 3 years relevant experience	3	
	Have at least 2 of each of the 4 groups of the following qualified and Experienced Staff: 1. ECSA Registered: Electrical Engineer / Electrical Engineering Technologist / Electrical Engineering Technician – 5 years relevant experience after registration. 2. Electrician / Millwright – 3 years relevant experience after trade test. 3. Mechanic – 3 years relevant experience after trade test. 4. Crane Operator – 3 years relevant experience	4	
	Have 3 or more of each of the 4 groups of the following qualified and Experienced Staff: 1. ECSA Registered: Electrical Engineer / Electrical Engineering Technologist / Electrical Engineering Technician – 5 years relevant experience after registration. 2. Electrician / Millwright – 3 years relevant experience after trade test. 3. Mechanic – 3 years relevant experience after trade	5	

	test. 4. Crane Operator – 3 years relevant experience		
Experience relevant to this technical field: Standby Generators **Evidence** Bidder must submit Proof of such orders, completion certificates and appointment letters.	No evidence or not sufficient information as requested under the list of Evidence.	0	30
	Number of similar projects (Standby Generators) successfully completed (Design and Construct): Less than 5	1	
	Number of similar projects (Standby Generators) successfully completed (Design and Construct): 5 to 9	2	
	Number of similar projects (Standby Generators) successfully completed (Design and Construct): 10 to 14	3	
	Number of similar projects (Standby Generators) successfully completed (Design and Construct): 15 to 29	4	
	Number of similar projects (Standby Generators) successfully completed (Design and Construct): 30 and more	5	
Experience in contracts of similar value, **Evidence** Bidder must submit Proof of such orders, completion certificates and appointment letters.	Projects with a value of up to 19% of this Bid Offer successfully completed.	0	5
	Projects with a value of 20% to 49% of this Bid Offer successfully completed.	1	
	Projects with a value of 50% to 79% of this Bid Offer successfully completed.	2	
	Projects with a value of 80% to 100% of this Bid Offer successfully completed.	3	
	Projects with a value of 101% to 150% of this Bid Offer successfully completed.	4	
	Projects with a value of more than 150% of this Bid Offer successfully completed.	5	
Proposed demand guarantee **Evidence** Bidder must submit Letter of intent from a Financier.	No evidence or not sufficient information as requested under the list of Evidence	0	5
	A proposed demand guarantee of less than 5% of this Bid Offer	1	
	A proposed demand guarantee of 5% to 9% of this Bid Offer	2	
	A proposed demand guarantee of 10% of this Bid Offer	3	
	A proposed demand guarantee of 11% of this Bid Offer	4	
	A proposed demand guarantee of more than 11% of this Bid Offer	5	
TOTAL			**100**

F.3.11 Evaluation of Offers (Gate 2)

The procedure for evaluation of responsive Offers will be **Method 2: Financial Offer and Preferences**. The responsive Tenderer with the highest combined total points for Financial Offer and preferences, is the preferred Tenderer.

The procedure for the evaluation of responsive Offers is Method 2.

a) Financial
The score for financial offer is to be calculated using Formula Nf = W1 x Pm/P (as above), where W1 is the percentage score given to financial offer and equals (100-W2).

b) Preferences
Up to 20points (for financial values up to R500 000) or 10 points (for financial values over R500 000) will be awarded to Contractors who complete the referencing schedule and who are found to be eligible for the preference claimed.

i. Direct Preference (based on equity ownership)

A maximum equal to W4 Bid evaluation points will be awarded, based on the following formula:

Np = W4 x D /100

Where:

W4 = 20 for financial values up to R500 000 (inclusive of VAT) of all responsive Bids received, and 10 for financial values over R500 000;

D = Bidded Contract Participation Goal

PRICE	**90**	**80**
PREFERENCE (B-BBEE Status Level of Contributor)	**10**	**20**
• Level 1	10 points	20 points
• Level 2	9 points	18 points
• Level 3	8 points	14 points
• Level 4	5 points	12 points
• Level 5	4 points	8 points
• Level 6	3 points	6 points
• Level 7	2 points	4 points
• Level 8	1 point	2 points
• Non-compliant contributor	0 points	0 points

SEE SCHEDULE R: PREFERENCE POINTS CLAIM FORM

F.3.13 Acceptance of Bid Offer

F.3.13.1 Bid Offers will only be accepted on condition that:

(a) the Bid Offer is signed by a person authorised to sign on behalf of the Bidder;

(b) the Bidder's declaration of compliance with the Occupational Health and Safety Act No. 85 of 1993 and the Construction Regulations 2003, is included with his Bid submission;

(c) a Bidder who submitted a Bid as a Joint Venture has included an acceptable Joint Venture Agreement with his Bid;

(d) the Bidder or a competent authorised representative of the Contractor who submitted the Bid has attended the compulsory clarification meeting or site inspection;

(e) the Bidder or any of its principals is not listed on the register of Bid 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;

(f) the Bidder has not abused the Employer's Supply Chain Management System or has failed to perform on any previous Contract and has been given a written notice to this effect;

(g) the Bidder or any of its Principals, Directors or Managers is not employed in the service of the State or any Municipality. In the event that such Principals are involved, official approval from the Executing Authority regarding carrying out remunerative work outside of the Public Service must be included in the Bid Submission.

(h) the Employer is satisfied that the Bidder or any of his Principals have not influenced the Bid Offer and acceptance by the following criteria:

a. having Offered, promised or given a bribe or other gift or remuneration to any person in connection with the obtaining or execution of this Contract;

b. having acted in a fraudulent or corrupt manner in obtaining or executing this Contract;

c. having approached an Officer or employee of the Employer or the Employer's Agent with the objective of influencing the award of a Contract in the Bidder's favour;

d. having entered into any agreement or arrangement, whether legally binding or not, with any other Person, Firm or Company to refrain from Bidding for this Contract or as to the amount of the Bid to be submitted by either party;

e. having disclosed to any other Person, Firm or Company other than the Employer, the exact or approximate amount of his proposed Bid;

f. the Employer may, in addition to using any other legal remedies, repudiate the Bid Offer and acceptance and declare the Contract invalid should it have been concluded already.

F.3.18 Copies of Contract

The number of paper copies of the signed Contract to be provided by the Employer is ONE.

F.2.22 Return of Bid Documents

Not applicable.

F.2.23 Certificates

The Bidder is required to submit with his Bid the following:

- Joint Venture Agreement and Power of Attorney in case of Joint Ventures;
- VAT Registration Certificate from South African Revenue Services (SARS);
- Workmen's Compensation Registration Certificate (or proof of payment of contributions in terms of the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993);
- Form of intent by a bank or insurance company to provide a performance guarantee; (for open Bids)
- Company / CC / Trust / Partnership registration certificates;
- Certified Copies of Identity Document of all members of the entity (certification should not be more than 3 months old).

Bidders must ensure that they meet the following requirements before the bid can be awarded.

Criteria	*Requirement*
Tax compliance status	Bidder must be tax compliant before the bid is awarded, i.e. *Where the recommended bidder is not tax compliant, the bidder will be notified of their non-compliant status and be granted reasonable timeframe to rectify their tax compliance status with the South African Revenue Service. The bidder must thereafter provide the procuring entity with proof of its tax compliance status which must be verified via the Central Supplier Database or e-filing".*
Business registration	The Company must be in business
Company registration with central supplier database (CSD)	Company must be registered on central supplier database (CSD)
In the service of the state status	Shareholders or directors must not be employed by state departments, municipalities, municipal entities, public entities
Tender defaulting and restriction status	Bidders Must not be listed as defaulters and/or restricted
Workmen's Compensation Registration Certificate	Appointed bidders must submit a valid COIDA certificate or proof of payment thereof

F.3.4 Opening of Bid Submissions

Bid will be opened immediately after the closing time for Bids. The time and location for opening of the Bid Offers are:
Time: **11:00**
Date: **7 October 2021**
Venue: Limpopo Department of Agriculture and Rural Development, at the Tender Box

T1.3: Annex F: Standard Conditions of Bid

(As contained in Annexure F of South African National Standard: Construction procurement processes, Methods and procedures: SANS 294: 2004 Edition)

F.1 General

F.1.1 Actions

The employer and each Bidder submitting a Bid offer shall comply with these conditions of Bid. In their dealings with each other, they shall discharge their duties and obligations as set out in F.2 and F.3, timeously and with integrity, and behave equitably, honestly and transparently.

F.1.2 Bid Documents

The documents issued by the employer for the purpose of a Bid offer are listed in the Bid data.

F.1.3 Interpretation

F.1.3.1 The Bid data and additional requirements contained in the Bid schedules that are included in the returnable documents are deemed to be part of these conditions of Bid.

F.1.3.2 These conditions of Bid, the Bid data and Bid schedules which are only required for Bid evaluation purposes, shall not form part of any contract arising from the invitation to Bid.

F.1.3.3 For the purposes of these conditions for the calling for expressions of interest, the following definitions apply:

a) **comparative offer** means the Bidder's financial offer after the factors of non-firm prices, all unconditional discounts and any other Bidded parameters that will affect the value of the financial offer have been taken into consideration

b) **corrupt practice** means the offering, giving, receiving or soliciting of anything of value to influence the action of the employer or his staff or agents in the Bid process; and

c) **fraudulent practice** means the misrepresentation of the facts in order to influence the Bid process or the award of a contract arising from a Bid offer to the detriment of the employer, including collusive practices intended to establish prices at artificial levels

d) **quality (functionality)** means the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs

F.1.4 Communication and employer's agent

Each communication between the employer and a Bidder shall be to or from the employer's agent only, and in a form that can be read, copied and recorded. Writing shall be in the English language. The employer shall not take any responsibility for non-receipt of communications from or by a Bidder. The name and contact details of the employer's agent are stated in the Bid data.

F.1.5 The employer's right to accept or reject any Bid offer

F.1.5.1 The employer may accept or reject any variation, deviation, Bid offer, or alternative Bid offer, and may cancel the Bid process and reject all Bid offers at any time before the formation of a contract. The employer shall not accept or incur any liability to a Bidder for such cancellation and rejection, but will give written reasons for such action.

F.1.5.2 After the cancellation of a Bid process or the rejection of all Bid offers the employer may abandon the proposed procurement and re-issue a similar Bid notice and invitation to Bid not less than three months after the closing dated for Bid offers or have it performed in another manner at any time.

F.2 Bidder's obligations

The Bidder shall comply with the following obligations:

F.2.1 Eligibility

Submit a Bid offer only if the Bidder complies with the criteria stated in the Bid data and the Bidder, or any of his principals, is not under any restriction to do business with employer.

F.2.2 Cost of Bidding

Accept that the employer will not compensate the Bidder for any costs incurred in the preparation and submission of a Bid offer, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements.

F.2.3 Check documents

Check the Bid documents on receipt for completeness and notify the employer of any discrepancy or omission.

F.2.4 Confidentiality and copyright of documents

Treat as confidential all matters arising in connection with the Bid. Use and copy the documents issued by the employer only for the purpose of preparing and submitting a Bid offer in response to the invitation.

F.2.5 Reference documents

Obtain, as necessary for submitting a Bid offer, copies of the latest versions of standards, specifications, conditions of contract and other publications, which are not attached but which are incorporated into the Bid documents by reference.

F.2.6 Acknowledge addenda

Acknowledge receipt of addenda to the Bid documents, which the employer may issue, and if necessary apply for an extension to the closing time stated in the Bid data, in order to take the addenda into account.

F.2.7 Clarification meeting

Attend, where required, a clarification meeting at which Bidders may familiarize themselves with aspects of the proposed work, services or supply and raise questions. Details of the meeting(s) are stated in the Bid data.

F.2.8 Seek clarification

Request clarification of the Bid documents, if necessary, by notifying the employer at least five working days before the closing time stated in the Bid data.

F.2.9 Insurance

Be aware that the extent of insurance to be provided by the employer (if any) may not be for the full cover required in terms of the conditions of contract identified in the contract data. The Bidder is advised to seek qualified advice regarding insurance.

F.2.10 Pricing the Bid offer

F.2.10.1 Include in the rates, prices, and the Bidded total of the prices (if any) all duties, taxes (except Value Added Tax (VAT)), and other levies payable by the successful Bidder, such duties, taxes and levies being those applicable 14 days before the closing time stated in the Bid data.

F2.10.2 Show VAT payable by the employer separately as an addition to the Bidded total of the prices.

F.2.10.3 Provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data.

F.2.10.4 State the rates and prices in Rand unless instructed otherwise in the Bid data. The conditions of contract identified in the contract data may provide for part payment in other currencies.

F.2.11 Alterations to documents

Not make any alterations or additions to the Bid documents, except to comply with instructions issued by the employer, or necessary to correct errors made by the Bidder. All signatories to the Bid offer shall initial all such alterations. Erasures and the use of masking fluid are prohibited.

F.2.12 Alternative Bid offers

F.2.12.1 Submit alternative Bid offers only if a main Bid offer, strictly in accordance with all the requirements of the Bid documents, is also submitted. The alternative Bid offer is to be submitted with the main Bid offer together with a schedule that compares the requirements of the Bid documents with the alternative requirements the Bidder proposes.

F.2.12.2 Accept that an alternative Bid offer may be based only on the criteria stated in the Bid data or criteria otherwise acceptable to the employer.

F.2.13 Submitting a Bid offer

F.2.13.1 Submit a Bid offer to provide the whole of the works, services or supply identified in the contract data and described in the scope of works, unless stated otherwise in the Bid data.

F.2.13.2 Return all returnable documents to the employer after completing them in their entirety, either electronically (if they were issued in electronic format) or by writing in black ink.

F.2.13.3 Submit the parts of the Bid offer communicated on paper as an original plus the number of copies stated in the Bid data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the employer.

F.2.13.4 Sign the original and all copies of the Bid offer where required in terms of the Bid data. The employer will hold all authorized signatories liable on behalf of the Bidder. Signatories for Bidders proposing to contract as joint ventures shall state which of the signatories is the lead partner whom the employer shall hold liable for the purpose of the Bid offer.

F.2.13.5 Seal the original and each copy of the Bid offer as separate packages marking the packages as "ORIGINAL" and "COPY". Each package shall state on the outside the employer's address and identification details stated in the Bid data, as well as the Bidder's name and contact address.

F.2.13.6 Where a two-envelope system is required in terms of the Bid data, place and seal the returnable documents listed in the Bid data in an envelope marked “financial proposal” and place the remaining returnable documents in an envelope marked “technical proposal”. Each envelope shall state on the outside the employer’s address and identification details stated in the Bid data, as well as the Bidder's name and contact address.

F.2.13.7 Seal the original Bid offer and copy packages together in an outer package that states on the outside only the employer's address and identification details as stated in the Bid data.

F.2.13.8 Accept that 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.

F.2.14 Information and data to be completed in all respects

Accept that Bid offers, which do not provide all the data or information requested completely and in the form required, may be regarded by the employer as non-responsive.

F.2.15 Closing time

F.2.15.1 Ensure that the employer receives the Bid offer at the address specified in the Bid data not later than the closing time stated in the Bid data. Proof of posting shall not be accepted as proof of delivery. The employer shall not accept Bid offers submitted by telegraph, telex, facsimile or e-mail, unless stated otherwise in the Bid data.

F.2.15.2 Accept that, if the employer extends the closing time stated in the Bid data for any reason, the requirements of these conditions of Bid apply equally to the extended deadline.

F.2.16 Bid offer validity

F.2.16.1 Hold the Bid offer(s) valid for acceptance by the employer at any time during the validity period stated in the Bid data after the closing time stated in the Bid data.

F.2.16.2 If requested by the employer, consider extending the validity period stated in the Bid data for an agreed additional period.

F.2.17 Clarification of Bid offer after submission

Provide clarification of a Bid offer in response to a request to do so from the employer during the evaluation of Bid offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the total of the prices or substance of the Bid offer is sought, offered, or permitted. The total of the prices stated by the Bidder shall be binding upon the Bidder.

Note: Sub-clause F.2.17 does not preclude the negotiation of the final terms of the contract with a preferred Bidder following a competitive selection process, should the Employer elect to do so.

F.2.18 Provide other material

F.2.18.1 Provide, on request by the employer, any other material that has a bearing on the Bid offer, the Bidder’s commercial position (including notarized joint venture agreements), referencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment. Should the Bidder not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer’s request, the employer

may regard the Bid offer as non-responsive.

F.2.18.2 Dispose of samples of materials provided for evaluation by the employer, where required.

F.2.19 Inspections, tests and analysis

Provide access during working hours to premises for inspections, tests and analysis as provided for in the Bid data.

F.2.20 Submit securities, bonds, policies, etc.

If requested, submit for the employer's acceptance before formation of the contract, all securities, bonds, guarantees, policies and certificates of insurance required in terms of the conditions of contract identified in the contract data.

F.2.21 Check final draft

Check the final draft of the contract provided by the employer within the time available for the employer to issue the contract.

F.2.22 Return of other Bid documents

If so instructed by the employer, return all retained Bid documents within 28 days after the expiry of the validity period stated in the Bid data.

F.2.23 Certificates

Include in the Bid submission or provide the employer with any certificates as stated in the Bid data.

NOTE: Failure to submit any of the above documents will result in disqualification

F.3 The employer's undertakings

The employer undertakes to:

F.3.1 Respond to clarification

Respond to a request for clarification received up to five working days prior to the Bid closing time stated in the Bid Data and notify all Bidders who drew procurement documents.

F.3.2 Issue Addenda

If necessary, issue addenda that may amend or amplify the Bid documents to each Bidder during the period from the date of the Bid Notice until seven days before the Bid closing time stated in the Bid Data. If, as a result a Bidder applies for an extension to the closing time stated in the Bid Data, the Employer may grant such extension and, will then notify it to all Bidders who drew documents.

F.3.3 Return late Bid offers

Return Bid offers received after the closing time stated in the Bid Data, unopened, (unless it is necessary to open a Bid submission to obtain a forwarding address), to the Bidder concerned.

F.3.4 Opening of Bid submissions

F.3.4.1 Unless the two-envelope system is to be followed, open valid Bid submissions in the presence of Bidders' agents who choose to attend at the time and place stated in the Bid data. Bid submissions for which acceptable reasons for withdrawal have been submitted will not be opened.

F.3.4.2 Announce at the opening held immediately after the opening of Bid submissions, at a venue indicated in the Bid data, the name of each Bidder whose Bid offer is opened, the total of his prices, preferences claimed and time for completion, if any, for the main Bid offer only.

F.3.4.3 Make available the record outlined in F.3.4.2 to all interested persons upon request.

F.3.5 Two-envelope system

F.3.5.1 Where stated in the Bid data that a two-envelope system is to be followed, open only the technical proposal of valid Bids in the presence of Bidders' agents who choose to attend at the time and place stated in the Bid data and announce the name of each Bidder whose technical proposal is opened.

F.3.5.2 Evaluate the quality of the technical proposals offered by Bidders, then advise Bidders who remain in contention for the

award of the contract of the time and place when the financial proposals will be opened. Open only the financial proposals of Bidders, who score in the quality evaluation above the minimum number of points for quality stated in the Bid data, and announce the score obtained for the technical proposals and the total price and any preferences claimed. Return unopened financial proposals to Bidders whose technical proposals failed to achieve the minimum number of points for quality.

F.3.6 Non-disclosure

Not disclose to Bidders, or to any other person not officially concerned with such processes, information relating to the evaluation and comparison of Bid offers, the final evaluation price and recommendations for the award of a contract, until after the award of the contract to the successful Bidder.

F.3.7 Grounds for rejection and disqualification

Determine whether there has been any effort by a Bidder to influence the processing of Bid offers and instantly disqualify a Bidder (and his Bid offer) if it is established that he engaged in corrupt or fraudulent practices.

F.3.8 Test for responsiveness

Determine, on opening and before detailed evaluation, whether each Bid offer properly received:

a) meets the requirements of these Conditions of Bid,
b) has been properly and fully completed and signed, and
c) is responsive to the other requirements of the Bid documents.

A responsive Bid is one that conforms to all the terms, conditions, and specifications of the Bid documents without material deviation or qualification. A material deviation or qualification is one which, in the Employer's opinion, would:

- detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work,
- change the Employer's or the Bidder's risks and responsibilities under the contract, or
- affect the competitive position of other Bidders presenting responsive Bids, if it were to be rectified.

Reject a non-responsive Bid offer, and not allow it to be subsequently made responsive by correction or withdrawal of the non-conforming deviation or reservation.

F.3.9 Arithmetical errors

Check responsive Bid offers for arithmetical errors, correcting them in the following manner:

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

- If a bill of quantities (or schedule of quantities or schedule of rates) applies and there is an error in the line item resulting from the product of the unit rate and the quantity, the rate shall be binding and the error of extension as entered in the bid offer will be corrected by the Employer in determining the Contract Price.

- Where there is an error in addition, either as a result of other corrections required by this checking process or in the Bidder’s addition of prices, such error will be corrected by the Employer in determining the Contract Price.

- The Contract Price for the completed Contract shall be computed from the actual quantities of authorized work done and compliant with the Contract Data, valued at rates contracted against the respective items in the Bill of Quantities, Schedule of Quantities or Schedule of Rates and shall include such authorized Provincial Sums and items of extra work as have become payable in terms of the Contract Data.

F.3.10 Clarification of a Bid offer

Obtain clarification from a Bidder on any matter that could give rise to ambiguity in a contract arising from the Bid offer.

F.3.11 Evaluation of Bid offers

F.3.11.1 General

Appoint an evaluation panel of not less than three persons. Reduce each responsive Bid offer to a comparative offer and evaluate it using the Bid evaluation method that is indicated in the Bid Data and described below:

Method 1: Financial offer	1) Rank Bid offers from the most favorable to the least favorable comparative offer 2) Recommend highest ranked Bidder for the award of the contract, unless there are compelling and justifiable reasons not to do so
Method 2: Financial offer and preferences	1) Score Bid evaluation points for financial offer. 2) Confirm that Bidders are eligible for the preferences claimed, and if so, score Bid evaluation points for preferencing. 3) Calculate total Bid evaluation points. 4) Rank Bid offers from the highest number of Bid evaluation points to the lowest. 5) Recommend Bidder with the highest number of Bid evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so.
Method 3: Financial offer and quality	1) Score quality, rejecting all Bid offers that fail to score the minimum number of points for quality stated in the Bid data 2) Score Bid evaluation points for financial offer. 3) Calculate total Bid evaluation points. 4) Rank Bid offers from the highest number of Bid evaluation points to the lowest. 5) Recommend Bidder with the highest number of Bid evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so.
Method 4: Financial offer, quality and preferences	1) Score quality, rejecting all Bid offers that fail to score the minimum number of points for quality stated in the Bid data. 2) Score Bid evaluation points for financial offer 3) Confirm that Bidders are eligible for the preferences claimed, and if so, score Bid evaluation points for preferencing. 4) Calculate total Bid evaluation points. 5) Rank Bid offers from the highest number of Bid evaluation points to the lowest. 6) Recommend Bidder with the highest number of Bid evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so.

Score financial offers, preferences and quality, as relevant, to two decimal places.

F.3.11.2 Scoring Financial Offers

Score the financial offers of remaining responsive Bid offers using the following formula:
N_{FO} = W_1 x A where:
N_{FO} = the number of Bid evaluation points awarded for the financial offer.
W_1 = the maximum possible number of Bid evaluation points awarded for the financial offer as stated in the Bid Data.
A = a number calculated using either formulas 1 or 2 below as stated in the Bid Data.

Formula	Comparison aimed at achieving	Option 1	Option 2
1	Highest price or discount	$A = (1+ \frac{(P - Pm)}{Pm})$	A = P / Pm
2	Lowest price or percentage commission / fee	$A = (1 - \frac{(P - Pm)}{Pm})$	A = Pm / P

where:
Pm = the comparative offer of the most favorable Bid offer.
P = the comparative offer of Bid offer under consideration.

F.3.11.3 Scoring quality (functionality)

Score quality in each of the categories stated in the Bid Data and calculate total score for quality.

F.3.12 Insurance provided by the employer

If requested by the proposed successful Bidder, submit for the Bidder's information the policies and / or certificates of insurance which the conditions of contract identified in the contract data, require the employer to provide.

F.3.13 Acceptance of Bid offer

F.3.13.1 Accept Bid offer only if the Bidder satisfies the legal requirements stated in Clause F.2.1 of the Bid Data.

F.3.13.2 Notify the successful Bidder of the employer's acceptance of his Bid offer by completing and returning one copy of the form of offer and acceptance before the expiry of the validity period stated in the Bid data, or agreed additional period. Providing the form of offer and acceptance does not contain any qualifying statements, it will constitute the formation of a contract between the employer and the successful Bidder as described in the form of offer and acceptance.

F.3.14 Notice to unsuccessful Bidders

After the successful Bidder has acknowledged the employer’s notice of acceptance, notify other Bidders that their Bid offers have not been accepted.

F.3.15. Prepare contract documents

If necessary, revise documents that shall form part of the contract and that were issued by the employer as part of the Bid documents to take account of:

a) addenda issued during the Bid period,
b) inclusion of some of the returnable documents,
c) other revisions agreed between the employer and the successful Bidder, and
d) the schedule of deviations attached to the form of offer and acceptance, if any.

F.3.16 Issue final contract

Prepare and issue the final draft of contract documents to the successful Bidder for acceptance as soon as possible after the date of the employer's signing of the form of offer and acceptance (including the schedule of deviations, if any). Only those documents that the conditions of Bid require the Bidder to submit, after acceptance by the employer, shall be included.

F.3.17 Complete adjudicator's contract

Unless alternative arrangements have been agreed or otherwise provided for in the contract, arrange for both parties to complete formalities for appointing the selected adjudicator at the same time as the
main contract is signed.

F.3.18 Provide copies of the contracts

Provide to the successful Bidder the number of copies stated in the Bid Data of the signed copy of the contract as soon as possible after completion and signing of the form of offer and acceptance.

PART T2: RETURNABLE SCHEDULES

TABLE OF CONTENTS

T2.1 List of Returnable Documents

The Bidder must complete the following Returnable Documents:

1 Returnable Schedules required only for Bid Evaluation purposes

A: Certificate of Attendance at a Briefing Session
B: Record of Addenda to Bid Documents
C: Certificate of Authority for Joint Ventures / Close Corporation/ Partnership/ Company/ Sole Proprietor (Certified copies of Identity Documents for all members of Joint Ventures / Close Corporation / Partnership / Company / Sole Proprietor)
D: Registration Certificates of entities – Joint Ventures / Close Corporation/ Partnership/ Company/ Sole Proprietor
E: Compulsory Enterprise Questionnaire
F: Schedule of the Bidder's Experience
G: Schedule of Key Personnel
H: Curriculum Vitae Format of Key Personnel
I: Proposed Amendments, Qualifications and Alternatives
J: Schedule of Subcontractors
K: Schedule of Plant and Equipment available for this contract
L: Copy of the Workmen's Compensation Registration Certificate (or proof of payment of contributions in terms of the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993)
M: Company profile, including track record

2 Other Documents required only for Bid Evaluation purposes

O: BBBEE Status Level Verification Certificate
Q: Financial Standing – Attach Letter of Intent (Demand Guarantee)

3 Returnable Schedules that will be incorporated into the Contract

Preferencing Schedule (Direct Preferences) – SBD Forms
R: Other SBD Forms (SBD4, SBD8, SBD 9)
S: Execution Programme / Program of Works
T: Detailed Method Statement
U: Contractor's Health and Safety Declaration

4 Other Documents that will be incorporated into the Contract

V: Contractor's Safety Plan
W: Proforma Notification form in terms of the Occupational Health and Safety Act 1993, Construction Regulations, 2014
X: Monthly Labour Report

5 The Offer portion

Part C1 Agreement and Contract Data
Part C2 Pricing Data
Part C3 Scope of Work
Part C4 Site Information

T2.2 Returnable Schedules to be completed by Bidder

A. CERTIFICATE OF ATTENDANCE AT A BRIEFING SESSION

This is to certify that *(Bidder)* ……..….

of (*address)*.....

..... was represented by the person(s) named below at the compulsory Briefing Session held for all Bidders for **DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT**

for Bid No **ACDP 21/19.**

I / We acknowledge that the purpose of the meeting was to acquaint myself / ourselves with the Site of the Works and / or matters incidental to doing the Work specified in the Bid Documents in order for me / us to take account of everything necessary when compiling our rates and prices included in the Bid.

Particulars of person(s) attending the meeting:

Name: .....……..... Signature: .....….....

Capacity: .....

Name: ….....…….. Signature: .....….....

Capacity: .....

Attendance of the above person(s) at the meeting is confirmed by the Employer's representative, namely:

Name: .....……..……..... Signature: .....

Capacity: .....…… Date and Time: .....…….....

B. RECORD OF ADDENDA TO BID DOCUMENTS

We confirm that the following communications received from the Employer before the submission of this Bid Offer, amending the Bid Documents, have been taken into account in this Bid Offer:

	Date	Title or Details
1.		
2.		
3.		
4.		
5.		

Attach additional pages if more space is required.

Signed..... Date.....

Name..... Position.....

Bidder.....

C. CERTIFICATE OF AUTHORITY OF AN ENTITY

Indicate the status of the Bidder by ticking the appropriate box hereunder. The Bidder must complete the Certificate set out below for the relevant category.

(I) Company	(II) Close Corporation	(III) Partnership	(IV) Joint Venture	(V) Sole Proprietor

(I) CERTIFICATE FOR COMPANY

I ....., chairperson of the Board of Directors of ....., hereby confirm that by resolution of the Board (copy attached) taken on ..... 20....., Mr/Ms ....., acting in the capacity of ....., was authorised to sign all Documents in connection with this Bid and any Contract resulting from it on behalf of the Company.

Signature of Chairman: .....

Signature of Signatory: .....

As Witnesses:

1..... Name in Block Letters.....

2..... Name in Block Letters.....

Date: .....

(II) CERTIFICATE FOR CLOSE CORPORATION

We, the undersigned, being the key Members in the business trading as.....
..... hereby authorise Mr/Ms .....,
acting in the capacity of ....., to sign all Documents
in connection with the Bid for Contract No. ACDP 20/11 and any Contract resulting from it on our behalf.

Signature of Signatory: .....

As Witnesses:

1..... Name in Block Letters.....

2..... Name in Block Letters.....

Date: .....

NAME	ADDRESS	SIGNATURE	DATE

Note: This Certificate is to be completed and signed by all of the key Members upon whom rests the Direction of the Affairs of the Close Corporation as a whole.

(III) CERTIFICATE FOR PARTNERSHIP

We, the undersigned, being the key Partners in the business trading as,

.....hereby authorise Mr/Ms…..

acting in the capacity of ..... , to sign all Documents in connection with the Bid for Contract No and any Contract resulting from it on our behalf.

Signature of Signatory: .....

As Witnesses:

1..... Name in Block Letters.....

2..... Name in Block Letters.....

Date: .....

NAME	ADDRESS	SIGNATURE	DATE

Note: This Certificate is to be completed and signed by all of the key Partners upon who rests the Direction of the Affairs of the Partnership as a whole.

(IV) CERTIFICATE FOR JOINT VENTURE

We, the undersigned, are submitting this Bid Offer in Joint Venture and hereby authorize Mr/Ms ....., authorized signatory of the Company, ……..…….……. …….....acting in the capacity of Lead Partner, to sign all Documents in connection with the Bid Offer for Contract No and any Contract resulting from it on our behalf.

This authorization is evidenced by the attached power of attorney signed by legally authorized signatories of all the Partners to the Joint Venture.

Signature of Signatory: .....

As Witnesses:

1..... Name in Block Letters.....

2..... Name in Block Letters.....

Date: .....

NAME OF FIRM	ADDRESS	AUTHORISING SIGNATURE, NAME AND CAPACITY
Lead Partner		

Note: This Certificate is to be completed and signed by all of the key Partners upon who rests the Direction of the Affairs of the Joint Venture as a whole.

V) CERTIFICATE FOR SOLE PROPRIETOR

I....., hereby confirm that I am the Sole Owner of the

business trading as:……...

Signature of Sole Owner: .....

As Witnesses:

1..... Name in Block Letters.....

2..... Name in Block Letters.....

Date: .....

D. REGISTRATION CERTIFICATE OF AN ENTITY

[Important note to Bidder: Registration Certificates for Companies, Close Corporations, Partnerships and ID Documents for Sole Proprietors must be inserted here. In the case of a Joint Venture, a copy of a duly signed Joint Venture Agreement must be included]

E. COMPULSORY ENTERPRISE QUESTIONNAIRE

The following particulars must be furnished. In the case of a Joint Venture, **separate** Enterprise questionnaires in respect of each Partner must be completed and submitted.

Section 1: Name of Enterprise: . . . . . .

Section 2: VAT registration number, if any: . . . . . .

Section 3: Other registration number, if any: . . . . . .

Section 4: Particulars of Sole Proprietors and Partners in Partnerships

Name*	Identity number*	Personal income tax number*

***** Complete only if Sole Proprietor or Partnership and attach separate page if more than 3 Partners

Section 5: Particulars of Companies and Close Corporations

Company registration number . . . . . .

Close Corporation number . . . . . .

Tax reference number . . . . . .

Section 6: Record in the service of the State

Indicate by marking the relevant boxes with a cross, if any Sole Proprietor, Partner in a Partnership or Director, Manager, Principal Shareholder or Stakeholder in a Company or Close Corporation is currently or has been within the last 12 months in the service of any of the following:

- ☐ a Member of any Municipal Council
- ☐ a Member of any Provincial Legislature
- ☐ a Member of the National Assembly or the National Council of Province
- ☐ a Member of the Board of Directors of any Municipal entity
- ☐ an Official of any Municipality or Municipal entity
- ☐ an employee of any Provincial Department, National or Provincial Public entity or Constitutional Institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)
- ☐ a Member of an Accounting Authority of any National or Provincial Public Entity
- ☐ an employee of Parliament or a Provincial Legislature

If any of the above boxes are marked, disclose the following:

Name of Sole Proprietor, Partner, Director, Manager, Principal Shareholder or Stakeholder	Name of Institution, Public Office, board or organ of State and position held	Status of service (tick appropriate column)	
		Current	Within last 12 months

*insert separate page if necessary

Section 7: Record of spouses, children and parents in the service of the State

Indicate by marking the relevant boxes with a cross, if any spouse, child or parent of a Sole Proprietor, Partner in a Partnership or Director, Manager, Principal Shareholder or Stakeholder in a Company or Close Corporation is

currently or has been within the last 12 months been in the service of any of the following:

- a Member of any Municipal Council
- a Member of any Provincial Legislature
- a Member of the National Assembly or the National Council of Province
- a Member of the Board of Directors of any Municipal Entity
- an Official of any Municipality or Municipal entity
- an employee of any Provincial Department, National or Provincial Public Entity or Constitutional Institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)
- a Member of an Accounting Authority of any National or Provincial Public entity
- an employee of Parliament or a Provincial Legislature

Name of spouse, child or parent	**Name of Institution, Public Office, Board or Organ of State and position held**	**Status of service (tick appropriate column)**	
		Current	**Within last 12 months**

*insert separate page if necessary

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the Enterprise:

i) authorizes the Employer to obtain a tax clearance Certificate from the South African Revenue Services that my / our tax matters are in order;

ii) confirms that the neither the name of the Enterprise or the name of any Partner, Manager, Director or other Person, who wholly or partly exercises, or may exercise, control over the Enterprise appears on the Register of Bid Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004;

iii) confirms that no Partner, Member, Director or other Person, who wholly or partly exercises, or may exercise, control over the Enterprise appears, has within the last five years been convicted of fraud or corruption;

iv) confirms that I / we are not associated, linked or involved with any other Bidding entities submitting Bid Offers and have no other relationship with any of the Bidders or those responsible for compiling the Scope of Work that could cause or be interpreted as a conflict of interest; and

iv) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

Signed Date

Name Position

Enterprise Name

F. SCHEDULE OF THE BIDDER'S EXPERIENCE

The following is a Statement of Work of similar nature recently successfully executed by myself / ourselves (attach completion certificate for all completed projects as proof):

Employer: Contact Person and Telephone Number	Consulting Engineer: Contact Person and Telephone Number	Nature of Work	Value of Work (inclusive of VAT)	Date Completed or Expected to be Completed

SIGNATURE: .....……... DATE: .....
(of person authorised to sign on behalf of the Bidder)

G. KEY PERSONNEL

In terms of the Project Specification and the Conditions of Bid, unskilled Workers may only be brought in from outside the Local Community if such personnel are not available locally.

The Bidder shall list below the personnel which he intends to utilize on the Works, including key personnel which may have to be brought in from outside if not available locally.

Category of Employee	Number of Persons		
	Key Personnel, Part of the Contractor's Organisation and Permanent Employees	Key Personnel to be imported if not part of the Contractor's Permanent Employees	Unskilled Personnel to be recruited from local community
ECSA Registered Electrical Engineer / Technologist / Technician (Suitably qualified and experienced to take Professional responsibility for the installations as in the Engineering Profession Act, 2000 (Act No. 46 of 2000)			
Site Agent			
Electrician / Millwright			
Electronic Technician			
Mechanic			
Crane Operator			
Unskilled Workers			
Others:			

SIGNATURE: .....…... DATE: …....
(of person authorised to sign on behalf of the Bidder)

H. CURRICULUM VITAE FORMAT OF KEY PERSONNEL

Name:	**Date of birth:**
Profession:	**Nationality:**
Qualifications:	
Professional Registration Number:	
Name of Employer (firm):	
Current position:	**Years with firm:**
Employment Record:	
Experience Record Pertinent to Required service:	

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

....
Signature of person named in the Schedule *Date*

Name:	**Date of birth:**
Profession:	**Nationality:**
Qualifications:	
Professional Registration Number:	
Name of Employer (firm):	
Current position:	**Years with firm:**
Employment Record:	
Experience Record Pertinent to Required service:	

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

....
Signature of person named in the Schedule *Date*

Name:	**Date of birth:**
Profession:	**Nationality:**
Qualifications:	
Professional Registration Number:	
Name of Employer (firm):	
Current position:	**Years with firm:**
Employment Record:	
Experience Record Pertinent to Required service:	

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

....
Signature of person named in the Schedule *Date*

Name:	**Date of birth:**
Profession:	**Nationality:**
Qualifications:	
Professional Registration Number:	
Name of Employer (firm):	
Current position:	**Years with firm:**
Employment Record:	
Experience Record Pertinent to Required service:	

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

....
Signature of person named in the Schedule *Date*

Name:	**Date of birth:**
Profession:	**Nationality:**
Qualifications:	
Professional Registration Number:	
Name of Employer (firm):	
Current position:	**Years with firm:**
Employment Record:	
Experience Record Pertinent to Required service:	

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

....
Signature of person named in the Schedule *Date*

I. AMENDMENTS, QUALIFICATIONS AND ALTERNATIVES

(***This is not an invitation for amendments, deviations or alternatives,*** *but should the Bidder desire to make any departures from the Provisions of this Contract he shall set out his proposals clearly hereunder. The Employer will not consider any amendment, unless form (a), has been completed to the satisfaction of the Employer*). *The Bidder is referred to Bid Data paragraph F.2.12, where it is clearly stated that no Alternative Offers will be accepted.*

I / We herewith propose the amendments, as set out in the table below:

(a) AMENDMENTS

PAGE, CLAUSE OR ITEM NO	PROPOSED AMENDMENT

Notes: (1) Amendments to the General and Special Conditions of Contract are not acceptable;

(2) The Bidder must give full details of all the financial implications of the amendments and qualifications in a covering letter attached to his Bid.

J. SCHEDULE OF PROPOSED SUB-CONTRACTORS

We notify you that it is our intention to employ the following Subcontractors for Work in this Contract.

If we are awarded a Contract we agree that this notification does not change the requirement for us to submit the names of proposed Subcontractors in accordance with requirements in the Contract for such appointments. If there are no such requirements in the Contract, then your written acceptance of this list shall be binding between us.

We confirm that all Subcontractors who are Contracted to construct a house are registered as Home Builders with the National Home Builders Registration Council.

	Name and address of proposed Subcontractor	**Nature and extent of Work**	**Previous experience with Subcontractor.**
1.			
2.			
3.			
4.			
5.			

Signed ..... Date .....

Name ..... Position .....

Bidder .....

K. SCHEDULE OF PLANT AND EQUIPMENT

The following are lists of major items of relevant equipment that I / we presently own or lease and will have available for this Contract or will acquire or hire for this Contract if my / our Bid is accepted.

(a) Details of major equipment that is owned by and immediately available for this Contract.

Quantity	Description, size, capacity, etc.

Attach additional pages if more space is required.

(b) Details of major equipment that will be hired, or acquired for this Contract if my / our Bid is acceptable.

Quantity	Description, size, capacity, etc.

Attach additional pages if more space is required.

Signed ---------- Date ----------

Name ---------- Position ----------

Bidder ----------

L. COPY OF WORKMEN'S COMPENSATION REGISTRATION CERTIFICATE (OR PROOF OF PAYMENT OF CONTRIBUTIONS IN TERMS OF THE COMPENSATION FOR OCCUPATIONAL INJURIES AND DISEASES ACT NO. 130 OF 1993)

[Certified Copy of the Certificate or Proof of Payment thereof obtained from the Workmen's Compensation Commissioner to be inserted here]

M. COMPANY PROFILE, INCLUDING TRACK RECORD

[Abbreviated company profile, giving history, status, activities, staff and track record of the Bidding entity, to be inserted here. In case of a Joint Venture, a separate profile for each partner must be submitted]

O. BBBEE STATUS LEVEL VERIFICATION CERTIFICATE

[Certified copy of the Bidder's BBBEE Status Level Verification Certificate, to be inserted here. For a Joint Venture, each partner's BBBEE certificate is to be included, as applicable]

Q. BIDDER'S FINANCIAL STANDING

(LETTER FROM FINANCIER MUST BE ATTACHED)

In terms of Clause F.2.18.1 of the Contract-specific Bid Data the Bidder shall provide information about his commercial position, which includes information necessary for the Employer to evaluate the Bidder's financial standing.

To that end the Bidder must provide with his Bid a bank rating, certified by his banker, to the effect that he will be able to successfully complete the contract at the Bidded amount within the specified time for completion.

However, should the Bidder be unable to provide a bank rating with his Bid, he shall state the reasons as to why he is unable to do so, and in addition provide the following details of his banker and bank account that he intends to use for project:

Name of account holder: …….

Name of Bank: ……... Branch: ……..

Account number: …… Type of account: …….

Telephone number: …… Facsimile number: ……...

Name of contact person (at bank): …….

Failure to provide either the required bank details or a certified bank rating with his Bid, will lead to the conclusion that the Bidder does not have the necessary financial resources at his disposal to complete the contract successfully within the specified time for completion.

The Employer undertakes to treat the information thus obtained as confidential, strictly for the use of evaluation of the Bid submitted by the Bidder.

SIGNATURE: …….. DATE: ……
(of person authorised to sign on behalf of the Bidder)

Q1 FINANCIAL INFORMATION OF BIDDER

(LETTER FROM FINANCIER MUST BE ATTACHED)

This information sheet has to be filled in by the financier of the Bidder, duly signed and stamped on behalf of the financial institution he represents.

Bidder / Bid Details

Bid Description: ……

Contract Period: ……..

Name of Bidder: ……..

Bank Account Number: ……...

Bid Amount: ……

State amount of Demand Guarantee: R…….

Attach Letter of Intent from Financial Institution

Financial Institution

Name of Commercial Bank: …….

Branch: …….

Name of Bank Manager: ……...

Telephone Number: ……...

We acting on behalf of the above Commercial Bank confirm that

……. (Bidder)

has operated an account with us for the last …….. years.

We have been requested to provide a bank rating based in relation to the financial capability of the Bidder, taking into account directives set out in the following two tables.

FINANCIAL CAPABILITY

Maximum value of contract that the Bidder is considered capable of	Value on which Bank Rating must be used
Up to R300 000	R24 000
R1 000 000	R78 000
R3 000 000	R240 000
R5 000 000	R480 000

R10 000 000	R900 000
R30 000 000	R2 400 000
R100 000 000	R7 800 000

BANK RATING

Bank Code	Description of Bank Code
A	Undoubted for the amount of enquiry
B	Good for the amount of enquiry
C	Good for the amount quoted if strictly in the way of business
D	Fair trade risk for amount of enquiry
E	Figures considered too high
F	Financial position unknown
G	Occasional dishonours
H	Frequent dishonours

The value on which our Bank Rating of the Bidder is based is R……

In words …… only)

The Bank Rating is code: ……

…… …… ……

Signature: Manager Financial Institution Print Name Date

RUBBER STAMP OF INSTITUTION

SBD 6.1

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2017

This preference form must form part of all bids invited. It contains general information and serves as a claim form for preference points for Broad-Based Black Economic Empowerment (B-BBEE) Status Level of Contribution

NB: BEFORE COMPLETING THIS FORM, BIDDERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF B-BBEE, AS PRESCRIBED IN THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017.

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to all bids:

- 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

a) The value of this bid is estimated to not exceeding R50 000 000 (all applicable taxes included) and therefore the 80/20 preference point system shall be applicable; or

b) Either the 80/20 or 90/10 preference point system will be applicable to this tender (*delete whichever is not applicable for this tender*).

1.3 Points for this bid shall be awarded for:

(a) Price; and

(b) B-BBEE Status Level of Contributor.

1.4 The maximum points for this bid are allocated as follows:

	POINTS
PRICE	80
B-BBEE STATUS LEVEL OF CONTRIBUTOR	20
Total points for Price and B-BBEE must not exceed	**100**

1.5 Failure on the part of a bidder to submit proof of B-BBEE Status level of contributor together with the bid, will be interpreted to mean that preference points for B-BBEE status level of contribution are not claimed.

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

2. DEFINITIONS

(a) **"B-BBEE"** means broad-based black economic empowerment as defined in section 1 of the Broad-Based Black Economic Empowerment Act;

(b) "**B-BBEE status level of contributor"** means the B-BBEE status of an entity in terms of a code of good practice on black economic empowerment, issued in terms of section 9(1) of the Broad-Based Black Economic Empowerment Act;

(c) **"bid"** means a written offer in a prescribed or stipulated form in response to an invitation by an organ of state for the provision of goods or services, through price quotations, advertised competitive bidding processes or proposals;

(d) **"Broad-Based Black Economic Empowerment Act"** means the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);

(e) "EME" means an Exempted Micro Enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9 (1) of the Broad-Based Black Economic Empowerment Act;

(f) **"Functionality"** means the ability of a tenderer to provide goods or services in accordance with specifications as set out in the tender documents.

(g) **"prices"** includes all applicable taxes less all unconditional discounts;

(h) **"proof of B-BBEE status level of contributor"** means:

1) B-BBEE Status level certificate issued by an authorized body or person;

2) A sworn affidavit as prescribed by the B-BBEE Codes of Good Practice;

3) Any other requirement prescribed in terms of the B-BBEE Act;

(i) **"QSE"** means a qualifying small business enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9 (1) of the Broad-Based Black Economic Empowerment Act;

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

3. POINTS AWARDED FOR PRICE

3.1 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 bid under consideration

Pt = Price of bid under consideration

Pmin = Price of lowest acceptable bid

4. POINTS AWARDED FOR B-BBEE STATUS LEVEL OF CONTRIBUTOR

4.1 In terms of Regulation 6 (2) and 7 (2) of the Preferential Procurement Regulations, preference points must be awarded to a bidder for attaining the B-BBEE status level of contribution in accordance with the table below:

B-BBEE Status Level of Contributor	Number of points (90/10 system)	Number of points (80/20 system)
1	10	20
2	9	18
3	6	14
4	5	12
5	4	8
6	3	6
7	2	4
8	1	2
Non-compliant contributor	0	0

5. BID DECLARATION

5.1 Bidders who claim points in respect of B-BBEE Status Level of Contribution must complete the following:

6. B-BBEE STATUS LEVEL OF CONTRIBUTOR CLAIMED IN TERMS OF PARAGRAPHS 1.4 AND 4.1

6.1 B-BBEE Status Level of Contributor: . = ……. (maximum of 10 or 20 points)

(Points claimed in respect of paragraph 7.1 must be in accordance with the table reflected in paragraph 4.1 and must be substantiated by relevant proof of B-BBEE status level of contributor.

7. SUB-CONTRACTING

7.1 Will any portion of the contract be sub-contracted?

(***Tick applicable box***)

YES		NO	

7.1.1 If yes, indicate:

i) What percentage of the contract will be subcontracted .....……%
ii) The name of the sub-contractor……..
iii) The B-BBEE status level of the sub-contractor.....……..
iv) Whether the sub-contractor is an EME or QSE
(Tick applicable box)

YES		NO	

v) Specify, by ticking the appropriate box, if subcontracting with an enterprise in terms of Preferential Procurement Regulations,2017:

Designated Group: An EME or QSE which is at last 51% owned by:	EME √	QSE √
Black people		
Black people who are youth		
Black people who are women		
Black people with disabilities		
Black people living in rural or underdeveloped areas or townships		
Cooperative owned by black people		
Black people who are military veterans		
OR		
Any EME		
Any QSE		

8. DECLARATION WITH REGARD TO COMPANY/FIRM

8.1 Name of company/firm: …….

8.2 VAT registration number: ……

8.3 Company registration number: ……..

8.4 TYPE OF COMPANY/ FIRM

- □ Partnership/Joint Venture / Consortium
- □ One-person business/sole propriety
- □ Close corporation
- □ Company
- □ (Pty) Limited

[TICK APPLICABLE BOX]

8.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

……
……
……
……..

8.6 COMPANY CLASSIFICATION

- □ Manufacturer
- □ Supplier
- □ Professional service provider
- □ Other service providers, e.g. transporter, etc.

[*TICK APPLICABLE BOX*]

8.7 Total number of years the company/firm has been in business:……

8.8 I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the B-BBE status level of contributor indicated in paragraphs 1.4 and 6.1 of the foregoing certificate, qualifies the company/ firm for the preference(s) shown and I / we 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 6.1, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct;

iv) If the B-BBEE status level of contributor has been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have –

(a) disqualify the person from the bidding 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 bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury 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.

WITNESSES 1. …….. 2. ……	…… SIGNATURE(S) OF BIDDERS(S) DATE: …….. ADDRESS …….. …….. ……..

R: OTHER SBD FORMS REQUIRED TO BE COMPLETED

- **SBD 4 - DECLARATION OF INTEREST**
- **SBD 8 - PAST SUPPLY CHAIN MANAGEMENT PRACTICES**
- **SBD 9 - CERTIFICATE OF INDEPENDENT BID DETERMINATION**

ANNEXURE B

SBD 4

DECLARATION OF INTEREST

1. Any legal person, including persons employed by the state[1], or persons having a kinship with persons employed by the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid (includes an advertised competitive bid, a limited bid, a proposal or written price quotation). In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons employed by the state, or to persons connected with or related to them, it is required that the bidder or his/her authorised representative declare his/her position in relation to the evaluating/adjudicating authority where-

   - the bidder is employed by the state; and/or

   - the legal person on whose behalf the bidding document is signed, has a relationship with persons/a person who are/is involved in the evaluation and or adjudication of the bid(s), or where it is known that such a relationship exists between the person or persons for or on whose behalf the declarant acts and persons who are involved with the evaluation and or adjudication of the bid.

2. **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

2.1 Full Name of bidder or his or her representative: …….

2.2 Identity Number:……...

2.3 Position occupied in the Company (director, trustee, shareholder[2], member): …….

2.4 Registration number of company, enterprise, close corporation, partnership agreement or trust: …….

2.5 Tax Reference Number: ……

2.6 VAT Registration Number: ……....

2.6.1 The names of all directors / trustees / shareholders / members, their individual identity numbers, tax reference numbers and, if applicable, employee / PERSAL numbers must be indicated in paragraph 3 below.

[1]"State" means –

(a) any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No. 1 of 1999);
(b) any municipality or municipal entity;
(c) provincial legislature;
(d) national Assembly or the national Council of provinces; or
(e) Parliament.

[2]"Shareholder" means a person who owns shares in the company and is actively involved in the management of the enterprise or business and exercises control over the enterprise.

2.7 Are you or any person connected with the bidder presently employed by the state? **YES / NO**

2.7.1 If so, furnish the following particulars:

Name of person / director / trustee / shareholder/ member: ……..……

Name of state institution at which you or the person connected to the bidder is employed : ……

Position occupied in the state institution: ……

Any other particulars:

……

……

……

2.7.2 If you are presently employed by the state, did you obtain the appropriate authority to undertake remunerative work outside employment in the public sector? **YES / NO**

2.7.2.1 If yes, did you attach proof of such authority to the bid document? **YES / NO**

(Note: Failure to submit proof of such authority, where applicable, may result in the disqualification of the bid.

2.7.2.2 If no, furnish reasons for non-submission of such proof:

……
……
……

2.8 Did you or your spouse, or any of the company's directors / trustees / shareholders / members or their spouses conduct business with the state in the previous twelve months? **YES / NO**

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

2.9 Do you, or any person connected with the bidder, have any relationship (family, friend, other) with a person employed by the state and who may be involved with the evaluation and or adjudication of this bid? **YES / NO**

2.9.1 If so, furnish particulars.
……...
……..….
……

2.10 Are you, or any person connected with the bidder, aware of any relationship (family, friend, other) between any other bidder and any person employed by the state who may be involved with the evaluation and or adjudication of this bid? **YES / NO**

2.10.1 If so, furnish particulars**.**
……
……
……

2.11 Do you or any of the directors / trustees / shareholders / members of the company have any interest in any other related companies whether or not they are bidding for this contract? YES/NO

2.11.1 If so, furnish particulars:
……
……
……

3. Full details of directors / trustees / members / shareholders.

Full Name	Identity Number	Personal Income Tax Reference Number	State Employee Number / Persal Number

4 DECLARATION

I, THE UNDERSIGNED (NAME)……

CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 2 and 3 ABOVE IS CORRECT.

I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

…….. .....

Signature Date

…… ……

Position Name of bidder

November 2011

SBD 8

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1 This Standard Bidding Document must form part of all bids invited.

2 It serves as a declaration to be used by institutions in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.

3 The bid of any bidder may be disregarded if that bidder, or any of its directors have-

a. abused the institution's supply chain management system;
b. committed fraud or any other improper conduct in relation to such system; or
c. failed to perform on any previous contract.

4 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury's database as companies or persons prohibited from doing business with the public sector? (Companies or persons who are listed on this database were informed in writing of this restriction by the National Treasury after the *audi alteram partem* rule was applied).	Yes ☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Bid Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **To access this Register enter the National Treasury's website, www.treasury.gov.za, click on the icon "Register for Bid Defaulters" or submit your written request for a hard copy of the Register to facsimile number (012) 3265445.**	Yes ☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐

4.4.1	If so, furnish particulars:	

SBD.8

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)……

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

……... ……..

Signature Date

……. ……..

Position Name of Bidder

SBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

1 This Standard Bidding Document (SBD) must form part of all bids[1] invited.

2 Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging).[2] Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.

3 Treasury Regulation 16A9 prescribes that accounting officers and accounting authorities must take all reasonable steps to prevent abuse of the supply chain management system and authorizes accounting officers and accounting authorities to:

a. disregard the bid of any bidder if that bidder, or any of its directors have abused the institution's supply chain management system and or committed fraud or any other improper conduct in relation to such system.

b. cancel a contract awarded to a supplier of goods and services if the supplier committed any corrupt or fraudulent act during the bidding process or the execution of that contract.

4 This SBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.

5 In order to give effect to the above, the attached Certificate of Bid Determination (SBD 9) must be completed and submitted with the bid:

[1] Includes price quotations, advertised competitive bids, limited bids and proposals.

[2] Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

SBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

_____

(Bid Number and Description)

in response to the invitation for the bid made by:

_____

(Name of Institution)

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of: _____ that:

(Name of Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word “competitor” shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:

    (a) has been requested to submit a bid in response to this bid invitation;
    (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
    (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder

SBD 9

6. 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 consortium[3] will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
    (a) prices;
    (b) geographical area where product or service will be rendered (market allocation)
    (c) methods, factors or formulas used to calculate prices;
    (d) the intention or decision to submit or not to submit, a bid;
    (e) the submission of a bid which does not meet the specifications and conditions of the bid; or
    (f) bidding with the intention not to win the bid.
8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. 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] 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.

SBD 9

10. 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.

……	……
Signature	Date
……	……
Position	Name of Bidder

Js914w 2

S. EXECUTION PROGRAMME / PROGRAM OF WORKS

The Bidder shall detail below or attach a preliminary programme reflecting the proposed sequence and tempo of execution of the various activities comprising the Work for this Contract. The programme shall be in accordance with the information supplied in the Contract, requirements of the Project Specifications and with all other aspects of his Bid.

The Execution Programme must be based on the completion time as specified in the Contract Data. The activities identified and filled in below, are specifically to be carried forward to Schedule T, the contractor's Method Statement.

PLEASE NOTE: the cash flow projections from the Contractor (to be submitted before commencement of the execution of the Contract) must be in accordance with this execution plan in order to ensure proper Cash flow management by the Department and to minimise delayed payments.

(To be provided with the request for Quotations for a specific project)

PROGRAMME										
ACTIVITY	**WEEKS**									

T. DETAILED METHOD STATEMENT

[The adjudication of the responsiveness of a bid also relies on the extent to which a Bidder can prove an understanding of the scope of works. The Bidder should describe below the methods and procedures he will employ to successfully complete the various activities as identified for the foregoing Schedule S, the Execution Programme]

(To be provided with the request for Quotations for a specific project)

ACTIVITY	DESCRIPTION
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……
……	……

[Add more pages as required]

U. CONTRACTOR'S HEALTH AND SAFETY DECLARATION

In terms of Clause 4(4) of the OHSA 1993 Construction Regulations 2003 (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 safely in accordance with the Occupational Health and Safety Act No 85 of 1993 and the OHSA 1993 Construction Regulations 2003.

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

Declaration by Bidder

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 No 181 of 1993), and the OHSA 1993 Construction Regulations 2003.

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 4(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 6, and Competent Persons as defined in Regulations 7, 8, 10, 11, 12, 14, 15, 18, 21(1), 22, 26 and 27, as applicable to this Contract)

(a) Details of the competent and qualified key persons from my Company's own resources, who will form part of the Contract team:

NAMES OF COMPETENT PERSONS	POSITIONS TO BE FILLED BY COMPETENT PERSONS

(b) Details 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 Subcontractor: .....

Qualifications or details of competency of the Subcontractor: .....

.....

.....

.....

5. I hereby undertake, if my Bid is accepted, to provide, before commencement of the Works under the Contract, a suitable and sufficiently Documented Health and Safety Plan in accordance with Regulation 5(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 2003 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 Bidded rates and prices in the Schedule of Quantities to cover the cost of all resources, actions, training and all health and safety measures envisaged in the OHSA 1993 Construction Regulations 2003, and that I will be liable for any penalties that may be applied by the Employer in terms of the said Regulations (Regulation 30) 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 2003, and accept that my Bid will be prejudiced and may be rejected at the discretion of the Employer.

SIGNATURE: ..... DATE: .....…….....

(of person authorised to sign on behalf of the Bidder)

V. CONTRACTOR'S SAFETY PLAN

[The Contractor shall submit the Contractor's Health and Safety Plan as required in terms of Regulation 5 of the Occupational Health and Safety Act 1993 Construction Regulations 2003, and referred to in T2.1, before commencement of the Works.]

W. PRO FORMA NOTIFICATION FORM IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT 1993, CONSTRUCTION REGULATIONS 2003

[This form must be completed and forwarded, prior to commencement of Work on Site, by all Contractors that qualify in terms of Regulation 3 of the Construction Regulations 2003, to the Office of the Department of Labour]

1. (a) Name and postal address of Contractor:……..
   .....
   (b) Name of Contractor's contact person: .....
   Telephone number: .....
2. Contractor's Workman's compensation registration number: .....
3. (a) Name and postal address of Client: .....
   .....
   .....
   (b) Name of Client's contact person or Agent: .....
   Telephone number.....
4. (a) Name and postal address of designer(s) for the Project: .....
   .....
   (b) Name of Designer's contact person: .....
   Telephone number.....
5. Name of Contractor's Construction Supervisor on Site appointed in terms of Regulation 6(1): ..... Telephone number: .....
6. Name/s of Contractor's sub-ordinate supervisors on Site appointed in terms of Regulation 6(2).
   …… .....
7. Exact physical address of the construction Site or Site Office: .....
   .....
8. Nature of the construction Work: .....
   …….....
9. Expected Commencement Date: .....
10. Expected Completion Date: .....
11. Estimated maximum number of persons on the construction Site: .....
12. Planned number of Subcontractors on the construction Site accountable to Contractor: .....
13. Name(s) of Subcontractors already chosen: .....
    .....
    .....
    …….
    …….

SIGNED BY:

CONTRACTOR: .....……..... DATE: .....

CLIENT: .....…… DATE: .....

X. MONTHLY LABOUR REPORT

MONTHLY LABOUR REPORT FOR CERTIFICATE OF PAYMENT NO. ……

JOBS CREATED……..

AS PER BUSINESS PLAN

A	B	C	D	E	F	G	H	I	J
Category	Number of persons employed in category	Rate (R/d)	Local P-days	Non-local P-Days	Total P-days (D+E)	Amount expended on labour (C x F)	P-days by women	P-days by youth	P-days by disabled
Clerical									
Managerial									
Supervisory									
Skilled									
Semi-skilled									
Unskilled									
All operations									

ACTUAL TO DATE

A	B	C	D	E	F	G	H	I	J
Category	Number of persons employed in category	Rate (R/d)	Local P-days	Non-local P-Days	Total P-days (D+E)	Amount expended on labour (C x F)	P-days by women	P-days by youth	P-days by disabled
Clerical									
Managerial									
Supervisory									
Skilled									
Semi-skilled									
Unskilled									
All operations									

SUMMARY

Planned person-days target
Bidded construction period (months):
Overall person-days target per month:
Months represented by this report:
Person-day target for this month:
Achieved person-days to date:
Person-days ahead/behind target:

THE CONTRACT

PART C1: AGREEMENTS AND CONTRACT DATA

PART C2: PRICING DATA

PART C3: SCOPE OF WORK

PART C4: AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT (No 85 OF 1993)

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

TABLE OF CONTENTS

PART C1: AGREEMENTS AND CONTRACT DATA

C1.1: FORM OF OFFER AND ACCEPTANCE

C1.2: CONTRACT DATA

C1.2.1: CONDITIONS OF CONTRACT

C1.2.2: PART A: CONTRACT DATA PROVIDED BY THE EMPLOYER

PART B: CONTRACT DATA PROVIDED BY THE CONTRACTOR

C1.3: FORM OF GUARANTEE

C1.4: AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT (No 85 OF 1993)

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

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:

Contract No **ACDP 21/19**: **DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT**

The Bidder, identified in the Offer Signature block, has examined the Documents listed in the Bid Data and addenda thereto as listed in the Returnable Schedules, and by submitting this Offer has accepted the Conditions of Bid.

By the representative of the Bidder, deemed to be duly authorized, signing this part of this Form of Offer and Acceptance, the Bidder 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:

……

…….. Rand (in words);

R …….. (in figures)

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 Bidder before the end of the period of validity stated in the Bid Data, whereupon the Bidder becomes the Party named as the Contractor in the Conditions of Contract identified in the Contract Data.

Signature Block: Bidder	
Signature	Date . . . . .
Name	
Capacity	
Name of organization.	
Address of organization	
. . . . .	
Signature of witness	Date . . . . .
Name of witness	

Acceptance

By signing this part of this Form of Offer and Acceptance, the Employer identified below accepts the Bidder'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 Bidder's Offer shall Form an Agreement between the Employer and the Bidder 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: Agreements 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 Parts C1 to C4 above.

Deviations from and amendments to the Documents listed in the Bid Data and any addenda thereto as listed in the Bid Schedules as well as any changes to the Terms of the Offer agreed by the Bidder and the Employer during this process of Offer and Acceptance, are contained in the Schedule of Deviations attached to and Forming part of this Agreement. No amendments to or deviations from said Documents are valid unless contained in this schedule.

The Bidder 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) for delivery of any 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 Bidder receives one fully completed original copy of this Document, including the Schedule of Deviations (if any). Unless the Bidder (now Contractor**)** within five working days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the Contents of this Agreement, this Agreement shall constitute a binding Contract between the Parties.

Signature Block: Employer

Signature . . . . . Date . . . . . .

Name . . . . . .

Capacity . . . . . .

for the Employer Limpopo Department of Agriculture and Rural Development

Signature of witness . . . . . Date . . . . . .

Name of witness . . . . . .

Schedule of Deviations

1 Subject . . . . . .
Details . . . . . .
. . . . . .
. . . . . .
. . . . . .
2 Subject . . . . . .
Details . . . . . .
. . . . . .
. . . . . .
. . . . . .

3 Subject . . . . . .
Details . . . . . .
. . . . . .
. . . . . .
. . . . . .
4 Subject . . . . . .
Details . . . . . .
. . . . . .
. . . . . .
. . . . . .
5 Subject . . . . . .
Details . . . . . .
. . . . . .
. . . . . .
. . . . . .

By the duly Authorised Representatives signing this Agreement, the Employer and the Bidder agree to and accept the foregoing Schedule of Deviations as the only deviations from and amendments to the Documents listed in the Bid Data and addenda thereto as listed in the Bid Schedules, as well as any confirmation, clarification or changes to the terms of the Offer agreed by the Bidder 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 Bid Documents and the receipt by the Bidder of a completed signed copy of this Agreement shall have any meaning or effect in the Contract between the parties arising from this Agreement.

For the Bidder:

Signature(s) _____ _____

Name(s) _____ _____

Capacity _____ _____

_____
(Name and address of organisation)

Name &
Signature of
Witness _____ Date _____

For the Employer:

Signature(s) _____ _____

Name(s) _____ _____

Capacity _____ _____

_____
(Name and address of organisation)

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

C1.2 CONTRACT DATA

Section 1.01 The General Conditions of Contract for Construction Works (2010) published by the South African Institution of Civil Engineering, is applicable to this Contract. Copies of these Conditions of Contract may be obtained from the South African Institution of Civil Engineering (Tel: 011-805 5947).

The General Conditions of Contract for Construction Works make several references to the Contract Data for Specific Data, which together with these Conditions collectively describe the risks, liabilities and obligations of the Contracting parties and the procedures for the administration of the Contract. The Contract Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the General Conditions of Contract.

Each item of Data given below is cross-referenced to the clause in the General Conditions of Contract for Construction Works to which it mainly applies.

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

C1.2.1: CONDITIONS OF CONTRACT

GENERAL CONDITIONS OF CONTRACT

SPECIAL CONDITIONS OF CONTRACT

1. GENERAL

2. AMENDMENTS TO THE GENERAL CONDITIONS OF CONTRACT

3. TRANSFER OF RIGHTS

C1.2.1 CONDITIONS OF CONTRACT

GENERAL CONDITIONS OF CONTRACT

This Contract will be based on the "General Conditions of Contract for Construction Works – 2nd Edition 2010", issued by the South African Institution of Civil Engineering (Short title: **"General Conditions of Contract 2010**") and can be obtained from:

SAICE
Waterfall Park
Howick Gardens
Vorna Valley Half way House
Becker Street
MIDRAND
1685
Gauteng Province
Tel: (011) 805-5947/8
Fax: (011) 805-5971.

It is agreed that the only variations from the General Conditions of Contract 2010 are those set out hereafter under "Special Conditions of Contract".

SPECIAL CONDITIONS OF CONTRACT

1. GENERAL

These Special Conditions of Contract (SCC) form an integral part of the Contract. The Special Conditions shall amplify, modify or supersede, as the case may be, the General Conditions of Contract 2010 to the extent specified below, and shall take precedence and shall govern.

The clauses of the Special Conditions hereafter are numbered "SCC" followed in each case by the number of the applicable clause or sub clause in the General Conditions of Conditions 2010, and the applicable heading, or (where a new special condition that has no relation to the existing clauses is introduced) by a number that follows after the last clause number in the General Conditions, and an appropriate heading.

2. FOR CONTRACT ABOVE R3M (THREE MILLION RAND), THE FOLLOWING SPECIAL CONDITIONS APPLY

(a) (i) All bidders from outside the province must enter into a Consortium or Joint Venture with local SMMEs or suppliers.

(ii) Preference must be given to local bidders entering into Joint Ventures with local SMME's or suppliers.

(iii) The members of consortium or Joint venture, formed in response to preferential procurement conditions, must share in the control and management of such consortium.

(iv) The percentage of the contract value managed or executed by the local partner must not be less than 40% of the project value.

(v) All white owned bidders must enter into join venture with black owned local contractor and percentage of management and control for equity owned by black must not be less than 25% in the venture arrangement.

(b) The AO/AA may, after consulting the departmental or public entities demand management unit, in the bid documentation, exempt bidders from complying with the provisions of clause (a), if there are no SMME's or suppliers in Limpopo with the skills or knowledge required to execute the project.

(c) In the case of construction works, applicable to the construction industry;

(d) (i) The Consortium or Joint Venture that benefits from the preference system, must within 30 days of receiving notice of the contract, must organize themselves into legal entity or provide with a working agreement between members of the Joint venture or consortium. Successful suppliers, both from in and outside the province, must upon implementation of the project, establish fully fledged office, branch or plant in the province.

The department reserves the right to retain a percentage of contract value to ensure that the above condition is complied with.

(ii) The retained fee must be paid to the supplier or service provider on successfully completing the contract and after having complied with the special conditions.

(iii) Where the supplier or service provider fails to successfully complete the contract or comply with any condition, such supplier or service provider will forfeit the retained percentage.

(iv) Notwithstanding the forfeiture of the retained percentage of the contract value, if the failure to comply with conditions in clause (i) amounts to breach of the contract, the department or public entity may invoke any remedy available to it in law.

(v) A performance guarantee of 10% is applicable to all contracts above R 2 000 000.00 and must be obtained from either commercial bank or insurance company prior to award of bids. The performance security shall be dominated in the currency of the contract and shall be in the form of a bank guarantee or an irrevocable letter of credit issued by a reputable bank located in South Africa. The accounting officer reserves the right to cancel the award of the bid when the bidder fails to present the required security as stipulated in the special conditions.

(e) In all labour intensive projects, at least 70% of the labourers must be employed from the local community where the project will be executed.

3. AMENDMENTS TO THE GENERAL CONDITIONS OF CONTRACT

Clause no.	Description
SCC 5.12.1	Add the following to the sub-clause: Extension of time in respect of abnormal rainfall shall be calculated using the rainfall Formula in PS 8 for each calendar month or part thereof.
SCC 9.2.1.3.6	Replace sub-clause with: The Contractor or anyone on his behalf or in his employ would pay, offer or offer as payment to any person in the employ of the Employer, or in the employ of the Engineer, a gratuity or reward or commission.
SCC 6.11	Replace the Heading with "**VARIATIONS EXCEEDING 20 PERCENT**"
SCC 6.11.1.3	Replace the wording:" *greater than 15 percent"* with *"greater than 20 percent".* **<u>The following additional clauses to the General Conditions of Contract shall apply:</u>**

SCC 11	**LABOUR INTENSIVE WORKS**
SCC 11.1	**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.
SCC 11.2	**Applicable labour laws** The Ministerial Determination, Special Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of Labour in Government Notice No R63 of 25 January 2002, as reproduced below, shall apply to work which are undertaken by unskilled or semi-skilled workers.
SCC 11.3.1	**Introduction** (a) This document contains the Standard Terms and Conditions for workers employed in elementary occupations on a Special Public Works Programme (SPWP). These terms and Conditions do NOT apply to persons employed in the supervision and management of a SPWP. (b) In this document – (i) "Department" means any department of State, implementing Agent or Contractor; (ii) "Employer" means any Municipality, implementing Agency or Contractor that hires workers to work in elementary occupations on a SPWP; (iii) "worker" means any person working in an elementary occupation on a SPWP.; (iv) "elementary occupation" means any occupation involving unskilled or semi-skilled work; (v) "Management" means any person employed by a Municipality or implementing Agency to administer or execute an SPWP.; (vi) "task" means a fixed quantity of work; (vii) "task-based work" means work in which a worker is paid a fixed rate for performing a task; (viii) "task-rated worker" means a worker paid on the basis of the number of tasks completed; (ix) "time-rated worker" means a worker paid on the basis of the length of time worked.
SCC 11.3.2	**Terms of Work** (a) Workers on a SPWP are employed on a temporary basis. (b) A worker may NOT be employed for longer than 24 months in any five year cycle on a SPWP. (c) Employment on a SPWP does not qualify as employment as a contributor for the purpose of the Unemployment Insurance Act 30 of 1966.

SCC 11.3.3	**Normal Hours of Work** (a) An Employer may not set tasks or hours of work that require a worker to work– (i) more than forty hours in any week (ii) on more than five days in any week; and (iii) for more than eight hours on any day. (b) An Employer and worker may agree that a worker will work four days per week. The worker may then work up to ten hours per day. (c) A task-rated worker may not work more than a total of 55 hours in any week to complete the tasks allocated (based on a 40-hour week) to that worker.
SCC 11.3.4	**Meal Breaks** (a) A worker may not work for more than five hours without taking a meal break of at least thirty minutes' duration. (b) An Employer and worker may agree on longer meal breaks. (c) A worker may not work during a meal break. However, an Employer may require a worker to perform duties during a meal break if those duties cannot be left unattended and cannot be performed by another worker. An Employer must take reasonable steps to ensure that a worker is relieved of his or her duties during the meal break. (d) A worker is not entitled to payment for the period of a meal break. However, a worker who is paid on the basis of time worked must be paid if the worker is required to work or to be available for work during the meal break.
SCC 11.3.5	**Special Conditions for Security Guards** (a) A security guard may work up to 55 hours per week and up to eleven hours per day. (b) A security guard who works more than ten hours per day must have a meal break of at least one hour or two breaks of at least 30 minutes each.
SCC 11.3.6	**Daily Rest Period** Every worker is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next day.
SCC 11.3.7	**Weekly Rest Period** Every worker must have two days off every week. A worker may only work on their day off to perform work which must be done without delay and cannot be performed by workers during their ordinary hours of work ("emergency work").
SCC 11.3.8	**Work on Sundays and Public Holidays** (a) A worker may only work on a Sunday or Public holiday to perform emergency or security work. (b) Work on Sundays is paid at the ordinary rate of pay. (c) A task-rated worker who works on a public holiday must be paid –

	(i) the worker's daily task rate, if the worker works for less than four hours; (ii) double the worker's daily task rate, if the worker works for more than four hours. (d) A time-rated worker who works on a public holiday must be paid – (i) the worker's daily rate of pay, if the worker works for less than four hours on the public holiday; (ii) double the worker's daily rate of pay, if the worker works for more than four hours on the public holiday.
SCC 11.3.9	**Sick Leave** (a) Only workers who work four or more days per week have the right to claim sick-pay in terms of this clause. (b) A worker who is unable to work on account of illness or injury is entitled to claim one day's paid sick leave for every full month that the worker has worked in terms of a Contract. (c) A worker may accumulate a maximum of twelve days' sick leave in a year. (d) Accumulated sick-leave may not be transferred from one Contract to another Contract. (e) An Employer must pay a task-rated worker the worker's daily task rate for a day's sick leave. (f) An Employer must pay a time-rated worker the worker's daily rate of pay for a day's sick leave. (g) An Employer must pay a worker sick pay on the worker's usual payday. (h) Before paying sick-pay, an Employer may require a worker to produce a certificate stating that the worker was unable to work on account of sickness or injury if the worker is – (i) absent from work for more than two consecutive days; or (ii) absent from work on more than two occasions in any eight-week period. (i) A medical certificate must be issued and signed by a Medical Practitioner, a qualified Nurse or a Clinic staff member authorised to issue medical certificates indicating the duration and reason for incapacity. (j) A worker is not entitled to paid sick-leave for a work-related injury or occupational disease for which the worker can claim compensation under the Compensation for Occupational Injuries and Diseases Act.
SCC 11.3.10	**Maternity Leave** (a) A worker may take up to four consecutive months' unpaid maternity leave. (b) A worker is not entitled to any payment or employment-related benefits during maternity leave. (c) A worker must give her Employer reasonable notice of when she will start maternity leave and when she will return to work.

	(d) A worker is not required to take the full period of maternity leave. However, a worker may not work for four weeks before the expected date of birth of her child or for six weeks after the birth of her child, unless a medical practitioner, midwife or qualified nurse certifies that she is fit to do so. (e) A worker may begin maternity leave – (i) four weeks before the expected date of birth; or (ii) on an earlier date – (1) if a medical Practitioner, Midwife or Certified Nurse certifies that it is necessary for the health of the worker or that of her unborn child; or (2) if agreed to between Employer and worker; or (iii) on a later date, if a medical Practitioner, Midwife or Certified nurse has certified that the worker is able to continue to work without endangering her health. (f) A worker who has a miscarriage during the third trimester of pregnancy or bears a stillborn child may take maternity leave for up to six weeks after the miscarriage or stillbirth. (g) A worker who returns to work after maternity leave has the right to start a new cycle of twenty-four months' employment, unless the SPWP on which she was employed has ended.
SCC 11.3.11	**Family responsibility leave** Workers, who work for at least four days per week, are entitled to three days paid family responsibility leave each year in the following circumstances – (a) when the employee's child is born; (b) when the employee's child is sick; (c) in the event of a death of – (i) the employee's spouse or life partner; (ii) the employee's parent, adoptive parent, grandparent, child, adopted child, grandchild or sibling.
SCC 11.3.12	**Statement of Conditions** (a) An Employer must give a worker a statement containing the following details at the start of employment – (i) the Employer's name and address and the name of the SPWP; (ii) the tasks or job that the worker is to perform; and (iii) the period for which the worker is hired or, if this is not certain, the expected duration of the Contract; (iv) the worker's rate of pay and how this is to be calculated; (v) the training that the worker will receive during the SPWP. (b) An Employer must ensure that these terms are explained in a suitable language to any employee who is unable to read the statement. (c) An Employer must supply each worker with a copy of these Conditions of employment.

SCC 11.3.13	**Keeping Records** (a) Every Employer must keep a written record of at least the following – (i) the worker's name and position; (ii) in the case of a task-rated worker, the number of tasks completed by the worker; (iii) in the case of a time-rated worker, the time worked by the worker; (iv) payments made to each worker. (b) The Employer must keep this record for a period of at least three years after the completion of the SPWP.
SCC 11.3.14	**Payment** (a) An Employer must pay all wages at least monthly in cash or by cheque or into a bank account. (b) A task-rated worker will only be paid for tasks that have been completed. (c) An Employer must pay a task-rated worker within five weeks of the work being completed and the work having been approved by the manager or the Contractor having submitted an invoice to the Employer. (d) A time-rated worker will be paid at the end of each month. (e) Payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker. (f) Payment in cash or by cheque must take place – (i) at the workplace or at a place agreed to by the worker; (ii) during the worker's working hours or within fifteen minutes of the start or finish of work; (iii) in a sealed envelope which becomes the property of the worker. (g) An Employer must give a worker the following information in writing – (i) the period for which payment is made; (ii) the numbers of tasks completed or hours worked; (iii) the worker's earnings; (iv) any money deducted from the payment; (v) the actual amount paid to the worker. (h) If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it (i) If a worker's employment is terminated, the Employer must pay all monies owing to that worker within one month of the termination of employment.

SCC 11.3.15	**Deductions** (a) An Employer may not deduct money from a worker's payment unless the deduction is required in terms of a law. (b) An Employer must deduct and pay to the SA Revenue Services any income tax that the worker is required to pay. (c) An Employer who deducts money from a worker's pay for payment to another person must pay the money to that person within the time period and other requirements specified in the agreement law, court order or arbitration award concerned. (d) An Employer may not require or allow a worker to – (i) repay any payment except an overpayment previously made by the Employer by mistake; (ii) state that the worker received a greater amount of money than the Employer actually paid to the worker; or (iii) pay the Employer or any other person for having been employed.
SCC 11.3.16	**Health and Safety** (a) Employers must take all reasonable steps to ensure that the working environment is healthy and safe. (b) A worker must – (i) work in a way that does not endanger his/her health and safety or that of any other person; (ii) obey any health and safety instruction; (iii) obey all health and safety rules of the SPWP; (iv) use any personal protective equipment or clothing issued by the Employer; (e) report any accident, near-miss incident or dangerous behaviour by another person to their Employer or manager.
SCC 11.3.17	**Compensation for Injuries and Diseases** (a) It is the responsibility of the Employers (other than a Contractor) to arrange for all persons employed on a SPWP to be covered in terms of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993. (b) A worker must report any work-related injury or occupational disease to their Employer or manager. (c) The Employer must report the accident or disease to the Compensation Commissioner. (d) An Employer must pay a worker who is unable to work because of an injury caused by an accident at work 75% of their earnings for up to three months. The Employer will be refunded this amount by the Compensation Commissioner. This does NOT apply to injuries caused by accidents outside the workplace such as road accidents or accidents at home.

SCC 11.3.18	**Termination** (a) The Employer may terminate the employment of a worker for good cause after following a fair procedure. (b) A worker will not receive severance pay on termination. (c) A worker is not required to give notice to terminate employment. However, a worker who wishes to resign should advise the Employer in advance to allow the Employer to find a replacement. (d) A worker who is absent for more than three consecutive days without informing the Employer of an intention to return to work will have terminated the Contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period. (e) A worker who does not attend required training events, without good reason, will have terminated the Contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period.
SCC 11.3.19	**Certificate of Service** On termination of employment, a worker is entitled to a certificate stating – (i) the worker's full name; (ii) the name and address of the Employer; (iii) the SPWP on which the worker worked; (iv) the work performed by the worker; (v) any training received by the worker as part of the SPWP; (vi) the period for which the worker worked on the SPWP; (vii) any other information agreed on by the Employer and worker.
SCC 11.3.20	**Reporting** The Contractor shall report the breakdown of each payment certificate into the broad categories of: a) Overheads, b) Supervision, c) Materials, d) Plant, and e) Labour. The Contractor shall further report for each payment certificate the person-days of employment as set out in the Pro Forma, Schedule T: Monthly Labour Report. In the calculation of person-days, a day shall be taken as 8 hours and no time over and above 8 hours per day shall be used to contribute to the number of person-days reported.
SCC 11.3.21	**Source of Labour** The Contractor shall source his labour from the local area through the services of an appropriate Councillor or Community Liaison Officer or another appointed person who has contact with a labour pool in the area.

4. TRANSFER OF RIGHTS

The successful Bidder should complete and submit a Transfer of Rights Form to claim for materials on site with every progress payment for the project. No payment for materials on site would be granted if this Document is not submitted with the progress payment being considered.

TRANSFER OF RIGHTS

TRANSFER OF RIGHTS AND INDEMNITY (To be completed during construction by successful Bidder only)

Claim for materials on site, Payment Certificate No. …… **Date:** ……..

Contract No: ……. For (Contract title) ……..……

……

I, the undersigned (name of signatory) ……..……...… in my capacity as

……. of (name of Contractor) ……

duly authorised hereto on behalf of the Contractor hereby transfer, cede and assign all the Contractor's rights, title and interest in and to the materials and goods, for which evidence of bona fide ownership is attached hereto, unto and in favour of (name of Employer) …….. insofar as the Contractor retains actual control of the materials and goods, the right of ownership thereof passes to the Employer by *constitutum possessorium.*

I herewith indemnify the Employer against any claim to and in respect of said materials by reason of the Contractor's sequestration or liquidation or of any defect in the Contractor's title to the materials and agree that no payment for materials on site will be made by the Employer until such time as I have submitted documentary proof of bona fide ownership of the said materials and goods.

This transfer shall become effective upon conclusion of the Contractor receiving payment from the Employer or from any other person on behalf of the Employer for the materials and goods as Materials on Site, payment of retention money thereon excluded.

I further confirm that I am fully responsible for all materials and goods listed under this Transfer of Rights and that they have been insured adequately against all risks and will remain insured until they are built into or used in the permanent works and taken over by the Employer.

This certificate of Transfer of Rights applies only to the materials and goods as listed in the following table.

Description of Item	Unit	Quantity	Rate	Amount	Supplier
Total Value of Materials and goods					

Signed by: ……Date: ……..……..……
for and on behalf of the Contractor.

Witnessed by: ……. Date: ……..…

NOTE: This form, together with the documentary proof of ownership or proof of payment by the Contractor to the supplier, shall accompany the Contractor's claim for payment for materials on site in terms of Clause 49.1.5 of the General Conditions of Contract 2004.

C1.2.2 PART A: DATA PROVIDED BY THE EMPLOYER

The following Contract Specific Data are applicable to this Contract.

REFERENCE	CONTRACT SPECIFIC DATA BY THE EMPLOYER
Clause 1.1.1.15:	**Name of Employer:** Limpopo Department of Agriculture and Rural Development, Polokwane
Clause 1.2.1.2:	**Address of Employer:**

Physical:

Limpopo Dept of Agriculture
69 Biccard Street
Polokwane
0700

Postal:

Limpopo Dept of Agriculture
P Bag X9487
Polokwane
0700

E-Mail:

Telephone No: (015) 294 3000 Fax No: (015) 294 4535

Clause 1.1.1.16: **Name of Engineer:** MJ Gouws

Clause 1.2.1.2: **Address of Engineer:**

Physical:

Limpopo Dept of Agriculture
69 Biccard Street
Polokwane
0700

Postal:

Limpopo Dept of Agriculture
P Bag X9487
Polokwane
0700

E-Mail: gouwsmj@agric.limpopo.gov.za

Telephone No: 015 294 3539 Cell No: 060 967 4127

Clause 1.1.1.12 & 5.8.1: Special non-working days are Sundays and the following statutory public holidays as declared by National or Regional Government:

New Year's Day, Human Rights Day, Good Friday, Family Day, Freedom Day, Workers day, Youth Day, National Women's Day, Heritage Day, Day of Reconciliation, Christmas Day and the Day of Goodwill including the construction industry year end break.

Clause 1.1.1.26: **The Pricing Strategy is Re-Measurable Contract.**

Clause 1.1.1.12: The year end break commences on the first working day after 15 December and ends on the first working day after 5 January of the next year.

Appendix 3: Performance Guarantee to be delivered within 14 days of the Commencement Day.

The total liability under the guarantee should not be less than 10% of the Bid amount, excluding VAT.

Clause 5.3: The Contractor shall commence executing the work within 14 days of the Commencement date.

Clause 5.6.1: The Contractor shall deliver his programme of work within 14 days of the Commencement date.

Clause 8.6.1.1.2: The value of material to be supplied by the Employer is nil.

Clause 8.6.1.1.3: The amount to cover Professional fees for repairing damage and loss to be included in the Insurance sum is R 200 000.00

Clause 8.6.1.3: The limit of indemnity for Liability Insurance is R 5 000 000.00 for any single liability claim. Liability insurance shall include spread of fire risk.

Clause 6.5.1.2.3: The percentage allowance to cover overhead charges is 15%.

Clause 1.1.1.14: The **Works** shall be completed within **4 months** excluding special non-working days and the year-end break.

The **Operation & Maintenance** of the installations will commence after the completion of the Works and will be for **36 months**.

Clause 5.13.1: The penalty for failing to complete the works is 0.5 % of the Total Bid Sum per Calendar Day.

Clause 5.16.3: The latent defect period is 10 years.

Clause 6.8: No Contract Price Adjustment will **not** be allowed for this Contract.

Clause 6.10.1.5: The percentage advance on materials not yet built into the Permanent Works is: 80%

Clause 6.10.3: The percentage retention on the amounts due to the Contractor is 10 %, excluding Contract Price Adjustment, Contingencies and VAT, and limited to 5% of the Contract amount, excluding Contract Price Adjustment, Contingencies and VAT.

A Retention Money Guarantee will **not** be permitted.

Clause 1.1.1.13: The Defects Liability Period is 12 months measured from the date of the Certificate of Completion.

Clause 10.3.2: Dispute resolution shall be by Adjudication.

Clause 3.1.3: The Engineer is required to obtain the specific approval of the Employer for the following:

The Engineer requires Departmental approval in order to authorise any expenditure in excess of the Bid Sum plus 15% Contingencies.

C1.2.2: PART B: DATA PROVIDED BY THE CONTRACTOR

The following Contract Specific Data are applicable to this Contract:

REFERENCE **CONTRACT SPECIFIC DATA BY THE CONTRACTOR**

Clause 1.1.1.9: **Name of Contractor**: ……..

Clause 1.2.1.2: **Address of the Contractor**:

Physical: Postal:

....

....

....

....

E-Mail: .....

Telephone No: ……..... Fax No: ……

Clause 6.8.3: The variation in cost of all special materials is to be provided in the table SM 1 for special materials.

The rates and prices for the special materials shall be furnished by the Bidder, which rates and prices shall not include VAT but shall include all other obligatory taxes and levies. **The quoted price is the ruling price on the Month prior to close of Bid.**

TABLE: SM1

Special material	**Unit on which variation will be determined**		**Price for base month ex factory, excluding transport, labour or any other costs.**
	Containers	Delivered in bulk	

* Contractor to indicate the type, unit and rate of special material to be listed. When called upon to do so, the Contractor shall substantiate the above rates or prices with acceptable documentary evidence. Contractor to provide any other Special Materials if deemed necessary

C1.3 FORM OF GUARANTEE - PRO FORMA

Contract No.
WHEREAS **The Limpopo Department of Agriculture and Rural Development** (hereinafter referred to as the Employer") entered into, a Contract with:

. . . . . .

(Hereinafter called "the Contactor") on the . . . . . day of . . . . . 20. . . . .

For: ACDP 21/19:
DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

AND WHEREAS it is provided by such Contract that the Contractor shall provide the Employer with security by way of a Guarantee for the due and faithful fulfilment of such Contract by the Contractor;

AND WHEREAS . . . . . has / have at the request of the Contractor, agreed to give such Guarantee;

NOW THEREFORE WE . . . . . do hereby Guarantee and bind ourselves jointly and severally as Guarantor and Co-principal Debtors to the Employer under renunciation of the benefits of division and execution for the due and faithful performance by the Contractor of all the Terms and Conditions of the said Contract, subject to the following Conditions:

1. The Employer shall, without reference and / or notice to us, have complete liberty of action to act in any manner authorized and/or contemplated by the terms of the said Contract, and/or to agree to any modifications, variations, alterations, directions or extensions of the completion date of the works under the said Contract, and that its rights under this Guarantee shall in no way be prejudiced nor our liability hereunder be affected by reason of any steps which the Employer may take under such Contract, or of any modification, variation, alterations of the completion date which the Employer may make, give, concede or agree to under the said Contract.

2. This Guarantee shall be limited to the payment of a sum of money.

3. The Employer shall be entitled, without reference to us, to release any Guarantee held by it, and to give time to or compound or make any other arrangement with the Contractor.

4. This Guarantee shall remain in full force and effect until the issue of the Certificate of Completion in terms of the Contract, unless we are advised in writing by the Employer before the issue of the said Certificate of his intention to institute claims, and the particulars thereof, in which event this Guarantee shall remain in full force and effect until all such claims have been paid or liquidated.

5. Our total liability hereunder shall not exceed the Guaranteed Sum of:

   . . . . . .

   . . . . . .Rand (in words);

   R. . . . . (in figures)

6. The Guarantor reserves the right to withdraw from this Guarantee by depositing the Guaranteed Sum with the beneficiary, whereupon our liability hereunder shall cease.

7. We hereby choose our address for the serving of all notices for all purposes arising here from as

   . . . . . .

   . . . . . .

   . . . . . .

. . . . . .

IN WITNESS WHEREOF this Guarantee has been executed by us at . . . . . .
on this . . . . . day of . . . . . 20 . . . . . .

Signature . . . . . .

Duly authorized to sign on behalf of . . . . . .

Address . . . . . .

. . . . . .

. . . . . .

As witnesses:

1 . . . . . .

2 . . . . . .

C1.4: AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT NO 85 OF 1993

THIS AGREEMENT is made between **The Limpopo Department of Agriculture and Rural Development**

(hereinafter called the EMPLOYER of the one part, herein represented by:

....

in his capacity as: ..... ;

AND: ....

(hereinafter called the CONTRACTOR) of the other part, herein represented by .....

....

in his capacity as: .....

duly authorised to sign on behalf of the Contractor.

WHEREAS the CONTRACTOR is the Mandatory of the EMPLOYER in consequence of an Agreement between the CONTRACTOR and the EMPLOYER in respect of

CONTRACT No: ACDP 21/19:
DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

AND WHEREAS the EMPLOYER and the CONTRACTOR have agreed to enter into an agreement in terms of the provisions of Section 37(2) of the Occupational Health and Safety Act No 85 of 1993, as amended by OHSA Amendment Act No 181/1993 (hereinafter referred to as the ACT);

NOW THEREFORE the parties agree as follows:

1. The CONTRACTOR undertakes to acquaint the appropriate officials and employees of the CONTRACTOR with all relevant provisions of the ACT and the regulations promulgated in terms thereof.

2. The CONTRACTOR undertakes to fully comply with all relevant duties, obligations and prohibitions imposed in terms of the ACT and Regulations: Provided that should the EMPLOYER have prescribed certain arrangements and procedures that same shall be observed and adhered to by the CONTRACTOR, his officials and employees. The CONTRACTOR shall bear the onus of acquainting himself/herself/itself with such arrangements and procedures.

3. The CONTRACTOR hereby accepts Sole Liability for such due compliance with the relevant duties, obligations, prohibitions, arrangements and procedures, if any, imposed by the ACT and Regulations, and the CONTRACTOR expressly absolves the EMPLOYER and the Employer's CONSULTING ENGINEERS from being obliged to comply with any of the aforesaid duties, obligations, prohibitions, arrangements and procedures in respect of the work included in the Contract.

4. The CONTRACTOR agrees that any duly authorised officials of the EMPLOYER shall be entitled, although not obliged, to take such steps as may be necessary to ensure that the CONTRACTOR has complied with his undertakings as more fully set out in paragraphs 1 and 2 above, which steps may include, but shall not be limited to, the right to inspect any appropriate site or premises occupied by the CONTRACTOR, or to take such steps it may deem necessary to remedy the default of the CONTRACTOR at the cost of the CONTRACTOR.

5. The CONTRACTOR shall be obliged to report forthwith to the EMPLOYER any investigation, complaint or criminal charge which may arise as a consequence of the provisions of the ACT and Regulations, pursuant to work performed in terms of this agreement, and shall, on written demand, provide full details in writing of such investigation, complaint or criminal charge.

Thus signed at ..……..……...……...…….. for and on behalf of the CONTRACTOR

on this the …… day of ……...……..…… 20……

SIGNATURE: .....

NAME AND SURNAME: .....

CAPACITY: .....

WITNESSES: 1. .....

2. .....

Thus signed at …….. for and on behalf of the EMPLOYER on this

the ……... day of ……..…… 20……

SIGNATURE: .....

NAME AND SURNAME: .....

CAPACITY: .....

WITNESSES: 1. .....

2. .....

PART C2: PRICING DATA

C2.1: PRICING INSTRUCTIONS

C2.2: BILL OF QUANTITIES

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

C2.1 Pricing Instructions

1. Measurement and payment shall be in accordance with the relevant provisions of the General Conditions of Contract (2010 edition) as amended in the Scope of Works.

2. The units of measurement described in this Bill of Quantities are metric units. Abbreviations used in the Bill of Quantities are as follows:

%	=	percent
h	=	hour
ha	=	hectare
kg	=	kilogram
kl	=	kilolitre
km	=	kilometre
km-pass	=	kilometre-pass
kPa	=	kilopascal
kW	=	kilowatt
l	=	litre
m	=	metre
mm	=	millimetre
m²	=	square metre
m²-pass	=	square metre-pass
m³	=	cubic metre
m³-km	=	cubic metre-kilometre
MN	=	meganewton
MN.m	=	meganewton-metre
MPa	=	megapascal
No.	=	number
Prov sum	=	Provisional sum
PC sum	=	Prime Cost sum
R/only	=	Rate only
sum	=	lump sum
t	=	ton (1000 kg)
W/day	=	Work day

3. For the purpose of this Bill of Quantities, the following words shall have the meanings hereby assigned to them:

Unit:	The unit of measurement for each item of work as defined in the Specifications
Quantity:	The number of units of work for each item.
Rate:	The agreed payment per unit of measurement.
Amount:	The product of the quantity and the agreed rate for an item.
Lump sum:	An agreed amount for an item, the extent of which is described in the Bills of Quantities but the quantity of work of which is not measured in any units.

4. Unless otherwise stated, items are measured net in accordance with the Drawings, and no allowance is made for waste.

5. The prices and rates in this Bill of Quantities are fully inclusive prices for the Work described under the items. 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.

6. It will be assumed that prices included in the Bill 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 Bids. (Refer to www.stanza.org.za or www.iso.org for information on Standards)

7. Where the Scope of Work requires detailed Drawings and designs or other information to be provided, all costs associated therewith are deemed to have been provided for and included in the unit rates and sum amounts Bidded for such items

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

9. The quantities set out in this Bill of Quantities are approximate and do not necessarily represent the actual amount of Work to be done. The quantities of work accepted and Certified for Payment will be used for determining payments due and not the quantities given in this Bill of Quantities.

10. The short descriptions of the items of payment given in this Bill of Quantities are only for the purposes of identifying the items. More details regarding the extent of the work entailed under each item appear in the Scope of Work.

11. The item numbers appearing in the Bills of Quantities refer to the corresponding item numbers in the Specifications where applicable.

12. Those parts of the contract to be constructed using labour-intensive methods have been marked in the Bills of Quantities with the letters “LI” in a separate column filled in against every item so designated. The works, or parts of the works so designated are to be constructed using labour-intensive methods only. The use of plant to provide such works, other than plant specifically provided for in the scope of work, is a variation to the contract. The items marked with the letters LI are not necessarily an exhaustive list of all the activities which must be done by hand, and this clause does not over-ride any of the requirements in the generic labour intensive specification in the Scope of Works.

13 Payment for items which are designated to be constructed labour-intensively (either in this schedule or in the Scope of Works) will not be made unless they are constructed using labour-intensive methods. Any unauthorised use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment.

C2.2 BILL OF QUANTITIES

SCHEDULE 1 PRELIMINARY AND GENERAL

SCHEDULE 2 STANDBY GENERATOR

SCHEDULE 3 UNINTERRUPTIBLE POWER SUPPLY (UPS)

SCHEDULE 4 OPERATION AND MAINTENANCE (36 MONTHS)

SUMMARY SUMMARY OF SCHEDULE OF QUANTITIES

Item	Payment	Description	Unit	Qty	Rate	Total
1	**PSA 5**	**PRELIMINARY & GENERAL**				
	SABS 1200AA	**GENERAL (SMALL WORKS)**				
1.1	PSA 5.1 8.3	**SCHEDULED FIXED-CHARGE AND VALUE RELATED ITEMS (Max 15% of nett total Tender Amount)**				
1.1.1	8.3.1	Contractual Requirements	sum	1		
	8.3.2	**Provision of Facilities on Site**				
1.1.2	8.3.2.2	a) Facilities required by Contractor:	sum	1		
	8.3.3	**General Responsibilities and Other Fixed Charge Obligations**				
1.1.3	PSAA 8.3.3	a) Complying with Health and Safety Regulations	sum	1		
1.1.4	8.3.4	Removal of Site Establishment	sum	1		
1.2	8,4	**SCHEDULED TIME RELATED ITEMS**				
1.2.1	8.4.1	Contractual Requirements	sum	1		
1.2.2	8.4.3	General Responsibilities and other Time-related Obligations	sum	1		
1.2.3	PSAA 8.4.3	a) Complying with Health and Safety Regulations	sum	1		
1.2.4	PSAA 8.4.4	Insurance of the works inclusive of: Contractors all risks; SASRIA; 3rd part Public Liability; Professional liability	sum	1		
1.2.5		**SUMS STATED PROVISIONALLY**				
1.2.5.1		**Auditing of Compliance by the Contractor to the Health and Safety Regulations** The provisional sum for the appointment of an OSH Auditor on behalf of the LDARD to conduct monthly inspections and to present reports at the monthly meeting. Appiontment to be approved by the Engineer in writting. (Provisional Sum)	PC Sum	1	60 000,00	60 000,00
1.2.5.2		Mark-up on Item 1.2.5.1 (Max 10%)	%	60 000		
Total carried forward to next page						

Total brought forward from previous page						
1.3		**PROFESSIONAL SERVICES**				
1.3.1		Evaluate the electrical installations in the 2 buildings to calculate the required load for the sizing of the Standby Generator, cables and switch gear. The planning report must be inclusive of all the A**ncillary Works** and the **Uninterruptible Power Supply** (UPS) systems. To be approved by the Department before commencement of the designs. To be signed off by an ECSA Approved Competent Person that can take Professional responsibility.	sum	1		
1.3.2		Detailed design of all components for the complete installation of a Standby Generator for the 2 buildings complying with all Standards, Codes and Regulations. The design must include all **Ancillary Works** and provision for the **UPS systems**. To be approved by the Department before commencement of the works. To be signed off by an ECSA Approved Competent Person that can take Professional responsibility.	sum	1		
1.3.3		Issuing of Certificate of Compliance (COC) by an Approved Competent Person for all the electrical works.	sum	1		
1.3.4		As-build drawings indicating all relevant information as installed	sum	1		
1.3.5		Application and approval for the building plans and connecting of the Standby Generator as required by the Local Supply Authority, including of all fees payable.	sum	1		
1.3.6		Detailed design of all components for the complete installation of Uninterrupted Power Supply (UPS) units for the computer servers, telephone (IP) servers and computers in all the individual offices of Agrivillage 1 & 2. To be approved by the Department before commencement of the works.	sum	1		
1.3.7		Compile Operation & Maintenance manuals for all the installed equipment. Supply 3 paper base copies and 1 electronic copy in pdf format.	sum	1		
Total carried forward to summary page						

Item	Payment	Description	Unit	Qty	Rate	Total
2		**STANDBY GENERATOR SET**				
2.1		**GENERATOR**				
2.1.1		Supply, Deliver, Install, Connect to grid supply, Test, Commission and hand over a complete generator set according to the approved design and specifications. The installed circuit breakers at the main DB for the two buildings is 250A and 200A respectively. It is the responsibility of the tenderer to verify the information as on site to ensure that the design of the set is adequate for the required load.	sum	1		
2.1.2		**Technical Information of proposed generator set.** Name of Supplier: _____ Make & Model of Generator Set: _____				
2.1.2.1		**Engine:** Continuous sea level rating after allowing for ancillary equipment in kW: _____ Percentage de-rating for site conditions, in accordance with BS 551.4: _____ Net output on site in kW: _____ Capacity of fuel tank in litres: _____ Is an electric pump for filling the fuel tank included? _____				
Total carried forward to next page						

Total brought forward from previous page						
		Noise level at tail of exhaust pipe in dB: _____				
2.1.2.2		**Alternator:** Sea level rating kVA at 0,8 power factor: _____ De-rating for site conditions: _____ Input required in kW: _____ Efficiency at 0,8 power factor for full load: _____				
2.1.2.3		**Switchboard:** Maker's Name _____ Is manufacture of switchboard/control panel to be sub-let? _____ If yes, state name and address of specialist manufacturer: _____ _____				
2.1.3		**Spare Parts and Maintenance Facilities** Approximate value of spares carried in stock for this particular diesel engine and alternator _____ Where are these spares held in stock _____				
Total carried forward to next page						

Total brought forward from previous page						
		What facilities exist for the servicing of the equipment offered _____ _____ Where are these facilities available _____				
2.2		**CABLE WORK**				
2.2.1		Supply, deliver & install LV PVC/SWA insulated 4 core armoured Cu cables suitably sized. The cable shall include all terminations, glands & shrouds and the connection to DBs and control panels.	sum	1		
2.2.2		Cables mounted against walls must be installed on medium duty galvanised cable ladder. Where crossing the floor, the cable must be protected by steel wiring channels or steel conduits.	sum	1		
2.2.3		Underground cables shall be buried with a minimum cover of 0,8m. The underground installation of cables includes trenching, bedding, warning tape, backfilling and compaction (93% for clay material; 98% for sandy material: Mod ASSHTO) with separate coper earth wire strapped to the cable at 1,5m intervals.	sum	1		
2.2.4		Design, manufacture, supply and install additional required DB's and Control Panels according to the approved design and specifications.	sum	1		
2.2.5	SANS 1200DB 5.9	Reinstate paved surfaces complete with all courses and curbing that intersect a trench.	sum	1		
2.2.6		Repair, replace, supply and install damaged components on the existing electrical installation including faulty and improper connections with written approval of the Engineer. (Provisional Sum)	PC Sum	1	50 000,00	50 000,00
Total carried forward to next page						

Total brought forward from previous page						
2.3		**ANCILLARY WORKS**				
2.3.1	PSC 2.1.1	Remove and grub trees and tree stumps	no	3		
2.3.2	SANS 1200G	Design, supply and construct a concrete (min. Class 30/19) plinth for the Standby Generator inclusive of all activities. (e.g. excavation, compaction, concrete placement, finishing, etc.)	sum	1		
2.3.3	SANS 1200H, SANS 10400-L	Design, supply and construct a brick building to house the standby generator to fit in with the architecture of the two existing buildings, inclusive of all activities (Foundations, walls, concrete floor, concrete aprons, concrete ramp, generator room doors with ventilators, roof structure and roof cladding). Provision for access should be provided for repairs & maintenance of the plant as well as for the re-fuelling.	sum	1		
2.3.4		Take down and reinstate existing fence with written approval of the Engineer. (Provisional)	PC Sum	-		Rate only
2.3.5		Supply and install all Signage as required to comply with OHS regulations, etc. This item is inclusive for all the installations e.g. Stand-by Generator, UPS Units, Distribution Boards (DB), Control Panels, etc.	sum	1		
Total carried forward to summary page						

Item	Payment	Description	Unit	Qty	Rate	Total
3		**UNINTERRUPTIBLE POWER SUPPLY (UPS)**				
3.1		Supply, Deliver Install, Test, Commission and hand over an Uninterruptible Power Supply (UPS) unit/s for the **computer servers and telephone (IP) servers**. The UPS systems must be complete operational units with all ancillary switchgear, cables and batteries. The installations must comply to all applicable regulations, laws and by-laws. The installations must comply with Health & Safety regulation, be secure and aesthetically acceptable.	sum	1		
3,2		Supply, Deliver Install, Test, Commission and hand over an Uninterruptible Power Supply (UPS) unit/s for the individual computers in each of the offices of **Agrivillage 1**. The UPS systems must be complete operational units with all ancillary switchgear, cables and batteries. The installations must comply to all applicable regulations, laws and by-laws. The installations must comply with Health & Safety regulation, be secure and aesthetically acceptable. **This item is provisional and may be reduced by the Employer in writing.**	sum	1		
3.3		Supply, Deliver Install, Test, Commission and hand over an Uninterruptible Power Supply (UPS) unit/s for the individual computers in each of the offices of **Agrivillage 2**. The UPS systems must be complete operational units with all ancillary switchgear, cables and batteries. The installations must comply to all applicable regulations, laws and by-laws. The installations must comply with Health & Safety regulation, be secure and aesthetically acceptable. **This item is provisional and may be reduced by the Employer in writing.**	sum	1		
3.4		Supply, Deliver, Install, Test, Commission and hand over, suitably sized air conditioners for the rooms where the UPS units will be housed with written approval of the Engineer. (Provisional)	No.	3		Rate only
3.5		Install or repair red power sockets inclusive of cabling and switch gear as and where required with written approval of the Engineer. (Provisional Sum)	PC Sum	1	50 000,00	50 000,00
Total carried forward to summary page						

Item		Description	Unit	Qty	Rate	Total
4		**MAINTENANCE OF EQUIPMENT**				
4.1	**Part J**	**MAINTENANCE OF STANDBY GENERATOR**				
4.1.1		**SCHEDULED MAINTENANCE** Manufacturer's recommendations should be followed and supersede recommendations in the basic generic attached list. Before each consecutive interval is performed, all maintenance from the previous intervals must be performed. Details of the services to be provided by the contractor will include, but shall not be limited to, the tasks as detailed in the attached schedule.				
4.1.1.1		Quarterly maintenance schedule executed every 3 months. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.	Service	12		
4.1.1.2		Annual maintenance schedule executed every 12 months. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.	Service	3		
4.1.1.3		Two (2) year maintenance schedule executed in year 2. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.	Service	1		
4.1.1.4		Three (3) year maintenance schedule executed in year 3. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.	Service	1		
4.1.1.5		Replacement spares actual cost. The Contractor shall obtain 3 written quotations from reputable suppliers that are acceptable to the Department.	PC Sum	1	100 000,00	100 000,00
4.1.1.6		Mark-up on item 4.1.1.5	%	100 000		
Total carried forward to next page						

Total brought forward from previous page						
4.2 4.2.1		**SUPPLY AND DELIVERY OF DIESEL** The supply and delivery of diesel will be at actual cost. The Contractor shall obtain 3 written quotations from reputable bulk suppliers that are acceptable to the Department.	PC Sum	1	100 000,00	100 000,00
4.2.2		Mark-up on item 4.2.1	%	100 000		
4.3	**Part K**	**MAINTENANCE OF UNINTERUPTIBLE POWER SUPPLY (UPS) UNITS**				
4.3.1		**SCHEDULED MAINTENANCE** Manufacturers recommendations should be followed and supersede recommendations in the basic generic attached list. Before each consecutive interval is performed, all maintenance from the previous intervals must be performed. Details of the services to be provided by the contractor will include, but shall not be limited to, the tasks as detailed in the attached schedule.				
4.3.1.1		Quarterly maintenance schedule executed every 3 months. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.	Service	12		
4.3.1.2		Semi-annual maintenance schedule executed every 6 months. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.	Service	6		
4.3.1.3		Annual maintenance schedule executed every 12 months. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.	Service	3		
4.3.1.4		Replacement spares actual cost. The Contractor shall obtain 3 written quotations from reputable suppliers that are acceptable to the Department.	PC Sum	1	50 000,00	50 000,00
4.3.1.5		Mark-up on item 4.3.1.4	%	50 000		
Total carried forward to summary page						

Design, Supply, Installation and Maintenance of a Standby Generator and Uninterruptible Power Supply (UPS) Units at Agrivillage 1 & 2

SUMMARY OF SCHEDULE OF QUANTITIES

SCHEDULE	DESCRIPTION	AMOUNT
SCHEDULE 1	PRELIMINARY AND GENERAL	
SCHEDULE 2	STANDBY GENERATOR/S	
SCHEDULE 3	UNINTERUPTIBLE POWER SUPPLY (UPS)	
SCHEDULE 4	OPERATION & MAINTENANCE (36 MONTHS)	
TOTAL SCHEDULE OF QUANTITIES		
Add contingency (10%)		
SUB TOTAL		
ADD 15% VAT		
TOTAL AMOUNT CARRIED TO FORM OF CONTRACT		

PART C3: SCOPE OF WORK

C3.1: STANDARD SPECIFICATIONS

C3.2: PROJECT SPECIFICATIONS

C3.3: PARTICULAR SPECIFICATIONS

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

C3: SCOPE OF WORK

C3.1 STANDARD SPECIFICATIONS

C3.2 PROJECT SPECIFICATIONS

PART A: GENERAL

PS-1 Project Description
PS-2 Description of the Site and Access
PS-3 Details of the Works
PS-4 Construction Programme
PS-5 Site Facilities Available
PS-6 Facilities Required on Site
PS-7 Management and Disposal of Water
PS-8 Rainfall Figures
PS-9 Health and Safety
PS-10 Subcontractors
PS-11 Delay in Completion
PS-12 Supply of Materials
PS-13 Execution of Works
PS-14 Existing Services
PS-15 Spoil and Borrow Material

PART B: AMENDMENTS TO THE STANDARD SPECIFICATIONS

C3.3 PARTICULAR SPECIFICATIONS

In addition to the Standardised and Project Specifications the following Particular Specifications shall apply to this contract and are bound in hereafter.

PART C: ENVIRONMENTAL MANAGEMENT

PART D: OHSA 1993 HEALTH AND SAFETY REQUIREMENTS

PART E: ELECTRICAL WORKS

PART G: BUILDERS WORK

PART I: OPERATION AND MAINTENANCE MANUALS

PART J: MAINTENANCE SCHEDULE FOR STANDBY GENERATORS

PART K: MAINTENANCE SCHEDULE FOR UNINTERRUPTIBLE POWER SUPPLY (UPS)

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

C3.1 STANDARD SPECIFICATIONS

The following standardized specifications for Civil Engineering Construction of the South African Bureau of Standards SABS 1200 shall form part of this contract:

SANS 1200 A	1986	General
SANS 1200 AB	1986	Engineer's Office
SANS 1200 C	1980(amended 1990)	Site clearance
SANS 1200 DA	1988(amended 1990)	Earthworks (Small Works)
SANS 1200 DB	1989	Earthworks (Pipe trenches)
SANS 1200 G	1982	Concrete (Structural)
SANS 1200 H	1990	Structural steelwork
SANS 1200 HC	1988	Corrosion protection of structural steelwork
SANS 1200 LC	1981	Cable Ducts

The following standardised specifications for Construction Works of the South African Bureau of Standards shall form part of this contract

SANS 2001-BE1	2008	Earthworks (general)
SANS 2001-CG1	2007	Installation of Glazing in Window and Door Frames
SANS 2001-CM1	2007	Masonry Walling
SANS 2001-EM1	2007	Cement Plaster
SANS 2001-CT2	2009	Structural timberwork (roofing)

The following SANS specifications are also referred to in this document and the Contractor is advised to obtain them from Standards South Africa (a division of SANS) in Pretoria.

SANS 10396	2003	Implementing Preferential Construction Procurement Policies using Targeted Procurement Procedures
SANS 1914-1 to 6	2002	Targeted Construction Procurement
SANS 1921 – 1 to 6	2004	Construction and Management Requirements for Works Contracts Part 1: General Engineering and Construction Works Part 2: Accommodation of traffic on public roads occupied by the contractor Part 5: Earthworks activities which are to be performed by hand Part 6: HIV/AIDS Awareness

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

PART C3.2 PROJECT SPECIFICATIONS

STATUS

The Project Specification, consisting of two parts, forms an integral part of the contract and supplements the Standard Specifications.

Part A contains a general description of the works, the site and the requirements to be met.

Part B contains variations, amendments and additions to the SABS 1200 Standardized Specifications and, if applicable, the Particular Specifications.

In the event of any discrepancy between a part or parts of the Standardized or Particular Specifications and the Project Specification, the Project Specification shall take precedence. In the event of a discrepancy between the Specifications, (including the Project Specifications) and the drawings and / or the Bill of Quantities, the discrepancy shall be resolved by the Engineer before the execution of the work under the relevant item.

The standard specifications which form part of this contract have been written to cover all phases of work normally required for road contracts, and they may therefore cover items not applicable to this particular contract.

PART A: GENERAL

PS 1 PROJECT DESCRIPTION

This Project is a Design & Construct and Maintenance contract. It covers the Planning, Design, Supply, Installation/Construction, Commissioning and Maintenance of all civil, structural, electrical and mechanical works for a Standby Generator and Uninterruptible power supply (UPS) Units for the offices (Agrivillage 1 & 2) of the Limpopo Department of Agriculture and Rural Development.

PS 2 DESCRIPTION OF THE SITE AND ACCESS

2.1 Location of site

The two Building also Agrivillage 1 and Agrivillage 2 are located at 69 Biccard Street, Polokwane, Limpopo Province. The GPS Co-ordinates at the entrance gate is: 23°54’26.2”S and 29°27’20.3”E

2.2 Access to site

The site is currently a fully operational office with people and vehicles moving around. The site is also fenced with a palisade fence. Some items e.g. the generator may be required to be lifted over the fence with a crane. Accessibility to the site to do the works should be verified by the Contractor during the site briefing cession.

PS 3 DETAILS OF THE WORKS

The Works to be carried out by the Contractor under this Contract comprise mainly of the following:

(Note: This description of the Works is not necessarily complete and shall not limit the work to be carried out by the Contractor under this Contract.)

3.1 Professional Services:

The work to be done shall consist inter alia of the following:

3.1.1 Evaluate the electrical installations in the 2 buildings to calculate the required load for the sizing of the Standby Generator, cables and switch gear. The planning report must be inclusive of all the Ancillary Works and the Uninterruptible Power Supply (UPS) systems. To be approved by the Department before commencement of the designs. To be signed off by an ECSA Approved Competent Person that can take Professional responsibility for the planning of the works.

3.1.2 Detailed design of all components for the complete installation of a Standby Generator for the 2 buildings complying with all Standards, Codes and Regulations. The design must include all Ancillary Works and

provision for the UPS systems. To be approved by the Department before commencement of the works. To be signed off by an ECSA Approved Competent Person that can take Professional responsibility for the designs of the works.

3.1.3 Issuing of Certificate of Compliance (COC) by an Approved Competent Person for all the electrical works.

3.1.4 As-build drawings indicating all relevant information as installed.

3.1.5 Application and approval for the connecting of the Standby Generator as required by the Local Supply Authority, including of all fees payable.

3.1.6 Detailed design of all components for the complete installation of Uninterrupted Power Supply (UPS) units for the computer servers, telephone (IP) servers and computers in all the individual offices of Agrivillage 1 & 2. To be approved by the Department before commencement of the works.

3.1.7 Compile Operation & Maintenance manuals for all the installed equipment. Supply 3 paper base copies and 1 electronic copy in pdf format.

3.2 Standby Generator Set:

The work to be done shall consist inter alia of the following:

3.2.1 Supply, Deliver, Install, Connect to grid supply, Test, Commission and hand over a complete generator set according to the approved design and specifications. The installed circuit breakers at the main DB for the two buildings is 250A and 200A respectively. It is the responsibility of the tenderer to verify the information as on site to ensure that the design of the set is adequate for the required load.

3.2.2 Electrical supply, switch gear with all necessary protection elements.

3.3 Cable Work:

The work to be done shall consist inter alia of the following:

3.3.1 Supply, deliver & install LV PVC/SWA insulated 4 core armoured Cu cables suitably sized. The cable shall include all terminations, glands & shrouds and the connection to DBs and control panels.

3.3.2 Cables mounted against walls must be installed on medium duty galvanised cable ladder. Where crossing the floor, the cable must be protected by steel wiring channels or steel conduits.

3.3.3 Underground cables shall be buried with a minimum cover of 0,8m. The underground installation of cables includes trenching, bedding, warning tape, backfilling and compaction (93% for clay material; 98% for sandy material: Mod ASSHTO) with separate coper earth wire strapped to the cable at 1,5m intervals.

3.3.4 Design, manufacture, supply and install additional required DB's and Control Panels according to the approved design and specifications.

3.3.5 Reinstate paved surfaces complete with all courses and curbing that intersect a trench. All courses must be properly compacted.

3.3.6 Repair, replace, supply and install damaged components on the existing electrical installation including faulty and improper connections with written approval of the Engineer. (Provisional Sum)

3.4 Ancillary works:

The work to be done shall inter alia consist of the following:

3.4.1 Remove and grub trees and tree stumps.

3.4.2 Design, supply and construct a concrete (min. Class 30/19) plinth for the Standby Generator inclusive of all activities. (e.g. excavation, compaction, concrete placement, finishing, etc.)

3.4.3 Design, supply and construct a brick building to house the standby generator to fit in with the architecture of the two existing buildings, inclusive of all activities (Foundations, walls, concrete floor, concrete aprons, concrete ramp, generator room doors with ventilators, roof structure and roof cladding). Provision for access should be provided for repairs & maintenance of the plant as well as for the re-fuelling.

3.4.4 Take down and reinstate existing fence with written approval of the Engineer. (Provisional)

3.4.5 Supply and install all Signage as required to comply with OHS regulations, etc. This item is inclusive for all the installations e.g. Stand-by Generator, UPS Units, Distribution Boards (DB), Control Panels, etc.

3.5 Uninterruptable Power Supply Units (UPS):

The work to be done shall inter alia consist of the following:

3.5.1 Supply, Deliver Install, Test, Commission and hand over an Uninterruptible Power Supply (UPS) unit/s for the **computer servers and telephone (IP) servers**. The UPS systems must be complete operational units with all ancillary switchgear, cables and batteries. The installations must comply to all applicable regulations, laws and by-laws. The installations must comply with Health & Safety regulation, be secure and aesthetically acceptable.

3.5.2 Supply, Deliver Install, Test, Commission and hand over an Uninterruptible Power Supply (UPS) unit/s for the individual computers in each of the offices of **Agrivillage 1**. The UPS systems must be complete operational units with all ancillary switchgear, cables and batteries. The installations must comply to all applicable regulations, laws and by-laws. The installations must comply with Health & Safety regulation, be

secure and aesthetically acceptable. **This item is provisional and may be reduced by the Employer in writing.**

3.5.3 Supply, Deliver Install, Test, Commission and hand over an Uninterruptible Power Supply (UPS) unit/s for the individual computers in each of the offices of **Agrivillage 2**. The UPS systems must be complete operational units with all ancillary switchgear, cables and batteries. The installations must comply to all applicable regulations, laws and by-laws. The installations must comply with Health & Safety regulation, be secure and aesthetically acceptable. **This item is provisional and may be reduced by the Employer in writing.**

3.5.4 Supply, Deliver, Install, Test, Commission and hand over, suitably sized air conditioners for the rooms where the UPS units will be housed with written approval of the Engineer. (Provisional)

3.5.5 Install or repair red power sockets inclusive of cabling and switch gear as and where required with written approval of the Engineer. (Provisional Sum)

3.6 Maintenance of Standby Generator:

The work to be done shall inter alia consist of the following:

3.6.1 Manufacturer's recommendations should be followed and supersede recommendations in the basic generic attached list. Before each consecutive interval is performed, all maintenance from the previous intervals must be performed. Details of the services to be provided by the contractor will include, but shall not be limited to, the tasks as detailed in the attached schedule.

3.6.2 Quarterly maintenance schedule executed every 3 months. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.

3.6.3 Annual maintenance schedule executed every 12 months. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.

3.6.4 Two (2) year maintenance schedule executed in year 2. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.

3.6.5 Three (3) year maintenance schedule executed in year 3. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.

3.6.6 Replacement spares actual cost. The Contractor shall obtain 3 written quotations from reputable suppliers that are acceptable to the Department.

3.6.7 The supply and delivery of diesel will be at actual cost. The Contractor shall obtain 3 written quotations from reputable bulk suppliers that are acceptable to the Department.

3.7 Maintenance of Uninterruptible Power Supply (UPS) Units:

The work to be done shall inter alia consist of the following:

3.7.1 Manufacturer's recommendations should be followed and supersede recommendations in the basic generic attached list. Before each consecutive interval is performed, all maintenance from the previous intervals must be performed. Details of the services to be provided by the contractor will include, but shall not be limited to, the tasks as detailed in the attached schedule.

3.7.2 Semi-annual maintenance schedule executed every 6 months. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.

3.7.3 Annual maintenance schedule executed every 12 months. The rate per service must include all labour, transport and other costs to perform a complete service as describe in the schedules.

3.7.4 Replacement spares actual cost. The Contractor shall obtain 3 written quotations from reputable suppliers that are acceptable to the Department.

3.8 Correction of defects in the Works in accordance with the requirements specified in the Contract Documents.

3.9 Labour recruitment conditions

The Department of Agriculture will assist in the formation of a PSC. The composition of the PSC comprises representation by the Employer, the Engineer and formal structures within the community.

The contractor shall make use of these communication channels, and shall appoint from amongst his site personnel a responsible person to participate in the affairs of the PSC, and this representative may be also required to attend the monthly PSC meetings.

It is mandatory that the Contractor shall interact with the community via proactive project liaison and project participation by its leaders and constituted organisations and forums, as well as through the employment of its people, and these activities shall constitute essential facets of the project.

Local labour is to be used and the employment of such labour is to be done in conjunction with the PSC.

3.10 Construction in confined Areas

It may be necessary for the Contractor to work within confined areas. Except where provided for in the specifications, no additional payment shall be made for work done in restricted areas. In certain places excavation, construction and filling works will have to be performed in a small (± 1,0 m width) working space. The method of construction in these confined areas largely depends on the Contractor's constructional plant.

The Contractor shall note that, unless provided for in terms of the scheduled payment items of the project specifications, measurement and payment shall be in accordance with the specified excavation, construction and filling works, irrespective of the method used for achieving these cross sections and dimensions, and that the tendered rates and amounts shall include full compensation for all special equipment and construction methods and for all difficulties encountered when working in confined areas and narrow widths, and at or around obstructions, and that no extra payment shall be made nor shall any claim for additional payment be considered in such cases.

PS 4 CONSTRUCTION PROGRAMME

PS 4.1 General

The submission of a construction programme as stated per Clause 15 of the General Conditions of Contract is compulsory.

Before any work is to be commenced on the site (within a period as stated in Clause 15.2 of the General Conditions of Contract), the Contractor must submit a detailed project programme for the construction of the Works to the Engineer for his approval.

In preparation of the construction programme the Contractor must liaise with the Engineer and the programme must take into account the coordination of all activities. The programme must consist of a detailed schedule or block diagram covering all aspects of the Works and the planned time thereof must, with the Contract Period as time basis, be shown.

Rainfall conditions will be taken as abnormal when the average rainfall, as shown in Clause PS 8, is exceeded and the contractor must then apply in writing for extension of the contract period using Clause 50(5) of the Special Conditions of Contract.

The Tenderer is required to state in the Appendix to the Form of Tender the time in which he is prepared to undertake and complete the works.

The Contractor shall submit to the Engineer a realistic, detailed programme not later than 14 days after receipt of the Letter of Acceptance. The programme shall be in bar-chart format showing in detail how the Contractor proposes to complete the work covered by this contract by the Due Completion Date.

The following details must be stated:

i. The quantity of work applicable to each bar item as well as the rate at which the work will be completed.

ii. A budget of the value of completed work, month by month, for the full contract period.

iii. The Contractor's plant commitment on the contract for every fortnight.

iv. The critical path.

The programme shall be kept up to date. If a Contractor fails to maintain progress in terms of the programme, he shall produce a revised programme showing the modifications to the original programme necessary to ensure completion of the Works before the Due Completion Date.

The approval of any programme by the Engineer shall have no contractual significance, other than satisfying the Engineer that the Work is carried out according to such programme and that the Contractor undertakes to carry out the work in accordance with the programme. The Engineer will have the right to instruct the Contractor to revise the programme if necessitated by circumstances.

PS 4.2 Time for Completion

The maximum time allowed for the completion of the **WORKS** on the contract is **4-months** (excluding

special non-working days and the year-end break) from the date of Site Handover. The **Operation & Maintenance** of the installations will commence after the completion of the Works and will be for **36 months**

PS 5 SITE FACILITIES AVAILABLE

PS 5.1 Water Supply

The Contractor must make his own arrangements for provision of fresh water on site for domestic and construction purposes. Municipal water is available on site for use by the Contractor. The Contractor must make arrangements with the owner of the Offices with regards to the costs of the water.

The rates tendered for the relevant items in the Preliminary and General Section of the schedule shall include all costs for the establishment and maintenance of water supply to the works and the Contractor shall make his own arrangements for the possible conveyance and storage of water if necessary.

PS 5.2 Power Supply

The Contractor must make his own arrangements for the provision of electricity on site. Municipal electricity is available on site for use by the Contractor. The Contractor must make arrangements with the owner of the Offices with regards to the costs of the electricity

The rates tendered for the relevant items in the Preliminary and General Section of the schedule shall include all costs for the establishment and maintenance of a power supply to the works.

PS 5.3 Excrement Disposal

No water-borne sewage or other off-site excrement disposal systems are available in the vicinity of the Site. The Contractor must make his own arrangements for the provision of sewer / ablution facilities on site.

The rates tendered for the relevant items in the Preliminary and General Section of the schedule shall include all costs for the establishment and maintenance of ablution facilities at the works.

PS 6 FACILITIES REQUIRED ON SITE

PS 6.1 Facilities for the Engineer

If a site office for the Engineer is required, the details of the Engineer's Office are included in the bill of quantities.

PS 6.2 Facilities for the Contractor

Site Establishment

The Contractor is responsible to provide a suitable site for his camp and to provide accommodation for his personnel and labourers. If the Employer can make any specific site available to the Contractor, such site will be pointed out to the Contractor.

The chosen site shall be subject to the approval of the Engineer and the Department of Agriculture. Possible locations for a campsite shall be pointed out at the Site inspection. The Contractor shall conform to all local authority, environmental and industrial regulations.

The Contractor shall make his own arrangements concerning the supply of electrical power and all other services. No direct payment shall be made for the provision of electrical and other services. The cost thereof shall be deemed to be included in the rates and amounts tendered for the various items of work for which these services are required.

The Contractor shall provide security watchmen for the contract as he deems fit at no extra cost for the Employer. The Contractor must ensure that all his employees as well as the employees of his subcontractors are able to identify themselves as members of the construction team.

Ablution and Sanitary Facilities:

The Contractor shall erect and maintain on the site proper ablution facilities. The Contractor shall service and maintain the facilities in a clean and hygienic state for the duration of the contract period and on completion of the works it should be removed from the site.

PS 6.3 Construction Notice Board (Name Board)

No Official Name Board, as per C4.2 Site Information: Construction Notice Board, are required for this contract.

PS 7 MANAGEMENT AND DISPOSAL OF WATER

The Contractor shall pay special attention to the management and disposal of water and stormwater on the site. It is essential that all completed works or parts thereof are kept dry and properly drained. Claims for delay and for repair of damage caused to the works as a result of the Contractor's failure to properly manage rain and surface water, will not be considered.

PS 8 RAINFALL FIGURES

The following figures are applicable for Clause 50(5) of the Special Conditions of Contract.

INFORMATION SOURCE: National Weather Bureau
Pretoria, Tel.: (012) 309 3911
RAINFALL STATION: Polokwane
PERIOD: 1990-2009

Rainfall station: Polokwane					
Rainfall station:					
Period:					
Month	**N_n**	**R_n**	**Month**	**N_n**	**R_n**
January			July		
February			August		
March			September		
April			October		
May			November		
June			December		
Annual average:					

Nn = Average amount of days on which a rainfall of 10 mm or more has been recorded.
Rn = Average monthly rainfall in mm

Extensions of time in respect of Clause 5.12 in the General Conditions of Contract for Construction Works (2010) in respect of abnormal rainfall shall be calculated using the following formula for each calendar month or part thereof:

$$V = (Nw - Nn) + \frac{(Rw - Rn)}{X}$$

Where:
V = Extension of time in calendar days in respect of the calendar month under consideration.
Nw = Actual number of days during the calendar month on which a rainfall of 10 mm or more has been recorded.
Nn = Average number of days in the relevant calendar month , as derived from existing rainfall records, on which a rainfall of 10mm or more has been recorded for the calendar month.
Rw = Actual average rainfall in mm recorded for the calendar month under consideration.
Rn = Average rainfall in mm for the calendar month as derived from existing rainfall records as stated in the Site Information.
X = 20mm

For purposes of the Contract Nn, Rn and Nn shall have those values assigned to them in the table above based on figures from the WRC report 1994.

If V is negative and its absolute value exceeds Nn, then V shall be taken as equal to minus Nn.

The total extension of time shall be the algebraic sum of all monthly totals for the period under consideration, but if the total is negative the time for completion shall not be reduced due to subnormal rainfall. Extensions of time for part of a month shall be calculated using pro rata values of Nn and Rn.

This formula does not take account flood damage which could cause further or concurrent delays and will be treated separately as far as extension of time is concerned.

The factor (Nw – Nn) shall be considered to represent a fair allowance for variations from the average in

the number of days during which rainfall exceeds 10 mm. The factor (Rw-Rn) shall be considered to represent a fair allowance for variations from the average in the number of days during which the rainfall did not exceed 10 mm but wet conditions prevented or disrupted work.

For the purpose of applying the formula, accurate rain gauging shall be taken at a suitable point on the Site and the Contractor shall at his own expense, take all necessary precautions to ensure that rain gauges cannot be interfered with by unauthorized persons.

PS 9 HEALTH AND SAFETY

PS 9.1 General statement

It is a requirement of this contract that the Contractor shall provide a safe and healthy working environment and to direct all his activities in such a manner that his employees and any other persons, who may be directly affected by his activities, are not exposed to hazards to their health and safety. To this end the Contractor shall assume full responsibility to conform to all the provisions of the Occupational Health and Safety Act (OHSA) No 85 and Amendment Act No 181 of 1993, and the OHSA 1993 Construction Regulations 2003 issued on 18 July 2003 by the Department of Labour.

For the purpose of this contract the Contractor is required to confirm his status as mandatory and employer in his own right for the execution of the contract by entering into an agreement with the Employer in terms of the Occupational Health and Safety Act in the form as included in section C1.4

PS 9.2 Health and Safety Specifications and Plans

(a) Employer's Health and Safety Specification

The Employer's Health and Safety Specification is included in Section C3.3, Part D of the tender documents as part of the Particular Specifications.

(b) Tenderer's Health and Safety Plan

The Tenderer shall submit with the tender his own documented Health and Safety Plan he proposes to be implement for the execution of the work under the contract. The Health and Safety Plan must at least cover the following:

(i) a proper risk assessment of the works, risk items, work methods and procedures in terms of Regulations 7 to 28;
(ii) pro-active identification of potential hazards and unsafe working conditions;
(iii) provision of a safe working environment and equipment;
(iv) statements of methods to ensure the health and safety of subcontractors, employees and visitors to the site, including safety training in hazards and risk areas (*Regulation 5)*;
(v) monitoring health and safety on the site of works on a regular basis, and keeping of records and registers as provided for in the Construction Regulations;
(vi) details of the Construction Supervisor, the Construction Safety Officers and other competent persons he intends to appoint for the construction works in terms of Regulation 6 and other applicable regulations; and
(vii) details of methods to ensure that his Health and Safety Plan is carried out effectively in accordance with the Construction Regulations 2003.

The Contractor's Health and Safety Plan will be subject to approval by the Employer, or amendment if necessary, before commencement of construction work. The Contractor will not be allowed to commence work, or his work will be suspended if he had already commenced work, before he has obtained the Employer's written approval of his Health and Safety Plan.

Time lost due to delayed commencement or suspension of the work as a result of the Contractor's failure to obtain approval for his safety plan, shall not be used as a reason to claim for extension of time or standing time and related costs

PS 9.3 Cost of compliance with the OHSA Construction Regulations

The rates and prices tendered by the Contractor shall be deemed to include all costs for conforming to the requirements of the Act, the Construction Regulations and the Employer's Health and Safety Specification as applicable to this contract.

Should the Contractor fail to comply with the provisions of the Construction Regulations, he will be liable for penalties as provided in the Construction Regulations and in the Employer's Health and Safety Specification.

PS 10 SUBCONTRACTORS

All matters pertaining to subcontractors (including Nominated Subcontractors) and the work executed by them shall be dealt with directly between the Engineer and the Contractor in the context of all subcontract work being an integral part of the Works for which the Contractor is responsible.

The Engineer will not liaise directly with any subcontractors nor will he issue instructions concerning the subcontract works directly to any subcontractor.

All matters arising from the subcontract agreements shall be dealt with directly between the Contractor and the subcontractors and the Engineer will not become involved.

The Employer shall have the right to cede any sub-contract under this contract to a pre-approved subcontractor, in accordance with the provisions of Clause 4.4 of the General Conditions of Contract.

PS 11 DELAY IN COMPLETION

The Contractor shall organise the Works in such a manner that no delays occur. Delay due to faulty organisation or lack or shortage of materials or labour or co-operation with other parties or to any other cause within the control of the Contractor will not be countenanced and full power is reserved by the Engineer to order the Contractor to expedite the work should the work, in the opinion of the Engineer, not progress in a satisfactory way.

PS 12 SUPPLY OF MATERIALS

All material to be used in the Works is to be supplied by the Contractor.

The Contractor shall ensure that the work is not delayed due to the lack of materials on Site, by placing orders for material required under this Contract as soon as possible. No extension of time will be allowed for any delay due to the supply of materials.

Although the quantities have been carefully calculated, it must be considered as approximate only and the Contractor, before ordering any materials, should check the quantities required. The bill of quantities is provisional.

PS 13 EXECUTION OF THE WORKS

PS 13.1 Inspection by the Engineer

No portion of the work shall be proceeded with until the Engineer or his representative has examined and approved the previous stage. If any work is covered or hidden from view before the Engineer or his representative has inspected the work, the Contractor shall at his own cost expose the covered or hidden work for inspection. The Contractor shall also be responsible for making good any work damaged during the uncovering.

PS 13.2 Workmanship and Quality Control

The onus to produce work that conforms in quality and accuracy of detail to the requirements of the Specifications and Drawings rests with the Contractor, and the Contractor shall, at his own expense, institute a quality control system and provide suitably qualified and experienced engineers, foremen, surveyors, materials technicians, other technicians and technical staff, together with all transport, instruments and equipment to ensure adequate supervision and positive control of the Works at all times.

The cost of supervision and process control, including testing carried out by the Contractor, will be deemed to be included in the rates tendered for the related items of work.

The Contractor's attention is drawn to the provisions of the various Standardized Specifications regarding the minimum frequency of testing required. The Contractor shall, at his own discretion, increase this frequency where necessary to ensure adequate control.

On completion and submission of every part of the work to the Engineer for examination and measurement, the Contractor shall furnish the Engineer with the results of the relevant tests, measurements and levels to demonstrate the achievement of compliance with the Specifications.

PS 13.3 Certificate of Completion

When all the work under the Contract have been completed to the entire satisfaction of the Engineer, he will issue a certificate of completion to the Contractor informing the Contractor of the date the date at which the works are deemed to be completed and accepted by the Employer.

The sureties provided by the Contractor for the fulfilment and completion of the Contract in terms of the Form of Agreement will be released upon the issue of the Certificate of Completion.

PS 14 EXISTING SERVICES

The Contractor shall make himself acquainted with the position of all existing services before any excavation / clearing or other work likely to affect the existing services is commenced.

The Contractor will be held responsible for any damage to known existing services caused by or arising out of his operations and any damage shall be made good at his own expense. Damage to unknown services shall be repaired as soon as possible and liability shall be determined on site when such damage should occur.

A provisional amount is included in the bill of quantities for the protection and/or shifting of services.

Two weeks prior to commencing construction activities in a particular area, the Contractor shall also diligently enquire of local landowners as to whether there are any other known services which have not been shown on the drawings but which may be affected by the construction activities in that area, and any such services shall be brought to the attention of the Engineer immediately. The contractor shall make provision in his programme for the location and/or shifting of services.

PS 15 SPOIL AND BORROW MATERIAL

No indiscriminate spoiling of material will be allowed. All unsuitable or surplus material shall be spoiled at sites to be indicated by the Engineer. Should it be necessary for importation of materials from a designated borrow area, it will be the responsibility of the contractor in liaising with the relevant landowners for approval of access and obtaining of material.

PART B: AMENDMENTS TO THE STANDARD SPECIFICATIONS

In certain clauses in the standard, standardised and particular specifications, allowance is made for a choice to be specified in the project specifications between alternative materials or methods of construction, and for additional requirements to be specified to suit a particular contract. Details of such alternative or additional requirements applicable to this contract are contained in this part of the project specifications. It also contains the necessary additional specifications required for this particular contract.

The number of each clause and each payment item in this part of the project specifications consists of the prefix B followed by a number corresponding to the relevant clause or payment item in the standard specification.

The number of a new clause or payment item, which does not form part of a clause or a payment item in the standard specifications and which is included here, is also prefixed by B, but followed by a new number which follows on the last clause or item number used in the relevant section of the standard specifications.

PSA **SANS 1200 A: GENERAL**

PSA 1 **MATERIALS**

PSA 1.1 **Quality of Materials (Sub-Clause 3.1)**
Add the following:
All materials used in this Contract shall bear the official SANS mark where applicable. All materials shall be new and of the best quality available unless otherwise specified.

Storage of construction material shall comply with the set specification to the satisfaction of the Engineer.

PSA 2 **CONSTRUCTION (Clause 5)**

PSA 2.1 **Dealing with Water on Works (Sub-Clause 5.5)**
Add the following:
No separate or additional payment will be made keeping the Works dry nor for shoring and/or additional excavations and backfilling required as a result of trench walls and cutting sides collapsing. It will be assumed that the cost of these items is priced and included in the relevant Pay Items.

PSA 4 **OCCUPATIONAL HEALTH AND SAFETY (Sub-Clause 5.7)**
Replace the contents of this sub-clause with the following:

The safe conduct of the Works shall be a primary consideration and the entire Works shall be carried out in conformity with all the applicable statutory regulations and requirements and Tenders must price their tenders accordingly.

The Works must be executed in terms of the Occupational Health and Safety Act, 1993 (Act no. 85 of 1993, as amended), and the specific regulations made in terms of this Act.

In particular, the following Regulations will apply:
a) Construction Regulations, 2003. (18 July 2003).
b) General Administrative Regulations, 2003. (25 June 2003).

The Construction Regulations ensure that:
- Hazards and potential hazards to a healthy working environment are identified.
- These hazards are removed or reduced.
- Employees are trained to work safely in potential hazardous conditions.

The regulations ensure that not only the Contractor but also the Client has a responsibility to provide a safe and healthy working environment for all employees.

The contractor has to give notice in writing to the Provincial Director of the construction works in terms of clauses 3(1)(a)(ii), 3(1)(b)(i) and 3(1)(b)(ii) of the Construction Regulations, before starting with construction.

The Contractor's attention is also drawn to the following specific provisions in the Construction Regulations:

a) Based on the Client's Health and Safety Specifications, the Contractor has to prepare and submit a suitable and sufficient documented health and safety plan, which shall be applied from the date of commencement to the end of the contract. The works may only commence once the health and safety plan is approved by the Client.

b) The contractor shall appoint a full-time, competent employee designated in writing as the construction supervisor.

c) The contractor shall, before the commencement of construction work, and during construction work, cause a risk assessment to be performed by a competent person, which shall form part of the Health and Safety Plan.

d) Every employee shall receive Health and Safety induction training by a competent person of the Contractor, prior to the commencing of the construction work.

The Contractors health and safety plan should be based on the following principles:

- A proper risk assessment of the construction work.
- Pro-active identification of potential hazards and risk areas.
- Informing and/or training of employees in hazards and risk areas.
- Provision of a safe working environment and safety equipment.
- Ensure the safety of his Contractors through their safety plans.
- Monitoring the health and safety on the construction works on a regular basis.
- Use competent safety officers.

The Contractor's health and safety plan should cover the following details, where applicable: (with reference to clauses of the Construction Regulations)

Clause 5: Principal Contractor and Contractors

- Methods to ensure the approval, implementation and maintenance of all health and safety aspects regarding his Contractors.

Clause 6: Supervision of construction work.

- Details of the construction supervisor as well as his appointed assistants.
- Details of the construction safety officer. (Full-time or part-time).
- Details of the suitability and competency of the above persons regarding the health and safety aspects of the construction works.

Clause 7: Risk assessment

- Details of a proper risk assessment on which his health and safety plan is based.
- Ways, in which all construction employees are informed, instructed and trained regarding hazards and the related work procedures.

Clause 8 to 28: Risk items to be addressed

- The Principle Contractor health and safety plan should contain details of the design, management, responsibilities, worker training, work methods, procedures, maintenance or any other requirements necessary for him and his Contractor to work safely and in a healthy environment as stipulated in these clauses.

Copies of the Act and Regulations are available on the Department of Labour website, www.labour.gov.za.

The Construction Regulations prescribes specific actions by the Principal Contractor and his sub-Contractors, which will have an influence on the cost and duration of the Works. The Contractor must provide in his Tender for the expenditure and time implications related to the management of the Construction Regulations.

PSA 5 MEASUREMENT AND PAYMENT

PSA 5.1 Fixed charge and Value Related Items (Sub-clause 8.2.1)
Replace the sub-clause with the following:

Payment shall be a lump sum to provide for the Contractor's expenses in connection with:

(a) setting up and maintaining his organisation, camps and plant on the site;

(b) effecting the insurances and indemnities required in terms of the General Conditions of Contract

(c) meeting all other general obligations and liabilities which are not specifically measured for payment in these contract documents.

The lump sum total of Fixed Charge Items, Value Related Items and Time Related Items shall not exceed 15% of the nett total Tender Amount. If the Tenderer should tender a higher amount for this item it shall be reduced to the amount allowed above and all other tendered prices increased in the proportion required to retain the same Nett Total Tender Amount.

The tendered lump sum shall not be subject to any variation if the actual value of work done under the Contract exceeds, or falls short of, the Tender Amount, or as a result of an extension of time for completion in terms of Clause 46 of the General Conditions of Contract.

Any payment made under this item shall not be taken into account when determining whether the value of a certificate complies with the "minimum amount of monthly certificate" laid down in the Appendix.

Before any payment is made under this item the Contractor shall satisfy the Engineer that he has provided on site an establishment and plant of good quality and in value exceeding that of the first instalment. The Contractor may be asked to furnish documented proof that he owns the offices and plant on site, the value of which should exceed the amount claimed in the first certificate. In the event that the Contractor cannot satisfy the Engineer as to the value or ownership, the Engineer shall have the right to withhold part of any payments to be made under this item, until the Works have been completed.

Payment of the lump sum shall be made in three separate instalments as follows:

(a) The first instalment, 50% of the lump sum, will be paid in the first payment certificate after the Contractor has met all his obligations under this sub-clause and has made a substantial start on construction in accordance with the approved programme.

(b) The second instalment, 35% of the lump sum, will be paid when the value of the work done reaches one half of the Nett Total Tender Amount.

(c) The third and final instalment, 15% of the lump sum, will be paid when the works have been completed and the Contractor has fulfilled all requirements of this sub-clause. No payment for the scheduled Fixed Charge Items for this contract will be made until the requirements regarding and the erection of name boards have been met.

PSA 5.2 Occupational Health and Safety

Item:
"Provision for the cost related to the Occupational Health and Safety Act, 85 of 1993, and the relevant Regulations:

a) Contractor's initial obligations in respect of the Occupational Health and Safety Act and Construction Regulations Unit: Sum

b) Contractor's time related obligations in respect of the Occupational Health and Safety Act and Construction Regulations Unit: Sum
c) Submission of the Health and Safety File Unit: Sum
d) Protection of pedestrians at excavations Unit: Sum

The tendered sum shall include full compensation for providing the above services as required from the Occupational Health & Safety Act. The rate shall include all related costs incurred by the Act, remuneration of personnel, trainers, etc. and equipment required for the execution of the required

services as depicted by the Act. The tendered amount for items a, b, c and d shall only be paid on the successful completion of the task as approved by the client. The tendered amount for item b shall be paid on a monthly basis.

PSC SANS 1200 C: SITE CLEARANCE

PSC 1 SCOPE OF WORKS

This specification covers all clearing of the works.

PSC 2 MEASUREMENT AND PAYMENT

PSC 2.1 Basic Principles

PSC 2.1.1 Clearing and Grubbing (Sub-clause 8.1.1 & 8.2.3)

Add the following sub-clause:

The tendered unit prices for Items 2.3.1, 2.3.2, 2.3.3 and 2.3.4 shall include all the costs for the following actions:

a) Move and stockpile material obtained from clearing and grubbing to one positions inside the cleared site, away from any combustible material or infrastructure and dispose to a suitable site;

b) The rate shall include the removal and disposal of all trees irrespectively of the girth of the trees.

PSG SANS 1200 G: CONCRETE (STRUCTURAL)

PSG 1. SCOPE OF WORKS

This specification covers the construction of the concrete plinth for the Standby Generator.

PSG 2. MATERIAL

PSG 2.1 Use of Plums

The use of plums will not be permitted

PSG 2. CONSTRUCTION

PSG 2.1 Fixing (5.1.2)

Fixing of reinforcement bars by welding and heating of bars will not be permitted.

PSG 2.2 Cover (Sub-clause 5.1.3)

Add the following sub clause:

The strength of concrete cover blocks shall at least be equal to the strength of the structural element in which they are used. The size and fixing method of cover blocks shall be discussed in advanced with the engineer.

PSG 2.3 Finish of concrete surfaces (Sub-clause 5.2.1)

Add the following to the sub-clause:

Concrete surfaces which will be in contact with the natural ground or which will otherwise be covered on completion of the works, shall have a rough finish as specified in subclause 5.2.1 (a).

Horizontal surfaces and surfaces with a slope not exceeding one vertical to two horizontal shall be finished to a wood float finish. For this finish the surface must be given a finish as specified in sub-clause 5.5.10.1 and after the concrete has hardened sufficiently, it shall be floated to a uniform surface free of trowel marks.

The finished surface shall be accurate to degree 1 as defined in sub-clause 6.2.

The visible vertical or near vertical surfaces of valve chambers, and culvert head walls or parapets shall be finished to a smooth surface, repaired and rubbed to remove projections.

The bagging of concrete surfaces to repair defects will not be permitted.

All concrete edges shall be provided with 25 mm x 25 mm chamfers.

PSG 2.4 Exposure conditions (Subclause 5.1.3 and 5.5.1.5)
Add the following to the sub-clauses:
The exposure conditions for all structures in the works shall be deemed to be "severe" if not mentioned otherwise.

PSG 2.5 Strength concrete (Sub-clause 5.5.1.7)
Add the following sub-clause:
The concrete strength for various members:
Beams: 30MPa
Slabs: 30MPa

Coarse aggregate shall be 19mm stone

PSG 2.6 Mixing at construction site (5.5.3.1)
Add the following sub-clause:
Site mixing must be approved by the engineer

PSG 2.7 Curing and Protection (5.5.8)
Add the following sub-clause:
Concrete to be cured for 28 days by an approved method

PSG 2.8 Classification of finishes
Formwork for formed concrete surfaces against which backfill will be placed, shall be rough. Formwork for all other formed surfaces shall be smoothed, except where otherwise specified.

PSG 3. CEMENT
PSG 3.1. Applicable Specifications
Replace Sub Clause 3.2.1 with the following:

"Subject to the provisions of 3.2.2 cement and cement extenders shall conform to the following standards:

.....Common Cement:..... SANS 50197-1 (EN 197-1)
.....Cement Extenders:..... SANS 1491, Part 1 – Ground granulated
.... Blastfurnace slag
.... SANS 1491, Part 2 – Fly ash
.... SANS 1491, Part 3 – Condensed Silica fume

The compressive strength requirements for reinforced concrete is strength class 42,5N or higher. Types of cement 70% CEM 1 + 30% FA (Fly Ash), or CEM 11 B-V or B-W, provided that fly ash content is more than 30%. The portion of Blastfurnace slag is limited to 20%. The concrete mix design shall be done by the Cement & Concrete Institute or other approved independent laboratory".

PSG 3.2. Applicable Specifications
Replace Sub Clause 3.2.2 with the following:
Cement, which is stored on the Site, shall be kept under a cover that provides adequate protection against moisture and other factors that may aggravate deterioration.

Where the cement is supplied in bags, the bags shall be closely and neatly stacked to a height not exceeding 12 bags, and they shall be so arranged that they can be used in the order in which they were delivered to the Site. Different brands and/or types of the same brand shall be stored separately.

The storage of cement in bulk in silos or similar containers shall be permitted, provided that the cement drawn for use is measured by mass and not by volume.

Cement shall not be kept in storage for longer than 6 weeks from the date of manufacture without the Engineer's permission.

The Engineer may order the removal of cement, which is older than 6 weeks, from the Site or the alteration of the design mix if he does allow its use. Alternatively, he may allow the cement to be used in concrete of less critical importance, as in blinding layers.

PSG 4. TOLERANCES

PSG 4.1. General

Degree of Accuracy II shall apply to all concrete in the works, except where otherwise indicated in the Bill of quantities, Specifications and Drawings.

PSG5. TESTS

Frequency of Sampling (7.1.2)

Adjust 7.1.2.1 according to the following:

28 day concrete test cube results from an independent laboratory must be forwarded to the engineer for all concrete work. A minimum of 4 test cubes must be made of each cast. No concrete work will be certified without concrete compressive test results.

PSG 6. MEASUREMENT AND PAYMENT RATES

PSG 6.1. Add to Sub Clause 8.3 SCHEDULED REINFORCEMENT ITEMS

Notwithstanding the method of measuring and payment for reinforcement specified in sub-clause 8.1.2.2 and 8.1.2.3, reinforcement will be measured and paid for as scheduled.

PSH <u>SANS 1200 H : STRUCTURAL STEELWORK</u>

Surface Preparation:

Include a subclause as follows:

The edges of all rolled sections shall be true fair and full to profile throughout.

The whole bolted contact surface shall be in close contact.

Contact surfaces shall be clean and free from burrs, millscale, rust, grease, paint or other irregularities.

PSH2 MATERIALS

PSH2.1 Structural Steel (3.1)

Add to Subclause 3.1

All rolled steel, including plates and bolts, shall regarding quality, method of manufacture, fabrication and workmanship, conform to the latest requirements of SANS0162 Grade300WA.

Welding Specification (1.3.1.3)

All welding shall comply with the latest requirements of SANS455

The length and size of all welds shall be in accordance with the drawings or as specified by the engineer. Only skilled operators shall be employed and weld test samples shall be submitted on request.

All welding surfaces shall be clean and free from rust, scale, paint or foreign materials. Fusion faces shall be ground smooth before welding.

The welding method shall prevent distortion of the weld or parent section.

All welds shall have adequate root fusion. Welds shall be free from cracks, cavities or irregularities. Undercutting shall be filled by weld runs. Any completed weld with defects shall be removed and repaired at the contractor's expense.

Weld sizes indicated on the drawings are the net sizes required after grinding.

Corrosion Protection (1.3.3.1)

Steel surfaces are to be cleaned in accordance with SANS code of practice 064 to remove all rust, scale, grease, oil, etc. endeavouring to bring the surface to a bright metallic condition. Steel to be shot-blasted if required.

All paints to be applied according to manufacturer's specifications.

Steel must be primed with a single pack water based acrylic etch primer. Primer dry film thickness (DFT) to be minimum 40 microns. Two final enamel coats of different colours must be applied;

Paint Layer	*Colour and code*	*DFT*
Enamel Undercoat	G62 – Pale Grey	30 Microns
Enamel Topcoat	G35 – Navy Light Grey	30 Microns

Surfaces in contact with the ground must be painted with two layers approved cold bitumastic paint.

Galvanized steel members to be hot dipped galvanized – heavy duty according to SANS 121 (ISO:1461:1999).

PSH 2.2 Materials (3.1.1)

Include the following subclause:

The material shall be of the best quality throughout, free from rust or millscale, true to thickness and profile throughout and of the section weight specified subject to a 2.5% tolerance for rolling margin.

The engineer shall at all reasonable times have free access to inspect the works where steel is being fabricated or to the material suppliers.

PSH 3 CONSTRUCTION

PSH3.1 Holes for fasteners (5.2.4)

Include the following subclauses:

Holes must be drilled to template. Burrs and arrisses shall be removed before assembly.

PSH3.2 Bolting (5.3.5)

Include the following subclauses:

All bolts shall comply with the latest requirements of SANS 135 and SANS 1282, Grade 4.8.
Bolts shall have well-formed heads forged from the solid. Nuts shall closely fit the bolts to be turned by hand.

PSH3.3 BOLTING (5.3.5.2)

Adjust 5.3.5.2 according to the following:

All bolts shall have at least one washer under the nut and shall be so tightened that the threaded portion does not bear on the members connected. Where bolt heads or nuts bear upon bevelled surfaces, 5mm tapered washers shall be provided.

C3.3 PARTICULAR SPECIFICATIONS

In addition to the Standardised and Project Specifications the following Particular Specifications shall apply to this contract and are bound in hereafter.

PART C ENVIRONMENTAL MANAGEMENT SPECIFICATION

PART D OHSA 1993 HEALTH & SAFETY SPECIFICATION

PART E ELECTRICAL WORKS

PART G BUILDERS WORK

PART I OPERATION AND MAINTENANCE MANUALS

PART J MAINTENANCE SCHEDULE FOR STANDBY GENERATORS

PART K MAINTENANCE SCHEDULE FOR UNINTERRUPTIBLE POWER SUPPLY (UPS)

PART C: ENVIRONMENTAL MANAGEMENT SPECIFICATION

C.1 General

In order to ensure that the construction works is carried out in an environmentally sensitive matter, strict compliance to the Environmental Management Plan (EMP) guidelines is required. The purpose of the EMP is to:

- Encourage good management practices through planning and commitment to environmental issues,
- Provide rational and practical environmental guidelines to:
  - i. Minimise disturbance of the natural environment,
  - ii. Prevent pollution of land, air and water,
  - iii. Prevent soil erosion and facilitate re-vegetation.
- Adopt the best practicable means available to prevent or minimise adverse environmental impact,
- Develop waste management practices based on prevention, minimisation, recycling, treatment or disposal of wastes,
- Train employees and contractors with regard to environmental obligations.

C.2 Training and Induction of Employees

- The Contractor has a responsibility to ensure that all those people involved in the project are aware of and familiar with the environmental requirements for the project (this includes sub-contractors, casual labour, etc.). The EMP shall be part of the terms of reference for all contractors, sub-contractors and suppliers.

C.3 Complaints Register and Environmental Incident Book

Any complaints received by the project team from the public will be recorded. The complaint should be brought to the attention of the site manager, who will respond.
The following information must be recorded:

- Time, date and nature of the complaint,
- Type of communication (telephone, letter etc),
- Name, contact address and telephone number of the complainant,
- Response and investigation undertaken and
- Actions taken and by whom.

All complaints received will be investigated and a response given to the complainant within 14 days.
All environmental incidents occurring on the site will be recorded. The following information will be provided:

- Time, date, location and nature of the incident,
- Actions taken and by whom.

C.4 Site Cleanliness and Neatness

- Location of a construction camp is to be approved by the Engineer and is to be restored to its previous condition after completion of construction.
- The construction camp should preferably be fenced with a 1.8m high fence.
- All materials, equipment, plant and vehicles must be stored within the construction camp.
- A dedicated area must be made available for construction staff to change and store their personal belongings.

C.5 Access

- Access to existing roads, schools, buildings, shops and residential properties must not be impeded during construction.
- Access roads utilised by the Contractor must be maintained in good condition.

C.6 Borrow Pits

- Mining authorisations (permits) for borrow pits must be obtained from the Department of Minerals and Energy (DME) in consultation with the Department of Water Affairs and Forestry (DWAF).
- Spoil dumps resulting from borrow pits must not interfere with any natural surface drainage.
- Borrow pits must be rehabilitated after use in accordance with the requirements of DME and DWA.

C.7 Dust Control / Air Quality

- Dust suppression measures must be implemented during construction by ensuring that all surfaces prone to dust generation are kept damp (e.g. use of water tanker).
- Ensure that vehicles and equipment are in good working conditions and that emissions are not excessive.
-
- Ensure that vehicles and equipment are in good working conditions and that emissions are not excessive.
- Special care must be taken in areas where the route passes close to schools and residential areas.
- The speed of construction vehicles must be reduced.

C.8 Fauna

- Contractor staff may not chase, catch or kill animals encountered during construction.

C.9 Fire Prevention and Control

- Smoking is prohibited in the vicinity of flammable substances.
- The contractor must ensure that fire-fighting equipment is available on site, particularly where flammable substances are being stored or used, and that construction staff are aware of where it is kept and how it is operated.
- Fires started for comfort (warmth) are prohibited, due to the risk of veld fires and risk to adjacent property owner's lands.

C.10 Grave Sites

- Gravesites in close proximity to the road must not be disturbed during construction.

C.11 Materials Handling and Spills Management

- Any hazardous materials to be used during construction (e.g. lime, fuel, paint, etc) are to be stored in a designated area at the campsite.
- The storage containers/facilities (including any diesel/petrol tanks) must be placed on an impermeable surface and surrounded by a bund wall, in order to ensure that accidental spillage does not pollute the environment.
- Workers must at all times be made aware of the health and safety risks associated with any hazardous substances used (e.g. smoking near fuel tanks), and must be provided with appropriate protective clothing/equipment in case of spillages or accidents.
- Ensure all staff and contractors undergo relevant training in the maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants and other chemicals.
- Any spill of potentially hazardous materials must be cleaned up immediately (Potentially hazardous materials on site include paint, oil, grease, fuel, turpentine, etc).
- The area of contaminated soil or spill must be deposited into the hazardous waste container(s).
- The contractor should keep Peat Sorb or a similar absorbent on site to clean up any spills. The absorbent must be stored in a designated area and be available for inspection.
- All spills are to be recorded in the environmental incident book.

C.12 Noise

- Noise generating activities must be restricted to between 07h00 and 17h00 Monday to Friday, unless otherwise approved by the appropriate competent person in consultation with adjacent landowners/affected persons.
- All equipment, vehicles and machinery must be in good working condition and be equipped with sound mufflers if necessary.
- Construction staff must be trained and made aware of not creating unnecessary noise such as hooting and shouting.

C.13 Pollution Control

- Soil and water pollution through usage of fuel, oil, paint, bitumen or other hazardous substances must be avoided.
- All construction vehicles are to be maintained in good working order so as to prevent soil or water pollution from oil, fuel or other leaks, and to reduce noise pollution.

C.14 Rivers and Streams

- During construction of bridge structures, there must be no obstruction of the water flow of rivers and streams.
- Excavated material must not be stockpiled on or near riverbanks, in order to prevent sedimentation occurring.
- Erosion control measures must be employed both during and after construction.
- No impediments to natural surface water flow, other than approved erosion control measures, must occur.

C.15 Safety

- Safety measures, such as detour signs, must be implemented during construction to ensure the safety of workers, pedestrians and drivers/passengers in vehicles in the vicinity of construction work.
- Special care must be taken in the vicinity of schools to ensure the safety of children wishing to cross the road under construction.
- The relevant signage (e.g. speed control signs) must be erected alongside the road during the operation phase in order to control traffic.
- Accommodation must be made for pedestrian pathways alongside the road during the construction and operation phases.

C.16 Soil Management

- Stormwater drainage pipes must be installed alongside the road in all areas susceptible to soil erosion.
- Erosion should be minimised by the construction of meadow drains and the planting of indigenous vegetation on the side slopes and drains to reduce flow velocity of stormwater.
- Spoil from cuts may be used in existing erosion galleys.
- Stone pitching and gabions should be constructed at pipe culvert outlets.
- Accidental spills of contaminants onto the ground e.g. oil, concrete, fuel and chemicals should be removed together with the contaminated soil.
- If necessary an absorbent such as Peat Sorb should be used the aid in cleaning up the spill. The contaminated soil should be disposed of in an appropriate container, depending on its classification.
- Servicing and re-fuelling of vehicles must only be carried out at construction camp.

C.17 Worker Conduct

Code of Conduct for Construction Personnel:

- Do not leave the construction site untidy and strewn with rubbish which will attract animal pests.
- Do not set fires.
- Do not cause any unnecessary, disturbing noise at the construction camp/site or at any designated worker collection/drop off points.
- Do not drive a construction-related vehicle under the influence of alcohol.
- Do not exceed the national speed limits on public roads or exceed the recommended speed limits on the site.
- Do not drive a vehicle which is generating excessive noise or gaseous pollution (noisy vehicles must be reported and repaired as soon as possible).
- Do not litter along the roadsides, including both the public and private roads.
- Do not pollute any water bodies (whether flowing or not).
- No member of the construction team is allowed to enter the areas outside the construction site.

C.18 Traffic Disturbances and Diversions

- Any traffic diversions must be undertaken with the approval of all relevant authorities and in accordance with all relevant legislation.
- Wherever possible, traffic diversion must only take place on existing disturbed areas and remain within the existing road reserve.
- Traffic diversion routes must be rehabilitated after use.

C.19 Vegetation

- Only vegetation falling directly on the route must be removed where necessary.
- Alien vegetation within the road reserve must be eradicated, and management measures must be implemented for future control of these species.

- Vegetation that has been removed from large areas (e.g. on traffic diversion routes) during construction must be replaced with indigenous vegetation after construction has been completed.

C.20 Waste Management

- All general, non-hazardous waste must be placed in a skip container and disposed of at a registered waste disposal site.
- The contractor is to ensure that the portable toilet facilities at the campsite are properly maintained and in working order.
- No disposal, or leakage, of sewage must occur on or near the site.
- All hazardous waste (e.g. oil, paint, empty lime bags, contaminated wash water, etc) must be stored in leakproof containers and disposed of at a registered hazardous waste disposal site.
- The contents of waste storage containers must, under no circumstances, be emptied to the surrounding area. In general, littering, discarding or burying of any materials is not allowed on site or along the route.
- Adequate waste receptacles must be available at strategic points around the construction camp and site for all domestic refuse and to minimise the occurrence of littering.
- Concrete rubble must be collected and disposed of as directed by the Project Manager.
- Each working area must be cleared of litter and building waste (e.g. rubble, wood, concrete packets etc) on completion of the day's work.
- Any spill around the container(s) should be treated as per Section C11 and C16.

PART D : HEALTH AND SAFETY REQUIREMENTS

SCOPE

This specification covers the health and safety requirements to be met by the Contractor to ensure a continued safe and healthy environment for all workers, employees and subcontractors under his control and for all other persons entering the site of works.

This specification shall be read with the Occupational Health and Safety Act (Act No 85 and amendment Act No 181) 1993, and the corresponding Construction Regulations 2003, and all other safety codes and specifications referred to in the said Construction Regulations.

In terms of the OHSA Agreement in Section C1.2.4 of the Contract document, the status of the Contractor as mandatory to the Employer (client) is that of an employer in his own right, responsible to comply with all provisions of OHSA 1993 and the Construction Regulations 2003.

This safety specification and the Contractor's own Safety Plan as well as the Construction Regulations 2003, shall be displayed on site or made available for inspection by all workers, employees, inspectors and any other persons entering the site of works.

The following are possible risks associated with this project:
- Potentially dangerous existing services, i.e. electrical high voltage cables;
- Working around falling trees and branches;
- Risks related to general safety and security on site.

Additional risks may arise from specific methods of construction selected by the Contractor which are not necessary covered in the above.

DEFINITIONS

For the purpose of this contract the following shall apply:

(a) **Employer**" where used in the contract documents and in this specification, means the Employer as defined in the General Conditions of Contract and it shall have the exact same meaning as "**client**" as defined in the Construction Regulations 2003. "**Employer**" and "**client**" is therefore interchangeable and shall be read in the context of the relevant document.

(b) "**Contractor**" wherever used in the contract documents and in this specification, shall have the same meaning as "**Contractor**" as defined in the General Conditions of Contract.

In this specification the terms "**principal contractor**" and "**contractor**" are replaced with "**Contractor**" and "**subcontractor**" respectively.

For the purpose of this contract the **Contractor** will, in terms of OHSA 1993, be the mandatory, without derogating from his status as an employer in his own right.

(c) "**Engineer**" where used in this specification, means the Engineer as defined in the General Conditions of Contract. In terms of the Construction Regulations the Engineer may act as agent on behalf of the Employer (the client as defined in the Construction Regulations).

TENDERS

The Contractor shall submit the following with his tender:

(a) a documented Health and Safety Plan as stipulated in Regulation 5 of the Construction Regulations. The Safety Plan must be based on the Construction Regulations 2003 and will be subject to approval by the Employer;

(b) a declaration to the effect that he has the competence and necessary resources to carry out the work safely in compliance with the Construction Regulations 2003;

(c) a declaration to the effect that he made provision in his tender for the cost of the health and safety measures envisaged in the Construction Regulations.

(d) Failure to submit the foregoing with his tender, will lead to the conclusion that the Contractor will not be able to carry out the work under the contract safely in accordance with the Construction Regulations.

NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION WORK

After award of the contract, but before commencement of construction work, the Contractor shall, in terms of Regulation 3, notify the Provincial Director of the Department of Labour in writing if the following work is involved:

- High risk activities

The notification must be done in the form of the pro forma included under Section 9 (Forms to be completed by Successful Tenderer) of the tender document.

A copy of the notification form must be kept on site, available for inspection by inspectors, Employer, Engineer, employees and persons on site.

RISK ASSESSMENT

Before commencement of any construction work during the construction period, the Contractor shall have a risk assessment performed and recorded in writing by a competent person. (Refer Regulation 7 of the Construction Regulations 2003).

The risk assessment shall identify and evaluate the risks and hazards that may be expected during the execution of the work under the contract, and it shall include a documented plan of safe work procedures to mitigate, reduce or control the risks and hazards identified.

The risk assessment shall be available on site for inspection by inspectors, Employer, Engineer, subcontractors, employees, trade unions and health and safety committee members, and must be monitored and reviewed periodically by the Contractor.

APPOINTMENT OF EMPLOYEES AND SUBCONTRACTORS

6.1 Health and Safety plan

The Contractor shall appoint his employees and any subcontractors to be employed on the contract, in writing, and he shall provide them with a copy of his documented Health and Safety Plan, or relevant sections thereof. The Contractor shall ensure that all subcontractors and employees are committed to the implementation of his Safety Plan.

6.2 Health and safety induction training

The Contractor shall ensure that all employees under his control, including subcontractors and their employees, undergo a health and safety induction training course by a competent person before commencement of construction work. No visitor or other person shall be allowed or permitted to enter the site of the works unless such person has undergone health and safety training pertaining to hazards prevalent on site.

The Contractor shall ensure that every employee on site shall at all times be in possession of proof of the health and safety induction training issued by a competent person prior to commencement of construction work.

APPOINTMENT OF SAFETY PERSONNEL

7.1 Construction Supervisor

The Contractor shall appoint a full-time **Construction Supervisor** with the duty of supervising the performance of the construction work.

He may also have to appoint one or more competent employees to assist the construction supervisor where justified by the scope and complexity of the works.

7.2 Construction safety officer

Taking into consideration the size of the project and the hazards or dangers that can be expected, the Contractor shall appoint in writing a full-time or part-time **Construction Safety Officer** if so decided by the Inspector of the Department of Labour. The Safety Officer shall have the necessary competence and resources to perform his duties diligently.

Provision shall be made by the Contractor in his rates, to cover the cost of this dedicated construction safety officer appointed after award of the contract.

7.3 Health and safety representatives

In terms of **Section 17 and 18 of the Act (OHSA 1993)** the Contractor, being the employer in terms of the Act for the execution of the contract, shall appoint a **health and safety representative** whenever he has more than 20 employees in his employment on the site of the works. The health and safety representative must be selected from employees who are employed in a full-time capacity at a specific workplace.

The number of health and safety representatives for a workplace shall be at least one for every 100 employees.

The function of health and safety representative(s) will be to review the effectiveness of health and safety measures, to identify potential hazards and major incidents, to examine causes of incidents (in collaboration with his employer, the Contractor), to investigate complaints by employees relating to health and safety at work, to make representations to the employer (Contractor) or inspector on general matters affecting the health and safety of employees, to inspect the workplace, plant, machinery etc. on a regular base, to participate in consultations with inspectors and to attend meetings of the health and safety committee.

7.4 Health and safety committee

In terms of Sections **17 and 18 of the Act (OHSA 1993)** the Contractor (as employer), shall establish one or more **health and safety committee(s)** where there are two or more health and safety representatives at a workplace. The persons selected by the Contractor to serve on the committee shall be designated in writing.

The function of the health and safety committee shall be to hold meetings at regular internals, but at least once every three months, to review the health and safety measures on the contract, to discuss incidents related to health and safety with the Contractor and the inspector, and to make recommendations regarding health and safety to the Contractor and to keep record of recommendations and reports made by the committee.

7.5 Competent persons

In accordance with the Construction Regulations the Contractor has to appoint in writing **competent persons** responsible for supervising construction work on each of the following work situations that may be expected on the site of the works.

(a) Risk assessment and induction training as described in Regulation 7 of the Construction Regulations;
(b) Excavation work as described in Regulation 11;
(c) Construction vehicle and mobile plant inspections on a daily basis by a competent person as described in Regulation 21(1);
(d) Control of all temporary electrical installation on the construction site as described in Regulation 22;
(e) Stacking and storage on construction sites as described in Regulation 26; and
(f) Inspections of fire equipment as described in Regulation 27.

A competent person may be appointed for more than one part of the construction work with the understanding that the person must be suitably qualified and able to supervise at the same time the construction work on all the work situations for which he has been appointed.

The appointment of competent persons to supervise parts of the construction work does not relieve the Contractor from any of his responsibilities to comply with **all** requirements of the Construction Regulations.

RECORDS AND REGISTERS

In accordance with the Construction Regulations the Contractor is bound to keep records and registers related to health and safety on site for periodic inspection by inspectors, the Engineer, the Employer, trade union officials and subcontractors and employees. The following records and registers must be kept on site and shall be available for inspection at all times.

(a) A copy of the OHSA 1993 Construction Regulations 2003;

(b) A copy of this Health and Safety Specification;
(c) A copy of the Contractor's Health and Safety Plan (Regulation 4);
(d) A copy of the Notification of Construction Work (Regulation 3);
(e) A health and safety file in terms of Regulation 5(7) with inputs by the Construction Safety Officer (Regulation 6(7));
(f) A copy of the risk assessment described in Regulation 7;
(g) A full protection plan and the corresponding records of evaluation and training of employees working from elevated positions as described in Regulation 8;
(h) Drawings pertaining to the design of structures (Regulation 9(3)) and formwork and support work structures (Regulation 10(d)) must be kept on site;
(i) Pronouncement of the safety of excavations must be recorded in a register to be kept on site (Regulation 11(3)(h));
(j) A register for recording of findings by the competent person appointed to inspect construction vehicles and mobile plant (Regulation 21(1)(j)).

CONTRACTORS RESPONSIBILITIES

For this contract the Contractor will be the mandatory of the Employer (Client), as defined in the Act (OHSA 1993), which means that the Contractor has the status of employer in his own right in respect of the contract. The Contractor is therefore responsible for all the duties and obligations of an employer as set out in the Act (OHSA 1993) and the Construction Regulations 2003.

Before commencement of work under the contract, the Contractor shall enter into an agreement with the Employer (Client) to confirm his status as mandatory (employer) for the contract under consideration.

The Contractor's duties and responsibilities are clearly set out in the Construction Regulations 2003, and are not repeated in detail but some important aspects are highlighted hereafter, without relieving the Contractor of any of his duties and responsibilities in terms of the Construction Regulations.

The employer reserves the right to take any action should any of the breaches on above regulations and / or the Employer's Requirements come to their notice, including the provision of and insistence on the use of hard hats, overalls, ear protection plugs, eye protection goggles, reflective safety vests, gloves, safety boots, belted safety harnesses, etc. by any person on the site, the cost for purchase of which will be borne by the contractor.

(a) Contractor's position in relation to the Employer (Client) (Regulation 4)
In accordance with Section 4 of the Regulations, the Contractor shall liaise closely with the Employer or the Engineer on behalf of the Employer, to ensure that all requirements of the Act and the Regulations are met and complied with.

(b) The Principal Contractor and Contractor (Regulation 5)
The Contractor is in terms of the definition in Regulation 2(b) the equivalent of Principle Contractor as defined in the Construction Regulations, and he shall comply with all the provisions of Regulation 5.

Any subcontractors employed by the Contractor must be appointed in writing, setting out the terms of the appointment in respect of health and safety. An independent subcontractor shall however provide and demonstrate to the Contractor a suitable, acceptable and sufficiently documented health and safety plan before commencement of the subcontract. In the absence of such a health and safety plan the subcontractor shall undertake in writing that he will comply with the Contractor's safety plan, the health and safety specifications of the Employer and the Construction Regulations 2003.

(c) Supervision of construction work (Regulation 6)
The Contractor shall appoint the safety and other personnel and employees as required in terms of Regulation 6 and as set out in paragraph 7 above. Appointment of those personnel and employees does not relieve the Contractor from any of the obligations under Regulation 6.

(d) Risk assessment (Regulation 7)
The Contractor shall have the risk assessment made as set out in paragraph 7 above before commencement of the work and it must be available on site for inspection at all times. The Contractor shall consult with the health and safety committee or health and safety representative(s) etc. on a regular basis to ensure that all employees, including subcontractors under his control, are

informed and trained by a competent person regarding health hazards and related work procedures.

No subcontractor, employee or visitor shall be allowed to enter the site of works without prior health and safety induction training, all as specified in Regulation 7.

(e) Fall protection (Regulation 8)
Fall protection, if applicable to this contract shall comply in all respects with Regulation 8 of the Construction Regulations.

(f) Structures (Regulation 9)
The Contractor will be liable for all claims arising from collapse or failure of structures if he failed to comply with all the specifications, project specifications and drawings related to the structures, unless it can be proved that such collapse or failure can be attributed to faulty design or insufficient design standards on which the specifications and the drawings are based.

In addition the Contractor shall comply with all aspects of Regulation 9 of the Construction Regulations.

(g) Formwork and support work (Regulation 10)
The Contractor will be responsible for the adequate design of all formwork and support structures by a competent person.

All drawings pertaining to formwork shall be kept on site and all equipment and materials used in formwork, shall be carefully examined and checked for suitability by a competent person.

The provisions of Regulation 10 of the Construction Regulations shall be followed in every detail.

(h) Excavation work (Regulation 11)
It is essential that the Contractor shall follow the instructions and precautions in the Standard Specifications and Project Specifications as well as the provisions of the Construction Regulations to the letter as unsafe excavations can be a major hazard on any construction site. The Contractor shall therefore ensure that all excavation work is carried out under the supervision of a competent person, that inspections are carried out by a Professional Engineer or Technologist, and that all work is done in such a manner that no hazards are created by unsafe excavations and working conditions.

Supervision by a competent person will not relieve the Contractor from any of his duties and responsibilities under Regulation 11 of the Construction Regulations.

(i) Demolition work (Regulation 12)
Whenever demolition work is included in a contract, the Contractor shall comply with all the requirements of Regulation 12 of the Construction Regulations. The fact that a competent person has to be appointed by the Contractor does not relieve the Contractor from any of his responsibilities in respect of safety of demolition work.

(j) Tunnelling (Regulation 13)
The Contractor shall comply with Regulation 13 wherever tunnelling of any kind is involved.

(k) Scaffolding (Regulation 14)
The Contractor shall ensure that all the provisions of Regulation 14 of the Construction Regulations are complied with. [Note: Reference in the Regulations to “Section 44 of the Act” should read “Section 43 of the Act”].

(l) Suspended platforms (Regulation 15)
Wherever suspended platforms will be necessary on any contract, the Contractor shall ensure that copies of the system design issued by a Professional Engineer are submitted to the Engineer for inspection and approval. The Contractor shall appoint competent persons as supervisors and competent scaffold erectors, operators and inspectors and ensure that all work related to suspended platforms are done in accordance with Regulation 15 of the Construction Regulations.

(m) Boatswain's chains (Regulation 16)
Where boatswain's chains are required on the construction site, the Contractor shall comply with Regulation 16.

(n) Material Hoists (Regulation 17)
Wherever applicable, the Contractor shall comply with the provisions of Regulation 17 to the letter.

(o) Batch plants (Regulation 18)
Wherever applicable, the Contractor shall ensure that all lifting machines, lifting tackle, conveyors, etc. used in the operation of a batch plant shall comply with, and that all operators, supervisors and employees are strictly held to the provisions of Regulation 18. The Contractor shall ensure that the General Safety Regulations (Government Notice R1031 of 30 May 1986), the Driven Machinery Regulations (Government Notice R295 of 26/2/1988) and the Electrical Installation Regulations (Government Notice R2271 of 11/10/1995) are adhered to by all involved.

In terms of the Regulations, records of repairs and maintenance shall be kept on site.

(p) Explosive powered tools (Regulation 19)
The Contractor shall ensure that, wherever explosive-powered tools are required to be used, all safety provisions of Regulation 19 are complied with.

It is especially important that warning notices are displayed and that the issue and return of cartridges and spent cartridges be recorded in a register to be kept on site.

(q) Cranes (Regulation 20)
Wherever the use of tower cranes becomes necessary, the provisions of Regulation 20 shall be complied with.

(r) Construction vehicles and mobile plant (Regulation 21
The Contractor shall ensure that all construction vehicles and plant are in good working condition and safe for use, and that they are used in accordance with their design and intended use. The vehicles and plant shall only be operated by workers or operators who have received appropriate training, all in accordance with all the requirements of Regulation 21.

All vehicles and plant must be inspected on a daily basis, prior to use, by a competent person and the findings must be recorded in a register to be kept on site.

(s) Electrical installation and machinery on construction sites (Regulation 22)
The Contractor shall comply with the Electrical Installation Regulations (Government Notice R2920 of 23 October 1992) and the Electrical Machinery Regulations (Government Notice R1953 of 12 August 1993). Before commencement of construction, the Contractor shall take adequate steps to ascertain the presence of, and guard against dangers and hazards due to electrical cables and apparatus under, over or on the site.

All temporary electrical installations on the site shall be under the control of a competent person, without relieving the Contractor of his responsibility for the health and safety of all workers and persons on site in terms of Regulation 22.

(t) Use of temporary storage of flammable liquids on construction sites (Regulation 23)
The Contractor shall comply with the provisions of the General Safety Regulations (Government Notice R1031 of 30 May 1986) and all the provisions of Regulation 23 of the Construction Regulations to ensure a safe and hazard-free environment to all workers and other persons on site.

(u) Water environments (Regulation 24)
Where construction work is done over or in close proximity to water, the provisions of Regulation 24 shall apply.

(v) Housekeeping on Construction sites (Regulation 25)
Housekeeping on all construction sites shall be in accordance with the provisions of the environment Regulations for workplaces (Government Notice R2281 of 16 October 1987) and all the provisions of Regulation 25 of the Construction Regulations.

(w) Stacking and storage on construction sites (Regulation 26)
The provisions for the stacking of articles contained in the General Safety Regulations (Government Notice R1031 of 30 May 1986) as well as all the provisions Regulation 26 of the Construction Regulations shall apply.

(x) Fire precautions on construction sites (Regulation 27)
The provisions of the Environmental Regulations for Workplaces (Government Notice R2281 of 16 October 1987) shall apply.

In addition the necessary precautions shall be taken to prevent the incidence of fires, to provide adequate and sufficient fire protection equipment, sirens, escape routes etc. all in accordance with Regulation 27 of the Construction Regulations.

(y) Construction welfare facilities (Regulation 28)
The Contractor shall comply with the construction site provisions as in the Facilities Regulations (Government Notice R1593 of 12 August 1988) and the provisions of Regulation 28 of the Construction Regulations.

(z) Non-compliance with the Construction Regulations 2003
The foregoing is a summary of parts of the Construction Regulations applicable to all construction projects.

The Contractor, as employer for the execution of the contract, shall ensure that all provisions of the Construction Regulations applicable to the contract under consideration are complied with to the letter.

Should the Contractor fail to comply with the provisions of the Regulations 3 to 28 as listed in Regulation 30, he will be guilty of an offence and will be liable, upon conviction, to the fines or imprisonment as set out in Regulation 30.

The Contractor is advised in his own interest to make a careful study of the Act and the Construction Regulations as ignorance of the Act and the Regulations will not be accepted in any proceedings related to non-conformance to the Act and the Regulations.

PART E: ELECTRICAL WORKS SPECIFICATIONS

TABLE OF CONTENTS PAGE

E2012 SLEEVES
E2013 FEEDER CABLES AND CONNECTIONS
E2014 UNDERGROUND CABLE NETWORKS
E2015 INSTALLATION OF CABLES
E2016 ELECTRICAL LV SUPPLY CABLES
E2017 CONDUCTORS
E2018 WIRING
E2019 UNSWITCHED AND SWITCHED SOCKET OUTLETS
E2020 SWITCHGEAR
E2021 LV SWITCHBOARDS (UP TO 1KV) 7
E2022 TRANSFORMER
E2023 MOTOR CONTROL CENTRES (MCC)
E2024 PHOTO- ELECTRIC SWITCHES
E2025 LUMINAIRES

E3001 MEASURING AND PAYMENT PRINCIPLES
E3002 CALCULATION OF QUANTITIES
E3003 SCHEDULED ITEMS
E3003.1 GENERAL ITEMS: ELECTRICAL – SECTION E.1
E3003.2 RETICULATION SYSTEM – SECTION E.2
E3003.3 TRENCHING AND EARTHWORKS – SCHEDULE E.3
E3003.4 SOURCE OUTLETS – SECTION E.4
E3003.5 LUMINAIRES – SECTION E.6
E3003.6 EARTHING – SECTION E.6
E3003.7 SERVICE WAYS – SECTION E.7
E3003.8 SECURITY SYSTEM – SECTION E.8

E1000 GENERAL REQUIREMENTS

E1001 GENERAL

This specification is for the electrical works of the Standby Generator and Uninterruptible power supply (UPS) Units for the offices (Agrivillage 1 & 2) of the Limpopo Department of Agriculture and Rural Development

Any deviations from the drawings or equipment specified shall be listed together with alternatives offered in a covering letter.

If no deviations are listed, it will be assumed that the contractor complies fully with all the relevant technical parts of this portion of the document.

The tendered price shall be based on these specifications and an allowance shall be included in the tendered rate for the review of the necessary designs by the Engineer for acceptance prior to construction.

This work shall be carried out as a domestic sub-contract to the main contract. Any references in this part of the document to “contractor” or “electrical contractor” shall be deemed to mean the main contractor including his domestic electrical sub-contractor.

E1002 SCOPE OF WORKS

The Contractor shall be responsible for the Planning, Design, Supply, Installation/Construction, Commissioning and Maintenance of all electrical works for a Standby Generator and Uninterruptible power supply (UPS) Units for the offices (Agrivillage 1 & 2) of the Limpopo Department of Agriculture and Rural Development. All design, material and construction shall adhere to all relevant SANS or International standards where applicable.

General related works:

- The electrical subcontractor must have CIDB grading of at least 3EB.
- The electrical installation may not commence before the registration certificate and proof that the particular electrician is registered as an installation electrician has been received and approved by the Employer. This registration shall be maintained active and in good order for the duration of the Contract.
- The successful Bidder/electrical Contractor must be registered as an Electrical Contractor with the Electrical Contracting Board of South Africa or Department of Labour to qualify for this contract. This registration shall be maintained active and in good order for the duration of the Contract.
- The Contractor may be responsible for establishing a site office and ensuring adherence to public safety, inclusive in the Contractor’s rates.
- The Contractor will be required to work on a site that is occupied by other services and as such the Contractor may be held responsible for damaged works if the Contractor does not show cognisance nor provide evidence against claims of damage.
- The Contractor shall include for all costs entailed in the design and preparing of drawings for the boards, equipment and materials, all cost of supplying and delivery of the works on the site, setting out of the works including a surveyor, all cost entailed in refurbishing, repairing relocation and commissioning the works, all supervision, labour, tools and materials necessary to erect and to test the works and to survey installed works and compilation of as-built drawings and documentation to be submitted upon hand over of the works in complete working order.
- The cost of additional site visits which may be required by the Engineer, also forms part of this contract.
- The contract also includes for a latent defects’ liability period of 12 calendar months.
- Submission of 5 sets of “As Built" information, drawings, operational- and maintenance manuals for the electrical works upon handing over of the works.
- Submission of all tools and accessories required to power and operate the facility as specified.
- Completed works and spare maintenance material is to be handed over to and maintained by the local municipality upon project completion.

The lighting installation:

- The contractor is to undertake the responsibility for the supply, installation, testing, commissioning and 12-month maintenance of a new lighting installation, in compliance with SANS 10114-1, SANS 10389-1 & -2 & -3, and SANS 10142-1 and associated normative references.
- The installation of the lighting works shall be with the co-ordination of other and existing services.
- The lighting installation shall make use of LED luminaires only.
- The lighting installation is required to provide functional uniform lighting to improve visibility for the safe and secure use of the building and exterior property.
- The functional lighting installation shall provide uniform lighting in accordance with SANS 10114-1 and SANS 10142-1.
- The contractor shall refer to the project drawings prior to carrying out the lighting installation in order to fully understand the project construction.
- The contractor shall commission, test and aim the luminaires and test the system until the Engineer is satisfied with the lighting installation.

The electrical reticulation installation:

- The Contractor is to undertake the responsibility for the supply, installation, testing, commissioning and 12-month maintenance of a new feeder cable and LV electrical installation, in compliance with and SANS 10142-1, SANS 10142-2 and associated normative references.
- The installation of the electrical works shall be with the co-ordination of other and existing services.
- The contractor may be required to relocate existing electrical services affected by the project.
- The contractor shall be responsible for the co-ordination and the relocation of existing electrical services in accordance with SANS and the service owner’s standards and regulations.
- The contractor shall indicate the relocation of all existing electrical services on “as-built” drawings that shall be submitted to the Client and supply authority concerned.
- The contractor shall arrange, co-ordinate and obtain approval to connect the standby generator to the existing supply network in accordance to the correspondence with and standards of the Local Supply Authority and the contractual design drawings.
- The contractor shall supply, install, test and commission several LV distribution boards with all associated control, protection and metering gear in accordance with the applicable SANS specifications in addition to the standards and specifications contained within this document.
- The contractor shall supply and install PVC sleeves below ground level and recessed within the structure with the co-ordination of other and existing services drawings.
- The contractor shall supply and install galvanised steel conduits (ducts), wall and ceiling mounted cable trays and channel wire ways, IP65 Pratley termination boxes, and draw wire boxes with covers for the electrical, lighting, and control system installations, including the earthing thereof.
- The contractor shall test and clean all service sleeves and ducts before services are to be drawn through the sleeves after the Engineer’s approval. Blocked service sleeves or ducts shall be rectified by the contractor at the contractor’s own expense.
- The contractor shall supply, install, test and commission LV reticulation cable, either PVC or PVC SWA PVC sheathed LV cable, which is to be reticulated external and within the building structure as indicated on the drawings (including trench works).
- The contractor shall supply and install 400V & 230V power supply point outlets and 230V light switches where indicated on the drawings.
- The contractor shall supply, install, test and commission an earthing system for the LV reticulation network, including distribution boards, and associated electrical loads and systems.
- The contractor shall refer to the project drawings prior to carrying out electrical installations in order to fully understand the project construction.

These aspects should be seen only as a brief summary of the scope of the work and not as a complete record. Quantities and volume of work shall also be read or obtained from the drawings and the rest of the specification.

This General Requirements, Particular Specifications and Measurement and Payment Items specifies the standard of workmanship and quality of material for the installation, the scope of which is specified in SECTION E, on the Drawings and listed in the Schedules and, where applicable, in the Pricing Schedule.

Where supplemented later in SECTION E, Schedules, Bills of Quantities (where applicable) and Drawings with further specific requirements applicable to specific types of equipment or installations, the latter specification shall take precedence over this General Specification.

Upon receiving a set of documents, Contractors must make sure that all pages are included; in the correct numerical order as per the CONTENTS. Design and construction drawings shall be issued after the appointment of the Contractor. Should this not be the case it should immediately be brought to the attention of the Engineer for rectification.

The Electrical Contractor shall be appointed in terms of the Conditions of Contract or Sub-contract, as applicable.

This Contract covers the design, supply, delivery, off-loading, storage, installation, testing, commissioning, aiming of luminaires and handing over in proper working order of the complete services installation as specified in PART E and in all the constituent parts of this set of documents. All equipment provided by the Contractor shall be new.

E1003 CONSTRUCTION PROGRAMME

The electrical installation shall be executed in line with the main contractor's work programme.

It is the responsibility of the contractor to place his orders for material and equipment timeously. The contractor will be held responsible for any delays whatsoever.

The main contract programme shall indicate critical paths/dates, sequence of events, material ordering times, main and/or other (sub) contractor's work completion dates, etc. which are relevant to the electrical installation.

E1004 NOTICES AND FEES

The Contractor shall, immediately after appointment and at any time thereafter as may be necessary, notify all the relevant authorities, pay fees including inspection and re-inspection fees and take any other steps which may be required or prescribed to execute the installation as specified.

The Contractor shall issue all notices and make the necessary arrangements with ESKOM, ITS, TELKOM, NEOTEL, DFA, local supply authority and also other necessary authorities or service providers as may be required with respect to the installation.

Copies of such correspondence with the relevant authorities shall be forwarded to the Engineer who shall at all times be kept informed. Submission of copies to the Engineer to keep him informed does not relieve the Services Contractor of his responsibilities in terms of the contract.

The Contractor will pay the connection fee payable to the local electricity supply authority for the permanent electrical supply/connection for the installation. The tendered rates shall include all fees payable.

E1005 CAMP ESTABLISHMENT, POWER SUPPLY AND OTHER SERVICES

The Contractor is to make his own arrangements concerning the supply of electrical power and all other services. No direct payment will be made for the provision of electrical and other services. The cost thereof is deemed to be included in the rates and amounts tendered for the various items of work for which these services are required.

E1006 CONSTRUCTION IN CONFINED AREAS

It will be necessary for the Contractor to work within confined areas. The method of construction in these confined areas largely depends on the Contractor's constructional plant.

Regardless, measurement and payment will be in accordance with the specified cross-sections and dimensions only, irrespective of the method used for achieving these cross-sections and dimensions. It is deemed that the rates tendered in the Pricing Schedule include full compensation for all special equipment and construction methods and for all difficulties encountered when working in confined areas, at heights

and narrow widths, and at or around obstructions. No extra payment will be made nor will any claim for additional payment be considered in such cases.

E1007 MANAGEMENT OF THE ENVIRONMENT

The Contractor will be responsible for construction according to an environmental management plan in terms of Principal Contract Environmental Management Plan.

The Contractor must take the utmost care to minimise the impact of his establishment and other construction activities on the environment and must adhere to the requirements as set out in the Principal Contract. Where the Contractor fails to adhere to these requirements the specifications in the Principal Contract provide the methodology and cost liability of remedy.

E1008 REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS

Contractor is to comply with the Occupational Health and Safety plan and requirements of the Principal Contract document.

E1009 CHANGES TO SCOPE OF WORK

It is a condition of this contract that the Employer reserves the right to limit the total expenditure on the Works due to possible budget constraints. Should the bid sum exceed the budgeted amount, the scope of the works may be reduced at any time before or during the contract period to ensure that the final contract amount does not exceed the budgeted amount.

E1010 REGULATIONS

The installation shall be erected and tested in accordance with the following Acts and regulations that will be regarded as standards to be adhered to:

a) The General Conditions of Contract applicable to this contract as stipulated by the Client,

b) The latest issue of SANS 10142-1: “Code of Practice for the Wiring of Premises-Part 1: Low Voltage Installations”,

c) The latest issue of SANS 10142-2: “Medium-voltage installations above 1 kV a.c. not exceeding 22 kV a.c. and up to and including 3 MVA installed capacity”,

d) The latest issue of SANS 10114-1: “Interior Lighting Part 1: Artificial lighting of interiors”,

e) The latest issue of SANS 10389-1: “Exterior Lighting Part 1: Artificial lighting of external areas for work and safety”,

f) The latest issue of SANS 10313: “Protection Against Lightning”,

g) The latest issue of SANS 10292: “Earthing of low-voltage (LV) distribution systems”

h) The latest issue of BS EN 62305 part 1 to 4: “Protection Against Lightning”,

i) The latest issue of BS EN 62561 part 1 to 7: “Lightning protection components”,

j) The latest issue of BS 7671: “IEE 17th Ed. Wiring regulations”,

k) The latest issue of BS 7430: “Code of practice for protective earthing of electrical installations”,

l) The latest issue of SANS 10139: “Fire detection and alarm systems for buildings – System design, installation and servicing

m) The latest issue of BS 6266: “Fire protection for electronic equipment installations. Code of practice”

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

o) The Local Government Ordinance 1939 (Ordinance 17 of 1939) as amended and the municipal by-laws and any special requirements of the local supply authority,

p) The Fire Brigade Services Act 1993, Act 99 of 1987 as amend,

q) The latest issue of SANS 10400 National Building Regulations and Building Standards Act 1977 (Act 103 of 1977) as amended,

r) Electrical Installation Regulations of 1992 promulgated under section 35 of the Machinery and Occupational Safety Act of 1983 (Act No. 6 of 1983),

s) The Post Office Act 1958 (Act 44 of 1958) as amended,

t) The Electricity Act 1984 (Act 41 of 1984) as amended,

u) The Regulations of the local Gas Board where applicable,

v) Associated normative references to standards and regulations,

w) Relative Client and Supply Authority standards and specifications, and

It shall be assumed that the Contractor is conversant with the above-mentioned requirements. Should any requirement, by-law or regulation, which contradicts the requirements of this Document, apply or become applicable during erection of the Installation, such requirement, by-law or regulation shall overrule this Document and the Contractor shall immediately inform the Engineer of such a contradiction. Under no circumstances shall the Contractor carry out any variations to the installation in terms of such contradictions without obtaining the written permission to do so from the Engineer.

No claims for extras in respect of failure by the Contractor to comply with any of the above regulations will be considered. Where conflict exists between any of the above regulations and the specifications, the said conflict must be referred to the Engineer in writing for his ruling in writing.

E1011 SAFETY REGULATIONS

Both the “Factory, Machinery and Building Work Act (Act 22 of 1941) and the “Machinery and Occupational Safety Act (Act 6 of 1983)” as amended must, wherever they appear in the SANS 1200 standardised specifications, be submitted by the “Occupational Health and Safety Act (Act 85 of 1993)” as amended.

The Contractor shall apply suitable proven methods for construction so that his activities will not constitute a hazard to the public or any adjacent property. All excavations shall be suitable safeguarded and barricaded especially during night-time, weekends or holidays and any other day of inactivity by the Contractor. The Contractor shall also ensure that excavations are shored or otherwise made safe. No additional payment will be made to the Contractor for complying with these requirements.

The Contractor shall also comply with the Occupational Health and Safety specifications of the Principal Contractor.

E1012 ASPECTS THAT NEED SPECIAL ATTENTION

As the project progresses the Contractor must indicate on his drawings any deviation that has occurred. The exact position of equipment must be shown on the Contractor’s “as built” drawings.

The completion certificates shall only be issued when the completed “as built” drawings from the Contractor is received and approved by the Engineer.

E1013 TERMINOLOGY

Labels must indicate the functions of equipment and components in the distribution boxes and/or distribution boards. The terminology on the identification labels must be in English.

E1014 LIAISON

The electrical contractor shall, in each case, provide the engineer, employer (principal contractor) with all necessary information, dimensions, materials, etc., as called for in the specification, in good time.

It is essential that the electrical contractor work in close collaboration with the principal contractor to ensure that where his services run in proximity with other services, there are no clashes.

Failure to comply with the above may mean that corrective measures will have to be taken to correctly position the equipment. Any abortive work resulting will be entirely to the electrical contractor’s account.

Where the electrical contractor is to provide electrical supplies to control panels forming part of other contract works, it is essential that the electrical contractor liaise fully with the particular contractor who must provide the electrical contractor with all information necessary so as to ensure that the supply cable terminates in the correct position and that the phase rotation complies with the equipment installed.

Failure to do so may result in the electrical contractor being held responsible for the cost of removing and replacing not only his own but also the equipment of the main contractor and other contractors.

E1015 SUPERVISORY STAFF AND IDENTIFICATION

All work done on site shall at all times be under the direct and full time supervision of a contract manager who shall be a qualified installation electrician who will sign the certificate of compliance.

Full particulars of the site organisation, complete with names of officials the contractor proposes to allocate to this project are to be submitted upon construction. For the duration of this contract the above detailed officials will be permanently assigned to this project and may only be relieved of their duties after prior agreement by the Engineer or his representative/agent.

Whilst on the site all staff and labourers employed by the electrical contractor shall wear distinctively marked clothing bearing the name of the electrical contractor or his identification logo.

E1016 SETTING OUT OF WORKS

The electrical contractor shall be responsible for marking out and setting out of all electrical works, equipment and plant.

The position of items of electrical equipment and plant indicated on the drawings are to be taken as approximate. The exact position for fixing shall be obtained by site measurements.

In case of doubt, decisions shall be obtained from the Engineer or his representative/agent.

E1017 ERECTION OF EQUIPMENT

The contractor shall be responsible for the erection and installation of all works, equipment and plant supplied by the contractor under this contract.

In addition, the contractor shall be responsible for the care and maintenance of all electrical equipment after erection is completed until the first delivery of the specific section of the works. The contractor shall ensure that the proper enclosure of all equipment is maintained at all times, that access doors and covers are opened only when necessary to work on the equipment and replaced afterwards, that the paint finish on all items is effectively protected and that all unused cable and conduit entries are effectively sealed.

E1018 CERTIFICATE OF COMPLIANCE BY AN ACCREDITED PERSON

On completion of the electrical installation the contractor shall complete the Certificate of Compliance for the electrical installation in the form of Annexure 1 as described in the Occupational Health and Safety Act no. 85 of 1993, as amended, and obtainable from the Electrical Contracting Board of South Africa. This form must be handed to the Engineer or its representative in addition to four (4) signed copies.

The Certificate of Compliance will be completed and signed by an accredited electrical contractor.

A separate Certificate of Compliance will be issued for each electrical installation, distribution board and point of supply.

E1019 DELIVERY AND COMPLETION

All contract materials shall be ordered timeously and delivered to site at dates suited to the agreed construction program.

The successful Bidder for the installation will be required to commence work immediately following notification of bid acceptance, and shall thereafter at all times maintain the progress required by the agreed completion program.

E1020 MAINTENANCE OF INSTALLATIONS

With effect from the date of the First Delivery Certificate the contractor shall at the contractor's own expense undertake the regular servicing of the installation during the 12-month Defects Notifications Period and shall make all adjustments necessary for the correct operation thereof.

If during the said period the installation is not in working order for any reason for which the contractor is responsible, or if the installation develops defects, the contractor shall immediately, upon being notified thereof, take steps to remedy the defects and make any necessary adjustments at the contractor's own expense.

Should such stoppages however be so frequent as to become troublesome, or should the installation otherwise prove unsatisfactory during the said period the contractor shall, if called upon by the Engineer, at the contractor's own expense replace the whole of the installation or such parts thereof as the Engineer may deem necessary, with apparatus specified by the Engineer.

Luminaires will be tested upon the completion of the Defects Liability Period for compliance to the contract specifications. If the test results indicate non-compliance the contractor shall, by instruction by the Engineer, at the contractor's own expense replace the whole of the installation or such parts thereof as the Engineer may deem necessary, with apparatus specified by the Engineer.

E1021 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, the Engineer and the relevant Local Supply Authority.

E1022 SUPPLY AUTHORITY

a) Permanent Electricity Supply

An electricity supply will be made available by the Supply Authority at the voltage specified herein, and the Contractor shall, to be included in the pricing, then deliver the installation in such a manner that it complies with the Supply Authority's requirements and other applicable codes, standards and regulations regarding voltage, current, fault level, phase rotation and frequency and with any other requirements which may be imposed by these authorities and the specification.

The connection fee payable to the local electricity supply authority for the permanent electrical supply/connection will be paid by the Employer, or, where paid by the Contractor, he will be reimbursed by the Employer upon presentation of the receipt.

The application will be registered under the details of the Authority responsible for the payment of electrical consumption of the electrical system.

The positions of the new connections shall be determined on site with the approval of the Local Supply Authority.

b) Temporary Supply

Electricity for erection, testing and commissioning purposes shall be arranged by the Contractor, as the permanent supply will not be available during the execution of this contract.

If any temporary connections or supplies are required, every precaution must be taken by the Contractor to ensure the safety of persons and property. Special attention shall be paid to earthing and bonding.

c) Temporary Lighting

It shall be the Contractor’s responsibility and own cost to ensure that the temporary lighting is safely adequate and operational during the construction period.

E1023 SUPPLY VOLTAGE

The permanent supply voltage shall be 415V/230V from the nearby supply 100kVA/200kVA 22kV/415V transformers and to the distribution boards, lighting and electrical reticulation system, including the provision of additional loads.

E1024 BALANCING OF ELECTRICAL LOAD

The Contractor is required to balance the load as equally as possible over the multiphase supply. (If applicable)

E1025 SERVICE CONDITIONS

All plant shall be designed for the climatic conditions appertaining to the project site and service requirement.

E1026 SENSITIVE ELECTRICAL/ELECTRONIC EQUIPMENT

All the equipment must be properly protected against damage, faulty functioning or interference by any external factors such as static electricity, induced voltage, magnetizing forces, radio waves, etc., which may occur in the building.

Equipment which is sensitive to interference and interference peaks in the electrical circuit; variations in voltage and frequency, must be fitted with the necessary stabilizers, over and under-voltage protection equipment, suppressers, etc.

Equipment must be so manufactured and installed (and provided with suppression), that it does not cause any interference to other equipment or in any way affect the functioning thereof.

E1027 ELECTRICAL EQUIPMENT & MATERIALS

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

Materials and equipment used in this installation must be of the best quality of their respective types, must meet the relative SANS, IEC or BS specifications and must be installed to the satisfaction of the electrical Engineer or his representative.

The Contractor will be informed in writing if any material or workmanship is not of the required quality. In such a case the Contractor must replace the material concerned or repair the installation to the satisfaction of the Engineer or its representative.

If requested to do so, the Contractor must provide samples of materials or equipment, for the approval by the electrical Engineer, before it may be installed. The samples will be kept for comparison with materials and equipment actually installed and will be returned after the contract has been satisfactorily completed.

E1028 SCHEDULE OF FITTINGS

In all instances where schedule of socket outlets, power points, luminaires, and DB panels are attached to or included on the drawings, these schedules are to be regarded as forming part of the specification.

Except in the case of electrical installations supplied by a single-phase electricity supply at the point of supply, an accredited person shall exercise general control over all electrical installation work being carried out.

E1029 QUALITY OF MATERIALS

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

Only materials of highest quality shall be used and all materials shall be subject to the approval of the engineer.

Materials wherever possible, must be of South African manufacture and should have a local content of at least 50%.

Wherever applicable, the material shall comply with the relevant South African National Standards, specifications, or to IEC or British Standards Specifications, where no SANS Specifications exist, and shall be approved, installed and commissioned in accordance with these Specifications and Codes and to the satisfaction of the engineer.

Materials and equipment used in this Contract shall, where possible, be of South African manufacture and shall comply with this Specification and relevant SANS, BS or IEC Specifications and Codes.

Where a certain manufacturer's material or apparatus is mentioned in the drawings or specifications, such materials or apparatus shall be provided as specified, excepting where an alternative to this condition is allowed in the specifications, but the engineer shall have the final decision. Where a detailed specification for material or apparatus is not provided, it shall be understood that all normal requirements for the use of such material or equipment shall apply.

The contractor will be informed in writing if any material or workmanship is not of the required quality. In such a case the contractor must replace the material concerned or repair the installation to the satisfaction of the Engineer or its representative.

If requested to do so, the contractor must provide samples of materials or equipment, for the approval by the electrical Engineer, before it may be installed. The samples will be kept for comparison with materials and equipment actually installed and will be returned after the contract has been satisfactorily completed.

Should the Contractor base his tender price on any alternative and this alternative is rejected by the engineer, any cost implication this may have shall be for the Contractor's account.

Tender prices may be based on alternatives to those items specified in this specification or where a written addendum to this document specifying allowable alternatives is issued during the tender period by the Engineer.

Alternatives for specified equipment will only be considered during the first 8 weeks from the date of the letter of appointment of the Contractor, as issued by the Engineer. Only the Engineer shall have the right to grant the contractor permission to change the equipment and / or material subsequent to the award of the contract.

Should alternatives be offered by the Contractor, the following is required:

- A sample and technical pamphlet and data of the specified item
- A sample and technical pamphlet and data of the alternative or substitute offered
- Price implication per item for the alternative or substitute together with substantiating invoices or quotations

- Price implication for the entire installation for the alternative or substitute. This price implication should be itemised listing every item applicable separately and totalling them.

The Contractor shall submit samples of all materials or equipment for approval by the Engineer before installation, unless prior approval to the contrary has been obtained in writing from the Engineer. Such samples will be held for purposes of comparison with equipment and materials installed and will be released on satisfactory completion of the Contract.

The Engineer may instruct the Contractor to supply and/or deliver and/or install any other make or manufacture of article(s) than that/those specified and will issue a variation order where such a change has cost implications.

Where certain products of a specified manufacturer are unobtainable, substitutions may be offered, but shall only be supplied after written consent by the Engineer.

Where plastic materials are used in areas exposed to direct sunlight, they shall be treated for/protected against the effects of Ultra Violet light.

Where materials and equipment are to be installed exposed to the elements or in corrosive or explosive environments, the materials of the equipment and for holding down the equipment shall be selected taking due note of these conditions.

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

All inferior work shall, on indication by the Engineer's inspecting officers, be immediately removed and rectified by and at the expense of the Contractor.

E1030 TESTS

(a) General

The Engineer may call for the inspection or testing of all or any goods forming the subject of the Contract.

The Engineer reserves the right to attend or not to attend any of the inspections, tests or commissioning. Whether, the Engineer attends these or not, written reports and test results shall be submitted to the Engineer for approval.

The Contractor shall replace any portion of the installation, which does not meet with the requirements of the Wiring Code, relevant SABS, SANS, BS standards or this Specification, or the local by-laws as may be found by test or inspection. Such replacement shall be done at the Contractor's own cost.

All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Engineer's instructions and shall be subjected from time to time to such tests and by such persons as the Engineer may direct at the place of manufacture or fabrication or on the site or at all or any of such places.

The LV equipment, transformers, MCC's and distribution boards, etc., shall be tested in the factory by the manufacturer and the Contractor in the presence of the Engineer before the equipment is shipped to site. The Engineer must be given a few days' notice ahead of testing, to enable him to attend the tests.

Except as otherwise provided in the Specification the Contractor shall supply such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing of any work and the quality, mass or quantity of any materials used and shall supply samples of materials before incorporation in the works for testing as may be selected and required by the Engineer.

All samples shall be supplied by the Contractor at his own cost if the supply thereof is clearly intended by or provided for in the Specification but if not, then at the cost of the Employer.

The cost of making any test shall be borne by the Contractor if such test is clearly intended by or provided for in the Specification and (in the case of a test under load or a test to ascertain whether the design of any finished or partly finished work is appropriate for the purposes which it was intended to fulfil) if such is particularised in the Specification in sufficient detail to enable the Contractor to price or allow for the same in his Contract Price.

If any test is ordered by the Engineer which is either -

1. not so intended by or provided for; or
2. not so particularised; or
3. though so intended by or provided for is ordered by the Engineer to be carried out by an independent person or body at any other place than the site or the place of manufacture or fabrication of the materials or equipment tested;
4. then the cost of such test shall be borne by the Contractor if the test shows the workmanship or materials not to be in accordance with the provisions of the Contract or the Engineer's instructions, but otherwise by the Employer.

The Contractor shall keep records of all the data of tests and shall submit this data to the Engineer upon completion of all tests.

Such data shall include the results of:

1. earth tests;
2. insulation tests;
3. continuity tests;
4. pressure tests;
5. impedance tests;
6. performance or rating tests;
7. impulse tests;
8. Operational and commissioning tests;
9. temperature tests;
10. voltage drop and load tests; and
11. luminance tests, etc.

Tests carried out in the factory of the manufacturer or at a testing facility shall be done in accordance with the prescribed standards for such tests.

The applicable standards for such tests shall be SANS, BSI, IEC, DIN, NEMA or such acceptable standard as may be applicable to the product or equipment or assembly.

The Contractor shall further carry out any other special test as may be required by the Engineer in a manner or in accordance with the standards as may be required by the Engineer. The Engineer will have the right to obtain a quotation from the Contractor for any special tests which are required by him and to instruct the Contractor to carry out such tests.

If equipment should fail a standard or prescribed standard test by a testing authority, the cost thereof shall be for the account of the Contractor.

(b) Tests and Inspections by Local Authorities

The entire installation shall be tested after completion in accordance with the Wiring Code and any applicable by-laws of local authorities.

The Contractor shall assist the Inspectors of the local authorities during any tests carried out by them and shall supply tools, instruments and consumables for testing purposes.

The Engineer reserves the right to be present at any tests and the Contractor shall inform the Engineer of all tests to enable him to be present if he so desires.

The Engineer may perform similar tests at any time and the Contractor shall render all assistance and shall provide all tools and instruments, which may be required for such tests.

The work specified in this document shall not be considered to have been completed until the installation inspectors of the responsible authorities have issued a clearance certificate for the electrical installation.

(c) Acceptance Tests

After completion, either in a part or as a whole the complete installations shall be subject to acceptance tests by the Engineer. The Contractor shall assist the Engineer during any test carried out and must supply tools and instruments for testing purposes.

(d) Test and Commissioning Instruments, Labour and Consumables, etc.

All labour, power, fuel, dummy loads and all instruments and appliances that may be required for the tests and commissioning shall be provided by the Contractor at the contractor's own expense that forms part of the total tendered amount.

Test instruments used to demonstrate capacities and characteristics specified or offered shall be tested for accuracy by an approved laboratory or by the manufacturer and certificates showing degree of accuracy shall be furnished to the engineer.

If gauges, thermometers, etc. which are to be left permanently installed are used for tests, they shall not be installed until just prior to the tests to avoid possible changes in calibration.

(e) Test and Commissioning Certificates and Records

The engineer reserves the right to attend or not to attend any of the inspections, tests or commissioning. Whether, the Employer or engineer attends these or not, written reports and test results shall be submitted to the engineer.

All certificates shall be in English.

All test and commissioning forms shall be completed in rough or final form during these operations.

All test certificates are to be countersigned by the Engineer as "witnessed" or "accepted" or "seen".

Four copies of test and commissioning certificates shall be handed over to the Engineer.

Handover of the certificates and records is a prerequisite for handover of the installation.

With Final Acceptance the Electrical Contractor shall accept in writing the responsibility for the total installation as installed by him certifying the correctness of the installation in accordance with and on the certificates of Compliance of electrical works. The contractor shall also be responsible to have the sections required to be completed by the Engineer and the Owner completed by them as required.

Copies of the completed certificates shall be distributed as follows:

(i) To the Client, 3 copies

(ii) To the Engineer, 1 copy

After completion of the works and before first delivery is taken, a full test (including a full load test) will be carried out on the installation for a period of 30 days, normal daily operation per day thereof, 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 Engineer, 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.

(f) Factory Tests and Inspections

The Contractor shall inform the Engineer as soon as any equipment or any part of an installation in the place of manufacture or on site is ready for inspections or tests.

The Engineer shall be given sufficient notice in advance of inspections or tests and final dates and times of such inspection will then be confirmed with the Contractor by the Engineer. The inspection or testing of manufactured equipment in a factory by the Contractor or by any other test facility in the presence of the Engineer must not be regarded as acceptance of responsibility by the Engineer for the correct performance of such equipment on site.

The Contractor shall provide a clean and safe testing area in the place of manufacture of any equipment to be tested and inspected by the Engineer. The area shall be open and accessible and tests or inspection will not be carried out in cramped or dangerous areas. No tests or inspections will be carried out in areas where overhead cranes or hoists are in operation.

All live equipment shall either be screened off or enclosed so that inspecting persons are not endangered during such tests or inspections. Inspections or tests will not be carried out near paint areas, paint booths, ovens, grinding or polishing areas or on equipment which are still under construction.

Tests will not be done by the Engineer in areas where a normal conversation cannot take place due to background noise. Tests on equipment emitting exhaust gases or other dangerous gases shall not be witnessed by the Engineer, if such gases are not expelled or exhausted away from the test area and out into free outside air.

Test equipment, test leads, clean writing top space and all other facilities shall be provided for the Engineer during such tests.

The Engineer reserves the right to instruct the Contractor to carry out the re-testing of any equipment which does not pass the first inspection or test.

The time and traveling cost of the Engineer for the purpose of any re-testing of equipment which did not pass the first or a previous test will be for the account of the Contractor. Any delays in Contract time caused by failures of inspections or tests will also be for the account of the Contractor

(g) Site Tests and Inspections

The inspections of the Engineer of any part of an installation or Works on site do not exempt the Contractor from his responsibilities in terms of the Contract. The Engineer will only accept the completed installation work after having received all test results, commissioning results and certificates of compliance or test certificates of the Supply Authority (if applicable) on completion of the whole of the Works.

The Contractor shall provide a clean and safe testing area on site of any equipment to be tested and inspected by the Engineer.

The area shall be open and accessible and tests or inspection will not be carried out in cramped or dangerous areas. No tests or inspections will be carried out in areas where overhead construction work is in progress.

All live equipment shall either be screened off or enclosed so that inspecting persons are not endangered during such tests or inspections.

Test equipment, test leads, clean writing top space and all other facilities shall be provided for Engineer during such tests.

The Engineer reserves the right to instruct the Contractor to carry out the re-testing of any equipment which does not pass the first inspection or test.

The time and travelling cost of the Engineer for the purpose of any re-testing of equipment which did not pass the first or a previous test may be for the account of the Contractor.

Any delays in Contract time caused by failures of inspections or tests will also be for the account of the Contractor

The Contractor shall carry out all tests and shall do all settings of electrical equipment to safeguard the equipment of other Contractors, before site testing is carried out by the Engineer. Any abnormal condition, beyond the control of the Contractor, which may come to the attention of the Contractor during any preliminary or final tests or commissioning procedures, shall immediately be reported to the Engineer.

The Contractor shall not allow equipment of other contractors to stay connected to, or operate with electric power from his installation if any equipment of other contractors do not operate normally or within the limits laid down by the manufacturer of equipment for other contractors.

E1031 INSTALLATION TESTS

Tests as stipulated in the " Occupational Health and Safety Act no. 85 of 1993, as amended, and in the "Code of Practice for the Wiring of Premises" SANS 10142 (as amended), must be done. These test report forms must be filled in fully and correctly in ink, signed by the installation electrician and handed to the Engineer or its representative.

Tests must be conducted on site after the whole installation is complete, unless written the Engineer to the contrary grants permission. The tests must include a full-load test for an adequate period to ensure the

satisfactory working of the installation. If negative test results are obtained, faults must be rectified and tests again done.

The Contractor shall supply all testing apparatus, correctly calibrated with calibration certificates.

All tests shall be carried out in conjunction with and to the satisfaction of the Supply Authority and in the presence of the Engineer or his representative. The Contractor shall make all arrangements for testing and inspection, the costs thereof being included in the Tender Price.

Each length of cable shall be tested for insulation and polarity by means of a 2000 Volt Megger for LV and 22kV low frequency tester on 11kV cables designed for that purpose. In the case of underground cables this shall be done before back filling. In addition, the earth-loop impedance of each conductor earth electrode shall be measured. The earth resistance shall be tested by means of an approved instrument.

"Danger" notices shall be displayed at remote ends of cables under test.

The Contractor shall ensure that the installation is completed in every respect and that there are no major defects prior to notifying the Engineer (in writing) for a first delivery inspection. The Engineer will accept zero minor defects during the final inspection. Should the number of defects be exceeded at the final inspection then the Engineer will terminate that inspection and request that the Contractor arrange an additional final inspection.

E1032 LEVELLING AND PLUMBING

All equipment shall be carefully levelled and plumbed, checked with a spirit level. Should any equipment be unsatisfactorily installed in this respect it shall be dismantled and reinstalled, the costs of making good to damaged structures, plaster and paint will be for the account of the Contractor.

It must be noted that boxes for imported accessories must be levelled and plumbed when installed, since the inserts cannot be levelled independently of the boxes.

E1033 DETAILED OPERATIONAL AND MAINTENANCE MANUAL

This manual shall contain the detailed descriptions of all switchgear and control equipment in transformer, distribution boards, control gear, MCC controls and equipment, stand-by generator, luminaires, earthing, etc. i.e. all proprietary assemblies, shall be provided to assist the user personnel of the Employer with advanced knowledge of the equipment for short, medium and long term maintenance- and operations of the plant and the works.

The descriptions must be complete in all respects and the Contractor shall also ensure that these manuals are prepared in such a manner that, in the opinion of the Engineer, a competent and qualified technician can trace any fault, identify any defective component, replace it with the correct spare part and follow, without difficulty, the exact function of every component.

To this end, care must be exercised to correlate the text with the circuit diagrams, to relate the diagrams one with another and to provide a simple method of diagnosis and test to be used wherever breakdowns occur. The manuals shall also include block diagrams giving the layout of equipment as well as a description of the function and operation of every unit in the system.

Five (5) copies of the manuals shall be neatly prepared, in typewritten and/or printed format, indexed, with appropriate dividers between each section to facilitate ready reference. All documentation shall be presented in the English language.

The description shall, as a minimum requirement, include:

1. Certificate of Compliance
2. All test results
3. “As-Built” Electrical Drawings
4. Operational and maintenance data and details of all assemblies or components of electrical equipment and material installed. Copies of operational manuals of manufacturers can be inserted in these descriptions. In the case of insufficient descriptions in manuals of manufacturers, the Contractor shall provide additional descriptions to enable maintenance of the equipment. The descriptions shall include:
    a. Technical details of all equipment installed.
    b. A complete description of the operation of all equipment.

c. A parts and spares list of every item of equipment together with a description of the item, the name, address and telephone number of the original supplier or wholesaler of the equipment. Brochures may be added as additional information but must not replace the data required.

5. Complete equipment schematics.
6. All manufacturers' handbooks having reference to the equipment.
7. Installation test and alignment procedures.
8. All circuit diagrams.
9. All interconnection and inter cabling diagrams.
10. Complete trouble shooting procedures and any other information deemed necessary to permit rapid and efficient maintenance of any part of the equipment by a qualified technician.

The Contract will not be regarded as completed and will not be accepted by the Engineer unless all the requirements for testing, drawings, manuals and the certification has not been completed and all data has been handed to the Engineer.

E1034 DRAWINGS

1 General

All details, dimensions and instructions shown on the Engineer's drawings shall form part of this Specification. The drawings generally show the scope and extent of the proposed work and shall not be held as showing every minute detail of the work to be executed.

The position of power supply points, mini-substations, distribution boards, luminaires, cable and conduit or sleeve routes may be influenced by site conditions (landscape, etc.) and must be established on site, prior to these items being built in.

If there is any discrepancy in or contradiction between drawings and specifications, it shall be referred to the Engineer in writing for a ruling.

The Contractor, his manufacturer and suppliers should note that approval of drawings and documentation is an approval in principle and in no way absolves the Contractor of his obligations regarding the correctness thereof or of any mishaps resulting from incorrect design, material selection, dimensions on drawings or any other aspect that will influence the efficiency or integrity of the equipment or the installation, fastening down or operating conditions of the equipment.

2 Contract Working Drawings

The Engineer's drawings covering the various sections of the installation are NOT listed and are to be provided upon tender award. The working drawings of the Contract shall, however, consist of:

- The Electrical Engineer's drawings;
- The Civil Engineer's drawings;
- The Structural Engineer's drawings, and;
- The Mechanical Engineer's drawings.

Unless otherwise specified, three sets of paper prints of the Engineer's drawings will be issued to the Contractor for installation purposes. Any further copies shall be purchased from the Engineer.

One set of paper prints of drawings by other Consultants and/or of other services for this project will be issued to the Contractor on request. Any further copies shall be purchased from the Engineer.

Where work is incorrect due to failure by the Contractor to consult the working drawings, the cost of corrective or remedial work shall be for the contractor's own account.

3 Drawings with the Tender

The following drawings and information shall be submitted with the tender:

By the Engineer upon issue of the tender to Tenderers:

- None

By the Contractor upon submission of the tender before tender closing date:

- None

Drawings and information required with the tender is to illustrate specific features such as layout or size of equipment offered.

These drawings are not regarded as workshop drawings. Workshop drawings shall be specifically and separately submitted as specified below.

4 Drawings after Tender Appointment

As soon as is possible after the contract has been awarded to him, **the Contractor must submit two (2) copies of the following drawings to the Engineer for approval.**

Design and construction drawings:

1. Detailed Distribution Board designs
2. MCC panel designs
3. Materials:
    - **a.** Luminaires

The following information, but not limited to, must appear on the drawings:

1. A full detailed layout with the arrangement of all necessary equipment, and on which all measurements of the equipment and the construction are indicated;
2. The detailed reticulation and ducting layout.
3. The detailed positioning, fastening method of equipment;
4. The make, ratings, catalogue number of all components proposed (e.g. capacity of insulators, circuit breakers, fuses, contactors, UPS, busbars, etc.;

The Engineer's acceptance of these drawings does not release the Contractor from his responsibility to supply the material in terms of this contract.

Submit to the Engineer duplicate prints of dimensioned general arrangement drawings of all lighting protection systems, earthing systems, distribution boards, cable reticulation, etc. Attend upon the Engineer, preferably with the manufacturers of the equipment, to discuss and agree any changes required in the drawings.

Modify makers' drawings as directed and, after acceptance by the Engineer, provide at least four prints of each for distribution to the parties to the contract.

On completion of the project update the drawings with any changes made during the course of the contract works and furnish the Engineer with the necessary prints for record purposes.

5 Workshop Drawings

Workshop drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor, Manufacturer, Supplier or Distributor and which illustrate some portion of the work.

Four copies of workshop drawings shall be submitted to the Engineer for approval and to demonstrate compliance with the Contract Documents.

The Engineer's approval of workshop drawings or samples shall not relieve the Contractor of responsibility for any deviation from the requirements of this Contract unless the Contractor has informed the Engineer in writing of such deviations at the time of submission of shop drawings or samples and the Engineer has given written approval for the specific deviation, nor shall the Engineer's approval relieve the Contractor of responsibility for errors or omissions in the shop drawings or samples.

The Contractor/Manufacturer/Supplier will be required to supply equipment layout and detailed drawings for all mechanical, electrical and instrumentation equipment where applicable.

If special foundations are required for equipment, detail foundation drawings must be provided by the Contractor. Foundation drawings shall show the concrete strength and reinforcing requirements together with any holding down bolt details.

The Contractor shall perform foundation cube test on the plinths of all structures. Furthermore, cubes shall be submitted to the Engineer for independent testing.

All equipment shall be fully dimensioned showing all fixing details, cable entry positions and other details and dimensions that may be required for designing the building or foundations.

Electrical and instrumentation drawings shall consist of detail circuit and wiring diagrams, overall schematic diagrams, and equipment layout and equipment details.

The drawings should also contain the voltage, power, current, resistance and other component values.

All mechanical drawings shall show equipment layouts and details and all static and dynamic loads where this is relevant to the design of foundations and base-plates.

6 As-built Drawings

As-built drawings must be submitted of all workshop drawings submitted during the contract period, unless written that the Engineer has granted exemption.

Submission and approval of submitted as-built drawings is a prerequisite to handover of the installation.

If the Contractor cannot provide as-built drawings for the installations, then the Engineer will arrange inspections to determine the positions of installed works. All costs for the inspections to determine and record the positions of the installed works will be recovered against the Contract Amount.

7 Drawing Requirements and Standards

All drawings shall be suitable for microfilming and comply with the following standards:

- SANS Code of Practice 0111;
- BS 308; and
- All drawings shall be in English.

Drawing symbols used shall be clearly defined and consistently used. Symbols shall be standardised and generally used such as BS, DIN or IEC symbols. The Contractor's own concoction of symbols, where standardised symbols exist, will not be accepted.

E2000 PARTICULAR SPECIFICATIONS

E2001 GENERAL

This Quality specification defines the Generals of materials and equipment, installation work and ancillary work to be employed in the electrical installation contract or sub-contract. The Project Specification defines the extent of work required.

E2002 REGULATIONS LAWS AND BY-LAWS

The supply and installation of the work shall be in agreement with the Conditions of the Contract with special attention to the following in particular:

a) The Occupational Health and Safety Act no. 85 of 1993, as revised, whereby SANS 10142 is enclosed.

b) Government notices.

c) The local Municipal By-laws and any special requirements of the local supply authorities.

d) The local Fire Office Regulations.

e) Telkom Regulations

f) Any special conditions specified in this specification.

It must be clearly understood that, where differences in the Generals occur as stated in (a), (b), (c), (d), (e) and (f) or where additional requirements are required, the higher General requirements shall apply.

In the event of any contradiction between (a), (b), (c), (d), (e) and (f), then (f) shall be accepted above the rest.

Where any required by-law or regulation, which applies or becomes applicable during the execution of the electrical installation, is in conflict with the stipulation of the document, the former must have preference in all cases. The Contractor must immediately notify the Engineer of such discrepancies.

The Contractor may not make any alterations to the installation before written sanction to do so is received from the Engineer or its representative.

E2003 LABELS AND NOTICES

The Contractor shall arrange for the labelling of all equipment, instruments, meters, relays, cables, etc., as indicated below.

Where identical items of equipment can be removed from their housings, e.g. HV circuit breaker carriages, plug-in relays etc., both the fixed and withdrawal portion are to be labelled identically.

All labels shall be ivorine or other back engraved white on black labels of the sizes indicated. They are to be located in purpose made holders or otherwise are to be screwed or riveted into position. “Dymo” tape or similar labels will not be accepted nor will labels, which are glued in position only.

Prior to any equipment being labelled, the Contractor shall request the Engineer to provide a complete labelling schedule for all items of equipment. Under no circumstances is equipment to be labelled in accordance with the drawings since any description thereon is for identification purposes during construction only and is unlikely to apply to the completed Works.

The following list indicates the general labelling requirements but does not limit the extent of labelling required, which shall encompass the full extent of the equipment supplied, or in the case of existing equipment, any such which is affected by this Contract:

50mm high lettering:

- Substation and mini sub designation;
- Outdoor switch gear designation;
- Transformer designation; and
- Distribution kiosk and fused feeder panel designation.

20mm high lettering:

- Main or sub-main board designation;
- Control panel designation; and

- Indoor switch gear designation.

5mm high lettering:

- Mini sub feeder breakers and isolators;
- feeder breakers and isolators;
- General distribution switchgear; and
- Socket outlets, light switches, fire detection / access control / surveillance devices, etc.

This size shall be used to designate the conductor size and number of cores of each cable installed under this Contract. In addition, all feeder cables shall be labelled at both ends indicating from where/to cables are feeding.

All distribution boards shall be provided with a label in both official languages reading “In case of leakage or accidental contact, put off main switch immediately”.

All distribution boards shall be provided with notices as required by the Machinery and Occupational Safety Act. All doors to such locations shall be fitted with the appropriate notices.

Where more than one similar item of equipment is fed from the same board or control panel, the item itself shall be labelled, this being fixed in a permanent position, i.e. not attached to motors, pumps, etc., but to bases or adjacent thereto. The lettering shall be 50mm high.

Each distribution board shall additionally bear a label indicating the source and size of the feeder to it.

For example: DB.A (Normal):

- Fed from Mini-sub 1;
    - 95mm² x 4 core cable + 70mm² BCEW.

Each feeder must be labelled at both ends with “Brother Tape” and a clear heat shrink to cover the tape. This label must indicate the size of the cable and from/to where the cable is feeding.

For example:

- 95mm² x 4 core cable + 70mm² BCEW:
    - Fed from DB.A to DB.B

Light switches, socket outlets, multi outlets, pop out boxes and isolators must be labelled indicating from/ to which DB and circuit it is feeding.

E2004 DANGER SIGNS AND NOTICES

Notices as stipulated in the latest amendment of the Occupational Health and Safety Act 85/1993 shall be installed in the transformer, generator and MCC rooms.

The notices shall be in English.

Notices shall be in accordance with SABS 872-1967 Industrial Safety Signs.

All notices shall be of the metal engraved type with a minimum metal thickness of 1 mm. The words shall be in red lettering on a white background.

The lettering shall be embossed and the colouring shall not fade in sunlight.

The following notices shall be exhibited at all designated entrances to electrical panels:

(a) A notice prohibiting unauthorised persons from entering;

(b) A notice prohibiting any unauthorised persons from handling or interfering with electrical apparatus;

(c) A notice containing directions as to procedure in case of fire;

(d) A notice containing directions as to restoration of persons suffering from the effects of electric shock.

(e) A Skull and Crossed Bones danger notice shall be installed on each door.

(f) One nameplate shall be provided and mounted on each access door, with lettering at least 100 mm in height

E2005 EARTHING AND BONDING

E2005.1 General

The entire installation shall be properly and effectively earthed and bonded as prescribed in the Wiring Code and as specified, a maximum of 10 Ohm. The Contractor will be responsible for all earthing and bonding of the installation. The earthing and bonding is to be carried out strictly as described in the SANS 10313:2012, SANS 10292 and SANS 10142-1 and associated normative references and to the satisfaction of the Engineer.

Self-tapping screws are not acceptable as a means of securing earth conductors.

The armouring on all cables coming into switchboards shall be bonded together and bonded onto the earth bar. The armouring of cables shall not be considered as an effective earth conductor.

All earthing work must be executed before any painting commences.

All the housing of metal luminaires or electrical equipment shall be earthed.

Iron, lead and zinc shall not be used in direct contact with copper earth bar or conductors.

The earth to all light and power points shall consist of correctly sized stranded copper conductors and shall be drawn in with the conductors and terminate at the earth terminal of the equipment being supplied.

Jointing and "tee offs" of lengths of strip conductor shall be performed by means of **brazing or by tinning and bolting**. An overlap of minimum three times the width of the conductor shall be allowed for longitudinal joints. The bolts used shall not have a diameter greater than one-third the width of the copper strip. Brazed joints shall be brazed on all accessible sides and be smoothly and neatly finished off. The "Cadweld" method of jointing may be used on strip copper connections/tee offs. Tinning, riveting and soldering are also permissible (copper rivets).

Stranded copper conductors shall be joined by means of tinning and then bolting with 2 line taps (of the correct size) per joint or by means of specified clamps. An overlap of minimum 300mm shall be allowed. Stranded copper shall not be joined by means of brazing.

The covering, including the insulation (if any) of an earth continuity conductor shall be green or taped green at a termination.

Except where otherwise approved, conduit or flexible conduit or cable armouring shall not be used as an earth continuity conductor.

Where lugs are used for terminating stranded earth conductors, the lugs shall be hexagonally crimped with an approved type of crimping tool. The lug stud size shall correspond to the fixing bolt and the lug is to be so positioned that the full contact area of the lug is utilised.

All bolts/screws used for earthing shall be high tensile steel, brass or cadmium plated mild steel bolts.

All earthing conductors, shall be installed in such a manner that the earthing system shall remain continuous, should a particular connection be disconnected.

Earthing continuity in conduits, cable trays, wire-ways shall be maintained, i.e. expansion boxes, junction boxes, etc.

The continuity of the earth conductors should be tested and recorded. In no case should the resistance from any point of the installation to the point of supply exceed 0,09 ohms. In the event of this value being exceeded this must be brought to the Engineer's attention.

Where connection is made to painted steelwork the paint shall be removed over a minimum area to allow good contact between surfaces. Surfaces shall be coated with petroleum jelly before bolting. After bolting any scraped area not covered by the copper connection shall be made good by using the original type and colours of paints.

Where connection is made to galvanised steelwork the surfaces shall be coated with petroleum jelly prior to bolting.

The Contractor shall also ensure the resistance of the earthing systems shall incorporate the step potential, touch potential and other requirements and per the associated SANS standards.

The Contractor shall ensure that shall be possible to link the electrical system earth to the lightning protection earth via a several removal earthing links throughout the structure.

Neutral points of each separate system shall be earthed at or adjacent to the substation only. These neutrals shall be connected to the common earth.

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 distribution panels shall be connected to the common earth conductor with T-ferrules or soldered. The common earth shall not be broken.

E2005.2 Inspection and Testing

Inspection of earthing laid in trenches shall be requested by the Contractor (in writing) at the following stages:

Placing and compacting of lower bedding material in trenches;

Pulling and jointing of earth conductor and driving of earth rods;

Placing and compacting of upper bedding material; and

Completion of backfilling, manholes and terminations.

Inspections of the complete job may be called for where interim inspection certificates cannot be produced, by excavating at the Contractor's expense, at any position along the route and checking that the correct procedure and dimensions have been adhered.

The Contractor may be called upon, at his own expense, to repeat resistance and/or continuity tests in the presence of the Engineer, if the latter did not witness the initial measurements and to open portions of the work where interim inspections were not held.

The resistance between the main earth system and the earth mass shall be measured by the Contractor in the presence of the Engineer by the method specified or approved.

The earth and bonding continuity shall be tested in accordance with the Wiring Code.

Test results must be submitted to the Engineer in writing for written approval before the system is permanently covered or handed over.

E2006 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 galvanized, is specified in the drawings, but preferably galvanised steel conduit for the electrical system.

Unless other methods of installation are specified for certain circuits, the installation shall be in conduit throughout. No open wiring in void 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 National Standards.

a) Screwed metallic conduit and accessories: SANS 1065, parts 1 and 2.

b) Plain-end metallic conduit and accessories: SANS 1065, parts 1 and 2.

c) Non-metallic conduit and accessories: SANS 950

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 access control, fire detection, surveillance, lighting and electrical socket outlet circuits, the conduit used shall have an external diameter of 32mm, 25mm or 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 above of this specification or indicated on the drawings.

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 conduits 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 screeding 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 Engineer's inspection, 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 conduits will be tested with a mandrel to ensure that no blockages have occurred. If there are blockages, the blockages will be rectified at the Contractor's own expense.

E2007 SURFACE MOUNTED CONDUIT

Wherever possible, the conduit installation is to be concealed in the building work; however, where unavoidable or otherwise specified in this specification or indicated on drawings, 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 coupling as a lock-nut.

Conduit is to be run on approved spaced saddles rigidly secured to the walls, beams and ceiling.

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 surface mounted or recessed where indicated on the drawings.

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

Where structural operations are to be carried out, all surface conduit will be painted by the structural Contractor.

In all other instances the electrical Contractor shall allow for painting of surface conduit (either metallic or PVC where specified) with two coats of good quality enamel paint, and the colour shall match the surrounding building finish.

Lugging and welding of saddles and joints to the building structure surfaces may be required provided that they are not chemically reactive with building material, hence only non-reactive material is to be used for securing the conduits to the building, ceiling, walls, etc...

E2008 CONDUIT IN CONCRETE SLABS

In order not to delay building operations the Contractor must ensure that all conduits and other electrical equipment which are to be cast in the concrete columns and slabs are installed in good time.

The Contractor shall have a representative in attendance at all times when the casting of concrete takes place.

Draw-boxes, expansion joint boxes and round conduit boxes are to be provided where necessary. Sharp bends of any nature will not be allowed in concrete slabs.

Draw and/or inspection boxes shall be grouped under one common cover plate and must preferable be installed in accessible areas.

All boxes, etc., are to be securely fixed to the shuttering to prevent displacement when concrete is cast. The conduit shall be supported and secured at regular intervals and installed as close as possible to the neutral axis of concrete slabs and/or beams.

Before any concrete slabs are cast, all conduit droppers to switchboards shall be neatly spaced and rigidly fixed.

E2009 FLEXIBLE CONNECTIONS FOR CONNECTING UP OF EQUIPMENT, ETC.

Flexible tubing connections shall be of galvanised steel construction, and in damp situations of the plastic sheathed galvanised steel type. Other types may only be used subject to the prior approval of the Engineer.

Connectors for coupling onto the flexible tubing shall be of the gland or screw-in types, manufactured of either brass or cadmium or zinc plated mild steel, and the connectors after having been fixed onto the tubing, shall be durable and mechanically sound.

Aluminium and zinc alloy connectors will not be acceptable.

E2010 CABLE TRAYS, RACKING AND SUPPORTS

The Contractor shall allow for the supply and installation of the necessary racks, conduit and supports, which shall include straight lengths, bends, elbows, tees, reducers, brackets, fixing and fastening materials, earthing of racks and touch-up painting.

Cable racks shall be galvanised basket trays along and within structure installations, and ladder rack for long overland sections and conveyors. Tees, bends, etc shall be of similar construction where required. Joints shall be by means of fish plates. The construction of racks and accessories shall be compliant to SANS 10142-1 and applicable normative standard references. The standard width to be used shall be 300mm.

Cable racks shall be planned taking cognisance of the applicable drawings, but the Engineer's site representative is at liberty to select the most practical solutions to be implemented. If lack of clarity still prevails, the Engineer's site representative shall be consulted.

The cable trays / racks shall be sized to allow for 20% future extension.

Cable racks shall be installed in the vertical plane unless otherwise indicated and not deviate from the racking and routing installation drawing.

Horizontal cable racks shall be installed 450 mm below steelwork or slabs to facilitate access. Multiple runs shall be spaced at least 300 mm apart.

All racking shall be continuous and earthed. Where multiple racks are installed, they shall be electrically bonded together at 10 m intervals.

Racks, angle-iron and brackets shall be galvanised and where cutting is done cut sections shall be re-protected with cold galvanising.

Conduits that are appropriately terminated shall be used where cables leave main racks to feed individual items. Should more than two leave the main racks, then ladder or wire mesh supports shall be used.

Cable racks shall be supported by rigid steel brackets in such a way that there is no noticeable deflection between supports. The maximum distance between supports shall be:

Ladder rack installed in the vertical plane 3.0 m;

Basket rack installed in the vertical plane 1.5 m;

Ladder rack installed in the horizontal plane 1.5 m;

Basket rack installed in the horizontal plane 1.5 m.

Cables installed along the racks shall be clamped at every 2.0m interval and shall be spaced sufficiently to avoid de-rating

A bracket shall be provided at every change in direction of racks or angle-iron supports. Racks supports shall be continuous and bends shall have radii not less than the minimum permitted bending radius for any cable or pipe thereon.

The Contractor is required to check, prior to installing the racks / angle-iron supports, that routes given in the drawing are unobstructed and do not obstruct other reserved spaces. If such clashes are observed, they shall be reported to the Engineer.

Excessive use of brackets and support steel will not be accepted.

E2011 WIRING CHANNELS AND BUILDING DUCTING

1. Wiring Channels

General

The channels shall be manufactured of rolled sheet steel.

The minimum thickness of the sheet steel shall be:

(a) 1,6mm for ribbed channels with a maximum width of 42mm.

(b) 2,5mm for unribbed channels with a maximum width of 42mm.

(c) 1,2mm for channels with a width in excess of 42mm.

The channels shall be finished as follows:

(a) In coastal areas (under all installation conditions) Hot-dip galvanised or epoxy powder coated

(b) Cast in concrete Pre-galvanised

(c) False ceiling voids Pre-galvanised

(d) Vertical building ducts Hot-dip galvanised or epoxy powder coated

(e) Surface mounted in plant rooms, substations, service tunnels, basements Epoxy powder coated or electro-galvanised

(f) Damp areas, exposed to weather, underground runs in contact with earth Hot-dip galvanised or epoxy powder coated

(g) Undercover industrial applications Hot-dip galvanised or epoxy powder coated

The above-mentioned finishes shall apply unless specified to the contrary or approved by the Department. Hot-dip galvanised ducts shall be cold galvanised at all joints, sections that have been cut and at places where the galvanising has been damaged. Powder coated ducts shall likewise be touched up at joints, cuts and damaged portions using methods recommended by the manufacturer of the channels.

Cover Plates

All channels shall be supplied with cover plates,

Channels up to 127mm wide shall have snap in cover plates of metal or PVC.

For channels wider than 127mm only metal cover plates shall be used.

The finish of steel cover plates shall be the same as the finish of the channels.

Accessories

All accessories i.e. hangers, brackets etc. shall be purpose made and in general have the same finish as the channels.

Wiring Supports

Wiring supports shall be provided in order to prevent the wires falling out when cover plates are removed.

2. Building Ducting

General

The ducting shall be manufactured of 1.2mm thick rolled sheet steel or rectangular tubing. Galvanised steel shall be used or shall be epoxy coated after manufacture.

Outlets

Outlets shall be provided on a modular basis in the ducting to accommodate pedestal or recessed socket units. Tapped holes shall be provided to fix the pedestal units to the ducting.

Draw boxes at junctions of perpendicular ducts shall have removable barriers for wiring and shall be provided with a heavy gauge cover plate.

Pedestals

Pedestals shall be manufactured of die-cast aluminium or pressed steel.

The finish of pedestals shall be epoxy powder coating of an approved colour.

E2012 SLEEVES

Cable sleeves shall be provided where shown on the drawings and wherever necessitated by installation conditions. Sleeves shall be of steel water pipe when traversing railways sidings, heavy duty tarmac, loading areas, etc.; they shall be of other approved materials where traffic loading is lighter (heavy duty class 34 uPVC sleeving with a wall thickness of not less than 1,5mm thick or equivalent HDPE sleeving and a smooth finish inside).

*Cable sleeves shall not be less than 100mm internal diameter unless specifically noted otherwise in SECTION E; they shall be of continuously smooth bore with no snags or hitches en route and shall encompass only easy sweeping bends permitting the easy passage of the heaviest cable involved. No cable sleeve shall exceed **ten** meters without a manhole draw position, unless authorized in writing by the Engineer.*

The standard colouring coding system for underground service sleeves are:

- Black – electricity

Cable sleeves entering a floor cable duct shall be swept gently to the level of the bottom of the trench so that cables do not kink at entry to the trench. Cable sleeves brought to switchboards or distribution boards having no associated floor cable ducts, or brought to rising cable ducts shall be swept up easily so that the cable emerges vertically from the floor. In cases where the emerging cable is exposed to view, wooden dams shall be fitted round the cable at the top of the sleeve, and the floor screeded completely round the cable. The outer ends of cable sleeves entering buildings shall, after drawing in the cables, be water proofed with cable compound of low melting point.

Sweeping bends shall be installed where sleeves enter distribution boards. Sharp sleeve bends are not acceptable.

Cables attached to external walls must be placed in a recessed galvanized pipe from 300mm below ground level into the meter box or into roof spaces complete with brass bushes at both ends.

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.

The Electrical Contractor shall ensure that all required sleeves are installed in the correct positions.

E2013 FEEDER CABLES AND CONNECTIONS

1 General

The Contractor shall ensure that all Certificate of Compliances are done prior to commissioning of the connection.

2 HV and LV Cable Work

The sizes and routes of high voltage and low voltage cables are indicated on the drawings and in these documents.

Medium Voltage cables shall be 3-core Copper XLPE insulated, copper tape screened, and PVC sheathed Type B 6.35/11kV cable manufactured to SANS 1339.

Low voltage cables shall be either

1. Un-armoured cables: PVC-insulated/PVC-sheathed.
2. Armoured cables: PVC-insulated/PVC-bedded/armoured/black extruded PVC outer sheath.
3. Armoured cables: PVC-insulated/PVC-bedded/armoured with ECC/ black Flame Retardant extruded PVC outer sheath.
4. Single core cables: PVC-insulated/unsheathed.

As indicated on the drawings with Copper or Aluminium conductors as indicated which shall comply with the requirements of SANS 1574, SANS 1507 and those of the Quality Specification in all respects.

The conductors shall be of high conductivity annealed stranded copper and the cores may be shaped or circular.

Low voltage cables insulation shall be general purpose PVC, 600/1000 Volt Grade.

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

Low voltage cables, cable terminations and cable joints shall comply with the requirements of SECTION E.

All new cables shall be provided with enhanced armouring suitable for E.C.C. use and cable glands are to be provided complete with E.C.C. connection washers to allow for correct earthing techniques to be followed, as specified.

Earth continuity conductors are to be run with all cables constituting part of the low tension distribution system. Such continuity conductors are to be stranded insulated copper of a cross-sectional area equal to at least that of one live conductor of the cable.

Cables shall be labelled, cable routes marked and terminated as per the requirements of the Quality Specification (Labels and Notices).

The installation of cables in cable ladders/trays shall comply with the requirements of the Quality Specification.

The electrical Contractor shall determine the present cable routes of all existing underground cables as and when required for the contract work and shall allow for this requirement as part of his bid sum.

The dielectric shall consist of PVC suitable for MV, LV and Intermediate Voltage use. It shall be distinctly coloured as detailed in Table I of SANS 150/1970 so as to identify the phase, neutral and earth conductors with the phase conductors being coloured red, white or blue, the neutral conductor black and the earth conductor green/yellow or green.

The whole of the dielectric shall be coloured - surface painting or a longitudinal coloured stripe is not acceptable.

3 Danger Tape above Cable

For all cables, a coloured plastic-marking tape shall be installed 200mm above the cable. The tape shall be yellow, with red skull and crossbones with the words “ELECTRIC CABLE “. These markings shall not be more than 1m apart from centre to centre.

4 Schedule of Cables

The following sizes of cables for power- and control purposes are required for this contract:

FROM	**TO**	**CABLE SIZE (mm²) Copper**	**EARTH CONDUCTOR SIZE (mm²)**
As per Line Diagram			

NOTE: THESE ARE THE MAJOR CIRCUITS AND DOES NOT LIST ALL CIRCUITS AND ALL CABLE ROUTES. THESE SHALL BE DETERMINED ON SITE WITH THE ENGINEER AND THEN MEASURED BEFORE ANY CABLES ARE ORDERED.

4 Excavation

The Contractor shall be responsible for all trenching excavations unless specified to the contrary.

Low voltage cables shall be laid at a depth of 1000mm under final ground level. Trench excavated to a depth of 1650mm x 450mm wide.

Intermediate voltage cables shall be laid at a depth of 1200mm under final ground level. Trench excavated to a depth of 1350mm x 450mm wide.

Medium voltage cables shall be laid at a depth of 1200mm under final ground level. Trench excavated to a depth of 1350mm x 450mm wide.

5 Terminals

Terminal bodies and screws shall be of non-corrosive metal, enclosed in fire resistant, moulded plastic insulating bodies. Terminal bodies or screws shall not project beyond the insulating material and shall afford suitable protection against accidental contact by personnel and against short circuits and tracking.

The construction of the terminal block and mounting rail shall be such as to ensure a firm and positive location of the terminal blocks. It shall be possible to add additional terminal blocks within the terminal sequence without having to disconnect or dismantle the terminal strip. The terminal blocks shall be held in position by means of standard end clamps.

It shall be possible to intermix terminals of various sizes, i.e. for different sizes of conductors, whilst utilizing the same mounting rail. Where smaller terminal blocks occur adjacent to larger terminal blocks, suitable shielding barriers shall be inserted to cover the terminals that might otherwise be exposed.

The terminal bodies and clamping screws shall be so constructed as to ensure that conductors are not nicked or severed when the clamping screws are tightened. Screws shall not come in direct contact with the conductors.

Terminals shall be sized and rated to match the conductors that are connected to them.

Each terminal block shall have provision for clip-in numbering or labelling strips to be installed, together with protective, clear caps over the sheets.

All control wiring ends on all terminals and equipment shall be pin-lugged.

Neutrals shall not be cut, but shall be done on a loop-in basis on lugs.

6 Conduit and Conduit Accessories

It is a requirement of this contract that all conduit and accessories used shall be PVC, fire detection related systems shall require galvanised steel conduit.

All the surface mounted power points conduits must be installed surface mounted on the structure.

It is the responsibility of the Electrical Contractor to see that boxes and conduits are installed correctly.

7 Power Points

All power points shall be installed in positions as indicated on the layout drawings.

It is the responsibility of the Electrical Contractor to plug the conduit ends in all boxes to stop ingress of debris and to clean the boxes before wires are drawn in.

8 Wiring of Circuits

All polyvinyl chloride (hereafter called P.V.C.) insulated copper conductors, for the wiring of circuits must comply with the requirements of SANS 1507.

Deviations from SANS 1507 shall only be permitted when such deviations are allowed by the stipulations in SANS 10142.

P.V.C. insulated conductors shall be of the general purpose 1000V grade.

Except if specified to the contrary, no more than one circuit of the same type shall be drawn into one conduit.

Circuit wiring shall be done with the loop-in method. The cutting off of conductor strands, joining of conductors in draw boxes and cutting away of insulation material will not be allowed.

Wiring of conduits shall not commence until all boxes are clean and free of debris.

Wires shall be strained upon draw-in in conduits and enough slack shall be left for proper connections to switches, socket outlets and luminaires.

All wired circuits shall be complete with earth wires.

9 Sealing glands for PVC insulated cables

The sealing glands must consist of a sleeve in which a conical bush screws into one side and a nickel-brass or galvanized steel lock nut is situated on the other side. The galvanizing must meet SANS 763 as amended standards. The sleeve must have a hollow groove on the side on which the cable enters the sleeve to house the top ring of the waterproofing mantle.

The waterproofing mantle must be manufactured from non-weathering neoprene or other synthetic rubber and must be proof against water, oil and sunlight. These mantles must fit snugly over the sealing glands and the cables.

Sealing glands must have a 150 screw thread and must be suitable for the specified cable sizes.

E2014 UNDERGROUND CABLE NETWORKS

1 Scope

This specification covers the laying and joining of cables for underground high-voltage and low voltage systems.

2 Interpretation

2.1 Supporting Specification

The following specifications are part of this specification.

a) SANS 97 : Electrical cables with impregnated paper insulation;

b) SANS 1507: Electrical cables and flexible cords with poly-vinyl chloride (PVC) insulation;

c) SANS 61442: Electric cables: Test methods for accessories for power cables with rated voltages from 6 kV (Urn – 7.2 kV) up to 30 kV (Urn = 36 kV);

d) SANS 10198: The choice, handling and installation of electrical power cables with a rating not exceeding 33 kV;

e) SABS 60502-4: Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Urn = 1.2 kV) up to 30 kV (Urn = 36 kV) - Part 4: Test requirements on accessories for cables with rated voltages from 6 kV (Urn = 7.2 kV) up to 30 kV (Urn = 36 kV);

f) NRS 012: Cable terminations and live conductors within air insulated enclosures (insulation co-ordination) for rated A.C. voltages of 7.2 and up to and including 36 kV;

g) NRS 013: Medium Voltage Cables;

h) NRS 028: Specification for crimped lugs and ferrules;

i) NRS 053 : Accessories for medium voltage power cables (3.8/6.6 kV to 19/33 kV);

j) NRS 075 : Specification for mechanical torque shears connectors;

k) SANS 9001: Quality Systems: Requirements;

l) SANS 1200 C: The clean-up of the site;

m) SANS 1200 DA: Ground works (small jobs);

n) SANS 1200 DB: Ground works (pipe trenches);

o) SANS 1200 LB: Scatting (pipes);

p) SANS 1200 LC: Cable ducts;

q) SANS 1339: Electrical cables with insulation of cross-linked polyethylene (XLPE) Insulated Electric Cables;

r) SANS 1411-2: Materials of insulated electric cables and flexible cords – Part 2: Polyvinyl Chloride (PVC);

s) SANS 1411-7: Materials of insulated electric cables and flexible cords – Part 7: Polyethylene (PE);

t) Relative Local Authority Standards and Regulations

2.2 Implementation

This specification includes clauses which is in general applicable to underground network systems for electrical power supply. The interpretation of, and variations to this specification is explained in SECTION E of the project specification.

2.3 Terminology

The terminology in the applicable supporting specifications, as given in 2.1 and the following terminology applies to this specification.

Core

A single insulated conductor without any protective housing.

Screened cable

A cable in which every core is separately encased by a conducting layer to ensure that the conductor is surrounded by a radial electric field when it is energised.

Belted cable

It is a multi-core cable where a part of the insulation covers each conductor and the rest of the insulation covers the combined cores.

Pilot cable

A cable which is normally used for measuring (control) or safety or communication circuits or all three.

Phase sequence

The sequence in which the phase voltages of a multiphase system reach its maximum values.

High voltage (HV)

Voltages with RMS value higher than 1 000V.

Cable

A length of core (or a length of 2 or more cores, laid up) which, in total, can be provided with a mechanical housing.

Low voltage (LV)

Voltages with RMS value of 1 000 V or lower.

Mass impregnated non-draining cable (MIND)

A cable of which the surplus impregnated-agent was not removed during production because the cable is non-migrating at the conductor's working temperature.

Ambient temperature

The temperature of the air 400mm above ground level at the bottom of the ditch, where applicable.

Thermal resistivity

The resistance against the flow of heat in a dielectric (Unit: K.m/W).

Consumer distribution unit (CDU)

A switch-box for LV service connections connecting the network and one or more consumer supply points.

2.4 Abbreviations

The abbreviations in the applicable part of the specification given in 2.1 and the following abbreviations apply to this specification.

Al :Aluminium

Cu :Copper

CNE :Combined neutral and earth

CDU :Consumer distribution unit (LV – distribution connecting box) (see def. in 2.3)

HV :High voltage (see definition in 2.3)

LV :Low voltage (see definition in 2.3)

MIND :Mass impregnated non-draining cable

PME :Protective multiple earthing

PI :Plasticity index

PILC :Paper insulated, lead covered

PVC :Poly-vinyl chloride

SWA :Steel Wire Armour

XPLE :Cross-linked polyethylene cables

3 Material

3.1 Graded Backfill material

Graded backfill material must be used to cover the cable(s) and to ensure good embedding. The material must be earth with low clay content, with a maximum PI of 6 and a maximum resistivity of 1,2 K.m/W and must be free of all plant materials, clots and stones with diameter bigger than 15mm, except in situations where other limits are specified in the project specifications. Sea or river sand is not acceptable because of its high thermal resistivity.

3.2 Grading

The Contractor may not waste excavated material that complies with 3.1 by removing it. The Contractor is not compelled to use selective methods of excavation. He is allowed, (but not forced) to sift the excavated material, treat or process the material in any other way to make it suitable to cover the cable(s) and to prevent material that is suitable for fill material or main fill material to become buried or contaminated.

If suitable material for graded backfill material is not freely obtainable form excavations, the Contractor must obtain material from other excavations on site or by opening quarries or by importing suitable material from commercial or other approved sources.

3.4 Cable Route Markers

Cable route markers must be provided if required and according to the project specifications.

3.5 Cable Joints and Cable Terminations

Cable joints and cable terminations must be of an approved type, e.g. heat shrink or mechanical sealing type. All cable ends must be insulated via heat shrink.

All high voltage cable joints must be done by an approved artisan. Paper insulated cable joints may be done with heat shrink joints else will be encased by a cast-iron joint box, designed for this purpose. The fill material must comply with BS 1858. XPLE cables must be jointed with heat shrink joints. The electrical continuity, screening and armouring may in no way be negatively influenced by the joint.

All heat shrink terminations must be supplied as a unit, including all necessary parts. The termination must be designed for the specific cable and application. Outdoor terminations must be designed to prevent arcing under any pollution and weather conditions to which it may be subjected. The joints to be used must adhere to the local supply authority specifications and requirements.

Cable glands shall be used according to the manufacturer's recommendations. All cable glands shall be manufactured from brass.

Cable shoes must be "Hex" crimped onto the cable ends with a purpose made tool. Cable shoes must be encased with a heat shrink sleeve of which the colour corresponds with the phase of each cable core.

3.6 Protective Concrete Slab

Where protective concrete slabs are required in the project specifications, it must have the following nominal measurements:

Length : 1m;

Width : 230mm; and

Depth : 50mm.

The slabs must be manufactured of 20 MPa concrete. Each slab must have one armament rod along the length and 3 across the width. The rods must be manufactured using mild steel with a nominal diameter of 8mm. If not, the slabs must be manufactured as specified in the project specifications.

3.7 Plastic Warning Tape

Plastic warning tape must consist of a strip of polyethylene, at least 0,04mm thick and with a nominal width of 150mm or 230mm (as specified in the project specifications). The warning tape must be totally impregnated with pigment so that it corresponds with colour no B26 (light orange) of SANS 1091 in a reasonable way. A black triangle and the flash symbol for electricity, which corresponds with sign WW7 of SANS 1186 as well as the words "DANGER, GEVAAR, INGOZI" must be printed on the full length of the tape with maximum intervals of 1 meter.

4 Construction Equipment

4.1 Compaction Equipment

Sufficient manual compaction equipment must be supplied for the compacting of the graded backfill material around and above the cables, sleeves and in trenches.

5 Installations

5.1 General

Trench excavations must comply with the requirements of SANS 1200 LC and SANS 1200 DA. No cables may be laid before the site is cleaned and the mass earthworks, which is done by others, is completed.

Every trench must be kept as straight as possible and must be dug to approved levels and measurements. The bottom must have an even contour.

Trenches dug close to railway lines, walls, roads, drains, pipes, cables, structures and on similar places where the danger of sagging exists, must be secured against such dangers and it must be done in such a way as to prevent possible injuries to construction personnel and the public. All these excavations must be done to the satisfaction of the Engineer and the public authorities concerned.

Bedding materials may not be laid until the trench has been approved by the Engineer. The Engineer might expect proof from the Contractor that the minimum depth of bedding material is provided before giving authority for the cables to be laid.

5.2 Guarding, Barricades, Lighting and Traffic Intersections

The Contractor must arrange guarding, barricades, lighting and traffic intersections for work in public roads. This arrangement must comply with the applicable Road Traffic Ordinance, the requirements of the Occupational Health and Safety Act (Act 85: 1993), the project specification and the applicable requirements of sub clause 5.0 of SANS 1200 DA.

5.3 Protection of Structures

In cases where work has to be done in the vicinity of buildings, bridges, tanks or other structures, the Contractor must take all the necessary precautions as required by the Occupational Health and Safety Act (Act 85: 1993) and the Mines and Industries Act of 1956, (Act 27: 1956). These precautions shall include shoring where necessary, to ensure the safety of structures which is subject to danger during installation.

5.4 Protection of Surface and Underground Services

The Contractor must take all the necessary precautions to protect all existing services (meaning services on the site, which is shown on the drawings) and he will be held responsible for all damages to these services, caused by his activities. All works and protection arrangements are subject to approval and it must only be done after consulting the owner(s) of the various services. Should a service be damaged, the Contractor must immediately inform the Engineer and the authorities concerned. The Contractor may not repair the damaged service, unless he is instructed to do so.

In cases where no underground services are shown on the drawings or recorded, but the possible presence thereof cannot be discarded, the Contractor must, in conjunction with the Engineer, establish if any such services exist within the applicable site area. The Contractor must in good time complete such investigation before construction may start on the area concerned. A report must be issued to the Engineer whom will make the necessary arrangements for the protection, removal or relaying of the services prior to the commencement of any construction work.

Upon the discovery an underground service previously not indicated on the drawings, this service will be classified as ‘n known service and the Contractor will be held responsible for any damages thereof during all further works. In cases where such service is damaged with the initial discovery, the Employer will cover the costs of repairing the service, except if the Employer can prove that the Contractor did not take the necessary precautions and that the damage could have been prevented. Should the authorities concerned prefer to make the changes or arrangement for protection of services on their own expenses, the Contractor must co-operate with such authorities, and give reasonable access, working area and time to complete the necessary work. Permanent changes to or permanent relaying of services which is necessary to complete the work and which is authorised, will be compensated for, there will be no compensation for work carried out and not previously investigated by the Engineer and for which no written instructions were issued.

5.5 Conduct with Respect to Water on Site

The Contractor must give proper attention to water and remove it to ensure that the works are kept dry enough so the work can be properly executed. For this purpose he must provide, use and keep in order, pump equipment, water sand pens, pipes and other equipment that might be needed. He must also provide fresh drains, trenches, coffer-dams and other temporary works that might be necessary to keep damages, inconveniences and disturbances at a minimum.

5.6 Pollution

The Contractor must take all reasonable precautions to the satisfaction of the Engineer to keep dust disturbance, pollution of streams and inconveniences or annoyances to the public (or others) because of the execution of the work, at a minimum.

5.7 Safety

The Contractor must at all times provide proper and adequate precaution and safety arrangements on site. Should the Contractor fail to comply with this requirement, the Engineer will take the necessary steps to ensure that this requirement is met and any costs incurred will be for the Contractor's account. Complying with this requirement does not exonerate the Contractor of his responsibilities and duties in accordance with the Occupational Health and Safety Act (Act 85: 1993) and mines and Industries Act of 1956, (Act 27: 1956). Symbolic safety signs must comply with the applicable requirements of SANS 1186.

5.8 Minimum Base Width of Trenches

The minimum base width of each trench must be wide enough for the cable spacing which is specified in the project specifications. Each trench must be excavated in a way that half the specified width will be left on both sides of the designated centre line of the cable or group of cables. The trench width must be adequate for the proper compacting of the fill materials when backfilling is done. (In the case of trenches for cable sleeves or –ducts, see sub clause 5.1.1 of SANS 1200 LC).

5.9 Cleaning of Route

The Contractor must clean an area wide enough to ensure that his inspection is not obstructed along the cable trench as specified in SANS 1200 C. In cases where the cable trench falls within a servitude or passage-way of specified width, the damage to the vegetation of the named servitude or passage-way must be limited.

6 Backfilling

6.1 LV Cables

In trenches containing one or more low voltage cables, the approved fill material must be cautiously placed, in layers of 100mm un-compacted depth, throughout the width of the trench and then compacted to a minimum compacted depth of 150mm as specified.

6.2 HV Cables

In trenches containing one or more high voltage cables the approved fill material must be placed in the trench as specified. Should the project specification require a layer of protective concrete slabs or plastic warning tape, this must cautiously be centred over the high voltage cable after the first layer of approved uncompressed fill material.

6.3 Compaction

In areas subjected to road traffic and any other such area which is specified in the project specifications the trenches must be refilled in layers of maximum 150mm depth (after compaction) and in case of soil sticking together (clay material) it must be compacted up to 93% of the modified AASHTO-density or in the case of non-sticky soil (sandy material) up to 98% of the modified AASHTO-density.

Machine compaction will not be permitted directly above the cable(s) or sleeve(s) before a layer of 300mm depth fill material has been placed on top of the cable(s) or sleeve(s). The machine compaction must be conducted in such a way that the forces superimposed on the cable(s) or sleeve(s) does not exceed that superimposed by ordinary pedestrians or light vehicle traffic when the cover is already 1 m deep. If road traffic is involved, the cable(s) must be protected by a cable-way or –sleeve of at least 100mm in diameter, through which the cable(s) can be drawn at any time. Cable-ways beneath subways must be cast in concrete in a suitable way, if it is required by the project specifications.

6.4 Cables at Different Depths

In situations where cables are laid at different depths in a common trench, the same procedure for placing and compaction of the approved fill material beneath and on top of the upper cable applies as for the lower cable.

In situations where cables have to be laid on top of each other the high voltage cables must be laid under the low voltage cables. (See drawing LC-1 in SANS 1200 LC).

6.5 Conduct with Respect to Obstructions

In cases where obstructions are encountered during excavation that demands changes to the trench or a special kind of trench, the Contractor must have the Engineer's approval to implement such changes before laying the cable(s).

7 Excavated Material

7.1 Stacking

The excavated material must be placed along the trench in such a way that it does not obstruct or damage adjacent fences, trees, drains, gate openings and other properties and must be heaped up in such a way that traffic is not obstructed. Should this not be possible, the material must be removed from site, with the Engineer's approval and brought back later to backfill the trench after the cable(s) has been laid.

Surplus material must be removed by the Contractor and on the Contractor's own expense.

7.2 Removal of Surplus Material

Surplus material excavated from trenches must be removed from the trenches side or the servitude to a scheduled area within 0,5 km of the source, as nominated.

8 Admittance to Properties on Cable Routes

Unless otherwise specified in the project specifications, the Contractor must (on his own expense) provide owners, inhabitant and their vehicles with reasonable access to their properties which may be situated adjacent or near the cable route(s).

9 Jointing Chambers

Jointing chambers must be of approved size in order to make it possible for the cable jointer to work efficient and expeditiously. Every chamber must be adequately covered to as far as possible to prevent dust and moisture from penetrating and must be equipped with sufficient lighting, draining and ventilation for use during cable jointing.

10 Transport of Cable Drums

Cable drums must be carefully transported to prevent damage to the cables and to prevent disturbing the cables. Damaged cables will be rejected. Drums may not be off-loaded by simply allowing them to roll off the back of the truck onto the ground. Drums may only be rolled in the direction as indicated by the arrow painted on the drum by the manufacturer. (This will ensure that the correct tension is maintained and prevent the cable from damage later). Every drum may only have one cable length on it. Proper attention must be given to where the drums are to be off-loaded in order to prevent unnecessary moving thereof, e.g. at joint locations.

11 Handling of Drums on Site

Note: It is recommended that a correctly designed spreader must be used to load and unload the drums with a crane.

Every drum must be mounted on jacks or on a cable-drum trailer with a horizontal supporting beam of suitable size and strength to handle the width and weight of the drum. The drum may not be allowed to rotate freely when the cable is rolled off. (Free rotation causes the cable to twist and loosen the windings, which can cause the inside armouring/insulation of the cable to be stretched). The cable must enter the trench from the top of the reel. All cables ends including that left on the drum or in a trench must be sealed to prevent the penetration of moisture into the cable. The free cable end on the drum must be fastened to the side of the drum.

12 Rollers

Rollers must be used when each cable is layed and must be carefully placed in the trenches to make sure the cable only lies on the rollers when it is pulled in.

13 Communication

The Contractor must ensure good communication between the operators at the pulling end and at the reel end of the cable while laying the cable(s).

14 Pulling Cable

The cable may be pulled by hand or by a wrench, but the maximum tension in the cable as specified by the manufacturer, may not be exceeded. A cable grip must be used to pull the cable, but if specified by the project specification, a loop connected to the cable cores and sheathing must be used. A twist connection must be used between the loop and the rope used to pull the cable. In cases where cables have to be drawn around corners, well lubricated skid-plates or special corner rollers must be used. Skid-plates and rollers must be firmly secured and must be inspected regularly throughout the cable laying process to ensure that they work properly.

15 Ambient Temperature During Cable Laying

In accordance with the stipulations of 5.19.2, a cable may not be installed at an ambient temperature that:

a) In the case of paper insulated cables, is lower than 10°C; or

b) In the case of PVC-insulated cables, is lower than 0°C.

In situation where the ambient temperature is continuously at a low a temperature, the cable may be installed, with the written approval of the Engineer. Special arrangements are made to keep the cable temperature above the minimum temperature specified in 5.19.1 for at least 24 hours before installation.

16 Cable Bends

No cable bend may have a smaller radius than the minimum radius specified by the cable manufacturer. This radius shall never be less than the radius prescribed by the relevant SANS specification.

17 Cables Laid in Sleeves, Cable Ways, etc.

Cables laid under roads or railway lines, must be laid through sleeves or cable-ways that are strong enough to withstand the expected shock loads applied by traffic. The laying of cable-ways and sleeves must comply with the applicable requirements of SANS 1200 LB and SANS 1200 LC. After the cable-ways and sleeves had been laid, they must be cleaned thoroughly to remove roughness and sharp edges that can damage the cable. The ends of spare sleeves and cable-ways must be properly sealed and if the project specification requires a pull wire, this must be installed. The position of these sleeves and cable-ways must be identified in the project specifications.

18 Spacing Between Cables and Other Services

The minimum spacing between electrical cables and other services must be in accordance with the project specifications.

In case of trenches used for a number of electrical cables the minimum horizontal free space required to prevent de-rating of the cables, are as follows:

a) In the case of cables with a conductor size of not more than 70mm2: 150mm;

b) In the case of cables with a conductor size of at least 70mm2: 250mm.

19 LV Cable Joints

No joints are `allowed in distribution cables, except where it is specifically authorised. The low voltage cable in a continuous cable run must be of one size, except where a change in cable size is necessary, in which case the change must be approved by the Engineer.

20 Marking of Cables

An approved identification plate or label, on which the following information is given, must be attached to every high voltage and low voltage cable in every substation, miniature substation and CDU:

a) The size of the conductors; and

b) The number of phases; and

c) The route (“from” or “to”); and

d) The system voltages.

21 Reinstatement

The reinstatement of areas over cable- and pipe trench excavations must be executed as specified in sub clause 5.9 of SANS 1200 DB.

22 Marking and Recording of Cable Routes

If required by the Engineer that the cable run must be surveyed and marked in such a way that the underground position thereof can be traced at any time.

In case of straight runs, the cable route markers may be placed at intervals not exceeding 50m or as specified by the Engineer.

The Contractor must measure and indicate on plan all the detail of the installed cable, the position of each cable run, the depth of each cable, as well as all the joints and cable-ways which are installed. The name of the cable jointer and the date on which the joint was made must be indicated on the plans and, if specified by the project specifications, on the cables as well. Drawings of the cable routes “as built” must be supplied immediately by the Contractor to the Engineer after the Contractor has finished the work covered by the contract.

23 Tolerances

Degree of accuracy II applies to approved backfill material and the placing thereof.

24 Tests

24.1 Density of Bedding and Back Fill Material

The Engineer may demand a density test to determine the grade of density at the bottom layer of the trench and of the approved back fill material.

If the density is lower than specified (see 5.10.3) the Engineer may demand the removal of the material, replacing of the bottom layer or the back fill material with the same or other material, and the re-compaction, on the Contractor’s own expense.

The Contractor is responsible for all tests done as a result of the removing and replacing of material.

24.2 Electrical Tests

Every part of the cable network between CDU’s and substations must be tested for electrical continuity and for insulation resistance. Acceptance tests must consist of the following.

a) Phase identification test

A test must be done to determine if the connections between the end points are correct. All cables must be phased out before connected to the switchgear.

b) Insulation resistance test (Low voltage cables)

The resistance of the insulation of every core to earth and to every other core must be determined. These tests must be done with a 2 000V insulation resistance tester on paper and PVC insulated cables.

E2015 INSTALLATION OF CABLES

1 General

All cable sleeves manholes and cable markers are to be provided by the Contractor unless otherwise specified. Others will provide cable ducts in the floors of buildings unless otherwise specified.

Cable run indoors shall be supported on cable trays or cable rack, secured thereto by heavy duty plastic strapping. The cables shall be fixed at intervals not greater than those stipulated in SANS 10142 and shall be spaced sufficiently to avoid de-rating in terms of SANS 10142 – 1. Cables shall be individually fixed so that any one may be removed from a group without disturbing the others.

Cables installed in trenches shall be installed at the depth prescribed. All cable depth measurements shall be made to the top of the cable when laid directly in ground or to the top of the duct or sleeve where these are provided.

The Contractor may only deviate from the above depth provided prior authority in writing has been obtained from the Engineer.

A yellow PVC cable warning tape with the wording "DANGER" shall be installed above all cables installed in cable trenches.

Every run of cable shall be a single length without joints. Say that where a run exceeds the general drum length of where the length of a run is increased after the cable is delivered on site, a through box will be permitted. Such through boxes shall be so placed as to afford easy access for maintenance and repair; when they are required in underground cable runs the Contractor shall provide special cable markers to locate them.

All cable tails shall be provided with either cable lugs or ferrules as may be appropriate. At each sealing end straps-on cable markers shall be fixed, showing clearly and indelibly the number and size of cable cores and the destination of the cable.

2 Cable routes

Cables shall follow the routes shown on the drawings; the routes shall only be varied with the written permission of the Engineer. Where no routes are defined on the drawings the Contractor may select routes to his reasonable preference but shall obtain written approval of them before installing the cables.

The Contractor shall, before trenching commences, familiarizes him with the routes and site conditions and the procedure and order of doing the work shall be planned in conjunction with the general construction program for other services and building requirements.

The Contractor shall acquaint himself with the position of all the existing services such as storm water pipes, water mains, sewer mains, gas pipes, telephone cables, etc. before any excavations are commenced. For this purpose he shall approach the Engineer's representative, the local municipal authority and any other authority which may be involved, in writing.

The Engineer reserves the right to alter any cable route or portion thereof in advance of cable laying. Payment in respect of any additional or wasted work involved shall be at the documented rates.

The removal of obstructions along the cable routes shall be subject to the approval of the Engineer.

3 Trenching

Trenching shall be programmed in advance and the approved program shall not be departed from except with the consent of the Engineer.

The Contractor will be held responsible for damage to any existing services brought to his attention by the relevant authorities and shall be responsible for the cost of repairs.

The Contractor shall take all the necessary precautions and provide the necessary barriers, warning signs and/or lights to ensure that the public and/or employees on site are not endangered.

The Contractor shall ensure that the excavations will not endanger existing structures, roads, railways, other site constructions or other property.

Trenches shall connect the points shown on the drawings in a straight line. The Engineer beforehand shall approve any deviations due to obstructions or existing services.

Trenches shall be as straight as possible and shall be excavated to the prescribed depth and width for the specific cable type.

The bottom of the trench shall be of smooth contour, and shall have no sharp dips or rises, which may cause tensile forces in the cable during back filling.

The excavated material shall be placed adjacent to each trench in such a manner as to prevent nuisance, interference or damage to adjacent drains, gateways, trenches, water furrows, other works, properties or traffic. Where this is not possible the excavated materials shall be removed from site and returned for back filling on completion of cable lying.

Trenches across roads, access ways or footpaths shall not be left open. If cables cannot be laid immediately the Contractor shall install temporary "bridges" or cover plates of sufficient strength to accommodate the traffic concerned.

In the event of damage to other services or structures during trenching operations the Contractor shall immediately notify the Engineer and institute repairs.

Prior to cable laying the trench shall be inspected thoroughly and all objects likely to cause damage to the cables either during or after lying shall be removed.

Where ground conditions are likely to reduce maximum current carrying capacities of cables or where the cables are likely to be subjected to chemical or other damage or electrolytic action, the Engineer shall be notified before installing the cables. The Engineer will advise on the course of action to be taken.

Extreme care shall be taken not to disturb surveyor's pegs. These pegs shall not be covered with excavated material. If the surveyor's pegs are disturbed, a person qualified to do so shall replace them.

4 Bedding

HV Cables: The bottom of the trench shall be filled across the full width with a 150mm layer of approved bedding soil. After cable laying a further layer of 150mm approved bedding soil shall be provided to extend to 150mm above the cables.

LV, Intermediate & Medium voltage Cables: The bottom of the trench shall be filled across the full width with a 150mm layer of approved bedding soil. After cable laying a further layer of 150mm approved bedding soil shall be provided to extend to 150mm above the cables.

5 Backfilling

The Contractor shall not commence with the backfilling of trenches without prior notification to the Engineer so that the cable installation may be inspected. Should the Contractor fail to give a timeous notification, the trenches shall be re-opened at the Contractor's cost. Such an inspection will not be unreasonably delayed.

For all cables, a coloured plastic-marking tape shall be installed 200mm above the cable. The tape shall be yellow, with red skull and crossbones with the words "ELECTRIC CABLE". These markings shall not be more than 1m apart from centre to centre.

Back filling shall be undertaken with soil suitable to ensure settling without voids. The maximum allowable diameter of stones present in the back fill material is 75mm.

The Contractor shall have allowed in his bid for the importation of suitable backfill material if required.

The backfill shall be compacted in layers of 150mm and sufficient allowance shall be made for final settlement. The Contractor shall maintain the refilled trench at his expense for the duration of the contract. Surplus material shall be removed from site and suitably disposed of.

On completion, the surface shall be made good to match the surrounding area.

In the case of roadways or paved areas the excavations shall be consolidated to the original density of the surrounding material and the surface finish reinstated.

6 Blasting

No guarantee is given or implied that blasting will not be required.

Should blasting be necessary and approved by the Engineer, the Contractor shall obtain the necessary authority from the relevant Government Departments and Local Authorities. The Contractor shall take full responsibility and observe all conditions and regulations set forth by the above authorities

E2016 ELECTRICAL LV SUPPLY CABLES

1 General

All low voltage underground cables shall be stranded copper-core, 600/1000 Volt grade, multi-cored, PVC insulated, PVC covered, wire armoured ECC and PVC encased (PVC/SWA-ECC/PVC).

All cables shall comply with SANS 150 and 1507 as amended, where applicable. Cables shall be of new stock and must still be sealed when brought on site. If these conditions are not met it may lead to the cables being removed from the site and their being replaced with the correct type all at the Contractor's expense.

The Contractor must do all measuring on site himself in respect of lengths of cable, earth wires and ditches required. The lengths given in the schedules are only allowed for bid purposes. Payments will only be made for the lengths of cable actually installed and at the bidded tariffs. In their bids, Bidders must allow for cut-off lengths of cables and bends.

The storage, transport, handling and lying of cables must conform to approved and acceptable practice and must meet the requirements of SANS 10198 as amended. Cables which are cut and left open for a period of time before being coupled must be sealed in the prescribed manner.

When such cable ends are flooded by water they must be subjected to the tests prescribed by the Engineer.

The Contractor shall have adequate suitable equipment and labour available to prevent damage to cables.

Before the cable is installed, the cable trenches must be carefully inspected and any objects, which may damage the cable during or after installation, must be removed.

2 Sealing glands for PVC insulated cables

The sealing glands must consist of a sleeve in which a conical bush screws into one side and a nickel-brass or galvanized steel lock nut is situated on the other side. The galvanizing must meet SANS 763 as amended standards. The sleeve must have a hollow groove on the side on which the cable enters the sleeve to house the top ring of the waterproofing mantle.

The waterproofing mantle must be manufactured from non-weathering neoprene or other synthetic rubber and must be proof against water, oil and sunlight. These mantles must fit snugly over the sealing glands and the cables.

Sealing glands must have a 150 screw thread and must be suitable for the specified cable sizes.

3 Cable joints

Cable joints are not permissible except where specifically approved. No joints will be allowed where the specified length of cable appears on a drum.

E2017 CONDUCTORS

Cables used for wiring the installation must be 1000V grade PVC insulated cables for LV installations, Contractor so confirm voltage grades for other voltages. Heat resistant cables must be heatproof PCP insulated (e.g. B.I.C.C. or other approved type). Cables must not be old stock and must be delivered on site with their seals unbroken. PVC insulated conductors must meet SANS 150 and 1507 as amended standards and bear the SANS mark. Conductors for light circuits must be 2,5mm² and those for outlet socket circuits 2,5mm², unless specified otherwise.

Because of the distortion of insulating materials at temperatures above 57°C, PVC cables must not be directly attached to the terminal clamps of equipment such as stoves, geysers, built-in electrical heaters and any other electrical apparatus or equipment (including light accessories) of which the temperature exceeds 57°C.

Except where otherwise specified in this specification or drawings, wiring shall be carried out in conduit throughout. Only one circuit per conduit will be permitted, unless otherwise indicated a maximum of two circuits per conduit will be permitted.

E2018 WIRING

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

Unless otherwise specified in this specification or indicated on the service drawings, 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 aforementioned 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 or indicated on the drawings. Sizes of conductors not specified must be determined in accordance with the “Wiring Code”.

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

The wiring shall be done in PVC insulated 600/1000 V grade cable to SANS 1411-1.

Also the wiring shall be done in PVC SWA PVC insulated 600/1000 V grade cable to SANS 97 where indicated.

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.

E2019 UNSWITCHED AND SWITCHED SOCKET OUTLETS

1 General

This section covers the requirements for unswitched and switched socket-outlets for use in general installations under normal environmental conditions.

All switches and switch-socket outlet combination units shall conform to the Engineer's approval.

No other than 16A 3 pin sockets are to be used, unless other special purpose types are distinctly specified or shown on the drawings. If sockets are to be installed in the external weather environment, they are to be housed in IP65 surface mountable draw boxes, unless specified differently.

2 Flush and Surface Mounted Switched Sockets

All switched socket outlets shall be suitable for mounting in 100 x 100 x 50mm or 100 x 50 x 50mm boxes, shall comply with SANS 164-1.

Switches shall be of the tumbler operated microgap type rated at 16A, 220/250V.

Terminals shall be enclosed for safe wiring.

Contacts shall be of silver material.

Safety shutters shall be provided on live and neutral openings.

The yoke strap shall be slotted to allow for easy alignment.

The covers of surface mounted switched socket shall have toggle protectors.

3 Watertight Switched Sockets

The housing of watertight switched sockets shall be of galvanised cast iron or die cast aluminium with watertight machined joints.

The switch shall have a porcelain base and a quick-acting spring mechanism and shall be rated at 16A, 220/250V.

The ON/OFF positions shall be clearly marked on the switch housing.

The socket openings shall be rendered watertight by means of a gasket cover plate which is screwed onto the body of the unit. The cover plate shall be secured to the body of the unit by means of a chain.

The units shall have an IP rating of at least IP65

4 Three Phase Switched Socket Outlets

Three phase switched socket outlets shall have 5 pins, one for each phase, neutral and earth.

The current rating shall be as specified in the drawings.

The units shall be interlocked to prevent switching on if the plug top is not installed.

The units shall be supplied complete with plug top.

The live terminals shall be shrouded and shall be completely safe when the plug top is removed.

Samples shall be submitted to the Engineer for approval prior to the installation.

E2020 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 Engineer's approval 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.

1 Moulded Case Circuit Breakers

This section covers single or multi pole moulded case circuit breakers for use in power distribution systems, suitable for panel mounting, for ratings up to 1 000 A, 600 V, 50 Hz.

The circuit breakers shall comply with SANS 156.

Circuit-breaker overload trip systems of the thermal or hydraulic-magnetic types are equally acceptable. Where high ambient temperatures or widely varying extremes of ambient temperature are expected hydraulic-magnetic devices shall be used. Where circuit breakers have to sustain motor-starting currents and the like, circuit breakers shall be hydraulic-magnetic with appropriate tripping characteristics.

The continuous current rating, trip rating and rupturing capacity shall be as specified on the electrical schematic drawing.

The contacts shall be silver alloy and shall close with a high pressure wiping action.

Where specified, the circuit breaker shall be capable of accommodating factory fitted shunt trip or auxiliary contact units or similar equipment.

The operating handle shall provide clear indication of "ON", "OFF" and "TRIP" positions.

The mechanism shall be of the TRIP-FREE type preventing the unit from being held in the ON position under overload conditions.

All moulded case circuit breakers in a particular installation shall as far as is practical be supplied by a single manufacturer.

The incoming terminals of single pole miniature circuit breakers shall be suitable for connection to a common busbar.

The circuit breaker shall have a rating plate indicating the current rating, voltage rating and breaking capacity.

Extension type operating handles shall be provided for units of 600 A rating and above.

2 Earth Leakage Relays

Earth leakage relays shall be single or three-phase units with a sensitivity of 30mA, with associated circuit breaker or on-load switch for use on 220/250V single phase or 380/433 V three phase, 50 Hz, supplies.

The units shall be suitable for installation in switchboards in clip-in trays or bolted to the chassis.

The earth leakage relay shall function on the current balance principle and shall comply with SANS 767-1 as amended, and shall bear the SANS mark. Integral test facilities shall be incorporated in the unit.

Circuit breakers with trip coils used integrally with earth leakage units (two pole for single phase units and three pole for three phase units) shall comply with SANS 156.

On-load switches used integrally with earth leakage units (two pole for single-phase units and three pole for three phase units) shall comply with SANS 152.

The fault current rating of the unit shall be 5kA or 10kA as required, when tested in accordance with SANS 156.

3 Triple Pole On-Load Isolators

This section covers switches suitable for panel mounting for use in power distribution systems up to 600 V, 50 Hz. Switches for motor isolation are included.

The switches shall be of the triple pole, hand operated type complying with SANS 152.

The switches shall have a high speed closing and opening feature.

The switches shall be suitably rated for the continuous carrying, making and breaking of the rated current specified as well as the through-fault current capacity as specified.

To distinguish the switches from circuit breakers the operating handles shall have a distinctive colour and/or the switch shall be clearly and indelibly labelled "ISOLATOR".

4 Contactors

Contactors shall be of the open or totally enclosed, triple- or double-pole, electromechanically operated, air-break type suitable for 380/433 V or 220/250 V supplies and shall comply with SANS.

Contactors shall comply with SANS 1092 and shall be rated to perform not less than 1 000 000 operations at the current ratings and duties quoted on the wiring schedules. They shall be so fixed as to ensure adequate coil ventilation.

Contactors shall have the following characteristics:

(a) Enclosed coil easily replaceable.

(b) A permanent air gap in the magnetic circuit to prevent sticky operation.

(c) Provision for quick and simple inspection of contacts.

(d) Clearly marked main and auxiliary terminals.

All parts shall be accessible from the front.

Contactors which are not located in switchboards shall be housed in enclosures which comply with IP 54 of IEC 144.

The current rating of the contactor shall be as specified for the circuit with a switching duty in accordance with the SANS or IEC 158-1, utilisation category ACI for lighting and power circuits and utilisation category AC3 for motor starting.

In addition to the required current carrying capacity and switching duty of a Contractor, the contactor chosen for a particular application shall be rated for the maximum through fault current allowed by the back-up protection devices at the point where the contactor is installed. Careful co-ordination of short circuit devices shall take place.

All laminations of the magnetic system of the contactor shall be tightly clamped. Noisy contactors will not be accepted.

Non-current-carrying metallic parts shall be solidly interconnected and a common screwed earth terminal shall be provided. The contactor shall be earthed to the switchboard earth bar.

Latched contactors shall be provided with a trip coil and a closing coil. The contactor shall remain closed after de-energising the closing coil and shall only trip on energising the trip coil.

Contactor operating coils shall have a voltage rating as required by the control circuitry and shall have limits of operation and temperature rise as specified in Clause 7.5 and Table IV of IEC 158 1. Latched contactors shall be capable of being tripped at 50 % of the rated coil voltage.

Contactors for normal/standby changeover circuits shall be electrically and mechanically interlocked. Contactors in star-delta starters shall be electrically interlocked.

Contactors with provision to add auxiliary contacts and convert auxiliary contacts on site are preferred. Contactors with permanently fixed auxiliary contacts shall have at least 1 x N/0 and 1 x N/C spare auxiliary contacts in addition to the contacts specified for control purposes and in addition to contacts required for self-holding operations or economy resistances. Where the number of auxiliary contacts required is greater than the number of contacts that can be accommodated on the contactor, an auxiliary relay or additional contactor shall be provided to supply the additional contacts.

It shall be possible to replace main contacts without disconnecting wiring.

Auxiliary contacts shall be capable of making, carrying continuously and breaking 10A at 230V AC, unity power factor for contactors used on 380 433/220 250 V systems.

Auxiliary contact functions required e.g. "lazy" contacts, late-make, late-break, make-before-break, etc. shall be inherent in the contact design. Under no circumstances may these functions be improvised by bending contacts, loading contacts, etc. These functions shall be available in all contactors.

Spare auxiliary contacts shall be wired to numbered terminal strips in the switchboard and shall appear on the switchboard drawings.

All contactors on a specific project shall be from a standard range of one single manufacturer, unless specified to the contrary.

5 Surge Arrestors

Surge arrestors shall comply with the requirements of SANS 10142-1, SANS 61643-1 and applicable normative references.

Surge arrestors shall be suitable for installation at altitudes of up to 1800m above sea level.

The unit shall be contained within a thermoplastic or cast resin housing and all internal components shall be fully sealed in.

The unit shall be supplied complete with a galvanised steel-mounting bracket for convenient mounting onto the metalwork or tray of a switchboard.

Alternatively, the unit shall be of the type, which can be mounted into the clip-tray of a switchboard.

Surge arrestors shall be provided in all cases where a switchboard is supplied directly from an overhead line.

In other cases, surge arrestors, if required, will be specified in the Detail Technical Specification.

5 Bus Bars

Bus bars shall be of copper or aluminium and shall comply with SANS 1195: 1978. Copper bus bars shall be tinned after fabrication; the current ratings shall be those assigned by the Copper Development Association. Aluminium bus bars shall be of bright finish; the current ratings shall be those assigned by Alcan Aluminium S.A. Ltd. Multiple bars shall be arranged with air gaps between the sections, equal to the section thickness. Insulating busbar supports shall be provided at intervals related to the prospective short-circuit fault currents, the following table being a guide for single-section bus bars:

Busbar Section	**kA at 400V for Insulating Spacing of**			
mm x mm	**450mm**	**450mm**	**450mm**	**450mm**
25 x 9,5	29	21	17	14
40 x 9,5	47	35	27	23
50 x 9,5	55	47	39	33
75 x 9,5	61	53	47	43
100 x 9,5	67	58	52	47

Cable sealing ends and glands shall be fixed to perforate metal gland plates or racks rigidly fixed in the boards and so positioned that terminating the cables is made easy.

E2021 LV SWITCHBOARDS (UP TO 1kV)

1. GENERAL

All boards shall be in accordance with the types as specified, be constructed according to the detail or type drawings and must be approved by the Engineer 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 of board proposed as an alternative to that specified, must have the prior approval of the Engineer.

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.

1.1 Scope

This section covers the manufacturing and testing of flush mounted, surface mounted and floor standing switchboards for general installations in normal environmental conditions and for system voltages up to 1 kV.

1.2 Size

All switchboards shall be of ample size to accommodate the specified switchgear and provide space for future switchgear. A 20% additional space allowance shall be accounted for future space requirements. The clearance between adjoining switchgear openings shall be as specified in par. 6.2.

1.3 External Dimensions

The maximum allowable height of free standing switchboards is 2,2 m. Cubicle type boards may be up to 2,4 m high if they can be fully dismantled into individual cubicles. Where, due to space restrictions, a board

exceeds 2,4m in height, equipment not normally requiring access, shall be installed in the top section, enabling equipment normally requiring access to be installed lower down in the board. All other specified external dimensions for switchboards shall be strictly adhered to. If the clearances specified in par. 6.2 cannot be adhered to as a result of restricting external dimensions, the Contractor shall obtain the approval of the Engineer before manufacturing the switchboards.

1.4 Moisture and Vermin

All switchboards shall be rendered moisture resistant and vermin resistant and shall be adequately ventilated. Refer to par. 4.10 and 4.11.

1.5 Load Balance

The load shall be balanced as equally as possible across multiphase supplies.

2. CONSTRUCTION OF FLUSH MOUNTED SWITCHBOARDS

2.1 Standard

Flush mounted switchboards shall comply fully with SANS. Unless the depths of the switchboards are specified, the depths shall be determined in accordance with par. 6.

2.2 Expanded Metal

Where switchboards are to be built into 115 mm thick walls, expanded metal shall be spot-welded to the rear of the bonding trays. The expanded metal shall protrude at least 75 mm on each tray side to prevent plaster from cracking.

2.3 Knock-outs

Knock-outs shall be provided in the top and bottom ends of each switchboard tray to allow for the installation of conduits for the specified and future circuits. Knock-outs shall be provided for an equal number of 20 mm, 25 mm and 50 mm dia. conduits.

2.4 Panel

Front panels shall have machine punched slots for housing the specified and future flush mounted switchgear. The distance between the inside of the closed doors and the panel shall not be less than 20 mm. No equipment nay be mounted on the panel unless the panel is permanently hinged to the switchboard frame.

2.5 Fixing of Front Panels

The front panel shall be secured to the architrave frame by means of 6mm studs and chromium-plated hexagonal domed nuts, hank nuts or captive fasteners. Alternatively the panel may be secured to the architrave frame by means of two pins at the bottom and a latch or lock at the top of the panel. Self-tapping screws will not be allowed. All front panels shall be provided with a minimum of one chrome plated handle.

2.6 Door Handles and Catches

Switchboard doors shall be equipped with handles and catches that are vandal resistant with lock covers. Locks shall only be provided when specified. In all cases where lockable doors are required and in all cases where the switchboard doors are higher or wider than 450 mm, handles consisting of a push-button-and-handle combination with spring loaded catch or rotary handle-and-catch combination shall be installed. Switchboard doors smaller than 450 mm in height and width may be equipped with spring loaded flush mounted ring type latches. Square key operated catches are not acceptable unless specified.

3. CONSTRUCTION OF SURFACE MOUNTED SWITCHBOARDS

3.1 Standard

Surface mounted switchboards shall comply with SANS.

3.2 Switchboard Tray

Surface mounted switchboards shall be equipped with a 1,6mm minimum sheet steel reinforced tray, suitably braced and stiffened to carry the chassis, door and equipment. Lugs to secure the switchboard to a vertical surface shall be provided.

3.3 Construction

All joints shall be welded or securely bolted. The tray shall be square and neatly finished without protrusions. The front tray sides shall be rounded with an edge of at least 20mm to accommodate flush doors.

3.4 Chassis

A sheet steel chassis for the mounting of equipment shall be bolted to the tray and shall comply with the requirements of par. 6.1 and 6.3.

3.5 Front Panel and Door

The front panel and door shall comply with par. 2.4 to 2.6 above. Doors shall fit flush in the tray when closed. Switchboard doors shall be equipped with handles and catches that are vandal resistant with lock covers

3.6 Dimensions

Unless the depth of the switchboards is specified, the dimensions shall be determined in accordance with the requirements of par. 6.2 and 6.3.

4. CONSTRUCTION OF FREE STANDING SWITCH BOARDS

4.1 Framework

A metal framework for free standing switchboards shall be manufactured from angle iron, channel iron or 2mm minimum folded metal. A solid U-channel base frame, sufficiently braced to support all equipment and span floor trenches and access holes shall be provided. Switchboards shall be of cubicle design with 2mm side panels forming divisions between cubicles. The maximum allowable cubicle width is 1,5m. (Refer also to par. 4.7). Joints shall be non-continuously butt-welded. Welds shall be ground smooth and the joint wiped with plumber's metal in order to provide a smooth finish. Switchboards wider than 2m shall be fitted with screwed eye-bolts attached to the framework to facilitate loading and transportation of the board.

4.2 Rear and Side Panels

The rear panels shall be removable and shall be manufactured from 2mm minimum sheet steel. The panels shall have returned edges which are recessed in the frame or which fit over lips on the switchboard frame. The panels shall be secured to the frame by means of studs and chromium-plated hexagonal domed brass nuts or hank nuts or captive fasteners equal or similar to "DZUS" or "CAMLOC". Where switchboards are intended for installation in vertical building ducts or against walls, the rear and side panels may consist of a single folded sheet which is either bolted or welded to the frame or which forms part of the folded metal frame.

4.3 Front Panels

The front panels of floor standing switchboards shall preferably be hinged except where flush mounted equipment prevents this. Alternatively, panels shall be secured by means of the methods described in par. 2.5. The panels shall be arranged in multi-tiered fashion to allow for the logical grouping of equipment in accordance with par. 6.

The hinged front panels shall have a dished appearance with 20mm upturns which fit over a lip on the switchboard frame. Alternatively the hinged panels shall have folded edges and shall be fitted flush or slightly recessed in the switchboard frame. The latter method shall be used where doors are required. (Also refer to par. 4.6). Corners shall be welded and smoothed.

The panels shall be of 2mm minimum sheet steel with machine punched slots to allow for the flush mounting of instrumentation, switchgear toggles and operating handles. A minimum clearance of 50mm shall be maintained between the rear of equipment mounted on the panels (taking into account terminals or other projections) and the frame and chassis of the switchboard. Separate panels shall preferably be provided for the mounting of instrumentation and for covering flush mounted switchgear. Enclosed switchgear with front panels e.g. combination fuse-switch units, may be flush mounted in the board in lieu of separate hinged panels.

Hinged panels shall be suitably braced and stiffened to carry the weight of flush mounted equipment and to prevent warping.

Hinged panels with flush mounted equipment and panels higher than 600mm shall be supported by hinges of adequate strength to ensure smooth and reliable operation. 16mm pedestal or similar heavy duty hinges with single fixing bolts may be used on panels smaller than 600mm. On the larger panels long pedestal type hinges with two fixing bolts per hinge are preferred. Piano hinges are not acceptable for this application.

A tubular chromium-plated handle shall be fitted on each panel. The handle may be omitted if "DZUS" or "CAMLOC" fasteners are used.

Blanking plates shall be fitted over slots intended for future equipment. These plates shall be fixed in a manner which does not require the drilling of holes through the front panel. Dummy circuit-breakers may be fitted where applicable.

Front panels containing live equipment such as instrumentation or control switches, shall be bonded to the switchboard frame with a braided copper earth trap with an equivalent cross-sectional area of at least 4mm².

4.4 Securing of Front Panels

Hinged panels shall be secured in position by means of square key operated non-ferrous fasteners designed to draw the panels closed or similar quick-release fasteners. Self-tapping screws are not acceptable. Where non-hinged removable panels are specified, they shall be secured in position by means of 6mm studs and hexagonal chromed brass dome nuts and washers or hank nuts. Non-hinged removable panels may alternatively be secured in position by means of two pins at the bottom and a latch or lock at the top.

4.5 Chassis

A suitably braced chassis for the mounting of switchgear and equipment shall be firmly secured to the frame of the switchboard. The chassis shall be designed so that the switchgear can be installed in accordance with par. 6. Circuit-breakers and isolating switches which are not of the moulded-case air-break type and the insulators of busbars for ratings of 200 A and more may be secured directly to the framework. (Refer to par. 6.1).

4.6 Doors

(a) Doors shall be provided. Doors shall be arranged in multi-tiered fashion to allow for the logical grouping of equipment in accordance with par. 6.

(b) Doors shall have a dished appearance with a minimum of 20 mm upturns which fit over a lip on the switchboard frame or shall fit flush in the switchboard frame. Corners shall be welded and smoothed.

(c) Doors shall be of sheet steel with machine punched slots to allow for the flush mounting of instrumentation, control and protection equipment. Switchgear shall be flush mounted in the front panels behind the doors unless specified to the contrary. A minimum clearance of 50mm shall be allowed between the rear of equipment mounted on doors (including terminals and projections) and the frame, front panel and chassis.

(d) Doors shall be suitably braced and stiffened to carry the weight of the equipment and to prevent warping.

(e) Hinges for doors shall be provided as described in par. 4.3.5. At least three hinges shall be provided on doors higher than 1,2m.

(f) Doors shall be fitted with handles consisting of a pushbutton-and-handle combination with spring-loaded catch or a rotary handle-and-catch combination. Flush mounted ring type handles or square key operated latches are not acceptable. The same key shall fit all locks on the switchboard in cases where locks are required.

(g) Doors shall be fitted with hypalon or neoprene seals.

(h) Doors containing any electrical equipment shall be bonded to the switchboard frame with a braided copper earth wire with an equivalent cross-sectional area of at least 4mm².

4.7 Sections

For ease of transportation and to facilitate access to the allocated accommodation, switchboards may be dismantled into cubicles or sections. Each section shall be rigidly manufactured to ensure that damage to the switchgear will not occur during transportation and handling. Where required, switchboards shall have temporary wood or steel bracing to protect switchgear and facilitate handling.

4.8 Grouping of Switchgear

The switchgear shall be logically arranged and grouped as described in par. 6. Depending upon the number and size of components, a common front panel may be installed over one or more groups of equipment. All equipment shall be installed in accordance with the requirements of par. 6.

4.9 Cable Gland Plate

A cable gland plate shall be installed across the full width of each power cubicle at a minimum height of 300mm above the bottom of the switchboard to house the cable glands. A Steel cable channel or other approved support shall be provided to carry the weight of the cable and remove mechanical stress from the cable glands. A minimum distance as required by the bending radius of outgoing cables shall be provided between the lowest terminals of major equipment and the gland plate.

4.10 Ventilation

Switchboards shall be properly ventilated, especially cubicles containing contactors, transformers, motor starters, lighting dimmers and other heat producing equipment. Louvres shall be fitted to provide adequate upward or cross ventilation. All louvres shall be vermin proofed with 1,5mm brass mesh or perforated steel plate internally spot welded over the louvres. The internal ambient temperature shall not exceed 40 ^{o}C.

4.11 Vermin Proofing

Free standing boards shall be protected against vermin, especially from below- Where cables have to pass through the gland plate, rubber grommets shall be provided and enough non-hardening compound shall be delivered with the board so that these holes can be sealed properly after installation of the cables.

5. CONSTRUCTION OF MAIN LOW TENSION SWITCHBOARDS

Main low tension switchboards and sub-main low tension switchboards heavily equipped shall comply with par. 4.1 to 4.11 as well as the following exceptions or additions:

(a) These boards shall be fully extensible with removable busbar cover plates in the side panels.

(b) Doors shall not be supplied unless specifically called for.

(c) Switchgear and equipment shall be installed in accordance with the requirements of par. 6.

(d) Provision for metering equipment shall be made in accordance with requirements of local authorities where applicable.

6. MOUNTING OF EQUIPMENT

6.1 General

The mounting of equipment shall comply with SANS where applicable. Equipment to be mounted on the chassis shall be mounted by bolts, washers and nuts or by bolts screwed into tapped holes in the chassis plate. In the latter case the minimum thickness of the chassis plate shall be 2,5 mm. The latter method shall not be used where boards will be subject to vibration or mechanical shocks. Self-tapping screws will not be accepted.

6.2 Space Requirements

In designing the switchboards the following requirements shall be strictly adhered to:-

(a) A minimum of 50 mm between any piece of equipment and the frame or internal partitioning. This minimum space is required on all sides of the equipment. In the case of a single row of single-pole circuit-breakers the spacing on one side of the row may be reduced to 25 mm if the incoming side of the circuit-breakers is busbar connected.

(b) A minimum of 75 mm between horizontal rows of equipment. The maximum outside dimensions of equipment shall be considered.

(c) Circuit-breakers up to a fault rating of 10 kA may be installed adjacent to each other. For higher ratings a minimum of 40 mm shall be allowed between circuit-breakers or isolators.

(d) Sufficient space shall be provided for wiring allowing for the appropriate bending radius.

(e) Space for future equipment shall be allowed as described in par. 1.2.

6.3 Mounting of Chassis

The chassis of flush mounted and smaller surface mounted boards shall be mounted in accordance with SANS. For all free standing switchboards and surface mounted switchboards where the main switch rating exceeds 100 A (triple-pole), space for wiring shall be provided between the chassis and tray. This space shall be adequate to install the supply cable behind the chassis and terminate on the main switch without sharp bends in the cable cores.

6.4 Grouping of equipment

Equipment shall be arranged and grouped in logical fashion as follows:

(a) Main switch - to be installed either at the top or bottom of the board.

(b) Short circuit protection equipment - fuse gear or fuse-switches.

(c) Change-over contactors or other contactors controlling the supply.

(d) Motor supplies.

(e) Fuse-switches for outgoing circuits.

(f) Other circuits and equipment.

Where a portion of the equipment on the switchboard is supplied from a standby power source, the change-over contactor and the associated equipment shall be grouped in a separate compartment.

Where earth leakage units are required, the associated circuit-breakers shall be installed adjacent to the unit.

6.5 Mounting of Circuit-Breakers

All moulded-case circuit-breakers shall be flush mounted with only the toggles protruding. Miniature circuit-breakers may be installed in clip-in trays mounted on the frame. All other circuit-breakers shall be bolted to the chassis. Special provision shall be made for large main switches when designing the framework. Care shall be exercised that the rear studs of circuit-breakers are properly insulated from the steel chassis. Where necessary, insulating material shall be installed between the rear studs and the chassis. Circuit-breakers shall be installed so that the toggles are in the up position when "ON" and down when "OFF".

6.6 Instrumentation

All metering instruments shall be flush mounted in the front panel or door. The rear terminals of instruments mounted on doors shall be covered with an insulating material to prevent accidental contact. Current transformers for metering shall be mounted so that the rating plate is clearly visible. Fuses for instrumentation shall be mounted in an easily accessible position and clearly marked.

6.7 Mounting of Fuses

Fuse holders shall be mounted semi-recessed in the front panel so that fuses can readily be changed without removing the front panel. Busbar mounted fuses for instrumentation shall be used as far as possible.

Where equipment requiring fuses is specified on a board (fuse switches etc), a ruling shall be obtained from the Engineer on the quantity of spare fuses to be provided.

6.8 Equipment in Main Boards

Equipment in main low tension switchboards and sub-main boards shall be grouped in individual compartments. Equipment shall be installed as follows:

Rack-out type air circuit-breakers shall be mounted in the bottom section, flush behind the panel with the handle only protruding. If this is not possible, the panel shall be omitted and the air circuit-breakers installed behind a door.

If the main switch is a moulded-case circuit-breaker or isolator it shall be flush mounted.

Contactors controlling the supply shall be installed behind separate front panels.

All metering, protection and indicating equipment shall be clearly visible from the front of the board. Current transformer ratios and multiplication factors shall be clearly marked. Where doors are specified the equipment shall be installed flush in the doors and covered as described in par. 6.6.

All circuit-breakers and fuses (with the exception of fuse-switches) may be grouped together behind one or more panels as described in par. 4.8.

Fuses or fuse-switches providing back-up protection for circuit breakers, shall be grouped with the associated circuit-breakers. Exposed surfaces of fuse-switches shall be of the same finish and colour as the rest of the board where practical.

6. 9 Standby Supplies

Where standby power from a UPS or other sources is available and has to be connected to some of the equipment on a switchboard, the switchboard shall be divided into separate sections with sheet metal divisions to isolate standby power and mains power sections.

Standby and normal supply shall each have its own incoming isolator or circuit-breaker.

The two sections of the switchboard shall be labelled "ESSENTIAL" and "NON-ESSENTIAL" respectively.

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

a	Normal supply	"LIGHT ORANGE", colour B26 of SABS 1091
b	Standby power	"SIGNAL RED", colour All of SABS 1091
c	No-break supply	"DARK VIOLET", colour F06 or "OLIVE GREEN", colour H05 of SABS 1091

7. BUSBARS IN SWITCHBOARDS

7.1 Application

Busbars shall be manufactured of solid drawn high conductivity copper with a rectangular cross-section in accordance with SANS 1195, BS 159 and BS 1433, where applicable.

Although SANS refers only to overhead or rising busbars, busbars in switchboards shall comply with applicable sections of this specification especially as far as insulation and clearance values, creepage distance, joints, insulation resistance, dielectric strength, deflection test, absorption resistance and rated short time withstand current are concerned.

Busbars shall be supplied for the following applications:

(a) Distribution of supply voltage.

(b) Connection of equipment with ratings exceeding the current rating of 70mm² conductors (par. 8.6).

(c) Connection of outgoing circuits with current ratings in excess of that allowed for 70mm² conductors (par. 7.8).

(d) Collector bars for parallel cables (par. 8.1).

(e) Connection bars for neutral conductors (par. 7.9).

(f) Earth busbars (par. 7.10).

(g) Connections to miniature circuit-breakers (par. 8.6).

8. WIRING

8. 1 Cabling

Cables connected to incoming or outgoing circuits shall be terminated on the gland plate supplied for this purpose. (Refer to par. 4.9). Power cables up to and including 70 mm² may terminate on clamp type terminals where the clamping screws are not in direct contact with the conductor. Connection to the equipment can then be made with cables that are similarly connected to the clamp terminal. All power cables larger than 70mm² terminate on busbars that are connected to the associated equipment. Parallel incoming or outgoing cables shall be connected to a collector busbar without crossing the conductors.

8.2 Terminal Strips

External wiring for low voltage, control, interlocking, alarm, measuring and DC circuits shall terminate on numbered wiring terminals complying the with "WIRING CODE", SANS:10142. The correct terminal size as recommended by the manufacturer for each conductor to be connected shall be used throughout. The terminal numbers shall appear on the wiring diagrams of the switchboard. Terminals for power wiring shall be separated from other terminals. Terminals for internal wiring shall not be interposed with terminals for external circuits. All connections to terminals shall be identified as described in par. 8.8. Where switchboards consist of separate sections, the control wiring passing between sections shall be terminated on strips in each section so that control wiring can be readily re-instated when reassembling the board.

8.3 Current Ratings

The current rating of conductors for the internal wiring shall be sufficient for the maximum continuous current that can occur in the circuit. This value shall be determined from the circuit-breaker or fuse protection of the circuit.

TABLE 8.3 CURRENT RATING FOR INTERNAL WIRING

Nominal cross-section mm²	CONDUCTOR RATING (A)				
	Number of conductors in bunch				
	1	2 - 3	4 - 5	6 - 9	10 and more
2,5	28	25	22	19	16
4	37	33	30	26	22
6	47	42	38	33	28
10	64	54	51	44	38
16	85	76	68	59	51
25	112	101	89	78	67
35	138	124	110	96	88
50	172	154	137	120	103
70	213	191	170	149	127

The above table shall be applied for ambient temperatures up to 30°C. For higher ambient temperatures the values shall be derated as prescribed by SANS 10142, Table 10.

8.4 Internal Wiring

(a) Standard 600/1 000 V grade PVC-insulated stranded annealed copper conductors to SANS standard shall be employed for the internal power wiring of switchboards. The smallest conductor size to be used for power wiring in switchboards shall be 2,5mm². Flexible cord of minimum size 2,5mm² may be used for control wiring.

(b) Where heat generating equipment is present and the internal temperature of the board is likely to exceed 50°C, silicon-rubber insulated stranded conductors shall be used.

(c) Wiring shall be arranged in horizontal and vertical rows and shall be bound with suitable plastic straps or installed in PVC wiring channels. Under no circumstances may PVC adhesive tape be used for the bunching of conductors or for the colour identification of conductors.

(d) Bunched conductors shall be neatly formed to present a uniform appearance without twisting or crossing the conductors. Conductors leaving the harnesses shall be so arranged that they are adjacent to the chassis.

(e) Conductors to hinged panels and doors shall be secured on both the door and the frame and shall be looped between the two points. The loop shall be arranged to produce a twisting motion when the door is opened or closed. A flexible protection sleeve shall be installed over the conductors.

(f) Where wiring channels are used, they shall be installed horizontally and vertically. Under no circumstances may power and control circuit wiring be installed in the same wiring channels. Channel shall not be more than 40% full.

(g) All wiring between different Panels within the same switchboard shall be installed in wiring channels.

(h) Grommets shall be installed in each hole in the metalwork through which conductors pass.

(i) All wiring shall be installed away from terminals, clamps or other current carrying parts. Wiring shall also be kept away from exposed metal edges or shall be protected where they cross metal edges.

(j) Conductors may be jointed at equipment terminals or numbered terminal strips only. No other connections are allowed.

(k) Where conductors change direction, smooth bends shall be formed with a radius of at least 5 times the outside diameter of the conductor or harness.

(l) Where screened cables are specified, the screening shall be earthed in the switchboard or control board only unless clearly specified to the contrary, Screened cables entering control boxes through pressed knock-outs, shall terminate in compression glands. Conductors shall as far as possible remain inside the screening at terminations. Where conductors have to separate from the screen, the braiding shall be separated and the conductors drawn through the braid without damaging the braiding. The conductors shall then be connected to their respective terminals and the screening smoothed and connected to the earth terminal.

(m) Where neutral connections are looped between the terminals of instruments, it is essential that the two conductor ends be inserted into a common lug or ferrule and are crimped or soldered together in order that the neutral connection is not broken when the conductors are removed from one of the instruments.

(n) Wiring should as far as possible be confined to the front portions of switchboards for ease of access. This requirement is important for wiring between smaller circuit-breakers and the associated main circuit-breaker as well as the wiring from circuit-breakers to lighting and socket-outlet circuits.

(o) A maximum of two conductors will be allowed per equipment terminal. Where more conductors must be connected to the same equipment terminal (e.g. a main circuit-breaker feeding other circuit-breakers), stub busbars shall be provided for the various conductors. Refer also to par. 8.6.

8. 5 Load End Connections

The supply end connections to all equipment shall under all circumstances be at the top and the load end connections at the bottom.

8.6 Wiring to Circuit-breakers

Equipment with a rating exceeding the current rating of 70mm^2 conductors shall be connected by means of busbars to the main busbars. Looped connections may only be installed for a maximum of two outgoing circuits. Where there are more than two outgoing circuits, busbars shall be used and equipment connected individually to the busbars. Where miniature circuit-breakers are mounted in continuous rows and supplied by busbars connected to each MCB, each busbar shall be supplied by a separate conductor. This conductor shall be connected to the busbar by means of a separate lug and not via an MCB terminal.

8.7 Conductor Terminations

Conductors connected to terminals complying with the standard specification for "WIRING TERMINALS", need not be soldered or ferruled. Connections to circuit-breakers, isolators or contactors shall be made by one of the following methods:

(a) A ferrule of the correct size,

(b) Soldering the end of the conductor, or

(c) Winding a conductor strand tightly around the end to totally cover the end.

All conductors terminating on meters, fuse holders and other equipment with screwed terminals shall be fitted with lugs. The lugs shall be soldered or crimped to the end of the conductor. The correct amount of insulation shall be stripped from the end to fit into the terminal. Strands may not be cut from the end of the conductor.

8.8 Identification

The colour of the conductors for all 220/250 V circuits shall correspond to the colour of the supply phase for that circuit. Neutral conductors shall be black.

All other conductors in the board, supplying control circuits, etc. shall be coded in colours other than those specified above. A colour code shall be devised for each board and the colour code shall be shown on the wiring diagrams.

All conductors that terminate at wiring terminals and all conductors used for the internal wiring of the switchboard, shall further be identified at both ends by means of durable cable marking ferrules. PVC or other tape is not acceptable.

The numbers on the markers shall be shown on the wiring diagrams.

9. PAINT FINISH

Metal components of the framework, panels and chassis shall be powder coated.

10. LABELLING

10.1 Care shall be taken to ensure that all equipment is fully labelled and that accurate descriptions and safety warning notices appear in both official languages.

10.2 Material

Engraved plastic or ivory sandwiched strips shall be used throughout. The strips shall bear white lettering on a black background for normal labels and red letters on a white or yellow background for danger notices.

10.3 Main Switchboards

Main switchboards and sub-main switchboards shall be supplied with the following bilingual labels in English and Afrikaans:

(a) Number and allocation of switchboard.

Lettering: at least 10 mm high. Prominent position. Label on the outside in a prominent position.

(b) Designation of busbar sections.

Lettering: at least 10mm high. Label on the outside in a prominent position.

(c) Designation of all switchgear including circuit-breakers, isolators, contactors, etc. If the current rating of circuit-breakers is not clearly marked on the equipment, the value shall be indicated on the engraved label.

Letters at least 5mm high. Label on the outside of the switchboard.

(d) All other equipment including meters, instruments, indicator lights, switches, push-buttons, circuit-breakers, fuses, contactors, control relays, protection relays, etc. shall be identified. The function of the equipment and circuits shall be clearly indicated. The main switch shall be labelled as such and designated:

"SWITCH OFF IN CASE OF EMERGENCY"

Flush mounted equipment within doors or front panels shall be identified with labels fixed to the doors or front panels respectively. The labels for equipment installed behind panels, shall be fixed to the chassis close to the equipment. If this equipment is positioned too close together to accommodate descriptive engraved labels, the equipment may be identified by a code or number on an engraved label which shall be fixed close to the equipment. The code number shall be identified on a legend card which shall be installed on the switchboard behind a plastic or other protective cover.

10.4 Other Switchboards

All equipment on switchboards shall be identified with the necessary bilingual labels. The circuit numbers shall appear at grouped single-pole circuit-breakers. The circuit numbers shall correspond to the circuit numbers on the final installation drawings. The above-mentioned circuits shall be identified on a legend card, which shall be installed on the inside of the switchboard door, or in any other position where it can conveniently be observed. All fuses, including instrument fuses, shall have labels stating function, fuse rating and duty or type where applicable. All other equipment shall be identified separately and their functions shall be clearly indicated.

10.5 Fixing of Labels

Labels shall not be fixed to components or trunking but to doors, panels, chassis or other permanent structures of the switchboard.

Engraved strips shall be secured to facilitate a neat alteration of the designation of the labels. Sufficient fixing points shall be provided to prevent labels from warping. Labels in slotted holders shall be secured in position to prevent unauthorised removal. Labels may be secured by the use of brass bolts and nuts, self-tapping screws, slotted label holders or pop-rivets.

11. TESTS

The Engineer shall be notified when the mechanical construction of the switchboard, i.e. frame, panels and base frame, is complete in order that it may be inspected at the factory.

Function tests of all equipment, control and interlocking circuits shall be conducted to the satisfaction of the Engineer. Testing equipment and facilities including instruments, dummy loads and additional switchgear and cables shall be provided by the Contractor at no extra cost. The Engineer shall be notified in writing

two weeks in advance of any test to be conducted, to allow its representative to be present at such tests. A complete report on the tests shall be handed to the Engineer.

E2023 CONTROL CENTRES (CC)

1. GENERAL

The CC shall additionally be fitted with an emergency stop button and alert control system that shall send messages, sms, to authorised and designated personnel (e.g. maintenance team) notifying them of an emergency condition fault.

2. CC REQUIREMENTS

The CC panel is to be manufactured by an approved SABS panel manufacturer.

The following standards shall apply, unless otherwise stated.

SPECIFICATION	SANS	IEC	NRS	VC	BS
Graphical Symbols for Electrical Diagrams			NRS 002		
Wiring of Premises: Part 1: Low Voltage Installations (Latest Ed.)	SANS 10142-1				
PVC-insulated cables.	SANS 150 SANS 152 SANS 1663 SANS 60947-3				
On-load Isolators		IEC 60947-3	NRS031	VC8003	
Busbars	SANS 1195	IEC 60439-2			
Solid drawn high conductivity copper	SANS 804, 1195				
Busbartrunking		IEC 60439-2			
Circuit breakers (magnetic- & other)	SANS 61008-1 SANS 60934 SANS 60947-1 SANS 60947-2 SANS 156			VC8036	
Contactors		IEC 60947-4-1 IEC 60947-1			
Surge Arrestors	SANS 60099-4 SANS 60099-5		NRS 039-1 NRS 039-2		

SPECIFICATION	SANS	IEC	NRS	VC	BS
	SANS 61643-1				
LV Fuses	SANS 172	IEC 60269-1 IEC 60269-2 IEC 60269-3 IEC 60269-4 IEC 60269-3-1 IEC 60269-2-1			
Earth Leakage Relays	SANS 767-1 SANS 767-2 SANS 1433-1 SANS 1433-2	IEC 60947-7-1	NRS 028	VC8035	
Terminals & lugs & ferrules		IEC 60947-7-2			
Heavy duty terminals		IEC 60998-2-1			
kWh meters	SANS 61036 SANS 61358	IEC 60998-2-2			BS37
Indicating instruments					BS89
Electrical Indicating Instruments (part 1,2,7,8 & 9)		IEC 51			
Current transformers		IEC 185			BS3938
Single phase Voltage Transformers		IEC 186-2			
Electrical Relays (Part 1)		IEC 255-1			
LV Assemblies	SANS 1473-1 SANS 1473-2	IEC 60439-1 IEC 60439-2 IEC 60439-3 IEC 60439-4 IEC 60439-5			

SPECIFICATION	SANS	IEC	NRS	VC	BS
Distribution Boards & Safety of DB's	SANS 1765				
Enclosure for electric equipment (IP Code)	SANS 1222				
Glands & terminals for PVC-insulated cables	SANS 808 SANS 1433-1 SANS 1433-2 SANS 1213				
Installation, Handling, Termination & Jointing of Cables	SANS 10198-1 to -14				
Earth Electrodes	SANS 10199 SANS 1063				
Earth Wire	SANS 1411-1				
Code of Practice for Lightning Protection	SANS 03				
PVC Conduit	SANS 950				
Metal Conduit	SANS 60614-1 SANS 60614-2-1 to SANS 60614-2-7 SANS 1065-1 SANS 1065-2				
Flexible Conduit	SANS 60614-2-5				
Light Switches	SANS 60669-2-1 to SANS 69699-2-3			VC 8003	
Socket Outlets	SANS 1239			VC 8008	
Wall boxes (for switches and socket outlets)	SANS 1085				
Trunking and ducting	SANS 61084-1 SANS 61084-2-1				

SPECIFICATION	SANS	IEC	NRS	VC	BS
	SANS 61084-2-4				
Photoelectric switches	SANS 1777				
Metal Light Fittings	SANS 60598-1 SANS 60598-2-1 to SANS 60598-2-6				
Fluorescent lamps	SANS 1041				
Tubular fluorescent lamp luminaries	SANS 1119				
Ballasts for tubular fluorescent lamp luminaries	SANS 890-1 SANS 890-2 SANS 891				
Ballasts for discharge lamps	SANS 1266				
Capacitors for tubular fluorescent lamp luminaries	SANS 1250				
Distribution Transformers	SANS 780				
Transformer oil	SANS 555				
Hot-dip Galvanising	SANS 121 SANS 935				
Standard Voltages and Currents	SANS 1019				
Colour Codes for Identification	SANS 10140-1 SANS 10140-2		NRS040-2		
Colour Codes for Cables	SANS 1574				
UPS Equipment	SANS 50091-1 SANS 50091-2 SANS 62040-3				
Emergency Stop Buttons	SANS 60947-5-5		NRS 042		
Lightning Protection	SANS 61024-1 SANS 61024-1-1 SANS 61024-1-2				

SPECIFICATION	SANS	IEC	NRS	VC	BS
	SANS 61312-1 SANS 61312-2 SANS 61312-4 SANS 10313 SANS 61662				
Colours for Painting	SANS 1091				
Emergency Stop Buttons	Sans 60947-5-5				

Any conflict that should arise between any of the above-mentioned regulations and this Specification shall forthwith be referred to the Engineer in writing for his ruling.

A competent electrical contractor will design, manufacture and install the electrical equipment and cabling required to operate the Standby Generator and UPS Units.

E2024 PHOTO- ELECTRIC SWITCHES

This unit must consist of a photocell, thermal starter and switch. The body of this unit must be manufactured from strong material to protect it against tampering, and it must also have good anti-weathering features; it must be capable of withstanding ultra-violet rays and long periods of exposure to the sun.

The unit must be a wall-mountable type and it must be fitted with a suitable mounting frame. The unit must be mounted over a 60mm (diameter) round draw-box of which the lid must be fitted with a grommet to protect conductors entering the draw-box. The unit must be installed in such a way that it is not activated by ambient or any other artificial light source.

The unit must be pre-set in the factory so that it will switch on at an illumination level of approximately 54 Lux and switch off again at 108 Lux. A time delay of at least 15 seconds must be provided for to prevent the switch from being activated by lightning or other brief changes in the illumination level.

E2025 LUMINAIRES

1 General

The luminaires shall comply with the following specifications detail:

a) Dimmable and Non-Dimmable output-controlled LED luminaires for functional lighting will be accepted.

b) The proposed luminaires shall yield lighting installations that shall conform to SANS 10114-1, SANS 10389-1 & -2, BS or IEC equivalent standards and other applicable lighting standards.

c) The luminaires shall have a minimum rating of IP20 for interior and IP65 for exterior in accordance with IEC / SANS 60529 and with SANS 60598-2-5 and SANS 60598-2-3 safety mark or equivalent International rating.

d) Compliance testing certificates to LM-80 and LM-79 shall be submitted for each luminaire.

e) The installation and mounting of luminaires shall conform to the design drawings.

f) All fittings to be supplied shall be reviewed by the Engineer for acceptance prior to ordering and installation.

g) All luminaires/lamps/LED modules shall bear the approved mark of any of the following: SANS; IEC; ANSI; CIE; ENERGY STAR; or IESNA.

2 Standard & Specification requirements

Luminaires shall be to IEC 60598-1: General requirements and tests

The luminaire shall be manufactured by an ISO 9002 accredited company.

The luminaire company shall be a SANS Marked Bearing Company.

The luminaires shall be of South African manufacture and should have a local content of at least 50%.

The luminaire should fully conform to following specification:

IEC 62471 – Photo-biological safety of lamps and lamp systems

EN 55015: 2006 and 2007 – Limits and methods of radio disturbance characteristics of electrical lighting.

EN 61547:1995 / +A1:2000 – Equipment for general lighting purpose EMC immunity requirements.

EN 61000-3-2:2006 – Limitation of harmonic current emission.

EN 61000-3-3:2008 – Limitation of voltage fluctuation and flicker

The luminaire manufacturer is to provide a minimum 5 year warranty on each luminaire and its components and submit a warranty certificate, when proposing LED luminaires.

The luminaire shall be rated to operate at an ambient temperature, Ta, -20°C to 35°C.

The LED driver shall be designed to operate large array of high power LED's through current controlled output. The driver shall be suitable for nominal 220V-240V 50Hz mains supply. The LED driver shall have an efficiency of at least 90%.

The LED driver shall incorporate multiple control interfaces for dimming capability. It shall enable DALI, & 1-10V DC interface dimming control. It shall also have a programmable feature to allow pre-programming of step dimming lighting levels based on the ON time.

The LED driver shall fully conform to following specifications:

1) EN61347-1 - General and safety requirements.

2) EN61347-2-13 - Particular requirements for DC or AC supplied electronic control gear for LED modules.

3) EN62384 - DC or AC supplied electronic control gear for LED modules.

3 Construction and Installation of Luminaires

The luminaires shall be installed as indicated on the Construction Drawings.

Only interior luminaires with high grade aluminium die-cast housings shall be accepted.

Only exterior luminaires with aluminium housings shall be accepted and shall be manufactured from grade LM 6 (EN1706 AC-44100) (or higher) aluminium alloy.

The housing, especially the lamp / LED module and control gear compartment, shall be robustly constructed, weatherproof, hail proof, insect proof, corrosion proof, ultra-violet light resistant and vandal resistant.

Luminaires shall be suitable for operation at the specified rated ambient temperature, Ta, of -20°C to 35°C.

Fixing devices, junctions, lips and the like shall be designed to shed water. Pockets and ledges in which condensation may accumulate shall be avoided.

Exterior LED luminaires for area lighting will be incorporated with 10kA Class II surge protection and have applicable thermal protection devices applicable to the region of installation, such that should the ambient temperature exceed the rated operating ambient temperature of 35ºC, that the luminaire then either "switch-off" or lower its operating mode while remaining "switched-on".

IP rating certificate to be submitted.

The luminaires shall be constructed from light weight durable materials which for all parts shall be compatible and failure or deterioration shall not occur due to electrolytic action or by differential thermal expansion.

Where glass reinforced polyester (GRP) is used it shall comply with the requirements of SABS 141 for Type F laminate products.

Luminaires shall have successfully passed the accelerated ageing tests of LM-79 testing for LED luminaires. Certificates to be provided.

Luminaires made of DMC (Dough Moulding Compound) are not acceptable.

Luminaires shall have a lamp, control gear compartments and a spigot/mounting compartment where applicable, and shall have a minimum degree of protection of IP20 for interior unless stated otherwise and IP65 for exterior on the control gear and lamp compartment. Preference will be given to luminaires exceeding the minimum requirement, where it can be proven to the Engineer that such ratings will provide a material benefit or long term financial saving.

Exterior luminaires with aluminium die-cast housings shall be of grade LM 6 (EN1706 AC-44300) (or higher) aluminium alloy and shall comply with BS 1490 or equivalent and will not be powder coated or have any other coating applied, excluding interior luminaires. Contractors offering aluminium housings shall submit a metallurgical report from an independent metallurgist confirming the grade of aluminium for all the luminaires offered or a letter from the supplier confirming the compliance of the luminaire. The Engineer reserves the right to submit luminaires for metallurgical testing when necessary.

Ferrous components shall be hot-dip galvanised and shall withstand the test specified in the current edition of SANS 121 for heavy duty application.

Small components (such as toggle clips, bolts, screws, nuts, washers) shall be manufactured of stainless steel (grade 304 or better).

Due attention shall be paid to the accessibility of parts and to other requirements necessary for efficient maintenance and cleaning.

Any paint and/or tape on the reflector or bowl to achieve cut-off distribution shall not be considered.

The luminaire should have a minimum colour rendering index (Ra) of 70+/- 10 for exterior and 80 +/- 5 for interior and a colour temperature of either 3000K or 4000K for maximum efficiency as indicated in the drawings. The LED shall have a colour consistency within 5 SDCM (standard deviation of colour matching) as defined by McAdam. The colour temperature variation of the LEDS should be restricted as per ANSI C78.377A with CCT variation limiting within 500K for nominal CCT of 3000K and 4000K.

The LED luminaire shall be designed for lumen maintenance of L70 or 70% at the end of useful life at ambient temperature of -20°C to 35°C with a minimum life time rating of L70/E10. The luminaire shall have a controlled steady state lumen output such that the initial and end of useful life lumen output are nearly identical although the LED's have degraded over time. The complete luminaire shall have a useful life of over 50 000 burning hours. The luminaire including the driver will include a warranty of 5 years against manufacturing defects.

4 Schedule of Luminaires to be used

Supply, install and connect all luminaires as specified and shown on the Construction Drawings.

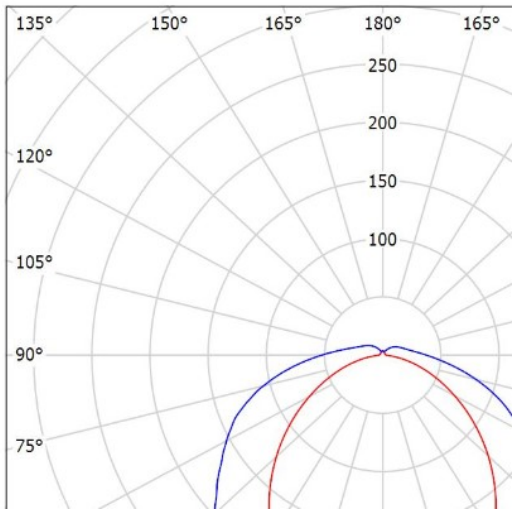
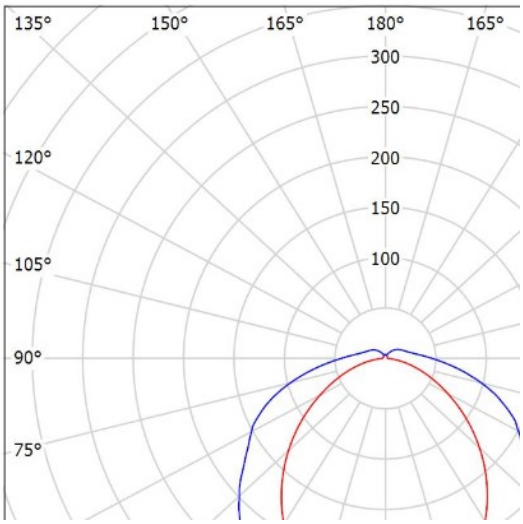
All luminaires shall be complete with lamp / LED module, protection as specified.

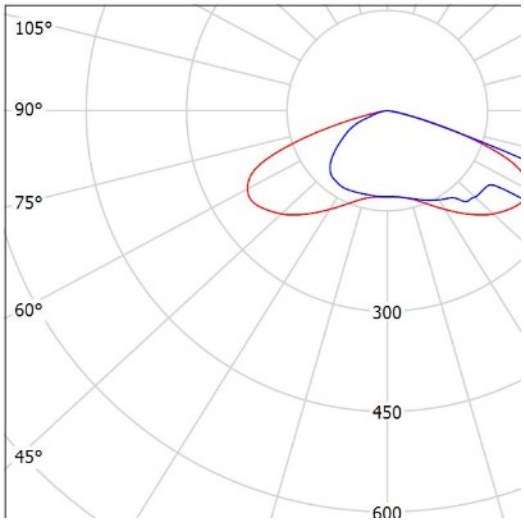
NOTE:

All installation positions will be determined on site. A sample of each luminaire shall be submitted for approval by the Engineer before delivery on site if required by the Engineer. The luminaires shall be returned to the Contractor by the Engineer. Schedule of Lighting Design for Luminaires to be used:

TABLE 1 – Luminaire Schedule

Luminaire Legend	Description	Photometric

Luminaire Legend	Description	Photometric
1	Proposal shall be similar or exceeding the quality and performance of a: REGENT NIMBUS IP66, 32W, 4000K, 350mA, 4177 lm, 1278mm, SURFACE MOUNTED	
2	Proposal shall be similar or exceeding the quality and performance of a: REGENT NIMBUS IP66, 63W, 4000K, 500mA, 4213 lm, 1578mm, SURFACE MOUNTED	
3	Proposal shall be similar or exceeding the quality and performance of a: EUROLUX O421: 10W SOLAR PIR SECURITY LUMINAIRE, 4000K, SURFACE MOUNT	

Luminaire Legend	Description	Photometric
4	Proposal shall be similar or exceeding the quality and performance of a: BEKA LEDLUME FLOOD-MIDI 55W, 4000K, 700mA, 24LED, 5119 OPTIC	

E3000 MEASUREMENT AND PAYMENT

E3001 MEASURING AND PAYMENT PRINCIPLES

1. The basic principles of measurement and payment for cable trench excavations is that the rate tendered for excavations covers the cost of excavations, the re-use of excavated material for back filling and the removal of all surplus material along the trench routes within 2.0 km from the source.
2. The rate for the laying of the cable covers the cost of the handling and placing of the cable in the approved trench, as well as any other costs concerning the laying of the cables.
3. Trench excavations for cables, etc. is measured volume wise, but can be measured according to length.
4. Except when differently stated in the project specification or differently demanded, the depth will be measured from the ground level, along the centre line of the trench, down to the bottom of the specified bottom layer. The ground level is that which was formed after mass ground works was completed, measuring the excavated level or the backfilled level, except where another execution sequence is demanded.
5. **The source of the approved back fill material and the bottom layer is the contractors own responsibility. The contractor is free to use approved material excavated from the side of the trench or other excavations on site, providing such material meats the applicable requirements. The contractor is also free to buy one or both the materials from commercial sources or to excavate along the cable route at the contractor's own cost.**
6. **Additional and separate payment for the backfill of over-excavations and the removal of surplus materials or any other unforeseen works will only be made if such works was specified by the Engineer.**
7. The requirements of sub clause 8.3.3 of SANS 1200 DA apply to additional transport distances. All additional distances will be measured only via the shortest route possible and only in one direction to the nearest 0,1 km measured and the volumes will be calculated as specified in 8.2.3.
8. All rates shall allow for fault finding and commissioning procedures as well as include making, aiming, conveying, importing, delivering, unloading, storing, unpacking, hoisting, setting, fitting and fixing in position, cutting and waste, plant, temporary works, surveying and profit. All equipment and materials shall be new.
9. The rates shall include all permanent labelling and numbering on all switchgear, cables and equipment. The labelling shall be made from Trafolite (black writing on white background) as detailed in the general technical specification. All ends of cables shall be labelled.
10. The Contractor shall be responsible for obtaining the Engineer's signature accepting any measurements and payment claims by no later than one week before the payment claim is to be submitted for payment.
11. Payment for Materials on Site (MOS), with written Engineer approval, may be claimed for billed items purchased by the contractor and stored securely on site, provided the contractor submit delivery notes of material on site and invoices for the materials supplied by the suppliers. The contractor may only claim 80% of the full invoiced amount of MOS submitted by the supplier, provided that the total claimed MOS for each billed item does not exceed 80% of the full amount allowed for each billed item in the pricing schedule.
12. Although MOS may be claimed, the MOS will remain the contractor's responsibility until project completion and hand-over to the Employer, thereafter the defect liability period is effective, thus any damage, vandalism, theft, etc. of materials will be the contractor's responsibility to replace and repair at the contractor's own expense.
13. The installation of works shall include all plant, equipment, masonry-cutting, concrete-cutting, chasing, general-cutting, setting out, fixing, tying, drawing, terminating, finishing, levelling, labelling, tidying, clearing, cleaning, removal of debris and other associated works and material required to install the related pay item materials.
14. All items for installation shall be regarded as surface items, apart from conduiting, unless indicated otherwise.

E3002 CALCULATION OF QUANTITIES

1. The length used for calculations is the total length of the cable, cable trench, etc. from one end to the other or from one structure face to the next structure face. No deductions will be made for any manholes, etc.
2. Excavations will be measured as if excavated with vertical sides, regardless of whether it was excavated with sloping sides.
3. If volumetric measurements are required, the volume will be measured from the depths shown on the drawings or to the bottom of the specified base, whichever is the largest, and a minimum base width of 450mm in the case of medium voltage cables and 450mm in the case of low voltage cables.
4. The volume of the backfill will be calculated from the minimum base width of the trench and the depth of the backfill needed. No allowance shall be made for loss of volume of the compacted material.
5. Imported material must be disposed of along the cable servitude within a distance of 50m from the source unless specified otherwise by the project specifications. Additional transport of material if ordered must be handled as specified in sub clause 8.3.3.4 of SANS 1200 DB. Free haul as specified in sub clause 5.2.6.1 of SANS 1200 DA shall be applied.
6. If supports are specified or ordered, the length of the supports will be measured for payment along the centre of the trench. This tariff includes works done as specified in 8.3.1.4(a) of SANS 1200.
7. The rates per unit shall be for all required works and material required to supply, install, test and commission the unit in full completion.

E3003 SCHEDULED ITEMS

E3003.1 GENERAL ITEMS: ELECTRICAL – PART E.1

1. **Operational and Maintenance manuals**

Unit: Prov. Sum.

The unit of measure shall be a provisional sum for the cost of providing three hard copies of complete Operational and Maintenance manuals complete with ‘as built’ drawings bound in lever arch files and copied into electronic format on five CD’s.

A suitable CAD package shall be used for the drawings. Exact positions of cables and all electrical services installed shall be clearly shown.

1.01. **Soil resistivity survey**

Unit: No.

The unit of measure shall be for the cost of conducting a complete soil resistivity survey for each area indicated by the engineer. Resistivity measurements shall be taken at each supply point. It shall include a certificate and recommendation regarding the soil conditions.

1.03 **Testing and Commissioning of each complete Electrical Installation**

Unit: No

The unit of measure shall be the number of completion tests and final commissioning of each M/S, metering kiosk, LV kiosk, DB panel, MCC or other MV / LV installation that is energised with electrical circuit installations fully completed and tested and all necessary test results and test certificates submitted.

In addition, all testing is to be included in the rate, which will include cable pressure and insulation testing, voltage drop, full load, fault level, loop impedance and earth testing.

1.04 **Issuing of Certificate of Compliance for the complete Electrical Installation**

Unit: No

The unit of measure shall be the number of CoC’s submitted and approved with 5 hard copies for each M/S, metering kiosk, LV kiosk, DB panel, MCC or other MV / LV installation that is energised with electrical circuit installations fully completed and tested.

1.05 **Electrical Connection Fee**

Unit: Prov Sum

The unit of measure shall be a Provisional sum for the application and payment for the upgraded power supply discussed and obtained with the Local Supply Authority. Negotiations with supply authorities for supplying an upgraded supply point. May only claim amount invoiced by Local Supply Authority, once payment is made to Local Supply Authority and proof of payment is submitted with claim.

In addition to submitting CoC's, Connection & service connection fee, terminations, feeder cable testing, appropriately sized feeder circuit breakers, switchgear, fuses (10kA, 400V) and all other provision of supply requirements are to be included in the rate.

1.06 **Handling Cost and profit in respect of Item 1.05**

Unit: %

The unit of measure shall be a percentage of the pay item indicated to account for all costs involved and related to the handling of the specific works and including Contractor's profit margin.

E3003.2 RETICULATION SYSTEM – SECTION E.2

2.01(a-c) **LV Distribution Boards**

Unit: No.

The unit of measure shall be the number of distribution boards supplied, installed, tested and commissioned.

Electrical DB's shall be surface mounted or self standing as indicated.

The rate shall include all associated costs involved in bringing the distribution board to full operational status, including the mounting, securing, vermin proofing of the distribution board and to allow safe maintenance.

Labelling is inclusive in the rate.

The DB shall be constructed in accordance to the specifications.

In the LV compartment, rails shall be mounted to accommodate the control gear listed below in addition to a 20% future allowance. LV circuit breakers are measured within this rate. In addition, included in this rate is the following gear:

- MCCB's
- SPD's
- Disconnectors
- Rotary by-pass switches

All control and protection gear shall be Schneider or ABB, unless specified otherwise.

The DB doors shall be fitted with locking mechanisms as specified in the specifications.

All DB's shall be tested prior delivery and test certificates issued, including thermal compliance tests.

One sample of the complete DB shall be available in the factory for inspection by the Engineer prior to production of the remaining DB's.

2.02 **240mm² Al 4-core PVC SWA ECC PVC LV Cable**

Unit: m.

The unit of measure shall be the cable length in meters supplied, installed and commissioned.

All cable ends shall be labelled. The labels shall be included in the rate.

Laying cables in trenches:

Measurement of cables laid in trenches shall be of the actual length of that part of a cable laid in the trench when the cable is finally installed.

Drawing cables into ducts, pipes and conduits:

(Excluding supply and installation of ducts, pipes and conduits).

2.03 **95mm² Al 4-core PVC SWA ECC PVC LV Cable**

Unit: m.

The unit of measure shall be the cable length in meters supplied, installed and commissioned.

All cable ends shall be labelled. The labels shall be included in the rate.

Laying cables in trenches:

Measurement of cables laid in trenches shall be of the actual length of that part of a cable laid in the trench when the cable is finally installed.

Drawing cables into ducts, pipes and conduits:

(Excluding supply and installation of ducts, pipes and conduits).

2.04 **35mm² Al 4-core PVC SWA ECC PVC LV Cable**

Unit: m.

The unit of measure shall be the cable length in meters supplied, installed and commissioned.

All cable ends shall be labelled. The labels shall be included in the rate.

Laying cables in trenches:

Measurement of cables laid in trenches shall be of the actual length of that part of a cable laid in the trench when the cable is finally installed.

Drawing cables into ducts, pipes and conduits:

(Excluding supply and installation of ducts, pipes and conduits).

2.05 **25mm² Al 4-core PVC SWA ECC PVC LV Cable**

Unit: m.

The unit of measure shall be the cable length in meters supplied, installed and commissioned.

All cable ends shall be labelled. The labels shall be included in the rate.

Laying cables in trenches:

Measurement of cables laid in trenches shall be of the actual length of that part of a cable laid in the trench when the cable is finally installed.

Drawing cables into ducts, pipes and conduits:

(Excluding supply and installation of ducts, pipes and conduits).

Measurement of cables drawn into ducts, pipes and conduits shall be of the actual length of that part of a cable laid in ducts, pipes or conduits when the cable is finally installed.

2.06 **25mm² Al 3-core PVC SWA ECC PVC LV Cable**

Unit: m.

The unit of measure shall be the cable length in meters supplied, installed and commissioned.

All cable ends shall be labelled. The labels shall be included in the rate.

Laying cables in trenches:

Measurement of cables laid in trenches shall be of the actual length of that part of a cable laid in the trench when the cable is finally installed.

Drawing cables into ducts, pipes and conduits:

(Excluding supply and installation of ducts, pipes and conduits).

Measurement of cables drawn into ducts, pipes and conduits shall be of the actual length of that part of a cable laid in ducts, pipes or conduits when the cable is finally installed.

2.07 **6mm² Copper 4-core PVC SWA ECC PVC LV Cable**

Unit: m.

The unit of measure shall be the cable length in meters supplied, installed and commissioned.

All cable ends shall be labelled. The labels shall be included in the rate.

Laying cables in trenches:

Measurement of cables laid in trenches shall be of the actual length of that part of a cable laid in the trench when the cable is finally installed.

Drawing cables into ducts, pipes and conduits:

(Excluding supply and installation of ducts, pipes and conduits).

Measurement of cables drawn into ducts, pipes and conduits shall be of the actual length of that part of a cable laid in ducts, pipes or conduits when the cable is finally installed.

2.08 **2.5 mm² Copper PVC GP Wire (3 independent insulated wires L-N-E)**

Unit: m.

The unit of measure shall be the wire length in meters supplied, installed and commissioned.

Three radial GP wires will be of a multi-strand single core, 1000V rated PVC sheathed each that is colour coded (Red – Live1, Black – Neutral, Yellow/Green - Earth)

All wire ends shall be labelled. The labels shall be included in the rate.

Drawing wires into ducts, pipes and conduits:

(Excluding supply and installation of ducts, pipes and conduits).

Measurement of wires drawn into ducts, pipes and conduits shall be of the actual length of that part of a wire laid in ducts, pipes or conduits when the wire is finally installed.

2.09 **240mm² 4-core Al PVC SWA ECC PVC LV Cable Termination with Gland**

Unit: No.

The unit of measure shall be the number of terminations supplied and installed, including glands/clamps for securing the cable.

The termination shall be rated for 2000V and be made from heat shrinkable material.

2.10 **95mm² 4-core Al PVC SWA ECC PVC LV Cable Termination with Gland**

Unit: No.

The unit of measure shall be the number of terminations supplied and installed, including glands/clamps for securing the cable.

The termination shall be rated for 2000V and be made from heat shrinkable material.

2.11 **35mm² 4-core Al PVC SWA ECC PVC LV Cable Termination with Gland**

Unit: No.

The unit of measure shall be the number of terminations supplied and installed, including glands/clamps for securing the cable.

The termination shall be rated for 2000V and be made from heat shrinkable material.

2.12 **25mm² 4-core Al PVC SWA ECC PVC LV Cable Termination with Gland**

Unit: No.

The unit of measure shall be the number of terminations supplied and installed, including glands/clamps for securing the cable.

The termination shall be rated for 2000V and be made from heat shrinkable material.

2.13 **25mm² 3-core Al PVC SWA ECC PVC LV Cable Termination with Gland**

Unit: No.

The unit of measure shall be the number of terminations supplied and installed, including glands/clamps for securing the cable.

The termination shall be rated for 2000V and be made from heat shrinkable material.

2.14 **6mm² 4-core Cu PVC SWA ECC PVC LV Cable Termination with Gland**

Unit: No.

The unit of measure shall be the number of terminations supplied and installed, including glands/clamps for securing the cable.

The termination shall be rated for 2000V and be made from heat shrinkable material.

2.15 **2.5mm² Copper PVC GP 3xWire Terminations**

Unit: No.

The unit of measure shall be the number of terminations supplied and installed, including lugs, glands/clamps for securing the cable/wire. Where the termination of all GP wires at one end of the wire circuit is defined as a single termination.

The termination shall be rated for 2000V and be made from heat shrinkable material.

2.16 **35 mm² Al 4-core PVC SWA ECC PVC LV cable Joint**

Unit: No.

The unit of measure shall be the number of joints supplied and installed, including lugs, glands/clamps, ferrules, HEX-crimping for securing the cable/wire joint. Where the joint of all cores is considered a single joint contained within a single jointing kit, IP68 rated.

The joint shall be rated for 2000V with heat shrinkable shroud material.

2.17 **Cable Warning Tape**

Unit: m.

The unit of measure shall be the number of metres of 230mm wide tape supplied and installed.

(Trenching measured elsewhere).

The warning tape shall be installed 300mm above MV as well as LV cables.

E3003.3 TRENCHING AND EARTHWORKS – SCHEDULE E.3

Excavation of all material for trenches, backfill, compaction and removal of excess material.

The volumes of the cable sleeve, cable ways and cable trench excavations shall be calculated according to the length and depth as shown on the drawings or to the bottom of the specified bedding, whichever is the largest and to the minimum base width specified.

The tariff covers the cost to comply with safety and protection regulations including backfill and compaction as well as the removal of any excess material, except in the case of particular items listed to cover the cost of deep excavations.

The tariff also covers the cost of the same works in tunnels if the Contractor wishes to use this method of excavation. No additional payment will be made for such tunnels and no deductions will be allowed for the decrease in the amount of excavation quantities.

3.01 **Hand pickable soil (soft soil)**

Unit: m³.

The unit of measure shall be the number of cubic metres of hand pickable soil removed from the trenches (see general specifications for definition of soil type).

LV trenching to be 1 650mm deep, Intermediate Voltage trenching to be 1350mm deep and MV trenching to be 1 350mm deep. The maximum width of a trench shall be fixed at 450mm for LV and 450mm for MV.

3.02 **Machine excavation (soft rock)**

Unit: m³.

The unit of measure shall be the number of cubic metres of soft rock removed to form the trenches (See general specifications for definition of soil type).

LV trenching to be 1 650mm deep, Intermediate Voltage trenching to be 1350mm deep and MV trenching to be 1 350mm deep. The maximum width of a trench shall be fixed at 450mm for LV and 450mm for MV.

3.03 **Hard rock (heavy excavating plant)**

Unit: m³.

The unit of measure shall be the number of cubic metres of hard rock removed to form the trenches (see general specifications for definition of soil type).

LV trenching to be 1 650mm deep, Intermediate Voltage trenching to be 1350mm deep and MV trenching to be 1 350mm deep. The maximum width of a trench shall be fixed at 450mm for LV and 450mm for MV.

3.04 **Back filling and compacting**

Unit: m³.

The unit of measure shall be the number of cubic metres of backfilling and compaction done to close the trenches (the measurement shall be based on the size of the trench).

When backfilling every 150mm shall be compacted to 90% AASHTO.

The size of the trench shall be from the top of the bedding to ground level with a trench width maximum of 450mm.

3.05 **Sifting of local soil for bedding of the cables**

Unit: m³.

The unit of measure shall be the number of cubic metres of bedding sifted and installed in the trenches.

The bedding shall have a thermal conductivity of at least 1.2 K.m/W and be approved by the Engineer prior to installation. A 6mm grid shall be used during the sifting process.

The bedding shall be 150mm above and below the cable as well as cover the width of the trench (maximum of 450mm).

3.06 **Import soil for bedding of cables**

Unit: m³.

The unit of measure shall be the number of cubic metres of imported soil and installed in the trenches.

The bedding shall have a thermal conductivity of at least 1.2 K.m/W and be approved by the Engineer prior to installation. A 6mm grid shall be used during the sifting process.

The bedding shall be 150mm above and below the cable as well as cover the width of the trench (maximum of 450mm).

E3003.4 SOURCE OUTLETS – SECTION E.4

4.01 **SINGLE 16A SSO (NORMAL)**

Unit: No.

The unit of measure shall be the number of socket outlets supplied, installed and commissioned in the locations indicated on the electrical drawings.

The rate shall include all accessories, conduit terminations, complete with back boxes, mounting equipment and cover plates.

4.02 **SINGLE 16A SSO (IP65)**

Unit: No.

The unit of measure shall be the number of IP65 rated socket outlets supplied, installed and commissioned in the locations indicated on the electrical drawings.

The rate shall include all accessories, conduit terminations, complete with back boxes, mounting equipment and cover plates.

4.03 **IP65 32A 3 PHASE 5-PIN SOCKET OUTLET, SURFACE, ROTARY SWITCH (L1/L2/L3/N/E)**

Unit: No.

The unit of measure shall be the number of IP65 32A 3 PHASE 5-PIN SOCKET OUTLET, SURFACE, ROTARY SWITCH (L1/L2/L3/N/E) outlets supplied, installed and commissioned in the locations indicated on the electrical drawings.

The rate shall include all accessories, conduit terminations, complete with back boxes, mounting equipment and cover plates.

E3003.5 LUMINAIRES – SECTION E.6

5.0 **General**

All luminaires shall be supplied, installed, commissioned and aimed by the Contractor.

All luminaires are to adhere to Contract Standards and Specifications.

All luminaires & Lamps are to adhere to relevant Regional Environment standards, Contract & Client specifications, with IP Ratings Intact or higher.

The luminaire shall be rated to operate at an ambient temperature, Ta, -20°C to 35°C.

The Contractor shall be responsible for installation of the fittings including lamps / LED Modules strictly according to the supplier's requirements and approved compliant lighting simulations submitted.

Any defective luminaires found after installation will be the responsibility of the Contractor and shall be replaced at his cost, within the one year defect liability period.

The lighting installation will comply with the relevant SANS standards. Should the lighting installation not comply with the relevant SANS standards upon testing, it will be the Contractor's responsibility and at the Contractor's own expense to provide a compliant lighting installation. All alternative luminaires or alterations proposed to achieve compliancy will need to be reviewed and approved by the Engineer.

Should a tendered luminaire model become outdated, the Contractor is to inform the Engineer and clearly state the latest luminaire model that takes the place of the outdated model. Additionally, the necessary lighting simulations are to be submitted to validate that the newer luminaire model is compliant. The Contractor is to submit this information for approval by the Engineer. Any additional costs for the updated luminaire will be for the Contractor's own expense.

Only once the commissioned system has operated fault free at full load for 30 days initially without fail to test the electrical and lighting system, will full payment of all luminaires be allowable, until such time 30% shall be retained.

5.01-5.04 **Supply & Installation of Luminaire**

Unit: No.

The unit of measure shall be the number of luminaires supplied, installed, terminated and commissioned per luminaire type specified. All accessories and related works shall be included in the rate (e.g. trailing cable, emergency power battery banks, etc).

5.05 **PHOTOCELL**

Unit: No.

The unit of measure shall be the number of surface mounted 16A, 230V photocell supplied, installed and commissioned per electrical lighting circuit.

Photocell failure shall result in an 'on' state. Similar to that of a Royce Thompson.

This unit must consist of a photocell, thermal starter and switch. The body of this unit must be manufactured from strong material to protect it against tampering, and it must also have good anti-weathering features; it must be capable of withstanding ultra-violet rays and long periods of exposure to the sun.

The unit must be a wall-mountable type and it must be fitted with a suitable mounting frame. The unit must be mounted over a 60mm (diameter) round draw-box of which the lid must be fitted with

a grommet to protect conductors entering the draw-box. The unit must be installed in such a way that it is not activated by ambient or any other artificial light source.

The unit must be pre-set in the factory so that it will switch on at an illumination level of approximately 54 Lux and switch off again at 108 Lux. A time delay of at least 30 seconds must be provided for to prevent the switch from being activated by lightning or other brief changes in the illumination level.

The rate shall include all accessories, conduit terminations, complete with back boxes, mounting equipment and cover plates.

5.06 **16A 1-LEVER 1-WAY LIGHT SWITCH**

Unit: No.

The unit of measure shall be the number of 1-lever 1-way light switches supplied, installed and commissioned in the locations indicated on the electrical drawings.

The rate shall include all accessories, conduit terminations, complete with back boxes, mounting equipment and cover plates.

5.07 **16A 2-LEVER 1-WAY LIGHT SWITCH**

Unit: No.

The unit of measure shall be the number of 2-lever 1-way light switches supplied, installed and commissioned in the locations indicated on the electrical drawings.

The rate shall include all accessories, conduit terminations, complete with back boxes, mounting equipment and cover plates.

5.08 **Testing of Luminaires and Controllers**

Unit: No.

The unit of measure shall be the number of luminaires commissioned and fully operational after the fulfilment of the testing requirements.

E3003.6 EARTHING – SECTION E.6

6.01 **Earth Conductor**

Unit: m.

The unit of measure shall be the length of specified 70mm^2 earth continuity conductor supplied and installed to achieve an earth resistance smaller or equal to 10 ohm and in accordance with SANS 62561. Terminations and all related works and material shall be included in the rate.

All the cable connections to the earth electrodes shall be cad-welded.

6.02 **Earth Conductor Termination**

Unit: No.

The unit of measure shall be the number of additional earth conductor terminations supplied and installed.

The termination shall include all the lugs and insulating material needed to complete the termination.

6.03 **Earth Spikes**

Unit: No.

The unit of measure shall be the number of additional 1.2 m 16mm diameter copper earth electrode terminations supplied and installed in accordance with SANS 62561. Inclusive in the rate is the cad welding termination of the earth spike to the earth conductor.

6.04 **Earth Joint / Termination Clamps**

Unit: No.

The unit of measure shall be the number of U-clamp pair joints or terminations (2 clamps per joint/termination) of earth conductors supplied, installed, commissioned and all associated works and materials to complete the installation in accordance with SANS 62561

6.05 **Earth tests with test certificate.**

Unit: No.

The unit of measure shall be the number of earth system resistance tests done and certificates issued for each test site after installation of the earthing system.

Resistance of the earthing system shall be measured for each structure element. Resistance readings shall be logged and shall form part of the commissioning tests.

E3003.7 SERVICE WAYS – SECTION E.7

7.01 **110mm Diameter PVC Sleeves**

Unit: m.

The unit of measure shall be the length of sleeve supplied and installed; inclusive in the rate is draw wire in the sleeve, testing of the sleeve for blockages and all necessary accessories, slow 90° bends, couplings, adapters, joints, elbow-joints, saddles (1m spacing), anchor bolts and sleeve terminations.

7.02 **75mm Diameter PVC Sleeves**

Unit: m.

The unit of measure shall be the length of sleeve supplied and installed; inclusive in the rate is draw wire in the sleeve, testing of the sleeve for blockages and all necessary accessories, slow 90° bends, couplings, adapters, joints, elbow-joints, saddles (1m spacing), anchor bolts and sleeve terminations.

7.03 **75mm Diameter Galvanised Steel Conduit.**

Unit: m.

The unit of measure shall be the length of Galvanised Steel conduit supplied and installed; inclusive in the rate is draw wire in the conduit, testing of the conduit for blockages and all necessary accessories, slow 90° bends, couplings, adapters, joints, elbow-joints, saddles (1m spacing), anchor bolts and conduit terminations.

7.04 **50mm Diameter Galvanised Steel Conduit.**

Unit: m.

The unit of measure shall be the length of Galvanised Steel conduit supplied and installed; inclusive in the rate is draw wire in the conduit, testing of the conduit for blockages and all necessary accessories, slow 90° bends, couplings, adapters, joints, elbow-joints, saddles (1m spacing), anchor bolts and conduit terminations.

7.05 **20mm Diameter PVC Conduit.**

Unit: m.

The unit of measure shall be the length of PVC conduit supplied and installed; inclusive in the rate is draw wire in the conduit, testing of the conduit for blockages and all necessary accessories, slow 90° bends, couplings, adapters, joints, elbow-joints, saddles (1m spacing), anchor bolts and conduit terminations.

7.06 **50mm Diameter Round Draw Box.**

Unit: No.

The unit of measure shall be the number of round galvanised steel draw boxes (IP65 rated with neoprene gasket) with cover plate and all accessories supplied and installed to bring the draw box to full operational status.

The round galvanised steel draw box will allow the termination of 25mm and 20mm diameter PVC conduits on the draw box.

The round draw box will be secured in the structure with appropriately sized anchor bolts or installed in-situ, with all related works included in the rate as well as all glands and terminations.

7.07 **300mm LIGHT DUTY CABLE TRAY, 19mm SIDE WALLS**

Unit: m.

The unit of measure shall be the length of 300mm LIGHT DUTY CABLE TRAY, 19mm SIDE WALLS supplied and installed.

Supply and installation of the 300mm LIGHT DUTY CABLE TRAY, 19mm SIDE WALLS and associated equipment, bend sections, T-sections, fixing against structure, suspended from ceiling, slab or structure or cantilevered on wall, complete with fixing brackets, hangers, and all additional accessories shall be included in the rate.

All cable tray joints shall be earthed by means of a 6mm² insulated earth wire, with terminations, to be included in the rate.

E3003.8 SECURITY SYSTEM – SECTION E.8

8.01-04 **Alarm System**

Unit: SUM.

The unit of measure shall be the SUM for the supply, installation, commissioning and GSM Data Contract for 2 years (data sized for system requirements, max 250MB/month) of an alarm system to be installed at the locations indicated in the pay items.

Skills transfer, operation and maintenance training of the systems shall be inclusive, consisting of 1-day workshop and course material (10 delegates).

Each alarm system shall consist of a main alarm panel unit, mimic panel and key panel, PIR sensors (qty per structure), Siren, Strobe Light, 24hr capacity back-up battery in the event the power is disconnected, allowance for another 24hr capacity battery, GSM capabilities.

The rate shall also include the initial commissioning, of the GSM system, sms notification addressing to key persons and authorities.

All associated material and works shall be included in the rate to ensure the safe operation and reactive unauthorised intrusion detection and alarm notification, with minor (<5% per annum, assuming 5 actual alarms per month) faulty alarms.

PART G: BUILDERS WORK

G 1 SCOPE

This section covers the various construction activities associated with the erection of buildings, which form part of certain civil projects.

Building work shall be carried out in accordance with the National Building Regulations and the information contained in this section.

Work appurtenant to the erection of buildings such as earthworks, concrete work, structural steelwork, etc. shall be carried out as specified in the appropriate sections of these specifications and will be measured and paid for under those sections.

G 2 SUPPORTING SPECIFICATIONS

All building works and materials shall be carried out in accordance with the National Home Builders Registration Council (NHBRC) Home Building Manual, Parts 1, 2, and 3, February 1999, Revision 1.

In addition, the following specifications shall, inter alia, form part of the Contract Document:

(a) SANS 10400 Code of Practice: The application of the National Building Regulations

(b) SANS 2001 Part CG1: Installation of glazing in window and door frames

(c) SANS 2001 Part CM1: Masonry walling

(d) SANS 2001 Part CT2: Structural timberwork (roofing)

(e) SANS 2001 Part EM1: Cement plaster

(f) SANS 0252-1 Part 1: Water supply installations for buildings

(g) SANS 0252-2 Part 2: Drainage installations for buildings

G 3 SOIL POISONING

The Contractor will be required to provide a 10 YEAR guarantee from a registered (member of SAPCA) soil poisoning company for soil insecticide and weed killing applications

G 4 FLOOR SCREEDS

(a) Materials

Cement sand & water shall comply with the requirements set out in SANS 2001-EM1:2007: Cement Plaster.

(b) Normal screeds

Normal screeds shall have a mix proportion by mass consisting of 1 part of Portland cement and 3 parts of fine aggregate. A minimum amount of water is to be used but it shall be sufficient to allow adequate compaction.

Screeds shall be laid on clean hardened bases, prepared as for granolithic screeds, in panels not exceeding 14 m and shall be steel-trowel led to a true and smooth finish. In monolithic construction the panels shall not exceed 30 m. Joints in screeds shall coincide as closely as possible with joints in the bases. The thickness of screeds shall be as shown on the Drawings or as directed by the Engineer.

The entire screed surface shall be free from loose or raised particles of aggregate, trowel marks or from any irregularities, humps or depressions exceeding 5 mm when measured from a 3 m long straight-edge.

Screeds shall be cured for 3 to 7 days as may be directed by the Engineer, and shall be protected from damage.

No moisture-sensitive floor finish shall be laid on screeds unless a reliable moisture test shows that the screed is sufficiently dry to receive the covering.

(c) Granolithic screeds

Granolithic floor screeds shall be composed of 2 parts of Portland cement to 3 parts of aggregate with sufficient water added to obtain a consistency as dry as may be practicable. The screed shall be rendered with a wood float and struck off with a steel trowel after set has commenced.

The granolithic mixture shall be floated onto the concrete floor slab within 12 hours of the latter having been laid. Where this cannot be done within 12 hours, the concrete surfaces shall be thoroughly hacked, cleaned, watered and treated with an approved cement slurry or with an approved bonding agent, as may be directed before the granolithic screed is laid.

Where a tinted granolithic screed is specified, it shall be placed in two layers, a lower layer placed to within 6 mm of the finished level and an upper layer into which the pigment has been mixed. No dusting on of colouring material will be allowed.

The surface of all granolithic screeds shall be kept damp for a period of at least 7 days after laying by covering it with polyethylene sheeting or by thickly covering is with wet sand, sawdust or Hessian kept moist by frequently sprinkling it with water.

The granolithic screeds shall be not less than 20 mm thick, finished to falls as shown on the Drawings, and shall be laid in panels not exceeding 6,0 m. Thresholds shall be finished with granolithic screeds 25 mm thick, treads 25 mm thick, and risers 20 mm thick, including rounded nosing and reedings.

Edges next to walls shall be finished with projecting skirting, 75 mm high, with rounded top edges, unless otherwise specified or instructed by the Engineer.

G5 BRICKWORK AND PLASTER WORK

G5.1 MATERIALS

(a) Bricks

Bricks shall comply with SABS 227 and shall be of the class scheduled or shown on the Drawings. Satisfactory proof of the load-bearing capacity of the bricks offered shall be submitted before deliveries are made to the Site.
Air bricks shall be well-burnt terracotta and shall be free from cracks and blemishes and lined with copper mosquito gauze.
Three samples of each type of brick shall be submitted to the Engineer for approval. All subsequent deliveries shall be of a standard equal to or better than that of the approved samples.

(b) Cement

Cement shall comply with the requirements of SABS 471 and shall be stored under cover. The use of Portland blast-furnace cement (PBFC) which complies with the requirements of SABS 626 will only be allowed if approved by the Engineer.

(c) Aggregate

Fine aggregate shall consist of natural sand, or crushed rock or gravel, and shall be hard, clean and free from adherent coatings or other deleterious matter. Sand for plaster and mortar shall comply with the requirements of SABS 1090, whereas the aggregates for normal and granolithic floor screeds shall comply with the requirements of BS 1199 and BS 1201 respectively.

(d) Water

Water shall be clean and free from clay, silt, oil, acid, alkali, organic or other matter which would impair the required strength and durability of the mortar, plaster or floor screed.

(e) Wall ties

Wall ties shall be of the galvanized, crimped, single-wire type, 3,5 mm in diameter, and shall comply with the requirements of SABS 28.

(f) Damp-proof sheeting

Damp-proof sheeting shall comply with SABS 248, type FV for fibre felt, or SABS 952, type B for embossed polyethylene sheeting.

G5.2 CONSTRUCTION OF BRICKWORK

(a) Cement mortar

Cement mortar shall, unless otherwise specified, consist of one part Portland cement to four parts sand (1:4) by volume for normal brickwork and one part Portland cement to three parts sand (1:3) by volume for reinforced brickwork. The ingredients for cement mortar shall be measured in proper gauge boxes on a boarded platform and thoroughly mixed. Alternatively, mixing may be by means of an approved mechanical batch mixer. Only when the dry ingredients have been thoroughly mixed and a mixture of uniform colour has been obtained may the water be added in sufficient quantity to obtain mortar with the required consistency.

Cement mortar shall be used within two hours of adding water to the mix and shall not be used after two hours or if it has begun to set. Mortar shall be turned over frequently to prevent it from setting until it is used.

(b) Brickwork

Dimensions of all the brickwork shall be set out and built as shown on the Drawings. Bricks shall be kept wet before laying and the top of brickwork shall be wetted before any further bricks are laid. Bricks shall be well buttered with mortar before being laid and all joints shall be thoroughly flushed up as the work proceeds. All joints to face brickwork shall be neatly made and key-drawn with a 6mm key.

Brickwork shall be carried up in a uniform manner with no portion being raised more than 1 m above an adjacent portion. All perpends, quoins, etc, shall be kept strictly true and square and the whole properly bonded together.

Brickwork shall be built in stretcher bond or english bond as shown on the Drawings, and bats shall not be used except where required for the bond. All joints shall be 10 mm wide and four courses shall measure 340 mm.

Brickwork for cavity walls and solid walls built in stretcher bond shall be tied with wall ties placed not more than one metre apart in every third course, and shall be staggered vertically. At openings, the ties shall be positioned not more than 300 mm apart along the periphery of the opening and 150 mm from the opening.

Face brickwork shall be kept perfectly clean and rubbing down of the brickwork shall not be allowed. Scaffold boards shall be turned back during heavy rain to avoid splashing. Soiled brickwork shall be cleaned at the Contractor's expense, and the cleaning method shall be approved by the Engineer.

(c) Reinforced brickwork

Brickwork over door and window openings shall be reinforced with steel rods, welded or expanded mesh, etc. Reinforcement shall be placed in each course of brickwork for a minimum of four (4) courses or as shown on the Drawings. Reinforced brickwork shall continue at least 300 mm on each side of the openings.

Brick lintels shall be built upon rigid temporary supports left in position for not less than seven (7) days after brick-laying. Prestressed concrete lintels may be used where approved by the Engineer.

(d) Key for plaster

Joints of all brickwork receiving plaster shall be raked out, or the brick surfaces shall otherwise be prepared with an acrylic slurry or any other approved bonding agent.

(e) Damp-proofing

A damp-proof course shall be laid over the full width of all the walls at a minimum height of 150 mm above the final ground level or wherever else it may be required, and it shall be lapped for at least 150 mm at angles and joints. A damp-proof course shall also be laid and stepped up under all external sills.

(f) General

Rough and fair cutting shall be performed as required, and the brickwork shall be fitted around any steel work. Face brickwork shall be carefully cut and fitted to suit fittings.

Chases shall be left or formed for edges of concrete floors, staircases, etc. Chases shall also be provided wherever they may be required for pipes, conduits, switch boxes, distribution boards, and the like. Joints shall be raked out for flashings.

G5.3 PLASTER WORK

(a) Plaster coats

A plastered finish shall consist of a single coat, comprising one application of a 1:6 cement sand mixture with a wood or steel-float finish.

(b) Thickness

The total thickness of the plaster finish shall be 13 mm minimum and 20 mm maximum.

(c) Workmanship

All plaster work shall be finished smooth and ready to receive paint. Plaster shall be flush with the faces of all switch and plug boxes, the interiors of which shall be kept free from plaster. Plastered surfaces shall be plumb and jambs and reveals shall be formed square.
The plasterer shall cut out and make good all cracks, blisters and other defects and leave the plaster work, on completion, in a state which is acceptable to the Engineer.

G 6 IRONMONGERY

(a) General

All steel and iron work shall be delivered clean and free from rust, pitting or other defects. Shop priming shall be applied before delivery and shall consist of a coat of red oxide paint, or any other approved anti-rust paint on all surfaces.

Unless otherwise specified, all materials shall conform at least to the appropriate SANS or BS standards where such standards apply to ironmongery, steel, cast iron or any other related materials.

(b) Burglar-proofing for steel window frames

Burglar-proofing for steel window frames shall be constructed from rolled mild steel rods of at least 12 mm diameter and welded at all intersections to form openings not exceeding 125 mm by 250 mm.

Burglar-proofing sections shall be formed perfectly flat, truly square where applicable and properly welded onto the window frame in such a manner that it does in no way prohibit the opening/closing of windows nor the cleaning of window panes.

Burglar-proofing shall be welded/fixed to the window frame prior to the building in of the frame.

(c) Door locks and handles

All door locks shall comply with the requirements of SANS 4 and shall be of approved manufacture and pattern. All locks shall be supplied with two keys. Keys shall be distinctly numbered with consecutive numbers and each key shall be stamped with the same number as that of the lock which it controls. No two locks in any one building may have the same key.

External doors shall be fitted with four-lever heavy-duty mortise locks, which shall be master-keyed.

All locks shall be properly installed and, after completion, striker plates shall be adjusted and the locks serviced. Door handles shall be of cast zinc of approved manufacture and pattern.

All retaining devices for doors and windows as well as fittings such as coat hooks, retaining hooks, etc. shall be of solid brass. All fittings shall be secured by screws or set screws of the same material and finish as the fitting.

Fittings to be fixed to plastered walls, masonry or floors shall be fixed direct by means of patent plastic or fibre plugs fitted into drilled holes.

Door stops shall be provided at every door and shall be 40 mm diameter rubber stops.

(d) Installation of Doors and Windows

All built-in door and window frames shall be set straight, plumb and level, and shall operate to the satisfaction of the Engineer after fixing has been completed.

Fittings shall be either removed, or wrapped and protected from damage, until all rough trades have been completed.

G 7 ROOFING AND ACCESSORIES

Approved domestic type metal roof sheeting shall be utilised.

Flashings, ridging, eaves closers, etc. shall be of the size and shape necessary to suit the sheeting used. Flashings shall be of an approved type and shall be properly cut, lapped, shaped, dressed and fixed in an approved manner to render a waterproof finish. Provision shall be made for expansion and contraction in long lengths and at expansion joints of the building.

Gutters shall be fixed on suitable brackets and shall fall to outlets, all as directed by the Engineer. Gutters and brackets shall be standard units.

All downpipes shall be watertight and shall be fixed 25 mm clear of the finished wall face or structure by means of suitable brackets, and at approved spacings. The positions of the downpipes shall be as directed by the Engineer.

(a) Roof sheeting

(i) Galvanised-steel sheeting

Galvanised-steel sheeting shall have a minimum ungalvanised thickness of 0,6 mm and shall be of the profile as scheduled or shown on the Drawings. The sheeting shall comply with the requirements of an approved manufacturer's specification. The galvanising shall comply with the relevant requirements of SANS 934 for class Z 600 coating and shall have been passivated.

(ii) Fibre-cement sheeting

Fibre-cement sheeting shall have a minimum thickness of 5 mm, shall be of the profile as scheduled or shown on the Drawings, and shall comply with the relevant requirements of SANS 685.

(iii) Concrete roof tiles

Samples of concrete roof tiles shall be submitted to the Engineer for his prior written approval.

(b) Fasteners

Fasteners and washers shall comply with the requirements of SANS 1273, shall be durable, and shall be protected against corrosion to a standard at least equal to the standard of corrosion protection of the sheeting material with which they are to be used. Fasteners to be used with fibre-cement sheeting shall be hot-dip galvanised fasteners.

Bolts and rivets used with galvanised sheeting shall be at least 4 mm in diameter, and those used with fibre cement sheeting, at least 6 mm in diameter.

Self-tapping screws and blind rivets may be used for side-stitching and as fasteners for ridging, flashings, etc.

(c) Rain-water goods and flashings

Rain-water goods such as launders, gutters, down pipes, etc. and flashings shall be of the size and materials as scheduled or shown on the Drawings, and the materials shall, if similar, comply with the same requirements as specified for the sheeting. All rain-water goods shall be supplied complete with adequate quantities of suitably shaped brackets and fasteners.

(d) Sealants

Sealants shall comply with the requirements of SANS 110, SANS 1254 or SANS 1305 as applicable or with the sheeting manufacturer's recommendations as approved by the Engineer.

G 8 TILING

Wall tiles shall be 'first-grade' glazed ceramic tiles complying with the requirements of SANS 22 for class E tiles and shall be true and regular in shape and size and of even colour.

Quarry tiles shall be the best quality pressed tiles, sound, well burnt, even in size and colour and free of markings, hollows, cracks and chips.

Tiles shall be fixed to walls with an approved adhesive and finished with white cement joints. Tiles shall be laid with straight joints and arranged symmetrically in the tiling pattern.

Concrete tiles and all other types of hard tiles used as floor cover shall be bedded in cement mortar and shall be laid level. Tiles shall be laid with straight joints and flush with granolithic work, where applicable.

Vinyl floor tiles shall be laid level and with straight joints. The adhesive compound used and the method of laying employed shall be strictly in accordance with the tile manufacturer's instructions.

G 9 WATERPROOFING OF CONCRETE ROOFS

Waterproofing for concrete roof slabs shall be approved synthetic rubber or plastic sheet roof covering capable of being fusion welded at joints to provide a homogenous layer over the whole roof area. The sheeting must have fibreglass or similar stretch-resistant backing fully bonded to the sheeting and to be capable of withstanding extreme climatic conditions and to be manufactured in the RSA. It shall furthermore be biologically neutral, resistant to ultra-violet rays and heat, compatible with bitumen and be of a thickness of not less than 2 mm.

G 10 PLUMBING AND DRAINAGE

All plumbing installations shall comply with the requirements of SANS 0252: Water Supply and Drainage for Buildings Part 1: Water supply installations for buildings, and Part 2: Drainage installations for buildings.

G 11 EXTERNAL WORKS

Where applicable the contractor is referred to the relevant sections of SANS 1200 for the full specification, meaning and implications of the work to be executed.

G 12 ATTENDANCE

Without in any way limiting the meaning and interpretation, "general attendance" on sub-contractors shall include free of charge to the sub-contractor the following services for the purpose of the relative sub-contract works:

a) Access to the site and to the places where the work is to be carried out, including the use of any temporary personnel hoists erected by the Contractor for his own use;
b) The provision of water and lighting and a single and/or three phase electric power to a position within 50 metres of the place where work is to be carried out, but excluding water, fuel and power for commissioning of the installation for which the Contractor shall be responsible;
c) The provision of an area for office accommodation, temporary workshops and for the storage of plant and materials;
d) The use of erected scaffolding belonging to the Contractor, in common with others having the like right whilst it is remains erected upon the site;
e) The use of rest rooms, latrine, health and welfare facilities, and the like, where provided;
f) The use of site telephone (if provided) subject to the payment by the sub-contractor for all his outgoing calls;
g) Temporary casing and/or other protection of the work;
h) Site security measures;
i) Hoisting of the sub-contractor's material in loads not exceeding 500kg;
j) Making good in all trades and final cleaning down on completion.

G 13 FUEL, POWER AND WATER FOR COMMISSIONING PLANT

The cost of fuel, power and water for the commissioning of plant shall be borne by the sub-contractor appointed for the relevant sub-contract works in terms of the conditions under which they have/are contract for the specialist work involved. The Contractor shall allow opposite this item or under the relevant attendance items for the recovery of such costs via the installation of the necessary metres, etc.

G 14 ELECTRICAL INSTALLATION

See Section E: Specifications for Electrical Installations.

G 15 DIRECT SUB-CONTRACTS

Refer to Item PS10.

G 16 CARPENTRY WORK

(a) Scope of work

Carpentry work shall be carried out in a manner consistent with good workmanship and in compliance with the Drawings.

The carpenter shall perform all cutting away and making good in attendance upon all other trades and he shall provide and maintain temporary coverings required for the protection of any finished work that might be damaged it left unprotected during the progress of the work.

(b) Dimensions

"Unwrought" timber shall be "as sawn" and shall be to the dimensions and within the tolerances specified in the relevant SANS Standard Specifications mentioned in Sub-Clause PSU 3.4 (a).

(c) Jointing

Unless otherwise specified, all joints shall be secured by means of a suitable type and a sufficient number of approved connectors. All joints shall be carefully made in such a way that they will not impair the strength and stiffness of the beams or members.

(d) Timber roof construction

The plates, joists, rafters, purlins, brandering and other pieces used for the construction of the roof and trusses shall be of the dimensions, spacing and construction, as shown on the drawings provided by the Roof Specialist.

All the joints in the framework shall be of the most appropriate type, accurately formed and adequately secured with fasteners as specified.

G 17 JOINERY WORK

(v) Scope of work

Joinery work shall consist of the manufacture, delivery to the Site, and fixing in the buildings, of all joinery shown on the Drawings.

Except where a special finish is specified, the Contractor shall have all stairs, landings, doors, shelves and other joinery work cleaned and scrubbed down and shall leave all his work in a good order to the satisfaction of the Engineer.

(vi) Dimensions

All "wrought" timber shall be sawn, planed, drilled or otherwise machined or worked to the correct sizes and shapes shown on the Drawings.

Reasonable tolerance shall be provided at all connections between joinery works and the building structure to compensate adequately for any irregularities, settlements or any other movements.

(vii) Fabrication

The joiner shall perform all the necessary mortising, tenoning, grooving, matching, tonguing, housing, rebating and all the other works necessary for correct joining. He shall also provide all metal plates, screws, nails and other fixings that may be necessary for doing the specified joinery work properly.

(viii) Joints

Where joints are not specifically indicated, they shall be the recognised forms of joints for each position. The joints shall be so made as to comply with Part 2 of BS 1186.

(ix) Doors and frames

Door frames, linings, panel doors, framed, ledged and braced doors, flush doors, sliding doors, etc. shall be supplied or made by the joiner and shall be installed, fitted or hung as detailed on the Drawings.

All timber shall be "wrought" and prepared for oiling, staining, varnishing or painting.

(x) Skirting, cornices, etc.
Skirting, cornices, etc. shall not be installed until after the wall coverings have been applied, the flooring laid and ceilings installed, unless otherwise specified.

(xi) In situ joinery
In situ joinery work shall not be executed until after all floor, wall and ceiling surfaces have been formed or constructed, unless otherwise instructed.

(xii) Ceilings
Ceilings shall consist of plasterboard or fibre-cement panels as shown on the Drawings and shall be nailed to the brandering or suspended from the roof structure. The panels shall be separated by exposed tees and insulated with a 100mm thick fibreglass wool blanket where shown on the Drawings.

G18 PAINTING

G18.1 GENERAL

No paint shall be applied to any surface containing traces of dust, grit, grease, oil, loose rust, millscale or corrosion products of any kind or to any surface that is not free from moisture. Where necessary, surfaces shall be thoroughly washed to remove all traces of soluble salts and/or corrosive air-borne contaminants prior to painting, and the surfaces shall be dried and painted immediately thereafter.

Welding shall be completed in so far as it is possible before painting commences, but in cases where welding can be done only at a later stage, no paint shall be applied to within 75 mm of the proposed weld position unless otherwise specified. Welds and adjacent parent metal shall be abrasive blasted and/or ground and all contaminants such as flux shall be removed prior to painting.

Surfaces of members which are to rest on concrete or other floors or which will be otherwise inaccessible after erection shall receive the full paint system prior to erection.

Damaged paint areas on metal surfaces shall be cleaned, rust spots removed where applicable and the surrounding paint which is still intact shall be feathered for a distance of 20 mm beyond the damaged area. Spot priming and repair shall consist of all the coats previously applied and shall overlap the damaged area.
Damaged galvanised areas shall be cleaned and any rust spots and any flakes of the coating surrounding the damaged area removed. The coating shall then be restored by zinc spraying or soldering, or painting with a zinc-rich paint, as may be approved by the Engineer.

Where the shop coat is allowed to age for a few months before the final painting is done, light sanding or rubbing with steel wool or scrubbing with clean water using a bristle brush shall be carried out.

Steel to be embedded in concrete shall not be painted below 50 mm from the final level of the concrete.

Each priming coat and each undercoat of paint shall be inspected and approved by the Engineer before any subsequent undercoat or finishing coat is applied.
All finishing colours shall be as shown on the Drawings, or as directed by the Engineer.

G18.2 MATERIALS

Paints shall comply with the requirements of the appropriate Specifications below:

(a) Primers
SABS 312 : Red-lead based for structural steel
SABS 678 : For wood
SABS 679 : Zinc chromate for steel
SABS 723 : Etch-wash primer for metals
SABS 912 : Calcium plumbate for galvanized iron
SABS 926 : Zinc-rich epoxy for steel

(b) Undercoats
SABS 681 : For all undercoats

(c) Finishing coats
SABS 515 : For interior use, flat and egg-shell finish
SABS 630 : For interior and exterior use, high-gloss enamel
SABS 631 : For interior and exterior use, oil gloss paint

SABS 633 : For interior use, emulsion paint
SABS 634 : For exterior use, emulsion paint
SABS 684 : For exterior use on structural steel
SABS 801 : For interior and exterior use, epoxy-tar paint
SABS 802 : For interior and exterior use, bituminous aluminium paint
SABS 887 : For interior use, glossy and egg-shell varnish

The Contractor shall furnish the Engineer with the following information and details regarding the paints and decorative materials for the painting system he proposes to use, for written approval:

(i) The name of the manufacturer and trade name;
(ii) The brand, type or grade of paint and the appropriate SABS Specification;
(iii) Manufacturer's data sheets, colour references, instructions for use, including surface preparation, sealers, primers, undercoats, finishing coats, coat thicknesses and curing periods, which shall all be considered as being part of these Specifications if approved by the Engineer
(iv) Safeguards to protect the applied paint from damage until the work is accepted by the Engineer
(v) The shelf or pot life of materials, if applicable
(vi) An undertaking that the proposed paint system is suitable for its intended use and that the various coats of paint are compatible with one another

Where proprietary brands are used, the manufacturer's priming and all subsequent coats of paint suitable for that particular brand shall be employed in accordance with the manufacturer's instructions.

No other materials of a similar nature and quality or from another manufacturer may be used instead of those approved, unless written permission to do so has been obtained from the Engineer. All materials shall be brought onto the Site in containers sealed by the manufacturer. Paints of a different quality, type, brand or colour shall not be mixed, or thinned and shall not be adulterated in any way, but shall be used as supplied by the manufacturer. Any mixing or tinting required shall be carried out by the manufacturer.

G18.3 INSPECTION AND PRELIMINARY WORK

Before commencing paintwork, the Contractor shall carefully inspect the surfaces to be painted to satisfy himself that the surfaces are in a satisfactory or acceptable condition to receive the paint system specified.

All metal fittings and fastenings shall be removed where applicable before the preparatory processes are commenced. On completion, the metal fittings and fastenings shall be cleaned and refitted in position.

G18.4 WORKMANSHIP AND FINISHES

Paint may be applied by spray, brush or roller depending on the materials used, the surface to be painted, and the manufacturer's instructions.

Every coat of paint, irrespective of the method of application, shall be adequately and permanently keyed or bonded to the base material or previously applied coat, and shall be evenly distributed, continuous, free from sags, runs, brush marks, pin holes or other imperfections, and shall dry to a smooth finish.

An approved water trap and air-regulating valve shall be furnished and installed on all equipment used in spray painting.

Before painting the interiors of buildings, they shall be cleaned and the floors shall be washed and kept free from dust during the progress of the interior work.

The Contractor shall protect all nearby surfaces against disfigurement by spatters, splashes and smirches of paint or paint materials. The Contractor shall be responsible for any damage by paint or dirt caused by his operations to vehicles or property or injury to persons and he will be required to provide protective measures to prevent any such damage or injury and make good, where required, at his own expense.

If passing traffic creates dust which may harm or spoil the appearance of external painted surfaces, the Contractor shall sprinkle the adjacent areas with water, at his own cost, for a sufficient distance on each side of the location where painting is being done.

Undercoats shall be tinted by the manufacturer to distinguish between successive coats. The final coats or finishing coats of paint shall be applied after all the other work in the vicinity has been completed. The painter shall keep some of the final paint in reserve in the event of his having to make good any patching which may be required as a result of damage or unforeseen circumstances.

Upon completion, the Contractor shall, in the case of buildings, clean all glass, remove all paint spots from walls, floors and fittings, and leave the premises clean and fit for occupation. All inflammable materials, comprising solvents, thinners, wiping cloths, etc, shall be placed in tightly closed containers and properly disposed of.

G18.5 PAINTING OF PLASTER, CONCRETE OR BRICK SURFACES

(a) Surface preparation

Surfaces for painting shall be prepared by sandpapering, scraping or wire-brushing to remove loose material, dust, laitance, scum or other deleterious materials or high spots. Defective areas shall be cut out where necessary and made good with an approved non-shrink filler. Cracks shall be cut out, suitably keyed, and given a coat of an approved bonding agent before the filler is applied. All patches shall be rubbed down to an even surface. Surfaces shall be washed and allowed to dry.

Surfaces shall be treated with neutralising liquid for walls, and if the surface is coarse or textured, either one full coat of pigmented wall sealer or one full filler coat shall be applied in addition to the neutralising liquid.

(b) Paint application

Prior to the emulsion paint being applied, the surface shall be sealed with an approved clear sealer and primed with an undercoat diluted to 50%. Emulsion paint (PVA or acrylic) shall then be applied in two finishing coats.

Egg-shell finish (alkyd oil-based), oil gloss paint or enamel gloss paint shall be applied as follows: one coat of universal undercoat shall be applied and it shall be followed by one coat of a mixture comprising 50% of the undercoat and 50% of the paint to be used for the finishing coat. A finishing coat of semi-gloss egg-shell, or oil gloss paint or enamel gloss paint shall then be applied.

G18.6 PAINTING OF WOODWORK

(a) Surface preparation

The surfaces shall be cleaned, sandpapered and rubbed down to a smooth, even face before painting. The moisture content of the timber shall not be more than 20% at the time when the first coat is applied. All cracks, shakes or scars shall be filled flush with a filler approved by the Engineer before painting. The surface shall then be washed with cleaner and allowed to dry.

(b) Primer application

One coat of an approved wood primer shall be applied.
After open-grained timber has been prepared and primed, the grain shall be stopped and filled with synthetic filler and rubbed down with water paper.
All new woodwork shall be properly primed on all surfaces and edges before being fixed in position. All woodwork not previously painted shall be given a prime coat, well brushed in.

(c) Paint application

One coat of universal undercoat shall be applied followed by one coat of a mixture of 50% of the undercoat and 50% of the paint to be used for the finishing coat. A finishing coat of oil gloss paint or enamel gloss paint or semi-gloss egg-shell (alkyd oil-based) paint shall then be applied.

(d) Varnish finish

Two coats of gloss

G18.7 PAINTING OF METAL SURFACES

(a) General

Wherever possible, all painting shall be done at the manufacturer's works, but where this is not feasible, the Engineer may permit the application of the undercoat and finishing coats to be carried out on the Site, in which case a prime coat shall be applied at the manufacturer's works prior to the members being despatched to the Works.

(b) Surface preparation

The preparation of metal surfaces shall comply with SABS Code of Practice 064 and shall receive the greatest care to ensure rust-free conditions prior to the paint system being applied.
All surfaces shall be prepared by removing loose paint, rust, plaster, scale, dust, dirt, grease, etc and by repairing or patching defective paint surfaces before painting or repainting. Damaged shop-primed surfaces shall be thoroughly cleaned of rust and patched with a prime coat.

(c) Paint application

(i) Iron and steel work
All iron and steel work shall be properly primed with a red-lead-based primer where steel work is likely to be exposed to the elements for longer than 30 days. Zinc-chromate primer may be used where overpainting will be completed within 30 days of priming. Metal-etch wash primers may be used under dry conditions where overpainting will be completed within 24 hours of priming. The dry-film thickness of the prime coat shall not be less than 0,300 mm.

After priming, one coat of universal undercoat shall be applied. If necessary, the undercoat shall be tinted to a shade just lighter than the desired finish with approved liquid stainers. The dry-film thickness shall not be less than 0,250 mm.

The two finishing coats shall either be of alkyd resin-based synthetic enamel, gloss or matt oil paint, or as specified elsewhere. The dry-film thickness shall not be less than 0,250 mm per coat.

When mating surfaces are brought together, both surfaces shall have been given the full treatment specified, but where this cannot be done, each surface shall be given a copious coating of primer and the surfaces drawn together while the paint is still wet.

The portion of structural steel members to be buried in soil, and all bases to a height of 500 mm shall be given two coats of an epoxy-tar primer instead of the zinc-chromate primer specified for other surfaces.

The surfaces of steel and cast-iron articles, such as floor gratings, grids and manhole covers, shall, after a thorough brushing to remove loose rust, be painted with two coats of epoxy-tar paint, each at least 0,230 mm thick.

(ii) Galvanized iron and steel
All traces of protective coating shall be removed with galvanized iron cleaner, and two coats of calcium plumbate primer shall be applied. One coat of tinted universal undercoat and two finishing coats of alkyd resin-based synthetic enamel gloss paint shall be applied.

(iii) Non-ferrous metals
Surfaces of aluminium, copper, etc shall be prepared and cleaned, and one coat of self-etch zinc-chromate wash primer shall be applied. One coat of universal tinted undercoat and two finishing coats of enamel gloss paint shall then be applied. Where non-ferrous metals are not to be painted, the surfaces shall be cleaned, polished and two coats of lacquer applied.

G18.8 PAINT THICKNESS

Unless otherwise specified, all coats of paint, whether prime coat, undercoat or finishing coat, shall have a dry-film thickness of not less than 0,200 mm, irrespective of the method of application.

G18.9 INSPECTION

The Contractor shall provide the necessary equipment to establish whether the primers, undercoats and finishing coats have been applied to the correct thickness according to the correct applications. The Engineer may take samples of the paints during painting operations for testing and quality control.

PART I OPERATION AND MAINTENANCE MANUALS

CONTENTS

I1 SCOPE

This Particular Specification covers the compilation and supply of Operation and Maintenance Manuals according to the specification as detailed below.

I2 SUBMISSION OF MANUALS

(a) A complete set of Provisional Operation and Maintenance Manuals shall be handed over to the Engineer at least one month before any commissioning tests commence.
The manuals will be checked by the Engineer and returned to the Contractor with comments. The Contractor shall make the necessary changes and amendments to the manuals to incorporate the Engineer's comments in the manuals.

(b) Portions of the information required in terms of this section may only be omitted with approval of the Engineer.

(c) After the Operation and Maintenance Manuals have been approved by the Engineer, three sets of the manuals shall be provided by the Contractor for distribution by the Engineer.

I3 FORMAT OF MANUALS

(a) Physical appearance

(i) Manuals shall be bound in hard cover lever-arch files with plastic coatings. The files shall be clearly labelled on the outer front cover and on the spine with the following information.
- The Contractor's name (logo optional)
- The project title
- The title "Operation and Maintenance Manuals"
- The month and year during which the manuals are finally handed over to the Employer

(ii) Pamphlets and bound leaflets/booklets from suppliers shall be placed in plastic sachets, especially if they are of non-standard size.

(iii) Large format Drawings shall be folded and placed in plastic sachets from where they can be easily removed.

(iv) The sections of the manuals described below shall be clearly partitioned.

(v) Systems and/or functional units on the Site shall be treated as units in the manuals, even if different types of equipment occur on such units. Cross-referencing may be used.

(b) Contents

The manual shall contain the following:

(i) A description of the equipment supplied giving full details of name, manufacturer, model number, size design duty and design and performance data. This shall, inter alia, include the information called for in the Standby Generator Data Forms – part of the bill of quantities.

(ii) Descriptive and technical literature including clear and comprehensive performance curves specifically applicable to the equipment supplied (Re Test certificates)

(iii) Operating instructions supported by drawings, flow diagrams, explanatory sketches etc as may be necessary and including details of control and protection systems incorporated, and safety precautions which must be observed.

(iv) Dimensional arrangement and layout drawings.

(v) A comprehensive lubricating schedule covering all equipment supplied with full details of recommended lubricants, initial fill lubricants used, capacities and lubrication periods.

(vi) A comprehensive schedule of routine maintenance with timelines, for all equipment supplied.

(vii) Assembly and disassembly instructions, supported by clear assembly and/or exploded view drawings.

(viii) A comprehensive spare list for the equipment, complete referenced cross sectional drawings and indicating recommended spares. All information required for the ordering of spares to be given including manufacturer's part numbers, supplier's name and all identification information.

(ix) Electrical circuit drawings.

(x) Copies of all Test Certificates.

(xi) Documents, information and charts providing a full record of the results of the Tests on Completion.

PART J MAINTENANCE SCHEDULE FOR STANDBY GENERATORS

1. This is a basic generic list. Manufacturers recommendations should be followed and supersede recommendations in this list.

2. Before each consecutive interval is performed, all maintenance from the previous intervals must be performed.

A. Quarterly Schedule

1. Conduct visual inspection around generator.

- □ Check for evidence of leaks, damage, lose or missing hardware.
- □ Inspect engine and generator wiring harness for wear and damages.
- □ Inspect supports and spring isolators for soundness and stability.
- □ Inspect unit for corrosion.
- □ Hoses and Clamps - Inspect/Replace if needed.
- □ Belts - Inspect/Adjust/Replace if needed.
- □ Inspect all fuel, oil, and water piping for secure mounting.
- □ Inspect exhaust piping and muffler insulation.

2. Batteries.

- □ Battery charger – Inspect operation and clean.
- □ Battery electrolyte level and specific gravity – Check and adjust. Add distilled water as needed.
- □ Perform battery load test.
- □ Clean battery terminals and lugs (apply grease on terminal connections).

3. Fluids and Filters.

- □ Cooling System Coolant Level - Check and adjust.
- □ Coolant conditioner (DCA/SCA) – Check and adjust to specs.
- □ Jacket Water Heater - Check proper operation.
- □ Engine Oil Level - Check and add if needed.
- □ Fuel/water separators – Drain water.
- □ Engine Air Cleaner Service Indicator – Check, clean filter if needed.

4. Generator Room.

- □ Fuel tanks – Inspect and treat fuel if needed, check fuel level, drain water and sediment.
- □ Automatic fuel system -Check operation and control panel.
- □ Space Heater/Room exhaust fan - Check for proper operation.

- Air intake/exhaust – Ensure nothing obstructs airflow; louvers are free and operate properly.
- Exhaust condensate trap – drain condensate.

5. Control Panel.
   - Electrical Connections - Check tightness
   - Clean and remove dust from panel.

6. ATS.
   - Clean and remove dust.
   - Inspect seals.
   - Note date of last battery change. (Replace if 2 years or older).
   - Tighten connections.
   - Check for hot spots.

7. Run unit – No load.
   - Run the generator with no load for 15 minutes.
   - Remote Start Panel-Inspect and test operation. Inspect and clean.
   - Check the generator for unusual conditions, such as: excessive vibration, leaks, excessive smoke.
   - Verify all gauges and indicators are normal and functioning properly.
   - Check all indication lights, replace any defective bulbs.

8. Start unit and run under load for 1 hour.
   - Note: Unit should be run under facility load if permissible. If not, unit should be run with a minimum 80% load with load bank.
   - Automatic Start/Stop – Inspect.
   - Check ATS operations and calibrate TDES, TDNE, TDEN, TDEC if necessary. Observe and record retransfer/cool down time.
   - Check automatic open and close shutter-stats and thermo-matic fans.
   - Generator Set Vibration – Inspect.
   - Read and record all gauges/meters.
   - Record load readings – Voltage, amps, frequency, power factor.
   - Check exhaust for excessive black or white smoke.
   - Check turbocharger for vibrations or any abnormal noise during operation.
   - Check generator bearing for noise and overheating.
   - Check exhaust manifold, muffler, and piping for leaks and secure mountings.

9. Additional.

- Ensure Generator/ATS is left in proper position for automatic start and transfer.
- Clean generator and generator room. Wash radiator if necessary.
- Annotate date, hours and maintenance in Generator log, fill out maintenance checklist and report deficiencies to COR.
- Perform any additional maintenance tasks as recommended in the manufacture's operation and maintenance manuals.
- Submit Service Inspection and Test Report to COR.

B. Annual Schedule

1. Conduct Quarterly PM service
2. Engine Air Cleaner Elements – Replace.
3. Engine Crankcase Breather – Clean.
4. Engine Oil Sample - Obtain and perform analysis. Submit report to COR.
5. Engine Oil and Filter – Replace.
6. Fuel Filters and Water Separators – Replace.
7. Obtain fuel sample at day tank and storage tank for analysis.
8. Radiator – Clean (pressure wash).
9. Intake louvers and ducts – Inspect/Clean (pressure wash).
10. Fan Drive Bearing – Lubricate.
11. Magnetic Pickups - Clean/Inspect.
12. Cooling System Coolant Sample - Obtain
13. Cooling System Supplemental Coolant Additive (SCA) - Test/Add
14. Coolant filter – Change if applicable
15. Crankshaft Vibration Damper - Inspect
16. Engine Protective Devices - Check
17. Engine Valve Lash - Inspect/Adjust
18. Turbocharger – Inspect/Check; Check end play and radial clearance on the turbine wheel and shaft.
19. Clean and lubricate fuel pump linkages if applicable.
20. Fan bearing – Inspect/Grease.
21. Clean dust and vacuum all the controls, meters, switching mechanism components, interior bus-work, Remote Start control panel, Annunciator and connecting lugs of the ATS.

22. Inspect/Check bus-work and supporting hardware for carbon tracking, cracks, corrosion, or any type of deterioration.

23. Check all control wiring and power cables (especially wiring between or near hinged door) for sign of wear and deterioration.

24. Check the cabinet interior for loose hardware – tighten connections.

C. Two (2) Year Maintenance Schedule

1. Conduct the Semi-annual and Annual PM Service.

2. Inspect water pump and seals; replace any worn or defective parts.

3. Clean and inspect the oil cooler.

4. Clean and inspect the after cooler.

5. Generator – Check for moisture, dust, oil, grease, and debris on main stator windings, exciter. Clean as needed

6. Generator bearing – Inspect/Grease (or as recommended by manufacturer).

7. Service or replace the batteries in the Digital Module every two years. (as applicable)

D. Three (3) Year Maintenance Schedule

1. Cooling System Coolant – Flush system and replace coolant (Note CAT ELC coolant to be replaced every 12,000 hrs or 6 years).

2. Cooling System thermostat – Replace

3. Belts and hoses – Replace

4. Batteries - Replace

5. Generator Main Stator Winding Temperature (if equipped with winding defectors) – Check and record main stator winding temperatures with engine under load. NOTE: Nominal temperature values for stand by units are 180ºC (356ºF) for the alarm and 205ºC (401ºF) for the shutdown.

6. Generator Bearing and Bearing Bracket Temperature (If Equipped) – Check and record all bearing bracket temperatures with the engine under a load.

NOTE: Nominal temperature values for the bearing bracket are 85ºC (185ºF) for the alarm and 95ºC (203ºF) for the shutdown.

PART K MAINTENANCE SCHEDULE FOR UNINTERRUPTIBLE POWER SUPPLY (UPS)

1. This is a basic generic list. Manufacturers recommendations should be followed and supersede recommendations in this list.
2. Before each consecutive interval is performed, all maintenance from the previous intervals must be performed.

A. Quarterly Schedule

1. Conduct a visual inspection of the UPS, making sure the overall environment is clean and free of dust and debris.
2. Inspect and test the room's ventilation system to ensure its proper operation.
3. Inspect batteries for proper electrolyte levels and signs of leaks.
4. If a battery monitoring system is in place, review the results.
5. Measure the ambient temperature.
6. Measure the battery float charging current.
7. Visually inspect equipment for loose connections, burned insulation or any other signs of wear.
8. Measure the voltage of each cell or battery block.
9. Measure the ambient temperature and negative-post temperature of at least 10 percent of the cells or battery blocks (if possible, check all cells).

B. Semi-annual Schedule

1. Inspect and repair battery connections as needed, since loose or dirty connections can cause a build-up of heat at the battery terminals — decreasing system capacity, reducing battery life and creating potential fire hazards.
2. Visually check for liquid contamination from batteries and capacitors.
3. Clean and vacuum UPS equipment enclosures.
4. Test the UPS's overall operation.

C. Annual Schedule

1. Take the system offline and inspect its components for signs of corrosion and heat damage.
2. Visual inspection of the battery set and UPS system, connected mains cables, battery cables, distribution boards and the external maintenance bypass switch, if installed.
3. Conduct thermal scans on electrical connections using a diagnostic tool that identifies hot spots invisible to the human eye.

4. Load-test the battery bank to determine its capacity, which may require disconnecting the UPS from its power source and allowing the batteries to supply power to the connected load.

5. Internal components are inspected for age, wear and tear and cleanliness. Remove dirt and dust from UPS components.

6. Measure and check the torque of all connections, re-torque any power connections as needed.

7. Provide a complete operational test of the system, including a monitored battery-rundown test to determine if any battery strings or cells are near the end of their useful lives, an AC ripple current and interconnecting cable resistance testing.

8. For flooded-cell batteries, the technician should:

   - Inspect terminals for signs of corrosion and accumulation of dirt.
   - Measure and record the voltage and current of the entire bank.
   - Measure and record the voltage for each individual cell and test their electrolytes.
   - Record and log measurements to track battery performance.

9. Alarm and system logs are downloaded and inspected to see how the UPS has performed since the last visit.

10. Consumable items like fans and AC and DC capacitors are inspected and replaced according to their replacement programs.

11. UPS inspection and maintenance records are updated. Over time UPS maintenance logs can provide a good overview of the operational history, identifying problems, PCB, component and battery changes and any overall concerns for the site staff to address.

12. Firmware may be updated to bring the UPS system up to the current level of specification and operational performance. This should only be done with permission from the site.

PART C 4: SITE INFORMATION

C4.1: LOCALITY PLAN

LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF A STANDBY GENERATOR AND UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS AT AGRIVILLAGE 1 & 2 FOR THE LIMPOPO DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

C4.1: LOCALITY PLAN