PROVINCIAL ADMINISTRATION OF KWAZULU-NATAL
DEPARTMENT OF PUBLIC WORKS

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

BILLS OF QUANTITIES

with GCC for Construction Works - Second Edition 2010

RETURNABLE DOCUMENT

SINGLE VOLUME APPROACH
PART TWO

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

Electrical Engineer
CA du Toit Pty Ltd
PO Box 863
Westville
3630

031 266 9608 - Tel Number
031 266 9624 - Fax Number
pierre@cadutoit.co.za

Employer:
Head: Public Works
KZN Department of Public Works
Private Bag X 9041
PIETERMARITZBURG
3200
Tel Number: 033 355 5527
Fax Number: 033 355 5604

Region:
Head Public Works: Operations
KZN Department of Public Works
X9041
Pietermaritzburg
3200
Tel Number: 033 355 5527
Fax Number: 033 355 5604

Tender Number:	ZNTM 01190W	Project Code:	056794; 055620
CIDB Grading:	N/A	Document Date:	As Per Tender Advert
ECDP Number:	N/A	Contract Period:	36 Calendar Months

Contracting Party: _____

CIDB Registration Number: N/A

ICASA Radio Dealer Licence Number: _____

Central Suppliers Database Registration Number: _____

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

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IMPORTANT NOTICE TO TENDERERS

Any reference to words Tender or Tenderder herein and/or in any other documentation shall be construed to have the same meaning as the words Tender or Tenderer. These forms are for internal and external use for the KZN Department of Public Works, Provincial Administration of KwaZulu-Natal.

"Quality" shall mean totality of features and characteristics of a product or service that bears on the ability of the product or service to satisfy stated or implied needs.

No alternativeTenders will be accepted.

The Total (Including Value Added Tax) on the Final Summary of the Bill of Quantities must be carried to the "Offer" part only of the Form of Offer and Acceptance - T2.21

"Enterprise" shall mean the legal Tendering Entity or Tenderer who, on acceptance of the Offer, would become the contractor"

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
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Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

THE CONTRACT

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
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Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

C1 - AGREEMENT AND CONTRACT DATA

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

FORM OF OFFER AND ACCEPTANCE

FORM OF OFFER AND ACCEPTANCE

Tender No - ZNTM 01190W

KWAZULU-NATAL PROVINCE
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Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

C.1.1 - FORM OF OFFER AND ACCEPTANCE

THE OFFER AND ACCEPTANCE FORM IS BOUND INTO **SECTION 1** (See end of Returnable Documents) OF THIS DOCUMENT AS PART OF THE RETURNABLE DOCUMENTS. ONCE A CONTRACT IS CONCLUDED WITH A SUCCESSFUL TENDERER, THIS PAGE WILL BE REPLACED WITH THE FILLED AND SIGNED OFFER AND SIGN ACCEPTANCE BY THE EMPLOYER AND IT WILL BECOME PART OF THE CONTRACT.

PLEASE SUBMIT THE OFFER AND ACCEPTANCE FORM WITH THE OTHER RETURNABLE DOCUMENTS.

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

C1.2 - CONTRACT DATA

C 1.2 CONTRACT DATA:
with GCC for Construction Works - Second Edition 2010

CONTRACT DATA FOR:

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

Tender no: **ZNTM 01190W**

The General Conditions of Contract are the clauses contained in the General Conditions of Contract (2010) (Second Edition) published by the South African Institution of Civil Engineering. Copies of these conditions of contract may be obtained through most regional offices of the South African Institution of Civil Engineering, telephone number 011 805 5947 or by visiting their website at www.saice.org.za.

CONTRACT SPECIFIC DATA
The following contract specific data are applicable to this contract:

CONTRACT VARIABLES

This schedule contains all variables specific to this document and is divided into pre-tender and post-tender categories. The pre-tender category must be completed in full and included in the tender documents. Both the pre-tender and post-tender categories form part of this **agreement.**

Spaces requiring information must be filled in, shown as 'not applicable' or deleted but not left blank. Where choices are offered, the non-applicable items are to be deleted. Where insufficient space is provided the information should be annexed hereto and cross referenced to the applicable clause of the schedule. Key cross reference clauses are italicised in *[ ]* brackets.

The Engineer/Principal Agent, in accordance with Clause 1.1.1.16, shall obtain the specific approval from the Employer before executing any of his functions according to the "Conditions under which Consultants are appointed", or in the event where an employee of the Employer represents the Employer, the relevant General Delegations applicable at the time of executing his/her duties as described in Clause 3.1.2.

Part 1: CONTRACT DATA PROVIDED BY THE EMPLOYER:

PRE-TENDER INFORMATION

CONTRACTING AND OTHER PARTIES

[1.1.1.15] **Employer:**

Head: Public Works (KZN Department of Public Works: Province of KwaZulu-Natal)

Postal address:

Private Bag X 9041
PIETERMARITZBURG
3200

Tel: ***033 355 5604*** Fax: ***033 355 5527***

[1.2.1.2] Physical address:
191 Prince Alfred Street
PIETERMARITZBURG
3200

[1.1.1.16] **Employers Agent 1**
CA du Toit Pty Ltd

Agent's service:
Electrical Engineer

Postal address:
PO Box 863
Westville
3630

Tel: ***031 266 9608*** Fax: ***031 266 9624***

PART 1: DATA PROVIDED BY THE EMPLOYER

[1.1.1.13] **Defects Liability Period**

The defects liability period is: **A time measured from the date of the Certificate of Completion.**
Defects Liability Period is 12 Months for the whole of the Works

Latent Defect Period

[5.16.3] The latent defect period is: 5 years after the Final Approval Certificate

Documentation required before Commencement of the Works:

[5.3.1] The documentation required before commencement with the Works execution are;

[4.3]	Health and Safety Plan	The Contractor shall deliver his Health and Safety Plan of the Works within 14 calendar days after notice from the Employer, prior to the Commencement Date.
[5.6]	Initial Programme	The Contractor shall deliver his programme of work within 10 calendar days after notice from the Employer, prior to the Commencement Date.
[6.2]	Guarantee	The Contractor shall deliver his chosen Guarantee (security) for this Works within 14 calendar days after notice from the Employer, prior to the Commencement Date.
[8.6]	Insurance	The Contractor shall deliver his insurance for the Works within 14 calendar days after notice from the Employer, prior to the Commencement Date.

	Cash flow by contractor	The Contractor shall deliver his Cash flow for the Works within 14 calendar days after notice from the Employer, prior to the Commencement Date.
	Priced Bill of Quantity	The Contractor shall deliver his Priced Bill of Quantity within 14 calendar days after notice from the Employer, prior to the Commencement Date.
	Programme	The Contractor is required to submit his Programme of Works in terms of Clause 5.6.1 and 5.3.1 and the Principal Agent is required to approve this within 7 days in terms of Clause 5.6.3
	Other requirements	
[5.3.2]	The time to submit the documentation required before commencement with Works execution is:	14 calendar days

Non-Working days

[5.8.1]	Non-Working days	**N/A**
	Special non- working days	**N/A**
[5.8.1]	First Year end break - commences	***N/A***
	ends on	***N/A***
	Second Year end break - commences	***N/A***
	ends on	***N/A***
	Third Year end break - commences	***N/A***
	ends on	***N/A***
	Fourth Year end break - commences	***N/A***
	ends on	***N/A***

Engineer/Principal Agent to consult with Employer

[3.1.3] The Engineer shall obtain the specific approval from the Employer before executing any of his functions according to the "Conditions under which Consultants are appointed", or in the event where an employee of the Employer represents the Employer, the relevant General Delegations applicable at the time of executing his/her duties.

Security

[6.2.1] The time to deliver the deed of guarantee is Prior to site hand over in terms of clause 5.3.1 and 5.3.2.

[6.2.1] Please see CONTRACT DATA - below to select Guarantee Option

Commencement Date

Commencement date means the date of Site Hand over that should not occur prior to the tenderer receiving one fully signed copy of the Offer and Acceptance in terms of the Form of Offer and Acceptance.

*The **Agreement comes into effect** on the date when;*
The tenderer receives one fully completed original copy of this document , including the Schedule of Deviations (if any)

The agreement ("this document") consists of;
1. Agreement and Conditions of Contract.
2. Form of Offer and Acceptance.
3. Contract Data.
4. Scope of Works.
5. Site Information.
6. Drawings & documents referred to in the 1 to 4 above.

(See Form of Offer and Acceptance)

[5.3.1] The contractor shall commence executing the Works within 7 calendar days from the Commencement Date.

[5.4.1] ***Possession of the*** **site** will be given within 10 calendar days after the **contractor** has fulfilled the conditions (4.3, 5.6, 6.2, 8.6) and received the notification from the Employer of Site Hand Over where the contractor will receive one fully signed copy of the Form of Offer and Acceptance from the **employer.**

[5.6.1] The Contractor shall deliver his programme of work within 10 calendar days after notice from the Employer, prior to the Commencement Date.

CONTRACT DETAILS

[1.1.1.33] ***Works*** description: Refer to document C3 – Scope of Work.

[1.1.1.30] ***Site*** description: Refer to document C4 – Site Information.

Specific options that are applicable to a **State** organ only
Where so :

[6.10.6.2]

1) Interest rate legislation:

(a) in respect of interest owed by the **employer**, the interest rate as determined by the Minister of Justice and Constitutional Development from time to time, in terms of section 1(2) of the Prescribed Rate of Interest Act, 1975 (Act No. 55 of 1975), will apply; and

(b) in respect of interest owed to the **employer**, the interest rate as determined by the Minister of Finance, from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No. 1 of 1999), will apply

2)	Lateral support insurance to be effected by the contractor:	***Yes X***	***No***
3)	Payment will be made for materials and goods	***Yes X***	***No***
4)	Dispute resolution by litigation	***Yes***	***No X***
5)	Extended **defects** liability period applicable to the following elements:	***All Works***	

[8.6.1.1.2]	The Value of material, supplied by the Employer, and not included in the Contract Price, is:	***R0.00***
[8.6.1.1.3]	The amount to cover Professional Fees, not included in the Contract Price, for repairing damage and loss to be included in the insurance: ***30% of the Contract Price***	
[8.6.1.3]	The limit for indemnity for liable insurance is:	***R10 000 000.00***
[6.5.1.2.3]	The percentage allowance to cover overhead charges for contractor and subcontractors, is:	***33.30%***
[1.1.1.14]	**Practical Completion Date** The Practical Completion date is: **A time measured from the Commencement date.**	
	For the **works** as a whole: The whole of the works shall be completed within:	***36*** *Months* *(which shall be deemed to include all Non – Working Days, Special Non – Working Days and the year-end Builders Annual Industry Holiday Periods).*
[5.5.1]	The date for **practical completion** shall be	***To be determined***
[5.13.1]	The penalty per calendar day shall be :	***0.04% of the Contract Price, rounded to the nearest R10***
	***For the* works** in **sections:** ***The date for* practical completion** from the **commencement date** and the **penalty** per **calendar day:**	
	Portion 1:	
[5.5.1]	***3 Calendar Months***	
[5.13.1]	***0.04% of the Contract Price, rounded to the nearest R10***	
	Portion 2:	
[5.5.1]	***N/A***	
[5.13.1]	***0.04% of the Contract Price, rounded to the nearest R10***	
	Portion 3:	
[5.5.1]	***N/A***	
[5.13.1]	***0.04% of the Contract Price, rounded to the nearest R10***	
	Portion 4:	
[5.5.1]	***N/A***	
[5.13.1]	***0.04% of the Contract Price, rounded to the nearest R10***	
	Portion 5:	
[5.5.1]	***N/A***	
[5.13.1]	***0.04% of the Contract Price, rounded to the nearest R10***	
	Portion 6:	
[5.5.1]	***N/A***	
[5.13.1]	***0.04% of the Contract Price, rounded to the nearest R10***	
[1.3.2]	***The* law** applicable to this **agreement** shall be that of the: **Republic of South Africa**	
[6.10.1.5]	The percentage advance on materials not yet built into the Permanent Works is:	***80.00%***
[6.10.3]	Percentage retention on amounts due to contractor is:	***The Percentage retention is nil. The only security required by the Employer will be such as selected by the Contractor on the Form of Offer and Acceptance and Part 2: CONTRACT DATA PROVIDED BY THE CONTRACTOR, point 2 - Documents, of the Contract Data.***
	Maximum retention is: ***0.00%*** *of the Contract Price*	
[6.8.1]	Notwithstanding anything to the contrary contained in the General conditions of Contract and Preliminaries, this contract could only, when the construction period exceeds 6 months **and** the contract exceeds R1,000,000.00, be subject to a Contract Price Adjustment Factor.	
[6.8.2] *[6.8.3]*	Clause 6.8.2 the last part of the sentence saying *"calculated according to the formula and the conditions set out in the Contract Price Adjustment Schedule."* must be replaced by *"calculated according to the Contract Price Adjustment Provisions (CPAP) Indices Application Manual for use with P0151 indices (Revised 1 January 2013)" as published by Statistics South Africa. The Contract Price Adjustment Provision (CPAP) will be subject to the most recently released indices by Statistic South Africa. Tenderers are advised that with reference to Clause 3.4.6 of the Contract Price Adjustment Provisions (CPAP) Indices Applications Manual, the Head: Public Works will not accept the submission by Tenderers of lists of additional items."*	
[6.8.2] *[6.8.3]*	Where this contract is a Lump Sum contract, the contract will only be subject to Contract Price Adjustment Provisions (CPAP)(Revised 1 January 2013) where the contract period equals or exceeds 6 calendar months. The applicable work group shall be WG 160 for Electrical Installations.	
[5.14.5]	***The following clause must be added to clause 5.14.5:*** *[5.14.5.6]* The employers agent shall submit the **final account** within 3 calendar months to the principal agent.	
[10.5]	The determinations of disputes shall be by ARBITRATION ONLY.	
[10.5.3]	The number of Adjudication Board Members to be appointed is:	**One**
[10.9.1]	Replace the last part of the clause with the following: *"..on the application of either party, by the Chairman, or his nominee of the Association of Arbitrators."*	

	Where **CPAP** is applicable, the **contract sum** will be adjusted in accordance with the Contract Price Adjustment Provisions (**CPAP**) as set out in the **CPAP** Indices Application Manual as published by Statistics South Africa, dated 1 January 2013 and any amendments thereto: 1) Glass etc. measured in specialist section Metalwork, will be adjusted in terms of the index for that work group unless specifically stated otherwise in the bills of quantities. 2) CPAP shall be adjusted in accordance with Work Group 160. 3) Further to clause 3.4.6 of the CPAP Indices Application Manual, the listing of additional items for exclusion by Tenderer's, shall be as per returnable schedules - T2.16 ***Alternative Indices:*** **Not Applicable** Details of changes made to the General Conditions of Contract for construction works (2010) Second Edition
	Clause
[1.1]	*[1.1.1.5]* **COMMENCEMENT DATE** – means the actual date of Site Hand over that should not occur prior to the Tenderer receiving one fully signed copy of the Offer and Acceptance in terms of the Form of Offer and Acceptance.
	[5.12.2.2] **ABNORMAL CLIMATIC CONDITIONS** - means conditions over and above what could reasonably be expected for the specific locality where the Works are being executed and include inter alia exessive rain, heat, cold, wind and any other climatic condition that would not normally be experienced during the season that the Works are executed in that area. The South African Weather Service's (http://www.weathersa.co.za) 10 year average climatic conditions statistics would be what could be reasonably expected for the specific locality where the Works are executed.
	[6.2.1] **CONSTRUCTION GUARANTEE** – means an on demand guarantee at call obtained by the **contractor** from an institution approved by the **employer** in terms of the **employer's** construction guarantee form as selected in the Offer and Acceptance Form and the **contract data.**
	CONSTRUCTION PERIOD – means the period commencing on the **commencement date** and ending on the date of **due completion date.** This period will be deemed to commence on actual site hand over date to the contractor and end on the date of practical completion and shall include all annual industrial holiday periods, Sundays and public holidays.
	CORRUPT PRACTICE – means the offer, giving, receiving, or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.
	FINAL ACCOUNT - The document prepared by the principal agent, which reflects the contract value of the works at final approval or termination.
	FRAUDULENT PRACTICE – means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any tenderer and includes collusive practise among tenderers (prior to or after the tender submission) designed to establish tender prices at artificial non-competitive levels and to deprive the tenderer of the benefits of free and open competition.
	INTEREST – the interest rates applicable on this contract, whether specifically indicated in the relevant clauses or not, will be in terms of the legislation of the Republic of South Africa, and in particular: (a) in respect of interest owed by the **employer,** the interest rate as determined by the Minister of Justice and Constitutional Development from time to time, in terms of section 1(2) of the Prescribed Rate of Interest Act, 1975 (Act No. 55 of 1975), will apply; and (b) in respect of interest owed to the employer, the interest rate as determined by the Minister of Finance, from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No. 1 of 1999), will apply
	[1.1.1.16] **ENGINEER/PRINCIPAL AGENT –** means the person or entity appointed by the **Employer** and named in the **Contract Data** as the **Engineer /Principal Agent** to act as agent of the **Employer**. In the event of an Engineer/**Principal Agent** not being appointed, then all the duties and obligations of an Engineer/**Principal Agent** as detailed in the **Contract** shall be fulfilled by a representative of the **Employer** as named in the **Contract Data. (Hereafter referred to as Engineer)** *[1.1.1.21]* **GENERAL ITEMS -** or preliminaries means items stipulated in the Pricing Data relating to general obligations, site services, facilities and/or items that cover elements of the cost of the work which are not considered as proportional to the quantities of the Permanent Works.
	[4.4.1] Add the following to the clause 4.4.1: *"The Contract shall only use subcontractors who are duly registered with the CIDB and who has an ACTIVE status at the time of submitting the tender"* *[6.2.1]* Refer to Offer and Acceptance form for the various options that the contractor may choose from in providing a form of **Guarantee** under "GUARATEE OPTIONS". *[6.10.6.2]* Replace *"at the prime overdraft rate, as charged by the Contractor's Bank,"* with *"..at the interest rate as determined by the Minister of Justice and Constitutional Development from time to time, in terms of section 1(2) of the Prescribed Rate of Interest Act, 1975 (Act No. 55 of 1975). "* Omit *",on all overdue payments from the date on which the same should have been paid..." and replace with " only after 30 calendar days from receiving written notice from the Contractor that the amount is overdue,.."*
	SPECIAL CONDITIONS OF CONTRACT
[5.12.3]	Omit clause 5.12.3 and add the following: *"5.12.3. If an extension of time is granted, the Contractor shall be paid such additional time-related General Items, including for special non-working days, if applicable as are appropriate regarding to any other compensation which may already have been granted in respect of the circumstances concerned.The reasons for extension of time that would invoke payment of time related General Items are inter alia;* *5.12.3.1 Failure to give possession of the site to the contractor.* *5.12.3.2 Making good physical loss and repairing damage to the works where the contractor is not at risk.* *5.12.3.3 Contract instructions not occasioned by default by the contractor.* *5.12.3.4 Failure to issue construction information timeously or the late issue of a contract instruction following a request from the contractor.* *5.12.3.5 Late acceptance by the principal agent of a design undertaken by a selected subcontractor where the contractor's obligations have been met.* *5.12.3.6 Suspension or cancellation termination invoked by a nominated or selected n/s subcontractor due to default by the employer or the principal agent.* *5.12.3.7 Insolvency of a nominated subcontractor.* *5.12.3.8 A direct contractor.* *5.12.3.9 Opening up and testing of work and materials and goods where such work is according to in accordance with the contract documents.* *5.12.3.10 The execution of additional work for which the quantity included in the bills of quantities is not sufficiently accurate.* *5.12.3.11 Late or failure to supply materials and goods for which the employer is responsible.* *5.12.3.12 Suspension of the works."*

[5.14.5.1] Omit entire clause 5.14.5.1

[5.16.4] Add the following new clause *"5.16.4. Upon the issue of a Final Approval Certificate, unless otherwise provided in the Contract:*
5.16.4.1. The performance Guarantee (if any) shall be returned within 14 days to the guarantor in terms of Clause 7."

[6.2.2] Replace the following *"..it shall be deemed that the Contractor has selected a security of ten percent retention of the value of the Works."* with *"..it shall be deemed that the Contractor has selected a security of a bank or insurance guarantee of 5% of the value of the Works and a payment reduction of 5% of the value certified in the payment certificate excluding value added tax."*

[6.2.3] Add to clause 6.2.3 the following " *The Contractor shall provide proof of paid-up premium payments to accompany his payment certificate as proof that his performance guarantee has not expired yet. The Contractor will not receive payment without proof of the validity of their performance guarantee.*

[9.3.2.2] Omit *"without prejudice to the exercise of any lien the Contractor may have acquired over the Employer's property."*

Duties and functions of the **Engineer** requiring the specific approval of the **Employer** BEFORE execution of any part of these duties are as follows:

(a) Determinations of contractors claims for extension of time (revision of the contract completion date). All claims for extension of time shall be submitted by the **Engineer,** together with the **Engineer's** recommendations, to the **Employer** for determination. Omit "Engineer" in clause 42.2 and replace with "Employer".

(b) Drawings, instructions or communications of any kind requiring variations of the works and involving EXTRA's shall NOT be given effect by the **Contractor** UNTIL BOTH the "Official Variation Order" and the "Financial Request for Variation Order and Additional Funds" form, as issued by the Department of Public Works, have been approved and signed by the **Employer**.

(c) Insurance policies to be approved by the **Employer** within 21 days of the date of the **Commencement** of the Works.

(d) Any notice of disagreement raised by the **Contractor** or written Dispute Notice given by the **Contractor** to the **Engineer** shall be submitted by the **Engineer**, together with the **Engineer's** recommendations, to the **Employer** for determination.

(e) The issue of the certificate of practical completion, certificate of completion and the final approval certificate shall be signed and submitted by the **Engineer**, to the **Employer** for final approval and signature. The certificates shall not be considered as officially issued until signed by the **Employer**.

MANAGING PROJECT DURATION

(a) The Contractor shall co-ordinate his programme with all other contractors whose work may precede or be executed simultaneously to his own. The Contractor will be called upon to plan and control the project using the Project Evaluation and Review Technique (PERT) or other approved Critical Path Method (CPM) network analysis of his events and activities and those of the dub-contractors in his employ and must co-ordinate his planning with any other contractor employed on the project. A fortnightly project control report will be expected from the Contractor in writing, evaluating any gains or delays against the critical path and he should allow for all costs involved in planning reviewing and updating the programme to the satisfaction of the Principal Agent against this item.

(b) Activity-and total float shall belong to the Employer.

(c) The Contractor shall deliver his programme of work within 10 calendar days after notice from the Employer, prior to the Commencement Date.

It is a condition of this contact that, the contracter submit to the Engineer/principal agent a detailed CPM Programme which shall be to the approval of the Engineer/principal agent. In this regard tenderers are advised to consult with the Engineer/Principal Agent as to the format and requirements of the programme as no claim whatsoever will entertained should the programme fail to meet the requirements of the Engineer/Principal Agent. Failure to submit the programme within the stipulated time may result in the contractor being held in breach of contract.

The approved programme will form the basis of time management of the project and extension of time will not be guaranteed unless the Contractor has strictly complied with this provision.

The programme shall make allowance for rain and the number of rain days allowed within the critical path shall be on the provisions of the clause dealing with inclement weather and claiming for delays in performance in this bill.

Allowance for the above must be made under this item as no claims for failing to comply with this precondition will later be entertained.

INCLEMENT WEATHER AND CLAIMS FOR DELAYS IN PERFORMANCE

(a) The Contract Sum includes a monthly allowance of 3 working days inclement weather during which rainfall exceeds 10mm per day for months as indicated in the Scope of Works. These days shall be reflected on the critical path of the Contractor's programme as specified in MANAGING PROJECT DURATION above.

(b) Claims for delays in performance due to inclement weather shall be calculated separately for each calendar month and for the project as a whole. Delays or gains to the critical path shall be reflected in all revisions of the programme. An extension of time will only be granted where the following conditions are met:

(i) The criteria to be used for WORK stoppages shall be for safety hazards or poor quality of work.

(ii) The Employer's site representative or the Employer's Principal Agent, if the site representative is not available shall be notified when the Contractor stops the work and intends to claim performance delays. The Employer representative shall inspect the situation together with the Contractor and give an immediate decision.

1. The stoppage claimed must cause a delay in the Completion Date of work. If the critical activities can proceed and a non-critical activity is delayed due to inclement weather no claims for delay shall be granted.
2. No claims for stoppages less than 2(two) hours per day shall be considered.
3. Claims granted for more than 2 (two) hours, but less than 10 (ten) hour (lunch included) day, shall be added together and expressed as full days.
4. All claims shall be submitted in writing to the Principal Agent within one working day of the actual stoppage.
5. The total delay in performance granted to the Contractor expressed in days shall be added to the contractual Completion Date of each section of the Works. The contractual penalty clause shall only come into effect after this newly arrived date.
6. Total delays (in hours) will be rounded up or down to the nearest integer for the calculation of Working Days. The total hours (including lunch) per Working Day shall be 10 unless otherwise indicated on the Contractor's programme.
7. Where the programmed delays for inclement weather exceed the actual delays incurred the Completion Date(s) will not be adjusted.
8. Where the project includes builder's holidays the programmed durations for inclement weather shall be adjusted pro-rate to the actual Working Days.
9. The total of all monthly delays due to inclement weather shall be calculated in accordance with the example given below:

Description		Months					Total
		Sept	Oct	Nov	Dec	Jan	
		Hours	Hours	Hours	Hours	Hours	Hours
Programmed	Rain days	0	30	30	15	15	90
Actual	Rain days	16	22	35	15	18	106
Difference		-16	8	-5	0	-3	-16
8 hrs/day*						Estimated Extension of time - in working days	2

See point 5.2 in the Scope of Works for the specific days the tenderer must allow for in this contract.

Tender no:	ZNTM 01190W	Part 2: CONTRACT DATA PROVIDED BY THE CONTRACTOR:

POST-TENDER INFORMATION

Note: All information for this section requires consultation with the **Contractor**. The **Engineer/Principal Agent** shall not pre-select any of the alternatives available to the **Contractor.**

1 CONTRACT DETAILS

[1.1.1.9] **Contractor Name:** .....

[1.2.1.2] Postal address:

.....

.....

.....

Tel no ..... Fax no .....

Tax / VAT Registration No: ..... e-mail address .....

Physical address:

.....

.....

.....

[1.1.1.10] The accepted **contract price** inclusive of **tax** is R :

.....

[Amount in words]

Payment Of Preliminaries (Clause 6.7, 6.8, 6.10 and 6.11)

The preliminaries amounts shall be paid in terms of:

***Alternative A**	**Yes**
****Alternative B**	**N/A**

** Assessed by the Engineer/Principal Agent as an amount prorated to the value of the Work duly executed in the same ratio as the Preliminaries bears to the Contract Price excluding VAT, Preliminary amount, Contingencies and any CPAP.*

*** Calculated from the priced Bill of Quantity/Lump Sum document. The Contractor and the Engineer/Principal Agent shall agree on a division of the priced Preliminaries items into: initial establishment charge, monthly charge and final disestablishment charge.*

If the Contractor and the Engineer/Principal Agent can not agree, within 10 Working Days from the Commencement Date, on such a division then the Engineer/Principal Agent shall make a division of the Preliminaries to be incorporated in the valuations for each monthly payment certificate as follows;

10% of the General Items/Preliminaries amount shall not be varied

15% of the General Items/Preliminaries shall only be varied in proportion of the Contract Price to the Contract Sum

75% of the General Items/Preliminaries shall be varied in proportion to the revised Construction Period compared with the initial Construction Period.

Adjustment of Preliminaries (Clause 6.7, 6.8, 6.10 and 6.11)

Alternative A

For the adjustment of Preliminaries both the Contract Sum and the Contract Value (including tax) shall exclude the amount of Preliminaries, all Contingency Sum(s) and any provision for Cost Price Adjustment Provisions:-

- An amount which shall not be varied.

- An amount varied in proportion to the contract value as compared to the Contract Sum.

- An amount varied in proportion to the Construction Period as compared to the initial Construction Period (excluding revisions to the Construction Period to which the Contractor is not entitled) to adjustment of the Contract Value in terms of the agreement.

The Contractor shall provide a breakdown of charges (including tax) within 15 working days of the date of acceptance of tender and, where applicable, an apportionment of Preliminaries per section

If the Contractor and the Principal Agent cannot agree, within ten (10) Working Days from the Commencement Date, on such a division then the Principal Agent shall make a division of the Preliminaries to be incorporated in the valuations for each monthly payment certificate as follows;

10% of the amount shall not be varied

15% varied in proportion of the Contract Value to the Contract Sum

75% varied in proportion to the revised Construction period compared with the initial Construction Period

Sectional Completion : Subdivision of Preliminaries Costs

For the adjustment of preliminaries for sections of the work the value of fixed, value, and time related amounts of the preliminaries for each section is required. The contractor is to provide such information within fifteen (15) working days of taking possession of the site, failing which the categorised preliminaries amounts shall be prorated to the value of each section.

The above shall apply equally for projects where sectional completion was not contemplated at tender stage but subsequently occurred on an adhoc basis during construction of the works as agreed between the client and the employer. The original priced categorised amounts for fixed, value, and time related amounts shall be prorated to the value of each section.

When an extension of time has been granted in terms of the GCC and the preliminaries require to be adjusted accordingly, the pertinent sectional (subdivided) categorised preliminaries amounts shall be utilised, where applicable and not the overall preliminary amounts.

Where sectional completion is required in terms of the agreement, the Contractor shall provide the Principal Agent with the division of the above categorized amounts into sections. Should the Contractor fail to provide such information within the period stipulated the categorized amounts shall be prorated to the value of each section.

YES *yes / no*

or

Alternative B

The Contractor shall within 15 working days of the date of possession of the site provide the Principal Agent with a detailed breakdown of Preliminaries amounts for the works as a whole, or per section where applicable, including administrative and supervisory staff charges and for the use of construction equipment in terms of the programme.

NO *yes / no*

The contractor is informed that only option 'A' shall apply

2 DOCUMENTS

Contract documents marked and annexed hereto:

Priced **Bills of Quantities:**	**Yes**		**No**	
Lump Sum document: :	**Yes**		**No**	

Guarantee Options:

Not applicable

2.2 DESIGN BRIEF

Not applicable		**YES or NO**
2.3 DRAWINGS		**YES or NO**
See list of drawings/Annexure's attached to this document.		**YES or NO**
2.4 DESIGN PROCEDURES		**YES or NO**

Not applicable

Contract drawings:	**Yes**		**No**	
Other documents**:**				

Waiver of the Contractors lien or right of continuing possession is required. **YES**

GUARANTEE OPTIONS

The Tenderer agrees to provide a bank or insurance guarantee in accordance with clause 6.2.3 of the Conditions of the GCC2010 Contract within the period stated in the Contract Data. This guarantee shall be for a sum equal to an amount stated in the Contract Data.

Guarantees submitted must be issued by either an insurance company duly registered in terms of the Insurance Act (Long Term Insurance Act No 52 of 1998 or Short Term Insurance Act No 53 of 1998) or by a bank duly registered in terms of the Banks Act No 94 of 1990, on the pro-forma referred to above. No alterations or amendments of the wording of the pro-forma will be accepted.

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

(b) in respect of contracts above R1 million, the Tenderer offers to provide security as indicated below: select one option

(i) cash deposit of 10 % of the Contract Price	
(ii) bank or insurance Performance Guarantee of 10 % of the Contract Price	
(iii) cash deposit of 5% of the Contract Price and a payment reduction of 5% of the value certified in the payment certificate (excluding VAT)	
(iv) bank or insurance guarantee of 5% of the Contract Price and a payment reduction of 5% of the value certified in the payment certificate (excluding VAT)	

NOTE: Where the Tenderer has not selected one of the guarantee options above, the default option will be as if the Tenderer has selected a security of a bank or insurance guarantee of 5% of the value of the Works and a payment reduction of 5% of the value certified in the payment certificate excluding value added tax. - See GCC2010 clause 6.2.2 as amended in Contract Data.

3 SIGNATURES OF THE CONTRACTING PARTIES

Thus done and signed at……on ……of……20…..

Name of signatory — for and behalf of the **Employer** who by signature hereof

Capacity of signatory — as Witness.

Thus done and signed at……on ……of……20…..

Name of signatory — for and behalf of the **Contractor** who by signature hereof

Capacity of signatory — as Witness.

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

C1.3 - FORM OF GUARANTEE

C1.3 PERFORMANCE GUARANTEE - GCC FOR CONSTRUCTION WORKS (2nd Edition - 2010)

Head: Public Works
KZN Department of Public Works:
Private Bag X 9041
PIETERMARITZBURG
3200

Sir,

ON DEMAND PERFORMANCE GUARANTEE

Tender Number ZNTM 01190W	**Project Code 056794; 055620**

For use with the General Conditions of Contract for Construction Works, Second Edition, 2010.

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means: _____

Physical Address: _____

"Employer" means: The Provincial Administration of KwaZulu-Natal in its Department of Public Works

"Contractor" means: _____

"Engineer" means: _____

"Works" means: **Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network**

"Site" means: _____

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

"Contract Sum" means: The accepted amount inclusive of tax of: _____

Amount in Words: _____

"Guaranteed Sum" means: The maximum aggregate amount of: 10% _____
Of Contract Sum

Amount in Words: _____

"Expiry Date" means: _____

CONTRACT DETAILS

Engineer Issues: Interim Payment Certificates, Final Payment Certificates and the Certificate Completion of the Works as defined in the Contract.

PERFORMANCE GUARANTEE

1 The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.

2 The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the Expiry Date or the date of issue by the Engineer of the Certificate of Completion of the Works or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Engineer and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.

3 The Guarantor hereby acknowledges that:

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

3.2 its obligation under the Performance Guarantee is restricted to the payment of money.

4 Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 4.1 to 4.3:

4.1 A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Engineer in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2;

4.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid;

4.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum Certified in 4.

5 Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed Sum or the full outstanding balance upon receipt of a first written demand from the employer to the Guarantor at the Guarantor's physical address calling up this Performance Guarantee, such demand stating that:

5.1 the Contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 5; or

5.2 a provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 5; and

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

6 It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.

7 Where the Guarantor has made payments in terms of 5, the Employer shall upon the date of issue of the Final Payment Certificate submit an expense account to the Guarantor showing how all monies received in terms of this Payment Guarantee have been expended and shall refund to the Guarantor any resulting surplus. All monies refunded to the Guarantor in terms of this Performance Guarantee shall bear interest at the prime overdraft rate of the Employer's bank compounded monthly and calculated from the date payment was made by the Guarantor to the Employer until the date of refund.

8 Payment by the Guarantor in terms of 4 or 5 shall be made with seven (7) calendar days upon receipt of the first written demand to the Guarantor.

9 Payment by the Guarantor in terms of 5 will only be made against the return of the original Performance Guarantee by the Employer.

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

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

12 This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.

13 This Performance Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.

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

Signed at _____

Date _____

Guarantor's signatory (1) _____

Capacity _____

Guarantor's signatory (2) _____

Capacity _____

Witness signatory (1) _____

Witness signatory (2) _____

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

PART C2 - PRICING DATA

C2.1 PRICING INSTRUCTIONS GCC FOR CONSTRUCTION WORKS (Second Edition 2010)			
Project title:	**Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network**		
Tender no:	**ZNTM 01190W**	**Project Code:**	**056794; 055620**

C2.1 Pricing Instructions

	Where any item is not relevant to this specific contract, such item is marked N/A (signifying "not applicable") The adjustment of the preliminaries each item priced is to be allocated to one or more of the three categories by insertion of "F", "V", "T" as the case may be against the price in the "rate" column immediately preceding the "amount" column, where "F" denotes a fixed amount (amount not varied), "V" denotes an amount variable in proportion to value and "T" denotes an amount variable in proportion to time.
1	**MASSES AND MEASURING UNITS** These shall be in accordance with the Measuring Units and National Measuring Standards Act No. 76 of 1973 and amendments thereto. The pages of each of these documents are numbered consecutively and before the Tenderer submits his tender he should check the number of pages, and if any are found missing or duplicated, or the figures or writing indistinct, or the documents contain any obvious error, he should apply to the Head : Public Works AT ONCE and have same rectified as no liability whatsoever will be admitted by the Administration in respect of errors in Tender due to the foregoing.
2	**PRICES FOR VARIATIONS** Where prices or quotations for variations are submitted by the Contractor during the currency of the Contract, it is to be clearly understood that these are for the purpose of consideration by the Head : Public Works and that there is no assumption of acceptance. The Contractor will be notified of acceptance of prices or quotations either by insertion of the amount on the variation order or by written intimation.
3	**SCALE** The scale to which the Drawings are made is only to be made use of when no figured dimensions are given either on the Drawings or in the tender documents and the figured dimensions are always to be followed though they may not coincide with the scale of the Drawings, but dimensions where possible are to be taken from the buildings.
4	**PROVISIONAL ITEMS** All items described as "Provisional" shall be used as directed by the Employer and measured and valued or paid for. No work for which "Provisional" items are allowed shall be commenced without written instructions from the Head : Public Works.

5 TIMELY ORDERING OF MATERIALS

The Contractor is warned to place all orders for materials or special articles as early as possible, as he will be held solely responsible for any delay in the delivery of such goods.
Nevertheless this tender is conditional upon no liability being attached to the Contractor if delivery of materials is rendered impossible by reason of any act of the Government.

6 ELECTRICAL LIGHTING, POWER AND WATER

The Contractor shall provide any artificial lighting which may be necessary or required for the proper execution of the works, and provide electric power and water required by all Sub-Contractors, Nominated Sub-Contractors and Sub-Contractors appointed directly by the Employer.

The Contractor shall give all notices and pay all fees in connection with temporary electrical and water connections and shall connect temporary Electrical and Water meters for and pay for all current and water consumed.

Tenderers are advised that the permanent light fittings and water points of any kind installed in the Works are not to be used to provide temporary lighting and supplement water requirements for construction purposes.

7 IMPORT PERMITS, DUTIES AND SURCHARGES.

All tenders by means of which imported products are being called for, must use the rate of exchange 14 days prior to the closing date indicated in the tender documents. If this day falls on a weekend or public holiday, the next working day must be used.

Furthermore, Tenderers must submit documentary proof (in the form of a certified copy) from their bank or legally recognised financial institution, clearly indicating what the rate of exchange was 14 days prior to the closing date, as mentioned above.

Together with this, the Tenderer must confirm that the tender price relating to an imported product, was based on the rate of exchange 14 days prior to the closing date as mentioned above.

8 STANDARD SYSTEM OF MEASUREMENT WHERE BILLS OF QUANTITIES FORM PART OF THE TENDER DOCUMENTS

The work executed under this Contract has been measured in accordance with the;

Measuring System as Applicable to Electronic Systems

including all amendments unless descriptions of items indicate a deviation and it shall be understood that the system of measurement which is herein adopted is the only system of measurement which will be recognised in connection with this contract. Any contradictions to this system of measurement contained in the “Model Preambles for Trades 2008” shall be disregarded (unless same have been accommodated in the system of measurement) but applicable rates shall be included for all requirements stated and not measured separately in compliance with this system.

9 PRICING OF ROCK EXCAVATIONS

It is a condition of this tender that should the tenderer elect to price the Rock Excavation included in this tender, the rates must be market related and should be identically priced for the same classification of excavations and not vary for similar billed items in the different sections.

10 BROAD BASED BLACK ECONOMIC EMPOWERMENT

1. It is the deliberate policy of the Provincial Administration of KwaZulu-Natal to foster and to encourage the economic empowerment of Black South Africans. This policy will be implemented without prescription and without prejudicing the principles and the integrity of the Provincial Administration of KwaZulu-Natal. Subject to these constraints and also subject to good business practise and commercial consideration, it is therefore considered appropriate that the Provincial Administration of KwaZulu-Natal should encourage business relationships with companies which actively pursue Affirmative Action and Black Economic Empowerment Programmes.

2. In responding to this tender you are therefore encouraged to devote attention to these two subjects of Affirmative Action and Economic Empowerment. In addition, in considering the appointment of sub-contractors, you are requested to extend the spirit of these policies.

3. The foregoing enunciations of this policy are not intended to be prescriptive nor to preclude any individual or operation from responding to this tender.

11 REGISTRATION ON THE CENTRAL SUPPLIERS DATABASE

1. In terms of the Public Finance Management Act (PFMA), 1999 (Act No 1 of 1999) Section 38 (1) (a) (iii) and 51 (1) (iii) and Section 76 (4) of PFMA National Treasury developed a single platform, The Central Supplier Database (CSD) for the registration of prospective suppliers including the varification functionality of key supplier information.
2. Prospective suppliers will be able to self - register on the CSD website: www.csd.gov.za
3. Once the supplier information has been varified with external data sources by National Treasury a unique supplier number and security code will be allocated and communicated to the supplier. Suppliers will be required to keep their data updated regularly and should confirm at least once a year that their data is still current and updated.
4. Suppliers can provide their CSD supplier number and unique security code to organs of state to view their varified CSD information.
5. Tenderers are required to fill in clearly, legibly, in bold print and black ink their CSD supplier number in the space hereunder:

Name of Supplier	
Central Supplier Database (CSD) Supplier Number:	

12 TAX CLEARANCE REQUIREMENTS

It is a condition of tender that the taxes of the successful tenderer must be in order, or that satisfactory arrangements have been made with South African Revenue Service (SARS) to meet the Tenderder's tax obligations. It is a condition of this Offer of Commission that your practice remains in good standing with SARS (South African Revenue Services) in terms of its tax clearance, during the project, which is required to process your payment certificates.

1 In order to meet this requirement tenderers are required to apply via e-filing at any SARS branch office nationally. The Tax Complance Status (TCS) requirements are also applicable to foreign Tenderders / individuals who wish to submit Tenders.

2 SARS will then furnish the Tenderder with a Tax Compliance Status (TCS) PIN that will be valid for a period of 1 (one) year from the date of approval.

3 In tenders where Consortia / Joint Ventures / Sub-contractors are involved, each party must submit a separate Tax Compliance Status (TCS) PIN.

4 Application for Tax Compliance Status (TCS) PIN can be done via e-filing at any SARS branch office nationally or on the website www.sars.gov.za.

5 Tax Clearance Certificates may be printed via eFiling. In order to use this provision, taxpayers will need to register with SARS as eFilers through the website www.sars.gov.za.

6 Tax Clearance Certificates may be printed via eFiling. In order to use this provision, taxpayers will need to register with SARS as eFilers through the website www.sars.gov.za.

Security PIN Number	
Company / Entity Tax Reference Number	

13 BILLS OF QUANTITIES/LUMP SUM DOCUMENT

The Bills of Quantities document forms part of and must be read and priced in conjunction with all the other documents forming part of the contract documents, the Standard Conditions of Tender, Conditions of Contract, Standard Preambles to all Trades, Specifications, Drawings and all other relevant documentation.

14 VALUE ADDED TAX

The tender price must include for Value Added Tax (VAT). All rates, provisional sums, etc. in the Bills of Quantities must however be net (exclusive of VAT) with VAT calculated and added to the Total Value thereof in the Final Summary.

15 FIXED PRICE CONTRACT

Should the Bills of Quantities/Lump Sum Document be a fixed price contract, the following clause must be inserted in the Pricing Instructions:

Tenderders are to take note that the contract price adjustments are not applicable to this contract. Tenderders should therefore make provision in the Contract Sum, schedule of rates, etc. for possible price increases during the contract period, as no claims in this regard shall be entertained.

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

C2.2 - Preliminaries for GCC for Construction works - 2nd Edition 2010

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

BILL NO. 1
C2 .2 PRELIMINARY AND GENERAL

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
i)	The agreement is to be the General Conditions of Contract for Works of Civil Engineering Construction (2010) (Second Edition) , published by the S. A. Institution Of Civil Engineering.				
ii)	The Preliminaries are to be the Construction and management requirements for works contracts - Part 1: General engineering and construction works (SANS 1921-1: 2004 Edition 1) prepared by Standards South Africa and shall be deemed to be incorporated herein.				
iii)	Tenderers are referred to the abovementioned documents for the full intent and meaning of each clause thereof (hereinafter referred to by heading and clause number only) for which such allowance must be made as may be considered necessary.				
iv)	Where standard clauses or alternatives are not entirely applicable to this contract such modifications, corrections or supplements as will apply are given under each relevant clause heading.				
v)	Where any item is not relevant to this specific contract such item is marked N/A (signifying "not applicable").				
vi)	Adjustment of the preliminaries: each item priced, is to be allocated to one or more of the three categories, where "F" denotes a fixed amount (amount not to be varied), "V" denotes an amount variable in proportion to value and "T" denotes an amount in proportion to time.				
vii)	Time (T) related Preliminaries will only be adjusted for omissions or additions, issued by the Employer, or delays caused by the Employer, for which variation and extension of time has been granted. ***See Contract Data*** .				
	SECTION A: GENERAL CONDITIONS OF CONTRACT				
A1	General (clause 1) F:..... V:..... T:.....	Item			
A2	Basis of Contract (clause 2) F:..... V:..... T:.....	Item			
A3	Engineer (clause 3) F:..... V:..... T:.....	Item			
A4	Contractor's General Obligation (clause 4) F:..... V:..... T:.....	Item			
A5	Time and Related Matters (clause 5) - As referred to in the Contract Data under Special Condition of Contract. The Contract Period shall be deemed to include all Non – Working Days, Special Non – Working Days and the year-end Builders Annual Industry Holiday Periods. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
A6	Payment and Related Matters (clause 6)				
	F:..... V:..... T:.....	Item			
A7	Quality and Related Matters (clause 7)				
	F:..... V:..... T:.....	Item			
A8	Risk and Related Matters (clause 8)				
	F:..... V:..... T:.....	Item			
A9	Termination of Contract (clause 9)				
	F:..... V:..... T:.....	Item			
A10	Claims and Disputes (clause 10)				
	F:..... V:..... T:.....	Item			
	SECTION B: SANS 1921-1:2004 (Edition 1): CONSTRUCTION AND MANAGEMENT REQUIREMENTS FOR WORKS CONTRACTS: PART 1				
	Refer to the SCOPE OF WORK for detail requirements:				
B1	Scope				
	F:..... V:..... T:.....	Item			
B2	Normative references				
	F:..... V:..... T:.....	Item			
B3	Definitions				
	F:..... V:..... T:.....	Item			
B4	Requirements for construction and management				
	F:..... V:..... T:.....	Item			
B4.1	General				
	F:..... V:..... T:.....	Item			
B4.2	Responsibilities for design and construction				
	F:..... V:..... T:.....	Item			
B4.3	Planning, programme and method statements				
	F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
B4.4	Quality assurance F:..... V:..... T:.....	Item			
B4.5	Setting out F:..... V:..... T:.....	Item			
B4.6	Management and disposal of water F:..... V:..... T:.....	Item			
B4.7	Blasting F:..... V:..... T:.....	Item			
B4.8	Works adjacent to services and structures F:..... V:..... T:.....	Item			
B4.9	Management of the Works and site F:..... V:..... T:.....	Item			
B4.10	Earthworks F:..... V:..... T:.....	Item			
B4.11	Testing F:..... V:..... T:.....	Item			
B4.12	Materials, samples and fabrication drawings F:..... V:..... T:.....	Item			
B4.13	Equipment F:..... V:..... T:.....	Item			
B4.14	Site establishment F:..... V:..... T:.....	Item			
B4.15	Survey control F:..... V:..... T:.....	Item			
B4.16	Temporary works F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
B4.17	Existing services F:..... V:..... T:.....	Item			
B4.18	Health and safety F:..... V:..... T:.....	Item			
B4.19	Environmental requirements F:..... V:..... T:.....	Item			
B4.20	Alterations, additions, extensions and modifications to existing works F:..... V:..... T:.....	Item			
B4.21	Inspection of adjoining structures, services, buildings and property F:..... V:..... T:.....	Item			
B4.22	Attendance on nominated and selected subcontractors F:..... V:..... T:.....	Item			
	SECTION C: SCOPE OF WORK in accordance with SANS 10403 *(The reference to Clauses refer to Table B.1 of SANS 1921-1:2004)*				
C1	Certification by recognised bodies - CLAUSE 4.4 F:..... V:..... T:.....	Item			
C2	Agrément certificates - CLAUSE 4.5 F:..... V:..... T:.....	N/A			
C3	Other services and facilities - CLAUSE 4.8 F:..... V:..... T:.....	Item			
C4	Recording of weather - CLAUSE 5.2 F:..... V:..... T:.....	Item			
C5	Management meetings - CLAUSE 5.3 F:..... V:..... T:.....	Item			
C6	Daily records CLAUSE 5.6 F:..... V:..... T:.....	Item			
C7	Bond and guarantees - CLAUSE 5.7 F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
C8	Permits - CLAUSE 5.9 F:..... V:..... T:.....	Item			
C9	Proof of compliance with the law - CLAUSE 5.10 F:..... V:..... T:.....	Item			
	SECTION D: SPECIFICATION DATA ASSOCIATED WITH SANS 1921-1:2004 (Table A.1)				
D1	Requirements for drawings, information and calculations for which the contractor is responsible CLAUSE 4.1.7 F:..... V:..... T:.....	Item			
D2	The responsibility strategy assigned to the contractor for the works CLAUSE 4.2.1 F:..... V:..... T:.....	Item			
D3	The planning, programme and method statements - CLAUSE 4.3 F:..... V:..... T:.....	Item			
D4	Samples of materials, workmanship and finishes - CLAUSE 4.12.1 F:..... V:..... T:.....	Item			
D5	Fabrication drawings that the contractor is to provide and deliver to the employer - CLAUSE 4.12.2 F:..... V:..... T:.....	Item			
D6	Office for the foreman CLAUSE 4.14.3 F:..... V:..... T:.....	N/A			
D7	Telephone - CLAUSE 4.14.3 F:..... V:..... T:.....	N/A			
D8	Office for inspector of works - CLAUSE 4.14.3 F:..... V:..... T:.....	N/A			
D9	Telephone in office for inspector of works - CLAUSE 4.14.3 F:..... V:..... T:.....	N/A			
D10	Sheds - CLAUSE 4.14.3 F:..... V:..... T:.....	N/A			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
D11	Provision and erection of signboards - CLAUSE 4.14.6 F:..... V:..... T:.....	N/A			
D12	Termination, diversion or maintenance of existing services - CLAUSE4.17.1 F:..... V:..... T:.....	Item			
D13	Services which are known to exist - CLAUSE 4.17.3 F:..... V:..... T:.....	Item			
D14	Detection apparatus - CLAUSE 4.17.4 F:..... V:..... T:.....	N/A			
D15	Additional health and safety requirements - CLAUSE 4.18 F:..... V:..... T:.....	Item			
	SECTION E: SPECIFIC PRELIMINARIES Section E contains Specific Preliminary items which apply to this contract except where "N/A" (Not Applicable) appears against the item.				
E1	**PROPRIETARY BRANDED PRODUCTS** The contractor shall take delivery of, handle, store, use apply and/or fix all proprietary branded products in strict accordance with the manufacturers' instruction after consultation with the manufacturer's authorised representative. F:..... V:..... T:.....	Item			
E2	**OVERTIME** Should overtime be required to be worked for any reason whatsoever, the costs of such overtime are to be borne by the Contractor unless the Engineer/Principal Agent has specifically authorised in writing, prior to the execution thereof, that costs for such overtime are to be borne by the Employer. F:..... V:..... T:.....	Item			
E3	**AS BUILT DRAWINGS** The position of construction breaks and the extent of individual concrete pours are to be recorded by the Contractor on the Structural Engineer's drawings and are to be submitted to the Engineer/Principal Agent and the Structural Engineer for their records. F:..... V:..... T:.....	N/A			
	Carried forward to collection			R	

	SECTION E: SPECIFIC PRELIMINARIES	UNIT	QUANTITY	RATE	AMOUNT
E4	**SITE INSTRUCTIONS** Site Instructions issued on site are to be recorded in triplicate in a Site Instruction book which is to be maintained on site by the Contractor. F:..... V:..... T:.....	N/A			
E5	**LABOUR RECORD** At the end of each week the Contractor shall provide the Engineer/Principal Agent with a written record, in schedule form, reflecting the number and description of tradesmen and labourers employed by him and all sub-contractors on the works each day. F:..... V:..... T:..... *<u>Note</u> : In the event that the contractor fails to satisfy the requirements of this specification, the Employer (Head: Public Works) may apply any of the sanctions provided in the contract. Sanctions may include the application of a financial penalty of .04% of the Contract Sum per calendar day of which the required report has not been submitted.*	N/A			
E6	**PLANT RECORD** At the end of each week the Contractor shall provide the Engineer/Principal Agent with a written record, in schedule form, reflecting the number, type and capacity of all plant, excluding hand tools, currently used on the works. F:..... V:..... T:.....	N/A			
E7	**NON CESSION OF MONIES** The Contractor shall not cede nor assign his rights or claims to any monies due or to become due under this contract. F:..... V:..... T:.....	Item			
E8	**SECTIONAL COMPLETION** When it is required that the contract be executed in sections or portions, the tenderer shall allow for all costs in this regard as no claim for additional costs will be entertained. F:..... V:..... T:.....	N/A			
E9	**LOCAL LABOUR** It is a general requirement of this contract that persons normally resident in the locality of the works (Local Labour) be given preference for employment on the contract. Provided, however, that should adequate and appropriate Labour not be available within the locality, others may be employed subject to satisfactory proof being provided that every reasonable endeavour has been made to employ Local Labour. The Contractor shall identify the local community leaders with the purpose of negotiating with them regarding the utilization of Local Labour in the construction process. In this regard, the Contractor shall furthermore give preference, wherever possible to the employment of single heads of households, women and youth. The Contractor shall, in general, maximize the involvement of the local community. F:..... V:..... T:.....	N/A			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
E10	**IMPORT PERMITS AND DUTIES** The responsibility for obtaining the necessary import permits shall rest with the successful Tenderer. No foreign exchange will be arranged or provided by the Administration. Tenderers are to allow in their tenders and pay the ordinary levy imposed on imported items in terms of item 196.10 of Part 8 of Schedule No. 1 of the Customs and Excise Act, 1964 with effect from 1 October 1989. F:..... V:..... T:.....	Item			
E11	**CONTRACT PRICE ADJUSTMENT PROVISIONS (CPAP)** Notwithstanding anything to the contrary contained in the GCC for Construction Works 2010 2nd Edition, this Contract shall only when the Construction Period exceeds 6 months and the Contract sum exceeds R1,000,000,00 be subject to the Contract Price Adjustment Provisions Indices Application Manual for use with P0151 indices (CPAP) (Revised 1 January 2013) as published by Statistics South Africa. Tenderers are advised that with reference to Clause 3.4.6 of the Contract Price Adjustment Provisions (CPAP) Indices Applications Manual, the Head: Public Works ***will not accept the submission by Tenderers of lists of additional items.*** Where this contract is a Lump Sum contract, the contract will be subject to Contract Price Adjustment Provisions (CPAP) only where the contract period equals or exceeds 6 calendar months. The applicable work group shall be WG 180 for domestic buildings or WG 181 for commercial and industrial buildings. F:..... V:..... T:.....	N/A			
E12	**EPWP CONDITIONS AND SPECIFICATIONS** **12.1 EMPLOYMENT TARGETS** E12.1 a Employment Targets The contractor needs to provide a realistic estimate on the number of jobs that the project has the potential to create throughout the project duration as the project will be implemented using labour intensive construction methods on elements where it is economical and feasible for this construction method. No of jobs to be created = ……. *[Contractor to fill in an estimated number]* F:..... V:..... T:.....	N/A			
	E12.1 b Employment requirements Tenderers are advised that this contract will be subject to the Expanded Public Works Program (EPWP) aimed at alleviating and reducing unemployment. Tenderers must allow for any costs for the employement of unskilled labour as per the requirements of the EPWP program; 1. 55% of unskilled labour to be women 2. 55% of unskilled labour to be youth aged between 18 and 35 years 3. 2% of unskilled labour to be people living with disability 4. 100% Unskilled labour utilised must reside within the boundries of the Municipality Ward where this contract is executed, with preference to the local community closest or at the walking distance to the contract site. Wherever possible local skilled tradesmen are to be employed on this contract with the view to maximize utilization of local resources. F:..... V:..... T:.....	N/A			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
	E12.1 c Labour rate and payment intervals The contractor should ensure that labour rate paid to unskilled local labour is commensurate to the daily task. When determining the rate, consideration should be given to that EPWP beneficiaries are mostly bread winners in their families, as the program intends alleviating poverty. There should also be consideration that the labour rate promotes creation of expanded number of jobs created and person days of work. Contractors should make endeavours to ensure that labourers, particularly unskilled are remunerated on fortnight basis and prior notification be made should there be a shortfall on their wages. The labour rate for local unskilled shall also be determined in consideration of the location of the project, i.e. for projects implemented in urbanized municipalities will not be the same as that for rural municipalities.				
	F:..... V:..... T:.....	N/A			
	12.2 LABOUR INTENSIVE CONSTRUCTION METHOD E12.2 a Labour Intensive Construction (LIC) method On site there must a person(s) having competency in managing and implementing LIC methods. *Foreman @ NQF Level 4 the Unit Standard on Implementing LIC methods on site. *Site Agent/ Managers @ NQF level 5 the Unit Standard on Manage Labour-Intensive Skills Programme both must be CETA accredited				
	F:..... V:..... T:.....	N/A			
	E12.2 b Labour Intensive Construction Method Those parts of the contract to be constructed using Labour Intensive methods will be marked in the BoQ with letter LI (indicating Labour Intensive) against every item so designated. Such works will only be constructed using method so indicated. Reference to be made to Guidelines for the implementation of Labour Intensive Infrastructure projects under EPWP. "Scope of Work in Respect of Work Relating to the Expanded Public Works Programme (EPWP)"				
	F:..... V:..... T:.....	N/A			
	E12.3 RECORD KEEPING 12.3.1 Every employer must keep in the project site office the following minutes of site progress minutes; contractors' monthly site progress reports; accurately recorded attendance register; proof of payment as means to verify authenticity of data in the EPWP Beneficiary form submitted with payment certificates. Copies of submitted EPWP beneficiary data forms should also be kept in the site office.				
	F:..... V:..... T:.....	N/A			
	12.3.2 The employer must keep this record for a period of at least three (3) years after the completion of the project in his/her office as the project site office would have been relocated. This should be safely kept for job creation data verifications and periodical audits on projects conducted by National and Provincial Department of Public Works after one (1) or two (2) quarters of submitting captured EPWP Data to the National EPWP coordinating Department.				
	F:..... V:..... T:.....	N/A			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
	E12.4 EPWP REPORTING as per EPWP DATA FORM At the end of each month as part of site progress report and to be attached to every contractors' progress payment certificate; the contractor shall provide the principal agent & Public Works with a written records, as per EPWP data form; which will be reflecting, beneficiaries full name & surname; ID No and job description of labour employed by main contractor and sub-contractors on site. At the end of each month the contractor must submit the following documents to be attached to the Progress payment certificate: 1. EPWP monthly data collection form 2. Worker monthly payment upload 3. Worker monthly proof of payment i.e 3.1 Acknowledgement of receipt of payment or 3.2 Payslips 3.3 Bank statement highlighted the workers paid 4. Worker monthly training form 5. Monthly attendance register 6. Certified copies of ID's (once off) 7. ID size photos (once off) 8. Proof of UIF 9. Proof of COIDA F:..... V:..... T:.....	N/A			
	E12.5 EPWP PROMOTION <u>12.5.1 EPWP signage board</u> EPWP Program at the project level shall always be promoted through have the projects signage board that embrace EPWP logo at the bottom, correct measurement for this signage board will be provided by the project leader during the site handing over meeting. the standard "HELVETIVA MEDUIM " letters are to be used . Professional title to be 10 mm above line . Line thickness to be 8 mm thick . Space between bottom of the line and bottom of the lettering below the line has to be 100 mm. Letter sizes are as follows : Helvetica meduim 100 mm black upper case to be for project name and owner . Helvetica meduim 75mm black upper case only to be used for professional titles.Project name and owner shall be black lettering on white background.board sizes are as follows : Board to be minomum 2000mm from ground level and to be constructed from reinforced formed chromadek panels minimum 0,6mm thick chromadek. The contractor is responsible for ensuring that the project board remains neatly and safely erected for the full duration including maintenance period,after which the project board and post are to be dismantled and handed to the client in good order. F:..... V:..... T:.....	N/A			
	<u>12.5.2 Branding of labour apparel</u> Contractor & Sub-contractors' labourers shall be provided with EPWP branded Personal Protective Equipment (PPE), reflector vest with EPWP wording at the back is an ideal and cost effective means of promoting program on site. The contractor is then advised to price for both item 17.5.1 and 17.5.2 F:..... V:..... T:.....	N/A			
	Carried forward to collection			R	

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

		UNIT	QUANTITY	RATE	AMOUNT
	8. Assisting the Contractor and the work force in the establishment of grievance procedures and necessary recommenda-tion to the Contractor regarding the grievances and solution thereto. 9. Attending to site meetings and project implementation meetings as required by the Contractor and prepare periodic reports as may be required by the Contractor from time to time. 10. Attending to such other duties which are consistent with the functions of a CLO, as may be required by the Contractor from time to time. Tenderers are to price twice the rate of unskilled local labour rate against this item for any and all costs arising out of compliance with the foregoing and in the event of a Tenderer failing to price against this item or making inadequate financial provision against this item for compliance as aforesaid, then no claim for costs or additional cost incurred will be entertained by the Head: Works F:..... V:..... T:.....	N/A			
	E12.7 SKILLS DEVELOPMENT ON SITE Contractor in conforming to the object of EPWP that its beneficiaries need to be capacitated with skills that will render them employable in the future. It is then the responsibility of the Contractor that mandatory life skills are provided to 100% of workforce on site and on the job training to labourers from whom the potential for further development has been identified. The latter is not mandatory to all as it covers technical skills. Contractor should also make provision for the possibility that there might be local youth that will need to be placed on the project with an intention to be provided support towards improving their level of competency and productivity. Contractor shall also provide all necessary on-the-job training to targeted labour to enable such labour to master and advance on techniques required to undertake the work in accordance with requirements of the contract in a manner that does not compromise workers health and safety. F:..... V:..... T:.....	N/A			
	E12.8 LABOUR ONLY Sub Contracting for local emerging enterprises Tenderer's are advised that this contract is subject to the Expanded Public Works Programme (EPWP) and the following criteria will apply: <u>African Equity Ownership</u> a) The Tenderer is to allow for 5% of the total value of works to be undertaken by a Priority Population Group. This percentage excludes the costs of employing local unskilled labour. The allocation of this percentage from the Project, the screening of people, the selection of skills, will be for the Contractor to adjudicate. b) The Priority Population Group consists of women, youth and disabled people. c) The Contractor is to give first option for prospective PPG's from the surrounding areas of the Project. Should there be insufficient suitable people fitting the criteria of PPG's, the Contractor may hire people from further afield. This is to be done only after consultation with the Department of Works EPWP Co-ordinator and the Community Liaison Officer (CLO). d) A Mentor is to be employed by the Contractor, in consultation with the Department of Works for the purposes of quality control and liaison between the Contractor and the selected PPG's on site. The mentor will be responsible for ensuring an acceptable level of quality workmanship and that such work carried out by the PPG's is executed within the time frames stipulated. In so far as possible, the Contractor is encouraged to expand the PPG's skills, knowledge and performance levels. F:..... V:..... T:.....	N/A			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
	TENDERER'S TO NOTE CONDITIONS a) The contract to be entered into between the Contractor and the PPG's will be a LABOUR ONLY sub-contract. b) The Contractor will be responsible for ensuring that all materials for use by the PPG's in the works are to be on site timeously. The Contractor shall liaise with The Mentor and PPG to determine the nature and extent of materials required and the lead time necessary. c) The Contractor shall be responsible for the overall programming of the Works and he is to allow for monitoring the PPG's programme and progress. d) In conjunction with the Mentor, he is to allow for the supervision and mentoring (where necessary) of the PPG to ensure quality and adherence to standard building practice e) The Contractor is to allow for extra storage facilities on site for the PPG's tools and equipment. f) Basic tools shall be provided by the PPG's and where these are not available; the Contractor will supply him with the necessary tools and equipment and deduct the costs thereof from the interim claims made by the PPG. g) Work requiring specialized tools will be provided free of chargeby the Contractor with the provision that these be returned upon completion of the Work. CO-ORDINATION The Contractor is to co-ordinate the work of all the PPG's, Sub-Contractors and Nominated Sub- Contractors appointed direct by the Employer in such a manner and at all times as will suit the building programme and he is to allow adequate access, for the PPG's, where required, to carry out their work in an efficient manner as no claims for extras in this connection will be entertained. F:..... V:..... T:.....	N/A			
	ATTENDANCE The Contractor may allow for attendance upon the PPG's concerned to execute the work. The Contractor is to allow the PPG's the use of any scaffolding belonging to him while it remains so erected on the site. Where scaffolding is necessary for the use by any PPG and the Contractor has not erected any for his own use or has removed same after his own use, the Contractor shall supply sufficient scaffolding to the PPG to be erected and dismantled by the PPG and returned to the Contractor. This attendance upon PPG's to execute the work is to include for the scaffolding provisions as aforesaid and, in addition, is to include for co-operating to the fullest extent with all the parties, attending on off-loading materials, providing suitable storage for tools and materials used by the PPG's, use of general facilities such as latrines, etc., supply and cost of power, lighting, water and the like. F:..... V:..... T:.....	N/A			
	E12.9 EPWP CONTRACT FOR LABOUR It is compulsory that shortly after the contractor and or sub contractor has appointed local labour, the employment contract should be signed by both parties, prior to commencement with works on site. The employment contract forms part of the Ministerial Determination or from the regional EPWP officials. Each contract will lapse at the end of each financial year therefore requiring the Contractor to do a renewal of each contract should the need of employment still exist for that particular labourer. F:..... V:..... T:.....				
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
	E12.10 EPWP SCOPE of WORK **Note:** Contractors are to price any item on the Bill of Quantities having below, bearing in mind that they are regarded as main sources of job creation, whether sub contracted or undertaken by the main contractor. Elements on the scope of work where application of Labour Intensive Construction methods as will indicated with letters (LI) are regarded feasible are as follows; i) Excavating trenches for foundations and any other civil works with the depth not more than 1.5 m ii) All masonry works which include concrete mixing on site; brickwork; plastering; screed works; jointing; etc. iii) Painting, Plumbing, Ironmongery; roof cladding; glazing; tilling; carpentry; flooring; waterproofing; etc. F:..... V:..... T:.....	N/A			
	Note: It is a general requirement of this contract that persons normally resident in the ward of the works (local labour) be given preference for employment on the contract. Provided, however, that should adequate and appropriate labour not be available within the ward, others may be employed subject to satisfactory proof being provided that every reasonable endeavour has been made to employ local labour (Local Sub-contractor(s); Skilled; Semi-Skilled and Unskilled). The contractor shall in consultation with the local community leaders with the purpose of negotiating with them regarding the utilization of local resources in the construction process. In this regard, the contractor shall furthermore give preference, wherever possible to the employment of single heads of households, women and youth as well as families declared as most indigent by War on Poverty/ Sukuma Sakhe program profiling process. The contractor should aim, in general, to maximise the involvement of the local community, however workers from other communities should not exceed 20% of all persons working on the project, where local employees possess skills at level of competency that meet contractors requirements. <u>Payment for the labour-intensive component of the works</u> 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. <u>Linkage of payment for labour-intensive component of works to submission of project data</u> The Contractor's payment invoices shall be accompanied by labour information for the corresponding period in a format specified by the employer. If the contractor chooses to delay submitting payment invoices, labour returns shall still be submitted as per frequency and timeframe stipulated by the Employer. The contractor's invoices shall not be paid until all pending labour information has been submitted. <u>Applicable labour laws</u> The current Ministerial Determination (also downloadable at www.epwp.gov.za) Expanded Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of Labour in Government Notice , shall apply to works described in the scope of work as being labour-intensive and which are undertaken by unskilled or semi-skilled workers. F:..... V:..... T:.....	N/A			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
E13	**HIV/AIDS AWARENESS** Tenderers are to price against the following items for compliance with the SPECIFICATION FOR HIV/AIDS AWARENESS bound into this document (The clauses referred to are those of the Specification for HIV/AIDS)				
E13.1	Provide and maintain a condom dispenser in terms of Clause 5.1a) F:..... V:..... T:.....	N/A			
E13.2	Provide and maintain HIV/AIDS awareness posters terms of Clause 5.1b) F:..... V:..... T:.....	N/A			
E13.3	HIV /Aids Awareness Programme on Site for not less than 90% of workers inclusive of all direct and indirect costs; Engage a qualified service provider as described in the scope of works to conduct an HIV Awareness Programme in terms of Clause 5.2.1a) F:..... V:..... T:.....	N/A			
E13.4	Arrange for workers to attend the HIV Awareness Programme in terms of Clause 5.2.1b) F:..... V:..... T:.....	N/A			
E13.5	**Reporting** Prepare and attach to claims for payment a brief report in terms of Clause 5.3 (see also HIV/STI Compliance Report included with this document). F:..... V:..... T:..... ***Note: In the event that the contractor fails to satisfy the requirements of this specification, the employer (Head: Public Works) may apply any of the sanctions provided for in the contract. Sanctions may include the application of a financial penalty of .04% of the Contract Sum per calendar day of which the required reports has not been submitted.***	N/A			
E14	**OCCUPATIONAL HEALTH AND SAFETY ACT NO. 85 OF 1993** Tenderers are to allow for costs in providing a project specific ' Construction Phase Safety, Health and Environmental Plan' in accordance with "Section 2 - Specification Data associated with SANS 1921-1:2004" clause C4.18 in "Part C3 - Scope of Work" F:..... V:..... T:.....	Item			
E15	**NOTICE BOARD, SITE OFFICE, ETC.** Tenderers are to allow for the provision and removal of a project notice board and a site office in accordance with the Principal Agent's requirements. F:..... V:..... T:.....	N/A			
E16	**IMPORTED MATERIALS AND EQUIPMENT** Where imported items are listed in the tender documents, the tenderer shall provide all information called for, failing which the price of any such item, material or equipment shall be excluded from currency fluctuations. (***Refer to T2.14 - Schedule of Imported Materials and Equipment*** . F:..... V:..... T:.....	Item			
E17	**CONTRACT DOCUMENTS** The drawings issues with these Tender documents do not comprise the complete set but serves as a guide only for tendering purposes and for indicating the scope of works to enable the Tenderer to acquaint him with the nature and extent of the works and the manner in which they are to be executed. Should any part of the drawings not be clearly legible to the Tenderer he shall, before submitting his Tender, obtain clarification in writing from the principal agent. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

		UNIT	QUANTITY	RATE	AMOUNT
E18	**GENERAL PREAMBLES** The Document Preambles will be the "ASAQS Model Preambles for Trades – 2008" and is obtainable from the various Regional Office's of the Department of Public Works and shall be read in conjunction with the Bills of Quantities and be referred to for the full descriptions of work to be done and materials to be used. F:..... V:..... T:.....	Item			
E19	**TRADE NAMES** Wherever a Trade Name for any product has been described in the Bills of Quantities the Tenderer's attention is drawn to the fact that any other product of equal quality may be used subject to the written approval of the Principal Agent being obtained prior to the closing date for submission of Tenders. F:..... V:..... T:.....	Item			
E20	**EXISTING PREMISES OCCUPIED** Refer to Scope of Works Part C3 of this Tender Document for information on the occupation of existing buildings. F:..... V:..... T:.....	N/A			
E21	**INACCURATE AND DEFECTIVE WORK EXECUTED UNDER PREVIOUS CONTRACT** The contractor shall, after taking possession of the site and before commencing the work, check all levels, liners, profiles and the like and satisfy himself as to the dimensional accuracy of all work executed under the previous contract which may affect his work. Should any inaccurate or defective work be found, the contractor shall immediately notify the principal agent in writing requesting his instructions with regard thereto and afford every facility to those rectifying such inaccurate or defective work. F:..... V:..... T:.....	Item			
E22	**VIEWING THE SITE IN SECURITY AREAS** If the site is situated in a security area and the Tenderder must arrange with the Authorities to obtain permission to enter the site for Tenderding purposes. F:..... V:..... T:.....	Item			
E23	**COMMENCEMENT OF WORKS IN SECURITY AREAS** If the works falls within a security area, the contractor must arrange with the Authorities and give the necessary notices before commencement of the works. Should the contractor fail to make such arrangements, admission to the site may be refused and any additional costs will be for the contractor's account. F:..... V:..... T:.....	Item			
E24	**ENTRANCE PERMITS TO SECURITY AREAS** If the works fall within a security area, the contractor shall obtain entrance permits for his personnel and workmen entering the area and shall comply with all regulations and instructions which may be issued from time to time regarding the protection of persons and property under control of the Authority. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

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

SECTION 1

SUMMARY – PRELIMINARY & GENERAL

Collection	Page No.	Amount	
	1	R	
	2	R	
	3	R	
	4	R	
	5	R	
	6	R	
	7	R	
	8	R	
	9	R	
	10	R	
	11	R	
	12	R	
	13	R	
	14	R	
	15	R	
	16	R	
	17	R	
Carried forward to Final Summary		R	

Section No. 1
Preliminary & General
Summary

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

PART C2.3 BILL OF QUANTITIES

Item No.	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	BILL NO. 2 - REPEATER MAINTENANCE, CONSTRUCTION & UPGRADING, REPEATER REPLACEMENT & DIGITAL LINKS **MONTHLY REPEATER MAINTENANCE COSTS** Notes: The Contractor is to refer to C3.4 - Standard Specifications, C3.5 - Project Specifications, C5 - Drawings, Annexure 9 - Abbreviated List of Repeater Sites, Annexure 10 - Repeater Site Comprehensive Data, Annexure 11 - Repeater Inspection and Service Report Sample issued together with these bills of quantities in order to acquaint himself fully with the nature and scope of the work The cost of repeater maintenance under each item shall include all cost associated with comprehensive maintenance of repeater equipment including radios, antennas, interfacing equipment, all wire connections excluding the maintenance of items below which shall be priced separately for each repeater site: - Maintenance of the site, equipment huts, security fence, antenna masts, earthing and earth mats, power supplies including solar equipment, wind generators, chargers and batteries - Transport cost: Department of Transport (DOT): Tariffs for the use of Motor Transport: Ref: T118: - Category C: Diesel - 2001 to 2500 cc: Private - Travelling time All amounts in this schedule shall be the maintenance costs, per every second month over a period of 36 months. In cases of rented site space some items other than repeater equipment and antennas and antenna cables will not be maintained as part of this contract, as indicated in the schedules as per Annexure 10. Power supplies and earth connections shall however be maintained, as indicated. The contractor shall submit a proposed schedule for the maintenance works over a two month period which shall allow for the maintenance of all sites over said period. Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
1	**General**					
1.1	Documentation to be submitted at completion of the Contract (Part C3.5.1; Par. 20)	Item		1		
1.2	Initial Site Inspection and Upgrading including tests and the submission of priced, itemised quotations for upgrading work (Part C3.5.2; Par. 4)	Item		1		
1.3	Annual Inspection (Part C3.5.2; Par. 16)	No		3		
1.4	Supply padlock with key as specified (Part C3.5.2; Par. 17)	No		5		
1.5	Supply of standby equipment which the tenderer wish to include as part of the tender price to comply with the Part C3.5.2; Par. 7.3. (Note: Brief identifying descriptions must be given below and full detail must be provided in Part T2.16: *Equipment & Information Schedules* Quantities to be indicated by tenderer in the Quantity" column, as required)					
1.5.1	Description:.....	No				
1.5.2	Description:.....	No				
1.5.3	Description:.....	No				
1.5.4	Description:.....	No				
1.5.5	Description:.....	No				
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
2	**SITE NO. 1 - ALVERSTONE, PINETOWN** Coordinates: -29.776944, 30.712778						
2.1	DOT repeater	DMR Midband - Multicast	No		18		
2.2	KZW repeater	Midband Analogue	No		18		
2.3	KZE repeater	Midband Analogue	No		18		
2.4	EMS repeater	Highband Analogue	No		18		
2.5	DOT repeater	DMR Highband - Simulcast	No		18		
2.6	EMS Radio Link	Analogue Link	No		18		
2.7	IP Link - 5 GHZ	Simulcast Link 1	No		18		
2.8	IP Link - 5 GHZ	Simulcast Link 4	No		18		
2.9	GSU Sync Unit	GPS	No		18		
2.10	Power Supply	12V	No		18		
2.11	Power Supply	24V	No		18		
	Site Maintenance						
2.12	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
2.13	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
2.14	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
3	**SITE NO. 2 - BABANANGO** Coordinates: -28.392222, 30.995556						
3.1	KZE repeater	Midband Analogue	No		18		
3.2	KZW repeater	Midband Analogue	No		18		
3.3	DOT repeater	DMR Midband - Analogue Mode	No		18		
3.4	EMS repeater	Midband Analogue	No		18		
3.5	KZE Radio Link	Analogue Link	No		18		
3.6	EMS Radio Link	Analogue Link	No		18		
3.7	Power Supply	12V	No		18		
	Site Maintenance						
3.8	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
3.9	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
3.10	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
4	**SITE NO. 5 - BOKKIESBERG, KOKSTAD** Coordinates: -30.378628, 29.289792						
4.1	DOT repeater	Midband Analogue	No		18		
4.2	EMS repeater	Midband Analogue	No		0		
4.3	EMS repeater	Midband Analogue	No		18		
4.4	KZE repeater	Midband Analogue	No		18		
4.5	EMS Radio Link	Analogue Link	No		18		
4.6	KZE Radio Link	Analogue Link	No		18		
4.7	Power Supply	12V	No		18		
	Site Maintenance						
4.8	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
4.9	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
4.10	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
5	**SITE NO. 9 - DUMBE MOUNTAIN, PAUL PIETERSBURG** Coordinates: -27.447222, 30.841944					
5.1	KZE repeater Midband Analogue	No		18		
5.2	DOT repeater Midband Analogue	No		18		
5.3	KZW repeater Midband Analogue	No		18		
5.4	KZE Radio Link Analogue Link	No		18		
5.5	Power Supply 12V	No		18		
	Site Maintenance					
5.6	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
5.7	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
5.8	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
6	**SITE NO. 10 - DUNDEE, L'MPATI MOUNTAIN** Coordinates: -28.125556, 30.215						
6.1	DOT repeater	Midband Analogue	No		18		
6.2	KZE repeater	Midband Analogue	No		18		
6.3	EMS repeater	Midband Analogue	No		18		
6.4	KZW repeater	Midband Analogue	No		18		
6.5	KZE Radio Link	Analogue Link	No		18		
6.6	EMS Radio Link	Analogue Link	No		18		
6.7	Power Supply	12V	No		18		
	Site Maintenance						
6.8	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
6.9	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
6.10	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
7	**SITE NO. 12 - ESHOWE (TOP FARM)** Coordinates: -28.867109, 31.300805						
7.1	KZE repeater	Midband Analogue	No		18		
7.2	DOT repeater	Midband Analogue	No		18		
7.3	EMS repeater	Midband Analogue	No		18		
7.4	KZW repeater	Midband Analogue	No		18		
7.5	KZE Radio Link	Analogue Link	No		18		
7.6	Power Supply	12V	No		18		
	Site Maintenance						
7.7	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
7.8	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
7.9	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
8	**SITE NO. 13 - ESTCOURT, HIDCOTE** Coordinates: -29.121714, 29.926898						
8.1	KZE repeater	Midband Analogue	No		18		
8.2	DOT repeater	Midband Analogue	No		18		
8.3	EMS repeater	DMR Midband - Analogue Mode	No		18		
8.4	KZW repeater	Midband Analogue	No		18		
8.5	Power Supply	12V	No		18		
	Site Maintenance						
8.6	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
8.7	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
8.8	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
9	**SITE NO. 16A - GREYTOWN, CHIPPERFIELD** Coordinates: -29.032222, 30.505833						
9.1	KZE repeater	Midband Analogue	No		18		
9.2	DOT repeater	Midband Analogue	No		18		
9.3	EMS repeater	Midband Analogue	No		18		
9.4	KZW repeater	Midband Analogue	No		18		
9.5	KZE Radio Link	Analogue Link	No		18		
9.6	EMS Radio Link	Analogue Link	No		18		
9.7	Power Supply	12V	No		18		
	Site Maintenance						
9.8	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
9.9	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
9.10	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
10	**SITE NO. 17 GROENVLEI, NEWCASTLE** Coordinates: -27.49136, 30.330602						
10.1	DOT repeater	DMR Midband - Analogue Mode	No		18		
10.2	KZW repeater	Midband Analogue	No		18		
10.3	EMS repeater	Midband Analogue	No		18		
10.4	KZE repeater	Midband Analogue	No		18		
10.5	KZE Radio Link	Analogue Link	No		18		
10.6	Power Supply	12V	No		18		
	Site Maintenance						
10.7	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
10.8	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
10.9	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
11	**SITE NO. 18 HIGHFLATS, IXOPO (KUNATA)** Coordinates: -30.269444, 30.253333					
11.1	KZE repeater Midband Analogue	No		18		
11.2	DOT repeater Midband Analogue	No		18		
11.3	EMS repeater Midband Analogue	No		18		
11.4	KZW repeater Midband Analogue	No		18		
11.5	EMS Radio Link Analogue Link	No		18		
11.6	Power Supply 12V	No		18		
	Site Maintenance					
11.7	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
11.8	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
11.9	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
12	**SITE NO. 21 HLUHLUWE GAME RESERVE** Coordinates: -28.069444, 32.033889						
12.1	DOT repeater	Midband Analogue	No		18		
12.2	KZE repeater	Midband Analogue	No		18		
12.3	EMS repeater	Midband Analogue	No		18		
12.4	KZW repeater	Midband Analogue	No		18		
12.5	EMS Radio Link	Analogue Link	No		18		
12.6	Power Supply	12V	No		18		
	Site Maintenance						
12.7	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
12.8	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
12.9	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
13	**SITE NO. 22 HOWARD COLLEGE, DURBAN** Coordinates: -29.866389, 30.981111					
13.1	EMS repeater Highband Analogue	No		18		
13.2	DOT repeater Midband Analogue	No		18		
13.3	Power Supply 12V	No		18		
	Site Maintenance					
13.4	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
13.5	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
13.6	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
14	**SITE NO. 22 NETHERBY, UNDERBERG (SANDF SITE)** Coordinates: -29.658889, 29.631111						
14.1	KZE repeater	Midband Analogue	No		18		
14.2	EMS repeater	Midband Analogue	No		18		
14.3	DOT repeater	Midband Analogue	No		18		
14.4	KZW repeater	Midband Analogue	No		18		
14.5	KZE Radio Link	Analogue Link	No		18		
14.6	EMS Radio Link	Analogue Link	No		18		
14.7	Power Supply	12V	No		18		
	Site Maintenance						
14.8	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
14.9	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
14.10	Travelling time (Confirm travel time to site) (Note that access to site requires approximately one (1) hours walking one way)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
15	**SITE NO. 26 ITALA, LOUWSBERG** Coordinates: -27.617222, 31.322222						
15.1	EMS repeater	Midband Analogue	No		18		
15.2	KZW repeater	Midband Analogue	No		18		
15.3	DOT repeater	Midband Analogue	No		18		
15.4	EMS Radio Link	Analogue Link	No		18		
15.5	Power Supply	12V	No		18		
	Site Maintenance						
15.6	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
15.7	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
15.8	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
16	**SITE NO. 27 JOBSKOP, LADYSMITH** Coordinates: -28.579167, 30.212778					
16.1	KZE repeater Midband Analogue	No		18		
16.2	DOT repeater Midband Analogue	No		18		
16.3	EMS repeater Midband Analogue	No		18		
16.4	KZW repeater Midband Analogue	No		18		
16.5	KZE Radio Link Analogue Link	No		18		
16.6	Power Supply 12V	No		18		
	Site Maintenance					
16.7	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
16.8	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
16.9	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
17	**SITE NO. 28 JOZINI, NKANGALA** Coordinates: -27.561667, 32.045						
17.1	KZW repeater	Midband Analogue	No		18		
17.2	DOT repeater	Midband Analogue	No		18		
17.3	EMS repeater	Midband Analogue	No		18		
17.4	KZE repeater	Midband Analogue	No		18		
17.5	EMS Radio Link	Analogue Link	No		18		
17.6	EMS Radio Link	Analogue Link	No		18		
17.7	KZE Radio Link	Analogue Link	No		18		
17.8	Power Supply	12V	No		18		
	Site Maintenance						
17.9	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
18.10	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
18.11	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
18	**SITE NO. 29 KEARSNEY, STANGER** Coordinates: -29.276667, 31.2025						
18.1	DOT repeater	Midband Analogue	No		18		
18.2	EMS repeater	Midband Analogue	No		18		
18.3	KZE repeater	Midband Analogue	No		18		
18.4	KZW repeater	Midband Analogue	No		18		
18.5	DOT repeater	DMR Highband - Simulcast	No		18		
18.6	IP Link - 5 GHZ	Simulcast Link 5	No		18		
18.7	EMS Radio Link	Analogue Link	No		18		
18.8	GSU Sync Unit	GPS	No		18		
18.9	Power Supply	12V	No		18		
19.10	Power Supply	24V	No		18		
	Site Maintenance						
19.11	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
19.12	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
19.13	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
19	**SITE NO. 34 MARA FARM, PORT SHEPSTONE** Coordinates: -30.816389, 30.248889						
19.1	KZE repeater	Midband Analogue	No		18		
19.2	EMS repeater	Midband Analogue	No		18		
19.3	EMS repeater	Midband Analogue	No		18		
19.4	DOT repeater	DMR Midband - Analogue Mode	No		18		
19.5	KZW repeater	Midband Analogue	No		18		
19.6	DOT repeater	DMR Highband - Simulcast	No		18		
19.7	IP Link - 5 GHZ	Simulcast Link 5	No		18		
19.8	EMS Radio Link	Analogue Link	No		18		
19.9	GSU Sync Unit	GPS	No		18		
20.10	Power Supply	12V	No		18		
20.11	Power Supply	24V	No		18		
	Site Maintenance						
20.12	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
20.13	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
20.14	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
20	**SITE NO. 37 MATSHANE MOUNTAIN, EMPANGENI** Coordinates: -28.750833, 31.842778						
20.1	KZE repeater	Midband Analogue	No		18		
20.2	EMS repeater	Midband Analogue	No		18		
20.3	KZW repeater	Midband Analogue	No		18		
20.4	DOT repeater	Midband Analogue	No		18		
20.5	KZE Radio Link	Analogue Link	No		18		
20.6	Power Supply	12V	No		18		
	Site Maintenance						
20.7	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
20.8	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
20.9	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
21	**SITE NO. 42 NONGOMA** Coordinates: -27.901111, 31.65						
21.1	KZE repeater	Midband Analogue	No		18		
21.2	KZW repeater	Midband Analogue	No		18		
21.3	DOT repeater	Midband Analogue	No		18		
21.4	EMS repeater	Midband Analogue	No		18		
21.5	KZE Radio Link	Analogue Link	No		18		
21.6	EMS Radio Link	Analogue Link	No		18		
21.7	Power Supply	12V	No		18		
	Site Maintenance						
21.8	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
21.9	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
22.10	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
22	**SITE NO. 45 MTONJANENI, MELMOTH** Coordinates: -28.439722, 31.402222						
22.1	KZW repeater	Midband Analogue	No		18		
22.2	KZE repeater	Midband Analogue	No		18		
22.3	DOT repeater	Midband Analogue	No		18		
22.4	EMS repeater	Midband Analogue	No		18		
22.5	KZE Radio Link	Analogue Link	No		18		
22.6	Power Supply	12V	No		18		
	Site Maintenance						
22.7	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
22.8	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
22.9	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
23	**SITE NO. 56 SWARTKOP, PIETERMARITZBURG** Coordinates: -29.582851, 30.253562						
23.1	KZE repeater	Midband Analogue	No		18		
23.2	DOT repeater	DMR Midband - Multicast	No		18		
23.3	EMS repeater	Highband Analogue	No		18		
23.4	KZW repeater	Midband Analogue	No		18		
23.5	EMS repeater	Midband Analogue	No		18		
23.6	IP Link - 5 GHZ	Simulcast Link 5	No		18		
23.7	EMS Radio Link	Analogue Link	No		18		
23.8	GSU Sync Unit	GPS	No		18		
23.9	Power Supply	12V	No		18		
24.10	Power Supply	24V	No		18		
	Site Maintenance						
24.11	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
24.12	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
24.13	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
24	**SITE NO. 61 VAN REENEN (RDS)** Coordinates: -28.382778, 29.400278					
24.1	DOT repeater DMR Midband - Analogue Mode	No		18		
24.2	EMS repeater DMR Midband - Analogue Mode	No		18		
24.3	Power Supply 12V	No		18		
	Site Maintenance					
24.4	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
24.5	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
24.6	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
25	**SITE NO. 62 VERNON CROOKES, UMZINTO** Coordinates: -30.268205, 30.625303						
25.1	DOT repeater	Midband Analogue	No		18		
25.2	KZW repeater	Midband Analogue	No		18		
25.3	DOT repeater	DMR Highband - Simulcast	No		18		
25.4	IP Link - 5 GHZ	Simulcast Link 3	No		18		
25.5	IP Link - 5 GHZ	Simulcast Link 6	No		18		
25.6	GSU Sync Unit	GPS	No		18		
25.7	Power Supply	12V	No		18		
25.8	Power Supply	24V	No		18		
	Site Maintenance						
25.9	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
26.10	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
26.11	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
26	**SITE NO. 63 VRYHEID, ZUNGWENI** Coordinates: -27.710833, 30.854167					
26.1	DOT repeater Midband Analogue	No		18		
26.2	EMS repeater Midband Analogue	No		18		
26.3	KZW repeater Midband Analogue	No		18		
26.4	EMS repeater Midband Analogue	No		18		
26.5	KZE Radio Link Analogue Link	No		18		
26.6	Power Supply 12V	No		18		
	Site Maintenance					
26.7	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
26.8	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
26.9	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
		Brought Forward					
27	**SITE NO. 64 BLUFF, DURBAN** Coordinates: -29.898056, 31.038889						
27.1	DOT repeater	DMR Midband - Multicast	No		18		
27.2	EMS repeater	Midband Analogue	No		18		
27.3	KZW repeater	Midband Analogue	No		18		
27.4	EMS repeater	Highband Analogue	No		18		
27.5	DOT repeater	DMR Highband - Simulcast	No		18		
27.6	IP Link - 5 GHZ	Simulcast Link 1	No		18		
27.7	IP Link - 5 GHZ	Simulcast Link 2	No		18		
27.8	IP Link - 5 GHZ	Simulcast Link 3	No		18		
27.9	IP Link - 5 GHZ	Simulcast Link 7	No		18		
28.10	KZE Radio Link	Analogue Link	No		18		
28.11	GSU Sync Unit	GPS	No		18		
28.12	Power Supply	12V	No		18		
28.13	Power Supply	24V	No		18		
	Site Maintenance						
28.14	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
28.15	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
28.16	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
		Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
28	**SITE NO. 65 WORLDSVIEW, PIETERMARITZBURG** Coordinates: -29.583056, 30.331389					
28.1	DOT repeater Midband Analogue	No		18		
28.2	EMS repeater Midband Analogue	No		18		
28.3	Power Supply 12V	No		18		
	Site Maintenance					
28.4	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
28.5	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
28.6	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
29	**SITE NO. 81 UZIMKULU, STRAATHOEK** Coordinates: -30.347222, 29.847222						
29.1	KZW repeater	Midband Analogue	No		18		
29.2	DOT repeater	Midband Analogue	No		18		
29.3	EMS repeater	Midband Analogue	No		18		
29.4	KZE repeater	Midband Analogue	No		18		
29.5	EMS Radio Link	Analogue Link	No		18		
29.6	EMS Radio Link	Analogue Link	No		18		
29.7	KZE Radio Link	Analogue Link	No		18		
29.8	Power Supply	12V	No		18		
	Site Maintenance						
29.9	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
30.10	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
30.11	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
30	**SITE NO. 90 INANDA - 2** Coordinates: -29.671389, 30.9579						
30.1	EMS repeater	Midband Analogue	No		18		
30.2	DOT repeater	DMR Highband - Simulcast	No		18		
30.3	IP Link - 5 GHZ	Simulcast Link 2	No		18		
30.4	IP Link - 5 GHZ	Simulcast Link 5	No		18		
30.5	GSU Sync Unit	GPS	No		18		
30.6	Power Supply	12V	No		18		
30.7	Power Supply	24V	No		18		
	Site Maintenance						
30.8	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.		No		18		
	Travelling Costs						
30.9	Transport (Confirm distance to site)						
	Distance to site:	…….…… km					
	Travel rate:	…….…… R/km		1			
	Travel cost per visit:	…….…… R →	No		18		
31.10	Travelling time (Confirm travel time to site)						
	Travel time to site:	…….…… Hour					
	Time rate:	…….…… R/Hour					
	Time cost per visit:	…….…… R →	No		18		
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
31	**SITE NO. 91 RESEVOIR HILL** Coordinates: -29.80069, 30.92658					
31.1	EMS repeater Midband Analogue	No		0		
31.2	Power Supply 12V	No		18		
	Site Maintenance					
31.3	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
31.4	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
31.5	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
32	**SITE NO. 92 GLENDALE** Coordinates: -29.342256, 31.090736					
32.1	EMS repeater Midband Analogue	No		18		
32.2	Power Supply 12V	No		18		
	Site Maintenance					
32.3	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
32.4	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
32.5	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
33	**SITE NO. 93 SHALLCROSS** Coordinates: -29.882739, 30.856875					
33.1	IP Link - 5 GHZ Simulcast Link 7	No		18		
33.2	IP Link - 5 GHZ Simulcast Link 8	No		18		
33.3	Power Supply 24V	No		18		
	Site Maintenance					
33.4	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
33.5	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
33.6	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
34	**SITE NO. 94 MARIANHILL** Coordinates: -29.83197, 30.83040					
34.1	Control Room Equipment	No		18		
34.2	IP Link - 5 GHZ Simulcast Link 8	No		18		
34.3	Power Supply 24V	No		18		
	Travelling Costs					
34.4	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
34.5	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Simulcast System					
34.6	Remote Monitoring of Simulcast System over 36 Months - as specified	item		1		
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
35	**SITE NO. 95 Somopho Hills** Coordinates: -28.656884, 31.844271					
35.1	DOT repeater Midband Analogue	No		18		
35.2	EMS repeater Midband Analogue	No		18		
35.3	Power Supply 12V	No		18		
	Site Maintenance					
35.4	Maintenance as per Part C3.5.2 as required for: Site ,huts, fences, masts, earth mats, etc.	No		18		
	Travelling Costs					
35.5	Transport (Confirm distance to site)					
	Distance to site: …….…… km					
	Travel rate: …….…… R/km		1			
	Travel cost per visit: …….…… R →	No		18		
35.6	Travelling time (Confirm travel time to site)					
	Travel time to site: …….…… Hour					
	Time rate: …….…… R/Hour					
	Time cost per visit: …….…… R →	No		18		
	Total - carried forward to Summary Page C2.3.5					

Item No.	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	BILL NO. 3 - CONSTRUCTION & UPGRADING, REPEATER REPLACEMENT & DIGITAL LINKS Notes: The Contractor is to refer to C3.4 - Standard Specifications, C3.5 - Project Specifications, C5 - Drawings, Annexure 9 - Abbreviated List of Repeater Sites, Annexure 10 - Repeater Site Comprehensive Data, Annexure 11 - Repeater Inspection and Service Report Sample issued together with these bills of quantities in order to acquaint himself fully with the nature and scope of the work The cost of Construction and Upgrading under each item shall include all cost associated shall be priced separately for each repeater site: - Supply and installation of Equipment - Transport cost Department of Transport (DOT): Tariffs for the use of Motor Transport: Ref: T118: - Category C: Diesel - 2001 to 2500 cc: Private - Travelling time - Accommodation cost (if required) Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
1	**SITE NO. 1 - ALVERSTONE, PINETOWN** Coordinates: -29.776944, 30.712778					
1.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
1.1.1	DOT: MB Repeater - DMR: Supply	No		0		
1.1.2	EMS: MB Repeater - DMR: Supply	No		1		
1.1.3	EMS: HB Repeater - DMR: Supply	No		1		
1.1.4	KZW: MB Repeater - DMR: Supply	No		1		
1.1.5	KZE: MB Repeater - DMR: Supply	No		1		
1.1.6	Remove existing Analogue Repeater and deliver to the contractor's equipment store.	No		4		
1.1.7	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		4		
1.1.8	Transport costs (For completion of works under item 1.1)	sum				
1.1.9	Travel time costs: (For completion of works under item 1.1)	sum				
1.1.10	Accommodation cost (if required) (For completion of works under item 1.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
1.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
1.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
1.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
1.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
1.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
1.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
1.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
1.2.7	Transport costs (For completion of works under item 1.2)		sum				
1.2.8	Travel time costs: (For completion of works under item 1.2)		sum				
1.2.9	Accommodation cost (if required) (For completion of works under item 1.2)		sum				
1.3	<u>Undervoltage and Ovevoltage Protection</u> as per Part C3.5.5 Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
1.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
1.3.2	Transport costs (For completion of works under item 1.3)		sum				
1.3.3	Travel time costs: (For completion of works under item 1.3)		sum				
1.3.4	Accommodation cost (if required) (For completion of works under item 1.3)		sum				
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
1.4	Replacement of Antennas as per Part C3.5.5						
	ANTENNA, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable						
	Twin stack dipole, on mast leg, including for additional antenna support pipe						
1.4.1	VHF midband	Supply	No		2		
		Install	No		2		
1.4.2	VHF higband	Supply	No		1		
		Install	No		1		
	Antenna cable and accessories:						
1.4.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.						
	- RG 213 cable	Supply	m		165		
		Install	m		165		
1.4.4	Antenna cable termination including connector.						
	a) RG 213 - N-Type - Male		No		9		
	b) RG 213 - N-Type - Female		No		3		
1.4.5	Lightning surge arrestor.						
	- RG 213 cable	Supply	No		3		
		Install	No		3		
1.4.6	Cable earthing kit.						
	- RG 213 cable	Supply	No		3		
		Install	No		3		
1.4.7	Transport costs (For completion of works under item 1.4)		sum				
1.4.8	Travel time costs: (For completion of works under item 1.4)		sum				
1.4.9	Accommodation cost (if required) (For completion of works under item 1.4)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
1.5	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
1.5.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
1.5.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
1.5.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
1.5.4	Transport costs (For completion of works under item 1.4)	sum				
1.5.5	Travel time costs: (For completion of works under item 1.4)	sum				
1.5.6	Accommodation cost (if required) (For completion of works under item 1.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
2	**SITE NO. 2 - BABANANGO** Coordinates: -28.392222, 30.995556					
2.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
2.1.1	KZE: MB Repeater - DMR: Supply	No		1		
2.1.2	KZW: MB Repeater - DMR: Supply	No		1		
2.1.3	EMS: MB Repeater - DMR: Supply	No		1		
2.1.4	Remove existing Analogue Repeater and deliver to equipment store.	No		3		
2.1.5	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		3		
2.1.6	Transport costs (For completion of works under item 2.1)	sum				
2.1.7	Travel time costs: (For completion of works under item 2.1)	sum				
2.1.8	Accommodation cost (if required) (For completion of works under item 2.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
2.2	Digital Links The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
2.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
2.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe - UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
2.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
2.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
2.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
2.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
2.2.7	Transport costs (For completion of works under item 2.2)		sum				
2.2.8	Travel time costs: (For completion of works under item 2.2)		sum				
2.2.9	Accommodation cost (if required) (For completion of works under item 2.2)		sum				
2.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
2.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
2.3.2	Transport costs (For completion of works under item 2.3)		sum				
2.3.3	Travel time costs: (For completion of works under item 2.3)		sum				
2.3.4	Accommodation cost (if required) (For completion of works under item 2.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
3	**SITE NO. 5 - BOKKIESBERG, KOKSTAD** Coordinates: -30.378628, 29.289792					
3.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
3.1.1	DOT: MB Repeater - DMR: Supply	No		1		
3.1.2	EMS: MB Repeater - DMR: Supply	No		1		
3.1.3	KZE: MB Repeater - DMR: Supply	No		1		
3.1.4	Remove existing Analogue Repeater and deliver to equipment store.	No		3		
3.1.5	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		3		
3.1.6	Transport costs (For completion of works under item 3.1)	sum				
3.1.7	Travel time costs: (For completion of works under item 3.1)	sum				
3.1.8	Accommodation cost (if required) (For completion of works under item 3.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
3.2	Digital Links The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
3.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
3.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe - UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
	Antenna cable and accessories:						
3.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.						
	- LMR 195 cable	Supply	m		55		
		Install	m		55		
3.2.4	Antenna cable termination including connector.						
	a) LMR 195 - N-Type - Male		No		3		
	b) LMR 195 - N-Type - Female		No		1		
3.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
3.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
3.2.7	Transport costs (For completion of works under item 3.2)		sum				
3.2.8	Travel time costs: (For completion of works under item 3.2)		sum				
3.2.9	Accommodation cost (if required) (For completion of works under item 3.2)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
4	**SITE NO. 9 - DUMBE MOUNTAIN, PAUL PIETERSBURG** Coordinates: -27.447222, 30.841944					
4.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
4.1.1	DOT: MB Repeater - DMR: Supply	No		1		
4.1.2	EMS: MB Repeater - DMR: Supply	No		1		
4.1.3	Remove existing Analogue Repeater and deliver to equipment store.	No		2		
4.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		2		
4.1.5	Transport costs (For completion of works under item 4.1)	sum				
4.1.6	Travel time costs: (For completion of works under item 4.1)	sum				
4.1.7	Accommodation cost (if required) (For completion of works under item 4.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
4.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
4.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
4.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
4.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
4.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
4.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
4.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
4.2.7	Transport costs (For completion of works under item 4.2)		sum				
4.2.8	Travel time costs: (For completion of works under item 4.2)		sum				
4.2.9	Accommodation cost (if required) (For completion of works under item 4.2)		sum				
4.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
4.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
4.3.2	Transport costs (For completion of works under item 4.3)		sum				
4.3.3	Travel time costs: (For completion of works under item 4.3)		sum				
4.3.4	Accommodation cost (if required) (For completion of works under item 4.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
4.4	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
4.4.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
4.4.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
4.4.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
4.4.4	Transport costs (For completion of works under item 4.4)	sum				
4.4.5	Travel time costs: (For completion of works under item 4.4)	sum				
4.4.6	Accommodation cost (if required) (For completion of works under item 4.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
5	**SITE NO. 10 - DUNDEE, L'MPATI MOUNTAIN** Coordinates: -28.125556, 30.215					
5.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
5.1.1	DOT: MB Repeater - DMR: Supply	No		1		
5.1.2	EMS: MB Repeater - DMR: Supply	No		1		
5.1.3	KZE: MB Repeater - DMR: Supply	No		1		
5.1.4	KZW: MB Repeater - DMR: Supply	No		1		
5.1.5	Remove existing Analogue Repeater and deliver to equipment store.	Item		4		
5.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	Item		4		
5.1.7	Transport costs (For completion of works under item 5.1)	sum				
5.1.8	Travel time costs: (For completion of works under item 5.1)	sum				
5.1.9	Accommodation cost (if required) (For completion of works under item 5.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
5.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
5.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
5.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
5.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
5.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
5.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
5.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
5.2.7	Transport costs (For completion of works under item 5.2)		sum				
5.2.8	Travel time costs: (For completion of works under item 5.2)		sum				
5.2.9	Accommodation cost (if required) (For completion of works under item 5.2)		sum				
5.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
5.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
5.3.2	Transport costs (For completion of works under item 5.3)		sum				
5.3.3	Travel time costs: (For completion of works under item 5.3)		sum				
5.3.4	Accommodation cost (if required) (For completion of works under item 5.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
5.4	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
5.4.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
5.4.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
5.4.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
5.4.4	Transport costs (For completion of works under item 5.4)	sum				
5.4.5	Travel time costs: (For completion of works under item 5.4)	sum				
5.4.6	Accommodation cost (if required) (For completion of works under item 5.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
6	**SITE NO. 12 - ESHOWE (TOP FARM)** Coordinates: -28.867109, 31.300805					
6.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
6.1.1	DOT: MB Repeater - DMR: Supply	No		1		
6.1.2	EMS: MB Repeater - DMR: Supply	No		1		
6.1.3	KZE: MB Repeater - DMR: Supply	No		1		
6.1.4	KZW: MB Repeater - DMR: Supply	No		1		
6.1.5	Remove existing Analogue Repeater and deliver to equipment store.	No		4		
6.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		4		
6.1.7	Transport costs (For completion of works under item 6.1)	sum				
6.1.8	Travel time costs: (For completion of works under item 6.1)	sum				
6.1.9	Accommodation cost (if required) (For completion of works under item 6.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
6.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
6.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
6.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
6.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
6.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
6.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
6.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
6.2.7	Transport costs (For completion of works under item 6.2)		sum				
6.2.8	Travel time costs: (For completion of works under item 6.2)		sum				
6.2.9	Accommodation cost (if required) (For completion of works under item 6.2)		sum				
6.3	<u>Undervoltage and Ovevoltage Protection</u> as per Part C3.5.5 Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
6.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
6.3.2	Transport costs (For completion of works under item 6.3)		sum				
6.3.3	Travel time costs: (For completion of works under item 6.3)		sum				
6.3.4	Accommodation cost (if required) (For completion of works under item 6.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
7	**SITE NO. 13 - ESTCOURT, HIDCOTE** Coordinates: -29.121714, 29.926898					
7.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
7.1.1	DOT: MB Repeater - DMR: Supply	No		1		
7.1.2	EMS: MB Repeater - DMR: Supply	No		1		
7.1.3	EMS: MB Repeater - DMR: Supply	No		1		
7.1.4	Remove existing Analogue Repeater and deliver to equipment store.	No		3		
7.1.5	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		3		
7.1.6	Transport costs (For completion of works under item 7.1)	sum				
7.1.7	Travel time costs: (For completion of works under item 7.1)	sum				
7.1.8	Accommodation cost (if required) (For completion of works under item 7.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
7.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
7.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
7.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
7.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
7.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
7.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
7.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
7.2.7	Transport costs (For completion of works under item 7.2)		sum				
7.2.8	Travel time costs: (For completion of works under item 7.2)		sum				
7.2.9	Accommodation cost (if required) (For completion of works under item 7.2)		sum				
7.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5 Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
7.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
7.3.2	Transport costs (For completion of works under item 7.3)		sum				
7.3.3	Travel time costs: (For completion of works under item 7.3)		sum				
7.3.4	Accommodation cost (if required) (For completion of works under item 7.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
8	**SITE NO. 16A - GREYTOWN, CHIPPERFIELD** Coordinates: -29.032222, 30.505833					
8.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
8.1.1	DOT: MB Repeater - DMR: Supply	No		1		
8.1.2	EMS: MB Repeater - DMR: Supply	No		1		
8.1.3	KZE: MB Repeater - DMR: Supply	No		1		
8.1.4	KZW: MB Repeater - DMR: Supply	No		1		
8.1.5	Remove existing Analogue Repeater and deliver to equipment store.	No		4		
8.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		4		
8.1.7	Transport costs (For completion of works under item 8.1)	sum				
8.1.8	Travel time costs: (For completion of works under item 8.1)	sum				
8.1.9	Accommodation cost (if required) (For completion of works under item 8.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
8.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
8.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
8.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
8.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
8.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
8.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
8.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
8.2.7	Transport costs (For completion of works under item 8.2)		sum				
8.2.8	Travel time costs: (For completion of works under item 8.2)		sum				
8.2.9	Accommodation cost (if required) (For completion of works under item 8.2)		sum				
8.3	<u>Undervoltage and Ovevoltage Protection</u> as per Part C3.5.5 Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
8.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
8.3.2	Transport costs (For completion of works under item 8.3)		sum				
8.3.3	Travel time costs: (For completion of works under item 8.3)		sum				
8.3.4	Accommodation cost (if required) (For completion of works under item 8.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
9	**SITE NO. 17 GROENVLEI, NEWCASTLE** Coordinates: -26.49136, 30.330602					
9.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
9.1.1	EMS: MB Repeater - DMR: Supply	No		1		
9.1.2	KZE: MB Repeater - DMR: Supply	No		1		
9.1.3	KZW: MB Repeater - DMR: Supply	No		1		
9.1.4	Remove existing Analogue Repeater and deliver to equipment store.	No		3		
9.1.5	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		3		
9.1.6	Transport costs (For completion of works under item 9.1)	sum				
9.1.7	Travel time costs: (For completion of works under item 9.1)	sum				
9.1.8	Accommodation cost (if required) (For completion of works under item 9.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
9.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
9.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
9.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
9.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
9.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
9.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
9.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
9.2.7	Transport costs (For completion of works under item 9.2)		sum				
9.2.8	Travel time costs: (For completion of works under item 9.2)		sum				
9.2.9	Accommodation cost (if required) (For completion of works under item 9.2)		sum				
9.3	<u>Undervoltage and Ovevoltage Protection</u> as per Part C3.5.5 Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
9.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
9.3.2	Transport costs (For completion of works under item 9.3)		sum				
9.3.3	Travel time costs: (For completion of works under item 9.3)		sum				
9.3.4	Accommodation cost (if required) (For completion of works under item 9.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
9.4	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
9.4.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
9.4.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
9.4.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
9.4.4	Transport costs (For completion of works under item 9.4)	sum				
9.4.5	Travel time costs: (For completion of works under item 9.4)	sum				
9.4.6	Accommodation cost (if required) (For completion of works under item 9.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
9.5	Replacement of Equipment Container as per Part C3.4.11.					
9.5.1	New Container - Complete as specified and as per Drawing: D8260E14-104					
	a) Remove existing container/hut	No	1			
	b) Supply new container	No	1			
	c) Deliver container to site	No	1			
	d) Construct new plinth for container	No	1			
	e) Install new container on plinth	No	1			
	f) Removal and disposal of old container	No	1			
	g) Coordination of works with client to limit disruption of service	sum				
9.5.2	Electrical Services inside container					
	a) Electrical Distribution Board	No	1			
	b) Lighting and SSO's	sum				
	c) DC Distribution	sum				
	d) Termination of incoming cable	sum				
	e) Internal cabling routes and ducts	sum				
	f) Earthing of container	sum				
9.5.3	Transport costs (For completion of works under item 9.5)	sum				
9.5.4	Travel time costs: (For completion of works under item 9.5)	sum				
9.5.5	Accommodation cost (if required) (For completion of works under item 9.5)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
10	**SITE NO. 18 HIGHFLATS, IXOPO (KUNATA)** Coordinates: -30.269444, 30.253333					
10.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
10.1.1	DOT: MB Repeater - DMR: Supply	No		1		
10.1.2	EMS: MB Repeater - DMR: Supply	No		1		
10.1.3	Remove existing Analogue Repeater and deliver to equipment store.	Item		2		
10.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	Item		2		
10.1.5	Transport costs (For completion of works under item 10.1)	sum				
10.1.6	Travel time costs: (For completion of works under item 10.1)	sum				
10.1.7	Accommodation cost (if required) (For completion of works under item 10.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
10.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
10.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
10.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
10.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
10.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
10.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
10.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
10.2.7	Transport costs (For completion of works under item 10.2)		sum				
10.2.8	Travel time costs: (For completion of works under item 10.2)		sum				
10.2.9	Accommodation cost (if required) (For completion of works under item 10.2)		sum				
10.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
10.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
10.3.2	Transport costs (For completion of works under item 10.3)		sum				
10.3.3	Travel time costs: (For completion of works under item 10.3)		sum				
10.3.4	Accommodation cost (if required) (For completion of works under item 10.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
10.4	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
10.4.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
10.4.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
10.4.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
10.4.4	Transport costs (For completion of works under item 10.4)	sum				
10.4.5	Travel time costs: (For completion of works under item 10.4)	sum				
10.4.6	Accommodation cost (if required) (For completion of works under item 10.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
11	**SITE NO. 21 HLUHLUWE GAME RESERVE** Coordinates: -28.069444, 32.033889					
11.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
11.1.1	DOT: MB Repeater - DMR: Supply	No		1		
11.1.2	EMS: MB Repeater - DMR: Supply	No		1		
11.1.3	Remove existing Analogue Repeater and deliver to equipment store.	No		2		
11.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		2		
11.1.5	Transport costs (For completion of works under item 11.1)	sum				
11.1.6	Travel time costs: (For completion of works under item 11.1)	sum				
11.1.7	Accommodation cost (if required) (For completion of works under item 11.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
11.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
11.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
11.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
11.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
11.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
11.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
11.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
11.2.7	Transport costs (For completion of works under item 11.2)		sum				
11.2.8	Travel time costs: (For completion of works under item 11.2)		sum				
11.2.9	Accommodation cost (if required) (For completion of works under item 11.2)		sum				
11.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
10.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
10.3.2	Transport costs (For completion of works under item 10.3)		sum				
10.3.3	Travel time costs: (For completion of works under item 10.3)		sum				
10.3.4	Accommodation cost (if required) (For completion of works under item 10.3)		sum				
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
11.4	Replacement of Antennas as per Part C3.5.5 ANTENNA, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable Twin stack dipole, on mast leg, including for additional antenna support pipe						
11.4.1	VHF midband	Supply	No		2		
		Install	No		2		
11.4.2	VHF higband	Supply	No		1		
		Install	No		1		
	Antenna cable and accessories:						
11.4.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.						
	- RG 213 cable	Supply	m		165		
		Install	m		165		
11.4.4	Antenna cable termination including connector.						
	a) RG 213 - N-Type - Male		No		9		
	b) RG 213 - N-Type - Female		No		3		
11.4.5	Lightning surge arrestor.						
	- RG 213 cable	Supply	No		3		
		Install	No		3		
11.4.6	Cable earthing kit.						
	- RG 213 cable	Supply	No		3		
		Install	No		3		
11.4.7	Transport costs (For completion of works under item 11.4)		sum				
11.4.8	Travel time costs: (For completion of works under item 11.4)		sum				
11.4.9	Accommodation cost (if required) (For completion of works under item 11.4)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
11.5	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
11.5.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
11.5.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
11.5.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
11.5.4	Transport costs (For completion of works under item 11.5)	sum				
11.5.5	Travel time costs: (For completion of works under item 11.5)	sum				
11.5.6	Accommodation cost (if required) (For completion of works under item 11.5)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
11.6	Replacement of Equipment Container as per Part C3.4.11.					
11.6.1	New Container - Complete as specified and as per Drawing: D8260E14-104					
	a) Remove existing container/hut	No	1			
	b) Supply new container	No	1			
	c) Deliver container to site	No	1			
	d) Construct new plinth for container	No	1			
	e) Install new container on plinth	No	1			
	f) Removal and disposal of old container	No	1			
	g) Coordination of works with client to limit disruption of service	sum				
11.6.2	Electrical Services inside container					
	a) Electrical Distribution Board	No	1			
	b) Lighting and SSO's	sum				
	c) DC Distribution	sum				
	d) Termination of incoming cable	sum				
	e) Internal cabling routes and ducts	sum				
	f) Earthing of container	sum				
11.6.3	Transport costs (For completion of works under item 11.6)	sum				
11.6.4	Travel time costs: (For completion of works under item 11.6)	sum				
11.6.5	Accommodation cost (if required) (For completion of works under item 11.6)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
12	**SITE NO. 22 HOWARD COLLEGE, DURBAN** Coordinates: -29.866389, 30.981111					
12.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
12.1.1	DOT: MB Repeater - DMR: Supply	No		1		
12.1.2	EMS: HB Repeater - DMR: Supply	No		1		
12.1.3	Remove existing Analogue Repeater and deliver to equipment store.	No		2		
12.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		2		
12.1.5	Transport costs (For completion of works under item 12.1)	sum				
12.1.6	Travel time costs: (For completion of works under item 12.1)	sum				
12.1.7	Accommodation cost (if required) (For completion of works under item 12.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
12.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
12.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
12.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
12.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
12.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
12.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
12.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
12.2.7	Transport costs (For completion of works under item 12.2)		sum				
12.2.8	Travel time costs: (For completion of works under item 12.2)		sum				
12.2.9	Accommodation cost (if required) (For completion of works under item 12.2)		sum				
12.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
12.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
12.3.2	Transport costs (For completion of works under item 12.3)		sum				
12.3.3	Travel time costs: (For completion of works under item 12.3)		sum				
12.3.4	Accommodation cost (if required) (For completion of works under item 12.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
12.4	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
12.4.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
12.4.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
12.4.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
12.4.4	Transport costs (For completion of works under item 12.4)	sum				
12.4.5	Travel time costs: (For completion of works under item 12.4)	sum				
12.4.6	Accommodation cost (if required) (For completion of works under item 12.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
13	**SITE NO. 22 NETHERBY, UNDERBERG (SANDF SITE)** Coordinates: -29.658889, 29.631111					
13.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
13.1.1	DOT: MB Repeater - DMR: Supply	No		1		
13.1.2	EMS: MB Repeater - DMR: Supply	No		1		
13.1.3	KZE: MB Repeater - DMR: Supply	No		1		
13.1.4	KZW: MB Repeater - DMR: Supply	No		1		
13.1.5	Remove existing Analogue Repeater and deliver to equipment store.	No		4		
13.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		4		
13.1.7	Transport costs (For completion of works under item 13.1)	sum				
13.1.8	Travel time costs: (For completion of works under item 13.1)	sum				
13.1.9	Accommodation cost (if required) (For completion of works under item 13.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
13.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
13.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
13.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
13.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
13.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
13.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
13.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
13.2.7	Transport costs (For completion of works under item 13.2)		sum				
13.2.8	Travel time costs: (For completion of works under item 13.2)		sum				
13.2.9	Accommodation cost (if required) (For completion of works under item 13.2)		sum				
13.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
13.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
13.3.2	Transport costs (For completion of works under item 13.3)		sum				
13.3.3	Travel time costs: (For completion of works under item 13.3)		sum				
13.3.4	Accommodation cost (if required) (For completion of works under item 13.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
13.4	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
13.4.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
13.4.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
13.4.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
13.4.4	Transport costs (For completion of works under item 13.4)	sum				
13.4.5	Travel time costs: (For completion of works under item 13.4)	sum				
13.4.6	Accommodation cost (if required) (For completion of works under item 13.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
14	**SITE NO. 26 ITALA, LOUWSBERG** Coordinates: -27.617222, 31.322222					
14.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
14.1.1	DOT: MB Repeater - DMR: Supply	No		1		
14.1.2	EMS: MB Repeater - DMR: Supply	No		1		
14.1.3	KZW: MB Repeater - DMR: Supply	No		1		
14.1.4	Remove existing Analogue Repeater and deliver to equipment store.	Item		3		
14.1.5	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	Item		3		
14.1.6	Transport costs (For completion of works under item 14.1)	sum				
14.1.7	Travel time costs: (For completion of works under item 14.1)	sum				
14.1.8	Accommodation cost (if required) (For completion of works under item 14.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
14.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
14.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
14.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
14.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
14.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
14.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
14.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
14.2.7	Transport costs (For completion of works under item 14.2)		sum				
14.2.8	Travel time costs: (For completion of works under item 14.2)		sum				
14.2.9	Accommodation cost (if required) (For completion of works under item 14.2)		sum				
14.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
14.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
14.3.2	Transport costs (For completion of works under item 14.3)		sum				
14.3.3	Travel time costs: (For completion of works under item 14.3)		sum				
14.3.4	Accommodation cost (if required) (For completion of works under item 14.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
15	**SITE NO. 27 JOBSKOP, LADYSMITH** Coordinates: -28.579167, 30.212778					
15.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
15.1.1	DOT: MB Repeater - DMR: Supply	No		1		
15.1.2	EMS: MB Repeater - DMR: Supply	No		1		
15.1.3	DOT: MB Repeater - DMR: Supply	No		1		
15.1.4	EMS: MB Repeater - DMR: Supply	No		1		
15.1.5	Remove existing Analogue Repeater and deliver to equipment store.	No		4		
15.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		4		
15.1.7	Transport costs (For completion of works under item 15.1)	sum				
15.1.8	Travel time costs: (For completion of works under item 15.1)	sum				
15.1.9	Accommodation cost (if required) (For completion of works under item 15.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
15.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
15.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
15.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
15.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
15.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
15.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
15.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
15.2.7	Transport costs (For completion of works under item 15.2)		sum				
15.2.8	Travel time costs: (For completion of works under item 15.2)		sum				
15.2.9	Accommodation cost (if required) (For completion of works under item 15.2)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
15.3	Refurbishment of existing repeater site as per Part C3.5.4.					
15.3.1	Dis-assemble existing damaged mast and antenna equipment and remove from site.	Item				
15.3.2	Self supporting, HDG lattice type mast (21m) complete with bolts,nuts.lightning air terminal, clamped earth conductor and specified accessories, including climbing ladder and cage and anti-climbing device. (Part C3.4.8; Par. 7 and 8)					
	a) Supply	No		1		
	b) Make use of existing concrete foundation	No		1		
	c) Erection of mast	No		1		
	d) Antenna cable clamp installed	No		10		
	ANTENNA, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
15.3.3	Twin stack dipole, on mast leg, including for additional antenna support pipe					
	a) VHF midband: Supply & Install	No		4		
15.3.4	Yagi multi-element antenna					
	a) UHF: 9dB gain : Supply & Install	No		1		
	Antenna cable and accessories. installed					
15.3.5	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	a) RG 213 cable	m		220		
	b) LMR 400 cable	m		55		
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
15.3.6	Antenna cable termination including connector.					
	a) RG 213 - N-Type - Male	No		12		
	b) RG 213 - N-Type - Female	No		4		
	c) LMR 400 - N-Type - Male	No		3		
	d) LMR 400 - N-Type - Female	No		1		
15.3.7	Lightning surge arrestor.					
	a) On RG 213 cable.	No		4		
	b) On LMR 400 cable.	No		1		
15.3.8	Cable earthing kit.					
	a) On RG 213 cable.	No		4		
	b) On LMR 400 cable.	No		1		
15.3.9	Underground earth mat					
	a) 1.8metre earth electrodes installed	No		9		
	b) 70 mm² bare stranded copper conductor, installed in various lengths, including terminations	m		50		
	c) Trenching, back filling and compaction with hand tools	m³		15		
15.3.10	Test & Recommission existing equipment Replace existing Wind charger: Kestrel e160i or equal and approved 600W Rated output Output Voltage 12V Re-use existing mast	Item No		2		
15.3.11	Transport costs (For completion of works under item 15.3)	sum				
15.3.12	Travel time costs: (For completion of works under item 15.3)	sum				
15.3.13	Accommodation cost (if required) (For completion of works under item 15.3)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
16	**SITE NO. 28 JOZINI, NKANGALA** Coordinates: -27.561667, 32.045					
16.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
16.1.1	DOT: MB Repeater - DMR: Supply	No		1		
16.1.2	EMS: MB Repeater - DMR: Supply	No		1		
16.1.3	KZW: MB Repeater - DMR: Supply	No		1		
16.1.4	Remove existing Analogue Repeater and deliver to equipment store.	No		3		
16.1.5	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		3		
16.1.6	Transport costs (For completion of works under item 16.1)	sum				
16.1.7	Travel time costs: (For completion of works under item 16.1)	sum				
16.1.8	Accommodation cost (if required) (For completion of works under item 16.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
16.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
16.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
16.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
16.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
16.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
16.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
16.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
16.2.7	Transport costs (For completion of works under item 16.2)		sum				
16.2.8	Travel time costs: (For completion of works under item 16.2)		sum				
16.2.9	Accommodation cost (if required) (For completion of works under item 16.2)		sum				
16.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
16.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
16.3.2	Transport costs (For completion of works under item 16.3)		sum				
16.3.3	Travel time costs: (For completion of works under item 16.3)		sum				
16.3.4	Accommodation cost (if required) (For completion of works under item 16.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
16.4	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
16.4.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
16.4.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
16.4.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
16.4.4	Transport costs (For completion of works under item 16.4)	sum				
16.4.5	Travel time costs: (For completion of works under item 16.4)	sum				
16.4.6	Accommodation cost (if required) (For completion of works under item 16.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
17	**SITE NO. 29 KEARSNEY, STANGER** Coordinates: -29.276667, 31.2025					
17.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
17.1.1	DOT: MB Repeater - DMR: Supply	No		1		
17.1.2	EMS: MB Repeater - DMR: Supply	No		1		
17.1.3	KZE: MB Repeater - DMR: Supply	No		1		
17.1.4	KZW: MB Repeater - DMR: Supply	No		1		
17.1.5	Remove existing Analogue Repeater and deliver to equipment store.	No		4		
17.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		4		
17.1.7	Transport costs (For completion of works under item 17.1)	sum				
17.1.8	Travel time costs: (For completion of works under item 17.1)	sum				
17.1.9	Accommodation cost (if required) (For completion of works under item 17.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
17.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
17.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
17.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
17.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
17.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
17.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
17.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
17.2.7	Transport costs (For completion of works under item 17.2)		sum				
17.2.8	Travel time costs: (For completion of works under item 17.2)		sum				
17.2.9	Accommodation cost (if required) (For completion of works under item 17.2)		sum				
17.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
17.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
17.3.2	Transport costs (For completion of works under item 17.3)		sum				
17.3.3	Travel time costs: (For completion of works under item 17.3)		sum				
17.3.4	Accommodation cost (if required) (For completion of works under item 17.3)		sum				
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
17.4	Replacement of Antennas as per Part C3.5.5 ANTENNA, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable Twin stack dipole, on mast leg, including for additional antenna support pipe						
17.4.1	VHF midband	Supply	No		2		
		Install	No		2		
17.4.2	VHF higband	Supply	No		1		
		Install	No		1		
	Antenna cable and accessories:						
17.4.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.						
	- RG 213 cable	Supply	m		165		
		Install	m		165		
17.4.4	Antenna cable termination including connector.						
	a) RG 213 - N-Type - Male		No		9		
	b) RG 213 - N-Type - Female		No		3		
17.4.5	Lightning surge arrestor.						
	- RG 213 cable	Supply	No		3		
		Install	No		3		
17.4.6	Cable earthing kit.						
	- RG 213 cable	Supply	No		3		
		Install	No		3		
17.4.7	Transport costs (For completion of works under item 17.4)		sum				
17.4.8	Travel time costs: (For completion of works under item 17.4)		sum				
17.4.9	Accommodation cost (if required) (For completion of works under item 17.4)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
17.5	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
17.5.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
17.5.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
17.5.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
17.5.4	Transport costs (For completion of works under item 17.5)	sum				
17.5.5	Travel time costs: (For completion of works under item 17.5)	sum				
17.5.6	Accommodation cost (if required) (For completion of works under item 17.5)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
18	**SITE NO. 34 MARA FARM, PORT SHEPSTONE** Coordinates: -30.816389, 30.248889					
18.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
18.1.1	DOT: MB Repeater - DMR: Supply	No		1		
18.1.2	EMS: MB Repeater - DMR: Supply	No		1		
18.1.3	DOT: MB Repeater - DMR: Supply	No		1		
18.1.4	EMS: MB Repeater - DMR: Supply	No		1		
18.1.5	Remove existing Analogue Repeater and deliver to equipment store.	No		4		
18.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		4		
18.1.7	Transport costs (For completion of works under item 18.1)	sum				
18.1.8	Travel time costs: (For completion of works under item 18.1)	sum				
18.1.9	Accommodation cost (if required) (For completion of works under item 18.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
18.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
18.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
18.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
18.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
18.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
18.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
18.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
18.2.7	Transport costs (For completion of works under item 18.2)		sum				
18.2.8	Travel time costs: (For completion of works under item 18.2)		sum				
18.2.9	Accommodation cost (if required) (For completion of works under item 18.2)		sum				
18.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
18.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
18.3.2	Transport costs (For completion of works under item 18.3)		sum				
18.3.3	Travel time costs: (For completion of works under item 18.3)		sum				
18.3.4	Accommodation cost (if required) (For completion of works under item 18.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
18.4	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
18.4.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
18.4.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
18.4.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
18.4.4	Transport costs (For completion of works under item 18.4)	sum				
18.4.5	Travel time costs: (For completion of works under item 18.4)	sum				
18.4.6	Accommodation cost (if required) (For completion of works under item 18.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
19	**SITE NO. 37 MATSHANE MOUNTAIN, EMPANGENI** Coordinates: -28.750833, 31.842778					
19.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
19.1.1	DOT: MB Repeater - DMR: Supply	No		1		
19.1.2	EMS: MB Repeater - DMR: Supply	No		1		
19.1.3	KZE: MB Repeater - DMR: Supply	No		1		
19.1.4	KZW: MB Repeater - DMR: Supply	No		1		
19.1.5	Remove existing Analogue Repeater and deliver to equipment store.	Item		4		
19.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	Item		4		
19.1.7	Transport costs (For completion of works under item 19.1)	sum				
19.1.8	Travel time costs: (For completion of works under item 19.1)	sum				
19.1.9	Accommodation cost (if required) (For completion of works under item 19.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
20	**SITE NO. 42 NONGOMA** Coordinates: -27.901111, 31.65					
20.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
20.1.1	DOT: MB Repeater - DMR: Supply	No		1		
20.1.2	EMS: MB Repeater - DMR: Supply	No		1		
20.1.3	KZE: MB Repeater - DMR: Supply	No		1		
20.1.4	KZW: MB Repeater - DMR: Supply	No		1		
20.1.5	Remove existing Analogue Repeater and deliver to equipment store.	Item		4		
20.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	Item		4		
20.1.7	Transport costs (For completion of works under item 20.1)	sum				
20.1.8	Travel time costs: (For completion of works under item 20.1)	sum				
20.1.9	Accommodation cost (if required) (For completion of works under item 20.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
20.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
20.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
20.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
20.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
20.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
20.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
20.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
20.2.7	Transport costs (For completion of works under item 20.2)		sum				
20.2.8	Travel time costs: (For completion of works under item 20.2)		sum				
20.2.9	Accommodation cost (if required) (For completion of works under item 20.2)		sum				
20.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
20.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
20.3.2	Transport costs (For completion of works under item 20.3)		sum				
20.3.3	Travel time costs: (For completion of works under item 20.3)		sum				
20.3.4	Accommodation cost (if required) (For completion of works under item 20.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
21	**SITE NO. 45 MTONJANENI, MELMOTH** Coordinates: -28.439722, 31.402222					
21.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
21.1.1	DOT: MB Repeater - DMR: Supply	No		1		
21.1.2	EMS: MB Repeater - DMR: Supply	No		1		
21.1.3	KZE: MB Repeater - DMR: Supply	No		1		
21.1.4	KZW: MB Repeater - DMR: Supply	No		1		
21.1.5	Remove existing Analogue Repeater and deliver to equipment store.	No		4		
21.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		4		
21.1.7	Transport costs (For completion of works under item 21.1)	sum				
21.1.8	Travel time costs: (For completion of works under item 21.1)	sum				
21.1.9	Accommodation cost (if required) (For completion of works under item 21.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
21.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
21.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
21.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
21.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
21.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
21.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
21.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
21.2.7	Transport costs (For completion of works under item 21.2)		sum				
21.2.8	Travel time costs: (For completion of works under item 21.2)		sum				
21.2.9	Accommodation cost (if required) (For completion of works under item 21.2)		sum				
21.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
21.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
21.3.2	Transport costs (For completion of works under item 21.3)		sum				
21.3.3	Travel time costs: (For completion of works under item 21.3)		sum				
21.3.4	Accommodation cost (if required) (For completion of works under item 21.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
22	**SITE NO. 56 SWARTKOP, PIETERMARITZBURG** Coordinates: -29.582851, 30.253562					
22.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
22.1.1	EMS: MB Repeater - DMR: Supply	No		1		
22.1.2	KZE: MB Repeater - DMR: Supply	No		1		
22.1.3	KZW: MB Repeater - DMR: Supply	No		1		
22.1.4	Remove existing Analogue Repeater and deliver to equipment store.	Item		3		
22.1.5	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	Item		3		
22.1.6	Transport costs (For completion of works under item 22.1)	sum				
22.1.7	Travel time costs: (For completion of works under item 22.1)	sum				
22.1.8	Accommodation cost (if required) (For completion of works under item 22.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
22.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
22.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
22.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
22.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
22.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
22.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
22.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
22.2.7	Transport costs (For completion of works under item 22.2)		sum				
22.2.8	Travel time costs: (For completion of works under item 22.2)		sum				
22.2.9	Accommodation cost (if required) (For completion of works under item 22.2)		sum				
22.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
22.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
22.3.2	Transport costs (For completion of works under item 22.3)		sum				
22.3.3	Travel time costs: (For completion of works under item 22.3)		sum				
22.3.4	Accommodation cost (if required) (For completion of works under item 22.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
23	**SITE NO. 61 VAN REENEN (RDS)** Coordinates: -27.382778, 29.400278					
23.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
23.1.1	DOT: MB Repeater - DMR: Supply	No		0		
23.1.2	EMS: MB Repeater - DMR: Supply	No		1		
23.1.3	Remove existing Analogue Repeater and deliver to equipment store.	Item		1		
23.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	Item		1		
23.1.5	Transport costs (For completion of works under item 23.1)	sum				
23.1.6	Travel time costs: (For completion of works under item 23.1)	sum				
23.1.7	Accommodation cost (if required) (For completion of works under item 23.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
23.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
23.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
23.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
23.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
23.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
23.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
23.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
23.2.7	Transport costs (For completion of works under item 23.2)		sum				
23.2.8	Travel time costs: (For completion of works under item 23.2)		sum				
23.2.9	Accommodation cost (if required) (For completion of works under item 23.2)		sum				
23.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
23.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
23.3.2	Transport costs (For completion of works under item 23.3)		sum				
23.3.3	Travel time costs: (For completion of works under item 23.3)		sum				
23.3.4	Accommodation cost (if required) (For completion of works under item 23.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
23.4	Replacement of Equipment Container as per Part C3.4.11.					
23.4.1	New Container - Complete as specified and as per Drawing: D8260E14-104					
	a) Remove existing container/hut	No	1			
	b) Supply new container	No	1			
	c) Deliver container to site	No	1			
	d) Construct new plinth for container	No	1			
	e) Install new container on plinth	No	1			
	f) Removal and disposal of old container	No	1			
	g) Coordination of works with client to limit disruption of service	sum				
23.4.2	Electrical Services inside container					
	a) Electrical Distribution Board	No	1			
	b) Lighting and SSO's	sum				
	c) DC Distribution	sum				
	d) Termination of incoming cable	sum				
	e) Internal cabling routes and ducts	sum				
	f) Earthing of container	sum				
23.4.3	Transport costs (For completion of works under item 23.4)	sum				
23.4.4	Travel time costs: (For completion of works under item 23.4)	sum				
23.4.5	Accommodation cost (if required) (For completion of works under item 23.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
24	**SITE NO. 62 VERNON CROOKES, UMZINTO** Coordinates: -30.268205, 30.625303					
24.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
24.1.1	DOT: MB Repeater - DMR: Supply	No		0		
24.1.2	KZW: MB Repeater - DMR: Supply	No		1		
24.1.3	Remove existing Analogue Repeater and deliver to equipment store.	No		1		
24.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		1		
24.1.5	Transport costs (For completion of works under item 24.1)	sum				
24.1.6	Travel time costs: (For completion of works under item 24.1)	sum				
24.1.7	Accommodation cost (if required) (For completion of works under item 24.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
24.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
24.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
24.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
24.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
24.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
24.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
24.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
24.2.7	Transport costs (For completion of works under item 24.2)		sum				
24.2.8	Travel time costs: (For completion of works under item 24.2)		sum				
24.2.9	Accommodation cost (if required) (For completion of works under item 24.2)		sum				
24.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
24.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
24.3.2	Transport costs (For completion of works under item 24.3)		sum				
24.3.3	Travel time costs: (For completion of works under item 24.3)		sum				
24.3.4	Accommodation cost (if required) (For completion of works under item 24.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
24.4	Replacement of Mast as per Part C3.5.5					
24.4.1	Remove all antenna equipment from existing mast.	Item		1		
24.4.2	Disassemble existing mast and and remove from site.	Item		1		
24.4.3	Self supporting, HDG lattice type mast (30m) complete with bolts,nuts.lightning air terminal, clamped earth conductor and specified accessories, including climbing ladder and cage and anti-climbing device. (Part C3.4.8; Par. 7 and 8)					
	a) Supply	No		1		
	b) Concrete foundation altered	P-sum				25 000
	c) Erection of mast	No		1		
	d) Antenna cable clamp installed	No		10		
	Re-install existing antenna equipment.	Item		1		
	Antenna cable and accessories:					
24.4.4	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	a) RG 213 cable	m		220		
	b) LMR 400 cable	m		55		
24.4.5	Antenna cable termination including connector.					
	a) RG 213 - N-Type - Male	No		12		
	b) RG 213 - N-Type - Female	No		4		
	c) LMR 400 - N-Type - Male	No		3		
	d) LMR 400 - N-Type - Female	No		1		
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
24.4.6	Lightning surge arrestor.					
	a) On RG 213 cable.	No		4		
	b) On LMR 400 cable.	No		1		
24.4.7	Cable earthing kit.					
	a) On RG 213 cable.	No		4		
	b) On LMR 400 cable.	No		1		
24.4.8	Transport costs (For completion of works under item 24.4)	sum				
24.4.9	Travel time costs: (For completion of works under item 24.4)	sum				
24.4.10	Accommodation cost (if required) (For completion of works under item 24.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
25	**SITE NO. 63 VRYHEID, ZUNGWENI** Coordinates: -27.741250, 30.794997					
25.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
25.1.1	DOT: MB Repeater - DMR: Supply	No		1		
25.1.2	EMS: MB Repeater - DMR: Supply	No		1		
25.1.3	KZW: MB Repeater - DMR: Supply	No		1		
25.1.4	Remove existing Analogue Repeater and deliver to equipment store.	No		3		
25.1.5	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		3		
25.1.6	Transport costs (For completion of works under item 25.1)	sum				
25.1.7	Travel time costs: (For completion of works under item 25.1)	sum				
25.1.8	Accommodation cost (if required) (For completion of works under item 25.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
25.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
25.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
25.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
25.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
25.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
25.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
25.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
25.2.7	Transport costs (For completion of works under item 25.2)		sum				
25.2.8	Travel time costs: (For completion of works under item 25.2)		sum				
25.2.9	Accommodation cost (if required) (For completion of works under item 25.2)		sum				
25.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
25.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
25.3.2	Transport costs (For completion of works under item 25.3)		sum				
25.3.3	Travel time costs: (For completion of works under item 25.3)		sum				
25.3.4	Accommodation cost (if required) (For completion of works under item 25.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
26	**SITE NO. 64 BLUFF, DURBAN** Coordinates: -29.898056, 31.038889					
26.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
26.1.1	KZW: MB Repeater - DMR: Supply	No		1		
26.1.2	EMS: MB Repeater - DMR: Supply	No		1		
26.1.3	EMS: HB Repeater - DMR: Supply			1		
26.1.4	Remove existing Analogue Repeater and deliver to equipment store.	No		3		
26.1.5	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		3		
26.1.6	Transport costs (For completion of works under item 26.1)	sum				
26.1.7	Travel time costs: (For completion of works under item 26.1)	sum				
26.1.8	Accommodation cost (if required) (For completion of works under item 26.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
26.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
26.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
26.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
26.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
26.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
26.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
26.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
26.2.7	Transport costs (For completion of works under item 26.2)		sum				
26.2.8	Travel time costs: (For completion of works under item 26.2)		sum				
26.2.9	Accommodation cost (if required) (For completion of works under item 26.2)		sum				
26.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
26.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
26.3.2	Transport costs (For completion of works under item 26.3)		sum				
26.3.3	Travel time costs: (For completion of works under item 26.3)		sum				
26.3.4	Accommodation cost (if required) (For completion of works under item 26.3)		sum				
	Carried Forward						

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
26.4	Replacement of Antennas as per Part C3.5.5 ANTENNA, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable Twin stack dipole, on mast leg, including for additional antenna support pipe						
26.4.1	VHF midband	Supply	No		2		
		Install	No		2		
26.4.2	VHF higband	Supply	No		1		
		Install	No		1		
	Antenna cable and accessories:						
26.4.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.						
	- RG 213 cable	Supply	m		165		
		Install	m		165		
26.4.4	Antenna cable termination including connector.						
	a) RG 213 - N-Type - Male		No		9		
	b) RG 213 - N-Type - Female		No		3		
26.4.5	Lightning surge arrestor.						
	- RG 213 cable	Supply	No		3		
		Install	No		3		
26.4.6	Cable earthing kit.						
	- RG 213 cable	Supply	No		3		
		Install	No		3		
26.4.7	Transport costs (For completion of works under item 26.4)		sum				
26.4.8	Travel time costs: (For completion of works under item 26.4)		sum				
26.4.9	Accommodation cost (if required) (For completion of works under item 26.4)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
27	**SITE NO. 65 WORLDSVIEW, PIETERMARITZBURG** Coordinates: -29.583056, 30.331389					
27.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
27.1.1	DOT: MB Repeater - DMR: Supply	No		1		
27.1.2	EMS: MB Repeater - DMR: Supply	No		1		
27.1.3	Remove existing Analogue Repeater and deliver to equipment store.	No		2		
27.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		2		
27.1.5	Transport costs (For completion of works under item 27.1)	sum				
27.1.6	Travel time costs: (For completion of works under item 27.1)	sum				
27.1.7	Accommodation cost (if required) (For completion of works under item 27.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
27.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
27.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
27.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
27.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
27.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
27.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
27.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
27.2.7	Transport costs (For completion of works under item 27.2)		sum				
27.2.8	Travel time costs: (For completion of works under item 27.2)		sum				
27.2.9	Accommodation cost (if required) (For completion of works under item 27.2)		sum				
27.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
27.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
27.3.2	Transport costs (For completion of works under item 27.3)		sum				
27.3.3	Travel time costs: (For completion of works under item 27.3)		sum				
27.3.4	Accommodation cost (if required) (For completion of works under item 27.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
27.4	Replacement of Batteries and Battery Chargers as per Part C3.4.4.					
	LEAD-ACID STATIONARY BATTERIES AND ACCESSORIES:					
27.4.1	Tubular cell battery bank 12V, 530 Ah (10hr rate to 1.85VPC)					
	a) Supply battery, without carry tray	No	1			
	b) Supply carry tray	No	1			
	c) Install on battery stand including clamps and interconnections	No	1			
	d) Install on battery stand including clamps, stand and interconnections	No	1			
27.4.2	Battery charger - As per Part C3.4.4, Par. 4.1.					
	a) 12V,60A DC continuous : Supply	No	1			
	b) Install, including power connections	No	1			
27.4.3	Voltage Regulator and Battery Low Voltage Disconnect at pre-set level (Part C3.4.4, Par. 5)	No	1			
27.4.4	Transport costs (For completion of works under item 27.4)	sum				
27.4.5	Travel time costs: (For completion of works under item 27.4)	sum				
27.4.6	Accommodation cost (if required) (For completion of works under item 27.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
27.5	Replacement of Equipment Container as per Part C3.4.11.					
27.5.1	New Container - Complete as specified and as per Drawing: D8260E14-104					
	a) Remove existing container/hut	No	1			
	b) Supply new container	No	1			
	c) Deliver container to site	No	1			
	d) Construct new plinth for container	No	1			
	e) Install new container on plinth	No	1			
	f) Removal and disposal of old container	No	1			
	g) Coordination of works with client to limit disruption of service	sum				
27.5.2	Electrical Services inside container					
	a) Electrical Distribution Board	No	1			
	b) Lighting and SSO's	sum				
	c) DC Distribution	sum				
	d) Termination of incoming cable	sum				
	e) Internal cabling routes and ducts	sum				
	f) Earthing of container	sum				
27.5.3	Transport costs (For completion of works under item 27.5)	sum				
27.5.4	Travel time costs: (For completion of works under item 27.5)	sum				
27.5.5	Accommodation cost (if required) (For completion of works under item 27.5)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
28	**SITE NO. 81 UZIMKULU, STRAATHOEK** Coordinates: -30.347222, 29.847222					
28.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
28.1.1	DOT: MB Repeater - DMR: Supply	No		1		
28.1.2	EMS: MB Repeater - DMR: Supply	No		1		
28.1.3	KZE: MB Repeater - DMR: Supply	No		1		
28.1.4	KZW: MB Repeater - DMR: Supply	No		1		
28.1.5	Remove existing Analogue Repeater and deliver to equipment store.	No		4		
28.1.6	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		4		
28.1.7	Transport costs (For completion of works under item 28.1)	sum				
28.1.8	Travel time costs: (For completion of works under item 28.1)	sum				
28.1.9	Accommodation cost (if required) (For completion of works under item 28.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
28.2	Digital Links The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
28.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
28.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe - UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
28.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
28.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
28.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
28.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
28.2.7	Transport costs (For completion of works under item 28.2)		sum				
28.2.8	Travel time costs: (For completion of works under item 28.2)		sum				
28.2.9	Accommodation cost (if required) (For completion of works under item 28.2)		sum				
28.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
28.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
28.3.2	Transport costs (For completion of works under item 28.3)		sum				
28.3.3	Travel time costs: (For completion of works under item 28.3)		sum				
28.3.4	Accommodation cost (if required) (For completion of works under item 28.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
28.4	Replacement of Mast as per Part C3.5.5					
28.4.1	Remove all antenna equipment from existing mast.	Item		1		
28.4.2	Disassemble existing mast and and remove from site.	Item		1		
28.4.3	Self supporting, HDG lattice type mast (30m) complete with bolts,nuts.lightning air terminal, clamped earth conductor and specified accessories, including climbing ladder and cage and anti-climbing device. (Part C3.4.8; Par. 7 and 8)					
	a) Supply	No		1		
	b) Concrete foundation altered	P-sum				25 000
	c) Erection of mast	No		1		
	d) Antenna cable clamp installed	No		10		
	Re-install existing antenna equipment.	Item		1		
	Antenna cable and accessories:					
28.4.4	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	a) RG 213 cable	m		220		
	b) LMR 400 cable	m		55		
28.4.5	Antenna cable termination including connector.					
	a) RG 213 - N-Type - Male	No		12		
	b) RG 213 - N-Type - Female	No		4		
	c) LMR 400 - N-Type - Male	No		3		
	d) LMR 400 - N-Type - Female	No		1		
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
28.4.6	Lightning surge arrestor.					
	a) On RG 213 cable.	No		4		
	b) On LMR 400 cable.	No		1		
28.4.7	Cable earthing kit.					
	a) On RG 213 cable.	No		4		
	b) On LMR 400 cable.	No		1		
28.4.8	Transport costs (For completion of works under item 28.4)	sum				
28.4.9	Travel time costs: (For completion of works under item 28.4)	sum				
28.4.10	Accommodation cost (if required) (For completion of works under item 28.4)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
29	**SITE NO. 90 INANDA 2** Coordinates: -29.671389, 30.9579					
29.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
29.1.1	DOT: HB Repeater - DMR: Supply	No		0		
29.1.2	EMS: MB Repeater - DMR: Supply	No		1		
29.1.3	Remove existing Analogue Repeater and deliver to equipment store.	No		1		
29.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		1		
29.1.5	Transport costs (For completion of works under item 29.1)	sum				
29.1.6	Travel time costs: (For completion of works under item 29.1)	sum				
29.1.7	Accommodation cost (if required) (For completion of works under item 29.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
29.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
29.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
29.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
29.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
29.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
29.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
29.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
29.2.7	Transport costs (For completion of works under item 29.2)		sum				
29.2.8	Travel time costs: (For completion of works under item 29.2)		sum				
29.2.9	Accommodation cost (if required) (For completion of works under item 29.2)		sum				
29.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
29.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
29.3.2	Transport costs (For completion of works under item 29.3)		sum				
29.3.3	Travel time costs: (For completion of works under item 29.3)		sum				
29.3.4	Accommodation cost (if required) (For completion of works under item 29.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
30	**SITE NO. 92 GLENDALE** Coordinates: -29.342256, 31.090736					
30.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
30.1.1	DOT: HB Repeater - DMR: Supply	No		0		
30.1.2	EMS: MB Repeater - DMR: Supply	No		1		
30.1.3	Remove existing Analogue Repeater and deliver to equipment store.	No		1		
30.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		1		
30.1.5	Transport costs (For completion of works under item 30.1)	sum				
30.1.6	Travel time costs: (For completion of works under item 30.1)	sum				
30.1.7	Accommodation cost (if required) (For completion of works under item 30.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
30.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
30.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
30.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
30.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
30.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
30.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
30.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
30.2.7	Transport costs (For completion of works under item 30.2)		sum				
30.2.8	Travel time costs: (For completion of works under item 30.2)		sum				
30.2.9	Accommodation cost (if required) (For completion of works under item 30.2)		sum				
30.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
30.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
30.3.2	Transport costs (For completion of works under item 30.3)		sum				
30.3.3	Travel time costs: (For completion of works under item 30.3)		sum				
30.3.4	Accommodation cost (if required) (For completion of works under item 30.3)		sum				
	Carried Forward						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
31	**SITE NO. 95 SOMOPHO HILLS** Coordinates: -28.656884, 31.844271					
31.1	Repeater Replacement The replacement of radio repeaters shall be scheduled over the 36 month contract, as per instructions from client. The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems. The following analogue repeater shall be replaced with digital repeaters - including for Duplexers: (Part C3.4.6)					
31.1.1	DOT: HB Repeater - DMR: Supply	No		1		
31.1.2	EMS: MB Repeater - DMR: Supply	No		1		
31.1.3	Remove existing Analogue Repeater and deliver to equipment store.	No		1		
31.1.4	Install Digital Repeater in place of Analogue Repeater and re-commission in Analogue mode	No		1		
31.1.5	Transport costs (For completion of works under item 31.1)	sum				
31.1.6	Travel time costs: (For completion of works under item 31.1)	sum				
31.1.7	Accommodation cost (if required) (For completion of works under item 31.1)	sum				
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward					
31.2	Digital Links					
	The provision of digital radio links shall be scheduled over the 36 month contract, as per instructions from client.					
	The schedule shall accommodate the clients requirements for pilot migration projects from Analogue to Digital systems.					
	The number of links to be provided is insufficient for full system linking with complete system integration to form part of a separate contract.					
31.2.1	Digital link radio - 1400 MHz: Complete with interfaces as specified - Including for Duplexers (Part C3.4.7)					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
31.2.2	Antenna, including mounting brackets, bolts, nuts and multi-stack harness, connections and connectors as required, but excluding antenna mast and antenna cable					
	Yagi Y1500 link antenna, on mast leg, including for additional antenna support pipe					
	- UHF 1400 MHz: 16 dB Gain					
	Supply	No		1		
	Install, including all consumables	No		1		
	Test & Commission	No		1		
	Antenna cable and accessories:					
31.2.3	Cable including fixings on surfaces, cable ties but excluding terminations and cable clamps on mast.					
	- LMR 195 cable Supply	m		55		
	Install	m		55		
31.2.4	Antenna cable termination including connector.					
	a) LMR 195 - N-Type - Male	No		3		
	b) LMR 195 - N-Type - Female	No		1		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Brought Forward						
31.2.5	Lightning surge arrestor.						
	- LMR 195 cable	Supply	No		3		
		Install	No		3		
31.2.6	Cable earthing kit.						
	- LMR 195 cable	Supply	No		1		
		Install	No		1		
31.2.7	Transport costs (For completion of works under item 31.2)		sum				
31.2.8	Travel time costs: (For completion of works under item 31.2)		sum				
31.2.9	Accommodation cost (if required) (For completion of works under item 31.2)		sum				
31.3	Undervoltage and Ovevoltage Protection as per Part C3.5.5						
	Supply, install and commission Abnormal Voltage Protection (AVP) system, complete with with control relay, contactor and enclosure at or near LV in equipment building or container						
31.3.1	Voltage protection	Supply	No		1		
		Install	No		1		
31.3.2	Transport costs (For completion of works under item 31.3)		sum				
31.3.3	Travel time costs: (For completion of works under item 31.3)		sum				
31.3.4	Accommodation cost (if required) (For completion of works under item 31.3)		sum				
	Total - carried forward to Summary Page C2.3.5						

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	The following provisional items may be required during the 36 month contract. Item listed below will typically form part of variations or works instructions required but not covered under routine maintenance as per Bill no 3.					
1	Solar Power Supplies, excluding wiring					
1.1	Solar panel					
	(a) Supply 55W panel	No		10		
	(b) Supply 75W panel	No		15		
	(c) Install 55/75W panel on existing support frame	No		25		
1.2	Solar charge regulator and low battery voltage load shed relay (12V,5A,for single 55W panel)	No		2		
1.3	Solar charge regulator (12V,30A)	No		2		
1.4	Low battery voltage load shed relay (12V,30A,)	No		2		
2	Lithium-Ion Battery - 12V, 600 Ah					
	a) Supply battery, without carry tray	No		5		
	b) Supply carry tray	No		5		
	c) Install on battery stand including clamps and interconnections	No		5		
	d) Install on battery stand including clamps, stand and interconnections	No		5		
3	Battery charger - For Lithium-Ion Battery					
	a) 12V,60A DC continuous : Supply	No		5		
	b) Install, including power connections	No		5		
	Carried Forward					

Item	Description	Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Amount carried from previous page					
4	Application for Frequency Licence from ICASA on behalf of client.	Item		34		
5	Payment of Electricity Accounts on behalf of client. Provisional Cost	sum				950 000.00
6	Profit and handling required on the nett invoiced cost above (Show percentage in the rate column and amount in the amount column)	%				
7	Payment of Site Lease Accounts on behalf of client. Provisional Cost	sum				980 000.00
8	Profit and handling required on the nett invoiced cost above (Show percentage in the rate column and amount in the amount column)	%				
9	Preparation and submission of an application to the Supply Authority for a new power supply to a radio site, including coordination and attendance as necessary to have the power supply installed, excluding the cost of connection payable to the Supply Authority	No		2		
	Carried Forward					

Item	Description		Unit	CPAP Cat	Qty	Rate R-c	Amount R-c
	Amount carried from previous page						
10	Vehicle Transport Cost						
10.1	0.5 to 1 tonne commercial vehicle		km	1	5000		
10.2	4 x 4, 1 tonne commercial vehicle		km	1	10000		
10.3	3 tonne truck		km		1000		
11	Travelling Time (All Hours)						
11.1	Radio Technician		Hrs		100		
11.2	Artisan		Hrs		100		
11.3	Semi-skilled technician assistant		Hrs		100		
11.4	Labourer		Hrs		100		
12	Additional Labour						
12.1	Radio Technician	Normal time	Hrs		100		
12.2		Overtime	Hrs		50		
12.3	Artisan	Normal time	Hrs		100		
12.4		Overtime	Hrs		50		
12.5	Technician assistant	Normal time	Hrs		100		
12.6		Overtime	Hrs		50		
12.7	Labourer	Normal time	Hrs		100		
12.8		Overtime	Hrs		50		
	Total - carried forward to Summary Page C2.3.5						

Bill no.	Description	Page No.	Amount R-c
1	Preliminary & General - (From C2.2)	1 - 18	
2	Repeater Maintenance	1 - 36	
3	Construction and Upgrading	1 - 118	
4	Miscellaneous Items	1 - 3	
	Total Excluding VAT		
	Add: 15% Value Added Tax (VAT)		
	Total Tender Price Carried Forward to Form of Offer and Acceptance Bill of Quantities - Part T2.22		

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

PART C3. SCOPE OF WORKS

C3.1 SCOPE OF WORKS
GCC FOR CONSTRUCTION WORKS (Edition 2 of 2010)

Scope of Works complied in accordance with SANS 10403 where reference is made to this part of SANS 1921-1:2004

Project title:	**Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network**		
Tender no:	**ZNTM 01190W**	**Project Code:**	**056794; 055620**

SECTION 1

1 EXTENT OF THE WORKS

1.1 EMPLOYERS OBJECTIVES

To ensure reliable operation of Radio Repeater Networks in the Province of Kwazulu-Natal.

1.2 OVERVIEW OF THE WORKS

The contract comprises of selected upgrades of Radio Repeaters and comprehensive maintenance, including standby call-out service to 34 sites throughout the Province of Kwazulu-Natal. Upgrades shall be completed as per agreed works program. Routine maintenance of systems shall be done such that each site is attended two once every two (2) months. Emergency maintenance shall be performed if and when required, with required response times as stated in the Technical Specification.

1.3 EXTENT OF THE WORKS

The contract comprises of selected upgrades of Radio Repeaters and comprehensive maintenance, including standby call-out service to 34 sites throughout the Province of Kwazulu-Natal. Upgrades shall be completed as per agreed works program. Routine maintenance of systems shall be done such that each site is attended two once every two (2) months. Emergency maintenance shall be performed if and when required, with required response

1.4 LOCATION OF THE WORKS

The 34 sites are located throughout the Province of Kwazulu-Natal. Specific site details as per Annexures 9 and 10.

1.5 TEMPORARY WORKS

All temporary work to comply with the Occupational Health and safety Act (Act 85 of 1993)

2 ENGINEERING

2.1 EMPLOYER'S DESIGN

Not applicable

2.2 DESIGN BRIEF

Not applicable

2.3 DRAWINGS

See list of drawings/Annexure's attached to this document.

2.4 DESIGN PROCEDURES

As per best practice.

3 PROCUREMENT

3.1 PREFERENTIAL PROCUREMENT PROCEDURES

This tender will be subject to the implementation of the Preferential Procurement Regulations, 2022, pertaining to the Preferential Procurement Policy Framework Act, Act Number 5 of 2000 and the relevant Supply Chain Management Legislation and the KwaZulu-Natal Supply Chain Management Policy Framework published by the KwaZulu-Natal Provincial Treasury. Tenderers are referred to www.kzntreasury.gov.za for access to the relevant documents.
Tenderers are advised to familiarize themselves with the contents of the KwaZulu-Natal Supply Chain Management Policy Framework regarding Preference Point Systems, evaluation of tenders appeals and other matters.

3.2 RESOURCE STANDARD PERTAINING TO TARGETED PROCUREMENT

NOTE : This project will be adjudicated as not exceeding R 50,000 000,00

3.3 SCOPE OF MANDATORY SUBCONTRACT WORK

Not applicable

3.4 PREFERRED SUBCONTRACTORS/SUPPLIERS

Not applicable

3.5 SUBCONTRACTING PROCEDURES

Not applicable

4 CONSTRUCTION

4.1 APPLICABLE SANS 2001 STANDARDS FOR CONSTRUCTION WORKS

The Contractor is referred to the "Model Preambles to Trades - 2008", any "Supplementary Preambles", the Electrical Specifications and Mechanical Specification for full descriptions of materials and methods referred to in these Bills of Quantities/Lump Sum documents, insofar as they apply. The Contractor is advised to study the "Standard Preambles to all Trades", any "Supplementary Preambles", the Electrical Specifications and Mechanical Specification, before pricing Bills of Quantities/Lump Sum documents.

Where the description in the Bills of Quantities/Lump Sum documents differ from those in the Standard Electrical Specifications, the descriptions in the Bills of Quantities/Lump Sum documents are to apply. No claim whatsoever will be allowed in respect of errors in pricing due to brevity of description of items in the Bills of Quantities/Lump Sum documents which are fully described when read in conjunction with the relevant Preambles and/or Specifications. Suppliers of materials and the like, whose quality systems apply with one or more of the SABS/SANS ISO 9000 Series should be used whenever possible in the absence of a particular SABS/SANS Specification Standard Mark.

Wherever the words "shall be deemed to be included in the description", "shall be stated" or other words having the same effect, appear in the Standard System, it shall be deemed that all descriptions in these Bills of Quantities/Lump Sum documents incorporated such inclusions and statements whether specifically stated or not.

The Contractor is hereby informed that where SABS/SANS Specifications are referred to in these Bills of Quantities/Lump Sums documents and Specifications thereto, then ONLY the Specification of Work Clauses will apply. The method of measurement and payment clauses will NOT apply to this Contract.

The Contractor is hereby informed that risk of collapse and keeping excavations free from water (excluding subterranean water) generally are deemed to be included in the descriptions unless accommodated in the system of measurement. Please refer to the Geotechnical Investigation report when included at the end of these tender documents.
Whenever reference is made to "Sub-Contractor", "Nominated Sub-Contractor" or the like in the specifications included or referred to in these Bills of Quantities/Lump Sums documents, it shall be deemed to mean "Contractor" as defined.

4.2 APPLICABLE NATIONAL AND INTERNATIONAL STANDARDS

See above 4.1

4.3 PARTICULAR / GENERIC SPECIFICATIONS

The Contractor is referred to the following documents whether attached to this document or not:

SPECIFICATION	PAGES
Specification for HIV/AIDS Awareness (CIDB)	HIV1 TO HIV3
Specific Construction, Safety, Health and Environmental Plan	
Model Preambles for Trades 2008	1 to 49
General Electrical Specification	E/1 to E/20
All relevant SABS standards	0
All relevant ETSI standards	
Consulant/Project specific specifications	

4.4 CERTIFICATION BY RECOGNIZED BODIES

Only contractors in procession of a valid ICASA Radio Dealer Certificate will be accepted and permitted to do work under this contract.

4.5 AGRÉMENT CERTIFICATES

Not applicable

4.6 PLANT AND MATERIAL PROVIDED BY THE EMPLOYER

Not applicable

4.7 SERVICES AND FACILITIES PROVIDED BY THE EMPLOYER

Not applicable

4.8 OTHER SERVICES AND FACILITIES

The Contractor shall provide any artificial lighting which may be necessary or required for the proper execution of the works, and provide electric power and water required by all Sub-Contractors, Nominated Sub-Contractors and Sub-Contractors appointed directly by the Administration.
The Contractor shall give all notices and pay all fees in connection with temporary electrical and water connections and shall connect temporary Electrical and Water meters for and pay for all current and water consumed.
The Contractor is advised that the permanent light fittings and water points of any kind installed in the Works are not to be used to provide temporary lighting and supplement water requirements for construction purposes.

5 MANAGEMENT

5.1 APPLICABLE SANS 1921 STANDARDS

Tenderders are referred to
SECTION 2 : SPECIFICATION DATA ASSOCIATED WITH SANS 1921-1:2004 IN THIS DOCUMENT

5.2 RECORDING OF WEATHER

The Contractor shall keep record of abnormal climatic conditions to facilitate the adjudication of claims for extension of the contract period.

The Contractor shall allow in his programme for the following number of days for rain days (rain > 10mm per day) as per the table below:

CURRENT YEAR			YEAR + 1	YEAR + 2
January	*w/days*		3	3
February	*w/days*		3	3
March	*w/days*		3	3
April	*w/days*		3	3
May	*w/days*		3	3
June	*w/days*		3	3
July	*w/days*		3	
August	*w/days*		3	
September	*w/days*		3	
October	*w/days*		3	
November	*w/days*		3	
December	*w/days*	3	3	

5.3 MANAGEMENT MEETINGS

In order to facilitate the smooth functioning of the Works and to ensure the closest co-operation between all the parties concerned, the Employer will call for regular meetings to be held on the site, at which a senior member of the Contracting firm and the General Foreman of the Works will always be required to be present.
In addition to the above, other persons will be required to attend these meetings as and when their presence is necessary, e.g., Consultants in all disciplines, representatives of the various Sub-Contractors, etc.
Proper minutes of these meetings will be kept by the Employer\Principal Agent and copies will be circulated to all persons attending the meetings and to others who need to be kept informed.

5.4 FORMS FOR CONTRACT ADMINISTRATION

The Employer shall provide all necessary forms.

5.5 ELECTRONIC PAYMENTS

The Contractor shall provide all required information to the Employer to facilitate electronic payments upon request.

5.6 DAILY RECORDS

The Contractor shall keep daily records of people and equipment employed as well as a site diary in respect of work performed on the site.
At the end of each week the Contractor shall provide the Principal Agent with a written record, in schedule form, reflecting the number and description of tradesmen and labourers employed by him and all Sub-Contractors on the works each day.
At the end of each week the Contractor shall provide the Principal Agent with a written record, in schedule form, reflecting the number, type and capacity of all plant, excluding hand tools, currently used on the works.

5.7 BONDS AND GUARANTEES

The Contractor shall within 10 calendar days after receiving notice from the Engineer and prior to receiving a completed copy of this agreement, including the schedule of deviations (if any), contact the Employer's agent (whose details are given in the contract data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the Contract Data.

5.8	**PAYMENT CERTIFICATES** Requirements will be in accordance with the Employers prescriptions.
5.9	**PERMITS** The Contractor is advised that, in the case of an existing building or institution, all security measures in force will remain in operation and he must acquaint himself and his Employees with them as he and his Employees will at all times be subject to these measures. The Contractor will on no account extend his operations beyond the confines of the building site as indicated by the Employer and must ensure that all his Employees are made aware of these limits. Any Employee disregarding this instruction and found outside the limit of the building site without authority, shall be redeployed immediately and shall not again be employed on this Contract. The Contractor will be responsible for ensuring that this instruction is strictly enforced and must provide and remove upon completion or when directed, such other necessary temporary barriers, fences, etc., as may be required and is to allow opposite this item for any charges he may wish to make in this connection. The Employer will accept no responsibility whatsoever for damage to or the loss of plant, materials, etc., from the site.
5.10	**PROOF OF COMPLIANCE WITH THE LAW** The Contractor to ensure all works are carried out in compliance with any requirements by ICASA. All electrical works to be accompanied with an Electrical Certificate of Compliance, as per SANS 10142-1. Any structural works shall be according to relevant standards.
5.11	**INSURANCE PROVIDED BY THE EMPLOYER** Not Applicable

SECTION 2

SPECIFICATION DATA ASSOCIATED WITH SANS 1921-2004

Clause Numbers	
4.1.7	**The requirements for drawings, information and calculations for which the Contractor is responsible are:**
	As requested by Engineer and as necessary.
4.2.1	**The responsibility strategy assigned to the Contractor for the works is:**
	Strategy A
4.2.2	**The structural engineer is:**
	N/A
4.2.3	**Drawings & other info are to be submitted in accordance with the contractors programme**
	As requested by Engineer and as necessary.
4.3	**The planning, programme and method statement are to comply with the following:**
	N/A
4.12.1	**Samples of materials**
	The work is to be executed with materials of the best specified and in the most substantial and workmanlike manner under the inspection of the Employer and to his satisfaction. The Contractor shall furnish, without delay, such samples as called for or may be called for by the Employer, who may reject all materials or workmanship not corresponding with the approved sample. The samples of materials, workmanship and finishes that the Contractor is to provide and deliver to the employer are: Samples as requested by Engineer and as necessary.
4.12.2	**Fabrication drawings that the contractor is to provide to the employer are:**
	Structural drawings of masts.
4.12.3	**Office accommodation, equipment, accommodation for site meetings and other facilities for use by the employer and his agents are:**
	OFFICE FOR FOREMAN
	Not required for this Contract.
	TELEPHONE
	Not required for this Contract.
	OFFICE FOR INSPECTOR OF WORKS
	Not required for this Contract.
	TELEPHONE IN OFFICE FOR INSPECTOR OF WORKS
	Not required for this Contract.

	SHED
	Not required for this Contract.
4.14.6	**The requirement for provision and erection of signboards are:**
	Not required for this Contract.
4.17.1	**Requirement for the termination, diversion or maintenance of existing services:**
	Should the Contractor come in contact with any underground cables or pipes during excavations, immediate notification must be made to the Employer and all work in the vicinity of such cables, pipes, etc., shall cease until authority to proceed has been obtained from the Employer. Should the Contractor damage underground cables or pipes resulting in a disruption of services to an existing institution such damage shall be repaired immediately.
4.17.3	**Services which are known to exist on the site:**
	Investigate and provide detail drawings.
4.17.4	**Requirement for detection apparatus**
	None
4.18	**ADDITIONAL HEALTH AND SAFETY REQUIREMENTS ARE:**
	By the submission of a tender, any Tenderder will, if awarded the contract to which this tender document relates, be deemed to be the mandatory as envisaged by Section 37 (2) of the Act. As a mandatory the successful Tenderder will be deemed to be the “principal contractor” and an employer in his/her/their own right with duties as prescribed in the Act and accordingly will be deemed to have agreed to be solely responsible for ensuring that in connection with the service to which this tender document relates, all work will be performed and machinery and plant used in accordance with the Act. Should the Contractor, for whatever reason be unable to perform as required by the Act, the Contractor undertakes to inform the Employer accordingly. Tenderders are advised that it is a Condition of this Tender that a 'Construction Phase Safety, Health and Environmental Plan' specifically relates to the project for which tenders are being submitted and must be prepared by the Tenderder and submitted with the other tender documents at the time of tender. Failure to do so will invalidate the tender. Tenderders are therefore advised to study the 'Construction Safety, Health and Environmental Specification' which is issued as part of this tender document, the Model Preambles to Trades - 2008, any project Specification included in this tender document and any and all drawings which are referred to and issued as part of this tender document before preparing their own project specific 'Construction Phase Safety, Health and Environmental Plan' . Tenderders are also advised that such a plan which is submitted with a tender but is incomplete or considered inadequate by the Employer or his Representative will invalidate the tender. The Contractor will be deemed to have satisfied himself with his obligations in terms of the Act and to have allowed for all costs arising from compliance with the Act as no claim for extra costs arising from compliance with, and obligations in terms of the Act will be entertained.
4.22	**WORK BY NOMINATED AND SELECTED SUBCONTRACTORS COMPRISE:**
	Not required for this Contract.

C3.2 - SPECIFICATION FOR HIV/AIDS AWARENESS

1 Scope

This generic specification contains requirements applicable to the reduction of the risk of transfer of the HIV virus between and among construction workers and the local community through the following four strategies:

a) raising awareness about HIV/AIDS;

b) providing construction workers with access to condoms;

c) HIV counselling, testing and referral services; and

d) Sexually Transmitted Infection diagnosis and treatment.

2 Normative references:

The following standard contains provisions that, through reference in this text, constitute provisions of this standard:

SANS 4074 ISO 4074, *Condom Rubbers*

3 Definitions and Abbreviations

3.1 Definitions

Construction Worker: all persons in the employ of the contractor or in the employ of any of the subcontractors contracted by the contractor.

Local Community: the communities local to the site which are most likely to have contact with the construction worker and, in particular, sex workers in those communities.

Service provider: the natural or juristic person recognised by the South African Department of Health as specialist in conducting Aids Awareness Programmes.

3.2 Abbreviations

STI: Sexually transmitted infection

HIV: Human Immunodeficiency Virus

AIDS: Acquired Immune Deficiency Syndrome

4 Objectives

The objectives are to:

a) reduce the risk of transfer of the HIV virus between and among construction workers and the local community;

b) raise awareness amongst construction workers and the local community of the risk of infection with the HIV virus;

c) promote early diagnosis; and

d) assist affected individuals to access care and counselling.

5 Requirements

5.1 General requirement

The contractor shall, in order to satisfy the objectives stated in 4:

a) make condoms complying with the requirements of SABS ISO 4074 available to all construction workers at readily accessible points on the site, suitably protected from the elements, for the duration of the contract;

b) either place and maintain HIV/AIDS awareness posters of size of not less than A1 in areas which are highly trafficked by construction workers, or provide construction workers with a pamphlet, in languages largely understood by construction workers, which

c) encourage voluntary HIV/STI testing;

d) provide information concerning counselling, support and care of those that are infected services; and

e) comply with the requirements of 5.2.

***The* provisions *of* 5.1 c) *and d) do not apply to* this contract.**

5.2 HIV awareness programme

5.2.1 The contractor shall:

a) engage a qualified service provider as described in the scope of works to conduct an HIV Awareness Programme which is structured to achieve the outcomes stated in 5.2.3 for contract workers as soon as a construction workers camp is established and populated or, where no such camp is established, within two weeks of the commencement of a significant portion of the works and at subsequent intervals, if any, provided for in the scope of works; and

b) arrange for, provide a suitable venue, and instruct all construction workers to attend the HIV Awareness Programme and notify the Employer's Representative of the date, time and venue whenever a session with construction workers is conducted.

Note: The National Department of Public Works maintains a list of qualified service providers.

5.2.2 The contractor shall do nothing to dissuade construction workers from attending such an HIV Awareness Programme and shall take all reasonable steps to ensure that a minimum of 90% of construction workers engaged in the works attend such a programme, when it is conducted.

5.2.3 The outcomes of the HIV Awareness Programme shall as a minimum, result in contract workers exposed to such a programme being able to:

a) communicate the existence of problems of HIV and be able to outline the consequences of transmission of HIV to or from the local community;

b) recall and communicate the mode of HIV transmission and preventative measures including the proper use of the condom.

The HIV/ Aids awareness programme described in 5.2 is to be repeated at four month intervals throughout the duration of the contract. (Four times in total, including the initial one at the start of the contract)

5.3 Reporting

5.3.1 The contractor shall prepare and attach to his claims for payment a brief report which outlines how the actions taken by the contractor in the period for which payment is claimed satisfy the requirements and a schedule which lists the names, identity numbers, trade / occupation and name of employer of all construction workers exposed to the programme (see **HIV/STI Compliance Report**).

5.3.2 The employer's representative shall certify the report and schedule described in 5.3.1 whenever a claim for payment is issued to the employer.

Note: In the event that the contractor fails to satisfy the requirements of this specification, the employer (Head: Public Works) may apply any of the sanctions provided for in the contract. Sanctions may include the application of a financial penalty of .04% of the Contract Sum.

The *HIV /Aids* awareness programme *described* in 5.2 shall in addition *be conducted* for the benefit *of* the local community on two occasions in the community centre nearest to the building site. The contractor shall be *responsible* for inviting identifiable community-based *institutions and organisations, churches, and schools to participate in the* programme.

C3.3 - HIV/STI COMPLIANCE REPORT

Pro-forma reporting format in terms of the SPECIFICATION FOR HIV/AIDS AWARENESS

Project Code:	056794; 055620		
Payment Claim number:		Period covered by payment claim:	

1. Distribution of condoms (briefly describe where and how condoms are distributed).

2. Posters / pamphlets (briefly describe where posters were placed / how pamphlets were distributed).

3. Voluntary testing (briefly describe the actions taken / information provided to promote testing).

4. Counselling, support and care (summarise information provided).

5. HIV awareness programme (briefly describe action).

6. Schedule of construction workers exposed to the HIV awareness programme.

Name	Identity number	Trade / occupation	Name of employer

I hereby declare the above to be a true reflection of actions taken to ensure compliance with the specification.

For Contractor:

Name: _____

Signature: _____

Date: _____

Employer's representative:

Name: _____

Signature: _____

Date: _____

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Part C3.4.8:	Specification for Antennas, Cables and Masts	Page 1 – 5
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Part C3.4.10:	Specification for Lighting Protection and Earthing	Page 1 – 5
Part C3.4.11:	Specification for Equipment Huts and Fencing	Page 1 – 8

1. General information

1.1 This standard technical specification covers the general requirements with regard to the supply of material and equipment, including the installation, testing commissioning and/or maintenance of the installation and shall be read in conjunction with the conditions of tender, conditions of contract and the PROJECT SPECIFICATION for the specific installation.

1.2 The complete installation shall comply with the requirements of this specification. Should any differences or contradictions exist between this specification and the PROJECT SPECIFICATION for the specific installation, then the latter shall take preference.

1.3 It is in the interest of the contractor to notify the engineer when the installation reaches various stages of completion. The engineer may inspect the installation, at his discretion. These inspections will be informal and under no circumstances will they partly or wholly invalidate the requirements of the documents.

2. Compliance with regulations

2.1 The installation shall be erected and commissioned in compliance with the latest amendments of the following acts and regulations.

2.1.1 The Occupational Health and Safety Act, Act No 85 of 1993, including the Code of Practice for the Wiring of Premises, SANS 10142-1.
2.1.2 The Minerals Act, Act No 50 of 1991, which includes the Mines and Works Regulations.
2.1.3 The local Municipal bye-laws and regulations as well as the regulations of the local Supply Authority.
2.1.4 The National Building Regulations and Building Standards Act including the Code of Practice for the Application of the Regulations, SANS 10400.
2.1.5 The Telecommunications Act no 103 of 1996, including regulations of the Telecommunications Authorities, as amended.
2.1.6 The regulations of the local Gas Board, where applicable.
2.1.7 The standard regulations of any Government Department or public service company, where applicable.

2.2 In addition the contractor shall issue all notices and pay all the required fees in respect of the installation to the local authorities and shall exempt the Employer from all losses, costs or expenditures which may arise as a result of the contractor's negligence to comply with the requirements of the aforementioned regulations. Should any requirement, bye-law or regulation, which contradicts the requirements of this specification, apply or become applicable during erection of the installation, such requirement, bye-law or regulation shall overrule this specification.

2.3 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.

3. Compliance with sans specifications and standards

3.1 Equipment, materials and operational methods shall comply with the latest revision of the relevant SANS (SABS) Specifications, Standards and Codes of Practice. Any reference in this specification to SABS shall be interpreted to refer to the latest SANS specification which superseded the SABS specification.

3.2 Where a specification or standards is not specifically referred to it will be assumed that the relevant SANS, ISO, IEC, BS, DIN or equivalent American standard, listed in order of preference, will apply. If not incorporated in the SANS specifications ETSI and MPT standards shall apply to communication installations.

3.3 Upon being requested to do so the contractor shall supply a certificate of a recognised Research Laboratory or Bureau of Standards for materials used. Imported materials shall comply with the requirements of the appropriate SABS or other specification although these materials need not necessarily bear these marks.

4. Quality of work

4.1 Quality Control

4.1.1 The contractor shall apply the codes of practice for quality systems as outlined in SANS ISO 9001.

4.2 Equipment Material & Apparatus

4.2.1 The equipment, materials and apparatus used in the installation shall be new and of best commercial quality with high reliability and shall be selected for ease of maintenance.

4.2.2 All materials shall be suitable for the conditions on site. These conditions shall include weather conditions as well as conditions under which the materials are installed and used. Should the materials or components not be suitable for use under temporary site conditions, the contractor shall at his own cost provide suitable protection until these unfavourable site conditions cease to exist.

4.2.3 Samples of all equipment shall upon request of the engineer be submitted for approval before installation is commenced. All such samples may be retained until completion of the contract. All such samples shall have securely attached thereto labels designating the subcontract by name and number (if any), the name of the contractor and any further relevant information.

4.2.4 Individual components or apparatus shall, when used in the installation, be of the same make, type or series for each item used throughout the installation. Standardisation and mutual interchangeability of parts and components are essential and the aforementioned requirements must be considered in the contractor's approach to the interpretation of the specification, and may be subject to approval by the engineer following demonstrations of the equipment capability by the contractor.

4.2.5 The aim must be to standardize component types, series and make, thus reducing the number of items to be held by the Employer as spare parts.

4.2.6 Equipment shall also be readily available. It must be possible to have imported equipment available in South Africa on an agency basis. Upon request the contractor shall guarantee that such equipment or components may be available in South Africa.

4.2.7 Manufacture of sub-units or sub-assemblies forming part of a system shall be jig-built if required in quantities more than five to ensure uniformity and final manufacture to close tolerances to ensure smooth operation of such systems.

4.2.8 Notwithstanding the foregoing, and to best serve the Employer's needs and interests, tenders will only be considered for currently manufactured reliable equipment of good reputation which can properly be maintained and serviced without the necessity of the Employer carrying an extensive spares stock or being subjected to the inconvenience of long periods of interrupted service due to the unavailability of parts.

4.3 Standard of craftsmanship

4.3.1 All work for this installation shall be executed by experienced craftsmen and in accordance with specified standards and sound standard practices to ensure the reliability and durability of the installation.

4.3.2 The contractor shall nominate a senior and competent member of his staff to supervise all his staff on site throughout the period of installation in order that standards of craftsmanship are maintained and safety regulations are adhered to. This nominated person shall also liaise with other contractors, where necessary, and with the Engineer on a day-to-day basis where applicable.

4.3.3 Site staff shall be experienced and competent personnel, adequately trained to execute the various duties assigned to them.

4.3.4 The contractor shall liaise with the other contractors where necessary or as specified in the PROJECT SPECIFICATION.

4.3.5 Material or workmanship which is not to the satisfaction of the engineer, shall be rectified at the cost of the contractor. All rejected material shall be removed from site at the cost of the contractor.

4.3.6 The contractor shall be responsible for the correct and complete erection of the installation to comply with the requirements of the Project Specification for the installation.

4.4 Manufacturer’s ratings

4.4.1 All equipment shall be operated well within the manufacturer's ratings.

4.4.2 When equipment selections are submitted for approval, manufacturer's ratings shall be clearly stated.

4.4.3 It shall form part of the commissioning reports to substantiate manufacturer's ratings.

5. Ambient operating conditions

5.1 The installation, including all materials and equipment installed shall be suitable for operation under the extreme limits of temperature, relative humidity, wind, altitude, pollution, corrosion and any other environmental influences that can be expected at the site(s) and under the conditions of installation.

5.2 In addition to any specific operating conditions specified in the Project Specification the Contractor shall investigate and familiarise himself with operating conditions at the site(s) of installation.

6. Drawings and information

6.1 Code of Practice for engineering Drawings

6.1.1 Drawings shall be done in accordance with SANS 0111 - 1980: Code of Practice for Engineering Drawings.

6.1.2 Computer aided design (CAD) drawings shall also be done in accordance with SANS 0111.

6.1.3 Tender drawings may be issued in electronic format to the successful tenderer, if it is specified as such in the PROJECT SPECIFICATION.

6.2 Contractor's Drawings and Information

6.2.1 The contractor shall co-ordinate the installation with other services and produce complete workshop drawings and dimensioned layout drawings of the installation, for approval and construction purposes. In addition the following information shall be indicated and submitted:

- Detail of foundations, openings, holes, ducts and sleeves to be provided by others.
- Static and dynamic loads imposed by the installation on the other structures.
- Fixing detail to be co-ordinated with others.
- Electrical power supply requirements and starting currents of equipment.

6.2.2 All relevant drawings for co-ordination purposes will be issued to the contractor on his request according to the procedures applicable to that specific project.

6.2.3 The contractor shall issue two sets of all drawings to the engineer for approval. When the drawings are approved, one copy will be returned to the contractor. The contractor shall make reasonable corrections to the drawings and distribute all approved drawings for purposes of construction, co-ordination and information, according to the procedures applicable to that specific project.

6.2.4 Any work done by the contractor without an approved signed drawing, will be at the risk of the contractor.

6.2.5 Approval of drawings by the engineer shall not relieve the contractor of his responsibilities to carry out the work in terms of the contract documents.

7. Operation and maintenance manual

7.1 The contractor shall, at his cost, prepare and supply manuals for the successful operation and maintenance of the installation.

7.2 Prior to the commencement of commissioning, the contractor shall supply a draft of the manual to the engineer for approval. After commissioning, the contractor shall supply five (5) additional manuals which have been updated and include all commissioning data and "As Built" drawings.

7.3 These manuals shall contain the following information:

7.3.1 **SECTION 1: SYSTEM DESCRIPTION**
A summary of the design criteria and a comprehensive description of the installation with reference to all mechanical, electrical, control and instrumentation equipment.

7.3.2 **SECTION 2: OPERATING INSTRUCTIONS**
Starting and stopping instructions, pre-start checks, running checks, control sequences, flow-charts, schematic diagrams etc., to describe all operating procedures.

7.3.3 **SECTION 3: MAINTENANCE INSTRUCTIONS**
Scheduled maintenance instructions and troubleshooting guide. The instructions shall include schedules of lubricants and consumable items, with replacement routines.

7.3.4 **SECTION 4: COMMISSIONING DATA**
Data sheets containing all design and selection parameters, calculations, selection curves, compared to settings and values recorded during commissioning for all relevant mechanical, electrical, electronic, instrumentation and control items. The test results of all commissioning tests, signed by the contractor shall be included.

7.3.5 **SECTION 5: EQUIPMENT SCHEDULES**
The following information shall be provided as an inventory for each item of the mechanical and electrical equipment:
Description, make, model number, serial number, name and address of supplier, manufacturer or agent, (including details of replacement items) for mechanical, electrical, instrumentation and control items.

7.3.6 **SECTION 6 : EQUIPMENT SPECIFICATIONS**
Manufacturer's brochures and pamphlets, following the same order as the Equipment Schedules.

7.3.7 **SECTION 7 : DRAWINGS**
A complete set of all contractor's drawings of the installation, updated to "As Built" drawings.

7.3.8 **SECTION 8 : SOFTWARE**
Copies of any software or firmware required for the programming, setting and control of any equipment incorporated in the installation, including spare copies of programmed software for the specific installation and written records of set parameters, as may be required for the continued maintenance and operation of the installation shall be submitted as part of the maintenance information. The cost of any software licences required to comply with the above requirement shall form part of the tender price.

8. Coding, Labelling And Notices

8.1 General

8.1.1 The contractor shall supply and install all coding, labelling and notices as specified to comply with the requirements of this specification. The contractor shall submit a schedule of labels and notices to the engineer for approval, as well as full details of the type of coding offered.

8.2 Colour Coding: Electrical Wiring

8.2.1 All electrical conductors shall be colour coded according to the requirements of SANS 10142. Insulating sleeves or electrical insulating tape as a colour code is not acceptable.

8.2.2 All conductors that terminate at terminal strips, conductors used for internal wiring of cabinets and field cables, shall further be identified at both ends by means of durable cable marking ferrules. Colour coding and ferrule numbers shall also be shown on the wiring diagrams.

8.3 Labelling

8.3.1 All equipment shall be labelled by means of engraved plastic labels according to the identification numbers or names in the PROJECT SPECIFICATION and drawings or otherwise to clearly identify the function of a component.

8.3.2 Labels shall be fixed permanently by means of screws or pop rivets. Gluing will not be acceptable.

8.3.3 Labels shall further be provided on equipment to show the serial number, rating, operating parameters, including information required in terms of the manufacturing standard and ruling legislation, as applicable.

8.4 Notices

8.4.1 Notices shall be installed in terms of the Statutory Regulations. Symbolic Safety Signs shall comply with SANS 1186, as applicable. Entrance doors to plantrooms shall be provided with a notice to prohibit unauthorised access.

9. Storage and protection of plant prior to installation

9.1 The Contractor shall be responsible and shall allow in his rates for the handling, storage and protection of all plant and equipment until it is installed.

10. Safety precautions during construction and maintenance

10.1 Protection of Persons and Plant

10.1.1 The contractor shall take adequate precaution and provide adequate protection of persons and property from accidents arising or likely to arise from whatever source.

10.1.2 To this end, all units of plant or equipment which may possibly be subject to damage or become a source of danger to human life either in itself or by virtue of its operation, shall be adequately protected as laid down in the Occupational Health and Safety Act and regulations.

10.2 Appointment of Responsible Person

10.2.1 The contractor shall cause work to be carried out under the general supervision of a responsible person appointed by the contractor in writing in accordance with the provisions of the Occupational Health and Safety Act.

10.2.2 A copy of the letter of appointment and of the appointee's written acceptance thereof, shall be lodged with the Engineer. Work on site shall not commence until these documents have been received by the Engineer.

10.2.3 Precautions shall be taken to eliminate safety and health hazards to workmen. The contractor shall be responsible for supplying protective clothing and safety gear for use by the workmen, according to the demand of the activity to be performed.

11. Civil engineering and building work

11.1 Unless specified to the contrary in the Project Specification, any civil engineering and/or building work or alterations that may be required to install the installation or to accommodate the plant and equipment in existing concrete and brickwork structure shall or be the responsibility of the contractor.

11.2 Such work shall include excavation, backfilling, the provision of plinths, provision of openings through concrete, the concreting up of openings through concrete and the making good of surfaces through which pipes pass.

11.3 The Contractor shall also be responsible for:

- The provision of and grouting up of all holding down bolts
- Supporting all equipment and plant temporarily until it has been fixed permanently

11.4 The cost for such work as detailed above, unless measured separately, shall be deemed to be included in other rates and tender prices in the Schedule of Quantities.

12. Checking of dimensions

12.1 The Contractor shall be responsible for the checking of all levels and dimensions of existing concrete and brickwork structures and of all holes, supports, fixtures etc. prior to fabrication and erection to ensure that the plant and equipment will fit correctly.

12.2 If the Contractor proceeds with the fabrication and erection of the plant and equipment it will be taken that he has checked the critical dimensions.

13. Plant for erection purposes and site facilities

13.1 Unless specifically specified to be provided by others, the contractor shall make allowance in the tendered rates and prices and provide all plant required for erection of the works.

13.2 Site facilities, including accommodation, protected storage space, water, electrical power, ablutions, fences and security will only be provided by others to the extent specifically specified. The contractor shall make allowance in the tendered rates and prices and provide all facilities required for erection of the works.

14. Existing underground services

14.1 The contractor shall obtain all available information regarding existing underground services, prior to construction and shall further take the necessary precautions during excavation and construction, not to damage any existing services, whether the existence of such services is recorded or not.

15. Environmental impact

15.1 The contractor shall control the construction process to minimise the impact on the environment. Any special requirements applicable in conservation areas or included in environmental impact assessment studies shall be adhered to during construction.

16. Inspections

16.1 The equipment and components of the installation may be inspected by the engineer on a routine basis during the manufacture of the equipment and during installation on site. For this purpose the engineer must be allowed access at all reasonable times to the workshops of all manufacturers of equipment and components for the installation. Such inspections shall not exempt the contractor from his responsibility in respect of the control of quality of equipment and workmanship.

16.2 The contractor must execute all tests in the workshops of manufacturers or at any other venue or on site during or before erection of the installation in compliance with the requirements of this specification.

16.3 Any additional tests required, which according to the judgement of the engineer may be necessary, to determine whether the installation or equipment complies with the requirements of the specification, must be carried out. All such tests must be done in the presence of and to the satisfaction of the engineer at the place, date and time mutually agreed to.

16.4 The contractor shall provide all test equipment, test apparatus and other auxiliary equipment and must prepare test certificates as specified or as requested by the engineer.

16.5 The contractor must report to the engineer on a routine basis regarding the progress of manufacturing the equipment and the progress of installing the equipment on site, so that the engineer may decide when progress inspections should be undertaken as necessary to inspect workmanship and quality of material.

16.6 The contractor must, when necessary, arrange with the local Supply Authority for tests to be done as required. The engineer must be timeously informed of such tests to be conducted.

17. Site Tests

17.1 General

17.1.1 After the equipment has been installed on site, the contractor shall undertake performance tests of the equipment to ensure that the equipment is fully operational in compliance with the requirements of this specification. These tests shall be undertaken during the commissioning of the equipment on site.

17.1.2 Should the contractor be satisfied that such tests meet all the requirements of the specification, the engineer shall be informed thereof so that inspections and tests may be witnessed by the engineer and representatives of the Employer to determine whether the specified requirements have been met.

17.1.3 All equipment, instruments and test equipment, including all interconnections for executing such tests, must be supplied by the contractor.

17.1.4 Electricity consumption for commissioning purposes, from a power supply installed by the Employer, will be free of charge, unless stated to the contrary in the Project Specification.

17.1.5 Should the results of such tests prove that the equipment does not comply with the requirements of this specification, the contractor shall, without delay, at his own cost undertake modifications and adjustments as required, to ensure that the installation and equipment is modified to comply with the requirements of this specification. These modifications and adjustments shall be carried out with the full knowledge and approval of the engineer.

17.1.6 All tests results of tests during the commissioning of the installations shall be recorded in writing and shall be signed and submitted by the contractor.

17.2 Testing Manufactured Electrical/Electronic Assemblies

17.2.1 Before an assembly is sent to site, the following tests shall be done in the factory. The assembly shall be inspected and tests shall be witnessed and recorded by the contractor. The engineer shall further be notified of the intended date and detail of the tests and the shall be given the option at his discretion, to witness the tests:

- A simulated functional test to ensure the correct operation of equipment, controls, interlocks and circuits.
- Insulation resistance tests and all required tests on the assembly in terms of SABS standard specifications and the project specification to confirm compliance with specifications and statutory requirements.

18.1 Electrical Installation

18.1.1 The complete electrical installation shall be tested according to the SANS requirements before commissioning commences.

18.1.2 The contractor shall confirm in writing to the engineer that these tests were done, before the engineer is called out to inspect the work for physical completion.

18.1.3 An electrical Certificate of Compliance for the completed installation, shall be issued by the contractor.

18. Commissioning

20.1 The contractor shall allow to commission the installation, which shall include all testing, adjusting, balancing, etc. of all components of the installation. All necessary instruments and facilities shall be provided by the contractor.

20.2 The contractor must further program the commissioning in order to meet the required completion dates. Requirements in this regard shall be submitted as part of the whole program in writing to the relative parties, including the engineer.

19. Hand-over of the installation

21.1 After completion of commissioning, the contractor shall confirm in writing that the installation is ready for hand-over.

21.2 It is the responsibility of the contractor to assure hand-over according to the agreed program.

21.3 All items that are unacceptable, incomplete or not to Specification shall be recorded and shall be attended to before handover.

21.4 Any remaining items after hand-over will be listed as remedial work as part of the letter of confirmation of handover.

21.5 The Operating and Maintenance Manuals shall preferably be issued to the owner during the hand-over of the installation.

20. Guarantee

22.1 The contractor shall guarantee the material, apparatus and workmanship delivered by him for a period of twelve months unless a different period is specified in the project specification for the specific installation. The guarantee must be valid for a period starting on the date of hand-over. The complete installation must be guaranteed against defects as a result of patent and latent defects of the design and of the apparatus, as well as against faulty materials and workmanship. Fair wear and tear is excluded from the guarantee.

22.2 The guarantee must provide that all parts, spares and appurtenances that become defective during the guarantee period be replaced free of charge of any nature to the Employer or the Engineer.

22.3 The cost of labour and transportation to replace such part of a defective installation shall be borne by the contractor and shall be included in his guarantee.

22.4 The contractor shall cede to the employer the remainder of any equipment guarantee which he has received from his suppliers and which extends beyond the above-mentioned guarantee period.

21. Maintenance and servicing during the guarantee period

23.1 During the guarantee period the contractor shall be fully responsible for complete maintenance of the Installation. The guarantee period on material, equipment and labour performed commences on the date when the completion certificate is issued by the Engineer and expires at the end of the guarantee period.

23.2 Maintenance of the Installation shall mean the regular servicing, lubrication, repairing, cleaning and adjustment of the Installation as well as the free of charge replacement of any defective components during the guarantee period.

23.3 A suitably qualified and trained person shall examine and test the Installation once every three months or according to the intervals specified in the Project Specification and shall also perform all the necessary maintenance tasks to ensure smooth and faultless operation.

23.4 Emergency calls shall immediately be attended to.

23.5 A log book shall be kept and all servicing and repairs shall be recorded.

23.6 The maintenance shall be done according to the maintenance instructions in the Operating and Maintenance Manual. Maintenance includes cleaning of the installation.

1. General Construction

1.1 Free standing equipment cabinets shall be manufactured from steel angle or channel sections or 2 mm minimum folded steel metal framework and a solid U-channel base frame, sufficiently braced to support all equipment and span floor trenches and access holes.

1.2 The design of the cabinet shall provide for the mounting of control modules or racks or any other specified equipment.

1.3 The side, top and rear panels shall be removable as necessary to provide access for installation and maintenance. Removable panels shall be secured by means of designed square key latches with tapered tongue to securely lock panels in position in the locked position. Where equipment cabinets are installed against walls, the rear and side panels may consist of single folded sheet steel which are either bolted or welded to the frame or which form part of the folded metal frame.

1.4 All equipment cabinets shall be rendered moisture, dust and vermin proof. During execution of the installation work the equipment cabinets shall be protected against damage and penetration of moisture, dust or vermin.

1.5 The front panels of floor mounted equipment cabinets shall be hinged except where flush mounted equipment prevents this.

1.6 Blanking plates shall be fitted over slots intended for future equipment. These plates shall be fixed in such a fashion that fixing holes do not need to be drilled through the front panel.

1.7 Removable or hinged panels shall be fitted with rubber or neoprene seals.

1.8 A suitably braced chassis for the mounting of electronic equipment or control modules and racks, shall be firmly secured to the frame of the equipment cabinet. The chassis shall be designed to accommodate equipment in logical groupings with adequate access for installation and maintenance.

2. 19" Equipment Cabinets And Racks

2.1 Equipment Racks

2.1.1 Racks for housing electronic equipment shall be standard 483 mm (19") racks fitted with guides to slide on sliding rails.

2.1.2 The racks shall be manufactured of an extruded aluminium framework.

2.1.3 Each rack shall have a nominal width of 483 mm but the depth and height may vary according to standard multiples for housing the specified electronic equipment in each particular case.

2.1.4 Racks shall be installed in individual cubicles or sections of the equipment cabinet. Such cubicles shall be provided with extruded aluminium subframes fitted with the required support brackets and sliding rails to house the racks in a vertically tiered fashion.

2.1.5 A locking screw shall be provided for each rack to lock a rack in its normal operating position.

2.2 Equipment Cabinets for 19" Racks

2.2.1 Equipment cabinets to accommodate 19" racks, shall be of the required height and depth for the specified equipment.

2.2.2 The equipment cabinets shall consist of an aluminium extrusion frame mounted on a plinth base, with the additional removable components below, as required, complete with fixing accessories. Panels shall be manufactured from 1.5mm steel with Stone grey textured epoxy powder coated finish:

- Side panels
- Top panel, with or without ventilation fans
- Plinth base cover
- Back door with dual key lock and quick release hinges.
- Solid plate or framed glass front door with dual key lock and quick release hinges.
- Vented steel shelves with telescopic slides
- Fixed vented steel shelves
- Blanking panels to blank off/close unused cabinet space.

2.2.3 Unless specified in the Project Specification, 19"(483mm) equipment cabinets to accommodate radio equipment in radio equipment huts or accommodation, shall consist of a 600mm deep, 38U (38x44.45mm equipment space plus frame and base) frame with side, top and base cover plates, without front and back panels and with the required number and type of shelves and blanking plates.

3. Sections

3.1 For ease of transportation and to facilitate access to the allocated accommodation, the equipment cabinet shall be designed to be dismantled into cubicles. The section of the cabinet shall be of suitable size to pass through doorways, passages, etc.

3.2 Each section shall be rigidly manufactured to ensure that damage to the equipment will not occur during transportation and handling. Lifting eye bolts, handles and facilities for ease of handling and transport shall be provided.

4. Internal Wiring

4.1 Wiring shall be arranged in horisontal and vertical rows and may be bunched and strapped using "HELLERMAN" or other approved strapping and studs which are fixed to tubular harness supports or installed in PVC wiring channels.

4.2 Under no circumstances may PVC adhesive tape be used for the bunching of conductors or for the colour identification of conductors.

4.3 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.

4.4 Where wiring channels are used, they shall be installed horizontally and vertically. Under no circumstances may power, control circuit, data or signal wiring be installed in the same wiring channel. Channels containing control circuit, data or signal wiring shall not be more than 60 % full. Channels in which power circuits are installed shall not be more than 40 % full.

4.5 All wiring between different panels within the same equipment cabinet shall be installed in wiring channels. Grommets shall be installed in each hole in the metal work through which conductors pass.

4.6 Conductors may be joined at equipment terminals or numbered terminal strips only. Ferruled and taped or other connections are not acceptable.

4.7 Where screened cables are specified, the screening shall be earthed in the equipment cabinet only unless clearly specified to the contrary. Screened cables entering control boxes through pressed knock-outs, shall terminate in compression glands.

4.8 Wiring and connections to the terminals of racks housing electronic control equipment, shall be flat multi-core flexible PVC-installed cables, fitted with a plug-and-socket connection at the rear of the rack. The cable connections shall be long enough such that the cables can be unplugged when the rack is withdrawn from the front of the board. The multi-core flexible cables shall be provided with multi-coloured PVC-insulation for individual conductors and shall be of the "3M" type or other approved.

5. Current Ratings Of Conductors

5.1 The current rating of conductors for the internal wiring shall be sufficient to carry out the maximum continuous current that can occur in the circuit.

6. Terminal Strips

6.1 All wiring such as power, control interlocking, alarm, measuring and DC circuits shall terminate on numbered terminal strips of the "KLIPPON" type STV-1/5 or other approved manufacture. 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 and schematic diagrams of the equipment cabinet.

6.2 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.

7. Identification Of Conductors

7.1 The colour of the insulation material of conductors for all 220 V circuits shall correspond to the colour of the supply phase for that circuit. Neutral conductors shall be blue.

7.2 All other conductors in the equipment cabinet, supplying electronic circuits, etc., shall be coded in colours other than those specified above. A colour code shall be devised for each equipment cabinet and the colour code shall be shown on the wiring diagrams.

7.3 All conductors that terminate at terminal strips and all conductors used for the internal wiring of the cabinet, 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 also be shown on the wiring diagrams.

8. Installation

8.1 Equipment cabinets shall be firmly bolted to the floor and/or wall and the framework shall be provided with the necessary securing lugs and holes.

9. Ventilation

9.1 Equipment cabinets shall be designed to have adequate ventilation. Louvers with dust filters shall be fitted and shall be vermin proof.

10. Mounting Of Equipment

10.1 All equipment and wiring shall be completely accessible when the front and/or back panels are removed.

10.2 The following equipment shall be arranged and grouped in logical fashion:

- Change-over contactors or other contactors controlling the supply.
- Other circuit breakers.
- Short circuit protection equipment - fuse switches.
- Instrumentation and indication.
- Racks and control modules for electronic and radio circuits.
- Other radio equipment.
- All equipment shall be labelled according to function

10.3 All metering instruments indicating lights and controls shall be mounted flush in the front panel unless otherwise specified.

10.4 Fuses for instrumentation shall be mounted in an easily accessible position and marked clearly.

10.5 All equipment performing control functions, e.g. control relays, transducers, amplifiers, radio circuits, signal processing equipment and time relays not requiring adjustment, shall be mounted behind the front panel.

11. Paint Finish

11.1 Metal components of the framework, panels and chassis shall be finished with a high quality paint applied according to the best available method and in accordance with the paint manufacturer's specifications. Baked enamel, electrostatically applied powder coating or similar proven methods may be used.

11.2 The colour shall be dark grey, Code G12 of SABS 1091 on the outside and white on the inside or a light grey Code G80 or G54 of SABS 1091, unless specified to the contrary, or as approved by the Engineer.

11.3 Before the radio(s) or radio installation is handed over, the Contractor shall ensure that all surfaces are clean, and undamaged. Final coats of paint may be applied on site immediately prior to completion.

12. Identification Labels

12.1 Identification labels shall be installed for each equipment cabinet and for each group of electronic equipment within the area assigned to that particular equipment.

12.2 Engraved plastic or "IVORENE" type labels shall be installed. The labels shall bear white lettering on a black background or vice versa.

12.3 Equipment cabinets shall be supplied with the following labels:

12.3.1 Number and allocation of equipment:

Example: VHF RADIO REPEATER R1

These labels shall be attached to the equipment in a prominent position. The lettering shall be a minimum of 10mm high

12.3.2 In each equipment cabinet an identification label shall be installed on the front panel stating which equipment or group of electronic equipment is housed in that particular section or subsection of the equipment cabinet:

Example : POWER SUPPLY 24 V DC

12.3.3 Individual control components such as pushbuttons, switches, relays, contactors, etc., shall each have an identification label corresponding to the identification letter and/or code number shown on the schematic diagrams.

12.3.4 The function of the equipment and circuits shall be clearly identified.

12.4 Fixing of Labels:

12.4.1 Engraved labels shall be secured by means of brass nuts and screws or slotted label holders. Self-tapping screws will not be allowed.

12.4.2 Labels provided with identification code numbers or letters for identifying individual components of electronic equipment may be glued to the panels or framework by means of non-ageing epoxy resin type glue.

1. General

1.1 All cables for installations shall be supplied and installed by the Contractor, inside buildings and equipment huts in cable conduits or cable channels, or neatly tied down on to cable trays.

1.2 Cables entering or leaving enclosures, channels or cabinets through holes, shall pass through a compression gland or rubber grommet which shall be the correct size cable and opening.

1.3 All cables shall be marked by means of an identification code corresponding to a code given on the cable connection schedules.

1.4 The marking shall be marked by means of lettering punched into aluminium foil. The foil shall be wrapped around each respective cable and bound with aluminium tape.

1.5 Alternatively, a PVC type cable marker system utilising printed numbers on PVC strips may be installed.

1.6 The cables shall be marked as follows:

1.6.1 At both terminations.
1.6.2 At T-sections or four-way joints of cable trays.
1.6.3 At entries into vertical ducts should cables extend up or down at the particular point of entry. The cables shall be marked directly above and below such a point of entry.

1.7 Removable or hinged panels shall be fitted with rubber or neoprene seals.

1.8 All cables shall be supplied and installed without joints and individual conductors of cables may only be connected from terminal to terminal inside equipment cabinets or at cable connecting strips inside approved cable connecting strip boxes.

1. General

1.1 Batteries shall be suitable for the application. All standby power source batteries shall be designed for stationary applications.

1.2 Batteries shall be one of the following types as specified in the project specification and approved. Batteries shall be suitable for stationary applications.

1.2.1 Nickel Cadmium
1.2.2 Lead-Acid tubular plate plantè-cells
1.2.3 Lead-Acid (lead-antimony) low maintenance batteries
1.2.4 Lead-Acid gel, sealed, maintenance free batteries with deep discharge protection
1.2.5 Lithium-Ion.

1.3 The battery capacity shall be sufficient to maintain the load in case of power failure for the period specified in the project specification or for a period of 24 hours.

1.4 The positive terminal shall be permanently marked by a (+) sign, as well as colour coding and the battery rating shall be marked on the battery.

1.5 Stationary batteries shall be accommodated in suitable corrosion resistant cabinets and enclosures designed for the accommodation of batteries or shall be placed on purpose made battery shelves or racks in dedicated battery rooms or plant rooms.

1.6 The battery enclosure shall be adequately ventilated.

1.7 Where a number of single cells are grouped in series to form a battery bank with the required output voltage, the cells shall be fitted with numbering labels and shall be supplied with cell interconnecting cables with insulated bolt on connectors. The cells forming a bank shall further be supplied in a timber tray to facilitate the handling and storage of a battery consisting of single interconnected cells. The latter requirement will not apply in cases where the capacity, size and mass of individual cells are such that an assembled bank cannot be safely handled.

2. Nickel Cadmium Batteries

2.1 Nickel-Cadmium Batteries Shall Be Housed In Plastic Containers With The Maximum And Minimum Electrolyte Levels Indelibly Marked On The Housing.

2.2 Full details concerning routine maintenance, top-up or the periodic replacement of the electrolyte in the case of nickel-cadmium batteries, shall be supplied by the manufacturer. The necessary criteria concerning deposits such as sodium carbonate etc., which may form in the electrolyte and which may necessitate a change of electrolyte shall be submitted by the manufacturer.

2.3 Nickel-cadmium batteries for hand-held portable radios shall be supplied with full details regarding maintenance as well as re-charge of the batteries after use of the radio.

3. Lead-Acid Type Batteries

3.1 The batteries shall generally comply with paragraph 1 above.

3.2 The batteries consisting of tubular plate cells shall comply with the requirements stated in BS 440 as amended. The cells shall incorporate Plantè positive lead antimony and pasted grid type negative plates with overlapping microporous plastic separators. The grid and separators shall be assembled and housed in moulded glass containers or moulded containers manufactured form UV protected transparent synthetic material, fitted with lids, incorporating baffle type ventilation plugs.

3.3 The battery container shall have large electrolyte head space for longer maintenance intervals. Battery containers shall preferably be transparent with minimum and maximum electrolyte levels permanently marked on the container. The container shall further have adequate space at the bottom for the collection of sediment without interfering with the cell operation, to extend battery life.

3.4 The battery capacity shall be as specified for the specific application and batteries with a capacity of more that 100AH shall consist single interconnected cells in a tray.

3.5 The cells shall be designed for deep cycle applications with a rated battery life of >1000 cycles at an 80% depth-of-discharge.

3.6 Terminations shall consist of bolted clamps.

3.7 Clear maintenance instructions shall be framed and mounted at the battery installation for each type of battery.

4. Lithium-Ion Batteries

4.1 The batteries shall generally comply with paragraph 1 above.

4.2 The cells shall be designed for deep cycle applications with a rated battery life of ≥2500 cycles.

5. Battery Charger Equipment

5.1 Battery Charger Characteristics

5.1.1 The battery charger shall consist of a steel type cabinet housing equipment as described below.

5.1.2 Switch mode power supply: the main component of the battery charger installed in the cabinet as specified below shall be of the switch mode type and shall be capable of use under normal operating conditions. The following specifications shall apply:

–	Input Voltage	180 ~ 264v AC
–	Output Voltage	13.8V DC Under Normal Operating Conditions A. Battery Charging Function B. Simultaneous Repeater Load
–	Power Factor	> 0.9
–	Minimum Output Current	60a
–	Operating Type:	Switch mode/ Filter Rectifier

- Voltage Output Tolerance: +/- 1%
- Load Regulation +/- 0.5%
- Line Regulation +/- 0.5%

5.1.3 The Charger Shall Incorporate At Least The Following Protection:

- Input Voltage Surges Protection
- Input And Output Overload Protection
- Over Temperature Protection
- Short Circuit Protection
- Reverse Polarity Protection

5.1.4 The Following Shall Be Provided On The Face Plate Of The Charger:

- Input Main Switch (Circuit Breaker)
- Output Main Switch (Circuit Breaker)
- Input Power On Indicator Light
- Output (Charge Current) Ammeter
- Output Voltmeter
- Alarm Indicator
- Alarm/Charger Fail Indication
- Fuse Holders For Protection HRC Fuses And Fuse Fail Indication

5.2 Cabinet

5.2.1 The batteries and battery charger equipment shall be housed in a desk-top mounted steel cubicle unless otherwise specified. The general construction and finish of the cubicle shall comply with the requirements specified for equipment cabinets. The cabinet shall also be capable of being mounted on the wall of the hut or container and contain suitable brackets for doing so without compromising the integrity of the hut or container to which it is affixed.

5.2.2 The Following Shall Be Provided On The Face Plate Of The Charger Cabinet:

- Input main switch (circuit breaker)
- Output main switch (circuit breaker)
- Input power on indicator light
- Output (charge current) ammeter
- Output voltmeter
- Alarm indicator
- Alarm/charger fail indication
- Fuse holders for protection HRC fuses and fuse fail indication. The cabinet must be manufactured in two compartments, each compartment housing the battery charging equipment, the other the output fuses or circuit breakers respective.
- Adequate ventilation for cooling of the internal components (mainly the switch mode power supply) fitting of ventilation fans as necessary.

5.2.3 The front of the cubicle must be provided with doors which shall be fitted with door handles and spring type locks.

5.2.4 The battery charger compartment must be ventilated and provided with a mesh type protection screen.

5.2.5 The general finish of the cubicle shall be as specified for equipment cabinets.

5.3 Manuals For Batteries And Battery Chargers

5.3.1 Maintenance and instruction manuals which include general arrangement drawings, schematic and wiring diagrams and a general description of the method and periods of maintenance, shall be supplied by the manufacturer.

5.4 Manuals For Batteries And Battery Chargers

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6. Voltage Regulator/Low Voltage Cut-Out Relay

6.1 A DC-DC switch mode converter shall be fitted to the load side of the battery bank. The purpose of this converter is to:

- Maintain a constant voltage to the repeater equipment, regardless of the state of charge of the batteries.
- In case of a power failure, protect the batteries from full drainage
- Input voltage: 10.3V to 14.8V
- Output voltage: 13.8V fixed
- Input low voltage cut-out: 10.3V (adjustable)

1. System Overview

1.1 A Simulcast and Multicast system forms part of the KZN Department of Transport (DOT) radio infrastructure.

1.2 A Simulcast and Multicast system forms part of the KZN Department of Transport (DOT) radio infrastructure.

1.3 The Simulcast system serves the eThekwini region's provincial roads.

1.4 The Multicast system serves the areas between Pietermaritzburg and Durban

2. Simulcast System

2.1 The Simulcast System operates at the VHF High-band Range ~ 160 MHz.

2.2 DMR High-band repeaters are installed at the following radio sites:

2.2.1 Site 1: Alverstone - Slave
2.2.2 Site 29: Stanger - Slave
2.2.3 Site 34: Mara Farm - Slave
2.2.4 Site 62: Vernon Crooks - Slave
2.2.5 Site 64: Bluff - Master
2.2.6 Site 87: Inanda - Slave

2.3 Control room is located at DOT Pinetown (Marrianhill).

2.4 The following digital links are installed:

2.4.1 Link 1: Bluff to Alverstone
2.4.2 Link 2: Bluff to Inanda
2.4.3 Link 3: Bluff to Vernon Crooks
2.4.4 Link 4: Alverstone to Swartkop (Multicast system)
2.4.5 Link 5: Inanda to Stanger
2.4.6 Link 6: Vernon Crooks to Mara Farm
2.4.7 Link 7: Bluff to Shallcross (Link Hop)
2.4.8 Link 8: Shallcross to DOT Pinetown (Marrianhill)

3. Multicast System

3.1 The Multicast System operates at the VHF Mid-band Range ~ 80 MHz.

3.2 DMR Mid-band repeaters are installed at the following radio sites:

3.2.1 Site 1: Alverstone - Slave
3.2.2 Site 56: Swartkop - Slave
3.2.3 Site 62: Vernon Crooks - Slave
3.2.4 Site 64: Bluff - Master

3.3 The Multicast System shares the links of the Simulcast system.

4. Repeaters

4.1 Repeater installed on the Simulcast system are DMR High-band: Kairos KA-160.

4.2 Repeater installed on the Multicast system are DMR Mid-band: Kairos KA-80.

4.3 Duplexers are installed at both High-band and Mid-band repeaters.

4.4 Each repeater is connected to a GPS antenna.

5. Digital Links

5.1 Digital link radio are Radwin 2000 D Plus, 4900 – 6000 MHz.

5.2 Digital link dishes are Ubiquti MW 34 dBi.

5.3 The synchronisation unit is Radwin GSU, with Radwin GPS antenna.

5.4 Digital link radios and GSU is connected to a Radwin ID-H aggregation unit via CAT 5E cabling.

5.5 The aggregation unit and DMR repeaters are connected to an 8 port Gigabit network switch.

5.6 Digital Links are utilised by both the Simulcast and Multicast systems.

5.7 Power supply to the aggregation unit and network switch is 230VAC, supplied from a Mecer inverter and 24V battery bank.

6. Control Room

6.1 A central control room for the Simulcast system is located at RTI Pinetown.

6.2 The control room operates on the Saitel Codice NG platform.

1. General Requirements

1.1 The equipment shall be type approved by the Independent Communications Authority of South Africa (ICASA) and shall comply with the provisions of the Telecommunications Act 103 of 1996. A copy of the certificate of approval by ICASA shall be submitted for each item offered.

1.2 The repeater shall be provided in a robust steel sub frame or rack for mounting in a 19" equipment cabinet or shall be provided in a robust vermin proof enclosure with hinged door and suitable for desktop mounting. The equipment shall be fully tropicalized.

1.3 The repeater shall be fully digital and capable of either digital or analogue operations. This is required to achieve phased migration from analogue to digital operation.

1.4 The assembly forming a repeater or duplex link, shall be complete with a duplexer, output power rated at 100 W for single antenna operation.

1.5 Each repeater shall be equipped with a handheld microphone with press-to-talk switch and loudspeaker with volume control.

1.6 The repeater must make provision for manufacturer designed configuration for interfacing with UHF repeaters, or UHF radio links, as specified. A UHF link shall be equal to a UHF repeater, with interfacing.

1.7 Calculated MTBF and MTTR figures shall be provided for the equipment proposed.

1.8 The equipment shall comply with the requirements as specified in ETSI Standard TS 102 361 parts 1 - 4, as amended in the case of DMR equipment.

1.9 The digital radio repeater equipment shall be capable of operation in all frequency bands as specified in the performance criteria overleaf.

1.10 The repeater channel access shall be Time Division Multiple Access (TDMA).

1.11 The repeater shall be equipped with the following external interfaces:

1.11.1 Digital interfaces – 4 off
1.11.2 IP Interface
1.11.3 Ethernet 10/100
1.11.4 Alarms

1.12 The repeater shall be remotely programmable.

1.13 The Repeater shall be GPS location tracking capable.

1.14 The Digital Radio Repeater shall have a proven track record and references to present operational systems shall be provided.

1.15 The Digital Repeater and its communications protocol shall be compatible with mobile radios of multiple manufacturers, as to avoid lock-in with only one type. Tenderers to confirm this information at Part T2.16: Equipment and Information Schedules.

1.16 Refer to Part 3.5.6: Digital Radio Repeater System & Migration for system and integration requirements.

2. Electrical Performance Criteria For Digital Repeater

	Parameter	Specification	Compliance with Specification
(1)	General :		
(a)	Frequency band :	VHF 68 - 88 MHz VHF 136 - 174 MHz	
(b)	Channel spacing	12,5 kHz	
(c)	Frequency stability	0.5 parts per million	
(d)	Channel Access	TDMA	
(e)	Antenna connection	50 Ohms	
(f)	Nominal Operating voltage	12V DC	
(g)	Operating temperature	-20°C to +60°C	
(h)	Relative humidity	90°, salt-laden air	
(i)	Protection	Splash proof (water) Reverse polarity (Power supply)	
(j)	Overload protection	Power supply malfunction Antenna system fault	
(2)	Receiver		
(a)	Sensitivity : (without pre-amp)	Digital: BER 1%: -116dBm BER 5%: -117.5dBm Analogue: 20 dB SINAD : -117dBm	
(b)	Selectivity	-90 dB (EIA SINAD without pre-amp)	
(c)	Spurious rejections	85 dB	
(d)	Hum and noise	60 dB minimum	
(e)	Intermodulation	-85 dB (EIA SINAD without pre-amp)	
(f)	Squelch sensitivity : - without pre-amp :		
	Carrier squelch	0.20 microvolt or less at threshold	
	Tone coded squelch	0.20 microvolt or less	
(g)	Audio interface	600 Ohm line balance output	
(h)	Audio output	Monitor output 1 Watt @ 8 Ohms	
(i)	Audio response	Selectable : (Flat, pre/de-emphasis)	

	Parameter	Specification	Compliance with Specification
(3)	Transmitter		
(a)	RF Power output	25 W adjustable	
(b)	Spurious and Harmonics	More than 85 dB below carrier	
(c)	Deviation	± 2,5 kHz	
(d)	Audio frequency response	+ 1, -3 dB for 6 dB/octave pre-emphasis, 300 - 3000 Hz	
(e)	Modulation linearity	Better than 0,5 % for 300 - 3 400 Hz	
(f)	Duty cycle	100 %	
(g)	Intermodulation attenuation	-20 dB	
(h)	Protection	Antenna system fault Thermal protection	
(4)	CTCSS Requirements - In analogue operation mode		
(a)	Sub audible tones	Standard EIA frequencies (38 programmable tones)	
(b)	Modulation limits	500/1000 Hz	
(c)	Decode sensitivity	Less than 5 dB SINAD	
(d)	Rx response time	200 ms max	
(e)	Encoder response time	50 ms max	
(f)	Tx tone distortion	5 % max	
(g)	Tx intermodulation distortion	10 % max	
(5)	Duplexer :		
(a)	Frequency band :	VHF 68 - 88 MHz VHF 136 - 174 MHz	
(b)	Frequency spacing (min)	3.0 kHz	
(c)	Continuous power input	100 Watts	
(d)	Insertion Loss (Tx-Ant)	< 1.5 dB	
(e)	Rx Isolation @ Tx frequency	-80 dB	
(f)	VSWR	< 1.5:1	
(g)	Impedance - Ohms	50	
(h)	Temperature range	-10°C to + 60°C	
(i)	Connector	N-type Female	

1. General Requirements

1.1 The equipment shall be type approved by the Independent Communications Authority of South Africa (ICASA) and shall comply with the provisions of the Telecommunications Act 103 of 1996. A copy of the certificate of approval shall be submitted.

1.2 The UHF and Microwave Link Radio shall be provided in a robust steel enclosure for mounting in or on a repeater enclosure or shall be capable of being fitted as part of a Repeater. The enclosure (if required) shall have adequate ventilation slots, so that no forced air cooling will be required. The enclosure shall be coated in a high quality paint with good scratch and corrosion resistant properties.

1.3 The design of the UHF and Microwave Link Radio shall be 100 % solid state and construction shall be such to optimise EMI protection.

1.4 Calculated MTBH and MTTR figure shall be provided for the equipment proposed.

1.5 The UHF and Microwave Link Radios shall function off the 12V/13.8V DC supply installed at Repeater High Site Enclosures.

1.6 The equipment shall comply with the environmental requirements as specified in ETS 300-086.

1.7 The equipment shall be capable of functioning in harsh environments.

1.8 The Transmitter shall be fitted with (In case of Analogue):

- A time-out timer to automatically inhibit the transmitter after continuous transmission of a pre-determined duration, adjustable over the range 0 - 120 seconds.
- An economy mode option to partially “shut down” when the unit has not been in use for a predetermined time.
- Busy channel lockout option to make transmission impossible when the channel is already in use.

1.9 The radio transmitter shall be provided with protection to protect the output stages under short circuit and open circuit antenna conditions.

1.10 The UHF Link housing shall completely enclose the transmitter, receiver unit. The housing louvers and any other openings, must not allow ingress of dust, moisture, or splashed water. Adequate heat sink fins are to be provided to dissipate heat generated in the unit.

1.11 All external cables shall enter the equipment through an approved and acceptable connector integral to the Repeater or Interfaced accordingly.

2. Electrical Performance Criteria For Analogue UHF Link

	Parameter	Specification	Compliance with Specification
(1)	General :		
(a)	Frequency band :	UHF 440MHz - 470MHz	
(b)	Frequency stability	5 parts per million for -30°C to +60°C	
(c)	Channel spacing	12.5 kHz	
(d)	Number of channels	100 channels with selector switches.	
(e)	Antenna connection	50 Ohms	
(f)	Operating voltage	12V DC	
(g)	Operating temperature	-10°C to +60°C	
(h)	Relative humidity	90°, salt-laden air	
(i)	Protection	Splash protection (water) Reverse polarity (Power supply)	
(2)	Receiver		
(a)	Sensitivity :	12 dB SINAD : 0.35 microvolt 20 dB Quieting : 0.6 microvolt	
(b)	Selectivity	Better than 60dB	
(c)	Spurious rejections	-70 dB	
(d)	Hum and noise	60 dB minimum	
(e)	Intermodulation	-80 dB	
(f)	Demodulation distortion at 1kHz	Better than 5 %	
(g)	Audio output	4 W (RMS)	
(3)	Transmitter		
(a)	RF Power output	Up to 25 W, continuously adjustable	
(b)	Spurious emissions	More than 55 dB below carrier	
(c)	Duty cycle	100 %	
(d)	Hum and noise	40 dB	
(e)	Deviation	± 2.5 kHz	
(f)	Audio frequency response	+1, -3 dB for 6 dB/octave pre-emphasis, 300 to 3000Hz	
(g)	Modulation linearity	Batter than 5 % at 1 kHz	
(h)	Intermodulation attenuation	-20 dB	

3. Electrical Performance Criteria For Digital UHF Link

	Parameter	Specification	Compliance with Specification
(1)	General :		
(a)	Frequency band	UHF 1350MHz - 1550MHz	
(b)	Frequency stability	3 parts per million	
(c)	Channel spacing	500 kHz Selection – 25 kHz Steps	
(d)	Modulation	16, 32, 64 QAM and QPSK Software configurable	
(e)	Antenna connection	50 Ohms	
(f)	Operating voltage	12V DC	
(g)	Operating temperature	-10°C to +50°C	
(h)	Relative humidity	90%, salt-laden air	
(i)	MTBF	> 100 000 Hrs	
(j)	Protection	Splash protection (water) Reverse polarity (Power supply)	
(2)	Receiver		
(a)	Max Input Level	-20 dBm	
(b)	Selectivity	> 60dB – 10^{-3} BER	
(c)	Spurious rejections	< -50 dB	
(d)	C/I Ratio	Co-channel > 16 dB (QPSK) > 20 dB (16, 32 QAM) > 27 dB (64 QAM) 1st Adj Channel > -5dB 2nd Adj Channel > -30dB	
(e)	Intermodulation	-80 dB	
(f)	Image Rejection	> 97dB	
(g)	Receiver IF	70 MHz	
(3)	Transmitter		
(a)	RF Power output	34 dBm (QPSK) 31 dBm (16 QAM) 30 dBm (32 QAM) 29 dBm (64 QAM) Tolerance - 1 dBm	

	Parameter	Specification	Compliance with Specification
(b)	Spurious emissions	< -50 dBm	
(c)	Duty cycle	100 %	
(d)	Hum and noise	40 dB	
(e)	Deviation	± 2.5 kHz	
(f)	Audio frequency response	+1, -3 dB for 6 dB/octave pre-emphasis, 300 to 3000Hz	
(4)	Alarm & Management		
(a)	Alarm Relays	4 Out; 2 In – RJ45	
(b)	Interface	SNMP / Web Based	
(c)	Monitoring	Power – Forward/Reverse	
		Temperature	
		Internal Voltages	
		Fan operation	
		Radio Sync loss	
		BER rates / Statistics	
		RSSI	
		TX Loss	
		RX Synthesizer lock	
		Ext Alarms	
(5)	Interfaces		
(a)	4 Port Ethernet Switch	IEEE 802.3	
		RJ45	
(b)	Fractional Quad E1/T1 Card	ITU-T G.703/G.704	
		RJ45	
(c)	Quad 4 Wire E&M Card	64 kbps	
		RJ45	

1. General: Antenna Systems

1.1 Antenna systems shall be designed and selected for the specific application and shall be installed strictly in accordance with the recommendations of the antenna manufacturer and specified or recognised standards or codes of practice for radio site engineering. The antenna systems shall be installed on a radio mast, specified for the application, complete with antenna, matching harness as applicable, antenna cable, sealed low loss connectors, earthing, surge arrestors and cable supports.

1.2 Generally at least one point on each antenna element shall be a zero potential point. This point shall be directly connected to the metal work of the mast. Care shall be taken to ensure that dissimilar metals are not clamped together, although there is contact only at a zero potential difference point. Galvanised clamps with galvanised nuts and washers for the section of the clamp which grips the zero potential bar or tube in the antenna shall be used to clamp aluminium or aluminium based alloy antenna elements to steel mast sections.

1.3 All antennas shall be supplied with clamps and brackets in accordance with the specifications and any other fittings to complete the installation.

1.4 Multi-stack antenna systems shall be supplied with a matching harness.

1.5 Details shall be provided of all finishes used on antennas and masts and their suitability to withstand exposure to the atmosphere. No galvanically active metals shall be brought in contact and NEMA standards shall apply.

1.6 Antenna installations shall be able to withstand gusting or steady wind speeds of up to 160 km/hr at ground level.

2. Antenna Specifications

2.1 VHF Antenna

2.1.1 Twin stack folded dipole including harness

- Frequency 68 - 88 MHz or 134 -174 MHz
- Input impedance 50 Ohm
- SWR < 1.5 : 1
- Maximum power 150 W
- Gain 3 dB

2.1.2 Four stack folded dipole

- Frequency 68 - 88 MHz
- Input impedance 50 Ohm
- SWR < 1.5 : 1
- Maximum power 150 W
- Gain 6 dB

2.2 UHF Link Antenna

2.2.1 Yagi, Multi-element – UHF Low Band

- Frequency 440 - 470 MHz
- Input impedance 50 Ohm
- SWR <1.5 : 1
- Maximum power 150 W
- Gain 9 dB

2.2.2 Yagi, Multi-element – UHF Microwave

- Frequency 1350 -1517 MHz
- Input impedance 50 Ohm
- SWR <1.5 : 1
- Maximum power 100 W
- Gain 16 dB

3. Antenna Installation

3.1 Antenna systems shall be installed strictly in accordance with the recommendations of the antenna manufacturer and recognised standards for the antenna design, to achieve optimum antenna performance.

3.2 The required spacing between antennas in a multi-stack system, between the antenna system and the mast and the spacing between different antenna systems to maintain the required isolation, as well as the polarisation and directional orientation of the antenna, shall be accurately determined prior to installation and the as-installed data shall be recorded as part of the site installation data.

3.3 The antenna shall be installed such that the angle between a line from the top of the supporting structure to the top of the antenna radiator element and the vertical line is less than 45 degrees.

3.4 Multi-stack antennas shall be installed on the same vertical line with the same recommended distance between each antenna element forming part of the stack and the support structure. In the case of multi-stack antennas installed on a mast with tapering structure, an additional vertical 50mm dia. aluminium support pipe shall be installed to support the antenna array. The pipe shall be of sufficient length to maintain the required spacing in paragraph 3.2 above and the supporting pipe shall extend from the top level of the top antenna element, to the bottom level of the bottom element. If the top of the mast does not extend above the top of the antenna array to meet the requirement in paragraph 3.3 above, the length of the supporting pipe shall be extended above the top antenna to meet this requirement. The supporting pipe shall be supported off the mast leg by 2 (or more) horizontal pipe supports, clamped by HDG cross-over clamps.

4. Antenna Cables

4.1 Coaxial cable between the antenna and the radio equipment shall run down the mast on which the antenna has been mounted, alongside the earth conductor and shall be strapped to the mast at regular intervals. The coaxial cable shall then run underground to the equipment along the route, followed by the earth conductor to the earth mat. High quality outdoor type connectors shall be used to connect the coaxial cable to the antenna. These connections shall be properly sealed and weatherproofed after

completion of the installation to prevent the ingress of moisture. The strips used to tie down the coaxial cable shall not cause any damage to the cable and shall not allow movement of the cable under windy conditions. Insulation tape used to tie down the cables for this purpose will be unacceptable.

4.2 At unattended sites the last two metres of coaxial cable above ground level shall be run inside heavy galvanised pipe in order to protect the cable against damage. This pipe shall be sealed at the top where the cable enters and the Contractor shall ensure that there are sufficient holes in the bottom of the pipe to drain water which may accumulate in the pipe by condensation or otherwise.

4.3 The coaxial cable shall have no sharp bends in its run from the antenna to the equipment in the building.

4.4 At radio repeater or base station radio installations, where the antenna cable between the mast and the equipment is installed above ground, the coaxial cable from the mast to the equipment room shall be installed at a height of more than 2.5 metres above ground level. In cases where the distance is limited, the cables shall be installed on a hot dipped galvanised heavy duty cable tray or ladder, clamped and secured at both ends.

The cable tray shall be selected to carry the cable mass of all antenna cables and withstand wind loads, without sagging or permanent deflection. In some cases, to span longer distances with one or a limited number of antenna cables, a catenary cable of galvanised flexible steel wire rope of adequate mechanical strength, may be securely clamped to the mast and shall span across to the equipment building where it shall be made off around a thimble. The coaxial cable shall then be installed from the mast to the building supported by the catenary cable, to which it shall be strapped at regular intervals.

4.5 An earth bonding connection of 10mm square bare stranded copper cable, shall be made off at the point where the antenna is clamped to the mast and shall run alongside the coaxial cable to the equipment building. Care shall be taken to ensure that the coaxial cable and bonding conductor are not separated anywhere in the run from the mast to the equipment.

4.6 The coaxial cable shall run directly to the radio equipment (or duplexer if applicable) where it shall terminate. The bonding conductor (in the case where the coaxial cable enters from the above ground level) shall be connected to the equipment at a point close to the termination of the coaxial cable and shall then run directly to the earth bar.

4.7 Where a coaxial cable route runs along the face of a wall, the cable and earth conductors shall be fixed to the wall with suitable clamps and screws or strapped to a catenary cable, supported at regular intervals close to the face of the wall.

4.8 In-line coaxial type surge arrestors shall be used in all antenna feeder cables. These arrestors shall be mounted as close to the earth bar as possible and shall be bonded to the earth bar with 10mm minimum square bare stranded copper cable.

5. Antenna Cable Specification

	Parameter	Specification	Compliance with Specification
(1)	RG 213 Coaxial Cable – VHF Mid band and High band		
(a)	Nominal attenuation	100 MHz – 7.0 dB/100 m 300 MHz – 13.0 dB/100 m	
(b)	Inner conductor	Tin-plated copper	
(c)	Dielectric	Low density Polyethylene	
(d)	Outer conductor	Bare copper	
(e)	Sheath	PVC	
(2)	LMR 400 Coaxial Cable – 450 MHz		
(a)	Nominal attenuation	450 MHz – 9.0 dB/100 m	
(b)	Application	Outdoor and Waterproof	
(c)	Inner conductor	Bare Copper Clad Aluminium	
(d)	Dielectric	Foam Polyethylene	
(e)	Outer conductor	Aluminium Tape	
(f)	Braid	Tinned Copper	
(g)	Sheath	Polyethylene	
(3)	LMR 195 Coaxial Cable – 1400 MHz		
(a)	Nominal attenuation	1500 MHz – 48.0 dB/100 m	
(b)	Application	Outdoor and Waterproof	
(c)	Inner conductor	Bare Copper Clad Aluminium	
(d)	Dielectric	Foam Polyethylene	
(e)	Outer conductor	Aluminium Tape	
(f)	Braid	Tinned Copper	
(g)	Sheath	Polyethylene	

6. Antenna Masts for Base Stations

6.1 Antenna masts for base stations shall normally consist of a 5 metre, 50 mm diameter aluminium pipe, wall mounted on the building by means of hot dipped galvanised wall brackets of sufficient length to clear the roof overhang. The wall brackets shall be fixed by means of cadmium plated or galvanised rawl bolts.

6.2 The mast shall be earthed to the earth mat by means of 35 mm² green PVC insulated copper wire. The earth wire shall be connected to the mast or mast brackets by means of a suitable clamp avoiding direct copper/aluminium contact or by means of bolted, crimped cadmium plated cable lugs. The earth wire

shall be mechanically protected by installation in galvanised metal conduit saddled to the wall up to a height of 2.5 metres.

7. Antenna Masts with Extended Height

7.1 Masts with extended height, up to 30 metres shall be of the triangular self-supporting lattice type, specifically designed, complete with concrete foundations, for the equipment and maximum wind loading. The mast structural design shall be in accordance with a recognised South African (SANS) or other approved design standard for South African conditions. Full detail of the mast design by a Professional Structural Engineer with the relevant design specification and parameters shall be submitted prior to ordering and installation.

7.2 Reinforced concrete foundations with anchor bolts shall be installed strictly in accordance with the manufacturer's design specifications. Anchor bolts shall be electrically tied to the reinforcing.

7.3 Masts, bolts and nuts and all assembly components shall be hot dipped galvanised.

7.4 The mast shall be equipped with a lightning protection copper air terminal connected to the earth mat by means of 70 mm² stranded copper conductor which shall be tied to the mast by means of galvanised metal clamps or stainless steel tape straps.

7.5 Each mast leg shall be earthed to the underground earth mat by means of 70mm² copper conductor.

7.6 An aviation warning light shall be installed on masts exceeding the stipulated height in terms of ruling legislation.

7.7 A climbing ladder and climbing cage shall be available for the mast design, but shall only be installed if specified for the specific installation and shall be priced separately in the tender.

7.8 The soil conditions at the site of erection shall be certified to be suitable for the required bearing pressures of the mast foundation design and the completed mast foundation shall be certified to be in accordance with the design, a competent person in terms of the OHS Act.

8. Anti-Climbing Devices On Masts

8.1 In the case of masts with extended height and a lattice design that can be climbed and which are not enclosed by a security fence with locked access gate, anti-climbing devices shall be installed as a safety device, to bar access to the mast by unauthorised persons.

8.2 An anti-climbing device shall attached at a height of approximately 3 metres, but not less than 2.5 metres above ground level.

8.3 The anti-climbing devices shall be formed by stringing onto projecting steel supporting members, fencing of 2.50 mm double-strand uni-directional twist pattern, galvanised steel barbed wire or as otherwise specified. Spacing between strands shall not be more than 100 mm centres, the first being not more than 100 mm from the mast face and forming an overhang of not less than 500 mm beyond the outer face of the mast. This overhang distance shall be maintained at the mast corners. The projecting supporting steel members shall be clamped to the mast legs

8.4 The strands of barbed wire shall be secured at intervals, not exceeding 2 m, by spacers formed by pieces of the same barbed wire bound to the strung barbed wire by galvanised binding wire. Where barbed wire other than galvanised steel is specified, the spacers and binding wire shall be compatible.

1. Photovoltaic Modules (Solar Panels)

1.1 General

1.1.1 Modules shall consist of high grade monocrystalline or polycrystalline silicon cells and must be manufactured to comply with either the America JPL or European ESTI standards.

1.2 Power Rating

1.2.1 Photovoltaic modules shall be rated to deliver a nominal voltage of 12 V DC.

1.2.2 Rated power output of modules must be stated at 1000 W/m² and 25°C cell temperature.

1.2.3 Graphs showing voltage versus current at different isolation and cell temperatures together with temperature coefficients must be submitted with the tender.

1.3 Mechanical

1.3.1 The photovoltaic modules shall be totally encapsulated to form a hermetic package.

1.3.2 The glass substrate shall have a minimum thickness of 3.2 mm and shall be anti-reflection treated and shall transmit a minimum of 90 % of the solar irradiance impinging normal to the outer surface.

1.3.3 The glass substrate shall be capable of withstanding sudden temperature variations of the order of 60°C without cracking and shall be resistant to abrasion by wind carried particles and damage by hail.

1.3.4 The laminate shall be mounted in a rigid metal frame and have separate weatherproof connection boxes for the positive and negative terminals.

1.3.5 Mounting to the support structure shall be by four stainless steel bolts.

2. Array Support Structures

2.1 Mechanical

2.1.1 Support structures shall be manufactured from HDG mild steel sections. All fabrication and metal working is to be completed prior to hot dip galvanising.

2.1.2 Each sub-array shall consist of a maximum of 16 photovoltaic modules.

2.1.3 Design and construction shall be of sufficient strength to ensure a vibration free structure at wind speeds of up to 160km/hr.

2.1.4 When installed, the bottom edge of the modules shall be not less than 2 m above ground level.

2.2 Tilt Angle

2.2.1 Tilt angles shall be as per manufacturer’s recommendation relative to latitude of site.

2.3 Documents

2.3.1 Complete and detailed drawings and specifications of the proposed structure shall be included prior to construction.

3. Interconnecting Cabling

3.1 All interconnecting cables between modules shall be bolted to the module terminal points.

3.2 Cabling shall be ultra violet resistant and terminals shall be protected against the ingress of dust and moisture.

4. Regulators

4.1 General

4.1.1 The regulator must monitor and be controlled by the state of charge of the battery. It shall allow maximum array energy to the battery when required and when a state of full charge is reached, reduce the current to prevent undue electrolyte loss from the battery.

4.1.2 Regulators shall provide battery temperature compensation when called for.

4.1.3 The regulator shall automatically isolate the photovoltaic array from the batteries at night to prevent discharge through the modules.

4.2 Operation

4.2.1 Each regulator shall be a physically separate unit and operate independently from any other parallel charging circuit and shall be sized to handle 100% of the sub-array maximum current, based on the rated power of the modules.

4.3 Low voltage Disconnect

4.3.1 Each regulator shall have a low voltage load disconnect facility to prevent damage to the battery from over discharging. Alternatively a separate load shed relay shall be installed.

4.3.2 When the battery reaches the reconnect threshold the load shall automatically be switched into circuit.

4.3.3 The load voltage disconnect shall have a reset/disable switch and adjustable set points.

4.4 Indicators and Instruments

4.4.1 Each regulator shall have a LED to indicate that the regulator is in the charge mode and an LED to indicate when the battery is fully charged.

4.4.2 Each regulator or load shed relay shall have a LED to indicate that the load has been disconnected.

4.4.3 Meters shall be provided to indicate battery voltage and array charging current, if specified.

4.5 Load Circuit Breaker

4.5.1 Each regulator shall be fitted with a load circuit breaker rated at maximum load plus 10%.

4.6 Full Charge Set Point

4.6.1 The regulator shall be furnished with adjustable full charge termination set points. Set points are to be between 13.8 and 15.3 volt for 12 Volt nominal systems and between 27.6 and 30.6 volt for 24 Volt systems

5. Earthing

5.1 The metal mounting frame of the photovoltaic array shall be connected to an earth mat by means of 35mm², PVC insulated copper earth conductor.

5.2 An earth mat shall be installed in accordance with the specification for earthing.

1. General

1.1 Lightning protection shall be in accordance with Code of Practice for the Protection of Structures against Lightning, SANS 10313: 2012.

1.2 Lightning protection down conductors and earthing of equipment, connected to a common earth bar in the equipment hut, as well as the power supply earth shall be connected to a common earth mat system at radio repeater installations, unless specified to the contrary in the Project Specification.

1.3 The completed earth mat resistance shall be less than 5 Ohm, unless specified to the contrary in the Project Specification.

2. Lightning Protection

2.1 The Contractor shall attend to, provide and meet the following basic requirements in order to protect installations against damage caused by lightning:

2.1.1 A point of preferential strike termination or air terminals must be provided, capable of intercepting and withstanding a discharge, while effectively shielding adjacent objects requiring protection.
2.1.2 Interconnecting low impedance paths shall be provided to effectively conduct the lightning current from any air terminals to the earth.
2.1.3 A low impedance connection for dissipation of the discharge must be provided between the down conductors and the earth strata in the form of an effective earth electrode system.

2.2 Antennas shall be mounted on masts in such a position that the possibility of a direct lightning strike on the antennae will be small. At radio repeater station installations, a vertical brass or copper clad steel rod or tube lightning conductor of diameter 15mm minimum, bolted to the mast, shall extend above the top of the mast and above any antenna element so as to provide a 45 degree cone of protection (measured from the vertical) for the antenna element. The air terminal rod shall extend above the mast top or the highest portion of any antenna element by a minimum of three (3) meters.

2.3 A heavy copper bonding conductor shall be run from the top of the mast downwards. This conductor shall be clamped to the mast by means of hot dipped galvanised metal clamps, at regular intervals not exceeding 1.5 metres. The down conductor shall be routed along the extreme outer corner of the mast structure, with the corners of non-circular structures being the preferred positions. Sharp bends should generally be avoided.

2.4 All metallic elements in the vicinity of a down conductor shall be bonded to the down conductor. The top termination of the down conductor shall be to the air terminal on top of the mast. The termination shall be done by a welding or brazing process in the case of non-galvanised sections and by the use of clamps in the case of galvanised sections.

2.5 The bottom end of the down conductor shall be bonded to the earth mat. A separate down conductor running from each leg of the base of the mast shall also be bonded to the earth mat.

2.6 The material to be used for down conductors shall be 70mm² bare stranded copper conductor or a flat copper strip of equivalent area.

3. Earthing Systems

3.1 An earth mat system shall be installed to provide a low impedance path for the discharge of lightning in such a manner that a structure and its occupants in close proximity of the lightning strike are protected and that damage to the equipment shall be minimised.

3.2 An earth resistivity survey shall be carried out and the results documented to allow the design of an earth mat system with the specified completed earth resistance. The earth mat system shall consist of a system of interconnected earth electrodes, driven into undisturbed soil or into thoroughly compacted filled areas, spaced at intervals of at least 1.5 times the earth electrode length. Alternatively and depending on soil conditions and the soil resistivity, a trench earth shall be installed.

The connection to the earth mat and all underground earthing conductors shall be 70mm² stranded bare copper conductors. The earth electrodes shall be of the "Copperweld" type molecularly-bonded, copper clad steel rods, with a minimum diameter of 15mm, complete with brass cable clamp screwed to the thread at the top of the electrode, to securely clamp the interconnecting conductor. Alternatively all underground connections and any joints shall be done by a welding process. The top of earth electrodes and any underground earth conductors shall be at least 300 mm below the final finished ground surface.

3.3 At base station radio installations in buildings the earthing system shall, where conditions permit, consist of a minimum of 3 vertical earth electrodes, each at least 1,8 metres long, with a minimum spacing between earth electrodes of 3 metres. The rods shall be arranged in a line parallel to the building with the centre rod situated near the mast base or directly below the position of the mast, if a wall mounted mast is used.

3.4 Installation of the specified earth conductor to form 3 radial earths at 120□ spaced intervals. A minimum of two 1.8 metre earth electrodes, spaced at a minimum of 3 metres between electrodes and between the mast and the first electrode, shall be driven and be connected to each radial earth conductor, to have a minimum number of 6 earth electrodes installed. The first electrode on each radial leg shall further be interconnected by means of 70 mm² copper earth conductor to form an underground earth ring.

Similarly the second electrodes on the radial earth conductors shall be interconnected to form a second concentric underground earth ring

3.5 In the case of masts supported by guy ropes (typically 30m or higher) an earth system shall be installed as for free standing masts, but the concentric ring earth conductors shall not be installed. Each radial earth conductor shall however be extended to approximately 6 metres beyond the anchor point. Three 1.8 metre earth electrodes shall be installed, spaced at approximately 3 metres, and connected to the earth conductor, at each anchor point. All guy ropes shall be earthed at each anchor point, by clamping an earth conductor onto each guy rope, above the turnbuckle, with a Crosby type clamp, and connecting the earth wire to the underground earth wire.

3.6 Any incidental adjacent buried metallic components such as buried pipes, tanks and structural steel in reinforced concrete foundations shall, where possible, also be bonded to the earth electrode system.

3.7 When conditions do not permit the installation of vertical earth electrodes, a horizontal trench earth system shall be provided. Under such conditions the earthing system shall consist of a number of radial trench earths, of the required length, installed in a "crowfoot" pattern. The minimum number of radial trench earths shall not be less than 4 and the length of each earth shall be at least 6 metres measured from the centre point.

3.8 All joints in an earth electrode system shall be brazed or hard soldered. Bolted connections shall only be installed in protected positions, where it is accessible for regular inspection and testing and where such connections will not be subjected to a corrosive environment.

3.9 Joints between dissimilar metals should generally be avoided. When this is unavoidable as in the case of bonds between buried copper conductors and structural steel work. Cadmium plated or tinned and crimped cable lugs shall be used to terminate the cable. In the unavoidable case of bolted connections between dissimilar metals, cadmium plated or tinned spade type square connections shall be used which shall be greased or sealed if in a corrosive environments. Such joints shall be placed in a position where they can undergo inspections without difficulty.

3.10 It may be necessary to provide corrosion protection for a grounding conductor or a bond strap. This can be achieved by plating the conductor with a corrosion resistant metal, by coating it with a protective compound or by means of surface treatment such as anodising.

4. Grounding (Common Bonding) Of Equipment

4.1 A 250 mm long 150 mm² copper common earth bar shall be installed in the radio equipment room, spaced 30mm from the wall and 200mm from the floor, below the point of entry of antenna cables. The earth bar shall be pre-drilled and fitted with brass bolts and nuts over its full length to allow the connection of lugged earth wire terminations. (At least 4 x 4mm², 4 x 10mm² and 2 x 70mm² terminations).

A 70mm² stranded copper cable (or 25 x 3,5mm copper strap) shall be installed from the mast base to the earth bar in the equipment building, via the earth mat termination point. The bonding connection shall be of low impedance and shall not be bent to a radius of less than 0,5 metres in its run between the mast base and the equipment earth bar.

4.2 Each item of equipment in the building shall be separately bonded to this bar by means of 4mm² green PVC insulated stranded copper cable, properly made off to lugs of adequate size. The bonding cables shall be bolted onto the earth bar and follow the shortest route to the equipment where it shall be connected to the earth terminal on the cabinet. There shall not be sharp bends in the cables and care shall be exercised to ensure that the cables run in a downward direction from the equipment to the earth.

4.3 The earth bar shall also be directly bonded to the earth mat in the vicinity of the building. If the equipment building and the mast are not more than 6m apart, only one earth mat is necessary, but both mast and the earth bar shall be bonded to it by separate bonding connectors, going as directly as possible to the common point of the earth mat.

4.4 The earth conductor running with the power supply cable to the equipment building shall be separately earthed to the electrical earth in the distribution board, which shall in turn be earthed to the common earth bar.

4.5 Mains lightning arrestors mounted inside the building shall be bonded to the common earth bar with a 10mm² green PVC insulated stranded copper cable. Any pole mounted lightning arrestors shall be bonded directly to the earth mat.

5. Surge Protection On 400/230v Power Supplies

5.1 A voltage surge protection system shall be installed to provide protection on the mains power supply to the equipment installed at repeater sites. Protection shall be provided on all live and neutral conductors. The measures necessary for the protection are divided into the following stages:

- Coarse protection - Lightning current arrester
- Medium protection - Surge voltage arrester
- Fine protection - Surge voltage arrester

5.2 The combination of protection shall be installed in a fibre glass YORK enclosure type YB16. (370 x 255 x 73 mm). Inlet and outlet cables shall be terminated by cable glands, to suit the type of cable.

5.3 The following rail mounted equipment shall be supplied and installed in accordance with drawing D8260/E14/105:

- 63A, 2 pole circuit breaker (Curve D) as main switch (single phase supply).

The following equipment (or equivalent and approved) shall be installed on all live and neutral conductors:

- Phoenix Contact lightning current arrester FLT 60-400
- Phoenix Contact decoupling inductor (LT 36)
- Phoenix Contact surge voltage arrester (VAL MS 230)
- Wiring bridges MPB 18/1/20/1.2.5.

5.4 All equipment that remain connected to the power sockets shall be equipped with matched metal oxide varistor protected plug tops.

5.5 The surge protection and the earth from the power supply cable shall be bonded to a common earth stud in the enclosure, which shall be bonded to the common earth bar installed in the repeater housing with 10 mm² green PVC insulated stranded copper cable.

5.6 The output of the surge protection equipment shall be connected to the mains distribution board, which shall be in a separate enclosure with main circuit breaker.

6. Surge Protection On Coaxial Cables

6.1 Surge protection shall be installed on all antenna cables entering the equipment room at repeater sites.

6.2 The coaxial cable screen shall be earthed onto an earthed copper bulkhead at the point of entry into the equipment room, if an earthed bulkhead is installed. An antenna cable entering an equipment room shall be terminated on a coaxial cable surge arrester unit close to the point of entry. The surge arrestor unit shall be bonded to the common earth bar in the equipment room by means of 10mm² PVC insulated copper conductor.

6.3 Coaxial surge arresters shall be PolyPhaser DC blocked protectors, or equal and approved and shall meet the following minimum requirements:

- Surge current: 50kA (ANSI C62.1, 8/20 waveform, 500 Joules)
- Turn-on: 600 VDC ± 20%; 2.5 ns for 2kV/ns
- VSWR: ≤ 1.1 to 1 over required frequency range

- Insertion loss: ≤ 0.1dB over frequency range
- Cable terminations: N-Type connector

7. Surge Protection On Landlines

7.1 Surge arrester units, approved by Telkom or the provider of landlines, as applicable, and shall be installed on landlines connected to the radio equipment.

1. General

1.1 Equipment huts at radio repeater sites shall generally be erected as close to the mast as is practical.

1.2 Equipment huts shall be made vermin and insect proof.

1.3 The construction of brick huts, concrete slabs, fences and all building trades shall comply with the Standard Preambles to All Trades, Revision 3, January 2009, obtainable from the Department of Works, Province of KwaZulu-Natal.

2. Transportable Steel Radio Equipment Housing

2.1 The transportable steel housing shall be constructed generally in accordance with drawing D8260/E14/104.

2.2 Unless specified to the contrary in the project specification, the radio equipment housing shall be equipped and DC power and earth conductors shall be installed and terminated in positions to allow for the installation of at least 4 repeaters.

2.3 The steel housing shall be manufactured and fully equipped (excluding radio equipment, solar panels and batteries) and inspected and tested at the premises of the manufacturer. Once the foundation has been built on site, the installation of the housing will be limited to the positioning of the housing on the foundation and securing the housing to the foundation, as well as connecting the external power supply and the earth mat.

2.4 This equipment housing shall be constructed using a mild steel frame and 3 mm Corten panels (as described below) and shall be protected against corrosion, assuming the most severe outdoor environment. The housing shall be rigidly designed and constructed to allow lifting, transporting and handling without distortion of the housing. The minimum number of penetrations shall be made to the outer shell. Where possible all attachments shall be done by welding during the manufacturing process. Where penetration points are unavoidable, it shall be sealed before painting. The completed housing shall be weather proof to protect equipment installed.

2.5 Dimensions

Internal Dimensions

- Length: 2.83 m
- Width: 2.34 m
- Height: 2.34 m
- Door Opening Width: 1.30 m
- Door Opening Height: 2.31 m
- Floor Area: 6.55 m²

2.6 Foundations

2.6.1 The area where the housing will be placed shall be levelled and a concrete strip foundation, at least 300 mm wide x 200 mm high, shall be cast at the proposed site. The top of the foundation shall be not less than 30 mm above the levelled final ground level.

2.6.2 A single row of 190 x 190 x 290 mm concrete blocks shall be built on the foundation to serve as foundation for the steel housing and to elevate the steel housing at least 190 mm above ground level.

2.6.3 Provision shall be made to fix the steel housing to the cast concrete foundation by means of suitable steel brackets and rawl bolts.

2.7 Base frame

2.7.1 The construction of the housing shall generally be constructed on a base frame manufactured from 160 x 120 x 4 mm rectangular tubular steel sections, welded to 120 x 160 mm cast metal corner blocks, which shall also serve as pedestals to elevate the base frame at least 25 mm above the foundation blocks, to allow ventilation through openings in the floor, described elsewhere. The base frame shall be reinforced by an additional 5 supports, manufactured from 100 x 40 x 40 x 4 mm rectangular tubular steel, which shall be equally spaced across the length of the housing, to also support the floor plate of the housing.

2.7.2 Suitable sized 180 x160 x 6 mm profiled steel sections shall be used to construct the corner posts.

2.8 General Construction of the Steel Housing

2.8.1 Walls and roof: The walls, roof and door panels shall be constructed from **3 mm Corten steel** inverted box ribbed (IBR) sheets, welded into the housing frame.

2.8.2 Cable access : Access from underground, for the earth conductor connecting the earth mat to the earth bar and for a 230 V power supply cable into the enclosure, shall be provided in the positions indicated on the drawing, by means of cable sleeves into the housing, as described elsewhere.

Two openings of 300 mm wide x 50 mm high, shall be provided in the housing wall, at high level, at opposite sides of the housing, for coaxial cable entry. A 10 port entry panel shall be provided for the coaxial cables entering the housing. The holes shall be sleeved with the correct size rubber grommets. The openings shall be protected by a 300 x 400 x 3 mm Corten steel plate weather canopy, welded to the outside of the openings.

2.8.3 Wiring channels : Hot dipped galvanised wiring channel (P1000: 41.3mm x 41.3mm) with cover plate, including bends, joints, end caps and accessories, shall be spot welded in the positions indicated on the drawing to serve as fixing points and wiring channel for 230V mains wiring.

2.8.4 Cable trays: Medium duty galvanised metal cable trays of various widths shall be installed in the positions indicated on the drawing.

2.8.5 Ventilator: An opening, approximately 330 mm diameter, with a 150 mm high steel collar welded onto the opening, shall be provided in the roof, at the opposite end to the ventilation openings in the floor and above the battery shelves, to accommodate a 350mm wind turbine attic ventilator. A steel security plate shall be welded into the collar and a 400 x 400 mm steel expanded metal security mesh shall be welded to the roof panel at the underside of the opening. A 450 x 450 mm 3 mm steel plate shall be welded to 4 suitable thick 100mm brackets. The steel plate shall be welded below the ventilator opening. A 350mm Capil wind turbine ventilator or an equal and approved unit shall be installed.

2.8.6 Battery Stands: A double tier battery shelf, with each shelf consisting of a 300 mm wide x 38 mm thick timber plank, mounted in an angle iron frame, and shall be provided at the back end of the housing, across the full width of the housing. The two tiers shall be staggered and fitted at 300 mm and 600 mm above the floor level respectively. The overall width of the two staggered shelves shall not exceed 700 mm. The shelf frames shall have intermediate supports and be welded to support the total mass of batteries to be placed along the entire length of the shelves. The frame steelwork shall be coated and protected in an approved manner against battery acid corrosion.

2.8.7 Lifting Plates: Four 80 x 100 x 6 mm steel plates with holes to serve as lifting points, shall be welded to the top of the corner posts of the housing. Allowance shall be made for securing D-shackles through the holes. The lifting points shall allow for the safe lifting of an equipped container, for purposes of loading and transporting.

2.8.8 Solar Panel Supports Frame Fixings: Steel plates to serve as fixing brackets for a solar panel frame, with at least 6 pre-drilled 8mm holes, shall be welded to the top of the steel housing in the position shown on the drawing, as standard provision on all housings. In cases where a solar power supply is required, a galvanised steel angle iron frame, which shall bolt to the above brackets shall be manufactures to accommodate the solar panels.

2.8.9 Floor: The floor shall be welded steel chequer plate of sufficient thickness and adequately supported to carry the mass of personnel and equipment without movement or sagging. Two 450 mm x 150 mm ventilation openings, with expanded metal security mesh welded in position and fine insect proofing gauze securely fitted over the mesh, shall be provided in the floor chequer plate. The ventilation openings shall be positioned at the opposite end to the position of the ventilator, in positions shown on the drawing D7394E14/104. Openings over support beams in the frame shall not be acceptable. Two 100mm diameter galvanised steel cable entry sleeves with plugs, shall be provided in positions indicated on the drawing.

2.8.10 Door: A suitable hinged, 800mm wide access door shall be provided to allow personnel and equipment access to the container. The door shall be supplied complete with a vertical solid locking bar, with handle and 3 retainers and cams. The handle of the locking bar shall be protected with a 6 mm thick metal housing covering the lock mechanism, providing access from the bottom, with sufficient clearance from the wall for a human hand to reach the lock (± 80mm), however restricting the use of tools to destroy the lock.

The vertical locking bar shall be protected with a steel channel of similar thickness, seam welded to the door frame. The protective channel shall extend over the locking cams at the top and bottom of the locking bar. Provision shall be made for the protection on the handle to have sufficient clearance to open. A 30 mm rubber seal shall be fixed on the housing around the door frame to provide a weather proof door seal. A padlock as specified shall be provided as part of the housing. A shield plate, 8mm thick, shall be welded to the side of the container, in line with each hinge, to extend at least 50mm beyond the corner post, which accommodates the door hinges, to protect door hinges and hinges pins from attack by hacksaw or hand tool. The plates shall vertically extend approximately 30mm above and below the hinge.

2.8.11 Equipment Shelves: Two 600 mm wide x 32 mm thick Formica top equipment shelves shall be installed on and fixed to 450 mm cantilever cable tray support arms, along the side walls of the housing, in positions and at the height shown on the drawing. The cantilever arms shall be bolted onto the channel supports, specified elsewhere.

2.9 Paint

2.9.1 Metal components of the framework and panels shall be finished with a high quality quick dry machinery paint, applied according to the best available method and in accordance with approved paint manufacturer's specifications.

2.9.2 The colour shall be machinery green, on the outside and white on the inside or a light grey Code G80 or G54 of SANS 1091, unless specified to the contrary, or as approved by the Engineer.

2.9.3 Before the steel housing is painted, the contractor shall ensure that all surfaces are thoroughly cleaned, decreased, descaled and prepared in accordance with the paint manufacturer's specifications. A final coat of paint shall be applied on site, immediately after installation of the housing.

2.10 Insulation

2.10.1 Metal components of the framework and panels shall be finished with a high quality quick dry machinery paint, applied according to the best available method and in accordance with approved paint manufacturer's specifications.

2.10.2 Type of insulation: Insulation shall be spray-on polyethane foam and shall at least comply with the following:

- Minimum thickness at any point : 25 mm
- Minimum density : 30 Kg/m³
- Minimum conductivity : 0.025W/m C
- Minimum thermal resistance : 0.8 W/M2 C

2.10.3 Application: The spray-on insulation shall be applied strictly in accordance with the supplier's recommendations.

The surface of the container shall be clean, dust free, oil free and shall have at least one coat of newly applied paint to suit the spray on insulation.

Surfaces shall be inspected and approved by all relevant parties as well as the engineer before the application starts.

The insulation shall be applied in such a way that a smooth surface and finish are achieved as far as possible.

All welding and cutting on the surfaces shall be completed, treated for corrosion and approved by the engineer before the spraying of insulation proceeds.

2.10.4 Supplier: The spray-on insulation shall be done by an approved specialist company.

2.10.5 Co-ordination: The insulation as specified shall be co-ordinated with all the other items as specified for this container.

2.10.6 Guarantee: The insulation shall be guaranteed by the supplier for a period of at least one year.

2.11 Electrical

2.11.1 The equipment and complete installation shall comply with the requirements of the Occupational Health and Safety Act, including the Code of Practice for the Wiring of Premises: SANS 10142, as amended.

2.11.2 Light fittings shall be surface mounted on the wiring channel and be supplied complete with lamps. The following light fittings shall be installed:

- One 2x58 W switch start, commercial, fluorescent channel (or equivalent LED), to be connected to a circuit breaker on the 230VAC distribution board.
- One 2x18 W Commercial fluorescent channel (or equivalent LED), with inverter, to be connected to a circuit breaker on the 12 VDC power distribution board. (In cases where only a solar power supply is provided to the site, the 230V light fitting specified above shall be omitted and two of these 12VDC, battery powered light fittings shall be installed.)

2.11.3 16A Industrial switched sockets shall be installed in positions shown on the drawings, on surface on the wiring channel, above the equipment shelves.

2.11.4 All outlet points shall be earthed to the distribution board by means of a separate earth conductor.

2.11.5 Two 16A light industrial light switches shall be installed on surface, mounted on the HDG wiring channel at 1400 mm above floor level.

2.12 Distribution Boards

2.12.1 A 230 V, single phase distribution board shall be supplied and installed in the position indicated on the drawing in cases where a mains power supply is available or may become available. The board shall comply with the following:

- Type: Fibre glass, 10 way, single phase, including equipment tray, neutral and earth bars, face plate and lockable hinged door.
- Switchgear: Refer to drawing.
- Colour: White or cream.
- Cable entry: Top and bottom

2.12.2 A 12/24VDC distribution board shall be supplied and installed in the position indicated on the drawing. The board shall be equipped as shown on drawing D8260/E14/103:

- Type: Fibre glass, 10 way, single phase, including equipment tray, neutral and earth bars, face plate and lockable hinged door.
- Meters: 72 x 72 mm, 0 - 30 A DC ammeter on the supply from the batteries. 72 x 72 mm, 0 - 15 V DC volt meter.
- Switchgear: Refer to drawing.
- Colour: White or cream.
- Cable entry: Top and bottom

2.13 Power cables and wiring

2.13.1 All power supply cables outside the housing shall be PVC insulated, copper SWA, 600/1000V cables complying with SANS 1507, with earth conductors (ECC) in the armour. Underground cables shall be installed at 600 mm below ground level.

2.13.2 Power supply cables shall be earthed in accordance with the specification for Lightning Protection and Earthing.

2.13.3 All 230 VAC outlet points inside the housing shall be wired with 2.5mm² x 2 core plus earth SURFIX type cable, with white PVC insulation. As far as possible all 230 V wiring shall be installed in hot dipped galvanised wiring channel, as provided in the housing.

2.13.4 All 12 VDC wiring shall be flat twin core flexible PVC insulated copper wiring. The positive conductors shall be red and negative conductors shall be black PVC insulated. DC cables shall generally be installed on surface, tied down onto cable trays, neatly arranged in horizontal and vertical rows with equal spacing between tie down strips. Where a specific wire size is not specified the minimum wire size shall be 4mm².

2.14 Voltage Surge Protection and Earthing

2.14.1 The installation shall comply with the specifications for Lightning Protection and Earthing as well as schematic diagrams of the typical earthing arrangements at radio repeater sites.

2.14.2 Two common earth bars as specified, shall be installed at low level below the cable entry points of the housing, as shown on the drawing. The earth bars shall be interconnected by means of 70mm² green PVC insulated conductor, routed below the floor of the housing. The two earth bars shall be regarded as one common earth point and all equipment shall be single point earthed to the earth bar, along the shortest route. All earth wires shall be green PVC insulated copper conductors, installed on surface to be visible along the entire route and tied to cable trays provided in the housing.

2.14.3 230V Surge protection equipment, as specified, shall be installed in all housings where a 230VAC distribution board is installed to receive a mains power supply.

2.14.4 The required number of surge arrester units for antenna cables shall further be installed as shown on the drawing, as part of the equipment housing.

2.15 Abnormal Voltage Protection (AVP)

2.15.1 A 230 VAC rated under and over voltage protection system shall be provided. The AVP system shall comply with the following:

- Adjustable over voltage trip.
- Adjustable under voltage trip.
- Automatic re-close operation upon voltage returning to normal pre-set parameters.
- Status contacts for remote monitoring.

2.15.2 The proposed system may be a single unit or a unit consisting of necessary components, built into an appropriate enclosure. Alternatively the AVP system may be integrated within a new distribution board where installation are new.

2.15.3 Proposed system shall be of reputable manufacturer with a reference of effective deployment.

2.16 Certificate of Compliance and Electrical Warning Sign

2.16.1 An electrical Certificate of Compliance for the completed radio equipment housing shall be submitted to the Engineer, prior to the connection of a mains power supply and handover of the installation. Where an electrical installation is installed in the equipment housing to make provision for a future mains power supply, a Certificate of Compliance to the extent applicable, shall still be issued prior to handover of the installation.

2.16.2 An electrical warning sign shall be installed on the door of the equipment housing regardless of the type of power supply used

3. Security Fencing

Repeater sites shall be fenced to enclose the equipment housing and mast. The fence shall meet the following requirements:

3.1 A mesh wire fence shall be provided, fully galvanised as per SABS 675, Class A. The fence wire shall be fixed to 3.15mm dia. straining wires installed at the top and bottom, as well as at intervals of not more than 600mm in between. The fence material shall be either one of the following, as specified for the application:

- Razor mesh with 2.15mm core wire with a maximum mesh aperture of 150mm x 300 mm

or

- Weld mesh with 3.15mm core wire with a maximum mesh aperture of 100mm x 50mm.

3.2 The overall fence height shall be at least 2.3 metres high (i.e. 100mm concrete plinth + 1800mm razor mesh fence, with 50mm embedded in concrete + 450mm razor coil) and all around at least two (2) metres away from the equipment hut and shall include the mast.

3.3 A 2 metre high pedestrian gate with a padlocking facility shall be provided, except where otherwise instructed. The gate shall be fitted with the same fence material as the fence.

3.4 A concrete plinth 200 mm wide and 300 mm deep shall be cast around the perimeter of the fence so that the bottom tensioning strand and at less 50 mm of the wire mesh is secured in the concrete. The concrete plinth shall protrude 100 above the ground.

3.5 Fence poles shall be placed in the concrete such that the lower pole ends protrude beyond the lower concrete level to allow for sufficient drainage.

3.6 Corner posts shall be 76 mm diameter x 2mm wall thickness, hot dipped galvanised circular mild steel, buried 900 mm deep in a concrete base 400mm X 400mm. Corner posts are to be provided with (2) Two stays each. Stay posts shall be of 51 mm diameter x 2 mm wall thickness.

Stay posts shall be supplied with flattened ends, pre-drilled for affixing to pre-drilled fence posts with galvanised bolts, nuts and washers.

3.7 Intermediate posts installed at intervals not exceeding 2 metres, shall be 51mm diameter x 2 mm wall thickness, hot dipped galvanised circular mild steel poles set 600 mm deep in 300mm x 300 mm concrete bases.

3.8 To prevent the ingress of water, corner, gate and intermediate poles shall have a mild steel cap welded to the top of the poles, ground smooth, and prior to galvanising. A small ventilation hole shall be provided below the post cap.

3.9 A 450 mm diameter, flat clad, bayonet barbed tape (razor wire) stretched to a maximum of 15 m per length shall be mounted above the razor mesh fencing (Apron). The bottom of the fence shall be protected by means of bayonet barbed tape installed in the format of coils stretched to a maximum of 11 metres per length. This shall include the gate construction, where the lower portion shall move together with the gate construction itself. Bayonet barbed tape coils shall comprise of a 2.5 mm high-tensile core wire, surrounded with a mild steel plate of continuous 20 mm barbs at 15 mm point to point centres, cold-clinched around the core, all heavily galvanised. The razor coil shall also span the gate opening above the gate.

3.10 A minimum of three evenly spaced lengths of straining wire shall be fixed to the apron in order to secure the flat clad bayonet barbed tape. The bayonet barbed tape shall be affixed to the straining wire with binding wire of at least 2mm diameter.

3.11 All fence materials shall be heavily galvanised or satisfactorily protected against corrosion.

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1. Scope Of The Contract

1.1 The maintenance contract, will be administered by the KwaZulu-Natal Department of Works, on behalf of provincial radio user departments. The essence of the contract is to have optimum radio communication available to users at all times. The contract will comprise the following, as further described in this document:

1.1.1 Comprehensive maintenance of land mobile radio repeaters and repeater sites used by the KwaZulu-Natal Provincial Emergency Network (KZE), the KwaZulu-Natal Department of Transport (DOT), the Emergency Medical Services (EMS) and the KwaZulu-Natal Department of Works (KZW) radio networks or any other repeater network that the Employer may include by instruction.

1.1.2 Upgrading of the installations above, where and when necessary and instructed, to a specified and agreed level.

1.1.3 The installation, relocation or dismantling of any radio network facilities, if necessary during the contract.

1.1.4 Any radio installations the client may add or omit by instruction.

1.1.5 Replacement of Analogue Repeaters with Digital Repeaters, as per specification.

1.1.6 Provision of Digital Microwave links.

1.2 Without prejudice to their right to procure equipment or services from any other supplier, any one or more of the above radio users may choose to enter into a separate contract or place an order for the supply, installation, de-installation, maintenance and/or repair of base stations, mobile radios, handheld radios or other radio equipment, based on the tendered rates included in an accepted tender.

1.3 The duration of such contract or period during which separate orders for work may be placed will not exceed the duration of the maintenance contract, but could be for a shorter period of time.

1.4 If an order is placed by a user based on the accepted tender, the specifications and rates for various items of work in this document shall also apply to such a separate contract or order placed. The work shall be carried out under the jurisdiction of the instructing user Department and the contract account will not form part of the contract account for the maintenance contract. In case of a contract being entered into for a period of time, the conditions of the maintenance contract in this document shall apply. In addition the normal conditions and rules governing the placement of orders by the Provincial Government will apply.

2. Definitions Of Terms

For the purpose of this specification, the terms below shall have the meaning indicated:

2.1 **The Contract or Maintenance Contract**: Refers to the comprehensive maintenance contract for the maintenance of radio repeaters as described in this document.

2.2 **Users** : Shall refer to the KwaZulu-Natal provincial user departments of the various repeater networks as follows:

- Provincial users of the Emergency Network (KZE)
- Department of Transport (DOT)
- Emergency Medical Services (EMS)

- KwaZulu-Natal Department of Works (KZW)
- Any other user instructed by the Employer

Throughout this document, the users are sometimes identified by the letters indicated in brackets behind each name above

2.3 **Comprehensive Maintenance or Maintenance**: Shall refer to the total maintenance, including scheduled routine maintenance, of the specific installations for the duration of the contract at the tendered rates and prices, which shall include overhead costs, travelling, labour, material and equipment costs excluding only the replacement of certain types of equipment as outlined.

2.4 **Upgrading or Construction Work** : Shall refer to any ad-hoc maintenance, upgrading or construction work specifically instructed and not included in paragraph 2.3 above, which work will be carried and measured at tendered rates and prices or rates determined in terms of the conditions of contract, in terms of a variation order.

3. Contractor's Personnel

3.1 The successful tenderer shall appoint a contracts manager who shall be responsible to co-ordinate the contractor's activities, attend meetings and inspections, and who shall receive instructions on behalf of the contractor.

3.2 The contract works shall be carried out by the contractor's own personnel. No work shall be sub-contracted to other parties, without the written permission of the Chief Director.

3.3 The contractor shall employ only competent, experienced and reliable workmen on this contract.

4. Contract Administration And Communication

4.1 KwaZulu-Natal Department of Works will be the employer and will issue the tender and finance the contract from one budget. A representative appointed by the Department will handle the contract administration and all instructions to the contractor will be channelled through this representative.

4.2 The other users of the various repeater networks will be referred to as users and communication will be as follows:

4.2.1 Requests for the upgrading or changing of a repeater network will be addressed to the Department of Works for communication and instruction to the contractor, as a variation order.

4.2.2 Service complaints such as repeater network/communication failure, depending on the degree of urgency, will be directly communicated to the contractor by a limited number of nominated representatives from the user groups, which will require immediate response and remedial action by the contractor in terms of the comprehensive maintenance responsibility.

5. Contract Period

5.1 The contract period for the comprehensive maintenance of repeater networks shall be **36 calendar months** commencing on the first day of a month, as defined in the Special Conditions of Contract.

6. Compliance With Regulations

6.1 Refer to Part 3.4.1.

7. Standards, Samples And Workmanship

7.1 Refer to Part 3.4.1.

8. Ambient Operating Conditions

8.1 The following ambient conditions under which equipment may be required to operate, shall be assumed for the purpose of this contract:

Temperature	:	- 20°C to + 60°C
Relative humidity	:	up to 90 % with salt laden air at sea level
Altitude	:	0 to 2000 m above sea level
Wind	:	up to 160 km/hr
Lightning	:	Severe

9. Power Supplies

9.1 Mains power supplies to repeater sites are at 230 V (±10%), 50 Hz (AC), derived from available power distribution networks in the area, or at 12 V (DC), derived from solar power stations or wind generators forming part of the installations.

9.2 Detail of the power supply in each case, is indicated in the data schedules in the Annexures in Part C5.

10. Information To Be Submitted With The Tender

10.1 The schedules in Part T2, as well as the price schedules in Part C2 shall be fully completed at tender stage and shall be submitted with the tender. The tenderer shall further indicate the Compliance with Specifications in the radio equipment specifications in Part 3.4. Rates for equipment in Part C2 shall be based on the equipment specified in this document and offered in the schedules in Part T2.

10.2 In addition, the tenderer shall provide certificates of approval for radio equipment, as referred to in Part 3.4 and shall further include manufacturer's equipment specifications and technical literature to amplify technical detail on equipment offered in the tender.

10.3 Failure to submit the above information with the tender, may disqualify the tender.

11. Attendance Of Meetings And Inspections

11.1 The contractor shall allow in the tendered rates to attend regular (at least monthly) progress meetings and any other meetings necessary to facilitate the smooth running of this contract.

11.2 In addition, the contractor shall allow in the tendered rates to be in attendance during random inspections of installations as may be carried out by the client's representative from time to time to confirm quality of workmanship and compliance with the conditions of contract or to evaluate specific problems on site.

12. Quotations

12.1 Whenever requested, the contractor shall submit written quotations in an agreed format, for work to be carried out, as may be requested by the client's representative.

12.2 Quotations shall show in detail the quantity of materials and labour at tendered rates.

13. Claims For Payment

13.1 Payment will be made to the contractor at intervals and in accordance with conditions as laid down in the conditions of contract.

13.2 The contractor shall submit detailed claims for payment to be prepared in an agreed and acceptable format.

13.3 The onus will remain with the contractor to provide satisfactory detail and proof of the validity of any claim for payment.

14. Quantities, Additions And Omissions To The Maintenance Contract

14.1 Radio repeater stations to be maintained in terms of this contract, are listed in the price schedules in Part C2 and data on the various sites is given in the Annexures in Part C5. The number of repeaters to be maintained, may vary during the course of the contract. If repeaters and are added to the maintenance contract, the rates in the price schedule for similar maintenance work shall be used to determine the additional cost of such maintenance. Variation in quantity shall not invalidate any rates for individual items in the price schedule. In the case of additions and omissions of radio repeaters and base stations to be maintained, cognisance shall be taken of the fact that transport and travelling time are often shared between the maintenance of various repeater sites and revised rates for transport and travelling time shall be agreed with this understanding and on this basis.

14.2 If an additional repeater installation is installed at a site during the course of the contract and the contractor is instructed to include the repeater installation as part of the maintenance contract, the payment of monthly maintenance cost at an agreed rate, will only commence from the beginning of the next 2-month maintenance cycle, after the installation and commissioning date, based on the assumption that the preparation and installation of the repeater at scheduled rates, included a maintenance service on the repeater.

14.3 Unless a quotation has already been submitted and approved, as previously requested, any additional work instructed shall, within 14 (fourteen) days of completion, be followed by a detailed claim for issuing of a variation order, to be submitted by the contractor to the client's representative. A variation order shall be prepared and approved by the client's representative prior to payment for the work done.

14.4 Additional work required to upgrade repeater sites to an acceptable standard, as outlined in Part 3.10.2, shall be priced at tendered rates.

15. Involvement Of Local Communities

15.1 Although the specialised nature of this contract is acknowledged, in order to promote the objectives of the Government's procurement policies, it is a condition of this contract that the contractor shall involve local communities in physical site maintenance as far as practicable.

16. Specifications

16.1 All new equipment supplied in terms of this contract, shall comply with the Telecommunications Act no 103 of 1996, as amended.

16.2 New equipment supplied in terms of this contract, as well as installation work, shall comply with all the Standard Specifications in Part C3.4 and the Project Specification in Part C3.5.

16.3 The Standard Specification in Part C3.4.1 shall also apply to this contract and special attention shall specifically be paid to compliance with the OHS Act and the maintenance of safe construction (including maintenance) practice during the execution of the contract.

16.4 Any upgrading work done at repeater sites or at new sites established, shall further adhere to principles outlined in the Code of Practice for Radio Site Engineering, MPT 1331, as issued by the Department of Trading and Industry in the UK.

17. Workshop, Repair And Test Facilities

17.1 The contractor shall have a comprehensive range of test equipment, in sufficient quantity, which shall be available to the contractor in order to fully test the successful performance of, as well as to trace faults on radio and ancillary radio equipment, power supply equipment, cables of all types, and to properly carry out any work that may be envisaged by this contract. The contractor shall have available, a complete radio workshop with full and sufficient facilities at this workshop, for the repair and maintenance of radio equipment, as envisaged in terms of this contract.

17.2 In addition to the above established workshop facilities, the contractor shall have available, a sufficient quantity of portable repair and test equipment that will permit the repair and maintenance of radio equipment in the field and quick response to system failure and emergencies.

17.3 The client reserves the right to inspect the contractor's premises from time to time to satisfy himself regarding:

17.3.1 The available test equipment and validity of calibration certificates of such equipment.
17.3.2 The skills of personnel employed.
17.3.3 The level of spares holding as may be reasonably required for the proper execution of this contract.
17.3.4 The actual local content of equipment supplied.

18. Components And Spares

18.1 The contractor shall be solely responsible to maintain an adequate stock of spares or arrange and maintain access to such spares to guarantee the service and maintenance all radio installations, including ancillary equipment, in terms of this contract, within the response time limitations specified in Part C5.2. Any spares, assistance or advice offered by any of the Users at the time, shall not relieve the contractor of this contractual obligation in any way.

19. Maintenance Information

19.1 The contractor shall supply one copy of complete technical information and maintenance information on all equipment supplied or supplied and installed as part of the contract, at the time when the work is carried out.

19.2 In addition, the contractor shall keep a record of all such technical information and maintenance information, which shall be included in maintenance manuals to be handed over at the completion of the contract.

20. Documentation To Be Submitted At Completion Of The Contract

The following documents shall be submitted at the completion of the contract:

20.1 Four copies of a maintenance manual, which includes the information in par. 19 above, as well as relevant drawings and wiring diagrams.

20.2 Four copies of any software required for programming of equipment supplied, or supplied and installed as part of the contract. Software shall be supplied complete with instruction manuals and shall be on magnetic disc, the format to be agreed at the time of handover.

20.3 The complete updated database to be established and maintained by the client's representative, based on site information supplied by the contractor, as part of the comprehensive maintenance of repeaters and any selected base stations, shall be verified and certified by the contractor to be an accurate record of equipment on site, at the end of the contract.

20.4 Any other information, documents or records that may be reasonably required by the client to facilitate the continued maintenance and service of equipment installed as part of this contract.

21. Radio Frequencies

21.1 Radio frequencies licensed to the users shall be made available to the successful tenderer, after the contract has been awarded and shall remain confidential information and shall not be made available to any third party without the explicit written consent of the client. Existing radio equipment operate on frequencies in the following frequency bands:

21.1.1	VHF (mid band):	Duplex	:	69 to 78 MHz
21.1.2	VHF (high band):	Duplex	:	135 to 146 MHz
21.1.3	UHF (Used as repeater links)		:	450 to 460 MHz

21.2 The application for new frequencies for Microwave Links shall be the responsibility of the contractor.

22. Quality Control

22.1 Refer to Part C3.4.1.

22.2 The contractor shall establish and maintain quality assurance procedures, based on an approved quality assurance standard, for the duration of the contract to ensure that an acceptable standard of workmanship is maintained.

23. Guarantee And Defects Liability

23.1 The contractor shall guarantee equipment as outlined below. During the guarantee period the contractor shall replace any faulty equipment and materials free of charge.

23.2 The optimum performance of radio installations forming part of the comprehensive maintenance contract shall be guaranteed for the duration of the contract period.

23.3 Equipment included in the maintenance contract for which the replacement cost is excluded from the contract, as defined in Part C3.5.2, shall be guaranteed for a period of 12 months, as defined in that paragraph, limited however to the duration of the contract period.

23.4 The contractor's liability with regard to defects relating to Upgrading and Construction work shall be in accordance with the Conditions of Contract, as amplified by the Special Conditions of Contract for a period specified therein (6 months).

23.5 The contractor shall guarantee any new equipment and installations supplied and installed in terms of a separate order that does not form part of the comprehensive maintenance contract, for the period in paragraph 23.4, after completion as defined in the Conditions of Contract.

24. Drawings

24.1 Drawings are bound into this document in Part C5.1, with the exception of drawings marked with (*) which accompany this document:

24.1.1	056794/01:	Province of KwaZulu-Natal : Repeater Sites *
24.1.2	056794/101 :	Schematic Diagram: Earthing Arrangement at Radio Repeater Sites
24.1.3	056794/102 :	Schematic Diagram: Typical Solar Installation at Repeater Sites
24.1.4	056794/103 :	Schematic Diagram: D.C. Distribution Board with meters for Repeater Station
24.1.5	056794/104:	Radio Repeater Housing: Container Type Radio Repeater Station *
24.1.6	056794/106: Lattice Mast	Schematic Diagram: Earthing Arrangement for 30 metre Guyed

1. General

1.1 The commencement date and duration of the contract shall be as detailed in Part C3.5.1 and the Conditions of Contract.

2. Radio Repeaters

2.1 The following separate repeaters and repeater networks are included and are used by the users indicated. Refer to detail in Annexures in Part C5. Site coordinates are not necessarily accurate and shall be assumed to serve for approximate location of sites. Repeater sites accommodate one or more repeaters. In some cases repeaters share facilities such as power supplies, site huts and masts. Radio equipment and antennas are however not shared by users. In the data sheets in the Annexures, shared power supplies, huts and masts are only indicated with the repeater of the user who established and owns the facility.

2.1.1 **KwaZulu-Natal Emergency Network (KZE):** VHF (Mid band) repeaters with UHF links functioning as a complete linked network.

2.1.2 **Transport (DOT):** VHF (Mid band) repeaters.

2.1.3 **Emergency Medical Services (EMS):** VHF (Mid band) and VHF (High band) repeaters with UHF and landline links in some instances.

2.1.4 **KwaZulu-Natal Department of Works (KZW):** VHF (Mid band) repeaters.

2.1.5 **Transport (DOT):** VHF (High band) repeaters – Simulcast System for extended eThekwini Region.

3. Comprehensive Maintenance

The comprehensive maintenance contract shall include the following at the tendered price

3.1 The supply of all attendance, labour and materials to maintain and guarantee the optimum performance of the repeaters, including all ancillary equipment, the repeater site facilities and the power supply from the outgoing terminals of the electricity meter to the site, for the duration of the contract. The tender price shall include:

3.1.1 Overhead costs.
3.1.2 Repair or replacement cost of materials and equipment. (Except for the material and installation. labour cost of equipment listed under "Exclusions" in paragraph 5 below).
3.1.3 Labour for routine testing, maintenance and repair of all installations.
3.1.4 Labour to clean the site and control vegetation on and around the site.
3.1.5 Transport cost and travelling time.
3.1.6 Any other costs considered necessary in compliance with the requirements of the contract.

3.2 A compulsory comprehensive routine inspection, testing and maintenance service of each repeater every **two months** and the submission of a report in prescribed and agreed format following each service. An example of the maintenance report is included in the Annexures to this specification.

3.3 The attendance to self-detected or user-reported repeater malfunction, fault or communication failure and repair of any failure within the specified response times. A written report providing detail of the nature of the failure and remedial work carried out shall be submitted to the client's representative by fax, within 24 hours of the remedial work being carried out.

3.4 The investigation of and report on radio interference, as well as rendering assistance and liaison with the ICASA (Independent Communications Authority of South Africa) to investigate and eliminate the source of interference.

3.5 Providing accurate information on all equipment at repeater sites on a monthly basis, to enable the establishment and maintenance of a complete database on all equipment installed at repeaters sites and the maintenance of this database, by the client's representative. Accurate co-ordinates measured by the contractor shall be included in the database.

3.6 The reporting of all cases of theft (and vandalism as necessary) at repeater sites to the police and the detailed written recording and reporting of equipment losses and police case numbers to the client.

3.7 The maintenance of and monthly reporting on an updated record of all radio equipment forming part of this contract, in transit for repair or temporarily stored at the contractor's premises.

3.8 Remote testing of repeater functioning by radio, telephone line and/or signal strength measurement on a weekly basis to facilitate early detection of deterioration in performance or failure and the recording of and reporting on all tests and remedial work on a monthly basis.

3.9 The establishment and maintenance of a radio equipment store, with an up to date inventory, of spare or redundant provincial equipment forming part of this contract, for the duration the contract.

3.10 Attendance of meetings and inspections as necessary.

3.11 The general management and administration of the contract.

3.12 The introduction and management of satisfactory quality assurance procedures relating to all activities in the contractor's organisation.

4. Initial Site Inspection And Upgrading

The comprehensive maintenance contract shall include the following at the tendered price

4.1 The repeater installations have been maintained in terms of a similar maintenance contract for the past 7 years, during which period certain upgrading work has also been carried out to improve the reliability of installations. For tender purposes, it shall be assumed that all repeaters are fully operational or can be made fully operational by a thorough maintenance service and tenders shall be based on the stated and implied equipment in data sheets, included in this document.

4.2 It may be necessary to upgrade certain installations or part of installations to an acceptable level. Due to the logistical problems involved, a site inspection of all sites by all tenderers during the tender period will not be arranged by the client. The tender will therefore assume that installations are in working order or can be made satisfactorily functional by a thorough and comprehensive maintenance service.

4.3 After award of the tender, in addition to the normal maintenance service, an inspection of all sites will be carried out with the successful tenderer. The contractor will be given the opportunity to inspect sites and shall conduct tests as necessary to confirm the condition of installations. Any upgrading work considered

necessary and agreed to on site, shall be carried out by the contractor as additional work, to be measured and paid for at tendered rates. After completion such improvements will become part of the comprehensive maintenance contract at the tendered rates for maintenance. Provided that installations are reasonably and satisfactorily functional, refusal by the client to instruct immediate upgrading work, shall not invalidate the tendered rates for maintenance or have any effect on the obligation of the contractor to maintain the installations in terms of this contract.

4.4 Equipment in service does not necessarily comply with specifications and standards included in this document and upgrading will only take place to a practical, affordable and agreed standard, as necessary and as determined on site.

4.5 The contractor shall provide his own transport, test equipment, labour, meals and accommodation and submit a price in the price schedule to include everything necessary to inspect all sites with a representative from the client. The contractor shall further allow to transport one representative from the client. The contractor shall carry out tests, measure agreed upgrading work and submit quotations based on tendered rates. The tender price shall assume that the client will provide his own transport, if more than one representative take part in the inspection and that inspections will be carried out on a number of return trips, covering a number of repeaters in an area over one or more days for each trip.

4.6 The commencement of the monthly routine maintenance shall not necessarily be delayed, pending the completion of the above inspection tour, based on the assumption that adequate information will be available to the contractor regarding the location of sites and equipment on sites.

5. Exclusions

5.1 Equipment with a limited life and unknown present condition, as listed below, shall be included in the monthly routine maintenance service responsibility and price, but the replacement cost of such excluded items, when necessary, will be an addition to the contract price, per variation order and at tendered rates, after proven failure of equipment.

5.2 During regular maintenance visits deterioration of such excluded equipment shall be determined by inspection and test and the contractor shall report the need for replacement timeously, in order that replacement can take place during a subsequent service visit. The replacement cost of excluded items to be borne by the client, shall exclude travelling costs, based on the understanding that replacement on site will be done during a scheduled maintenance visit.

5.3 A guarantee of the equipment for a period of 12 months, shall apply after replacement of any of the excluded items and the full replacement cost of the equipment during such guarantee period, if necessary, will be for the contractor's account.

5.4 Excluded items will be:

5.4.1 Batteries.

5.4.2 Antennas with deteriorated performance due to corrosion only, within 50 km from the coast. Antenna failure, due to any other reason, will form part of the maintenance responsibility and replacement will be at no cost to the client.

5.5 Any equipment replaced in accordance with the above procedure shall be brought back to the contractor's workshop for test and inspection. Such proven unserviceable equipment shall be disposed of by the contractor.

5.6 The replacement cost of damage and repair resulting from direct lightning strike, as defined below, flood or similar disaster, as well as theft or proven vandalism reported to the police and substantiated by a case number, will be excluded from the comprehensive maintenance responsibility and the replacement cost, including travelling cost, will be for the client's account, except where equipment is covered by insurance in terms of the Conditions of Contract.

5.7 A direct lightning strike will be interpreted to have taken place where visible, severe and permanent damage was caused to equipment that can further be directly related to lightning discharge at the site, on the power supply or mast. This definition of accepted damage, due to direct lightning strike, takes into account that Phoenix Contact or other equal and approved voltage surge arrestors with associated earthing systems, have been installed on both the line and neutral of 230 V power supplies and that Polyphaser or other equal and approved surge arrestors have been installed on all antenna cables. The onus will further be on the contractor to logically prove that any damage claimed for, falls within the above definition of lightning damage and that the damage can be related to lightning disturbance.

5.8 Theft of any equipment in transit or from a new site under construction, before completion, commissioning and handover shall be at the contractors risk and shall be covered by insurance taken out and maintained by the contractor. Similarly theft of any unfixed and unconnected equipment placed on site, which are normally fixed and connected, shall be at the contractor's risk.

6. Maintenance Service Program

6.1 The contractor shall submit a detailed program of the scheduled maintenance visits for a specific month when requested to do so.

6.2 The program shall be scheduled such that the interval between maintenance services of a specific repeater is approximately two months.

7. Radio Installation Repair Response Time

7.1 The contractor shall maintain the following communication facilities to receive reports on repeater failure or repeater service complaints:

7.1.1 Office telephone line: During normal business hours
7.1.2 An emergency telephone line: 24 hours a day
7.1.3 A fax line: Accessible 24 hours per day
7.1.4 E-mail address: Accessible 24 hours per day

7.2 Repeater performance failure will be reported direct to the contractor by telephone, to be confirmed by fax, or only by fax in prescribed format, by a number of nominated representatives from the various user groups. A copy of the fax confirmation will be sent to the Department of Works representative, nominated as representative of the client for purposes of this contact. The repair response time shall be taken from the time of verbal reporting by telephone or receipt of a fax or e-mail in case the report is made by fax or e-mail only. The contractor shall respond immediately to any report of failure and repair and reinstatement of communications shall be affected within the response time categories below.

A Repeater Inspection and Service Report shall be completed in the logbook on site, for the malfunctioning repeater at the time of the remedial work and this Report, which shall provide full detail of remedial work undertaken, shall be submitted by fax to the above representative within 24 hours after completion of the remedial work. The contractor shall in each case indicate in the report the time taken

from receiving a fault report, until communication was restored. This report shall not be regarded as a normal routine maintenance Repeater and Service Report to be completed during the specified routine maintenance services.
The contractor shall assume that any user who reports repeater or radio service failure, is not necessarily technically knowledgeable to analyse the exact nature or extent of such perceived failure, and the contractor shall make use of any and all means, including remote testing procedures, to reasonably confirm the existence and establish the nature of a communication problem, before remedial action is taken, to avoid any abortive attendance cost due equipment malfunction, which does not form part of the maintenance contract.

7.3 Maximum response time categories shall be defined as follows, 7 days a week:

7.3.1 **Category A**: Immediate response and communication restored within 1 hour. Applicable to repeaters within a radius of 50 km from the centre of Durban and Pietermaritzburg.

7.3.2 **Category B:** Immediate response and communication restored within 6 hours.

7.3.3 **Category C:** Communication restored within 24 hours.

7.3.4 **Category D:** Communication restored within 48 hours.

7.4 The essence of this contract is to have optimum communication available to users at all times and it will be the contractor's responsibility to provide communication by means of standby repeaters and equipment, provided and maintained by the contractor as part of this contract, to restore communication if the normal equipment cannot be restored within the above response times.

The tenderer may price for such spare equipment considered necessary in the price schedule C2, provided that full detail of the equipment included is provided in Part T2. Any spare equipment paid for by the employer shall be handed over at the end of the contract and shall become the property of the employer. Equipment made available for standby purposes, by the contractor during the course of the contract, will remain the property of the contractor.

The cost of the standby equipment placed in service, while the original equipment is repaired for service, as well as the security risk associated with the equipment forms part of the tendered maintenance price. If the permanent equipment however becomes unserviceable due reasons, where the cost of repair/replacement does not form part of the tendered price (i.e. Excluded risks), the contractor shall give written notice, including full detail and proof of the failure, as well as the cost to repair/replace the equipment, to the client.

The client will issue an instruction regarding remedial action, within 30 days from the date of receiving full written information. If the client fails to issue an instruction within 30 days, rental of the contractor's standby equipment will become payable at tendered rates in the schedule of quantities, from the expiry date of the 30 day period, until the date a written instruction is issued to the contractor.

Payment of rental will however only be made at a rate per month for a full months (i.e. 30 days/m) and not for use of the standby equipment for part of a month. The rental rate shall also include insurance as necessary to cover the security risk of the rented equipment.

Where a standby repeater is temporarily placed in service, the normal specified maintenance shall continue and the scheduled monthly maintenance payments will be made, provided that the availability of airtime to the user is maintained.

7.5 The contractor will further be required to be on immediate and dedicated standby in specific areas, during special events, such as the Comrades marathon or similar events. Special dedicated standby duty will be arranged with the contractor to meet the requirements of the specific event and additional payment will be made for dedicated man-hours spent as arranged prior to the event.

7.6 The following maximum response times shall apply:

7.6.1	KZE Network:	Repeaters :	Category B
7.6.2	DOT Network:	Repeaters :	Category A (EThekwini Metro)
7.6.3	DOT Network:	Repeaters :	Category B (Other than above)
7.6.4	EMS Network:	Repeaters :	Category A (EThekwini & Pietermaritzburg Metro)
7.6.5	EMS Network:	Repeaters :	Category B (Other than above)
7.6.6	KZW Network:	Repeaters :	Category C

7.6.7 Specific emphasis shall be placed on the immediate restoration of communication on the KZE, DOT and EMS networks serving any National routes (N-routes), where communication is also used as part of an emergency Incident Management System (IMS).

7.7 The contractor will be permitted, for the purpose of this contract only, to use the Emergency Linked Radio Network, to the extent that it provides coverage, as may be changed from time to time, to communicate with the contractor's maintenance personnel in the field.

The above communication will be permitted to the extent that it does not interfere with the normal use of the network by the users.

8. Repeater Inspection, Testing And Maintenance And Service Reports

8.1 Service reports

8.1.1 A written service report for each repeater shall be completed for each maintenance service carried out and also for each repeater service following a repeater failure call-out. Each report shall have a unique identification number. A copy of the service report shall be kept by the contractor, in order that the maintenance history of any one installation may be recorded and a copy of each report shall be submitted to the client's representative at the end of each maintenance cycle, for information and perusal, as necessary.

8.1.2 One logbook per repeater installation with blank Repeater Inspection and Service Reports in triplicate, will be provided by the client, which shall be kept in the repeater site hut at all times. The top original copy shall be submitted to the client's representative at the end of each 2 month maintenance cycle, while the second copy shall be retained by the contractor. The third copy shall remain in the logbook as a site record of maintenance carried out.

8.1.3 Site information and information common to all repeaters on site, such as the site, the fence, the site hut, the mast, earthing, and the power supply shall be recorded on the service report for the first numbered repeater on a particular site.

8.1.4 The format of service reports shall be in the format of an example included in Annexure 11, in Part C5.1 of this document. Service reports shall generally record the information below, which

shall be based on inspection, testing, measurement and routine maintenance procedures carried out and shall record the optimal functioning state of the repeater after any adjustment, alignment remedial work and testing has been completed.

8.2 Maintenance service

The routine maintenance service shall include, but not be limited to the actions below, by means of inspection, testing, measurement, adjustment, routine maintenance, repair and cleaning, as required in the inspection and service report. For purposes of reference and recording maintenance information, items such as batteries shall be fitted with number labels.

8.2.1 Recording of the repeater contract number, the user and site name, as well as the serial number, make and model of all radio equipment.

8.2.2 Measurement, adjustment, testing and recording of all transmitter and receiver performance parameters, as required in the example of the inspection and service report.

8.2.3 Power supply maintenance and measurements, including mains power supplies, batteries, chargers, solar panels, solar regulators and wind chargers as applicable. The inspection and maintenance shall include the mains power supply from the electricity meter and including the electricity meter box.

8.2.4 Inspection of the mast, all antennas, connections and antenna cables.

8.2.5 Inspection and cleaning of the site hut, the fence and cutting and cleaning of all vegetation within the site fence, as well as the area within 1.5 metres outside the fence.

8.2.6 Repairs and remedial work carried out, must be recorded.

8.2.7 Any changes in equipment must be recorded.

8.2.8 On-air transmission tests shall be carried out and recorded, to confirm the functioning of each repeater system, at completion of the service.

8.2.9 Parameters and items, which according to the experience of the contractor on certain types of radios or radio equipment, are considered important to be inspected or checked and which have not been mentioned above, shall be included by the contractor on the service report.

8.2.10 The contractor shall institute a maintenance monitoring and tracking system which would verify remote site visits. Service vehicle GPS tracking and bi-monthly reporting can typically be proposed.

9. Radio Interference Problems

9.1 The contractor shall be responsible to attend to radio interference problems experienced on any of the radio systems included as part of the maintenance contract.

9.2 The source of radio interference shall be monitored, investigated and reported to the Independent Communications Authority of SA (ICASA) for further investigation as necessary and assistance shall be provided and progress shall be monitored by the contractor, until the problem is resolved.

9.3 The contractor shall report to the client on the findings of any investigation and remedial action taken.

9.4 Should the source of interference be due to malfunction of radio equipment forming part of the maintenance contract, the remedial work shall be carried out as part of the maintenance contract. The contractor shall further investigate and report on recommended improvements of the radio installations, forming part of the maintenance contract, in cases where remedial action to eliminate interference, do not reasonably form part of the scope of the maintenance responsibility.

10. Database Of Radio Equipment

10.1 The client's representative shall establish and maintain an updated database of all radio equipment on repeater sites, based on existing, available information and information to be provided by the contractor after commencement of the contract, as well as any changes to be confirmed by the contractor on a monthly basis, during the maintenance contract.

10.2 The database will be kept on the commercially available MS Excel program, or other selected database program and a copy of the database data files, will be made available to the contractor for purposes of the maintenance contract, when requested.

10.3 At the end of the maintenance contract the contractor will be required to verify and certify that the database is an accurate record of equipment on the repeater sites.

11. Theft Reports

11.1 The contractor shall be responsible to report all cases of theft and vandalism at repeater sites to the police for investigation and shall assist the police to the extent necessary to carry out such investigation.

11.2 The relevant police report number, as well as full detail of the equipment loss involved, shall be recorded by the contractor and shall be reported to the client in writing in each case.

11.3 Remedial work shall be carried out as outlined above.

11.4 Detailed information of any losses and changes in equipment shall be provided to allow the updating of the equipment database.

12. Equipment And Records Of Radio Equipment At The Contractors Premises

12.1 The contractor shall establish and maintain an updated record of radio equipment owned by the Province of KwaZulu-Natal which is in transit for repair or installation at the contractor’s premises, on a day-to-day basis.

12.2 The above record shall be available on a day-to-day basis for inspection by the client's representative or auditors as necessary, and shall further be maintained for insurance purposes.

12.3 The contractor shall maintain an adequate all risk insurance policy to cover equipment in transit at the contractor's premises.

12.4 No equipment owned by the Province of KwaZulu-Natal, forming part of this contract, shall be stored or kept at the contractor's premises longer than necessary, and all equipment shall be entered into the equipment store referred to in par. 13 below, at regular intervals.

13. Radio Equipment Store

13.1 The contractor shall be required to provide a secure, lockable store for redundant or spare radio equipment owned by the Province of KwaZulu-Natal, to be stored during the course of this contract and for the purposes of this contract, as necessary.

13.2 The store shall only be used for the above purpose and shall be approximately 30 m² in size. Shelves shall be provided for the proper storage of radio equipment.

13.3 The contractor shall take out and maintain all risk insurance cover to the value of R 200 000 and shall advise the client of the need to increase this insurance cover, should the contents of the store exceed this value for a duration of time.

13.4 Access to the store will be controlled by the contractor, but access shall be available to the client's representative for inspection when required.

13.5 An updated inventory of the contents of the store shall be maintained and reported to the client at regular intervals.

13.6 Items for disposal shall be dealt with as specified elsewhere.

13.7 The contents of the store with a complete record of equipment shall be handed over to the client for removal at the end of the contract.

14. Remote Testing Of Repeater Networks

14.1 The contractor shall make arrangements and establish procedures to test, record and report on the functioning of repeaters by radio or telephone communication, on a weekly basis.

14.2 The contractor shall not only rely on users to report malfunction of radio equipment.

14.3 In case of unsatisfactory performance of radio equipment, the specific problem shall be investigated and immediate remedial action shall be taken by the contractor.

14.4 In the case of linked radio networks, the functioning of repeaters and general communication can be tested by radio communication to selected base stations. In other instances, confirmation of radio performance shall be made via telephone line, to persons in control at control centres or by communications to selected base stations as necessary. The contractor shall however devise his own test procedures to suit the specific circumstances.

14.5 The contractor shall record the date and time of each test and shall report on the tests carried out on a regular basis, as required by the client's representative.

14.6 The contractor shall further conduct the following tests, once during every maintenance cycle (Refer to par.3.2).

The signal response from all repeaters to a transmitted reference signal, shall be monitored and measured at a limited number of positions, from which all repeaters can be accessed. Once the positions and parameters for these tests have been established, the tests shall be repeated in a well-controlled manner, with calibrated equipment, during every maintenance cycle and the recorded test results submitted, to monitor deterioration in repeater performance over a period of time. The employer's representative shall be notified when these test are conducted to allow attendance as may be required.

15. Disposal Of Unserviceable Equipment

15.1 All unserviceable radios and radio equipment removed from service, shall be returned to the equipment store and marked for disposal. A written report in an agreed format shall be provided on each radio marked for disposal. The equipment database shall record equipment removed from service for disposal. The contractor shall arrange to have equipment sealed by the ICASA, to meet all statutory requirements.

15.2 Equipment other than radios, removed from service for disposal as part of the maintenance responsibility in terms of this contract, shall be disposed of by the contractor.

15.3 Equipment replaced per variation order to be disposed of, shall be brought back to the contractor's premises for final test and inspection where after the contractor shall dispose of the equipment.

16. Annual Inspection

16.1 The contractor shall make allowance in the price schedule to accompany representatives from the client on an inspection tour of all repeater sites to confirm the condition of sites, once every twelve months.

16.2 The contractor shall allow for his own transport, attendance, accommodation and all other sundry expenses associated with such an inspection tour.

16.3 The time and program for such an inspection tour will be agreed with the contractor in advance.

16.4 Payment will be made to the contractor at the rates entered into the price schedule, only if and when such annual inspection of repeater sites takes place.

16.5 The cost of attendance by the contractor during routine inspection of one or more selected sites on an ad-hoc basis, will not be paid for separately but shall be priced as part of the allowance for routine maintenance of radio equipment.

17. Locks

17.1 The contractor shall provide new padlocks for all equipment huts and security gates for the duration of the maintenance contract. As and when required. All the padlocks shall use the same key. Keys to the locks shall be controlled by the contractor and a limited number of keys shall be issued to authorised representatives of the client and users, as necessary.

17.2 At the end of the contract period, the contractor's locks will become the property of the Province of KwaZulu-Natal and all spare keys shall be handed over.

17.3 The padlocks shall comply with the following:

17.3.1 The locks shall at least meet the Viro Discus Lock security level grading of 6 and shall be designed for outdoor use, exposed to the weather and all types of corrosive environments.

17.4 In cases where sites are rented from others or shared with other radio users, locks installed by other parties will remain in use and the contractor shall be solely responsible to make satisfactory arrangements to gain access to the sites, when required to carry out maintenance and repair work.

18. Radio Licence Application And Radio Licence Fees

18.1 Radio licence fees will be paid directly to the licensing authority by the client.

18.2 If required and when instructed to do so, the contractor shall submit an application to the licensing authority for the issuing of a new licence for an additional frequency or the amendment of an existing licence. The contractor will be paid for the administration of such licence application at rates entered into the price schedule.

19. Applications For Power Supplies

19.1 Communication with any supply authority for the maintenance and/or reinstatement of an existing power supply to a repeater site, shall form part of the contractor's responsibility in terms of the maintenance contract.

19.2 When specifically instructed and agreed, the contractor shall be required to submit a power application for a new power supply to a repeater site. The contractor shall attend to and co-ordinate the installation of such new power supply with the supply authority. Any connection fees charged by the supply authority for the installation of a new power supply, shall be submitted to the client for direct payment to the supply authority.

19.3 Any application for new power supplies shall be made in the name of the Province of KwaZulu-Natal, at an address to be provided to the contractor when necessary.

19.4 The contractor will be paid to submit an application and co-ordinate the installation of a new power supply with the supply authority, at rates entered into the price schedule.

20. Electricity Accounts

20.1 Electricity accounts will generally be paid directly by the client to the relevant supply authority.

20.2 Should it be necessitated, the contractor may be requested to pay certain electricity accounts on behalf of the client.

21. Site Rental

21.1 Where applicable, any site rental payable for the rental of a repeater site will be paid directly to the owner of the site by the Province of KwaZulu-Natal, unless specifically instructed and agreed otherwise.

21.2 In the cases where sites or site space are rented from other parties by the Province, the contractor shall strictly adhere to all conditions of rental imposed by the owner of the site.

22. EIA Squelch Control Systems

22.1 The maintenance contract shall include the maintenance of existing squelch control and switching arrangements, including CTCSS and/or ZVEI (5 tone) tone codes. Refer to repeater data sheets in Annexure 10. Detail of existing frequencies and tone will be made available to the successful tenderer by each user department.

22.2 For tender purposes it shall be assumed that field radios have ANI identification, which shall be maintained where applicable and that CTCSS and/or ZVEI (5 tone) switching is generally used.

23. Landlines And Landline Control Equipment

23.1 In a limited number of cases repeaters are linked by means of landlines and landline equipment as indicated in the data sheets in Annexure 10.

23.2 The maintenance and/or management of landline equipment and landlines shall be included in the maintenance contract, as follows:

23.2.1 The routine maintenance of landline equipment at repeaters and at the control room, as well as equipment up to the operator interface in the control room.

23.2.2 The management of landline services by establishing fault restoration and testing procedures and liaison with Telkom and rendering of assistance to Telkom to re-establish a landline, in case of failure of a communication link to the Telkom termination of the landline at the relevant control room. The management of the landline in case of failure, shall include close liaison with Telkom, on an ongoing basis until the landline is restored.

23.3 The following will be excluded from the maintenance contract:

23.3.1 Power supplies at control rooms.

23.3.2 Any other equipment not directly associated with the specific landline link.

23.3.3 The replacement cost or cost of repair of equipment in control rooms will not be included in the maintenance contract, but shall be carried out as a variation order to the contract, as instructed, or in terms of a separate order placed by the User Department.

1. General

1.1 The construction and development of a number of new radio repeater sites shall, subject to specific instruction to proceed, be carried out by the contractor during the contract period for the maintenance of repeaters.

2. Program For Construction Work

2.1 The commencement of the construction work on site shall be subject to a site survey and written instruction to procure equipment and materials and to proceed with the work on a specific site. The construction of a site shall be completed within a reasonable period of time and in accordance with a program to be agreed with the client's representative.

3. Measurement Of Quantities

3.1 Provisional quantities of material and equipment are measured in the schedule of quantities, Part C2, which will be re-measured, agreed and priced at rates in the schedule, to allow for any variance in the scope of work. After the site survey and finalisation of any further detail necessary, but prior to the commencement of any work, the contractor shall submit a re-measurement of quantities priced at rates in the schedules of quantities to arrive at a firm price, subject only to cost escalation as applicable. Unless significant variance in the quantities of materials take place the cost for the delivery of equipment and materials, transport cost and travelling time will not be re-measureable.

4. Repeater Equipment

4.1 Repeater equipment and antenna systems shall only be installed, as instructed, once the site construction has been fully completed. Each site shall however be fully completed as measured, including DC power wiring from a DC distribution board and the earth conductors from a common earth bar, forming part of the site construction, to 4 repeater positions in the equipment hut.

5. Site Security

5.1 The security of a site under construction shall remain the responsibility of the contractor until the site is completed and handed over to the client. Any unforeseen delay beyond the control of the contractor, to energise the installed power supply to the site, shall however not inhibit the handover of a completed site, provided that all other requirements have been met.

6. Site Rental Or Permission To Occupy

6.1 A site rental agreement or permission to occupy a site will be finalised by the client. Once permission to occupy the site has been obtained, the contractor will be responsible to organise, arrange and manage access to the site for the purposes of construction, while adhering to and respecting any specific rules or arrangements that the site owner may have determined.

7. Cleaning Of The Construction Site

7.1 The contractor shall keep the construction site tidy at all times during construction and shall remove all construction rubble from the site at completion of the site

8. Site Survey And Inspection

8.1 The contractor shall allow to carry out a site inspection and survey after award of the contract and in accordance with a program to be agreed with the contractor. The site survey will be attended by the client's representative as necessary. During the site survey the following shall be carried out:

8.1.1 The position of the site will be determined and shall be pegged by the contractor.
8.1.2 The source of power supply and cable routes will be agreed as necessary.
8.1.3 The contractor shall allow to dig test holes to sufficient depth to confirm that soil conditions will permit excavation and the installation of mast foundations in accordance with the design recommended by the mast manufacturer and submitted by the contractor.
8.1.4 The contractor shall arrange to have a soil resistivity survey done by a specialist contractor and shall afterwards submit the test results with detail of the recommended earth mat, to achieve the specified earth resistance. The depth of soil shall at the same time be determined to confirm that earth electrodes of the required length can be installed.

9. Power Applications

9.1 A power application will be submitted to the supply authority by the client, unless the contractor is specifically instructed to do so and the connection cost payable to the supply authority, will be paid by the client to the supply authority. The contractor shall be responsible to agree a program for the installation of the power supply with the supply authority and shall further co-ordinate the construction program with the supply authority and be in attendance as necessary, to ensure that the power supply is commissioned when the site is handed over.

10. Specifications

10.1 The installations on site, as further detailed below, shall comply with the relevant specifications in Parts 4 and 5 and drawings included with this specification, as listed in Part 5.1, paragraph 24. Unless otherwise agreed and instructed in writing, equipment and materials shall be used as specified and offered in the tender and priced in the schedules of quantities. The following shall be installed:

10.1.1 Antenna Masts

The antenna mast shall be a 21 metre high self-supporting hot dip galvanised steel lattice mast, complete as specified with concrete foundation, in accordance with the mast supplier's approved design.

10.1.2 Radio Equipment Hut

The radio equipment hut shall be a prefabricated, equipped and transportable painted steel container type enclosure, complete with foundations as specified in Part C3.4.11 and shown on drawing D8260/E14/104.

10.1.3 Site Security Fence

The repeater site security fence shall comply with Part C3.4.11 and shall be installed to fence an area of approximately 10 x 10 metres, as will be pegged on site during the site survey.

10.1.4 Earthing

A complete earthing system shall be installed at the repeater site, as shown on schematic drawing D8260/E14/101 and specified in Part C3.4.10, which shall include:

- An air terminal, clamped copper down conductor and earthing of the mast.
- An earth mat and earth connections to achieve the specified earth resistance, based on the specific surveyed soil conditions and the soil resistivity at the site.
- Earthing of all power supply components and surge protection components.

10.1.5 Power Supplies

At sites where a 230 V, 50 Hz power supply is available, the installation shall include:

- An electricity meter panel (as necessary).
- A 10 square mm x 2 core PVC insulated copper, SWA (with ECC) underground power supply cable.
- A distribution board and voltage surge protection in accordance with diagram D8260/E14/105 and as specified for the radio equipment hut in Part C3.4.11.
- A 12 V, battery charger rated at a minimum of 50 A (continuous for 8 hours), as measured in schedule 7.4 and the specified number of 12 V, 220 Ah tubular cell battery banks for each site, as well as a 12 Vdc distribution board as specified for the radio equipment hut.
- All power and earth wiring required by the specification.

At sites where a 230V, 50 Hz power supply is **not available** the installation shall include:

- A complete solar power supply in accordance with the specification in Part 4 and the schematic diagram D7394/E14/102, including solar panels and a support frame, solar regulators and load shed relays to suit the specified battery capacity.
- The specified number of 12 V, 220 Ah tubular cell battery banks for each site, as well as a DC distribution board as specified for the radio equipment hut.
- All power and earth wiring required by the specification.

1. General

1.1 The refurbishment, upgrading and re-establishment of a number of existing radio repeater sites shall, subject to specific instruction to proceed, be carried out by the contractor during the contract period for the maintenance of repeaters.

1.2 It is the intention to have the following sites refurbished and re-instated as detailed in this specification:

1.2.1 Site no 27: Jobskop

Refer to the Bills of Quantities for quantity of works to be done for each site.

2. Jobskop Site (Site No 27)

The refurbishment works to be undertaken at this site are as follows:

2.1 Remove existing damaged mast and antenna equipment.
2.2 Construct a new mast on existing foundations.
2.3 Install new antenna arrays, including new antenna cabling as necessary.
2.4 Test and recommission all equipment within the existing container.
2.5 Install new wind chargers as specified

1. General

1.1 The replacement of radio repeaters, masts and other equipment in number of radio repeater sites (existing, new and refurbished) shall, subject to specific instruction to proceed, be carried out by the contractor during the contract period for the maintenance of repeaters.

1.2 A replacement program will be drawn up in conjunction with the Contractor and works will proceed when instructed to.

1.3 Refer to the Bills of Quantities for quantity of works to be done for each site.

2. Batteries And Battery Chargers- Replacement Program

2.1 The following sites will be fitted with new batteries, chargers and load regulators (refer to Bills of Quantities):

2.1.1	Alverstone	Site No. 1
2.1.2	Dumbe Mountain	Site No. 9
2.1.3	Dundee	Site No. 10
2.1.4	Groenvlei	Site No. 17
2.1.5	Highflats	Site No. 18
2.1.6	Hluhluwe	Site No. 21
2.1.7	Netherby	Site No. 24
2.1.8	Josini	Site No. 28
2.1.9	Kearnsey/Stanger	Site No. 29
2.1.10	Mara Farm	Site No. 34
2.1.11	Worldsview	Site No. 65
2.1.12	Ndwedwe	Site No. 87

3. Antenna Replacement Program

3.1 The following sites (<50km or classed as coastal) will be fitted with new antennas, antenna cables and polyphasers (refer to Bills of Quantities for quantities):

3.1.1	Alverstone	Site No. 1
3.1.2	Hluhluwe	Site No. 21
3.1.3	Josini	Site No. 28
3.1.4	Stanger	Site No. 29
3.1.5	Mara Farm	Site No. 34
3.1.6	Vernon Crookes	Site No. 62
3.1.7	Bluff	Site No. 64

4. Masts Replacement Program

4.1 The replacement of Masts shall comprise works as follows:

- Removing of all antenna equipment off old mast
- Breaking down of old mast and removal thereof

- Modifications of mast foundations or casting of new foundations (as instructed and as necessary) for the installation of a new mast
- Installation of a new mast
- Re-use and installation of existing antenna arrays, excluding cable which is to be replaced in these instances

4.2 Refer to Bills of Quantities for quantities.

4.3 The following sites will have old mast removed and new masts fitted:

4.3.1 Vernon Crookes Site No. 62
4.3.2 Umzinkulu Site No. 81

5. Repeater Equipment – Replacement Program

5.1 A repeater equipment replacement program is envisaged to replace obsolete equipment and upgrade the radio network for future reliability.

5.2 The replacement programme shall be co-ordinated with the contractor and will proceed on a site by site basis as instructed. Refer to the Bill of Quantities for scope of supply.

6. Abnormal Voltage Protection (AVP)

6.1 A 230 VAC rated under and over voltage protection shall be provided for each site and installed on the incoming electrical supply adjacent to the electrical distribution board.

6.2 The AVP system shall comply with the following:

- Adjustable over voltage trip.
- Adjustable under voltage trip.
- Automatic re-close operation upon voltage returning to normal pre-set parameters.
- Status contacts for remote monitoring.

6.3 The proposed system may be a single unit or a unit consisting of necessary components, built into an appropriate enclosure.

6.4 Proposed system shall be of reputable manufacturer with a reference of effective deployment.

1. General

1.1 The user clients would initiate pilot projects on the digital radio systems, separate from this contract.

1.2 Management and monitoring stations shall be provided as part of this contract for the purpose of the pilot projects.

1.3 One station shall be provided for EMS and DOT respectively.

1.4 The system shall monitor and control the digital radio networks via IP network, including for the following functionality:

1.4.1 Dispatching function
1.4.2 Real time monitoring of network
1.4.3 Communications and inscription monitoring and recording
1.4.4 Alarm monitoring and recording

1.5 The front-end access to the system shall be a mimic on screen.

1.6 System hardware shall be as per recommended by system provider.

1.7 Tenderers shall provide detailed information on hardware and system capabilities.

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

PART C4. SITE INFORMATION

C4.1 SITE INFORMATION
GCC FOR CONSTRUCTION WORKS (2 Edition of 2010)

Project title:	**Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network**		
Tender No.	**ZNTM 01190W**	**Project Code:**	**056794; 055620**

C4.1 Site Information

C4.1 GENERAL

(a) The sites are located throughout the Province of Kwazulu-Natal, typically at high sites. Access to such sites are typically difficult.

(b) Access to sites by means of 4x4 vehicles.

(c) Refer to site description as per Annexure 10

C4.2 GEOTECHNICAL INVESTIGATION REPORT

(a) Not applicable

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

PART C5 - DRAWINGS / ANNEXURES

C5.1 - LIST OF DRAWINGS/ANNEXURES

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

Tender No.:	**ZNTM 01190W**	**Project Code:**	**056794; 055620**

(Where drawings/annexure's are issued, document compilers must insert the following paragraph and list the applicable drawings/annexure's below.)

The following drawings/annexure's shall be issued during the Tender period to form part of the tender documentation. Where applicable, drawings/annexure's could be re-issued to the Contractor at commencement of the construction phase.

DRAWING NO	**DESCRIPTION**
D8260/01	Province of KwaZulu-Natal : Repeater Sites
D8260/101	Schematic Diagram: Earthing Arrangement at Radio Repeater
D8260/102	Schematic Diagram: Typical Solar Installation at Repeater
D8260/103	Schematic Diagram: D.C. Distribution Board with meters for
D8260/104	Radio Repeater Housing: Container Type Radio Repeater
D8260/105	Schematic Diagram: Typical 230 V Lightning Protection
D8260/106	Schematic Diagram: Earthing Arrangement for 30 metre Guyed

ANNEXURES	
Annexure 1	Model Preambles for Trades 2008
Annexure 2	General Electrical Specifications
Annexure 3	Lightning Protection Specifications
Annexure 4	Map of Tender submission location
Annexure 5	Joint Venture Agreement
Annexure 6	Health and Safety Specification
Annexure 7	Health and Safety Bill of Quantities
Annexure 8	Builders Lien Agreement
Annexure 9	Abbreviated List of Repeater Sites
Annexure 10	Repeater Site Data - Comprehensive
Annexure 11	Repeater Inspection and Service Report Samples

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

ANNEXURES

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

ANNEXURE 1: MODEL PREAMBLES FOR ALL TRADES

MODEL PREAMBLES FOR TRADES

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A. GENERAL

A.1 APPLICATION OF CLAUSES

These Model Preambles for Trades, and any Supplementary Preambles, shall be read in conjunction with and shall form part of the descriptions of items in the bills of quantities

Where descriptions or Supplementary Preambles in the bills of quantities differ from these Model Preambles for Trades, the descriptions or Supplementary Preambles in the bills of quantities shall take precedence. Where supplementary preambles differ from descriptions in the bills of quantities, the descriptions in the bills of quantities shall take precedence

Except where otherwise stated, all preambles contained in any individual Trade Preamble shall apply equally to any work of a similar nature in all other trades

A.2 ABBREVIATIONS

The following abbreviations shall apply:

AASHTO	–	American Association of State Highway and Transportation Officials
AISI	–	American Institute of Steel Industries
BS	–	British Standard
CKS	–	Coordinating Specifications issued by the Central Coordinating Committee under the auspices of the South African Bureau of Standards
CSIR	–	Council for Scientific and Industrial Research
SANS	–	South African National Standards and the number following shall refer to the relevant specification or code of practice as the case may be

A.3 MATERIALS AND WORKMANSHIP

Materials and workmanship shall be the best of their respective kinds. Only new and undamaged materials shall be used in the Works. Materials to be permanently installed into the works shall not be used for any temporary purposes on site. Work shall be to the approval of the Principal Agent and shall be executed in accordance with the relevant manufacturer's written recommendations and instructions where applicable

A.4 PROPRIETARY PRODUCTS

For the purposes of submission of tenders, rates for items described in the bills of quantities by trade names, catalogue references, etc shall be for the particular type and manufacture specified

The approval of the Principal Agent shall be obtained prior to any substitution and where products or materials etc other than those specified are used, adjustments in the rates will be made if necessary

A.5 ASSEMBLING

Rates for manufactured items shall include assembling complete and handing over in proper working order

A.6 REFERENCES IN DESCRIPTIONS

Any references given in brackets at the end of certain descriptions shall refer to the relevant references on the drawings or schedules

A.7 WATER

Water shall be clean and free from injurious amounts of acids, alkalis, organic matter and other substances and shall be suitable for its intended use

A.8 APPLICATION OF THE NATIONAL BUILDING REGULATIONS

All work shall be executed in accordance with the requirements of SANS 10400

A.9 ACCURACY IN BUILDINGS

The dimensional and positional accuracy of the buildings and their component parts shall comply with Grade II requirements of SANS 10155 unless otherwise stated

A.10 REFERENCES TO OTHER DOCUMENTS

References in these "Model Preambles for Trades" to other documents, including SANS, CKS and BS, shall pertain to the latest edition thereof including all amendments thereto at the date for submission of the tender

B. ALTERATIONS

B.1 ALTERATIONS

In taking down and removing existing work the utmost care shall be observed to prevent any structural or other damage to remaining portions of the building. The Contractor shall ensure the stability of all structures during alteration work

Special care shall be exercised during the progress of the work to ensure that any electrical installations, water supply pipes, telephone and other services which may be encountered are not interfered with and notice shall be given to the Principal Agent if any disconnection or alterations become necessary

The Contractor shall take all precautions necessary to prevent any nuisance from dust whilst carrying out the work

B.2 MATERIALS FROM THE ALTERATIONS, CREDIT, ETC

Materials recovered from the alterations (except where described as to be re-used or to be handed over to the Employer) will become the property of the Contractor, who may allow credit in respect thereof where provided for in the bills of quantities. Such materials shall not be re-used in new work without written permission from the Principal Agent

Materials described as “removed” shall be removed from the site immediately.

Materials described as “handed over to the Employer” shall be carefully dismantled where necessary, neatly stored under cover on the site where directed and protected from damage, until required

Materials described as “set aside for re-use” shall be carefully dismantled where necessary, cleaned, neatly stored under cover and protected from damage until required for re-use. Any damage caused to such materials during removal, storage or refixing shall be made good at the Contractor’s expense

B.3 DISPOSAL OF DEBRIS ETC

The Contractor shall be responsible for the removal from the site of all materials, debris and rubbish resulting from the alterations

B.4 MAKING GOOD DAMAGED WORK

The Contractor shall make good in all trades to existing work where damaged or disturbed through the alterations with all necessary new materials to match the existing

B.5 FORMING NEW OPENINGS OR ALTERING OPENINGS IN EXISTING WALLS

Where new openings are formed or openings altered in existing walls, the wall above the opening shall be broken out and a new brick, in situ concrete or prestressed concrete lintel inserted, complete with all necessary reinforcement, formwork, turning piece, etc, the jambs and portions of openings as described shall be built up with new brickwork or blockwork properly toothed and bonded to existing, cavities of hollow walls shall be closed where necessary and finishes shall be made good all round and into reveals

B.6 BUILDING UP OPENINGS

Where existing openings are given in number as built up, the existing surfaces all round shall be prepared as necessary, brickwork or blockwork properly toothed and bonded to existing, wedged up to underside of existing lintel and finishes shall be made good on both sides

C. EARTHWORKS

C.1 DEMOLITIONS

C.1.1 Nature and extent

Descriptions of demolitions give a rough guide only as to the scope of the work. Tenderers are therefore advised to visit the site before submitting a tender and to acquaint themselves with the nature and extent of the work to be done and the value of recoverable materials which are not to be re-used or handed over to the Employer. Unless otherwise stated, loose furniture, kitchen and other equipment, apparatus, machinery, etc shall remain the property of the Employer and the removal thereof does not fall within the scope of this Contract

The Contractor shall completely demolish the buildings etc in a careful, skilful, practical and safe manner down to 150mm below ground level

Demolitions shall include breaking up and removing:

all floors and surface beds;

all external screen walls, steps, ramps, aprons, surface water channels, rainwater sumps, gulleys, etc attached to the building to be demolished;

all services, manholes, etc in ground to a point not less than 1m beyond the perimeter of the building including plugging off ends of all remaining pipes, drains, etc, filling in holes where necessary and ramming and levelling to ground level

Where only a portion of a building is to be demolished, it shall be done without damage to the remaining portion of the building. Any such damage shall be made good by the Contractor at his own expense

C.1.2 Notices etc

The Contractor shall, before commencing work, obtain all necessary authorisation for carrying out the work, by whatever means including the use of pneumatic equipment or blasting, give all necessary notices and pay all charges and fees in connection therewith. He shall also comply with all regulations pertaining to rodent extermination and he shall obtain the requisite Rodent Extermination Clearance Certificate and pay all necessary fees. All receipts and certificates shall be left in the safekeeping of the Principal Agent. All the abovementioned charges and fees shall be paid by the Contractor and included in his prices

The Contractor shall give ample notice to the Principal Agent and Local Authorities regarding any disconnections necessary prior to the removal or interruption of electrical or telephone cables, water and sanitary services etc

C.1.3 Loss

After the handing over of the site to the Contractor, the full risk of any loss or damage to buildings to be demolished shall be the responsibility of the Contractor and he shall take such precautions as he deems necessary against such loss or damage

C.1.4 Materials from the demolitions, credit, etc

Materials recovered from the demolitions will become the property of the Contractor, who may allow credit in respect thereof where provided for in the bills of quantities. Such materials shall not be re-used in any new work without written permission from the Principal Agent

C.1.5 Disposal of debris etc

The Contractor shall be responsible for the removal from the site of all materials, rubble, debris and rubbish resulting from the demolitions

C.2 SOIL INSECTICIDES

The application of soil insecticides shall be carried out in accordance with “The application of soil insecticides for the protection of buildings” - SANS 10124

C.3 FILLING ETC

C.3.1 **Filling generally**

Filling over site shall be spread, levelled, watered and consolidated in layers not exceeding 300mm

Filling under floors and backfilling to excavations shall be suitable inert material, free from clay, vegetable matter, large stones, etc, having a maximum plasticity index of 10, spread, levelled and compacted to a density of at least 90% Mod. AASHTO

C.3.2 **Hardcore**

Hardcore shall be broken stone or other approved hard material graded from 25mm to 75mm with the finer material on top and shall be spread, levelled and consolidated

C.4 EXCAVATIONS

C.4.1 **Classification of excavated material**

“Hard rock” shall mean granite, quartzitic sandstone or other rock of similar hardness, the removal of which requires drilling, wedging and splitting or the use of explosives

“Soft rock” shall mean hard material the removal of which warrants the use of pneumatic tools and includes hard shale, ferricite, compact ouklip and material of similar hardness

“Earth” shall mean all ground other than that classified as “hard rock” or “soft rock” and shall include made-up ground and any loose stones or pieces of concrete not exceeding 0,03m^3 in volume

D. CONCRETE, FORMWORK AND REINFORCEMENT

D.1 SPECIFICATION FOR CONCRETE WORK GENERALLY

All in situ concrete work (plain and reinforced) shall comply with SANS 1200G supplemented by the following Project Specification. Where SANS 1200G and the Project Specification are in conflict, the Project Specification shall take precedence

Wherever the term "Engineer" appears in SANS 1200G or in the following Project Specification this shall be deemed to mean the Principal Agent's representative responsible for this section of the Works

PROJECT SPECIFICATION

The following amplifications, additions and amendments to SANS 1200G shall constitute the Project Specification. Clause numbers refer to either the existing clauses in SANS 1200G or to new clauses, which are related to the existing clauses

1. **SCOPE**
This clause is amended to include:

1.1 This specification does not cover the methods by which the finished structure is to be measured for the purpose of payment and the "Standard System of Measuring Building Work" shall apply

2. **INTERPRETATIONS**

2.1 **SUPPORTING SPECIFICATIONS**
Clause 2.1(b) shall not apply

2.2 **APPLICATION**
This clause shall not apply

4. **PLANT**

4.5 FORMWORK

4.5.2 **Finish**
Unless otherwise stated the quality of all formwork shall be such that the finished surface of the concrete is "Rough" in terms of clause 5.2.1(a)

5. **CONSTRUCTON**

5.2 FORMWORK

5.2.1 **Classification of Finishes**

(a) **Rough**. No treatment of the surface of the concrete will be required after the striking of the formwork. The finish of the concrete need not be more accurate than Degree of Accuracy III

(b) **Smooth**. Imperfections such as small fins, bulges, irregularities, surface honeycombing and surface discolorations shall be made good and repaired by approved methods. The finish of the concrete shall be accurate to Degree of Accuracy II

(c) **Special**

(i) **Smooth and fair**

This class of finish requires the highest standard of concrete work, formwork, accuracy and technique

Concrete placed in any one structure to give this finish shall be made from cement and aggregates from the same source. The grading of the aggregate shall be kept constant

Formwork shall be metal, wrot timber or other approved material in new condition designed and constructed to suit the particular job in hand and with shutter bolts and joints between panels in a regular pattern approved by the Principal Agent. Joints between panels shall be watertight, but the use of sealing tape which will mark the concrete shall not be permitted

Designated joints shall be in the position and of the details shown upon the working drawings. Should the Contractor wish to incorporate further construction joints or amend the position of those shown to suit his own requirements or technique, this may be allowed provided that all design considerations are met, that the prior approval of the Engineer is obtained and that any extra costs are borne by the Contractor

In the case of horizontal construction joints, the top edge of the concrete on the smooth and fair finished side shall be struck true and level with a trowel

Special care shall be taken to ensure that forms are clean and free of all pieces of tying wire, nails and other debris at the time of concreting

The standard of finish shall be such that upon removal of the formwork, no further treatment, other than treatment of bolt holes if required, shall be found necessary to provide a straight, smooth and uniform finish of good quality and consistent colour and texture, free of all honeycombing etc. Any defect shall be made good by either removing and replacing the defective concrete or, in certain instances only, by patching

5.5 CONCRETE

5.5.1.6 **Prescribed mix concrete**

Where prescribed mix concrete is specified the proportions of constituents, the maximum size of coarse aggregate and the estimated minimum compressive strength shall be as specified in the following table:

Class of Concrete	Estimated minimum compressive strength in MPa at 28 days	Maximum nominal size of coarse aggregate in mm	Proportions of Constituents		
			Cement (Parts)	Fine aggregate (Parts)	Coarse aggregate (Parts)
A	7	37,5	1	4	8
B	15	19	1	3	5
C	20	19	1	2,5	3,5

Cement shall comply with SANS 50917-1 of strength 32,5N or higher

Should cement and aggregates be mixed by volume, the contents of a 50kg sack of cement shall be taken to be 0,033m^3

Notwithstanding the requirements contained in SANS 1200G, the Principal Agent may permit certain items of non-structural concrete to be mixed by hand

If the concrete is mixed by hand, it shall first be mixed in a dry state on a clean non-absorbent surface until it is of uniform colour and consistency. Just enough water shall then be added to permit mixing and working, at which stage the concrete shall continue to be mixed until it is of uniform colour and consistency

5.5.1.7 **Strength concrete**

Where strength concrete is specified it shall be designated by its specified strength followed by the size of stone used in its manufacture, eg 30 MPa/19mm

The water/cement ratio shall be as Table 5 of clause 5.5.1.5 for moderate exposure conditions

5.5.1.8 "**No-Fines" concrete**

"No-fines" concrete shall consist of one part cement to eight parts aggregate graded from minimum 6mm to maximum 13mm size

The quantity of water used shall be just sufficient to form a smooth grout which shall completely coat every particle of aggregate and also to ensure that the grout is just wet enough to form a small fillet at each point of contact between the stones. “No-fines” concrete mixed with excessive water, which results in a thin grout, which drops off the aggregate, will be rejected

“No-fines” concrete shall be placed in its final position within 20 minutes of mixing and shall be placed in continuous horizontal layers. Concrete shall be spade worked sufficiently to ensure that it fills the forms but vibrating, tamping or ramming will not be permitted

5.5.3.2 **Ready-mixed concrete**

The use of ready-mixed concrete and the acceptability of test results from a central concrete production facility shall be subject to the written approval of the Engineer

6. **TOLERANCES**

Degree of Accuracy II shall apply for all work unless otherwise stated

7. **TESTS**

7.1 FACILITIES AND FREQUENCY OF SAMPLING

7.1.2 **Frequency of sampling**

7.1.2.5 The frequency of sampling shall be as directed by the Engineer, but not less than one set of cubes from every 50m³ cast

8. **MEASUREMENT AND PAYMENT**

This clause shall not apply

D.2 AGGREGATES OF LOW DENSITY

Aggregates of low density shall comply with SANS 794

D.3 HOLLOW BLOCKS, PREFABRICATED BLOCK BEAMS AND PLANKS, ETC

Blocks, block beams, planks, etc shall be fixed and supported in such a manner that no movement can take place before or during the casting of concrete. No broken components shall be used

D.4 SUPERVISION

A competent and experienced foreman shall superintend personally the whole of the concrete construction and pay special attention to:

(a) The quality, testing and mixing of materials,
(b) The placing and compaction of concrete,
(c) The construction and removal of formwork and
(d) The sizes and position of reinforcement

The Contractor shall obtain the permission of the Principal Agent before commencing concreting of foundations or reinforced structure

No inspection, approval, authorisation to proceed, comment or instructions following from such an inspection, or failure of the Principal Agent to comment on any particular aspect of the work, shall be deemed to relieve the Contractor in any way from his obligation to ensure through his own supervision that the work is constructed in every way in accordance with the Drawings, Specification and Conditions of Contract, nor relieve him from his obligations to make good any fault or defect, nor shall it be deemed that there is any obligation on the Principal Agent to inspect all or any part of the Works or that such inspection is necessarily complete in every respect

D.5 GENERAL

Concrete

Rates for concrete work shall include all “construction joints” other than “designated joints” as defined in SANS 1200G clause 2.4.3 which are measured separately, and for the design of strength concrete mixes and all testing of concrete and materials other than compressive strength testing of concrete samples taken from concrete being placed in the Works. The Contractor shall only be entitled to payment for those samples and compressive strength tests called for by the Engineer and which pass the test requirements

Surface beds cast in panels shall be cast in panels approximately 9m^2

Formwork

Formwork to slabs and beams shall be cambered where required
Rates for formwork to soffits shall include propping not exceeding 3,5m high unless otherwise described. Formwork to walls and columns is not exceeding 3,5m high above bearing level unless otherwise described

Reinforcement

Standard welded steel fabric reinforcement shall be as included in Table 1 of SANS 1024 and shall have 300mm wide laps.

The mass of binding wire is not included in the mass of the reinforcement and the cost thereof shall be included in the rates for the reinforcement

E. PRECAST CONCRETE

E.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Precast concrete paving slabs SANS 541

Cement, water, aggregates and reinforcement shall be as described under D. CONCRETE, FORMWORK AND REINFORCEMENT

E.2 CONCRETE

Concrete shall be as described under D. CONCRETE, FORMWORK AND REINFORCEMENT and unless otherwise stated shall be prescribed mix concrete Class C but with coarse aggregate of an appropriate size

E.3 MOULDS

Before each casting, moulds shall be coated with a suitable release agent which will not in any way discolour the surface of the finished product or impair its strength. Where items are described as “finished smooth from the mould” or as “precast terrazzo”, moulds shall be made to a high degree of accuracy and shall be such as to leave even and smooth surfaces

E.4 FINISHES TO BLOCKS

Where described as “precast terrazzo”, such surfaces shall have a facing of terrazzo described under O. PLASTERING. The facing shall be poured into the moulds in a wet state (not dry pressed) and thoroughly worked up against finished faces to ensure that it finishes smooth from the mould

Projections shall be rubbed off and faces shall be of even colour and free from blemishes, cracks and other imperfections. Salient angles shall be arris rounded

E.5 CASTING ETC

Items shall be suitably cured, shall not be handled whilst still green and shall not be built in within 21 days of casting

E.6 REINFORCEMENT

Unspecified reinforcement required for manufacturing, handling and erection purposes and for reinforcing projecting and other unwieldy portions of blocks shall be provided by the Contractor at his discretion

E.7 BEDDING, JOINTING AND POINTING

Blocks shall be bedded and jointed solidly in Class I mortar as described under F. MASONRY and shall be pointed with slightly keyed joints

Blocks finished with “precast terrazzo” shall have joints raked out and pointed with slightly keyed joints in tinted waterproofed mortar composed of one part cement and three parts sand to match terrazzo facing

E.8 GENERAL

Precast concrete work shall include reinforcement required for manufacturing, handling and erection purposes, steel rod or wire hooks and/or mortices for lewis bolts required for handling and transporting, any necessary temporary propping and strutting and bedding, jointing and pointing

F. MASONRY

F.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Burnt clay masonry units	SANS 227
Limes for use in building	SANS 523 {Slaked (hydrated) limes}
Aggregates from natural sources – fine aggregates for plaster and mortar	SANS 1090
Concrete masonry units	SANS 1215
Prestressed concrete lintels	SANS 1504
Burnt clay paving units	SANS 1575
Metal ties for cavity walls	SANS 28
Common cement	SANS 50197-1 (Class 32,5N)
Masonry cement	SANS 50413-1 (Class 22,5X)
Concrete masonry construction	SANS 10145
The structural use of masonry	SANS 10164-1
Masonry walling	SANS 10249
Concrete floors	SANS 10109-1&2

F.2 SAND

Sand shall be washed where necessary and screened through a 2,4mm mesh sieve

F.3 BURNT CLAY BRICKS

Burnt clay bricks shall be of nominal size 222 x 106 x 73mm unless otherwise stated

Common bricks shall be General Purpose bricks

Extra hard burnt bricks shall be General Purpose (Special) bricks

Facing bricks shall exhibit a liability to efflorescence not in excess of “Slight” and water absorption when tested in conformity with the requirements of SANS 227 shall not exceed 14%

Particular care shall be taken to preserve arrisses and faces of facing and paving bricks during transit and handling

F.4 CONCRETE BRICKS

Concrete bricks shall have a nominal compressive strength of 8 MPa

F.5 QUARRY TILES ETC

Quarry, cement and similar tiles shall be of approved manufacture, even in shape and size, free from cracks, twists or blemishes and uniform in colour

F.6 WIRE TIES

Wire ties shall be of galvanized steel of the single wire type for solid walls and either the “Butterfly” or Modified PWD type for hollow walls. Ties shall be of sufficient length to allow not less than 75mm of each end to be built into brickwork or embedded in concrete

F.7 BRICKWORK REINFORCEMENT

Brickwork reinforcement shall be manufactured from hard drawn steel wire conforming to BS 785 and shall consist of two 2,8mm diameter main wires with 2,5mm diameter cross wires at 300mm centres welded at intersections

Brickwork reinforcement shall be lapped not less than 300mm at end joints and for a length equal to the width of the widest reinforcement at intersections

F.8 MORTAR

Mortar shall comply with the following table:

1	2	3	4
Mortar Class	Minimum compresive strength MPa	Cement:sand (common cement)	Cement:sand (masonry cement)
I	10	1:4 or 50kg to 130 litres	1:3 or 50kg to 100 litres
II	5	1:6 or 50kg to 200 litres	1:5 or 50kg to 170 litres
III	1,5	1:9 or 50kg to 300 litres	1:6 or 50kg to 200 litres

Mortar shall be Class II unless otherwise specified

Mortar plasticizers may only be used with the approval of the Principal Agent

The materials shall be mixed dry until of uniform colour, water added and the mixture turned over until the ingredients are thoroughly incorporated

Mortar shall be produced in such quantities as can be used before commencement of set and no mortar that has set shall be used

F.9 COMPO MORTAR

Compo mortar shall be Class III mortar in accordance with clause F.8 but with a lime content of 80 litres

The lime and sand shall be mixed dry until of uniform colour, water added and the mixture turned over until the ingredients are thoroughly incorporated. Immediately before use, the cement shall be mixed in and the requisite amount of water added. Compo mortar shall be produced in such quantities as can be used before commencement of set and no compo mortar that has set shall be used

F.10 BRICKWORK

Wherever practicable, brickwork shall be built in stretcher bond. Unless legitimately required to form bond, no false headers shall be used. English bond shall only be used where specifically so indicated or where stretcher bond is not practicable

Brickwork, unless otherwise described, shall be built in Class II mortar

Bricks shall be laid on a solid bed of mortar and all joints shall be grouted up solid

The brickwork shall be carried up in a uniform manner, no part being raised more than 1,2m above adjoining work

Where necessary, bricks shall be wetted before being laid and the course of bricks last laid shall be well wetted before laying a fresh course upon it

Walls in thicknesses of more than one skin shall have at least five wire ties per square metre. Linings to concrete, unless otherwise specified, shall be tied to the concrete with at least five wire ties per square metre

Hollow walls, unless otherwise specified, shall be built of two half brick skins with cavity between, tied together with at least five wire ties per square metre. The cavities shall be kept free of all rubbish, mortar droppings and projecting mortar. Mortar joints to brickwork shall be not less than 8mm or more than 12mm thick

F.11 BLOCKWORK

Unless otherwise described, all blockwork shall be built in stretcher bond. Whole blocks shall be used except where bats or closers are required to form bond. Blockwork, unless otherwise described, shall be built in Class II mortar

Solid blocks shall be laid on a solid bed of mortar and all joints shall be grouted up solid

Hollow blocks shall be laid in shell bedding, ie only the inner and outer shells of the blocks shall be covered with mortar. Vertical joints shall be similarly formed

The blockwork shall be carried up in a uniform manner, no part being raised more than 1,2m above adjoining work

Clay blocks shall be wetted before being laid and the course of blocks last laid shall be well wetted before laying a fresh course upon it

F.12 CENTRES AND TURNING PIECES

Centres and turning pieces to soffits of arches and lintels shall be left in position for not less than 14 days

F.13 FACE BRICKWORK

Face brickwork shall be built in stretcher bond, unless otherwise specified, to a true and fair face. Perpends shall be vertically aligned

Facing bricks shall be mixed to ensure that the proper blending of bricks within the colour range of each facing brick being used is obtained

F.14 PAVINGS, SILLS, COPINGS, ETC

Clay bricks and tiles shall be wetted before fixing and shall be solidly bedded and jointed in Class I mortar and pointed with slightly keyed joints

G. WATERPROOFING

G.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Bituminous damp-proof courses	SANS 248 (Type FV)
Polyolefin film for damp- and waterproofing in buildings (walls, sills, etc)	SANS 952 (Type B)
Polyolefin film for damp- and waterproofing in buildings (floors and basements)	SANS 952 (Type C)
Mastic asphalt for roofing	SANS 297
Mastic asphalt for damp-proof courses and tanking	SANS 298
Bituminous roofing felt	SANS 92 (Type 60)
Polyolefin film for damp- and waterproofing in buildings (flat roofs)	SANS 952 (Type A)
Chloroprene rubber sheet (for waterproofing)	SANS 580
Sealing compounds for the building industry, two-component, polysulphide base	SANS 110 (Type 2 - Gun Grade)
Sealing compounds for the building and construction industry, two- component, polyurethane base	SANS 1077
The waterproofing of buildings (including damp-proofing and vapour barrier installation)	SANS 10021

G.2 WATERPROOFING TO ROOFS, BASEMENTS, ETC

Waterproofing to roofs, basements, etc shall be carried out by workmen who are experienced in this type of work

G.3 DAMP-PROOF COURSE TO WALLS

All joints in damp-proof course to walls shall be lapped a minimum of 150mm except at junctions and corners where the lap shall equal the full thickness of the wall

H. ROOF COVERINGS ETC

H.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Concrete roofing tiles	SANS 542
Clay roofing tiles	SANS 632
Sawn softwood timber battens	SANS 1783-4
Fibre-cement sheets (flat and profiled)	SANS 685
Aluminium alloy corrugated and troughed sheets	SANS 903
Continuous hot-dip zinc-coated carbon steel sheet of commercial, lock-forming and drawing qualities	SANS 3575
Continuous hot-dip zinc-coated carbon steel sheet of structural quality	SANS 4998
Polyolefin film for damp- and waterproofing in buildings	SANS 952
Metal roofing tiles	SANS 1022
Glass-reinforced polyester (GRP) laminated sheets (profiled or flat)	SANS 1150
Fasteners for roof and wall coverings in the form of sheeting	SANS 1273
Materials for thermal insulation of buildings	SANS 1381-1&4
Expanded polystyrene thermal insulation boards	SANS 1508
Fixing of concrete interlocking roofing tiles	SANS 10062
Roof and side cladding	SANS 10237
Sheet zinc	BS 849
Sheet lead	BS 1178
Sheet aluminium	BS 1470
Sheet copper	BS 2870

H.2 GALVANIZED STEEL PROFILED SHEETS ETC

Galvanized steel profiled sheets, ridge and hip coverings, etc shall be coated with a minimum of 275 g zinc per m^2 and shall be free of white rust

H.3 GALVANIZED SHEET IRON

Galvanized sheet iron shall be rolled steel sheet coated on both sides with a minimum of 275 g of zinc per m^2 and shall be free from white rust

H.4 NAILING AND SCREWING

Where nailing and screwing is required:

- galvanized iron nails and screws shall be used for galvanized sheet iron and sheet zinc
- copper or copper alloy nails and screws for sheet copper and sheet lead
- aluminium alloy or stainless steel nails and screws for sheet aluminium

H.5 LAPS

Sheet metal flashings shall have minimum 100mm laps and linings to valleys, secret gutters, etc minimum 225mm laps

H.6 GENERAL

Rates for profiled sheet roofing and rolled edges, ridge and hip coverings, flashing pieces, etc of metal, fibre-cement, plastic, etc shall include fixing accessories

I. CARPENTRY AND JOINERY

I.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Sawn softwood timber : General requirements	SANS 1783-1
Sawn softwood timber : Stress-graded structural timber and timber for frame wall construction	SANS 1783-2
Sawn softwood timber : Brandering and battens	SANS 1783-4
Softwood flooring boards	SANS 629
Hardwood furniture timber	SANS 1099
Hardwood block and strip flooring	SANS 281
Wooden ceiling and panelling boards	SANS 1039
Laminated timber (glulam)	SANS 1460
Gypsum plasterboard	SANS 266
Fibreboard products	SANS 540
Wood-wool panels (cement bonded)	SANS 637
Fibre-cement sheets (flat and profiled)	SANS 685
Fibre-cement boards	SANS 803
Plywood and composite board	SANS 929
Wooden ceiling and panelling boards	SANS 1039
Particle boards	SANS 50312-1to7
Decorative laminates	SANS 4586
Wooden doors	SANS 545
Fire doors	SANS 1253
Materials for thermal insulation of buildings	SANS 1381-1,2,4&6
Expanded polystyrene thermal insulation boards	SANS 1508
Mild steel nails	SANS 820
Metal screws for wood	SANS 1171
Wood-preserving creosote	SANS 539

Softwood shall bear the relevant SABS mark and shall be ordered in the sizes in which it will be used as no scantlings of marked timber will be allowed. Should SABS marked timber be unavailable, the Principal Agent's prior permission shall be obtained before using unmarked timber

I.2 HARDWOODS

All hardwoods shall be specially selected, well seasoned, free from sapwood and well kiln dried. Meranti shall be Red or Medium Brown Meranti, even in grain and colour, selected from "Standard and Better" quality from Malaysia

I.3 INFECTION AND PRE-TREATMENT OF TIMBER

All timber used on the site, whether for permanent or temporary work, shall be free of borer or other beetle and termite infection. If the work under this contract falls within an area designated under Government Notice R2577 of 197812-29, permanent softwood fixed in the building shall be treated against borer etc in accordance with Government Notice R451 of 1969-03-28 using Class B or C preservative

When treated timbers are cut, the cut surfaces shall be effectively brushed with at least two coats of preservative solution

I.4 CONSTRUCTION IN GENERAL

Where applicable, construction methods shall comply with SANS 10082. Wood and laminate flooring shall be installed in accordance with SANS 10043. Roof trusses shall be manufactured, erected and braced in accordance with SANS 10243

I.5 STRUCTURAL TIMBER

Timbers generally shall be in single lengths and jointing of timbers will only be permitted when the required length is unobtainable. Only the absolute minimum of joints to obtain a particular length will be permitted and such joints are to be evenly spaced along the length of the timber

Finger-jointing of structural timber will be permitted, in which case it shall be manufactured in accordance with SANS 10096

I.6 PLATE NAILED TIMBER ROOF TRUSSES

Plate nailed timber roof trusses shall be of approved design and manufacture and constructed with softwood structural timber by a truss Fabricator holding a current Certificate of Competence awarded by the Institute of Timber Construction

Each roof truss shall have all its members accurately cut and closely butted together and rigidly fixed by CSIR approved patented galvanized metal spiked connectors, precision pressed on both sides of each intersection by an approved method, all in accordance with the manufacturer's instructions

The design, manufacture and transportation of the roof trusses, bracing, etc shall be under the control of a registered Structural Engineer in accordance with SANS 1900, SANS 10160 and SANS 10163, who shall, after erection, provide a certificate confirming that the design, manufacture, transportation, erection and bracing has been carried out in accordance with this specification

The design shall include for all live loads, wind loads and for dead loads imposed by roof covering, purlins, ceilings, etc

Fully detailed shop drawings of all trusses etc, indicating sizes, bracing, loading, etc, shall be submitted to the Principal Agent for approval prior to fabrication

Unless specific erection instructions are given, erection shall be carried out in accordance with the procedures and recommendations of the manual "The Erection and Bracing of Timber Roof Trusses" published by the Institute for Timber Construction and the Council for Scientific and Industrial Research or as detailed by the designer

Roof trusses and bracing shall include design and preparation of shop drawings

I.7 TONGUED AND GROOVED BOARDING

Tongued and grooved boards for floors, panelling, etc shall be in long varying lengths with joints tightly cramped up and secret nailed. Flooring boarding shall be flush jointed with staggered heading joints and machine sanded after fixing

I.8 JOINERY

Skirtings, cornices, rails, etc shall be in single lengths wherever practicable and shall have splayed heading joints where
necessary. Skirtings shall be trenched at back

All horns of door frames shall be checked and splayed back where frames are fixed projecting or flush with surface and built in

Heads of screws in exposed faces of hardwood joinery shall be sunk and match pelleted

Joinery shall have arris rounded angles and shall be blocked and planted on

I.9 VENEERS

All face veneers shall be of kiln dried timber, free from knots, cracks, patchwork, sapwood and other defects, selected and glued, dried and machine-sanded to a smooth finish. All veneers shall be applied under hydraulic pressure

I.10 DOORS

Flush doors shall have solid timber edge strips with concealed edges. Where doors are to be finished with a transparent finish, the veneer and the edge strips shall be timber of the same species and as far as possible of matching colour. Unless otherwise described all flush doors shall be of interior quality, but where exterior quality doors are specified the glue used shall be of the WBP type

Framed and ledged batten doors described as filled in with V-jointed boarding shall be filled in flush on one side with tongued and grooved vertical boarding, V-jointed on one or both sides and of the thickness stated. The boarding shall be in narrow widths, closely cramped up, rebated or tongued on outer edges and housed to grooves in stiles and rails and twice countersunk brass screwed at each intersection with ledges and braces and the inner edges of the abutting stiles and rails shall be chamfered to form a V-joint at junction with the board

Unless otherwise described double doors shall have rebated meeting stiles

I.11 FIXING

All nails and screws shall be of the size, length and type appropriate to their respective uses. All screws for hardwood joinery work shall be brass

Items described as “plugged” shall be screwed to fibre, plastic or metal plugs at not exceeding 600mm centres. Where items are described as “bolted”, the bolts have been given separately

I.12 ADHESIVES

Adhesives shall comply with BS 1204 and 4071 where applicable. Adhesives used in the manufacture of external joinery exposed to excessive moisture (eg kitchen and laboratory worktops) shall be of the WBP type

J. CEILINGS, PARTITIONS AND ACCESS FLOORING

J.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Gypsum plasterboard	SANS 266
Fibreboard products	SANS 540
Gypsum cove cornice	SANS 622
Wood-wool panels (cement-bonded)	SANS 637
Sawn softwood timber : Brandering and battens	SANS 1783-4
Sawn softwood timber : Timber for frame wall Construction	SANS 1783-2
Fibre-cement boards	SANS 803
Plywood and composite board	SANS 929
Wooden ceiling and panelling boards	SANS 1039
Materials for thermal insulation of buildings	SANS 1381-1&4
Expanded polystyrene thermal insulation boards	SANS 1508
Raised access flooring	SANS 1549

J.2 TONGUED AND GROOVED BOARDING

Tongued and grooved boarding for ceilings shall be in long varying lengths, V-jointed one side and with joints tightly cramped up and secret nailed

J.3 CEILINGS ETC

J.3.1 **Brandering**

Brandering for ceilings and eaves soffit coverings shall be symmetrically arranged with necessary smaller panels. Main branders shall be at right angles to roof timbers, with cross branders cut in between and branders shall be fixed with galvanized wire nails driven in on skew alternately in opposite directions

J.3.2 **Ceiling boards**

Ceiling boards shall be in long lengths symmetrically arranged with necessary smaller panels, closely butted and secured at 150mm centres to brandering with galvanized or cadmium-plated clout-headed nails

J.4 GYPSUM SKIM PLASTER

Gypsum skim plaster shall be pure gypsum plaster finished with a steel trowel

J.5 EXPOSED TEE-SYSTEM SUSPENDED CEILINGS

The ceiling panels shall be as described in the items and the panels shall be stiffened at back as recommended by the manufacturer to prevent bowing or sagging

The exposed surfaces of all ceiling panels and supporting members shall be uniform in colour and free from surface blemishes

The suspension grid system shall be an approved patent suspension system comprising 38mm galvanized steel main and cross tee bearers spaced in both directions at centres to suit sizes of ceiling panels used, with the cross bearers fitted between and notched to form flush fit with main bearers. The exposed flange of the tees shall be 25mm wide, covered with a rolled aluminium cap painted a low sheen satin white. Cornices etc shall be as described in the items and shall be finished to match the exposed tees

The main tee bearers shall have holes for cross tees at 300mm centres and holes for hangers at 50mm centres. In addition, main and cross tee bearers shall be holed as necessary for and provided with timber wedges or steel clips where recommended by the manufacturer to prevent ceiling panels from lifting

The web of the exposed cross tee bearers shall extend to form a positive interlock with the main tee bearers and the lower flange shall be cut back to provide a joint free appearance

All hangers shall be galvanized and shall be at centres to meet the requirements of the specification with one end fixed to the suspension grid main bearers and the other end fitted with suitable galvanized fixing cleat securely fixed to the structure. Fixing points shall be agreed to by the Principal Agent before any power shot fixings are made. Hangers shall not be suspended from air-conditioning ducts. Where recommended by the manufacturer, hangers shall be of the rigid type

Component parts and fixings shall be non-corrosive and able to withstand atmospheric pollution. Surfaces of aluminium which are in contact with other materials when fixed, particularly metals, shall be suitably insulated to prevent electrolytic corrosion

Ceilings shall comprise hangers, suspension grid system and ceiling panels, shall be constructed in a manner suitable for carrying air-conditioning diffusers and light fittings in the positions required, shall be set out to layouts approved by the Principal Agent and shall have the standard suspension systems modified as necessary to work around any pipes or light fittings

J.6 FLUSH PLASTERED SUSPENDED CEILINGS

Gypsum plasterboard panels of the specified thickness generally in 1200mm widths and in long lengths shall be fixed grey side down with self-tapping screws to the suspension system with the joints between boards loosely butt jointed and covered with 50mm wide strips of self-adhesive fibre tape

The plasterboard panels shall be finished with gypsum skim plaster trowelled to a smooth polished surface to the thickness etc recommended by the manufacturer

The suspension system shall be an approved patent concealed suspension system consisting of galvanized mild steel bearers suspended on approved non-rusting metal hangers spaced generally at 1200mm centres or to suit layout of air-conditioning ducts and other services etc above ceiling with one end bolted to the bearer and the other end fitted with a galvanized fixing cleat securely fixed to the structure as required

Fixing points shall be agreed to by the Principal Agent before any power shot fixings are made. Hangers shall not be suspended from air-conditioning ducting

Ceilings shall comprise hangers, suspension system, ceiling panels and plaster finish, shall be constructed in a manner suitable for carrying air-conditioning diffusers and light fittings in the positions required, shall be set out to layouts approved by the Principal Agent and shall have the standard suspension system modified as necessary to work around any pipes or light fittings

K. FLOOR COVERINGS, WALL LININGS, ETC

K.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Semi-flexible vinyl floor tiles	SANS 581
Resin modified vinyl floor tiles	SANS 586
Flexible vinyl flooring	SANS 786
Hardwood block and strip flooring	SANS 281
Wood mosaic flooring	SANS 978
Textile floor coverings (pile construction)	SANS 1375
Textile floor coverings (needle-punched construction)	SANS 141
Carpet underlays	SANS 1419
The installation of wood and laminate flooring	SANS 10043
The installation of resilient thermoplastic and similar flexible floor covering materials	SANS 10070
The installation of textile floor coverings	SANS 10186
Sheet linoleum (calendered types), cork, carpet and linoleum tiles	BS 810
Solid rubber flooring	BS 1711
Felt backed linoleum	BS 1863

K.2 LAYING OF MATERIAL

Floor tiles shall be laid with continuous joints in both directions

Patterned floor coverings shall be matched at joints

K.3 GENERAL

Floor coverings, wall linings, skirtings, nosings, etc shall include all preparatory work to screeded or plastered surfaces etc, priming coats and adhesives

Floor coverings and wall linings shall be dressed around and into corners. Wood block and wood mosaic flooring shall be sanded with a sanding machine and sealed with a coat of approved penetrating sealer

Plastic handrails shall have welded and polished butt joints

L. IRONMONGERY

L.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Locks, latches and associated furniture for doors. (Domestic type)	SANS 4
Kitchen cupboards: Built-in and free-standing	SANS 1385
Single action closers	SANS 1510
Padlocks	SANS 1533
Fasteners	SANS 1700
Chalk writing boards for schools	CKS 36

L.2 KEYS

Locks shall have the minimum possible number of interchangeable keys. Cylinder locks and locks described as "en suite" shall be clearly marked with consecutive numbers and each key shall be punched with the corresponding number of the relative lock

L.3 FIXING

Unless otherwise described, ironmongery is to be fixed to wood

Items described as "plugged" shall be screwed to fibre, plastic or metal plugs

Screws, bolts, etc for fixing of ironmongery shall be of matching metal and finish, except for aluminium ironmongery or ironmongery fixed to aluminium in which cases stainless steel screws may be used

All necessary preparation of pressed steel door frames for the fixing of ironmongery to the frames has been included with the pressed steel door frames

L.4 KITCHEN CUPBOARDS

Steel cupboards shall be finished with baked enamel. Tops of floor cupboards shall have laminated plastic covering

Cupboards shall be fitted with all necessary hinges, handles, catches, etc. Cupboards shall be securely fixed with all necessary screws and fibre, plastic or metal plugs

Where cupboards are described as a "series", tops shall be continuous and cupboards shall be bolted or screwed together, including bolts, screws, holes, etc

M. STRUCTURAL STEELWORK

M.1 SPECIFICATION

All structural steelwork shall comply with SANS 1200H or 1200HA as applicable. Structural fasteners shall comply with
SANS 1700

Whenever the term “Engineer” appears in SANS 1200H or 1200HA or in the following Project Specification this shall be deemed to mean the Principal Agent’s representative responsible for this section of the Works

M.2 PROJECT SPECIFICATION INCORPORATING AMPLIFICATIONS, ADDITIONS AND AMENDMENTS TO SANS 1200H AND 1200HA

The following amplifications, additions and amendments to SANS 1200H and SANS 1200HA shall apply and clause numbers refer to either the existing clauses in the relevant SANS or to new clauses which are related to the clauses therein

SANS 1200H

3.1.1 **Weldable structural steel**

Weldable structural steel shall comply with SANS 1431

5.1.2 **Contractor provides shop details**

The Contractor shall be responsible for the preparation of all shop detail drawings

5.1.3 **Engineer provides shop details**

This clause shall not apply

5.3.9 **Protective treatment**

Structural steelwork shall be cleaned and prepared by wire brushing in accordance with SANS 10064 and all surfaces shall be primed as specified to a minimum dry film thickness of 30 micrometres before leaving the workshop. Upon delivery to the site and again after erection all bared surfaces shall be made good with similar primer

8. **Measurement and payment**

This clause shall not apply

SANS 1200HA

5.2.10 **Protective treatment**

Structural steelwork shall be cleaned and prepared by wire brushing in accordance with SANS 10064 and all surfaces shall be primed as specified to a minimum dry film thickness of 30 micrometres before leaving the workshop. Upon delivery to the site and again after erection all bared surfaces shall be made good with similar primer

5.3.7 **Repairs to paint and site painting**
This clause shall not apply

8. **Measurement and payment**

This clause shall not apply

N. METALWORK

N.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Fasteners	SANS 1700
Expanded metal	SANS 190-1&2
Windows and doors made of rolled mild steel sections	SANS 727
Hot-dip galvanized zinc coatings on fabricated iron and steel articles	SANS 121
Strongroom and vault doors	SANS 949
Anodized coatings on aluminium (for architectural applications)	SANS 999
Steel door frames	SANS 1129
Mushroom- and countersunk-head bolts and nuts	SANS 1143
Welding of metalwork	SANS 1044
Adjustable glass-louvred windows	CKS 413
Aluminium sheet and strips	BS 1470
Aluminium extruded tube and hollow sections	BS 1474
Aluminium bars and sections	BS 1476

N.2 STEEL

Steel shall be mild steel of approved commercial quality. Steelwork shall be cleaned and prepared by wire brushing in accordance with SANS 10064 and given one coat of primer as specified before leaving the workshop

N.2.1 **Galvanizing of steel**

Steelwork described as “galvanized” shall be galvanized by means of the hot-dip process after fabrication. Where welding on site is unavoidable, such welded joints shall be cleaned down and cold galvanized to approval

N.3 STAINLESS STEEL

Stainless steel shall be AISI Type 304 stainless steel and shall be buffed to an even satin finish. Stainless steel screws shall be used for fixing stainless steel

N.4 ALUMINIUM

Aluminium extrusions shall be of 6063-T6 alloy and temper. Aluminium sheet and strips shall be of 1200-H4 alloy and temper.
Joints in all aluminium members shall be formed in an approved manner so that the joints are practically invisible. Screw heads, pins, rivets, etc shall be concealed as far as possible. 300 Series stainless steel screws and bolts shall be used for jointing and fixing aluminium work

The surfaces of all aluminium which are in contact with other materials when fixed shall be suitably insulated with a non-absorbent insulating material to prevent corrosion. All aluminium work shall be suitably protected against damage, deterioration or discolouration caused by mortar droppings, paint, etc by taping with removable tape, covering with temporary casings or by covering with motor oil

N.4.1 **Anodizing of aluminium**

Aluminium described as “anodized” shall be treated with Grade 25 coating thickness for exterior use or Grade 15 for interior use as specified, to the required finish. All alloys to be anodized shall be suited to anodizing

N.5 BOLTS AND NUTS

Nuts shall be of at least the strength grade appropriate to the grade of bolt or other threaded element with which they are used

N.6 SCREWING OF METALWORK TO STEEL, WOOD, CONCRETE, ETC

Metalwork described as “screwed” to steel, wood, etc or “plugged” to brickwork, concrete, etc shall be fixed at not exceeding 500mm centres, with necessary holes, countersinking, threading, screws, set screws, self-tapping screws and fibre, plastic or metal plugs

N.7 BOLTING OF METALWORK

Where metalwork is described as “bolted” to steel, wood, brickwork, concrete, etc the bolts are measured elsewhere

N.8 WELDING OF METALWORK

All welds shall be cleaned and filed or ground off smooth to approval. All welded joints shall be continuous

N.9 METALWORK GENERALLY

Metalwork shall have all sharp edges ground smooth. Tubular and pipe work shall include running joints. Rails etc described as “continuous” shall be in long lengths with welded joints

N.10 PRESSED STEEL DOORS, FRAMES, ETC

N.10.1 **Door frames**

Frames shall project not less than 20mm into floor finish. Except where described as galvanized, frames shall be primed as specified before leaving the factory. Frames are to jambs and heads of openings. Frames for single doors shall be provided with two 100mm steel butt hinges and an adjustable striking plate for a mortice lock and frames for double doors shall be provided with four 100mm steel butt hinges. Butt hinges shall be steel butts with loose pins, welded to frames. Where necessary mortar caps shall be welded to frames and back plates shall be welded on behind tappings for screws

N.10.2 **Cupboard door frames**

Cupboard door frames shall be as described in N.10.1, but with thresholds of unequal channel section, two 100mm steel butt hinges to hanging stiles, two 75mm steel butt hinges to hanging stiles above transoms, necessary striking plates for mortice locks and keeps for barrel bolts

N.10.3 **Combination doors and frames**

Combination doors and frames shall be manufactured of 1,6mm thick steel plate. Frames shall be as described in N.10.1. Doors shall be standard design and required profile, with a 44mm wide edge all round, vertical reinforcing ribs pressed in and with two reinforcing rails welded on. The door shall be provided with two lever mortice lock with lock box welded to inside. Doors shall be welded to steel butts

N.10.4 **Transformer room doors and frames**

Transformer room doors and frames shall be manufactured of 1,6mm thick steel plate. Frames shall be as described in N.10.1. Doors shall be of standard design with a 44mm wide edge all round, vertical reinforcing ribs pressed in and with three reinforcing rails welded on. Single doors shall be fitted with a padlock cleat and two 100mm brass pintle hinges and double doors shall be fitted with a padlock cleat, two 150mm bolts and four 100mm brass pintle hinges. Each leaf shall be fitted with a louvered ventilation panel of standard design backed with 6mm mesh galvanized wire vermin proof screen

N.10.5 **Sizes**

The frame widths given refer to unfinished wall thicknesses

N.10.6 **Glazing beads**

Where specified, glazing beads shall be 12 x 12mm standard metal glazing beads mitred at angles and countersunk screwed on at not exceeding 300mm centres with self-tapping screws

N.11 STEEL WINDOWS, DOORS, ETC

N.11.1 **Windows, doors, etc**

All fittings to windows, doors, etc shall be chromium plated. Fixed lights and opening sashes shall be in single squares. Windows etc of single unit construction shall have weather bars at transoms above opening sashes

Composite windows not of single piece construction shall be coupled with standard coupling mullions and transoms that correspond with the window section used

Kicking plates and panels shall be 1,6mm metal plate fixed with standard metal glazing beads mitred at angles and countersunk screwed on at not exceeding 300mm centres with self-tapping screws

Except where described as galvanized, windows, doors, burglar bars, etc shall be primed as specified before leaving the factory

N.11.2 **Burglar bars and flyscreens**

Where windows are described as fitted with burglar bars or flyscreens, these shall be standard type fitted over opening sashes

N.12 ADJUSTABLE LOUVRE UNITS

Adjustable louvre units shall be suitable for hand or longarm operation

Louvre units shall include glass louvres with polished edges and installation, including holes, screws, rivets, preparation of openings, etc

N.13 ALUMINIUM WINDOWS AND DOORS

The foregoing preambles “N.4 – ALUMINIUM” shall apply to aluminium windows, doors, etc in all respects in so far as they are applicable. Aluminium windows and doors shall be manufactured from extruded aluminium members of 6063T6, 6261-T6 or 6082-T6 alloy and temper

Ancillary members such as sills, flashings, infill panels and the like formed from flat sheet material shall be of an appropriate alloy selected from 1200, 3004 or 5251 complying with BS 1470 of a temper suitable for the method of forming and a composition suitable for anodizing or painting as required

Windows, doors, etc shall be of an approved standard system, manufactured by an approved firm experienced in this type of work, and shall meet with the minimum recommended performance requirements as set out by the Association of Architectural Aluminium Manufacturers of South Africa (AAAMSA) in the latest edition of the Selection Guide

The fittings for all opening sashes shall be substantial and, unless otherwise described, shall be of high quality aluminium alloy finished to match the windows, doors, etc on which they occur. Samples of all fittings shall be supplied to the Principal Agent for approval

Top, side and bottom hung opening sashes shall be hung on two aluminium hinges with 300 Series stainless steel pins, nylon bushes and stainless steel washers. Side hung sashes shall have fasteners and sliding stays, top hung sashes shall have peg stays and bottom hung sashes shall have spring catches and concealed arms

Projected out sashes shall have aluminium fasteners and concealed arms of a non-corrosive material compatible with aluminium

The frames which are to be built into openings in brickwork shall be fitted with the manufacturer’s standard type fixing lugs, not less than 20 x 3 x 150mm long, screwed to frame and placed one near each corner and intermediately not more than 450mm apart to sides, top and bottom and where fixed to concrete reveals, wood sub-frames or to preformed openings in brickwork shall have countersunk holes for screws, one near each corner and intermediately not more than 450mm apart to sides, top and bottom

N.13.1 **Glazing beads**

Where so described, openings and sashes of windows and doors shall be fitted with approved channel section aluminium glazing beads sufficient in size and profile to suit the method of glazing employed, finished to match the windows, doors, etc and neatly mitred. Screws where necessary shall be of aluminium or 300 Series stainless steel and have pan or raised heads finished to match the beads

N.13.2 **Finishes**

Windows, doors, etc described as “anodized” shall be treated with Grade 25 coating thickness. Windows, doors, etc described as “factory painted” shall have an electrostatically applied oven baked polyester paint coating not less than 25 micrometres thick

N.13.3 **General**

Aluminium windows, doors, etc shall include glass as described, fixing in position, sealing and protection against damage, deterioration or discolouration by taping with removable tape or covering with temporary casings or motor oil and removing same on completion

N.14 STRONGROOM AND RECORD ROOM DOORS

Strongroom and record room doors shall not be built in as the work proceeds, but shall be fixed later in the openings provided. The Contractor shall ensure that the lock or other important parts of the door are not tampered with. Should any such tampering occur, the Contractor will be held responsible and at the Principal Agent’s discretion shall provide a new door or lock and keys at his own expense. The keys shall not be delivered together with the doors to the building site. The Contractor shall arrange for the manufacturer to send the keys direct to the Principal Agent per registered post. If these instructions are not complied with, a new lock and keys shall be provided by the Contractor at his own expense

N.15 STEEL ROLLER SHUTTERS

Roller shutters shall be of approved manufacture comprising curtain, vertical channel guides and top mechanism. The curtain shall be constructed of 1mm thick machine-rolled galvanized interlocking slats with mild steel end locks spot welded to alternate strips. The bottom shall be provided with a galvanized rail riveted on and vertical edges shall slide in galvanized channel guides formed of steel not less than 2,5mm thick bolted to sides of openings

The mechanism shall be covered in a galvanized sheet iron box. The ungalvanized sections shall be primed as specified before leaving the factory

O. PLASTERING

O.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Common cement	SANS 50197-1(Class 32,5N)
Masonry cement	SANS 50413-1(Class 225X)
Limes for use in building	SANS 523 {Slaked (hydrated) limes}
Aggregates from natural sources – Fine aggregates for plaster and mortar	SANS 1090

O.2 PREPARATORY WORK

Surfaces shall be clean and free of oil and thoroughly wetted directly before any plastering or other in situ finishes are commenced. Concrete surfaces shall be slushed with a mixture of one part cement and one part coarse sand or otherwise treated to form a proper key. Preparatory coats shall be thoroughly scored and roughened to form a proper key

O.3 FINISH

All coats of paving and plastering shall be executed in one operation without any blemishes

O.4 SCREEDS

Screeds shall be composed of one part cement and four parts sand

O.5 CEMENT RENDER

Cement render shall be composed of one part cement and three parts sand finished with a steel trowel to a smooth polished surface and cured for at least seven days after laying

Cement render finish shall be divided into panels not exceeding $6m^2$ with V-joints and deep trowel cuts

O.6 GRANOLITHIC

Granolithic shall be composed of one part cement, one part fine sand, two parts coarse sand and one part granite or other approved stone aggregate that will pass through a 5mm sieve, finished with a steel trowel to a smooth polished surface and cured for at least seven days after laying

Coloured granolithic shall be carried out in two coats in one operation and shall be tinted to the required colour with approved colouring pigment mixed into the finishing coat. Under no circumstances is the pigment to be sprinkled on and trowelled in after the granolithic is laid

Granolithic shall be divided into panels not exceeding $6m^2$ with V-joints and deep trowel cuts

O.7 TERRAZZO

Terrazzo shall be applied in two coats. The undercoat shall be composed of one part cement and three parts sand and shall be finished with a wooden float. The finishing coat shall be composed of one part cement and two parts marble or stone aggregate of a colour and size to obtain the required colour and texture and shall be at least 12mm thick, and applied before the undercoat has dried out. The finishing coat shall be compacted by tamping or rolling until superfluous water has been expelled, finished with a steel trowel and cured for at least seven days after laying. The finished surface shall show at least 80% of the aggregate

Surfaces described as “polished” shall be polished by machine using various grades of abrasive and grouting with tinted cement as necessary between polishings

Surfaces described as “polished” shall be polished by machine using various grades of abrasive and grouting with tinted cement as necessary between polishings

Surfaces described as “brushed” shall be brushed with a steel wire brush on the day the terrazzo has been laid to expose the aggregate as required

Where required, brass or other dividing strips shall be embedded in the undercoat to finish flush with the finished surface

Three sample blocks, each size 300 x 300mm, as separately measured shall be prepared for approval by the Principal Agent and kept in an accessible place on the site until the completion of the contract

O.8 SKIRTINGS

Skirtings shall not exceed 25mm thick and shall have a fair edge with arris or rounded external angle at top edge or V-joint to finish flush with plaster and coved or square junction with floor finish

O.9 THICKNESS OF PLASTER

All plaster, other than skim plaster, shall be not less than 10mm and not more than 20mm thick

O.10 CEMENT PLASTER

Cement plaster shall comply with the following table:

1	2	3
Plaster Class	Cement:sand (common cement)	Cement:sand (masonry cement)
I	1:4 or 50kg to 130 litres	1:3 or 50kg to 100 litres
II	1:6 or 50kg to 200 litres	1:5 or 50kg to 170 litres
III	1:9 or 50kg to 300 litres	1:6 or 50kg to 200 litres

O.11 COMPO PLASTER

Compo plaster shall be composed of one part cement, two parts lime and nine parts sand

O.12 GYPSUM SKIM PLASTER

Gypsum skim plaster shall be pure gypsum plaster finished with a steel trowel

O.13 TWO COAT PLASTER WITH GYPSUM FINISH

Two coat plaster with gypsum finish shall comprise an undercoat of Class II cement plaster finished with a wooden float and a finishing coat of gypsum skim plaster

O.14 ROUGH-CAST PLASTER

Rough-cast plaster shall be applied in two coats. The undercoat shall be composed of one part cement and five parts sand finished with a wooden float. The finishing coat shall be composed of one part cement and three parts stone aggregate that will pass through a 4mm sieve. The finishing coat shall be flicked on with a machine before the undercoat has set to obtain an even texture

O.15 FINE ROUGH-CAST PLASTER

Fine rough-cast plaster shall be as for rough-cast plaster but the finishing coat shall be composed of one part cement and three parts coarse sand

0.16 GENERAL

Rates for plastering described as being on vertical surfaces of brickwork or blockwork shall include concrete columns, beams and lintels flush with the face of the wall

P. TILING

P.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Glazed ceramic wall tiles and fittings	SANS 22
Ceramic wall and floor tiles	SANS 1449
Common cement	SANS 50197-1(Class 32,5N)
Masonry cement	SANS 50413-1(Class 22,5X)
Aggregates from natural sources – Fine aggregates for plaster and mortar	SANS 1090
The design and installation of ceramic tiling	SANS 10107

P.2 TILES, MOSAICS, ETC

Tiles, mosaics, etc shall be even in shape and size, free from cracks, twists or blemishes and uniform in colour

P.3 PREPARATORY WORK

Surfaces shall be clean and free of oil and thoroughly wetted directly before any tiling is commenced. Concrete surfaces shall be slushed with a mixture of one part cement and one part coarse sand or otherwise treated to form a proper key

P.4 CERAMIC WALL AND FLOOR TILING

Where tiles are fixed to plaster or screeds with an adhesive, the adhesive shall be as recommended by the manufacturer of the tiles. Joints shall be straight, continuous and flush pointed with an approved grouting compound

P.5 GENERAL

Tiling described as “on walls” is on brick walls or block walls unless otherwise stated and shall include concrete columns, beams and lintels flush with the face of the wall

Q. PLUMBING AND DRAINAGE

Q.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Sheet metal

Sheet zinc	BS 849
Sheet aluminium	BS 1470
Sheet copper	BS 2870

Rainwater systems

Unplasticized poly(vinyl chloride) (PVC-U) components for external rainwater systems	SANS 11

Pipes and fittings

Steel pipes : Pipes suitable for threading and of nominal size not exceeding 150mm	SANS 62
Plain-ended solid drawn copper tubes for Potable water	SANS 460
Malleable cast iron fittings threaded to ISO 7-1	SANS 4
Polyethylene (PE) pipes for water supply – Specifications	SANS 4427
Cast iron fittings for asbestos cement pressure pipes	SANS 546
Vitrified clay sewer pipes and fittings	SANS 559
Reinforced concrete pressure pipes	SANS 676
Concrete non-pressure pipes	SANS 677
Cast iron pipes and pipe fittings for use above ground in drainage installations	SANS 746
Unplasticized poly(vinyl chloride) (PVC-U) sewer and drain pipes and pipe fittings	SANS 791
Fibre-cement pipes, couplings and fittings for sewerage, drainage and low-pressure irrigation	SANS 819
Pitch-impregnated fibre pipes and fittings and jointing	SANS 921
Unplasticized poly (vinyl chloride) (PVC-U) pressure pipe systems	SANS 966-1
Unplasticized poly(vinyl chloride) (PVC-U) soil, waste and vent pipes and pipe fittings	SANS 967
Rubber joint rings (non-cellular)	SANS 974-1
Copper-based fittings for copper tubes	SANS 1067-1&2
Fibre-cement pressure pipes and couplings	SANS 1223
Polypropylene pressure pipes	SANS 1315
Non-metallic waste traps	SANS 1321-1&2
Vent valves for drainage installations	SANS 1532
Heavy duty cast iron pipe fittings for drainage and gas and water supplies	BS 78

Lead pipes	BS 602
Cast iron pressure pipes for use in drainage and gas and water supplies	BS 1211
Stainless steel pipes for use with compression fittings	BS 4127
Sanitary fittings etc	
Stainless steel sinks with draining boards (for domestic use)	SANS 242
Stainless steel wash-hand basins and wash troughs	SANS 906
Stainless steel sinks for institutional use	SANS 907
Stainless steel stall urinals	SANS 924
Acrylic sanitary ware : Baths	SANS 1402-1
Glazed ceramic sanitary ware	SANS 497
WC flushing cisterns	SANS 821
Flush valves for WC flushing cisterns	SANS 1509
Taps, valves etc	
Water taps (metallic bodies)	SANS 226
Water taps (plastic bodies)	SANS 1021
Single control mixer taps	SANS 1480
Float valves	SANS 752
Plastic floats for ball valves	SANS 1006
Functional control valves and safety valves for Domestic hot and cold water supply systems	SANS 198
Cast iron gate valves for waterworks	SANS 664
Automatic shut-off flush valves for water closets and urinals	SANS 1240
Check valves (flanged and wafer types)	SANS 1551-1&2
Fire extinguishers	
Portable refillable fire extinguishers	SANS 1910
Portable rechargeble fire extinguishers : Halogenated hydrocarbon type extinguishers	SANS 1151
Water heaters and fire hose reels	
Fixed electric storage water heaters	SANS 151
Fire hose reels (with semi-rigid hose)	SANS 543
Drainage covers, gratings, etc	
Cast iron surface boxes and manhole and inspection covers and frames	SANS 558
Cast iron gratings for gullies and stormwater drains	SANS 1115
The installation of polyethylene and poly (vinyl chloride) (PVC-U and PVC-M) pipes	SANS 10112
Water supply and drainage for buildings	SANS 10252-1&2

Cast iron step irons BS 1247

Q.2 GENERAL

Q.2.1 Excavations

Excavations shall be deemed to be in “earth”. Backfilling to excavations shall be executed in 300mm thick layers, watered and compacted. Surplus excavated material shall be spread and levelled over site as directed

Q.2.2 Concrete

Unreinforced concrete shall be Class B prescribed mix concrete and reinforced and precast concrete shall be Class C prescribed mix concrete

Q.2.3 Brickwork

Brickwork shall be of extra hard burnt bricks built in Class I mortar

Q.2.4 Plaster

Plaster shall be 1:3 cement plaster finished smooth with a steel trowel. All angles shall be rounded

Q.2.5 Diameters of pipes etc

Diameters stated for pipes, traps, valves, etc are internal diameters except PVC, polyethylene, stainless steel and copper pipes and traps for which external diameters are stated

Q.3 SHEET METAL WORK

Q.3.1 Galvanized sheet iron

Galvanized sheet iron shall be rolled steel sheet coated on both sides with Class Z275, unless otherwise specified, zinc coating complying with SANS 3575/4998. Sheets shall be free from white rust

Q.4 EAVES GUTTERS

Q.4.1 Galvanized sheet iron gutters

Galvanized sheet iron gutters shall have beaded edges and all joints shall be riveted and soldered. Angles shall be strengthened with 50 x 0,6mm galvanized sheet iron strips soldered on over the internal faces of mitres

Gutters shall be fixed with falls to outlets on 30 x 3mm galvanized mild steel brackets, bent to the shape of gutters, with front ends taken up to the underside of beaded edge of gutter and each screwed to roof timbers or bolted to fibre-cement fascias with 6mm galvanized gutter bolts. Gutters shall be bolted to brackets at front with 6mm galvanized gutter bolts, one to each bracket

Brackets shall be positioned at joints of gutters and intermediately at not exceeding 1,25m centres

Q.4.2 Fibre-cement gutters

Fibre-cement gutters shall have spigot and socket joints. Gutters shall be fixed with falls to outlets on standard aluminium alloy brackets, screwed or bolted to roof timbers or fascias

Q.4.3 Unplasticized polyvinyl chloride (UPVC) gutters

Gutters shall be fixed with falls to outlets on brackets as supplied by the manufacturer, screwed or bolted to roof timbers or fascias

Q.4.4 Aluminium gutters

Aluminium gutters shall be roll formed on site to required lengths and profiles from 3003H14-3SH4 alloy strip not less than 0,7mm thick factory coated on both sides with baked enamel and two coats of silicone modified polyester to a total minimum thickness of 20 micrometres. Angles, stopped ends, etc shall be prefabricated units pop riveted to gutters with joints sealed with mastic. The guttering shall be in continuous lengths between angles, stopped ends, etc

Q.5 RAINWATER PIPES

Q.5.1 Galvanized sheet iron pipes

Galvanized sheet iron pipes shall have seams at the back and shall be jointed with soldered slip joints. Pipes shall be fixed to walls etc with galvanized mild steel holderbats spaced at not exceeding 2m centres with tails driven in or cut and pinned in 1:3 cement mortar

Q.5.2 Fibre-cement pipes

Fibre-cement pipes shall have spigot and socket joints. Pipes shall be fixed to walls etc with standard aluminium alloy holderbats with tails driven in or cut and pinned in 1:3 cement mortar

Q.5.3 Unplasticized polyvinyl chloride (UPVC) pipes

Pipes shall be fixed to walls etc with patented UPVC or aluminium clips and holderbats as supplied by the manufacturer of the pipe

Q.5.4 Aluminium pipes

Aluminium pipes and fixing straps shall be formed from 3003H14-3SH4 alloy strip not less than 0,7mm thick factory coated on both sides as described for aluminium gutters. Pipes shall be in continuous lengths with formed angles, offsets, shoes, etc. Pipes shall be fixed to walls etc with 20 x 0,6mm straps at not exceeding 1,5m centres screwed to 25 x 75 x 100mm hardwood chamfered and oiled blocks plugged to walls

Q.6 STORMWATER CHANNELS

In-situ concrete stormwater channels shall be constructed of unreinforced concrete with segmental channel formed in top. Channels shall be laid to falls on a well rammed earth bottom and finished smooth on exposed surfaces

Precast concrete channels shall be of 25 MPa concrete, generally in 1m lengths, finished smooth from the mould on exposed surfaces, laid to falls on a well rammed earth bottom, jointed in 1:3 cement mortar and pointed with keyed joints

Q.7 JOINTS

Joints of pipes not covered by SANS shall be as follows:

Pipes	Joints
Fibre-cement, concrete, pitch-impregnated fibre and vitrified clay pipes for use under ground in non-pressure pipe lines	Flexible joints in accordance with the manufacturer's instructions
Cast iron for use above ground	Spigot and socket joints with tarred rope yarn and caulking compound or Plain ended joints with stainless steel couplings with neoprene rubber sleeves
Cast iron for use below ground	Spigot and socket joints with tarred rope yarn and caulking compound
Galvanized mild steel	Joints of screwed galvanized steel sockets or bolted galvanized iron flanges Screwed joints with plastic jointing tape or hemp Flanged joints which shall be bolted and provided with rubber gaskets and with flanges screwed to pipes
Joints between pipes of different materials shall be as follows:	
Between cast iron and mild steel	Spigot and socket joints with tarred rope yarn and caulking compound
Between cast iron and clay	Spigot and socket joint with semi-dry cement caulking and 1:2 cement mortar fillet
Between mild steel or copper and clay	Spigot and socket joint with either bitumen or semi-dry cement caulking and 1:2 cement mortar fillet

Q.8 FIXING OF PIPES

Pipes shall be fixed as follows:

Q.8.1	Galvanized mild steel (except those stated in Q.8.3)	To walls with galvanized mild steel brackets for pipes not exceeding 80mm diameter and with galvanized cast iron hinged holderbats with brass pins or bolts for pipes exceeding 80mm diameter; both types with tails cut and pinned in 1:3 cement mortar To woodwork with screw-on type galvanized mild steel holderbats
Q.8.2	Copper and stainless steel	To walls with brass holderbats or screw-on type two- piece spacing clips for pipes not exceeding 75mm diameter and with purpose made holderbats for pipes exceeding 75mm diameter; both types with tails cut and pinned in 1:3 cement mortar To woodwork with screw-on type brass holderbats
Q.8.3	Cast iron and galvanized mild steel for soil, waste and vent pipes	To walls with hinged cast iron holderbats with brass bolts and with tails cut and pinned in 1:3 cement mortar To woodwork with screw-on type galvanized mild steel holderbats
Q.8.4	Polyethylene, polypropylene and patented UPVC or unplasticized polyvinyl chloride	To walls, woodwork, etc with aluminium clips and holderbats as supplied by the manufacturer of the pipes
Q.8.5	Fibre-cement	To walls with aluminium alloy holderbats with tails cut and pinned in 1:3 cement mortar

Q.8.6	Pipes fixed to ceilings	Fixed with holderbats and standard or purpose made hangers, with extended hangers for pipes to falls

Q.9 PIPES LAID IN GROUND

Q.9.1 **Water pipes etc**

Water pipes, gas pipes, etc laid in ground shall be at least 400mm deep from the crown of the pipe to the finished surface

Q92 **Drain pipes**

Excavations taken out too deep shall be filled in with selected soil and compacted. Backfilling to sides and up to 300mm above plastic pipes shall be free from stone or hard substances which will not pass a 10mm mesh

Q.10 CLEANING EYE LIDS

Cleaning eye lids for drain pipe fittings shall be fixed and sealed as follows:

Pipe fittings	**Method of sealing and fixing**
Fibre-cement	Sealed with synthetic rubber or bituminous mastic packing and fixed with screws
Vitrified clay	Polypropylene lid sealed with synthetic rubber packing and pressed into position
Polypropylene and unplasticized polyvinyl chloride	Sealed with synthetic rubber packing and screwed on or pressed into position
Cast iron	Sealed with tallow or putty and fixed with non-ferrous metal screws
Galvanized malleable cast iron and cast brass	Sealed with synthetic rubber packing and screwed in

Q.11 CLEANING EYES

Cleaning eyes shall consist of cast iron frames and lids with letters “CE” (or “SO”) cast in lids. The lids shall be secured with non-ferrous metal screws. Frames shall be jointed to vertical drain pipes. Cleaning eyes shall be encased in unreinforced concrete taken up to ground level and plastered on exposed surfaces

Q.12 INSPECTION EYE MARKER SLABS

Inspection eye marker slabs shall be 350 x 350 x 50mm thick precast concrete finished smooth from the mould, with letters “IE” (or “IO”) formed in top and placed flush in ground or paving

Q.13 GULLEYS

Gulleys shall be built up of traps, vertical piping and gulley heads with loose gratings, all encased in unreinforced concrete to finish flush with gulley head top and taken up to at least 50mm above surrounding finished surfaces. The outer top edge of the concrete encasing shall be splayed and the exposed surfaces plastered

Q.14 DISHED GULLEYS

Dished gulleys shall be built up of traps, vertical piping and gulley heads with loose gratings, all encased in unreinforced concrete and with dished unreinforced concrete hopper size 450 x 450mm overall around gulley head with rounded kerb 50mm wide to front and sides and 25mm wide at back, 100mm high above top of dishing and the hopper plastered on exposed surfaces. Top of hopper shall be taken up to at least 50mm above surrounding finished surfaces

Q.15 SUMPS, CATCHPITS, INSPECTION CHAMBERS, ETC

Q.15.1 **Rainwater sumps**

Rainwater sumps shall be built with half-brick sides on 100mm thick unreinforced concrete bottom, plastered internally on walls and with 80mm high unreinforced concrete kerb at top rebated for grating or cover and plastered on exposed surfaces

Q.15.2 **Stormwater catchpits and inspection chambers**

Brick catchpits and inspection chambers shall be built with one-brick sides on 150mm thick unreinforced concrete bottom projecting 100mm beyond walls all round, plastered internally on walls and with 100mm thick reinforced concrete cover slab with opening rebated for frame of grating or cover and plastered on exposed surfaces

Precast concrete catchpits and inspection chambers shall be constructed in accordance with the applicable details shown on Drawing LE-1 of SANS 1200LE. Precast concrete manhole sections and slabs shall comply with SANS 1294 and pipes shall be SC type and in accordance with SANS 677

Q.15.3 **Sewer inspection chambers**

Brick inspection chambers shall be built as for brick stormwater inspection chambers and with the bottom of the chamber well benched around half round channels, bends, junctions, etc up to sides of chamber in unreinforced concrete finished smooth

Precast concrete inspection chambers shall be constructed in accordance with the applicable details shown on Drawing LD-5 of SANS 1200LD. Precast concrete manhole sections and slabs shall comply with SANS 1294 and the pipes shall be SC type in accordance with SANS 677

Q.15.4 **Stormwater drain junction boxes**

Junction boxes shall be formed of 150mm thick unreinforced concrete bottom and sides to suit the various sizes of the drain pipes and built after the pipes have been laid, with the sides taken up slightly higher than the highest pipe and finished level on top for and covered with a 75mm thick loose precast concrete slab

Q.15.5 **Step irons**

Where inspection chambers exceed 1,2m deep, cast iron step irons shall be provided, built into the wall at 300mm centres and staggered regularly in vertical rows spaced at 200mm centres horizontally

Q.16 STOPCOCK AND METER BOXES

Stopcock and meter boxes shall be built with half-brick sides with a cast iron box and lid complying with SANS 558 set in 75mm wide unreinforced concrete kerb for the full depth of the cast iron box and plastered on exposed surfaces

Q.17 VALVE CHAMBERS

Valve chambers shall be built with half-brick sides with 100mm thick unreinforced concrete kerb to top with rebate for cover and frame to finish flush with adjacent paving or finished ground level and plastered on exposed surfaces

Q.18 CAST IRON COVERS, GRATINGS, ETC

All cast iron covers, gratings, frames and surface boxes shall be coated with preservative solution. Frames shall be cast into concrete. Covers, except covers to stormwater drainage or electrical cable inspection chambers, shall be set in grease

Q.19 CONCRETE ENCASING

Concrete encasing for pipes, bends, traps, gulleys, grease traps, etc shall be unreinforced concrete not less than 100mm thick all round

Q.20 SANITARY FITTINGS

Q.20.1 General

Glazed ceramic, acrylic and porcelain enamelled sanitary fittings and component parts shall be white. Accessories for sanitary fittings shall be chromium plated brass

Waste outlets for baths, basins, etc shall comprise chromium plated brass waste union with grating, rubber washers and locknut, fitted with rubber or vulcanite plug on a chromium plated brass chain and stay

Q.20.2 Stainless steel sanitary fittings

Stainless steel sinks and draining boards, basins, wash troughs and urinals shall be AISI Type 304 satin finished stainless steel. All stainless steel fittings shall be treated on the back with a vermin proof sound deadening coating. Sinks, basins and wash troughs shall be provided with 40mm diameter screwed waste outlets

Q.20.3 Precast concrete wash troughs

Reinforced precast concrete wash troughs shall have a sloping front with ribbed rubbing surface and shall be finished smooth on exposed faces with top edges and inner angles rounded. Each compartment shall be fitted with a 40mm diameter waste outlet. Wash troughs shall each be supported on two reinforced precast concrete pedestals finished smooth on exposed faces

Q.20.4 Steel baths

Steel baths shall be porcelain enamelled internally and painted externally and fitted with waste outlet and overflow grating with coupling

Q.20.5 Acrylic resinous baths

Acrylic resinous baths shall be fitted with waste outlet and overflow grating with coupling

Q.20.6 Acrylic resinous wash hand basins

Acrylic resinous wash hand basins and vanity units shall have a smooth high gloss finish, with outlet openings, soap recesses, tap-holes and integral overflow and shall be fitted with waste outlet and overflow grating with coupling

Q.20.7 Glazed ceramic sanitary fittings

Sinks shall be provided with integral weir overflows

Washdown closet pans shall have washdown action and be provided with smooth finished injection moulded polypropylene heavy duty double flap seats fixed with non-ferrous bolts. Urinal channels shall be provided with outlet gratings fitted in bitumen

Q.20.8 Flush and sparge pipes

Flush pipes for high level cisterns shall be of plastic or drawn galvanized steel

Flushpipes for low level cisterns shall be of plastic

Flush and sparge pipes for urinals with high level cisterns shall be of chromium plated copper piping and of the sizes recommended by the manufacturer of the urinal

Q.21 INSTALLATION OF SANITARY FITTINGS

Sanitary fittings shall be installed as follows:

Q.21.1 Precast concrete wash troughs

Precast concrete wash troughs shall be bedded on top of pedestals which shall be bedded on floors in 1:3 cement mortar

Q.21.2 Stainless steel wash troughs and wash hand basins

Stainless steel wash troughs and wash hand basins shall be fixed to walls on a pair of galvanized mild steel gallows brackets bolted to wall with 6mm diameter expanding bolts

Q.21.3 **Acrylic resinous wash hand basins**

Acrylic resinous wash hand basins shall be fixed to walls on a pair of standard painted cast iron brackets screwed to underside of basin and bolted to wall with 6mm diameter expanding bolts

Q.21.4 **Ceramic wash hand basins**

Ceramic wash hand basins shall be fixed to walls on a pair of standard painted steel or cast iron brackets bolted to wall with 6mm diameter expanding bolts

Q.21.5 **Acrylic resinous baths**

Acrylic resinous baths shall be bedded in 1:5 cement mortar on three cross rows of bricks or bedded solid on a layer of dry river sand and fixed to wall with galvanized steel brackets under edges (in the middle of the sides against walls) bolted to wall with 6mm diameter expanding bolts and sealed along top against wall finishes with patent mildew resistant silicone rubber

Q.21.6 **Washdown closet pans and cisterns**

Washdown closet pans shall be bedded on floors in 1:3 cement mortar. Cisterns shall be fixed to walls with 6mm diameter expanding bolts

Q.21.7 **Ceramic urinals**

Ceramic stall and slab urinals shall be bedded on floors and against walls in 1:3 cement mortar. Slabs, channels, treads, etc shall be jointed in 1:3 cement mortar and pointed in white cement

Ceramic bowl urinals shall be fixed to walls on standard steel brackets bolted to wall with 6mm diameter expanding bolts. Cisterns shall be fixed to walls on standard brackets bolted to wall with 6mm diameter expanding bolts

Q.21.8 **Stainless steel urinals**

Stainless steel stall and slab urinals shall be bedded on floors in 1:3 cement mortar and with backs and sides against walls filled in with fine unreinforced concrete. Cisterns shall be fixed as cisterns for ceramic urinals

Q.22 FIRE HOSE REELS

Fire hose reels shall each be fitted with a 30m long hose of internal diameter not less than 19mm with a 4,8mm internal diameter chromium plated brass nozzle

Q.23 FIRE EXTINGUISHERS

All fire extinguishers shall be fully charged

Q.24 TESTS

Sewerage pipe lines, sanitary plumbing including fittings and hot and cold water supply and fire service shall be tested to the approval of the Principal Agent and Local Authority

The Contractor shall provide all testing apparatus, material and labour required for the tests and inspections

R. GLAZING

R.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Glass in building	SANS 50572-1 to 5
Glazing putty for wooden and metal window frames	SANS 680
Silvered glass mirrors for general use	SANS 1236
Safety and security glazing materials for buildings	SANS 1263-1 to 3
Sealing compounds for the building industry, one Component, silicone-rubber based	SANS 1305
The installation of glazing materials in buildings	SANS 10137
Work on glass for glazing	SANS 1817

R.2 PUTTY ETC

Glazing putty shall be Type I for wooden sashes and Type II for steel sashes. Putty for glazing to unpainted hardwood shall be tinted to match the colour of the wood

Back putty shall not exceed 3mm thick. Putty shall not be painted until it has formed a surface crust, and if the putty does not form a surface crust it shall be replaced

Butyl putty shall be used where glass is to be fixed in aluminium sashes with glazing beads

Non-setting compounds shall be used where laminated glass is fixed in sashes with glazing beads

S. PAINTWORK

S.1 MATERIALS AND WORKMANSHIP

Materials and workmanship shall comply with the following standards:

Decorative paint for interior use	SANS 515
Decorative high gloss enamel paints	SANS 630
Primers for wood (for external work)	SANS 678
Primers for wood (for internal work)	SANS 678
Zinc phosphate primer for steel	SANS 1319
Undercoats for paints (except emulsion paint)	SANS 681
Aluminium paint	SANS 682
Varnish for interior use	SANS 887
Emulsion paints	SANS 1586

Materials for paintwork shall be delivered to the site in unopened containers and applied in accordance with the manufacturer's instructions. Materials shall be suitable for application to the surfaces concerned. Undercoats shall be as
recommended by the manufacturer of the finishing coats

S.2 PREPARATORY WORK

S.2.1 **Plastered surfaces etc**

Plastered surfaces shall be thoroughly inspected and, if necessary, washed down and brushed in order to remove any traces of efflorescence and allowed to dry completely before any paint finish is applied. Before any paint is applied, holes, cracks and irregularities in plaster and other surfaces shall be filled with a suitable filler and finished smooth. Unfinished concrete surfaces shall have all projections rubbed off and shall be thoroughly cleaned with a spirits-of-salts solution (1 part concentrated spirits-of-salts to 4 parts water)

S.2.2 **Metal surfaces**

Metal surfaces shall be sanded, where necessary, washed with a suitable cleaning agent and left smooth

Protective coatings applied by manufacturers to galvanized metal surfaces shall be removed with a suitable agent and the surfaces washed down

Rust, grease and defective factory primers on metal surfaces, as well as pitch on cast iron pipes, shall be removed

S.2.3 **Wood surfaces**

Knots in woodwork shall be treated with knotting. Minor blemishes shall be filled with a suitable filler. Wood surfaces shall be sanded smooth

S.3 APPLICATION OF PAINT

Primers to wood surfaces shall be applied by brush. Primers to other surfaces may be applied by roller with the approval of the Principal Agent. Undercoats and finishing coats may be applied by brush or roller

Paint shall not be sprayed on except in the case of cellulose and other special paints where spray painting is the accepted method of application

Before subsequent coats of paint are applied the previous coat shall be properly dry and shall be sanded down where necessary

S.4 COLOUR SCHEME

A colour scheme comprising colours and the blending of colours approved by the Principal Agent shall be used for the paintwork. The tints of the undercoats shall closely match the finishing coat but nevertheless differ sufficiently to indicate the number of undercoats. Colour samples of the finishing coats shall be provided in all cases

S.5 GENERAL

Paintwork shall include the preparation of surfaces, filling, stopping, sanding and priming of nail heads and screws. Where windows, sashes, etc are to be painted, the rebates of the openings to be glazed shall be primed

T. PAPERHANGING

T.1 PREPARATORY WORK

Plaster surfaces to be papered shall be dry, thoroughly cleaned down, filled with a suitable filler as necessary to obtain a smooth surface and painted thereafter with a single coat of emulsion paint

Wood surfaces to be papered shall be knotted, stopped and sanded

T.2 PAPERHANGING

Wallpaper shall be hung in vertical long lengths. Vertical joints shall be close-fitted and plumb and the paper shall be tightly fitted to skirtings, ceilings, door frames, windows, etc. Horizontal joints will not be allowed

U. EXTERNAL WORKS

U.1 GENERAL

U.1.1 Excavations

Excavations shall be deemed to be in “earth”

U.2 LANDSCAPING

U.2.1 Topsoil

Topsoil shall vary between sandy loamy soil and sandy clayey soil with an ideal composition of 15% to 25% clay, 10% silt/sludge and 65% to 75% sand, with a minimum ratio of organic material of 2%. All material shall be free of harmful deposits as well as unwanted seeds

U.2.2 Compost

Compost shall be composed of properly decayed organic material, free from harmful deposits, salts, seeds and other waste material and shall have a pH of more than 4 and less than 7

U.2.3 Mulch

Mulch shall be approved organic material free from small particles of bark residue, fungus, disease, etc

U.2.4 Lime

Lime shall be agricultural lime of an approved manufacture

U.2.5 Fertilizer

Fertilizer shall be of the type specified, mixed thoroughly into the soil as prescribed. No fertilizer shall be added more than two weeks prior to planting

U.2.6 Backfilling

Backfilling in plant and tree holes shall be composed of two parts topsoil to one part compost mixed thoroughly together and compacted by foot in 100mm layers. Fertilizer shall only be added if prescribed

U.2.7 Pebbles

Pebbles shall be smooth with a uniform colour and form and ranging in size from 50mm to 75mm diameter. Removal of pebbles from river beds shall be done selectively to avoid any major disruption to the ecology of the river and environment

U.2.8 Plant material

U.2.8.1 General

All plant material (plants, shrubs, trees, etc) shall be obtained from a registered nursery and shall be free from damaged parts, parasites, fungus, other plant diseases or insects. No container-bound plants will be acceptable

U.2.8.2 Trees

The height of trees described in the bills of quantities shall be measured from the top of the root ball to the top of the tree. Where trees are pruned, such prune wounds shall not be more than 25mm in diameter and be sealed with an approved sealing compound

U.2.8.3 Shrubs and small plants

Shrubs and small plants shall meet the requirements for height and spread as specified. Thin or sparsely branched plants shall not be accepted. Branches shall be well spread with ample young branches and the plant as a whole shall be growing well

U.2.8.4 Groundcover

Groundcover shall be dense and healthy and shall comply with the minimum requirements for leaf density as specified

Formal grass shall be planted as runners in 50mm deep drills at 150mm centres unless otherwise described

U.2.9 **Cultivation and preparation of planting areas etc**

All surface rocks and stones larger than 50mm shall be removed before commencing cultivation and preparation. The entire area shall be ripped and rotavated using approved machinery by breaking up the earth to a depth of 300mm at 600mm centres in both directions, unless otherwise described, and then levelled. Where fertilizer or compost is specified, it shall be worked into the topsoil after ripping and rotavation to a depth of 300mm and finished to final levels

All fertilizer to areas to be grassed shall be strewn on the final layer before final finishing is commenced and worked mechanically into the top 150mm soil

U.2.10 **Planting procedure**

Holes for shrubs and groundcover shall be as follows:

Shrubs – 500 x 500 x 500mm deep

Groundcover – 300 x 300 x 300mm deep (if not planted in drills)

Holes for trees shall be square, of adequate size to accommodate the root system and suitable for the height of the tree

All plant material shall be watered thoroughly before careful removal from the container and planted in the prescribed planting medium with the top of the soil in the container finishing level with the surrounding area. Water dams size 800mm diameter x 150mm deep and 500mm diameter x 150mm deep shall be formed around trees and shrubs respectively and all planting material shall be watered immediately after planting. Trees, shrubs, etc shall be properly staked or stayed, depending on their size, on the prevailing windy side with patent tree ties

U.2.11 **Maintenance**

All planted areas shall be maintained for a period of three months after practical completion as defined in the contract with the exception of hydroseeded areas which shall be maintained for 12 months after an acceptable cover has been obtained

This maintenance shall consist of keeping clear of weeds and litter, loosening soil where necessary every two weeks, replacing damaged, diseased or dead plants, pruning, cutting and mowing as necessary and watering so as to keep the plant material in a healthy growing condition

U.3 ROADWORK

U.3.1 **Filling**

Filling under roads etc shall be of inert material having a maximum plasticity index of 10, free from large stones etc spread, levelled, watered and compacted in layers not exceeding 200mm thick to a density of 98% Mod AASHTO

U.3.2 **Preparation of sub-grade**

The sub-grade shall be prepared by scarifying for a depth of 150mm and compacting to a density of 98% Mod. AASHTO, including trimming to the correct levels and grades

U.3.3 **Base course**

The base course shall consist of crusher run stone compacted to a density of 98% Mod. AASHTO and finished to the correct levels and grades

U.3.4 **Weed killer**

The completed sub-grade shall be treated with an approved total weed killer

U.3.5 **Bituminous premix road surfacing**

Before spreading the premix material, the base course shall be swept clean and free from all dust, dirt and loose particles, lightly wetted and sprayed with a prime coat of cutback bitumen complying with SANS 308 at the rate of 1 litre/m^2

The material shall consist of semi-gap graded crushed stone aggregate having the following grading:

Sieve size (mm)	% By mass passing sieve
13,2	100
4,75	45-60
2,36	42-55
1,18	40-52
0,3	25-45
0,075	5-12

The aggregate shall be mixed with bituminous road tar binder complying with SANS 748 at the rate of 1m3 of stone to 120 litre of emulsion at atmospheric temperature

The binder shall be added to the stone and mixed until the stone is uniformly coated. Thereafter 5% of clean, dry quartzitic sand shall be added and mixed until evenly distributed through the mixture

The premix shall be applied only after the primer has dried out completely and shall be spread immediately after mixing and rolled on the same day

Spreading shall be done evenly over the prepared base course to a loose depth sufficient to ensure the consolidated thickness specified

Rolling shall commence as soon as the binder has set sufficiently, followed after three days by a final rolling

U.3.6 **Precast concrete block road surfacing**

Paving blocks shall be precast concrete blocks complying with SANS 1058

Blocks shall be laid to true levels and grades on and including a 25mm thick layer of river sand with joints exceeding 2mm and not exceeding 6mm wide

After laying, the paving shall be compacted by means of a vibrating plate compactor, with joints between the blocks filled in, after compaction, by sweeping in fine sand

Infill areas at edges of paving constituting less than 25% of a full block unit and of 25mm minimum dimension shall be filled with Class C prescribed mix unreinforced concrete with top surface trowelled smooth to match blocks. Smaller areas shall be filled with 1:4 cement mortar

U.3.7 **Precast concrete kerbs and channels**

Precast concrete kerbs and channels shall comply with SANS 927, generally in 1m lengths and finished smooth from the mould on exposed surfaces. Kerbs and channels shall be bedded on and jointed in 1:3 cement mortar and pointed with keyed joints. Bases to kerbs shall be Class B prescribed mix unreinforced concrete

U.3.8 **Process control tests**

The Contractor shall be responsible for carrying out all necessary process control tests on the density and moisture content of the compacted sub-grade, base course, etc to ensure that the required compaction is being attained

U.4 FENCING ETC

U.4.1 **Materials**

Materials and workmanship shall comply with the following specifications and requirements :

Wooden poles, droppers, guardrail posts and spacer blocks	SANS 457-2&3
Zinc-coated fencing wire	SANS 675
Prefabricated concrete components for fencing	SANS 1372
Chain-link fencing and its wire accessories	SANS 1373

Fasteners	SANS 1700
Anti-intruder fences	CKS 451
Metal droppers and standards	CKS 451

U.4.2 **Galvanized wire**

All galvanized wire shall be zinc coated wire with Class B zinc coating. Straining wire shall be 4mm diameter galvanized mild steel wire. Tie wire shall be 1,6mm diameter galvanized mild steel wire

U.4.3 **Plastic coated wire**

Plastic coated straining wire shall be 3,15mm diameter Class C galvanized mild steel wire plastic coated to an overall diameter of 3,95mm

Plastic coated tie wire shall be 1,8mm diameter Class C galvanized mild steel wire plastic coated to an overall diameter of 2,5mm

U.4.4 **Galvanized barbed wire**

Galvanized barbed wire shall be 2,5mm diameter mild steel double strand reverse twist zinc coated barbed wire with Class A zinc coating

U.4.5 **Galvanized wire mesh**

Galvanized wire mesh shall be 50mm mesh chain link netting of 2,5mm diameter Class C galvanized mild steel wire

U.4.6 **Plastic coated wire mesh**

Plastic coated wire mesh shall be 50mm mesh chain link netting of 2,5mm diameter Class C galvanized mild steel wire plastic coated to an overall diameter of 3,25mm

U.4.7 **Galvanized welded wire mesh**

Galvanized welded wire mesh shall be fabricated from pre-galvanized wires to rectangular pattern welded together at each intersection using a welding method which forms a zinc oxide protective coating at each intersection

U.4.8 **Razor wire**

Razor wire shall be fabricated from 2,5mm diameter galvanized high tensile steel wire fitted with razor barbs formed of 0,5mm galvanized steel strip clipped on at 37,5mm centres

U.4.9 **Metal droppers and standards**

Droppers shall be of ridged T-section mild steel with a mass of not less than 0,55kg/m. Standards shall be of I- section mild steel with a mass of not less than 3kg/m or of ridged edge Y-section mild steel with a mass of not less than 2,5kg/m, and shall be driven 600mm deep into the ground

Droppers and standards shall have either galvanized, sprayed metal or painted finish as described in the items and in accordance with CKS 451. In addition, those surfaces of standards embedded in the ground shall be coated with bitumen

U.4.10 **Metal posts and stays**

Posts and stays shall comply with CKS 451 and shall be of black galvanized mild steel tubing as specified

Straining posts shall be of 108mm outside diameter x 3mm wall thickness tubing, each with a 300 x 300 x 5mm thick mild steel sole plate and a steel cap welded on

Intermediate posts shall be of 50mm outside diameter x 2,5mm wall thickness tubing, each with a 230 x 230 x 5mm thick mild steel sole plate and a steel cap welded on
Stays for straining posts shall be of 50mm outside diameter x 2,5mm wall thickness tubing, each with a 230 x 230 x 5mm thick mild steel sole plate welded on and fixed raking with top end flattened, bent, holed and bolted to straining post with and including a 5mm diameter galvanized mild steel bolt with nut and washer

Posts and stays shall have either galvanized or painted finish as described in the items and in accordance with CKS 451. In addition, sole plates and portions of posts and stays embedded in ground shall be coated with bitumen

U.4.11 **Timber posts, stays and droppers**

Timber posts shall be 125mm diameter, timber stays shall be 100mm diameter and timber droppers shall be 30mm diameter

U.4.12 **Prestressed concrete posts and stays**

Prestressed concrete posts and stays shall be finished smooth from the mould and uniformly stressed by means of high tensile longitudinal prestressing wires with concrete cover to wires of not less than 20mm

Corner and straining posts shall be 100 x 100mm and intermediate posts and stays shall be 75 x 75mm. Stays shall be fixed raking with top end splayed and glued to posts with a suitable epoxy compound

U.4.13 **Bolts, nuts and washers**

Straining eye bolts, hinge bolts, bolts, nuts and washers shall be galvanized

U.4.14 **Precast concrete fencing**

Precast concrete fencing over sloping terrain shall be stepped to suit terrain, including the use of increased lengths of posts as necessary, excavation, etc

U.4.15 **Concrete bases**

Bases in ground for posts, stays, etc shall be of Class B prescribed mix concrete with tops 100mm below surface of ground

Sizes of concrete bases for posts, stays, etc shall be as follows:

Straining and gate posts	–	450 x 450 x 700mm deep
Intermediate posts	–	300 x 300 x 600mm deep
Stays	–	600 x 300 x 500mm deep

U.4.16 **Security overhangs**

Where fencing is described as having a security overhang, the posts and standards shall have angular (single arm) extension arms

Extension arms shall be attached to the posts and standards by welding in the case of steel and by spiking in the case of timber

Concrete extension arms shall be cast integrally with the post or standard

Barbed wire to security overhangs shall be tightly strained and wired at each intersection with extension arms and shall have barbed wire braces at 450mm centres between standards, posts, etc wired onto the barbed wire and the top straining wire

U.4.17 **Gates**

Gates shall be formed of 40mm outside diameter x 2,5mm wall thickness mild steel tubular framework with welded joints, strongly braced as necessary and filled in with wire mesh as described above, properly strained and securely bound to framework with tie wire

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ANNEXURE 2: GENERAL ELECTRICAL SPECIFICATIONS

GENERAL ELECTRICAL SPECIFICATION

(ALL IN CONTRACTS)

1. CONDUIT AND CONDUIT ACCESSORIES

1.1 Conduit

Conduit shall be of steel galvanised internally and externally, either solid drawn, or welded and not less than 20 mm diameter, with all rough edges removed. All tube ends removed. All tube ends are to be reamed. With screwed conduit one threaded end is to be fitted with a coupling and the other end is to be protected against damage.

UPVC conduit may only be used if permitted by the Head : Works and only in those areas which he may specify. In this case this conduit shall be according to SABS 950.

Conduit accessories, which are secured to the conduit by means of lugs, screws or setscrews, are not acceptable.

General requirements of conduiting to SABS IEC 60614 (1).

Metal conduits shall be fully in accordance with SABS 1065 PART I.

1.2 Conduit Accessories

All conduit accessories shall be galvanised both internally and externally and comply with SABS 1065 – PART II.

All screwed conduit fittings shall be of malleable cast iron.

Where fittings are fitted with covers, the covers shall be of galvanised pressed steel secured with brass screws.

1.3 Flexible Conduit

Flexible conduit shall be of the plastic covered metal type complete with brass connectors to the approval of the Head : Works.

2. INSTALLATION OF CONDUIT

2.1 General

Except where cables are specified for certain circuits, the installation(s) shall be tubed throughout in steel conduit. Split conduit is not permitted. All conduits shall, wherever possible, or unless otherwise specified or agreed, be concealed in the structural work.

Except where agreed or otherwise specified or indicated on the drawings, all conduit to points shall run via the ceiling and floor slabs or roof space. In damp situations and where exposed to the weather, the conduits shall be so installed as to avoid, as far as possible, the condensation of moisture within them. All running joints are to be painted with an approved metal primer.

Mechanical and Electrical continuity must be maintained throughout the installation. Each length of conduit and every conduit fitting must be inspected for defects and all sharp edges or burrs must be removed before it is installed. All joints are to be tightly fitted together.

Running joints with long threads, where used, are to be fitted with a lock nut and the running thread shall not be longer in length than a coupling and lock unit.

In conduits smaller than 32 mm elbows and normal bends are not to be used but conduits are to be set to the required angles.

Flexible connections between conduit and appliance or other equipment shall be by means of flexible tubing (see Par 1.3).

No wiring shall be drawn into conduits until the conduits have been installed.

Where more than one socket outlet is connected on a circuit, the conduit shall be looped from the one outlet box to the following outlet box.

All switch-boxes, socket outlet boxes and any other purpose made metal box including distribution board trays shall be suitable treated against corrosion before installation with "Rustodian" or other approved metal primer.

All conduits shall be securely fixed into chases, and all flush switch and socket outlet boxes must be firmly embedded in cement mortar.

The Contractor shall make himself familiar with the positions of all fittings, such as blackboards, pinning boards, cupboards, shelving, worktops, etc, before commencing the conduit installation. The position of switches and socket outlets as indicated on the drawings are approximate only. The Contractor must verify that the final position of these will not be covered by the installation of the fittings referred to above, or come midway between the junction of any dados and upper wall finishes.

No extras will be entertained for moving switches or socket outlets as a result of the Contractor's failure to verify the final positions of the fittings or type of wall finish.

2.2 **In Roof Spaces**

The conduit in roof spaces shall be installed parallel or at right angles to the roof truss members and shall be secured at centers not exceeding 1,2 m by means of galvanised saddles nailed to the timbers with galvanised clout nails. Crampets will not be allowed.

Crossing of conduits is to be avoided wherever possible. Where unavoidable, one conduit must be neatly set over the other. Where a number of conduits have to run back to the distribution board or switchboard, they shall run parallel to the distribution board or switchboard, and at saddle distance to each other wherever possible.

Conduit runs from distribution boards shall terminate in fabricated sheet steel draw boxes installed in the roof above the distribution boards. Each draw box shall be fabricated from 1,6 mm galvanised sheet steel with welded corners and suitably treated against corrosion with "Rustodian" or other approved primer and finished in aluminium paint.

Each draw box is to be fitted with slip-on lid with a 13 mm skirt. The box shall be 75 mm deep, shall be rectangular in shape and the size of conduits entering or leaving the box. Conduits shall be fixed to the box by means of couplings and brass male bushes or lock nuts and brass bush-nuts.

Conduit droppers shall be neatly cut into timber wall plates and set to face the right direction. All sets must be uniform. Conduits may be set at angles only where droppers or ceiling points are within 230 mm of roof members.

No conduits are to be run over the top of gangplanks or trapdoors.

Draw-in boxes with metal covers shall be provided where required and shall be installed near the gangplanks, if any. All inspection conduit fittings in open roof spaces shall face upwards to facilitate wiring and to permit easy inspection. Three-way conduit boxes shall be used for tee-off purposed in open roof spaces. Inspection tees are not to be used except where otherwise agreed or specified.

All conduits extended into a roof space with a roof clearance of more than 900 mm shall be set onto the beam and extended into the roof for a distance where there is sufficient clearance. Under flat roofs or where there is less than 900 mm clearance, the conduit shall be installed as specified for tubing in concrete slabs, right angle bends should be kept to a minimum and the shortest route taken.

Where false ceilings occur they shall be tubed as called for in the detailed specification. Conduits in restricted spaces and run as for concrete slabs must however, be installed in a neat and orderly manner.

Conduits to ceiling points for all types of fittings must be firmly supported and shall terminate in a back entry conduit box. The conduit box shall be taken through to the face of the ceiling and finish flush. Where the ceiling brandering interferes with the installation of the ceiling point specified, the Contractor must trim the brandering to allow the conduit box to be taken through to the face of the ceiling as specified. Luminaires must be bonded to the conduit box by means of metal threaded screws.

2.3 In Concrete Slabs

In order not to delay building operations, the Contractor must ensure that all conduits and conduit fittings, which are to be cast in concrete, are laid in good time. The Contractor shall have a competent Electrical Artisan standing by during casting of concrete, etc, to ensure that the conduit boxes are not damaged during casting of concrete.

Draw boxes, expansion joints boxes and round conduit boxes are to be provided where necessary.

Deep type conduit boxes shall be used for side entering conduits and normal shallow boxes may be used for back entry conduits. No elbows, bends or sharp sets will be allowed in concrete slabs except in cases of conduits of 40 mm diameter or when larger sweeping bends will be permitted.

Common drawn and/or inspection boxes shall be used where there is more than one circuit involved. They shall be installed in lavatories, storerooms, or other inconspicuous places. Covers shall be of hardboard neatly finished to match the finished ceiling or wall surface, and shall be fitted parallel to the wall or ceiling.

All boxes, etc. are to be securely fixed to the shuttering to prevent displacement when concrete is cast. All conduits must be laid off the deck, supported and secured at regular intervals and installed as close as possible to the neutral axis of concrete beams and slabs.

Expansion joints shall be shown on layout drawings and shall consist of a metal box in which one conduit is fixed and the other capable of movement with the building's expansion and contraction. Earth continuity of these joints shall be maintained by means of stranded copper conductors bonded to the conduits in the box as shown on the drawing.

Earth conductors and clamps buried in concrete are not permitted.

Conduits must be spaced sufficiently apart to allow for proper concreting. All joints shall be painted with an approved metal primer after completion of the tubing installation, prior to the concreting. All exposed parts of the conduit installation shall be suitably, protected against corrosion at the discretion of the Head : Works.

Before any concrete slab is cast, all conduit droppers to switchboards shall be neatly spaced and rigidly fixed.

2.4 Surface Work

All conduit must be plumbed and leveled and only straight lengths shall be used.

In cases where doorframes are out of plumb, or fittings, beams etc, are out of level, the conduit shall be run parallel with the doorframes, fittings, beams etc.

No threads shall be visible when the conduit installation is complete, except on running couplings.

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

No inspection or normal bends are to be used on surface work, except with the approval of the Works Inspector and where conduits of 32 mm diameter or larger are used. Conduits shall be set uniformly and inspection couplings shall be used where necessary.

Fittings, tees, boxes, couplings, etc, are to be cut into the surface to allow the conduit to fit flush against the surface or alternatively spacer bar saddles may be used. Conduit is to be bedded into any irregularities to avoid gaps between the surface and the conduit.

Double sets, where used, shall be parallel with no twists and shall be as short as possible. All conduits, which terminate at metal trays, boxes, industrial switches and plugs shall do so by means of couplings and male bushes. No couplings will be permitted in droppers of lengths less than 3.6 m.

Where crossings of conduits is unavoidable, purpose made metal boxes shall be used. The length of the box is to be 8 times the diameter of the largest conduit, the width one and half times the sum of the diameter of al the conduits, and the depth one and half times the diameter of the largest conduit with a minimum depth of 50 mm. The box shall be fitted with a neatly fitting cover and the finish shall be in keeping with the general layout.

Where a number of conduits are to be installed in parallel they shall be evenly spaced and grouped under one purpose made saddle. Conduit spacing shall not exceed 10 mm. The purpose made saddle shall be made of 25 x 2 mm galvanised steel strip or other approved material, formed to suit the curvature of the various conduits and shall be drilled and fixed by means of screws between. Saddles shall be spaced at intervals not exceeding 1.8 m, except for conduit droppers, which shall be saddled centrally between ceiling and accessory box. All saddles are to be secured to the wall by means of black japan or brass rounded head screws. Distribution boards, draw boxes, industrial switches and plugs, etc, shall be neatly recessed into the surface of plastered walls to avoid double sets or alternatively spacer bar saddles may be used. On face brick walls the conduit shall be tightly set into the switch or plug.

In situations where there are not ceilings, the conduits are to be run along the wall plates and tie beams.

No wiring is to be carried out until the tubing has been inspected and approved.

Where spacer bar saddles are used, these shall be installed at centers of 1 m for horizontal and 1.5 m for vertical runs.

All conduits shall be painted with an approved enamel paint to match the background colour.

2.5 Future Extensions

In roof spaces with a minimum clearance of 900 mm, switch and plug drips for future use are to be set 300 mm in the correct direction and shall be threaded and fitted with plugged couplings. Where the roof over a slab is to be removed for future expansions, conduits for future use are to terminate 40 mm above tie beams and shall be threaded and fitted with plugged couplings.

Where future extensions are to be below slabs, all switch, socket outlet and other conduit droppers are to terminate 130 mm below slabs or beams with conduit ends threaded and fitted with plugged couplings.

Where provision is made for future extensions to a concrete slab, all conduits required for future use are to project 130 mm from the slab. Conduit projections are to be painted with an approved anti-corrosive paint and must be fitted with plugged couplings.

All switch, plug and other outlet boxes required for future use shall be fitted with approved blank cover plates.

Unused lighting outlet boxes are to be fitted with round hardboard or plastic covers with brass cover screws, which shall fit flat on the finished ceiling.

2.6 Fixing of Conduits

Conduits shall be fixed to switch and socket outlet boxes by means of couplings and brass male bushes or lock nuts and brass bush nuts. Couplings and male bushes to be used on all surface work.

2.7 **Chases and Building Work**

Except where otherwise specified conduits, switch boxes, plug boxes and distribution boards are to be built into the brick walls by the Contractor. It will, however, remain the responsibility of the Contractor to ensure that the above-mentioned boxes and distribution boards are correctly built in and are firmly bedded and cemented into the walls, plumb and square.

The Contractor shall, unless otherwise specified, do all necessary chasing and cutting of bricks. All electrical materials (e.g. conduits up to 40 mm for UG cables, conduits, conduit boxes, distribution boards etc) must be supplied by the Contractor who must arrange to have these on site, and positioned when required for the building work. A competent Electrical Artisan must be in attendance and ensure that the conduits etc are correctly installed and positioned.

The Contractor is to ensure that tubing installed in chases is securely nailed and covered by a layer of 5:1 mixture of coarse sand and cement, finished flush with brickwork and that switch and plug boxes finish flush with the finished wall surface.

The Contractor is to ensue that below distribution boards connected by means of under-ground cables, a 230 mm wide by 115 mm deep cavity in the wall from the cable pipe to the distribution board is to be provided by the Contractor, or alternatively, cable sleeves as specified.

3. **PLUGGING OF WALLS**

Only approved plastic plugs shall be used to secure conduit or equipment up to 5kg mass. The use of round-headed screws only will be permitted.

Heavier equipment shall be secured by means of approved expansion bolts.

Wood plugs and any plugs in the joints in brick walls are not permitted.

4. **FIXING TO CONCRETE CEILINGS**

Ceilings mounted equipment other than luminaires shall be secured to concrete ceilings by means of expansion bolts, shot bolts or "Robot" tools bolts or as expressly specified for the service.

5. **WIRING**

5.1 **PVC Insulated Single Core Medium Voltage Conductor**

The conductor is to be of high conductivity copper wire insulated with Polyvinyl Chloride. The cable shall be finished in the required colours and shall be in accordance with SABS 1507 and 1574.

Circuit wiring shall be of the Loop-in system and no wiring joints in the conduit or conduit fittings will be permitted. Not more than two conductors of a kind will be allowed at any outlet point. the end strands of cables, whether single or looped which have to be connected to terminals of switched, plugs, lamp-holders, fittings and distribution boards, etc, are to be tightly twisted together. Cutting away of wire strands of any cable will not be allowed. Only one circuit in any one conduit will be permitted unless otherwise specified.

Conductor sizes shall be as follows except where otherwise specified:

Lighting circuits	1,5 mm²	
Bells circuits	1,5 mm²	
Clock circuits	1,5 mm²	
Incinerator circuits	2,5 mm²	
Ironing circuits	2,5 mm²	with 2,5 mm² insulated earth wire
Plug circuits	4,0 mm²	with 2,5 mm² insulated earth wire
Geyser circuits	4,0 mm²	with 2,5 mm² insulated earth wire
Heater circuits	4,0 mm²	with 2,5 mm² insulated earth wire
Stove	10 mm²	with 6,0 mm² insulated earth wire
Motor circuits		
Up to 4kW single phase	4,0 mm²	with 2,5 mm² insulated earth wire
Up to 11kW three phase	4,0 mm²	with 2,5 mm² insulated earth wire

To avoid deformation of PVC insulated cables at temperatures in excess of 57° C, they shall not be brought directly on to the terminals of appliances such as electric heaters, or any other electrical appliances or apparatus (including luminaires) which have a temperature in excess of 57° C. They shall terminate in a suitable terminal box as near to the appliance or fittings as possible and connect up from thereon, with heat resistant conductor.

6. MOUNTING AND POSITIONING OF LUMINAIRES

Luminaires and installation to comply with SABS 1464 Parts 1 to 22 and IEC 598-1 and IEC 60598 as applicable.

The contractor shall, in the case of board and acoustic tile ceilings (i.e. as opposed to concrete slabs), ensure that the luminaires are symmetrically positioned with regard to the ceiling pattern.

The layout of the luminaires as indicated on the drawings shall be adhered to as far as possible. The exact positions must be confirmed on site with the Head : Works.

Except where otherwise specified, pendant luminaires are to be mounted with the bottom of the fittings 2,5 m above finished floor level, mounted on either metal discs or wood blocks.

Under no circumstances shall cover strips be cut to accommodate wood blocks. Wood blocks must be neatly slotted to fit over cover strips and are to be secured by a minimum of two screws, which shall penetrate at least 25 mm into solid wood. Ceiling cover strips shall be neatly cut to accommodate fluorescent luminaires.

Where ceilings are raked, all incandescent luminaires are to be mounted on shaped leveling wood blocks securely fixed to the ceiling. Batten holders shall be secured to woodblocks by suitable brass screws. Fluorescent luminaires are to be mounted direct on raked ceiling without leveling blocks.

Fluorescent luminaires to be mounted on concrete ceilings shall be screwed to the outlet boxes and additionally supported by means of 50 x 6 mm expansion bolts. The bolts are to be ¾ of the length of luminaires apart.

Where a number of luminaires are installed end to end, outlet points must be provided after every second luminaire unless otherwise indicated on the drawing.

The luminaires are to be joined together by means of 20 mm conduit nipples, lock nuts and male brass bushes, and the wiring led through the channels of the luminaires. The Contractor shall ensure that all such rows are correctly lined up and that the rows are parallel with the relevant building line.

The luminaires are to be jointed together by means of 20 mm conduit nipples, lock nuts and male brass bushes, and the wiring led through the channels of the luminaires. The Contractor shall ensure that all such rows are correctly lined up and that the rows are parallel with the relevant building line.

Incandescent luminaires are to be screwed directly to outlet boxes in concrete slabs and in board ceilings. In board ceilings the conduit box and the conduit shall be secured to the timberwork of the ceiling in such a manner that it shall support any incandescent luminaire, which is designed to be fixed to a normal conduit box.

Fluorescent luminaires shall be secured to board ceilings by means of the conduit box and 6 mm bolts passing through the boards and brandering.

7. BATTEN HOLDERS

B.C. batten holders shall be of brass or moulded plastic reinforced type complete with shade ring. The batten holders shall comply with SABS IEC 60238 and SABS IEC 61184. All lamp holders are to have brass terminals with screw type connection.

8. LAMP HOLDERS

Edison screw lamp holders	:	SABS IEC 60238
Bayonet lamp holders	:	SABS IEC 61184
Lamp holders for tubular fluorescent lamps	:	SABS IEC 60400

B.C. screwed lamp holders shall be of brass 20 mm E.T. complete with shade ring and shall comply with SABS IEC 60238 and SABS IEC 61184 with screw type connection terminals.

9. SWITCHES AND SOCKET OUTLETS

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

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

10. POSITIONS OF SWITCHES AND SOCKET OUTLETS

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

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

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

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

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

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

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

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

11. LOW TENSION SWITCHBOARDS

Low Voltage switch gear and control gear to comply with SABS 1473 and SABS IEC 60947 and SABS 60349.

Where switchboards are to be installed in switch rooms or switch cupboards, the Contractor must ensure that the boards are manufactured to suit the dimensions of the rooms or cupboards.

Low tension switchboards shall be specified in detail for each service, but shall generally conform to the following:

They are to be of strong and rigid construction, with suitable angle, channel or folded steel framework. They are to be flush fronted and totally enclosed with sheet steel panels suitably formed at the edges and reinforced to prevent distortion. Unless otherwise directed, all front panels must be at least 2 mm thick and all other panels at least 1.6 mm thick. Panels are to be secured to the framework with studs and chromium plated dome nuts (self-tapping and similar screws are not permitted).

Switches, etc, are to be mounted on metal frames within the boards to give flush front panels. Equipment of normally surface mounted types such as energy meters, time switches and contractors, are to be mounted on inner metal trays behind hinged front panels. In the case of supply authority meters the hinged front panels must have transparent inserts.

All metal work of the boards must be thoroughly degreased, primed with PA 10 self etching primer and finished with one coat of undercoat and two coats of electrical orange high gloss enamel, unless otherwise specified.

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

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

The complete distribution board including bus-bars must be suitably constructed to withstand fault currents specified.

Connections to bus-bars are to be made by means of lugs suitably bolted and locked with high tensile bolts and connections to lugs must be effected by means of a crimping tools.

Incoming and outgoing bus-bar studs, where required, must be suitably insulated where they pass through panels of the board, and firmly supported within the board.

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

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

Clear visible indication of all switch positions must be provided and the switches must be clearly labeled as directed by the Head : Works.

The details of construction proposed, and the Head : Works must approve all equipment of switchboards: Works before manufacture is commenced.

12. DISTRIBUTION BOARDS

12.1 Approval

The Head : Works must approve the details of construction proposed and all equipment within distribution boards: Works before manufacture is commenced.

12.2 Flush Mounting Distribution Boards

These shall be generally manufactured in accordance with SABS 1765. The board shall consist of two panels fitted side by side with common bonding tray and attached to a common architrave. One panel shall accommodate all single phase MCB's and the second panel shall accommodate the main isolator, main bus-bars and the triple pole MCB's. Chassis shall be of rigid channel section rust proofed steel with clip-on trays for the single pole MCB's. The main isolator is to be mounted at the bottom of the second panel with the triple pole circuit breakers above.

12.3 Surface Mounting Distribution Boards

These shall be generally manufactured in accordance with SABS 1765, with two panels as for flush boards.

12.4 **Single Phase Distribution Boards**

Single Phased boards shall be generally constructed as three phase boards except they shall have a single panel. Single phase boards shall be mounted with the bottom of the architrave 1,5 m above finished floor level unless specifically directed otherwise.

12.5 **Distribution Board – In Roof Spaces**

Where distribution boards are installed below a roof space, a minimum of 2 x 20 mm and 1 x 25 mm spare conduits are to be run from the distribution board into the roof space.

13. **METER BOXES**

The meter box shall be mounted with the top 1,7 m above finished ground level. Surface mounted meter boxes shall be secured by at least 4 x 10 mm expansion bolts.

Service cables entering the meter box shall be protected by means of a suitably sized galvanised pipe extended 450 mm below the ground surface and securely saddled to the wall and bonded to the meter box.

14. **CONNECTIONS TO OUTLETS**

14.1 **General**

Where connectors are used to connect to the wiring of luminaires and other appliances, the connectors shall comply with SABS Specification 1239.

14.2 **Connection to Stoves**

14.2.1 **General**

The connection to an electric stove, unless otherwise specified shall consist of 2 x 10 mm^2 conductors and a 6 mm^2 insulated earth wire in 25 mm conduit. The stove shall be controlled by a 60 Amp micro gap switch of approved make and the connection shall be by means of a 45 Amp 3 pin stove plug of the "Cape Town" type. Cable ends, which are to be connected to the stove, shall be equipment with suitable soldered or crimped lugs. The connection between the stove plug and stove shall be by means of flexible conduit.

Except for high school domestic science unit kitchens (see Clause 14.2.2), the conduit shall be chased into the wall and fitted with a switchbox for housing the micro gap switch and a 25 mm circular conduit box over which the stove plug will be mounted. The stove plug shall be fitted with an adaptor plate and shall be screwed directly to the conduit box by means of round head metal screws. The plug outlet shall face downward.

The stove plug and switch shall be mounted 430 mm and 1,4 m respectively above finished floor level unless otherwise specified or indicated on the drawings.

14.2.2 Stove Connections in High School Domestic Science Unit Kitchens

Connections to stoves in High School Domestic Science Unit Kitchens, where the stoves are situated in front of a fitting, shall be generally as specified in Clause 14.2.1 except that the 25 mm diameter conduit shall be run in the floor slab, from the distribution board to a position to the right of the stove. A pedestal, which is complete with a 45 Amp 3 pin "Cape Town" type cooker plug, mounted on the back, shall be fitted over the conduit and securely bolted to the floor by means of expansion bolts. The plug circuit, which passes through the pedestal, is to be on a separate circuit.

14.3 Connections to Hot-water Cylinders

The connections to hot-water cylinders not exceeding 3kW loading shall consist of 2 x 4 mm^2 PVC conductors and 1 x 2,5 mm^2 earth wire in a 20 mm diameter conduit from the distribution board. The conduits shall be chased in the wall and shall terminate at the side of the cylinder in a box over which is to be mounted a double pole isolator with pilot light.

The final connection between the isolator and cylinder shall be by means of silicone heat resistant conductors in 20 mm diameter flexible conduit.

Connections to roof mounted hot-water cylinders shall generally be as specified above with an isolator with pilot light mounted adjacent.

14.4 Connections to Power Points

Connections to electric motors and fixed apparatus to vibration shall, unless otherwise specified or indicated on the drawings, have final connections consisting of conduit and flexible tubing or reinforced hose in accordance with Clause 1.3 of this specification and PVC cables and earth wire of the required size.

An isolator shall protect all fixed apparatus and where necessary a starter fitted with a no-volt coil and overload protection adjacent to such apparatus.

Power points for connection of fixed apparatus to be installed by others, shall terminate in an approved type wall mounted switch unless otherwise specified.

The minimum conductor size for all power points shall be 4 mm^2 unless otherwise specified.

14.5 Underground Service Connection

This clause refers to underground service connections not provided by the Supply Authority.

The service cable and earth wire to be connected at the supply point in accordance with Clause 15.8 of this specification, and unless otherwise specified, shall be aid 600 mm below ground level throughout and otherwise fully in accordance with Clause 15 and all applicable sub-clauses thereof. Cable entries to meter boxes shall be in accordance with Clause 13 and other entries shall be by pipe or duct as directed.

14.6 Connections to Outbuildings

Connections to outbuildings shall be made by means of underground cable only, laid in accordance with Clause 15 and all applicable sub-clauses.

Where the cable is run from the roof space of the main building, it shall be enclosed in suitably sized galvanised pipe built into the wall or run surface as directed. Surface run pipes shall be securely saddled at 1,8 m centers. Where the cable connects to the conduit in the roof space, a suitable joint box shall be provided or alternatively the cable may be taken through the roof space, a suitable joint box shall be provided or alternatively the cable may be taken through the roof space with fixings at regular intervals, and down to the main board. At the outbuildings, the cable shall be enclosed in a suitably sized galvanised sleeve pipe built into the wall or run surface and terminated in the distribution board tray.

14.7 Connection and Mounting of Cable Fed Street/Site Lighting

Street/site lights shall in all cases, except where otherwise specified, be fed by underground cable. Unless otherwise directed, a suitable terminal board shall be provided in the base of the lighting pole for the connection of the incoming and outgoing cables, the feeds from the terminal board to the fitting shall be as specified.

"Surfix" cable and compression glands shall be installed between terminal board and cross arm/bracket mounted luminaires. The terminal board shall also accommodate a miniature circuit-breaker in the phase connection to the fitting. Poles intended for mounting directly in ground are to be provided with a 300 x 300 mm base plate.

15. UNDERGROUND CABLES

1000 volt PVC SWA and 110 Volt PILCA cable and accessories shall be in accordance with the relevant SABS specifications to SABS 1507.

The storage, transportation, handling and laying of underground cables shall be according to the manufacturer's requirements and the Contractor shall have adequate and suitable equipment and labour to ensure that no damage is done to cables during such operation. All cable pipes and ducts entering buildings are to be sealed against the ingress of vermin, water, etc.

15.1 Trenching

Cables, unless otherwise specifically directed, shall be laid at a depth of 600 mm below ground level. Trenches shall not be less than 300 mm wide for one to three cables, and the width shall be increased where more than three cables are to be laid together so that the cables may be placed at least 75 mm throughout the run.

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

15.2 **Cable Joints**

Joints in underground cable runs will not be permitted unless unavoidable and at the discretion of the Head : Works. Where cable joints are unavoidable, the cable jointer is to work efficiently and cleanly and so that each end of the cables to be joined may have a minimum of 0,9 m of slack disposed in a loop without stress. Back-filling under joints must be firmly tamped to prevent any subsequent settling.

15.3 **Bedding**

In trenches made in intermediate, hard rock, or boulder material, the cables shall be laid on a 75 mm thick bed of earth and be covered with a 150 mm layer of earth before the trench is filled in. The Contractor to supply all earth required for trench filling.

15.4 **Laying**

Cables shall be removed from the cable drum in such a way that no twisting, tension or mechanical damage is caused, and must be adequately supported at short intervals during the whole operation. Particular care must be exercised where it is necessary to draw cables through pipes and ducts, to avoid abrasion, elongation or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after the drawing in of the cables.

15.5 **Back Filling**

Back filling after bedding (see Clause 15.3) is to be carried out with a proper grading of the material to ensure settling without voids, and the material is to be tamped down after the addition of every 150 mm. The surface is to be made good a required.

Back filling of cable trenches must not be commenced until after the cable trenches and laid cable(s) have been inspected by the Head : Works. Where a Contractor fails to observe this requirement he may, at the discretion of the Head : Works, be required to re-open such cable trenches for inspection at his own expense.

15.6 **Protection of Cables**

Where so directed by the Head : Works, concrete or other warning covers shall be placed over cables above the top bedding layer. Cable pipes when directed are to be installed at road and other crossings.

15.7 **Marking of Cables**

Cable marking tape is to be supplied by the Contractor and is to be laid 150 mm below ground over a cable run and as may be directed by the Head : Works to give early indication of underground cable runs.

15.8 **Joints and Termination of Cables**

Joints in underground cables and terminations shall be made by means of "Scotch Cast" or other approved epoxy-resin pressure type jointing kits. Low tension PVC cables are to be made off with sealing glands and materials designed for this purpose, which must be of approved make.

15.9 Sealing of Paper Insulated Cable Ends

Where cables are cut and not immediately made off, the ends must be sealed without delay. If cables are cut and the ends not immediately made off or sealed, the cable may be rejected and the Contractor will be required to replace it at his own expense.

15.10 Earth Wires

Except where specifically directed otherwise, earth continuity conductors are to be run with all underground cables constituting part of a low tension distribution system. Such earth continuity conductors shall be bare copper wire of a cross sectional area in accordance with the Code of Practice 0142 but shall not be less than 4 mm^2 nor more than 70 mm^2. The earth continuity conductor is to be bonded to the cable armouring, and to the lead sheath if any, at each termination, as well as to the local earth bard. The earth wire must be secured to the cable at 1,8 m centers.

15.11 Opening Up of Existing Cables

Where it is necessary to expose existing buried cables for any purpose, or to excavate in the vicinity of existing buried cables, pipes, etc, every care is to be exercised and only labourers experienced in such work, and duly warned by the Contractor, shall be employed thereon.

15.12 Definitions for Classifying of Excavation

(a) Soft Excavation – shall be excavation in material that can be efficiently removed by a back-acting excavator of flywheel power approximately 0,10kW per millimeter of tinned-bucket width, without the assistance of pneumatic tools such as paving breakers, or that can be efficiently loaded without prior ripping or stockpiling by a rubber tyred front-end loader approximately 15T mass and a flywheel power of approximately 100kW.

(b) Intermediate Excavation – shall be excavation in material that requires a back-acting excavator of flywheel power exceeding 0,10kW per millimeter of tinned-bucket width and the assistance of pneumatic tools prior to removal by equipment equivalent to that specified in (a) above.

(c) Hard Rock Excavation – shall be excavation in material that cannot be efficiently removed without blasting or without wedging and splitting prior to removal.

(d) Class A Boulder Excavation – shall be excavation in materials containing more than 40% by volume of boulders of sizes between 0,03 cubic meter and 20 cubic meter in a matrix of softer material or smaller boulders.

Note: (1) Excavation of solid boulders or lumps of size exceeding 20 cubic meter will be classified as hard rock excavation.

(2) Excavation of fissured or fractured rock will not be classed as boulder excavation but as hard rock intermediate excavation according to the nature of the material.

(e) Class B Boulder Excavation – shall be excavation of boulders only in a material containing 40% or less by volume of boulders of size between 0,03 cubic meter and 20 cubic meter in a matrix of softer material or smaller boulders.

Note: Those boulders that required individual drilling and blasting in order to be loaded by a back-acting excavator as specified in (a) above, or by a track type front-end loader, will each be separately classed as Class B Boulder Excavation.

16. EARTHING

16.1 Main Earthing

The type of main earthing shall be as required by the Supply Authority, if other than the Head : Works and in any case as directed by the Head : Works who may require additional earthing to meet test standards.

Where required, an earth mat is to be provided, the minimum size, unless otherwise specified, being constructed from copper straps 950 x 25 x 3 mm at 230 mm centers and braced at all intersections. Alternatively or additionally earth rods or trench earths may be required, as the Head : Works may direct, and installed according to his instructions.

All earth electrodes and connections thereto must be approved "in-situ" by the Head : Works before back-filling.

The electrical installation shall not be earthed by means of the lightning arrester earth electrode, if such is included in the installation, but may be bonded thereto.

16.2 Earthing in Installations

The installation shall be effectively earthed in accordance with the relevant sections of the Code of Practice 0142 and the requirements of the Supply Authority.

All hot and cold water and waste pipes are to be effectively bonded by means of 12 x 1,5 mm solid copper tape (perforated tape or wire will not be permitted), clamped by means of brass bolts and nuts. Bonding tapes exceeding 75 mm in length must be fixed to the wall by means of No. 6 x 20 mm brass screws and plastic plugs not exceeding 150 mm centers. Main earth copper tapes where installed less than 2,5 m from ground level, must be run in 20 mm diameter conduit securely saddled to the wall.

Gutters and down pipes are to be bonded by means of 6 mm round headed brass bolts, with nuts and washers. Self-tapping screws are not permitted.

Connections from the earth bar or terminal on the main board must be made to a visible cold water main, the incoming service conductor, if any, and the earth mat or plate (where such is required) by means of either 12 x 1,5 mm solid copper tape or bare 25 mm^2 copper wire, or such larger conductor as the Head : Works may direct. From each distribution board separate earth conductors are to be taken to the main earth bar or terminal on the main board. Each conductor shall consist to stranded copper conductors drawn into the conduit together with the distribution board feeders. The size of the earth conductors to be in accordance with the requirements of the Code of Practice 0142 or as specified.

Earthing clips shall be made of not less than 0,9 mm thick copper strips not less than 12 mm wide. They are to be complete with 25 x 7,7 mm brass bolts, washers and nuts and must be constructed so that the clips will fit firmly to the conduit without any additional packing.

Adjustable earth clips are not permitted.

17. EXISTING BUILDINGS

17.1 Occupied Buildings

Where work is to be carried out in occupied buildings the Contractor must arrange to carry out the installation with as little interruption to services and discomfort to the occupants as possible.

17.2 Temporary Connections

Temporary connections shall be provided where necessary for continuity of services, and as directed by the Head : Works. The contractor must ensure that such connections are both electrically safe and free from physical hazard.

17.3 Old Materials

Unless otherwise specified all existing materials removed by the Contractor shall remain the property of the Head : Works and are to be handed to the Head : Works.

17.4 Making Good

Any damage which may be done to the plaster work, floors, ceilings, wood and paint work, furniture and other equipment in the building, etc, during the progress of the electrical installation shall be repaired and made good by the Contractor to the satisfaction of the Head : Works.

18. COMPLETION

18.1 Balancing of Load

The Contractor is required to balance the load as equally as possible over multi-phase supplies.

18.2 Tests

The installation shall be tested by the Contractor as the service progresses or as required by the Head : Works and upon completion, for earth continuity and insulation. The final test before the taking over of the installation shall be made in the presence of the Head : Works.

The mandatory "Certificate of Compliance" shall be issued by the Contractor to the Supply Authority, with a copy to the Head : Works prior to first delivery being taken.

18.3 **Labelling**

All circuits and apparatus on switchboards shall be suitably correctly labeled by means of engraved plastic labels (white lettering on black), which are to be either bolted or screwed to the equipment panel, or fitted in channeling provided below the switch gear.

Sub-circuits are to be numbered and a legend detailing the circuits is to be framed and fitted to the door of the distribution board.

All other equipment is to be individually labeled to indicate the function.

All switchboards are to be fitted with a label on which the designation of the board is clearly indicated.

A separate engraved label depicting the origin and cable/conductor size shall be fixed below the main switch.

18.4 **Finishes**

Covers for all boxes, expansion boxes, etc, shall be finished to match the paint work of the ceiling or wall surface or as specified.

18.5 **Site Drawing**

On all completed new work or where specifically called for in the Tender Document, the Contractor shall, on completion of the works, submit to the Head : Works, a marked up site plan indicating the exact underground cable reticulation.

19. **POWER DUCTING FOR SCHOOL SCIENCE LABORATORIES**

The ducting shall be "Ductline 3" supplied by Messrs. Lascon Lighting, 102 Malbourne Road, P.O. Box 2479, Durban 4000: Telephone 031-2075081 or other approved.

20. **SPEAKER AND MICROPHONE OUTLETS**

Speaker and microphone outlets are to conform to the following details:

1. Speaker outlet – To have one flat and one round pin.

2. Microphone outlet – To have one round pin only.

Both female and male parts to be supplied and installed by the Contractor.

21. **BELLS AND BUZZERS**

21.1 **Bells**

Bells for schools and hostels shall be 220 Volt AC or 24 Volt DC as specified for the service. They are to be of robust construction encased in a sturdy cast metal weather-proof case. They are to operate on the frequency of the supply. They shall have an adjustable stabilizing spring, gold-silver contact points and 150 mm gongs.

21.2 **Doorbells, Buzzers and Bell Transformers**

These will be as specified for each service.

21.3 **Bell Pushes**

Except where otherwise specified, bell pushes shall be of the flush type suitable for mounting in a standard 100 x 50 mm box. They shall be clearly marked as a bell push and shall be fitted with satin finished anodized aluminium cover plates.

22. **SIGNAL TIMERS**

22.1 **Primary Schools**

The timer shall be designed to automatically signal the start and finish of school periods by the switching of a bell circuit and is to comply with the following specification:

1. The mechanism may be synchronous motor or quartz movement driven with a 24 hour dial or digital time read-out suitable for operation on a 220V 50Hz supply and is to be provided with a spring or battery reserve of a least 24 (twenty four) hours.

2. The unit is preferably to have minute to minute timing for a 24 (twenty four) hour period although 5 (five) minute intervals are acceptable, and is to be provided with Weekend lockout. Signal periods shall be adjustable from 5 – 45 seconds.

3. The unit shall be housed in a metal or plastic case with detachable front cover suitable for wall mounting.

4. Timers with punch tape programming are not acceptable.

22.2 **High Schools and Colleges**

Timers for these institutions shall generally be as for Primary Schools but are to have at least 3 (three) separate programmes and be fitted with three push buttons for independent manual operations for testing of each programme, plus an on/off switch for each programme, which does not affect the running of the clock.

23. **CLOCKS**

Electric clocks shall be of the quartz electronic battery operated type, with a dial of 250 mm diameter. The dial shall be white, with distinctive minute markings and chapters shall be black Arabic figures. Time adjustment shall be simple. Where mains operated electronic clocks are specified, these shall be of the synchronous self starting type, suitable for a 200 – 250 V 50 Hz AC supply

24. **TIME SWITCHES**

The time switch shall consist of a single pole switch with silver to silver or other approved contacts operated by a quartz movement with a 24 hour reserve.

A suitable 24 hour, night and day dial, with hour indicator and two adjustable strikers, one OFF and one ON must be provided. The whole mechanism is to be totally enclosed in a dust proof case.

The current rating shall be required and the switch is to be suitable for operation on 220 volt 50 Hertz AC supply. Time switches used for under floor heating are to be fitted with weekend cut-out.

25. **MOULDED CASE CIRCUIT BREAKERS (INCLUDING MINIATURE)**

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

26. **SWITCHES: ON-LOAD FAULT MAKING (CIRCUIT BREAKER TYPE) WITHOUT TRIPS**

The switches shall be triple pole, hand operated, panel mounting air break type, having continuous current rating as specified and suitable for operation of 380 – 440 Volt 50 Hz AC system.

The contacts are to be of silver alloy and the switch mechanism shall be of the quick-make, quick-break type.

27. **SWITCHBOARD EQUIPMENT**

Switchboard equipment such as switches, circuit breakers, etc, shall be as directed and specified in the detail specification for the service.

Circuit breaker equipment of SABS IEC 60934.

28. **FUSE-SWITCH UNITS (WITH HRC FUSES)**

The fuse-switch unit is to be of the double pole, or triple pole or triple pole with neutral link type, and of the required current rating, as specified for the service and must be in accordance with BS EN 60947-3.

The fuse links must be fully isolated when the switch is in the open position, and interlocks must be provided to prevent the switch being operated with the cover open.

The fuse links shall comply with SABS Specification 172 and SABS IEC 60269-1 to 4.

29. **BUS-BAR COPPER**

Bus-bar copper must be fully in accordance with Tables A1 and A2 of SABS 1473-2 and SABS IEC 60439-2.

30. **SPECIFICATION COMPLIANCE**

The complete installation shall comply with the requirements of this specification. Should any differences or contradictions exist between this Specification and the detailed requirements for a specific installation, then the detailed requirements shall take precedence.

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

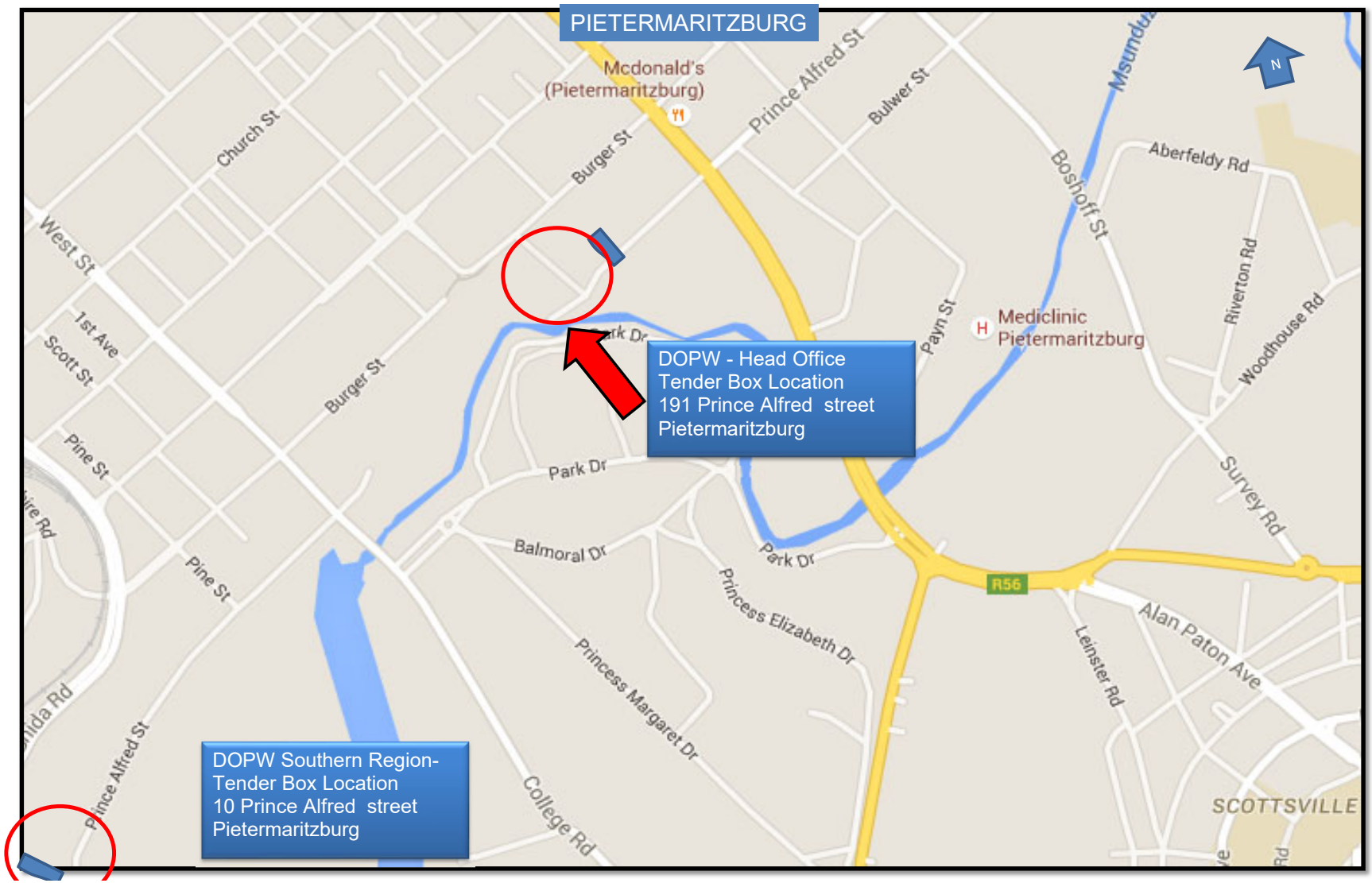
ANNEXURE 3: LIGHTNING PROTECTION SPECIFICATIONS

NOT APPLICABLE

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

ANNEXURE 4: Map of Bid submission location

Annexure 4


PIETERMARITZBURG
Mcdonald's (Pietermaritzburg)
Prince Alfred St
Bulwer St
Church St
Burger St
West St
1st Ave
Scott St
Pine St
Park Dr
Balmoral Dr
Princess Elizabeth Dr
Princess Margaret Dr
College Rd
Boshoff St
Aberfeldy Rd
Payn St
Mediclinic Pietermaritzburg
Riverton Rd
Woodhouse Rd
Survey Rd
R56
Alan Paton Ave
Leinster Rd
SCOTTSVILLE
N
DOPW - Head Office
Tender Box Location
191 Prince Alfred street
Pietermaritzburg
DOPW Southern Region-
Tender Box Location
10 Prince Alfred street
Pietermaritzburg

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

ANNEXURE 5: Joint Venture Agreement

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Annexure 5

Joint Venture Agreement

(March 2004)

(First Edition of CIDB document 1017)

1. **PREAMBLE**

This agreement is made and entered into by and between

_____

_____

_____

of the first part and

_____

_____

_____

of the second part and

_____

_____

_____

of the third part.

(allow for additional parties as necessary).

Whereas the foregoing parties have resolved to form a Joint Venture under the title of

_____

_____

_____

for the exclusive purposes of securing and/or executing the Contract to be awarded by

(name of Employer)

to the KZN Department of Public Works in respect of the following project:

for *(brief description of Contract)*

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

Now it is hereby agreed as follows :

2. DEFINITIONS AND INTERPRETATION

2.1 Definitions

The following words and expressions shall have the meanings indicated, except where the context otherwise requires. Defined terms and words are, in general, signified in the text of the Agreement by the use of capital initial letters, but the absence of such letters does not necessarily signify that a term, or word, is not defined.

'Agreement' means the agreement between the Members of the Joint Venture and includes this model form of agreement together with the Preamble, Specific Provisions, if any, Schedules 'A', 'B' and 'C' and any relevant Documents prepared prior to the signing of the Agreement and appended thereto.

'Contract' means the contract with the Employer for the supply of the Deliverables, for the purposes of securing and executing which, the Joint Venture has been formed.

'Deliverables' means the works and/or services, equipment, materials, goods, etc. to be furnished by the Joint Venture to the Employer in terms of the Contract.

'Document' means any written, drawn, typed, printed, or photographic material, which relates to the Agreement.

'Employer' means the person, or body, which is to award the Contract and will employ the Joint Venture if it is awarded the Contract.

'Joint Venture' means the joint venture formed by the Members in accordance with the Agreement.

'Management Committee' means the body established in terms of the Agreement to manage all aspects of the work of the Joint Venture in securing and executing the Contract and in meeting the provisions for the Agreement.

'Member' means a person, or body which, being a party to the Agreement, is a member of the Joint Venture.

'Member's Interest' means the proportion expressed as a percentage, which the total monetary value of all resources provided and contributions made by a Member towards the execution by the Joint Venture of the Contract bears to the total of such values by all Members and, unless otherwise indicated in the Agreement, represents the extent to which the Member participates in the fortunes of the Joint Venture.

'Representative' means the person representing a Member on the Management Committee.

'Schedules' means Schedules 'A', 'B' and 'C' which set out general, financial and other information relating to the Members and the obligations, duties, rights, risks and benefits arising from their participation in the Joint Venture.

'Specific Provisions' means the variations, if any, required to this standard form of agreement for the specific purposes of the Agreement.

2.2 Interpretation

Unless inconsistent with the context, an expression in the Agreement which denotes:

- any gender shall include the other genders
- a natural person shall include a juristic person and vice versa
- the singular shall include the plural and vice versa

2.3 Headings

The headings to clauses of the Agreement shall not be considered part thereof, nor shall the words they contain be taken into account in the interpretation of any clause.

2.4 Law

The Agreement shall be construed in accordance with and governed by the laws of the Republic of South Africa and the English language versions shall prevail.

2.5 Language

English shall be exclusively used by the Members in the preparation of Documents unless otherwise indicated.

2.6 Conflict between Agreement and Contract

Should any provision of the Agreement be in conflict with the terms of the Contract, the Agreement shall be amended to the approval of the Management Committee so as to eliminate the conflict.

3. JOINT VENTURE GENERAL

3.1 Establishment and Purpose

The Joint Venture established by the Members in terms of the Agreement is an unincorporated association with the exclusive purposes of securing and executing the Contract for the benefit of the Members.

3.2 Termination

The operation of the Joint Venture and the validity of the Agreement shall terminate if and when it becomes evident that the Joint Venture will not be awarded the Contract, or, if the Joint Venture secures the Contract, when all obligations and rights of the Joint Venture and the Members in connection with the Contract and the Agreement have ceased and/or been satisfactorily discharged.

Unless otherwise decided by the Management Committee, the Agreement shall not terminate if a Member changes its name, or is taken over by, or merged with, another body.

This agreement will terminate when any one of the Members resigns, are liquidated or opts out of this agreement and the Joint Venture will be in breach of contract with the Employer and their contract could be cancelled.

3.3 Exclusivity

Unless otherwise agreed by the Management Committee, or provided for in the Contract no Member shall engage in any activity related to the Contract other than as a Member of the Joint Venture and Members shall ensure that their subsidiaries and other bodies over which they have control comply with this requirement.

3.4 Participation of Members

Except as may otherwise be stipulated in the Agreement, each Member shall be responsible for all costs incurred by it prior to the date of inception of the Agreement.

Subsequent to the date of inception of the Agreement, each Member shall, participate in the operations, risks, responsibilities and fortunes of the Joint Venture including, inter alia, the provision of funding, sureties, guarantees, insurances, human and other resources and participation in profits and losses to the extents indicated in the Schedules. Participation in any aspect not covered in the Schedules shall, if an agreement cannot be reached between the Members, be to the same extents as indicated by the Members Interests.

3.5 Management

The affairs of the Joint Venture shall be directed and controlled by the Management Committee, as set out in Section 4 hereof.

3.6 Confidentiality

All matters relating to the Agreement and the Contract shall be treated by the Members as confidential and no such matter shall be disclosed to any third party without the prior written approval of the Management Committee.

No Member shall be party to the dissemination of publicity relating to the Contract, or the Agreement, without the prior written approval of the Management Committee and the Employer.

3.7 Assignment

No Member shall cede, assign, or in any other way make over any of its rights, or obligations, under the Agreement without the prior written consent of the Management Committee.

3.8 Subcontracting

No Member shall subcontract any obligation, work or duty for which it is, itself, responsible in terms of the Agreement without the prior written consent of the Management Committee.

3.9 Variations to Agreement

No variation, modification, or waiver of any part of the Agreement shall be of any force, or effect, unless unanimously agreed by the Members and reduced to writing.

3.10 Liability

Each Member warrants that it will indemnify the other Members against all legal liabilities arising out of, or in connection with the performance of its obligations under the Agreement.

It is acknowledged by the Members that they may be held jointly and severally liable in respect of claims against the Joint Venture by the Employer or third parties.

4. MANAGEMENT OF JOINT VENTURE

4.1 General

The affairs of the Joint Venture shall be directed, controlled and managed by the Management Committee, which, within the terms of the Agreement and the Contract, shall have full authority to bind the Members in all matters relating to the affairs of the Joint Venture.

Communication between the Joint Venture and the Employer, or third parties, relating to the Contract shall be conducted exclusively by the Management Committee, or by such person as it may delegate to perform this function.

The Management Committee shall have the power to appoint a project manager and/or such other persons as it may see fit to appoint for the purpose of executing the Contract and may delegate such of its powers, responsibilities and duties as it may consider necessary, or desirable, to persons or bodies appointed or seconded for this purpose.

Such administrative functions as are necessary to ensure the effective operation of the Management Committee shall be performed by its chairman.

4.2 Management Committee

4.2.1 *Composition*

The Management Committee shall, unless otherwise agreed by all the Members, consist of one Representative of each Member and each Member shall be obliged, at all times, to maintain a Representative on the Management Committee.

Each member shall, not later than three working days after the signing of the Agreement, appoint its Representative and notify the other Members of the name and contact details of the Representative. Such Representative shall have the power to bind the Member that he represents in all matters relating to the execution of the Contract and the performance of the Agreement.

A Member shall be entitled, after giving the other Members not less than three working days written notice of his intention to do so, appoint, remove and/or replace, an alternate who shall, at any meeting of the Management Committee from which the Representative whom he represents is absent, be vested with all rights and powers and subjected to all the obligations of the absent Representative.

The chairman of the Management Committee shall be the Representative of the Member which has the largest Member's Interest. If two, or more, Members have the same, largest Member's Interest, the chairmanship shall rotate between the Representatives of such Members at three monthly intervals, the order of rotation to be determined by ballot.

Notwithstanding the foregoing, the chairmanship of the Management Committee may be determined, or changed, at any time by unanimous decision of the Management Committee.

No remuneration shall be paid by the Joint Venture to Representatives or their alternates for serving on the Management Committee, unless otherwise decided by the Management Committee.

4.2.2 *Meetings*

Meetings of the Management Committee shall take place at such times and places as the Management Committee may determine, provided that the chairman shall convene a meeting of the Management Committee to be held not later than ten working days after he has been requested, in writing, by a Member to do so. Not less than five working days written notice of any meeting of the Management Committee shall be given to all Representatives and their alternates.

The Management Committee may permit, or invite, persons other than Representatives or alternates to attend any of its meetings, but such persons shall not have voting rights.

4.2.3 *Decisions*

Each Representative shall have one vote on the Management Committee and where, in terms of this clause, a casting vote is required, this shall be exercised by the chairman.

All decisions of the Management Committee shall, desirably, be unanimous. Accordingly, if unanimity cannot, initially, be achieved in regard to a decision, the meeting at which that decision is sought shall be adjourned for a period of 48 hours to enable Representatives to consult with their principals. If, on resumption of the adjourned meeting, unanimity can still not be achieved, the decision, provided it is not one requiring unanimity of the Members, shall be taken by majority vote and, in the event of a tie, the chairman shall exercise a casting vote.

A Member not satisfied with a majority decision of the Management Committee may declare a dispute, to be dealt with in terms of Clause 8 hereof, but the majority decision shall, nevertheless, be implemented with immediate effect.

Decisions of the Management Committee, whether taken at a meeting, or otherwise, shall be recorded in written minutes, which shall be distributed by the chairman to reach the Representatives not later than five working days after those decisions were taken. Such minutes shall be deemed to have been affirmed by the Representatives unless written notice of dissent is received by the chairman not later than three working days after receipt of the minutes by the Representative.

4.2.4 Powers and duties

The functions, responsibilities and powers of the Management Committee shall include, inter alia, those listed below:

4.2.4.1 Formulating overall policy in regard to the achievement of the objectives of the Joint Venture.

4.2.4.2 Managing the day to day affairs of the Joint Venture.

4.2.4.3 Monitoring, directing and co-ordinating the activities of the Members to ensure that the objectives of the Joint Venture are achieved and that the obligations and responsibilities of the individual Members are met.

4.2.4.4 Monitoring and controlling the financial affairs of the Joint Venture and ensuring that proper books of account and financial records relating to affairs of the Joint Venture are maintained in an approved form and submitted to the Management Committee for approval at regular intervals, which shall not be longer than one month.

4.2.4.5 Determining the necessity for and the details of any changes in the duties and responsibilities of Members provided that any resulting changes in Members' Interests shall be unanimously approved by the Members.

4.2.4.6 Determining the terms and conditions of employment of personnel and the emoluments applicable to staff seconded to the Joint Venture by the Members.

4.2.4.7 Controlling and approving the appointment of all subcontractors.

4.2.4.8 Procuring, after the completion of the Contract and the release of all bonds, guarantees and sureties given in respect of the performances of the Joint Venture and the Members, the preparation and auditing of a final set of accounts, on the basis of which the final profits, or losses, attributable to the individual Members shall be determined and any necessary adjustments effected.

5 RESOURCES OF JOINT VENTURE

The resources to be utilised by the Joint Venture in securing and executing the Contract shall, insofar as these are to be provided directly by the Members, be as set out in the Schedules and may, from time to time, be amended by decision of the Management Committee, provided that the Member's Interests are not, except with the unanimous approval of the Members, affected thereby.

Similarly, specific areas of responsibility of the Members for the performance of work and the provision of facilities shall be as set out in the Schedules and may, from time to time, be amended by decision of the Management Committee, provided that the Members' Interest are not, except with the unanimous approval of the Members, affected thereby.

5.1 Schedule 'A' (General)

Schedule 'A' shall contain general information relating to the Joint Venture including, inter alia, the following :

1. The Employer's name and address.
2. A brief description of the Contract and the Deliverables.
3. The name, physical address, communications addresses and domicilium citandi et executandi of each Member and of the Joint Venture.
4. The Members' Interests.
5. A statement indicating whether, or not, Specific Provisions apply to the Agreement.
6. A schedule of insurance policies which must be taken out by the Joint Venture and by the individual Members.
7. A Schedule of sureties, indemnities and guarantees that must be furnished by the Joint Venture and by the individual Members.
8. Details of the persons, who, in the event of failure by the Members to reach agreement on the appointments of mediator and arbitrator, will nominate appointees to these positions in terms of Clauses 8.2 and 8.3.

5.2 Schedule 'B' (Financial)

Schedule 'B' shall contain information regarding the financial affairs of the Joint Venture including, inter alia, the following :

1. The working capital required by the Joint Venture and the extent to which and manner whereby this will be provided and/or guaranteed by the individual Members from time to time.
2. The banking accounts that are to be opened in the name of the Joint Venture and the manner in which these are to be operated.
3. The rates of interest that will be applicable to amounts by which Members are in debit, or credit, to the Joint Venture.
4. The names of the auditors and others, if any, who will provide auditing and accounting services to the Joint Venture.
5. The intervals at which interim financial accounts and forecasts will be prepared for approval by the Management Committee.
6. Insofar as not covered in Schedule 'C', the basis on which contributions of various types by the Members towards the work of the Joint Venture in securing, executing, managing and satisfactorily completing the Contract, will be valued.
7. The basis on which profits and/or surplus cash will, if available from time to time, be distributed to Members.
8. The basis upon which losses, if any, are to be apportioned to Members.

5.3 Schedule 'C' (Contributions by Members)

Schedule 'C' shall set out the contributions of various types, other than cash, that will be made by the individual Members towards the work and obligations of the Joint Venture and shall, as far as possible, indicate the monetary values to be placed on such contributions, which may include, inter alia, the following :

1. Staff seconded to the Joint Venture.
2. Work carried out and services provided to, or on behalf of, the Joint Venture.
3. Plant, equipment, facilities etc. made available for use by the Joint Venture.
4. Materials and goods supplied to, or on behalf of, the Joint Venture.
5. Licences, sureties, guarantees and indemnities furnished to, or on behalf of, the Joint Venture.
6. Joint Venture Disclosure form required for the Contract.

6. BREACH OF AGREEMENT

If a Member breaches any material provision of the Agreement, or delays or fails to fulfil its obligations in whole, or in part, and does not remedy the situation within fourteen calendar days of receipt of notice from the Management Committee, or another Member, to do so, the other Members shall have the right, without prejudice to any other rights arising from the default, to summarily terminate the Agreement and re-assign the defaulting Member's rights and obligations in the Joint Venture as they see fit and withhold any moneys due to the defaulting member by the Joint Venture.

Each Member shall indemnify the other Members against all losses, costs and claims which may arise against them in the event of the Agreement being terminated as a result of breach of the Agreement by the said Member.

7. INSOLVENCY OF MEMBER

Should a Member be placed in liquidation, or under judicial management, whether provisionally or finally, or propose any compromise with its creditors, the other Members shall be entitled to proceed in terms of Clause 6, as if the Member had breached the Agreement.

8. DISPUTES

8.1 Settlement

The Members shall negotiate in good faith and make every effort to settle any dispute, or claim, that may arise out of, or relate to, the Agreement.

If agreement cannot be reached, an aggrieved Member shall, if he intends to proceed further in terms of Clause 8.2 hereof, advise all other Members in writing that negotiations have failed and that he intends to refer the matter to mediation in terms of Clause 8.2.

8.2 Mediation

Not earlier than ten working days after having advised the other Members, in terms of Clause 8.1, that negotiations in regard to a dispute have failed, an aggrieved Member may require that the dispute be referred, without legal representation, to mediation by a single mediator.

The mediator shall be selected by agreement between the Members, or, failing such agreement, by the person named for this purpose in Schedule 'A'. The costs of the mediation shall be borne equally by all Members.

The mediator shall convene a hearing of the Members and may hold separate discussions with any Member and shall assist the Members in reaching a mutually acceptable settlement of their differences through means of reconciliation, interpretation, clarification, suggestion and advice. The Members shall record such agreement in writing and thereafter they shall be bound by such agreement.

The mediator is authorised to end the mediation process whenever in his opinion further efforts at mediation would not contribute to a resolution of the dispute between the Members.

8.3 Arbitration

Where a dispute or claim is not resolved by mediation, it shall be referred to arbitration by a single arbitrator to be selected by agreement between the Members or, failing agreement, to be nominated by the person named for this purpose in Schedule 'A'.

The Member requiring referral to arbitration shall notify the other Members, in writing, thereof, not later than thirty calendar days after the mediator has expressed his opinion, failing which the mediator's opinion shall be deemed to have been accepted by all Members and shall be put into effect.

Arbitration shall be conducted in accordance with the provisions of the Arbitration Act No. 42 of 1965, as amended, and in accordance with such procedure as may be agreed by the Members or, failing such agreement, in accordance with the rules for the Conduct of Arbitrations published by the Association of Arbitrators and current at the date that the arbitrator is appointed.

The decisions of the arbitrator shall be final and binding on the Members, shall be carried into immediate effect and, if necessary, be made an order of any court of competent jurisdiction.

9. DOMICILIUM

The Members choose domicilium citandi et executandi for all purposes of and in connection with the Agreement as stated in Schedule 'A'. A Member shall be entitled to change his domicilium from time to time, but such change shall be effective only on receipt of written notice of the change by all other Members.

Member No. 1

Thus done and signed at _____ this _____ day of _____20___

For and on behalf of_____*[Company]*

by *[name]* _____ who warrants his authority to do so.

_____

As witnesses 1. _____ As witnesses 2. _____

Member No. 2

Thus done and signed at _____ this _____ day of _____20___

For and on behalf of_____*[Company]*

by *[name]* _____ who warrants his authority to do so.

_____

As witnesses 1. _____ As witnesses 2. _____

Member No. 3

Thus done and signed at _____ this _____ day of _____20___

For and on behalf of_____*[Company]*

by *[name]* _____ who warrants his authority to do so.

_____

As witnesses 1. _____ As witnesses 2. _____

[Allow for additional parties as necessary].

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

ANNEXURE 6: Health and Safety Specification

Annexure 6

Occupational Health and Safety Specification

(OHSE SPEC)

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Project Name:	**Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network**

Project Code:	**056794; 055620**
Agent Name:	**Ms. L. Ntuli (Head Office)**
Region:	**Head Office**
District:	**Head Office**
Ward no.:	**TBC**

1. Introduction

The *KwaZulu Natal Department of Public Works* is deemed as the "**Client"** in terms of the definitions of Construction Regulations of 2014 as published in *Government Gazette No. 37305* .The Construction Regulations of 2014 under *CR(5)(1)* stipulates that that the client must prepare a suitable, sufficiently documented and coherent site specific Occupational Health and Safety Specification for the intended construction work based on the baseline risk assessment.

The purpose of this Occupational Health and Safety Specification document (which hereinafter will be referred to as OHSE Spec) is to provide designers and the successful tenderer with essential OHS information to ensure effective safety management during the design and construction phase of the project.

This OHSE Spec forms an integral part of the contract between the Client and the Principal Contractor, so as to ensure compliance with the Occupational Health and Safety Act, Act 85 of 1993 and its applicable regulations and must serve as the basis for the Principal Contractor to develop his/her Project Safety, Health and Environmental Management Plan. As with any other plan for it to be implemented and managed effectively it requires the allocation of sufficient funds to achieve the objectives set out in the plan. In line with this requirement Construction Regulation 5(1)(g) requires the Client to ensure that the Principal Contractor has made adequate provisions for the cost of Health and Safety Measures in their tenders.

It must be noted that this OHSE Spec as much as it is detailed it is not exhaustive and the onus is on the Principal Contractors to ensure that they comply with Section 8 of the OHS Act, Act 85 of 1993 which states that "*Every Employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees* ." this means that Principal Contractors as they are employers in their own right must at all times ensure continuous assessments are done for continued provision and maintenance of a healthy and safe working environment.

2. Definitions

For the purpose of the OHSE Spec, the abbreviations or definitions given hereunder shall apply

"CR" refers to the Construction Regulations 2014

"Agent (*Pr.CHSA* **)"** means a competent person who acts as a representative for a Client in terms of regulation (5)5.

"Client" means Department of Public Works

"Competent person" means a person who-

(a) Has in respect of the work or task to be performed the required knowledge, training and experience and, where applicable, qualifications, specific for that work or task: Provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualifications Framework Act, 2000 (Act No.67 of 2000), those qualifications and that training must be regarded as the required qualifications and training; and

(b) Is familiar with the OHS Act, Act 85 of 1993 and with the applicable regulations made under the Act;

"Construction Manager (*Site Agent* **)"** means a competent person responsible for the management of the physical construction processes and the coordination, administration and management of resources on a construction site;

"Construction Site" means a work place where construction work is being performed;

"Construction Supervisor" means a competent person responsible for supervising construction activities on a construction site;

"Construction Vehicle" means a vehicle used as a means of conveyance for transporting persons or material, or persons and material, on and off the construction site for the purposes of performing construction work;

"Construction work" means any work in connection with –

(a) The construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure; or

(b) the construction, erection, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system; or the moving of earth, clearing of land, the making of excavation, piling, or any similar civil engineering structure or type of work;

"Construction Work Permit" means a document issued in terms of regulation 3 of the Construction Regulations 2014;

"Contractor" means an employer who performs construction work;

"Demolition Work" means a method to dismantle, wreck, break, pull down or knock down of a structure or part thereof by way of manual labour, machinery, or the use of explosives;

"Fall Protection Plan" means a documented plan, which includes and provides for-

(a) All risks relating to working from a fall risk position, considering the nature of work undertaken;

(b) The procedures and methods to be applied in order to eliminate the risk of falling; and

(c) A rescue plan and procedures;

"Health and Safety File" means a file, or other record containing the information in writing required by these Regulations;

"Health and Safety Plan" means a site, activity or project specific documented plan in accordance with the client's health and safety specification;

"Health and Safety Specification" means a site, activity or project specific document prepared by the client pertaining to all health and safety requirements related to construction work;

"Medical Certificate of Fitness" means a certificate contemplated in regulation 7(8) of Construction Regulations 2014;

"Principal Contractor" means an employer appointed by the client to perform construction work;

"Safety Officer" – a person deemed competent by SACPCMP under the relevant category of registration.

"Professional Engineer or Professional Certificated Engineer" means a person holding registration as either a Professional Engineer or Professional Certificated Engineer in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000);

3. Scope of Application

This OHSE Specification document stipulates the minimum Occupational Health, Safety, and
This Specification also makes provision for the protection of persons other than employees. **T**his OHSE Spec is exclusively applicable to the following project pending any change of scope which may necessitate changes to the OHSE Specification;

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This OHSE Specification further seeks to achieve the following**;**

(a) To provide Principal Contractors with the Structure of the Detailed OHSE Plans they will have to prepare and submit for this project. ***See T2.32 in returnable schedule***

(b) Provide the overarching framework within which the Principal Contractor is required to demonstrate compliance with certain requirements for occupational health and safety established by the Occupational Health and Safety Act, Act 85 of 1993, all applicable regulations and Client Specific Requirements. ***See T2.33 in returnable schedule***

(c) To bring to the attention of the Bidding Principal Contractors that they need to make an undertaking that the costs for executing the project includes the costs of complying with the OHS Act, Act 85 of 1993, all applicable regulations including Client Specific requirements. Such undertaking is made by appending signatures on the OHS Declaration for Tenders. ***See T2.17 in returnable schedule***

(d) Ensure that the Principal Agent as the Professional Service Provider appointed by the Department to manage the project on its behalf in terms of the Conditions of Contract applicable to this project ensures that the contents of this document and the attached Baseline Risk Assessment are taken into consideration during design by all professions appointed and that the OHSE Specification is incorporated into the tender documents. ***See T2.34 in returnable schedule***

4. Contractual Issues

Acceptance by the Principal Contractor of the contract with KZN DOPW shall constitute
Due to fact that this document is based on legislative requirements, the Client requires that all
The Client or its duly appointed Construction H&S Agent reserves the right to stop any Principal
The requirements as specified by the Client in this document must not be deemed to be
The Client will not entertain any claim of any nature whatsoever which arises as a result of costs incurred or delays being experienced due to the Contractor not complying with the requirements of this document and/or any other applicable legislative requirements imposed on the Contractor.

5. Administrative Requirements

(a) **Application for a Construction Work Permit Number** *(Exempted until 7 August 2015)*
Should the submitted tender meet the following criteria then the tenderers must ensure that they attach a certified copy of the **SACPCMP** Certificate for a Registered Construction Manager

(i) *Construction work will exceed 180 days*
(ii) *Will involve more than 1800 person days of construction work; or*
(iii) *The works contract is for a CIDB grading level N/A*

The application for the Construction Work Permit Number as contemplated above shall be the After the Provincial Director of Labour has issued a Construction Work Permit, the Client's or its

(b) **Notification of Construction Work**

If the submitted tender does not meet any of the criteria as stipulated under paragraph 5(a) then A copy of the notification once stamped by a DoL Official must be submitted to the client prior to

6. Appointment of a Fulltime/ Part time Safety Officer

The Principal Contractors will have to appoint a competent Construction H&S Officer as per the following criteria;

(i) *Number of employees onsite between 30 but below 50 – Part Time Safety Officer shall be appointed and will be onsite at least 2 days a week*
(ii) *Number of employees above 50 – Fulltime Safety Officer should be appointed.*
(iii) *Should the project require a Construction Work Permit – a Fulltime Safety Officer should be appointed.*

Further to the above criteria, should the Client or its Representative having considered the risks present and lack of compliance to the Occupational Health and Safety Act, Act 85 of 1993 and its applicable Regulations the Client or its Representative may issue an instruction that a Part/ Full Time Construction Health and Safety Officer must be appointed, such a requirement will have to be met. **Taking the Risk associated with this project into consideration it is deemed that a full time Safety Officer needs to be appointed and be present on site at all times.**

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ANNEXURE 7: Health and Safety Bill of Quantities

Annexure 7

HEALTH AND SAFETY IMPLEMENTATION COSTING

Contractor to give a breakdown of his Health and Safety costs on this sheet.

ITEM	DESCRIPTION	UNIT	QUAN-TITY	MONTHS (Indicative)	RATE	AMOUNT
			(a)		(b)	(a) x (b)
1	**MEDICALS**					
1.1	Pre-employment medical	Nr.	-			
1.2	Re-medicals - yearly	Nr.	-			
	TOTAL					
2	**PERSONAL PROTECTIVE EQUIPMENT**					
2.1	Overalls	Nr.				
2.2	Hard Hats	Nr.				
2.3	Safety boots/shoes	Nr.				
2.4	Gloves	Nr.				
2.5	Gumboots steel toe cap	Nr.				
2.6	Safety glasses	Nr.				
2.7	Reflector Bibs	Nr.				
2.8	Barricading Material	M				
2.9	Dust masks	Box 20				
	TOTAL					
3	**FIRE FIGHTING**					
3.1	Fire extinguishers - 4.5Kg	Nr.				
3.2	Surveys - Annual Service	Nr.				
	TOTAL					
4	**HEALTH AND SAFETY PERSONNEL**					
4.1	Safety Manager	Nr.				
4.2	Safety Officer	Nr.				
4.3	Construction Phase Safety, Health, Environmental and Waste Management Plan	Nr.				
	TOTAL					
5	**FACILITIES**					
5.1	Provision of ablution facilities	Nr.				
5.2	Service and maintenance of ablution facilities	Nr.				
5.3	Provision of eating areas	Nr.				
5.4	Cleaning of Lay down and other storage areas	Nr.				
5.5	Wash hand basin	Nr.				
5.6	Hot and Cold running water	Nr.				
5.7	Degreasing & Toilet soap	Nr.				
	TOTAL					

6	**FALL PREVENTION / PROTECTION**					
6.1	Safety harnesses with double lanyards	Nr.				
6.2	Safety harnesses with Scaffold hooks	Nr.				
6.3	Lifelines and vertical fall arrest systems	Nr.				
6.4	Scaffolding – material, erection and inspection (Estimate for project)	Nr.				
6.5	Temporary hand railing material and kick flats	Nr.				
6.6	Chin Straps	Nr.				
	TOTAL					
7	**FIRST AID**					
7.1	Replenishment of boxes and other supplies	Nr				
	TOTAL					
8	**TRAINING**					
8.1	SHE Representative	Nr.				
8.2	First Aid Level 1	Nr.				
8.3	Fire Fighting	Nr.				
	TOTAL					
9	**SIGNAGE**					
9.1	All Signage as required by Law, regulatory, warning and information	Nr.				
9.2	Posters for awareness	Nr.				
	TOTAL					
10	**ELECTRICAL**					
10.1	Replacement of Locks required for lockouts	Nr.				
10.2	Replacement of tags	Nr.				
10.3	Replacement for Permit books	Nr.				
10.4	Replacement of Callipers	Nr.				
	TOTAL					
11	**OTHERS (Project Specific)**					
11.1		Nr.				
	TOTAL					
	GRAND TOTAL TO BE CARRIED TO THE PRELIMINARIES AND GENERAL IN BILL OF QUANTITIES					

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ANNEXURE 8: Builders Lien Agreement

Annexure 8

WAIVER OF CONTRACTOR'S LIEN

DEFINITIONS

Contractor:	_____
Employer:	Head: Public Works (KZN Department of Public Works: Province of KwaZulu-Natal)
Agreement:	GCC FOR CONSTRUCTION WORKS - SECOND EDITION 2010
Works (description):	**Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network**
Site:	Region: District Municipality: Local Municipality: Ward Nr.: Cluster Nr x:

AGREEMENT

The Contractor waives, in favour of the Employer, any lien or right of retention that is or may be held in respect of the Works to be executed on the Site

Thus done and signed at _____ on _____
[Date]

_____ _____
Name of signatory Capacity of signatory

_____ _____
As witness For and on behalf of the contractor who by signature hereof warrants authorisation hereto

Province of Kwazulu-Natal: Upgrade and Maintenance of Radio Repeater Network

ANNEXURE 9: Abbreviated List of Repeater Sites

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWORKS
ABREVIATED LIST OF REPEATERS AND SITES

Item No	Site No	Radio Site Name	Radio No	User Dept	Type	Qty	Sites
1	1	Alverstone	1.1	DOT	DMR Multicast	1	1
		-29.776944, 30.712778	1.2	KZW	MB Analogue	1	
			1.3	KZE	MB Analogue	1	
			1.4	EMS	HB Analogue	1	
			1.5	DOT	DMR Simulcast	1	
			1.6	EMS	Link - Analogue	1	
			1.7	DOT	Link - Digital	1	
			1.8	DOT	Link - Digital	1	
			1.9	DOT	GSU Sync Unit	1	
2	3	Babanango	3.1	KZE	MB Analogue	1	1
		-28.392222, 30.995556	3.2	KZW	MB Analogue	1	
			3.3	DOT	MB - Digital	1	
			3.4	EMS	MB Analogue	1	
			3.5	KZE	Link - Analogue	1	
			3.6	EMS	Link - Analogue	1	
3	5	Bokkiesberg	5.1	DOT	MB Analogue	1	1
		-30.378628, 29.289792	5.2	EMS	MB Analogue	1	
			5.3	EMS	MB Analogue	1	
			5.4	KZE	MB Analogue	1	
			5.5	EMS	Link - Analogue	1	
			5.6	KZE	Link - Analogue	1	
4	9	Dumbe Mountain	9.1	KZE	MB Analogue	1	1
		-27.447222, 30.841944	9.2	DOT	MB Analogue	1	
			9.3	KZW	MB Analogue	1	
			9.4	KZE	Link - Analogue	1	
5	10	L'Mpati / Dundee	10.1	DOT	MB Analogue	1	1
		-28.125556, 30.215	10.2	KZE	MB Analogue	1	
			10.3	EMS	MB Analogue	1	
			10.4	KZW	MB Analogue	1	
			10.5	KZE	Link - Analogue	1	
			10.6	EMS	Link - Analogue	1	
6	12	Eshowe	12.1	KZE	MB Analogue	1	1
		-28.867109, 31.300805	12.2	DOT	MB Analogue	1	
			12.3	EMS	MB Analogue	1	
			12.4	KZW	MB Analogue	1	
			12.5	KZE	Link - Analogue	1	
7	13	Estcourt (Hidcote)	13.1	KZE	MB Analogue		1
		-29.121714, 29.926898	13.2	DOT	MB Analogue	1	
			13.3	EMS	MB - Digital	1	
			13.5	KZW	MB Analogue	1	
8	16	St. Michaels / Greytown	16.1	KZE	MB Analogue	1	1
		-29.032222, 30.505833	16.2	DOT	MB Analogue	1	
			16.3	EMS	MB Analogue	1	
			16.4	KZW	MB Analogue	1	
			16.5	KZE	Link - Analogue	1	
			17.6	EMS	Link - Analogue	1	
9	17	Groenvlei	17.1	DOT	MB - Digital	1	1
		-27.49136, 30.330602	17.2	KZW	MB Analogue	1	
			17.3	EMS	MB Analogue	1	
			17.4	KZE	MB Analogue	1	
			17.5	KZE	Link - Analogue	1	
10	18	Highflats\Kunata	18.1	KZE	MB Analogue	1	1
		-30.269444, 30.253333	18.2	DOT	MB Analogue	1	
			18.3	EMS	MB Analogue	1	
			18.4	KZW	MB Analogue	1	
			18.5	EMS	Link - Analogue	1	
11	21	Hluhluwe	21.1	DOT	MB Analogue	1	1
		-28.069444, 32.033889	21.2	KZE	MB Analogue	1	
			21.3	EMS	MB Analogue	1	
			21.4	KZW	MB Analogue	1	
			21.5	EMS	Link - Analogue	1	
12	22	Durban / Howard College	22.2	EMS	HB Analogue	1	1
		-29.866389, 30.981111	22.3	DOT	MB Analogue	1	

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWORKS ABREVIATED LIST OF REPEATERS AND SITES							
13	24	Netherby -29.658889, 29.631111	24.1 24.2 24.3 24.4 24.5 24.6	KZE EMS DOT KZW KZE EMS	MB Analogue MB Analogue MB Analogue MB Analogue Link - Analogue Link - Analogue	1 1 1 1 1 1	1
14	26	Itala -27.617222, 31.322222	26.1 26.2 26.3 26.4	EMS KZW DOT EMS	MB Analogue MB Analogue MB Analogue Link - Analogue	1 1 1 1	1
15	27	Jobskop -28.579167, 30.212778	27.1 27.2 27.3 27.4 27.5	KZE DOT EMS KZW KZE	MB Analogue MB Analogue MB Analogue MB Analogue Link - Analogue	1 1 1 1 1	1
16	28	Nkangala/Josini -27.561667, 32.045	28.1 28.2 28.3 28.4 28.5 28.6 28.7	KZW DOT EMS KZE EMS EMS KZE	MB Analogue MB Analogue MB Analogue MB Analogue Link - Analogue Link - Analogue Link - Analogue	1 1 1 1 1 1 1	1
17	29	Kearsney/Stanger -29.276667, 31.2025	29.1 29.2 29.3 29.4 29.5 29.6 29.7 29.8	DOT EMS KZE KZW DOT DOT KZE DOT	MB Analogue MB Analogue MB Analogue MB Analogue DMR Simulcast Link - Digital Link - Analogue GSU Sync Unit	1 1 1 1 1 1 1 1	1
18	34	Mara Farm -30.816389, 30.248889	34.1 34.2 34.3 34.4 35.5 34.6 34.7 34.8 34.9	KZE EMS EMS DOT KZW DOT DOT KZE DOT	MB Analogue MB Analogue MB Analogue MB Analogue MB Analogue DMR Simulcast Link - Digital Link - Analogue GSU Sync Unit	1 1 1 1 1 1 1 1 1	1
19	37	Matshane Mountain -28.750833, 31.842778	37.1 37.2 37.3 37.4 37.5	KZE EMS KZW DOT KZE	MB Analogue MB Analogue MB Analogue MB Analogue Link - Analogue	1 1 1 1 1	1
20	42	Nongoma -27.901111, 31.65	42.1 42.2 42.3 42.4 42.5 42.6	KZE KZW DOT EMS KZE EMS	MB Analogue MB Analogue MB Analogue MB Analogue Link - Analogue Link - Analogue	1 1 1 1 1 1	1
21	45	Mtonjaneni -28.439722, 31.402222	45.1 45.2 45.3 45.4 45.5	KZW KZE DOT EMS KZE	MB Analogue MB Analogue MB Analogue MB Analogue Link - Analogue	1 1 1 1 1	1
22	56	Swartkop -29.582851, 30.253562	56.1 56.2 56.3 56.4 56.5 56.6 56.7 56.8	KZE DOT EMS KZW EMS DOT KZE DOT	MB Analogue DMR Multicast HB Analogue MB Analogue MB Analogue Link - Digital Link - Analogue GSU Sync Unit	1 1 1 1 1 1 1 1	1

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWORKS ABREVIATED LIST OF REPEATERS AND SITES							
23	61	Van Reenen -28.382778, 29.400278	61.1 61.2 61.3	DOT EMS	MB - Digital MB - Digital	1 1	1
24	62	Vernon Crookes -30.268205, 30.625303	62.1 62.2 62.3 62.4 62.5 62.6	DOT KZW KZW DOT DOT DOT	MB - Digital MB Analogue DMR Simulcast Link - Digital Link - Digital GSU Sync Unit	1 1 1 1 1 1	1
25	63	Vryheid -27.741250, 30.794997	63.1 63.2 63.3 63.4 63.5	DOT EMS KZW EMS KZE	MB Analogue MB Analogue MB Analogue MB Analogue Link - Analogue	1 1 1 1 1	1
26	64	Bluff (Sandf) -29.898056, 31.038889	64.1 64.2 64.3 64.4 64.5 64.6 64.7 64.8 64.9 64.10 64.11	DOT EMS KZW EMS DOT DOT DOT DOT DOT DOT KZE	DMR Multicast MB Analogue MB Analogue HB Analogue DMR Simulcast Link - Digital Link - Digital Link - Digital Link - Digital GSU Sync Unit Link - Analogue	1 1 1 1 1 1 1 1 1 1 1	1
27	65	Worldsview -29.583056, 30.331389	65.1 65.2	DOT EMS	MB Analogue MB Analogue	1 1	1
28	81	Umzimkulu -30.347222, 29.847222	81.1 81.2 81.3 81.4 81.5 81.6 81.7	KZW DOT EMS EMS KZE EMS KZE	MB Analogue MB Analogue Link - Analogue MB Analogue MB Analogue Link - Analogue Link - Analogue	1 1 1 1 1 1 1	1
29	87	Inanda - 2 -29.671389, 30.9579	87.1 87.2 87.3 87.4 87.5	EMS DOT DOT DOT DOT	MB Analogue DMR Simulcast Link - Digital Link - Digital GSU Sync Unit	1 1 1 1 1	1
30	91	Res- Hills -29.80069, 30.92658	91.1	EMS	MB Analogue	1	1
31	92	Glendale -29.342256, 31.090736	92.1	EMS	MB Analogue	1	1
32	93	Shallcross -29.882739, 30.856875	93.1 93.2	DOT DOT	Link - Digital Link - Digital	1 1	1
33	94	Marianhill -29.83197, 30.83040	94.1	DOT	Link - Digital	1	1
34	95	Somopho Hills -28.656884, 31.844271	95.1 95.2	EMS DOT	MB Analogue MB Analogue	1 1	1

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ANNEXURE 10: Repeater Site Data - Comprehensive

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWORKS
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	ALVERSTONE									BABANANGO					
1	SITE	NUMBER		1									3					
2	RADIO UNIT	NUMBER		1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	3.1	3.2	3.3	3.4	3.5	3.6
3	UPDATED	DATE		2022/05/26									2022/05/26					
4	SITE	NAME		ALVERSTONE									BABANANGO					
5	SITE	DISTRICT		PINETOWN									BABANANGO					
6	SITE	FARM		FREELAND									DEPARTMENT OF AGRICULTURE					
7	SITE	CO-ORDINATES	LAT, LONG	-29.776944, 30.712778									-28.392222, 30.995556					
8	SITE	ALTITUDE	m	848									1519					
9	SITE	OWNER		MR A.H. DRAKE									DEPARTMENT OF AGRICULTURE					
10	SITE	USER NAME		DOT ; DOW; KZE ; EMS									KZW: DOT: KZE					
11	SITE	ACCESS 1		M13 to PMB, take Alverstone T/off, Road past Waldolf school,@ T-Junction									Nqutu/Melmoth Rd. Site seen on left approx. 5km ex Babanango from					
12	SITE	ACCESS 2		turn left: through cattle gate: Freeland Farm sign board on right									Durban or 5km from Nkandla t/o (from Nqutu).					
35	POWER ACCOUNT	SUPPLY AUTHORITY		ESKOM - Presently supplied form SANDF									ESKOM					
36	POWER ACCOUNT	ACCOUNT No.		TBC									6487530304					
37	POWER ACCOUNT	PAYEE		DEPARTMENT OF WORKS									DEPARTMENT OF WORKS					
38	POWER ACCOUNT	CONTACT PERSON		S. MATHONSI									S. MATHONSI					
39	POWER ACCOUNT	POSTAL ADDRESS		191 PRINCE ALFRED STREET, PMB									191 PRINCE ALFRED STREET, PMB					
40	POWER ACCOUNT	TEL NO.		033 355 5527									033 355 5527					
41	POWER ACCOUNT	FAX NO																
42	POWER SUPPLY	TYPE		230 V									230 V					
43	SURGE ARRESTOR	FLASHTRAB																
44	SURGE ARRESTOR	MAKE		PHOENIX									PHOENIX					
45	SURGE ARRESTOR	FLT 60-400		2									2					
46	SURGE ARRESTOR	VAL MS-230		2									2					
47	SURGE ARRESTOR	LT-35		2									2					
48	SURGE ARRESTOR	SURGE PLUG		1									1					
49	SURGE ARRESTOR	DETAIL		D8260/E14/105									D8260/E14/105					
50	SOLAR PANELS	MAKE																
51	SOLAR PANELS	TYPE																
52	SOLAR PANELS	QUANTITY	No															
53	SOLAR PANELS	RATING/UNIT	Watt															
54	SOLAR REGULATOR	MAKE																
55	SOLAR REGULATOR	TYPE																
56	SOLAR REGULATOR	QUANTITY	No															
57	SOLAR REGULATOR	RATING/UNIT	Amp															
58	WIND GENERATOR	MAKE																
59	WIND GENERATOR	TYPE																
60	WIND GENERATOR	QUANTITY	No															
61	WIND GENERATOR	RATING/UNIT	Watt															
62	BATTERY	MAKE		RAYLITE									RAYLITE					
63	BATTERY	TYPE		M SOLAR CELLS 3 MIL 15 S MONO BLOC									M SOLAR CELLS 3 MIL 15 S MONO BLOC Smart Battery Protector					
64	BATTERY	VOLTAGE	VOLT	12				24					12					
65	BATTERY	NO OF UNITS	No	1									1					
66	BATTERY	RATING	AH	530 AH (C100)									530 AH (C100)					
67	BATTERY	CONDITION		Old - Deteriorated									New - OK					
68	BATTERY CHARGER	MAKE		Victron Centaur 12V 60A				Mecer Inverter					JSM Power Charger and Battery Protect					
69	BATTERY CHARGER	TYPE						24V DC										
70	BATTERY CHARGER	SERIAL NUMBER		TBC				TBC					020					
71	BATTERY CHARGER	RATING/UNIT	Amp	60									60					
72	EARTH MAT																	
73	EARTH MAT	EARTH RESISTANCE	Ohm															
74	EARTH MAT	DATE MEASURED																
75	MAST	MAKE		COMTOWER									WEBB					
76	MAST	TYPE		SELF SUPPORTING									SS21					
77	MAST	HEIGHT	m	21									21					
78	MAST	OWNED BY		DEPARTMENT OF WORKS									DEPARTMENT OF WORKS					
79	MAST	CONDITION		Erected: 1997-11-05 - Acceptable condition									Erected: 1984 - Acceptable condition					
80	SITE ACCOMMODATION	TYPE		STEEL CONTAINER									STEEL CONTAINER (INSULATED)					
81	SECURITY FENCE	TYPE		MESH WIRE & FLAT COIL RAZOR WIRE									MESH WIRE & FLAT COIL RAZOR WIRE					
82	SECURITY FENCE	GATE		PEDESTRIAN									PEDESTRIAN					
83	SECURITY FENCE	LOCKS	No	2									2					
84	SECURITY FENCE	SURFACE		GROUND									GROUND					
85	RADIO UNIT	NUMBER		1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	3.1	3.2	3.3	3.4	3.5	3.6
86	USER			DOT	KZW	KZE	EMS	DOT	EMS	DOT	DOT	DOT	KZE	KZW	DOT	EMS	KZE	EMS
87	UNIT TYPE			Multicast Slave	Midband Analogue	Midband Analogue	Highband Analogue	Simulcast Slave	Analogue Link	IP Link Radio	IP Link Radio	GSU Sync Unit	Midband Analogue	Midband Analogue	Midband Digital	Midband Analogue	Analogue Link	Analogue Link
88	RADIO UNIT 1	MAKE		KAIROS - DMR	TAIT	MIDLAND	TAIT	KAIROS - DMR	MAXON	RADWIN	RADWIN	RADWIN	TAIT	TAIT	KAIROS - DMR	TAIT	TAIT	TAIT
89	RADIO UNIT 1	MODEL		KA-80 M/B	T800II	70-066A	T800II	KA-160 H/B	SMX4450	2000D IP	2000D IP	RW-9924-0070	T825/10	T825-15	KA-080 M/B	T800II	T855/25	TP 7100
90	RADIO UNIT 1	CHANNEL	No	20	20	20				Simulcast Link 1	Simulcast Link 4		11	11	11			
91	RADIO UNIT 1	SERIAL No.		080KA5948	13117805 (PA)	273132 (Tx Radio)	13126058 (PA)	160KA5508	941010459	P16650E000A006EA	P11990E000A003B9	P09270E700A00C5A	13006619 (exciter)	13127757(receiver)	KA6099	13131829(exciter)	735781 (TX)	18029445
92	RADIO UNIT 1	FREQUENCY BAND		66-88	69-77	69-77	145-155	136-174	450-460	4900-6000	4900-6000	GPS	69-77	69-77	69-77		450-460	450-460
93	RADIO UNIT 1	TONE											13006629 (PA)					
94	RADIO UNIT 1	MAKE			TAIT	MIDLAND	TAIT						TAIT	TAIT		TAIT	TAIT	TAIT
95	RADIO UNIT 1	MODEL			T800II	70-066A	T800II						T825/15	T827-15		T800III	T856/25	
96	RADIO UNIT 1	CHANNEL			2								11	11				
97	RADIO UNIT 1	SERIAL No.		TBC	13125999	273135 (Rx Radio)	13120121						707005 (RX)	13132636(PA)		13124878 (RX)	706380	13096138 (PA)
98	RADIO UNIT 1	FREQUENCY BAND		66-88	69-77	69-77	145-155						69-77	69-77	69-77		450-460	450-460
99	RADIO UNIT 1	TONE																
124	ANTENNA 1	MAKE		WEBB (2-stack)	Antronic	WEBB	WEBB (2-stack)	Colinear	WEBB	Ubiquity MW	Ubiquity MW	RADWIN	WEBB	WEBB	WEBB	WEBB	WEBB	WEBB
125	ANTENNA 1	TYPE		TBC	2 - Stack	CD 70 FD	High Band	High Band	YAGI 7 EL	5GHz 34dBi	5GHz 34dBi	GPS Antenna	FDC 72		FD 72	FD 72	UHF COLINEAR	YAGI 7 EL
126	ANTENNA 1	QUANTITY	No	1	2	2	1	1	1	1	1	1	2	4	2		1	1
127	ANTENNA 1	INSTALLATION DATE		2019				2019										
128	ANTENNA 1	RATING/UNIT	dB	3	3	3	3		9	34dBi	34dBi		3	6	3		7.2	9
133	DUPLEXOR 1	MAKE		TBC	DR66/5	QD	WEBB	TBC	QD				WEBB	WEBB	QD	TBC	WEBB	WEBB
134	DUPLEXOR 1	TYPE			1 #893101001	QSDT 4/10	DHP 150/6		QSDT 4/10				DR 66	DR66	QDSF4/10/150		DU 400	DU 400
135	DUPLEXOR 1	QUANTITY		1	1	1	1		1				1		1		1	1
136	DUPLEXOR 1	RATING/UNIT	Watt	100		150		100	150				150	50	150		80	80
141	CAVITY FILTER	MAKE				WEBB							WEBB		Circulator/Notch Filter			
142	CAVITY FILTER	TYPE				DJCF 500-01							DJCF 500/0		#7340/0:& 6351/F			
143	CAVITY FILTER	QUANTITY	No			1							1 # 565		1			
144	CAVITY FILTER	RATING	Watt			350							350					
145	SUB-AUDIO TONE	MAKE				MICROTONE												
146	SUB-AUDIO TONE	TYPE				MT108												
147	SUB-AUDIO TONE	QUANTITY				2												
148	SUB-AUDIO TONE	STANDARD											(IN RADIO)					
149	5-TONE	MAKE																
150	5-TONE	TYPE																
151	5-TONE	QUANTITY											2					
152	5-TONE	STANDARD																

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWO
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	BOKKIESBERG						DUMBE MOUNTAIN				L'MPATI / DUNDEE					
1	SITE	NUMBER		5						9.				10					
2	RADIO UNIT	NUMBER		**5.1**	**5.2**	**5.3**	**5.4**	**5.5**	**5.6**	**9.1**	**9.2**	**9.3**	**9.4**	**10.1**	**10.2**	**10.3**	**10.4**	**10.5**	**10.6**
3	UPDATED	DATE		2022/05/26						2022/05/26				2022/05/26					
4	SITE	NAME		BOKKIESBERG						DUMBE MOUNTAIN				L'MPATI					
5	SITE	DISTRICT		KOKSTAD						PAULPIETERSBURG				DUNDEE					
6	SITE	FARM		DIE KROON						MUNICIPAL SITE				MUNICIPALITY SITE					
7	SITE	CO-ORDINATES	LAT, LONG	-30.378628, 29.289792						-27.447222, 30.841944				-28.125556, 30.215					
8	SITE	ALTITUDE	m	2174						1521				1582					
9	SITE	OWNER		S M BESTER						PAULPIETERSBURG MUNICIPALITY				DUNDEE MUNICIPALITY					
10	SITE	USER NAME		DOT:EMS:KZE						DOT:KZE				DOT:EMS:KZE:KZW					
11	SITE	ACCESS 1		Kokstad to Cedarville Rd: Before Cedarville turn right to Franklin (D607)						FOLLOW SIGNS TO DUMBE NATURE RESERVE				ALONGSIDE P.O. MICROWAVE TOWER ON IMPATI MOUNTAIN					
12	SITE	ACCESS 2		Farm (Die Kroon) on right.															
35	POWER ACCOUNT	SUPPLY AUTHORITY								PAULPIETERSBURG MUNICIPALITY				ESKOM					
36	POWER ACCOUNT	ACCOUNT No.								7717280				9881187554					
37	POWER ACCOUNT	PAYEE								DEPARTMENT OF WORKS				RADIO CONTRACTOR					
38	POWER ACCOUNT	CONTACT PERSON								S. MATHONSI									
39	POWER ACCOUNT	POSTAL ADDRESS								191 PRINCE ALFRED STREET, PMB									
40	POWER ACCOUNT	TEL NO.								033 355 5527									
41	POWER ACCOUNT	FAX NO																	
42	POWER SUPPLY	TYPE		SOLAR POWER						230 V				230 V					
43	SURGE ARRESTOR	FLASHTRAB																	
44	SURGE ARRESTOR	MAKE								PHOENIX				PHOENIX					
45	SURGE ARRESTOR	FLT 60-400								2				2					
46	SURGE ARRESTOR	VAL MS-230								2				2					
47	SURGE ARRESTOR	LT-35								2				2					
48	SURGE ARRESTOR	SURGE PLUG								1				1					
49	SURGE ARRESTOR	DETAIL								D8260/E14/105				D8260/E14/105					
50	SOLAR PANELS	MAKE		Kyocera Corporation															
51	SOLAR PANELS	TYPE																	
52	SOLAR PANELS	QUANTITY	No	12															
53	SOLAR PANELS	RATING/UNIT	Watt	51															
54	SOLAR REGULATOR	MAKE		PDI															
55	SOLAR REGULATOR	TYPE		30A LOAD SHED															
56	SOLAR REGULATOR	QUANTITY	No	2															
57	SOLAR REGULATOR	RATING/UNIT	Amp	30															
58	WIND GENERATOR	MAKE																	
59	WIND GENERATOR	TYPE																	
60	WIND GENERATOR	QUANTITY	No																
61	WIND GENERATOR	RATING/UNIT	Watt																
62	BATTERY	MAKE		SLA						RAYLITE NEW LOADSHED Smart Battery Prot				RAYLITE NEW LOADSHED Smart Battery Prot					
63	BATTERY	TYPE		No Maintenance Solar						M SOLAR CELLS 3 MIL 15 S MONO BLOC				M SOLAR CELLS 3 MIL 15 S MONO BLOC					
64	BATTERY	VOLTAGE	VOLT	12						12				12					
65	BATTERY	NO OF UNITS	No	5						1				1					
66	BATTERY	RATING	AH	100 AH						530 AH (C100)				530 AH (C100)					
67	BATTERY	CONDITION		New - OK						Old - Deteriorated				Old - Deteriorated					
68	BATTERY CHARGER	MAKE								Powermaster - 12V				Powermaster - 12V					
69	BATTERY CHARGER	TYPE																	
70	BATTERY CHARGER	SERIAL NUMBER																	
71	BATTERY CHARGER	RATING/UNIT	Amp							60				60					
72	EARTH MAT																		
73	EARTH MAT	EARTH RESISTANCE	Ohm																
74	EARTH MAT	DATE MEASURED																	
75	MAST	MAKE		COMTOWER						WEBB				WEBB					
76	MAST	TYPE		SELF SUPPORTING						SS21				SS 21					
77	MAST	HEIGHT	m	21						21				21					
78	MAST	OWNED BY		DEPARTMENT OF WORKS						DEPARTMENT OF WORKS				DEPARTMENT OF WORKS					
79	MAST	CONDITION		Erected: 1998 - Acceptable condition						Erected: 1984 - Acceptable condition				Erected: 1990 - Acceptable condition					
80	SITE ACCOMMODATION	TYPE		STEEL CONTAINER						CONCRETE BLOCK				STEEL CONTAINER					
81	SECURITY FENCE	TYPE		MESH WIRE & FLAT COIL RAZOR WIRE						MESH WIRE & FLAT COIL RAZOR WIRE									
82	SECURITY FENCE	GATE		PEDESTRIAN						PEDESTRIAN									
83	SECURITY FENCE	LOCKS	No	2						2				1					
84	SECURITY FENCE	SURFACE		GROUND						GROUND				CONCRETE					
85	RADIO UNIT	NUMBER		**5.1**	**5.2**	**5.3**	**5.4**	**5.5**	**5.6**	**9.1**	**9.2**	**9.3**	**9.4**	**10.1**	**10.2**	**10.3**	**10.4**	**10.5**	**10.6**
86	USER			DOT	EMS	EMS	KZE	EMS	KZE	KZE	DOT	KZW	KZE	DOT	KZE	EMS	KZW	KZE	EMS
87	UNIT TYPE			Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Analogue Link	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Analogue Link
88	RADIO UNIT 1	MAKE		QD		QD	MIDLAND	ICOM	MAXON	MIDLAND	SIMOCO	TAIT	MAXON	QD	MIDLAND	SIMOCO	TAIT	MAXON	SIMOCO
89	RADIO UNIT 1	MODEL		Q8000		Q8000	70-066A	F410	SMX4450	70-066	TSF Lite	T800II	SMX4450	Q8000	70-066A	TSF Lite	T800II	SMX4450	SMR9000
90	RADIO UNIT 1	CHANNEL	No	27		27	27			2	2	2		7	7	7	7		
91	RADIO UNIT 1	SERIAL No.		MC111229		LC508003	279019	72147	941010440	119188	T2JSE031113115	13081627(exciter)	941010447	MC111227	119410	L2ISE01124HLX	13132640(exciter)	941010426	ARTUX11503MG6
92	RADIO UNIT 1	FREQUENCY BAND		69-77		69-77	69-77	450-460	450-460	69-77	69-77	69-77	450-460	69-77	69-77	69-77	69-77	450-460	450-460
93	RADIO UNIT 1	TONE																	
94	RADIO UNIT 1	MAKE					MIDLAND			MIDLAND		TAIT			MIDLAND		TAIT		
95	RADIO UNIT 1	MODEL					70-066A			70-066		T800II			70-066A		T800II		
96	RADIO UNIT 1	CHANNEL					27			2		2			7		7		
97	RADIO UNIT 1	SERIAL No.					279026			009270		13081593 (RX)			2788522		13131654 (RX)		
98	RADIO UNIT 1	FREQUENCY BAND		69-77		69-77	69-77			69-77	69-77	69-77		69-77	69-77	69-77	69-77		
99	RADIO UNIT 1	TONE																	
124	ANTENNA 1	MAKE		WEBB	Q TENNA	WEBB	Q TENNA	WEBB	WEBB	WEBB	WEBB	WEBB	WEBB	WEBB	WEBB	WEBB	WEBB	WEBB	WEBB
125	ANTENNA 1	TYPE			QFD160		QFD 70	YAGI 7E	DIPOLE	FD 70	FD 70	FD70	YAGI 7E					YAGI 7 E	YAGI 7 E
126	ANTENNA 1	QUANTITY	No	2	4	2	2	1	1	2	2		1	2	2		2	1	1
127	ANTENNA 1	INSTALLATION DATE																	
128	ANTENNA 1	RATING/UNIT	dB	3	6	3	3	9	3	3	3		9	3	3		3	9	9
133	DUPLEXOR 1	MAKE		WEBB	WEBB	Q TENNA	Q TENNA	TBC	TBC	WEBB	Q TENNA	TBC	TBC	WEBB	QD		WEBB	TBC	TBC
134	DUPLEXOR 1	TYPE		DR66	PD 636-6A	QDSF 4/10/150	QDSF 4/10/150			DR66	QDSF4/10			DM66/6	QSDT 4/10		DR 66/6		
135	DUPLEXOR 1	QUANTITY		1 #60040	1# 49221	1	1			1 #5055	1			1 #857	1#2102DN		1 #1474		
136	DUPLEXOR 1	RATING/UNIT	Watt	100	50	150	150			100	150			40	150		100		
141	CAVITY FILTER	MAKE								WEBB	ISOLATOR				WEBB				
142	CAVITY FILTER	TYPE								CS 500-1	HARMONIC FILTER				DJCF 500-01				
143	CAVITY FILTER	QUANTITY	No							1 #0707					1 #544				
144	CAVITY FILTER	RATING	Watt							350					350				
145	SUB-AUDIO TONE	MAKE								MICROTONE					MICROTONE				
146	SUB-AUDIO TONE	TYPE								MT 108					MT108				
147	SUB-AUDIO TONE	QUANTITY								2					2				
148	SUB-AUDIO TONE	STANDARD																	
149	5-TONE	MAKE													YES				
150	5-TONE	TYPE																	
151	5-TONE	QUANTITY								1					1				
152	5-TONE	STANDARD																	

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWO
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	ESHOWE					ESTCOURT (HIDCOTE)				ST. MICHAELS / GREYTOWN					
1	SITE	NUMBER		12					13				16					
2	RADIO UNIT	NUMBER		**12.1**	**12.2**	**12.3**	**12.4**	**12.5**	**13.1**	**13.2**	**13.3**	**13.5**	**16.1**	**16.2**	**16.3**	**16.4**	**16.5**	**16.6**
3	UPDATED	DATE		2022/05/26					2022/05/26				2022/05/26					
4	SITE	NAME		TOP FARM					ESTCOURT				CHIPPERFIELD					
5	SITE	DISTRICT		ESHOWE					HIDCOTE				GREYTOWN					
6	SITE	FARM		TOP FARM					INVERNESS				FERNHILL					
7	SITE	CO-ORDINATES	LAT, LONG	-28.867109, 31.300805					-29.121714, 29.926898				-29.032222, 30.505833					
8	SITE	ALTITUDE	m	853					1664				1504					
9	SITE	OWNER		Misty Farm (PTY) ltd					B.G. SYMMONS				M.B. HILL					
10	SITE	USER NAME		KZE:DOT:EMS:KZW					KZE:DOT:EMS:KZW				DOT: EMS: KZE:KZW					
11	SITE	ACCESS 1		Ntumeni Rd from Eshowe. Before FM tower turn left @ Top Farm.					N3 North: After Toll Plaza at Mooi River: Take HIDCOTE Turn off.				BETWEEN GREYTOWN & MUDEN ON R74: AT THE TOP OF HILL:					
12	SITE	ACCESS 2							50m on the left from intersection: Road to Inverness farm; Follow road.				SITE ON LEFT: GO THROUGH WHITE GATES: FOLLOW RD TO SITE					
35	POWER ACCOUNT	SUPPLY AUTHORITY		ESKOM					ESKOM				ESKOM (Meter No: GRT 55)					
36	POWER ACCOUNT	ACCOUNT No.		5932210985					910199743				6260773498					
37	POWER ACCOUNT	PAYEE		RADIO CONTRACTOR					RADIO CONTRACTOR				RADIO CONTRACTOR					
38	POWER ACCOUNT	CONTACT PERSON																
39	POWER ACCOUNT	POSTAL ADDRESS																
40	POWER ACCOUNT	TEL NO.																
41	POWER ACCOUNT	FAX NO																
42	POWER SUPPLY	TYPE		230 V					230 V				230 V					
43	SURGE ARRESTOR	FLASHTRAB																
44	SURGE ARRESTOR	MAKE		PHOENIX					PHOENIX				Phoenix Contact					
45	SURGE ARRESTOR	FLT 60-400		2					2				2					
46	SURGE ARRESTOR	VAL MS-230		2					2				2					
47	SURGE ARRESTOR	LT-35		2					2				2					
48	SURGE ARRESTOR	SURGE PLUG		1					1				1					
49	SURGE ARRESTOR	DETAIL		D8260/E14/105					D8260/E14/105				D8260/E14/105					
50	SOLAR PANELS	MAKE																
51	SOLAR PANELS	TYPE																
52	SOLAR PANELS	QUANTITY	No															
53	SOLAR PANELS	RATING/UNIT	Watt															
54	SOLAR REGULATOR	MAKE																
55	SOLAR REGULATOR	TYPE																
56	SOLAR REGULATOR	QUANTITY	No															
57	SOLAR REGULATOR	RATING/UNIT	Amp															
58	WIND GENERATOR	MAKE																
59	WIND GENERATOR	TYPE																
60	WIND GENERATOR	QUANTITY	No															
61	WIND GENERATOR	RATING/UNIT	Watt															
62	BATTERY	MAKE		RAYLITE					RAYLITE NEW LOADSHED Smart Battery Prot				RAYLITE NEW LOADSHED Smart Battery Prot					
63	BATTERY	TYPE		M SOLAR CELLS 3 MIL 15 S MONO BLOC					M SOLAR CELLS 3 MIL 15 S MONO BLOC				M SOLAR CELLS 3 MIL 15 S MONO BLOC					
64	BATTERY	VOLTAGE	VOLT	12					12				12					
65	BATTERY	NO OF UNITS	No	1					1				1					
66	BATTERY	RATING	AH	530 AH (C100)					530 AH (C100)				530 AH (C100)					
67	BATTERY	CONDITION		New - OK					New - OK				New - OK					
68	BATTERY CHARGER	MAKE		Victron Centaur 12V 60A					Victron Centaur 12V 60A				Victron Centaur 12V 60A					
69	BATTERY CHARGER	TYPE																
70	BATTERY CHARGER	SERIAL NUMBER		TBC					TBC				HQ1503JB812					
71	BATTERY CHARGER	RATING/UNIT	Amp	60					60				60					
72	EARTH MAT																	
73	EARTH MAT	EARTH RESISTANCE	Ohm															
74	EARTH MAT	DATE MEASURED																
75	MAST	MAKE		WEBB					WEBB				Tower					
76	MAST	TYPE		SS21					SS21				Sectional pole					
77	MAST	HEIGHT	m	21					21				24					
78	MAST	OWNED BY		DEPARTMENT OF WORKS					DEPARTMENT OF WORKS				DEPARTMENT OF TRANSPORT					
79	MAST	CONDITION		Erected: 1980 - Acceptable condition					Erected: 1984 - Acceptable condition				Erected: 1987 - Acceptable condition					
80	SITE ACCOMMODATION	TYPE		SECURAPANE FIBREGLASS					STEEL CONTAINER				STEEL CONTAINER (INSULATED) (KZN 02/01)					
81	SECURITY FENCE	TYPE		MESH WIRE & FLAT COIL RAZOR WIRE (NEEDS TO BE REPLACED)					MESH WIRE & FLAT COIL RAZOR WIRE				MESH WIRE & FLAT COIL RAZOR WIRE					
82	SECURITY FENCE	GATE		PEDESTRIAN					PEDESTRIAN				PEDESTRIAN					
83	SECURITY FENCE	LOCKS	No	2					3				2					
84	SECURITY FENCE	SURFACE		GROUND					GROUND				GROUND					
85	RADIO UNIT	NUMBER		**12.1**	**12.2**	**12.3**	**12.4**	**12.5**	**13.1**	**13.2**	**13.3**	**13.5**	**16.1**	**16.2**	**16.3**	**16.4**	**16.5**	**16.6**
86	USER			KZE	DOT	EMS	KZW	KZE	KZE	DOT	EMS	KZW	KZE	DOT	EMS	KZW	KZE	EMS
87	UNIT TYPE			Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Midband Analogue	Midband Analogue	Midband Digital	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Analogue Link
88	RADIO UNIT 1	MAKE		MIDLAND	RTS Repeater	RTS Repeater	QD	Vertex			KAIROS - DMR	TAIT	MIDLAND	TAIT	SIMOCO	TAIT	MAXON	SIMOCO
89	RADIO UNIT 1	MODEL		70-066A			Q8000	VX2100			KA-080 M/B	T800/II	70-066A	T7100	TSF Lite	T800/II	PM160	SRM9000
90	RADIO UNIT 1	CHANNEL	No	15	15	15					17	17	16	16	16	16		
91	RADIO UNIT 1	SERIAL No.		279214	V150500239	V141200014	MC 302001	#501018			KA8329	13115844	261804	18332238	T1HPE0311097SL	13120106	9912000039	ERTUX1111A6MR
92	RADIO UNIT 1	FREQUENCY BAND		69-77	69-77	69-77		450-460			69-77	69-77	69-77	69-77	69-77	69-77	450-460	450-460
93	RADIO UNIT 1	TONE																
94	RADIO UNIT 1	MAKE		MIDLAND	RTS Repeater	RTS Repeater		Vertex				TAIT	MIDLAND			TAIT	MAXON	
95	RADIO UNIT 1	MODEL		70-066A				VX2100				T800/II	70-066A			T800/II	PM160	
96	RADIO UNIT 1	CHANNEL		15	15	15							16			16		
97	RADIO UNIT 1	SERIAL No.		279248	V150500019	V140700010		#192846				13125991	273134			13125992 (RX)	7000325	
98	RADIO UNIT 1	FREQUENCY BAND		69-77	69-77	69-77		450-460				69-77	69-77			69-77	450-460	
99	RADIO UNIT 1	TONE																
124	ANTENNA 1	MAKE		WEBB	WEBB	Antronic	Q TENNA	WEBB	WEBB	WEBB	WEBB	Q TENNA	WEBB	WEBB	WEBB	WEBB	WEBB	WEBB
125	ANTENNA 1	TYPE		CD 70 FD	CD 70 FD		QFD 70	YAGI 7 E	CD 70 FD	CD 70 FD	CD 70 FD	QFD 70	FD 70	FD 70	FD 70	FD 72	YAGI 7 E	YAGI 7 E
126	ANTENNA 1	QUANTITY	No	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
127	ANTENNA 1	INSTALLATION DATE											2001/08	2001/08	2001/08	2004/02		
128	ANTENNA 1	RATING/UNIT	dB	3	3	3	3	9	3	3	3	3	3	3	3	3	9	9
133	DUPLEXOR 1	MAKE		Q & D	WEBB	WEBB	WEBB	TBC	Q & D	Q TENNA	Q TENNA	WEBB	QD	WEBB	WEBB	WEBB	TBC	TBC
134	DUPLEXOR 1	TYPE		QSDT 4/10	PD902/6	DR66/6	DM66/6		QSDF 4/10/150	QSDF 4/10/150	QSDF 4/10/150	D66/9	QSDF 4/10/150	DM 66/6	DR66	DM 66/5		
135	DUPLEXOR 1	QUANTITY		1	1 #1733	1 #60047	#669		1	1	1	1 #0802	1	1 #1622	1 #60053	1		
136	DUPLEXOR 1	RATING/UNIT	Watt	150	50	100	40		150	150	150	50	150	40	100	40		
141	CAVITY FILTER	MAKE		WEBB					WEBB	WEBB			WEBB	WEBB				
142	CAVITY FILTER	TYPE		CS 500-1					CS 500-1	Circulator 7340/0			CF 500-0	Circulator 7340/0				
143	CAVITY FILTER	QUANTITY	No	1					1 #548	941104/113			1 #544	010227-020				
144	CAVITY FILTER	RATING	Watt	BAND PASS					350				350					
145	SUB-AUDIO TONE	MAKE		MICROTONE		QD			MICROTONE		QD		MICROTONE		QD			
146	SUB-AUDIO TONE	TYPE		MT108		Q8000			MT108		Q 8000		MT 108		Q8000			
147	SUB-AUDIO TONE	QUANTITY		2		1			2				2					
148	SUB-AUDIO TONE	STANDARD							-									
149	5-TONE	MAKE		YES														
150	5-TONE	TYPE																
151	5-TONE	QUANTITY		2					1				2					
152	5-TONE	STANDARD																

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWO
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	GROENVLEI					HIGHFLATS\KUNATA					HLUHLUWE				
1	SITE	NUMBER		17					18					21				
2	RADIO UNIT	NUMBER		17.1	17.2	17.3	17.4	17.5	18.1	18.2	18.3	18.4	18.5	21.1	21.2	21.3	21.4	21.5
3	UPDATED	DATE		2022/05/26					2022/05/26					2022/05/26				
4	SITE	NAME		GROENVLEI					HIGHFLATS\KUNATA					HLUHLUWE				
5	SITE	DISTRICT		NEWCASTLE					IXOPO					HLUHLUWE GAME RESERVE				
6	SITE	FARM		WONDERFONTEIN					KUNATA									
7	SITE	CO-ORDINATES	LAT, LONG	-27.49136, 30.330602					-30.269444, 30.253333					-28.069444, 32.033889				
8	SITE	ALTITUDE	m	2259					1136					384				
9	SITE	OWNER		H. SHAWE					SAPPI					NPB				
10	SITE	USER NAME		DOT:KZW:EMS:KZE					DOT:KZE:EMS:KZW					DOT:KZE:KZW:EMS				
11	SITE	ACCESS 1		Take Wakkerstroom Rd from Newcastle: Travel past W/Stroom SAPS : Take					HIGHFLATS UMZINTO RD. THROUGH VILLAGE OF HIGHFLATS.					MAST BY GAME CAPTURE OFFICE				
12	SITE	ACCESS 2		D673: 1st rd right: Follow rd. Farm hse on right: Collect key: Proceed to site.					AFTER BRIDGE TURN LEFT OPP. DISTRICT RD. FOLLOW RD TO SITE.									
35	POWER ACCOUNT	SUPPLY AUTHORITY		ESKOM					ESKOM					ESKOM				
36	POWER ACCOUNT	ACCOUNT No.		7691467321					1340140012					5801501374				
37	POWER ACCOUNT	PAYEE		RADIO CONTRACTOR					DEPARTMENT OF TRANSPORT					DEPARTMENT OF WORKS				
38	POWER ACCOUNT	CONTACT PERSON							DISTRICT SUPERINTENDENT					S. MATHONSI				
39	POWER ACCOUNT	POSTAL ADDRESS							Private Bag Ixopo					191 PRINCE ALFRED STREET, PMB				
40	POWER ACCOUNT	TEL NO.												033 355 5527				
41	POWER ACCOUNT	FAX NO																
42	POWER SUPPLY	TYPE							230 V					230 V				
43	SURGE ARRESTOR	FLASHTRAB							1									
44	SURGE ARRESTOR	MAKE		Phoenix Contact					PHOENIX					PHOENIX				
45	SURGE ARRESTOR	FLT 60-400		2					2					2				
46	SURGE ARRESTOR	VAL MS-230		2					2					2				
47	SURGE ARRESTOR	LT-35		2					2					2				
48	SURGE ARRESTOR	SURGE PLUG		1					1					1				
49	SURGE ARRESTOR	DETAIL		D8260/E14/105					D8260/E14/105					D8260/E14/105				
50	SOLAR PANELS	MAKE																
51	SOLAR PANELS	TYPE																
52	SOLAR PANELS	QUANTITY	No															
53	SOLAR PANELS	RATING/UNIT	Watt															
54	SOLAR REGULATOR	MAKE																
55	SOLAR REGULATOR	TYPE																
56	SOLAR REGULATOR	QUANTITY	No															
57	SOLAR REGULATOR	RATING/UNIT	Amp															
58	WIND GENERATOR	MAKE																
59	WIND GENERATOR	TYPE																
60	WIND GENERATOR	QUANTITY	No															
61	WIND GENERATOR	RATING/UNIT	Watt															
62	BATTERY	MAKE		RAYLITE NEW LOADSHED Smart Battery Prot					RAYLITE					RAYLITE NEW LOADSHED Smart Battery Prot				
63	BATTERY	TYPE		M SOLAR CELLS 3 MIL 15 S MONO BLOC					M SOLAR CELLS 3 MIL 15 S MONO BLOC					M SOLAR CELLS 3 MIL 15 S MONO BLOC				
64	BATTERY	VOLTAGE	VOLT	12					12					12				
65	BATTERY	NO OF UNITS	No	1					1					1				
66	BATTERY	RATING	AH	530 AH (C100)					530 AH (C100)					530 AH (C100)				
67	BATTERY	CONDITION		Old - Deteriorated					Old - Deteriorated					Old - Deteriorated				
68	BATTERY CHARGER	MAKE		JSM Charger					Victron Centaur 12V 60A					Victron Centaur 12V 60A				
69	BATTERY CHARGER	TYPE																
70	BATTERY CHARGER	SERIAL NUMBER							HQ16195PE6Y					HQ16095UNJT				
71	BATTERY CHARGER	RATING/UNIT	Amp	60					60					60				
72	EARTH MAT																	
73	EARTH MAT	EARTH RESISTANCE	Ohm															
74	EARTH MAT	DATE MEASURED																
75	MAST	MAKE		WEBB					WEBB					WEBB				
76	MAST	TYPE		GUYED LATTICE					SS21					SS21				
77	MAST	HEIGHT	m	30m					21					21				
78	MAST	OWNED BY		DEPARTMENT OF WORKS					DEPARTMENT OF WORKS					DEPARTMENT OF WORKS				
79	MAST	CONDITION		Erected: 1998 - Acceptable condition					Erected: 1990 - Acceptable condition					Erected: 1997 - Acceptable condition				
80	SITE ACCOMMODATION	TYPE		BRICK HUT FOR BATTERIES ; FIBREGLASS FOR EQUIPMENT					CONCRETE BLOCK					STEEL CONTAINER				
81	SECURITY FENCE	TYPE		MESH WIRE & FLAT COIL RAZOR WIRE					MESH WIRE & FLAT COIL RAZOR WIRE					MESH WIRE & FLAT COIL RAZOR WIRE				
82	SECURITY FENCE	GATE		PEDESTRIAN					PEDESTRIAN					PEDESTRIAN				
83	SECURITY FENCE	LOCKS	No	2					2					2				
84	SECURITY FENCE	SURFACE		GROUND					STONE CHIP (sparsely spread)					GROUND				
85	RADIO UNIT	NUMBER		17.1	17.2	17.3	17.4	17.5	18.1	18.2	18.3	18.4	18.5	21.1	21.2	21.3	21.4	21.5
86	USER			DOT	KZW	EMS	KZE	KZE	KZE	DOT	EMS	KZW	EMS	DOT	KZE	EMS	KZW	EMS
87	UNIT TYPE			Midband Digital	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link
88	RADIO UNIT 1	MAKE		KAIROS - DMR	TAIT	TAIT	QD	MAXON		TAIT	QD		ICOM	SIMOCO		SIMOCO		SIMOCO
89	RADIO UNIT 1	MODEL		KA-080 M/B	T800/II	T800 II	Q8000	SMX4450		T800II	Q8000		F410	TSF Lite		TSF Lite		SRM9000
90	RADIO UNIT 1	CHANNEL	No	1	1		1			24	24		1	8		8		
91	RADIO UNIT 1	SERIAL No.		KA7311	13126407 (exciter)	13160916 (exciter)	LC912010	941010475		18255666	LC301168		74387	L2ISE0113372SZ		L2ISE0113372SZ		ARTUX11513MGS
92	RADIO UNIT 1	FREQUENCY BAND		69-77	69-77	69-77	69-77	450-460		69-77	69-77		450-460	69-77		69-77		450-460
93	RADIO UNIT 1	TONE																
94	RADIO UNIT 1	MAKE			TAIT													
95	RADIO UNIT 1	MODEL			T800/II													
96	RADIO UNIT 1	CHANNEL			1													
97	RADIO UNIT 1	SERIAL No.			13125998 (RX)	13161262 (receiver)												
98	RADIO UNIT 1	FREQUENCY BAND			69-77													
99	RADIO UNIT 1	TONE																
124	ANTENNA 1	MAKE		WEBB	WEBB	WEBB	WEBB	ANTRONIC	WEBB	Antronic	WEBB	WEBB	WEBB	WEBB	WEBB	ANTRONIC	WEBB	WEBB
125	ANTENNA 1	TYPE		FD70	FD70	FD70	FD70	YAGI	FD 72			FD 70	YAGI 7 E	FD 70	CD 70		FD 70	YAGI
126	ANTENNA 1	QUANTITY	No	2	2	2	2	1	2	2	2	2	1	2	2	2	2	1
127	ANTENNA 1	INSTALLATION DATE																
128	ANTENNA 1	RATING/UNIT	dB	3	3	3	3	12	3	3	3	3	9	3	3	3	3	9
133	DUPLEXOR 1	MAKE		WEBB	JAYBEAM	Q TENNA	QD	TBC	QD	QD	WEBB		TBC	WEBB	QD	QD/RF ADVANT	WEBB	TBC
134	DUPLEXOR 1	TYPE		DP902	6006	QFT 4/6	QSDF 4/10/150		QSDF 4/10/150	QSDF4/10/150	DR66/6	DR66/5		DM66/6	QDPF70/6	DFP 70/6	DM 66/6	
135	DUPLEXOR 1	QUANTITY		1 #68333	1 #2050	1	1		1	1	1 #60057	1		1 #669	1	1		
136	DUPLEXOR 1	RATING/UNIT	Watt	50	50	50	150		150	150	100	50		40	50	50	50	
141	CAVITY FILTER	MAKE			NONE	NONE			WEBB	CELWAVE					WEBB			
142	CAVITY FILTER	TYPE				T1030			CC 500-0	CAVITY					DCEF 500-0			
143	CAVITY FILTER	QUANTITY	No			1 # 2522			1 #583	1 #24521					1 #564			
144	CAVITY FILTER	RATING	Watt						350	350					350			
145	SUB-AUDIO TONE	MAKE							MICROTONE		QD							
146	SUB-AUDIO TONE	TYPE							MT108		Q8000							
147	SUB-AUDIO TONE	QUANTITY							2									
148	SUB-AUDIO TONE	STANDARD																
149	5-TONE	MAKE																
150	5-TONE	TYPE																
151	5-TONE	QUANTITY							2									
152	5-TONE	STANDARD																

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ITEM	ITEM DESCRITION		UNIT	DURBAN / Howard College		NETHERBY						ITALA			
1	SITE	NUMBER		22		24						26			
2	RADIO UNIT	NUMBER		22.2	22.3	24.1	24.2	24.3	24.4	24.5	24.6	26.1	26.2	26.3	26.4
3	UPDATED	DATE		2022/05/26		2022/05/26						2022/05/26			
4	SITE	NAME		HOWARD COLLEGE		NETHERBY						ITALA			
5	SITE	DISTRICT		DURBAN		Underberg/Loteni						LOUWSBURG			
6	SITE	FARM		UNIVERSITY OF NATAL								MOOIPLAAS			
7	SITE	CO-ORDINATES	LAT, LONG	-29.866389, 30.981111		-29.658889, 29.631111						-27.617222, 31.322222			
8	SITE	ALTITUDE	m			1893						1448			
9	SITE	OWNER		UNIVERSITY OF NATAL		SAPPI						NPA			
10	SITE	USER NAME		DOT		DOT:EMS:KZE:KZW						DOT:EMS: KZW			
11	SITE	ACCESS 1		ACCESS THROUGH SECURITY OR SUPE		Impendle Rd at Bulwer Travel +-18km : (Himeville Rd) Keep left at each						Pongola/Vryheid Rd R69 take D579 to left 5.5km. On left is gate take Rd up			
12	SITE	ACCESS 2				junction. Site is on left of road.						mountain to 2nd gate Sharp left after gate Follow tracks up to tower.			
35	POWER ACCOUNT	SUPPLY AUTHORITY		BUILDING POWER SUPPLY		SANDF/PWD						ESKOM			
36	POWER ACCOUNT	ACCOUNT No.													
37	POWER ACCOUNT	PAYEE										DEPARTMENT OF WORKS			
38	POWER ACCOUNT	CONTACT PERSON										S. MATHONSI			
39	POWER ACCOUNT	POSTAL ADDRESS										191 PRINCE ALFRED STREET, PMB			
40	POWER ACCOUNT	TEL NO.										033 355 5527			
41	POWER ACCOUNT	FAX NO													
42	POWER SUPPLY	TYPE		230 V		230 V						230 V			
43	SURGE ARRESTOR	FLASHTRAB													
44	SURGE ARRESTOR	MAKE		PHOENIX		Nil						PHOENIX			
45	SURGE ARRESTOR	FLT 60-400		2								2			
46	SURGE ARRESTOR	VAL MS-230		2								2			
47	SURGE ARRESTOR	LT-35		2								2			
48	SURGE ARRESTOR	SURGE PLUG		1								1			
49	SURGE ARRESTOR	DETAIL		D8260/E14/105								D8260/E14/105			
50	SOLAR PANELS	MAKE													
51	SOLAR PANELS	TYPE													
52	SOLAR PANELS	QUANTITY	No												
53	SOLAR PANELS	RATING/UNIT	Watt												
54	SOLAR REGULATOR	MAKE													
55	SOLAR REGULATOR	TYPE													
56	SOLAR REGULATOR	QUANTITY	No												
57	SOLAR REGULATOR	RATING/UNIT	Amp												
58	WIND GENERATOR	MAKE													
59	WIND GENERATOR	TYPE													
60	WIND GENERATOR	QUANTITY	No												
61	WIND GENERATOR	RATING/UNIT	Watt												
62	BATTERY	MAKE		ENERTEC		RAYLITE NEW LOADSHED Smart Battery Prot						RAYLITE			
63	BATTERY	TYPE				M SOLAR CELLS 3 MIL 15 S MONO BLOC						M SOLAR CELLS 3 MIL 15 S MONO BLOC			
64	BATTERY	VOLTAGE	VOLT	12		12						12			
65	BATTERY	NO OF UNITS	No	2		1						1			
66	BATTERY	RATING	AH			530 AH (C100)						530 AH (C100)			
67	BATTERY	CONDITION		New - OK		Old - Deteriorated						New - OK			
68	BATTERY CHARGER	MAKE		Mean Well		Victron Centaur 12V 60A						Mean Well			
69	BATTERY CHARGER	TYPE				HQ16197814									
70	BATTERY CHARGER	SERIAL NUMBER										60			
71	BATTERY CHARGER	RATING/UNIT	Amp	60		60									
72	EARTH MAT														
73	EARTH MAT	EARTH RESISTANCE	Ohm												
74	EARTH MAT	DATE MEASURED													
75	MAST	MAKE				WEBB						WEBB			
76	MAST	TYPE		2 X section Aluminium pipe		SSS 30						SS21			
77	MAST	HEIGHT	m	+/-2 Metres		30						21			
78	MAST	OWNED BY		DOT		SANDF						DEPARTMENT OF WORKS			
79	MAST	CONDITION				Erected: Unknown - Acceptable condition						Erected: 1997 - Acceptable condition			
80	SITE ACCOMMODATION	TYPE		BRICK BUILDING		SANDF CONTAINER						STEEL CONTAINER			
81	SECURITY FENCE	TYPE				MESH WIRE & FLAT COIL RAZOR WIRE						MESH WIRE & FLAT COIL RAZOR WIRE			
82	SECURITY FENCE	GATE				PEDESTRIAN						PEDESTRIAN			
83	SECURITY FENCE	LOCKS	No			3						2			
84	SECURITY FENCE	SURFACE				STONE CHIP						GROUND			
85	RADIO UNIT	NUMBER		22.2	22.3	24.1	24.2	24.3	24.4	24.5	24.6	26.1	26.2	26.3	26.4
86	USER			EMS	DOT	KZE	EMS	DOT	KZW	KZE	EMS	EMS	KZW	DOT	EMS
87	UNIT TYPE			Highband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Analogue Link	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link
88	RADIO UNIT 1	MAKE		TAIT	TAIT	MIDLAND	SIMOCO	QD	TAIT	MAXON	SIMOCO	QD	TAIT	SIMOCO	MAXON
89	RADIO UNIT 1	MODEL		TB T800	T828/10	70-066	TSF Lite	Q8000	T800II	PM160	SRM9000	Q8000	T800/II	TSF Lite	PM160
90	RADIO UNIT 1	CHANNEL	No	1	1	13									
91	RADIO UNIT 1	SERIAL No.		18276452	882135 (PA)	261808	T8JSE010414Q1	HC418025	13132642 (exciter)	9912000012	ARTUX1339462R	LC508004	13115837(exciter)	T2JSE0104141Q2	99122000006
92	RADIO UNIT 1	FREQUENCY BAND		155	69-77	69-77	69-77	69-77	69-77	450-460	450-460	69-77	69-77	69-77	450-460
93	RADIO UNIT 1	TONE													
94	RADIO UNIT 1	MAKE			TAIT	MIDLAND			TAIT				TAIT		
95	RADIO UNIT 1	MODEL			T825/15	70-066			T800II				T800/II		
96	RADIO UNIT 1	CHANNEL			1	13									
97	RADIO UNIT 1	SERIAL No.			891425 (Rx)	155899			13127752 (PA)				13125996 (RX)		
98	RADIO UNIT 1	FREQUENCY BAND			69-77	69-77			69-77			69-77	69-77		
99	RADIO UNIT 1	TONE													
124	ANTENNA 1	MAKE		Antronic	WEBB	WEBB	Antronic	ANTRONIC	Antronic	WEBB	WEBB	WEBB	WEBB	Q TENNA	QD
125	ANTENNA 1	TYPE			FD 72	FD 70	AND70	AND70	AND70	YAGI 7E	YAGI 7E	FD 72	FD 72	FD 70	YAGI
126	ANTENNA 1	QUANTITY	No		2	2		2	2	1	1	2	2	2	1
127	ANTENNA 1	INSTALLATION DATE													
128	ANTENNA 1	RATING/UNIT	dB	1	Nil	3	3	3	3	9	9	3	3	3	9
133	DUPLEXOR 1	MAKE		WEBB	WEBB	WEBB	WEBB	WEBB	WEBB	TBC	TBC	QD	WEBB	Q TENNA	TBC
134	DUPLEXOR 1	TYPE			DR77	PD902RB5	DR66	DR66	DM66/4/6			QSDF4/10	DR66/5	QDSF4/10	
135	DUPLEXOR 1	QUANTITY		1	1	1 #64072	1 #60048	1 #80012	1 #1232			1	631114/00021	1	
136	DUPLEXOR 1	RATING/UNIT	Watt	50	50	100	100	100	40			150	100	150	
141	CAVITY FILTER	MAKE				WEBB									
142	CAVITY FILTER	TYPE				CS 500-1									
143	CAVITY FILTER	QUANTITY	No			1 ?									
144	CAVITY FILTER	RATING	Watt			350									
145	SUB-AUDIO TONE	MAKE				MICROTONE	QD								
146	SUB-AUDIO TONE	TYPE				MT 108	Q8000								
147	SUB-AUDIO TONE	QUANTITY				2									
148	SUB-AUDIO TONE	STANDARD				-									
149	5-TONE	MAKE													
150	5-TONE	TYPE													
151	5-TONE	QUANTITY				1									
152	5-TONE	STANDARD													

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ITEM	ITEM DESCRITION		UNIT	JOBSKOP					NKANGALA/JOSINI						
1	SITE	NUMBER		27					28						
2	RADIO UNIT	NUMBER		**27.1**	**27.2**	**27.3**	**27.4**	**27.5**	**28.1**	**28.2**	**28.3**	**28.4**	**28.5**	**28.6**	**28.7**
3	UPDATED	DATE		2022/05/26					2022/05/26						
4	SITE	NAME		JOBSKOP					JOSINI						
5	SITE	DISTRICT		LADYSMITH					NKANGALA						
6	SITE	FARM		TRIBAL TRUST LAND					TRIBAL TRUST LAND						
7	SITE	CO-ORDINATES	LAT, LONG	-28.579167, 30.212778					-27.561667, 32.045						
8	SITE	ALTITUDE	m	1697					632						
9	SITE	OWNER		KZNPA					TRIBAL LAND						
10	SITE	USER NAME		KZE:EMS DOT:KZW					KZW:KZE:DOT:EMS						
11	SITE	ACCESS 1		Ladysmith to Helpmekaar Rd. @ Doornkraal right. Second Rd left.					Take Ubombo Rd from Mkuze at bottle store. Turn left. Follow road						
12	SITE	ACCESS 2		Follow road to dipping tanks on left.					+-3km to site.						
35	POWER ACCOUNT	SUPPLY AUTHORITY							ESKOM						
36	POWER ACCOUNT	ACCOUNT No.							7128182764						
37	POWER ACCOUNT	PAYEE							RADIO CONTRACTOR						
38	POWER ACCOUNT	CONTACT PERSON													
39	POWER ACCOUNT	POSTAL ADDRESS													
40	POWER ACCOUNT	TEL NO.													
41	POWER ACCOUNT	FAX NO													
42	POWER SUPPLY	TYPE		WIND CHARGER					230 V						
43	SURGE ARRESTOR	FLASHTRAB													
44	SURGE ARRESTOR	MAKE							PHOENIX						
45	SURGE ARRESTOR	FLT 60-400							2						
46	SURGE ARRESTOR	VAL MS-230							2						
47	SURGE ARRESTOR	LT-35							2						
48	SURGE ARRESTOR	SURGE PLUG							1						
49	SURGE ARRESTOR	DETAIL							D8260/E14/105						
50	SOLAR PANELS	MAKE													
51	SOLAR PANELS	TYPE													
52	SOLAR PANELS	QUANTITY	No												
53	SOLAR PANELS	RATING/UNIT	Watt												
54	SOLAR REGULATOR	MAKE													
55	SOLAR REGULATOR	TYPE													
56	SOLAR REGULATOR	QUANTITY	No												
57	SOLAR REGULATOR	RATING/UNIT	Amp												
58	WIND GENERATOR	MAKE		Kestrel											
59	WIND GENERATOR	TYPE		e160i											
60	WIND GENERATOR	QUANTITY	No	2											
61	WIND GENERATOR	RATING/UNIT	Watt	12V 600 Watt											
62	BATTERY	MAKE		DELTEC					RAYLITE NEW LOADSHED Smart Battery Prot						
63	BATTERY	TYPE							M SOLAR CELLS 3 MIL 15 S MONO BLOC						
64	BATTERY	VOLTAGE	VOLT	12					12						
65	BATTERY	NO OF UNITS	No	1					1						
66	BATTERY	RATING	AH	200					530 AH (C100)						
67	BATTERY	CONDITION		Old - Deteriorated					Old - Deteriorated						
68	BATTERY CHARGER	MAKE							Victron Centaur 12V 60A						
69	BATTERY CHARGER	TYPE							HQ1609NP4T7						
70	BATTERY CHARGER	SERIAL NUMBER													
71	BATTERY CHARGER	RATING/UNIT	Amp						60						
72	EARTH MAT														
73	EARTH MAT	EARTH RESISTANCE	Ohm												
74	EARTH MAT	DATE MEASURED													
75	MAST	MAKE		WEBB					WEBB						
76	MAST	TYPE		SS21					SS30						
77	MAST	HEIGHT	m	21					30						
78	MAST	OWNED BY		DEPARTMENT OF WORKS					DEPARTMENT OF WORKS						
79	MAST	CONDITION		To be replaced					Erected: 1997 - Acceptable condition						
80	SITE ACCOMMODATION	TYPE		STEEL CONTAINER					STEEL CONTAINER						
81	SECURITY FENCE	TYPE		-					MESH WIRE & FLAT COIL RAZOR WIRE						
82	SECURITY FENCE	GATE							PEDESTRIAN						
83	SECURITY FENCE	LOCKS	No	1					2						
84	SECURITY FENCE	SURFACE		GROUND					GROUND						
85	RADIO UNIT	NUMBER		**27.1**	**27.2**	**27.3**	**27.4**	**27.5**	**28.1**	**28.2**	**28.3**	**28.4**	**28.5**	**28.6**	**28.7**
86	USER			KZE	DOT	EMS	KZW	KZE	KZW	DOT	EMS	**KZE**	**EMS**	**EMS**	**KZE**
87	UNIT TYPE			Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Analogue Link	Analogue Link
88	RADIO UNIT 1	MAKE		MIDLAND	QD	TAIT	TAIT	ICOM	TAIT	TAIT	SIMOCO		TAIT	TBC	TBC
89	RADIO UNIT 1	MODEL		70-066A	Q8000	T800II	T800II	F210	T800/II	T800/II	TSF Lite		T856/20		
90	RADIO UNIT 1	CHANNEL	No			1	1	1	4	2					
91	RADIO UNIT 1	SERIAL No.		120833	No.70	13081664	13081666(pa)	01092	13122816	18252765	L2ISE011337252		839406 (RX)		
92	RADIO UNIT 1	FREQUENCY BAND		69-77	69-77	69-77	69-77	450-460	66-77	69-77	69-77		450-460	450-460	450-460
93	RADIO UNIT 1	TONE													
94	RADIO UNIT 1	MAKE		MIDLAND		TAIT	TAIT		TAIT				TAIT		
95	RADIO UNIT 1	MODEL		70-066A		T800II	T800II		T800/II				T856/25		
96	RADIO UNIT 1	CHANNEL													
97	RADIO UNIT 1	SERIAL No.		273120 (Rx)		13020918	13083376(rx)		13125993				833145 (PA)		
98	RADIO UNIT 1	FREQUENCY BAND		69-77		69-77	69-77		69-77				450-460		
99	RADIO UNIT 1	TONE													
124	ANTENNA 1	MAKE		WEBB	WEBB	WEBB	WEBB	WEBB	Q TENNA	Q TENNA	WEBB	WEBB	WEBB	Dummy load	WEBB
125	ANTENNA 1	TYPE		FD 70	FD 70	FD 70	FD 70	YAGI 7E	QFD 80	QFD 70	FD 72	QFD 70	YAGI 7E	TBC	YAGI
126	ANTENNA 1	QUANTITY	No	2	2	2	2	1	2	2	2	2	2		1
127	ANTENNA 1	INSTALLATION DATE									03/10		02/02		
128	ANTENNA 1	RATING/UNIT	dB	3	3	3	3	9	3	3	3	3	9		9
133	DUPLEXOR 1	MAKE		QD	RF ADVANTAGE	WBB	WEBB	TBC	WEBB	WEBB	WEBB	Q TENNA	WEBB	TBC	TBC
134	DUPLEXOR 1	TYPE		QSDT 4/10	6 CAVITY	DR 66/5	DR 66/5		DM66/6	DM66/6	DR66	QSFD/4/10/150	DU 400/6		
135	DUPLEXOR 1	QUANTITY		1		636/589-0001	Nil		1 #1120	1 #570	1 #60052	1	1 # 0114		
136	DUPLEXOR 1	RATING/UNIT	Watt	150	50	100	100		40	40	100	150	80		
141	CAVITY FILTER	MAKE		WEBB								WEBB			
142	CAVITY FILTER	TYPE		CF 500-0								DJCF 500/1			
143	CAVITY FILTER	QUANTITY	No	1								1 #569			
144	CAVITY FILTER	RATING	Watt	350								350			
145	SUB-AUDIO TONE	MAKE									QD				
146	SUB-AUDIO TONE	TYPE									Q8000				
147	SUB-AUDIO TONE	QUANTITY													
148	SUB-AUDIO TONE	STANDARD													
149	5-TONE	MAKE													
150	5-TONE	TYPE													
151	5-TONE	QUANTITY		1											
152	5-TONE	STANDARD													

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWO
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	KEARSNEY/STANGER								MARA FARM								
1	SITE	NUMBER		29								34								
2	RADIO UNIT	NUMBER		29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9
3	UPDATED	DATE		2022/05/26								2022/05/26								
4	SITE	NAME		KEARSNEY								MARA FARM								
5	SITE	DISTRICT		STANGER								PORT SHEPSTONE								
6	SITE	FARM		KEARSNEY								DEPARTMENT OF AGRICULTURE								
7	SITE	CO-ORDINATES	LAT, LONG	-29.276667, 31.2025								-30.816389, 30.248889								
8	SITE	ALTITUDE	m									551								
9	SITE	OWNER		J KALLICHURUM								DEPARTMENT OF AGRICULTURE								
10	SITE	USER NAME		DOT: EMS: KZE:DOV								DOT:EMS:KZW:KZE								
11	SITE	ACCESS 1		R74 between Stanger and Kranskop approx 9km from Stanger look for white								P.Shep/Harding rd. Past Paddock take St.Elms Mission rd. Keep left.								
12	SITE	ACCESS 2		gates Farm name on gate Sharp left inside gate Follow break to site.																
35	POWER ACCOUNT	SUPPLY AUTHORITY		STANGER MUNICIPALITY								ESKOM								
36	POWER ACCOUNT	ACCOUNT No.										9553417635								
37	POWER ACCOUNT	PAYEE		RADIO CONTRACTOR								DEPARTMENT OF WORKS								
38	POWER ACCOUNT	CONTACT PERSON										S. MATHONSI								
39	POWER ACCOUNT	POSTAL ADDRESS										191 PRINCE ALFRED STREET, PMB								
40	POWER ACCOUNT	TEL NO.										033 355 5527								
41	POWER ACCOUNT	FAX NO																		
42	POWER SUPPLY	TYPE		230 V								230 V								
43	SURGE ARRESTOR	FLASHTRAB																		
44	SURGE ARRESTOR	MAKE		Nil								PHOENIX								
45	SURGE ARRESTOR	FLT 60-400										2								
46	SURGE ARRESTOR	VAL MS-230										2								
47	SURGE ARRESTOR	LT-35										2								
48	SURGE ARRESTOR	SURGE PLUG										1								
49	SURGE ARRESTOR	DETAIL										D8260/E14/105								
50	SOLAR PANELS	MAKE																		
51	SOLAR PANELS	TYPE																		
52	SOLAR PANELS	QUANTITY	No																	
53	SOLAR PANELS	RATING/UNIT	Watt																	
54	SOLAR REGULATOR	MAKE																		
55	SOLAR REGULATOR	TYPE																		
56	SOLAR REGULATOR	QUANTITY	No																	
57	SOLAR REGULATOR	RATING/UNIT	Amp																	
58	WIND GENERATOR	MAKE																		
59	WIND GENERATOR	TYPE																		
60	WIND GENERATOR	QUANTITY	No																	
61	WIND GENERATOR	RATING/UNIT	Watt																	
62	BATTERY	MAKE		RAYLITE								RAYLITE	NEW LOADSHED	Smart Battery Prot						
63	BATTERY	TYPE		M SOLAR CELLS 3 M								M SOLAR CELLS 3 MIL 15 S MONO BLOC								
64	BATTERY	VOLTAGE	VOLT	12				24				12					24			
65	BATTERY	NO OF UNITS	No	1								1								
66	BATTERY	RATING	AH	530 AH (C100)								530 AH (C100)								
67	BATTERY	CONDITION		Old - Deteriorated								Old - Deteriorated								
68	BATTERY CHARGER	MAKE		Mean Well				Mecer Inverter				Victron Centaur 12V 60A					Mecer Inverter			
69	BATTERY CHARGER	TYPE						24V DC				12V 60Amp					24V DC			
70	BATTERY CHARGER	SERIAL NUMBER																		
71	BATTERY CHARGER	RATING/UNIT	Amp	60								60								
72	EARTH MAT																			
73	EARTH MAT	EARTH RESISTANCE	Ohm																	
74	EARTH MAT	DATE MEASURED																		
75	MAST	MAKE		WEBB								WEBB								
76	MAST	TYPE		450 mm Parallel								SS21								
77	MAST	HEIGHT	m	24								21								
78	MAST	OWNED BY		J KALLICHURUM								DEPARTMENT OF WORKS								
79	MAST	CONDITION		Acceptable condition								Erected: 1984 - Acceptable condition								
80	SITE ACCOMMODATION	TYPE		BRICK BUILDING (KEYS @ KALLICHURUM)								METAL CONTAINER								
81	SECURITY FENCE	TYPE										MESH WIRE & FLAT COIL RAZOR WIRE								
82	SECURITY FENCE	GATE										PEDESTRIAN								
83	SECURITY FENCE	LOCKS	No									2								
84	SECURITY FENCE	SURFACE		GROUND								GROUND								
85	RADIO UNIT	NUMBER		29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9
86	USER			DOT	EMS	KZE	KZW	DOT	DOT	KZE	DOT	KZE	EMS	EMS	DOT	KZW	DOT	DOT	KZE	DOT
87	UNIT TYPE			Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Simulcast Slave	IP Link Radio	Analogue Link	GSU Sync Unit	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Simulcast Slave	IP Link Radio	Analogue Link	GSU Sync Unit
88	RADIO UNIT 1	MAKE		SIMOCO	TAIT T800II	QD	TAIT T800II	KAIROS - DMR	RADWIN	MAXON	RADWIN	MIDLAND	PHILIPS	TAIT	KAIROS - DMR	TAIT	KAIROS - DMR	RADWIN	MAXON	RADWIN
89	RADIO UNIT 1	MODEL		TSF Lite		Q8000	T826-15	KA-160 H/B	2000D IP	PM160	RW-9924-0070	70-066	F490	T800/II	KA-80 M/B	T800/II	KA-160 H/B	2000D IP	SMX4450	RW-9924-0070
90	RADIO UNIT 1	CHANNEL	No		2				Simulcast Link 5			10	1	1	20			Simulcast Link 6	1	
91	RADIO UNIT 1	SERIAL No.		T2JSE0104141Q0	LC508004	MC502020	856184 (PA)	TBC	TBC	991200015	TBC	273133	H429740	13061551 (PA)	TBC	13122835 (PA)	TBC	TBC	941010455	TBC
92	RADIO UNIT 1	FREQUENCY BAND		69-77	69-77	69-77		136-174	4900-6000	450-460	GPS	69-77	69-77	69-77	66-88	69-77	136-174	4900-6000	450-460	GPS
93	RADIO UNIT 1	TONE																		
94	RADIO UNIT 1	MAKE					TAIT T800II					MIDLAND		TAIT		TAIT				
95	RADIO UNIT 1	MODEL					T825-15					70-066		T800/II		T800/II				
96	RADIO UNIT 1	CHANNEL										10		1						
97	RADIO UNIT 1	SERIAL No.					852659 (RX)					273126		13061528 (RX)	TBC	13125995 (RX)				
98	RADIO UNIT 1	FREQUENCY BAND										69-77		69-77	66-88	69-77				
99	RADIO UNIT 1	TONE																		
124	ANTENNA 1	MAKE		WEBB	Antronic	WEBB	WEBB	Colinear	Ubiquity MW	WEBB	RADWIN	WEBB	ANTRONIC	WEBB	WEBB (2-stack)	WEBB	Colinear	Ubiquity MW	WEBB	RADWIN
125	ANTENNA 1	TYPE		QFD 70	CD 70	FD 72	FD	High Band	5GHz 34dBi	YAGI	GPS Antenna	QFD 70			TBC	FD70	High Band	5GHz 34dBi	YAGI 7E	GPS Antenna
126	ANTENNA 1	QUANTITY	No	2	2	2	2	1	1	1	1	2	1	2	1	2	1	1	1	1
127	ANTENNA 1	INSTALLATION DATE											18-03-2010		2019		2019			
128	ANTENNA 1	RATING/UNIT	dB	3DB	3DB				34dBi	9		3	3	3	3	3		34dBi	9	
133	DUPLEXOR 1	MAKE		QD/RF ADVANT	WEBB	Q TENNA	TBC	TBC		TBC		Q & D	CELLWAVE	WEBB	TBC	CELLWAVE			TBC	
134	DUPLEXOR 1	TYPE		DPT 70/6		QSDF 4/10						QSDT 4/10	PD636-6A	DR66		DR66/5				
135	DUPLEXOR 1	QUANTITY		1	1 #60054	1						1	1 #49229							
136	DUPLEXOR 1	RATING/UNIT	Watt	0	100	150		100				150	50	100	100	50				
141	CAVITY FILTER	MAKE										WEBB								
142	CAVITY FILTER	TYPE										DPF 500								
143	CAVITY FILTER	QUANTITY	No									1 #560								
144	CAVITY FILTER	RATING	Watt																	
145	SUB-AUDIO TONE	MAKE			YES (CTCSS)							NONE	YES (5 TONE)	YES (CTCSS)						
146	SUB-AUDIO TONE	TYPE			ON REPEATER								ON REPEATER							
147	SUB-AUDIO TONE	QUANTITY										2								
148	SUB-AUDIO TONE	STANDARD																		
149	5-TONE	MAKE																		
150	5-TONE	TYPE																		
151	5-TONE	QUANTITY										1								
152	5-TONE	STANDARD																		

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWO
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	MATSHANE MOUNTAIN					NONGOMA						MTONJANENI				
1	SITE	NUMBER		37					42						45				
2	RADIO UNIT	NUMBER		37.1	37.2	37.3	37.4	37.5	42.1	42.2	42.3	42.4	42.5	42.6	45.1	45.2	45.3	45.4	45.5
3	UPDATED	DATE		2022/05/26					2022/05/26						2022/05/26				
4	SITE	NAME		MATSHANE MOUNTAIN					NONGOMA						NTONJANENI				
5	SITE	DISTRICT		EMPANGENI					DEPARTMENT OF WORKS						MELMOTH				
6	SITE	FARM		TRIBAL TRUST LAND					DEPARTMENT OF WORKS										
7	SITE	CO-ORDINATES	LAT, LONG	-28.750833, 31.842778					-27.901111, 31.65						-28.439722, 31.402222				
8	SITE	ALTITUDE	m	197					848						904				
9	SITE	OWNER		DEPARTMENT OF WORKS					DEPARTMENT OF WORKS						DEPARTMENT OF WORKS				
10	SITE	USER NAME		DOT:EMS:KZW:KZE:(SAPS)					DOT:EMS:KZW:KZE						DOT:EMS:KZW:KZE:KZNW				
11	SITE	ACCESS 1		Gingindlovu/Ndakeni bypass rd. Turn @ Matshane sign. Proceed to site.					KZN Dept. Works premises. Enter from Mkuze side of the village						Melmoth/Ulundi Rd.: Before turnoff to Mtonjaneni D269				
12	SITE	ACCESS 2							before the Vryheid intersection. (Look for mast)						on the right. Follow road past 3 sites to the reserve.				
35	POWER ACCOUNT	SUPPLY AUTHORITY		ESKOM					BUILDING COMPLEX						ESKOM				
36	POWER ACCOUNT	ACCOUNT No.		9016572163											9608262643				
37	POWER ACCOUNT	PAYEE		RADIO CONTRACTOR					DEPARTMENT OF WORKS						RADIO CONTRACTOR				
38	POWER ACCOUNT	CONTACT PERSON																	
39	POWER ACCOUNT	POSTAL ADDRESS																	
40	POWER ACCOUNT	TEL NO.																	
41	POWER ACCOUNT	FAX NO																	
42	POWER SUPPLY	TYPE		230 V					230 V						230 V				
43	SURGE ARRESTOR	FLASHTRAB																	
44	SURGE ARRESTOR	MAKE		PHOENIX					PHOENIX						PHOENIX				
45	SURGE ARRESTOR	FLT 60-400		2					2						2				
46	SURGE ARRESTOR	VAL MS-230		2					2						2				
47	SURGE ARRESTOR	LT-35		2					2						2				
48	SURGE ARRESTOR	SURGE PLUG		1					1						1				
49	SURGE ARRESTOR	DETAIL		D8260/E14/105					D8260/E14/105						D8260/E14/105				
50	SOLAR PANELS	MAKE																	
51	SOLAR PANELS	TYPE																	
52	SOLAR PANELS	QUANTITY	No																
53	SOLAR PANELS	RATING/UNIT	Watt																
54	SOLAR REGULATOR	MAKE																	
55	SOLAR REGULATOR	TYPE																	
56	SOLAR REGULATOR	QUANTITY	No																
57	SOLAR REGULATOR	RATING/UNIT	Amp																
58	WIND GENERATOR	MAKE																	
59	WIND GENERATOR	TYPE																	
60	WIND GENERATOR	QUANTITY	No																
61	WIND GENERATOR	RATING/UNIT	Watt																
62	BATTERY	MAKE		RAYLITE					RAYLITE						RAYLITE NEW LOADSHED Smart Battery Prot				
63	BATTERY	TYPE		M SOLAR CELLS 3 MIL 15 S MONO BLOC Smart Battery Protector					M SOLAR CELLS 3 MIL 15 S MONO BLOC						6 x M SOLAR CELLS 3 MIL 15 S MONO BLOC				
64	BATTERY	VOLTAGE	VOLT	12					12						12				
65	BATTERY	NO OF UNITS	No	1					1						1				
66	BATTERY	RATING	AH	530 AH (C100)					530 AH (C100)						530 AH (C100)				
67	BATTERY	CONDITION		Old - Deteriorated					New - OK						New - OK				
68	BATTERY CHARGER	MAKE		Victron Centaur 12V 60A					Victron Centaur 12V 60A						Powermaster				
69	BATTERY CHARGER	TYPE		HQ161969IDP					12V 60Amp										
70	BATTERY CHARGER	SERIAL NUMBER							HQ1629BLB26										
71	BATTERY CHARGER	RATING/UNIT	Amp	60					60						60				
72	EARTH MAT																		
73	EARTH MAT	EARTH RESISTANCE	Ohm																
74	EARTH MAT	DATE MEASURED																	
75	MAST	MAKE		WEBB					WEBB						COMTOWER				
76	MAST	TYPE		SS21					SS32						SELF SUPPORTING				
77	MAST	HEIGHT	m	21					32						30				
78	MAST	OWNED BY		DEPARTMENT OF WORKS					DEPARTMENT OF WORKS						DEPARTMENT OF WORKS				
79	MAST	CONDITION		Erected: 1984 - Acceptable condition					Acceptable condition						Erected: 1998 - Acceptable condition				
80	SITE ACCOMMODATION	TYPE		SECURAPANE FIBREGLASS					BRICK BUILDING						BRICK BUILDING				
81	SECURITY FENCE	TYPE		CORRODED (NON EXISTENT)					MESH WIRE & FLAT COIL RAZOR WIRE						MESH WIRE & FLAT COIL RAZOR WIRE				
82	SECURITY FENCE	GATE		CORRODED					PEDESTRIAN						PEDESTRIAN				
83	SECURITY FENCE	LOCKS	No	2					1						3				
84	SECURITY FENCE	SURFACE		GROUND					GROUND						GROUND				
85	RADIO UNIT	NUMBER		37.1	37.2	37.3	37.4	37.5	42.1	42.2	42.3	42.4	42.5	42.6	45.1	45.2	45.3	45.4	45.5
86	USER			KZE	EMS	KZW	DOT	KZE	KZE	KZW	DOT	EMS	KZE	EMS	KZW	KZE	DOT	EMS	KZE
87	UNIT TYPE			Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Analogue Link	Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link
88	RADIO UNIT 1	MAKE		MIDLAND	TAIT	TAIT	RTS Midband	MAXON	MIDLAND	TAIT	QD	SIMOCO	MAXON	SIMOCO	TAIT	TAIT	QD	SIMOCO	TAIT
89	RADIO UNIT 1	MODEL		70-066A	T800/II	T800II		SMX4450	70-066A	T827	Q8000	TSF Lite	SMX4450	SRM9000	T800II	T800	Q8000	TSF Lite	T800
90	RADIO UNIT 1	CHANNEL	No						7				1						
91	RADIO UNIT 1	SERIAL No.		009247	13061549	13127890	V140700172	930922143	279206	833176	MC502009	L2ISE0113372SY	941010465	ARTUX11503MJ0	13132639(exciter)	13040695 (RX)	HC412027	L21SE011224HLY	922516 (RX)
92	RADIO UNIT 1	FREQUENCY BAND		69-77	69-77	69-77	69-77	450-460	69-77		69-77	69-77	450-460	450-460	69-77	69-77	69-77	69-77	450-460
93	RADIO UNIT 1	TONE																	
94	RADIO UNIT 1	MAKE		MIDLAND	TAIT	TAIT			MIDLAND						TAIT	TAIT			926582 (TX)
95	RADIO UNIT 1	MODEL		70-006A	T800/II	T800II			70-066						T800II	T800			450-460
96	RADIO UNIT 1	CHANNEL							7										
97	RADIO UNIT 1	SERIAL No.		009424	13061529	13131667			279249						13131666 (RX)	13036607(exciter)			
98	RADIO UNIT 1	FREQUENCY BAND		69-77	69-77	69-77			69-77						69-77	69-77			
99	RADIO UNIT 1	TONE														13043571 (PA)			
124	ANTENNA 1	MAKE		WEBB	WEBB	Q TENNA	ANTRONIC	WEBB	WEBB	WEBB	QD	WEBB	WEBB	WEBB	WEBB	WEBB	Q TENNA	Q TENNA	WEBB
125	ANTENNA 1	TYPE		CD 70 FD	CD 70 FD	QFD 70		YAGI 7E	CD 70 FD	FD 70	QFD 70	FD 70	YAGI 7E	YAGI		FD 70	QFD 70	QFD 70	YAGI 7E
126	ANTENNA 1	QUANTITY	No	2	2	2	2	1	2	2	2	2	1	1	2	2	2	2	1
127	ANTENNA 1	INSTALLATION DATE																	
128	ANTENNA 1	RATING/UNIT	dB	3	3	3	3	9	3	3	3	3	9	9	3	3	3	3	9
133	DUPLEXOR 1	MAKE		QD	WEBB	J BEAM	QD	TBC	QD	WEBB	WEBB	Q TENNA	TBC	TBC	DR 66/5	Antronic	Duplexer	QD	TBC
134	DUPLEXOR 1	TYPE		QSDT 4/10	DR 66\5	6008	QSDT 4/10/15		QSDT 4/10	DR 66/5		QDF 4/10H/150				FSD 70/10/150	PD902/RB3	QSDF 4/10	
135	DUPLEXOR 1	QUANTITY		1	1 # 628934/0001	1 #2055	1		1	1		1			1		S/n: 61608	1	
136	DUPLEXOR 1	RATING/UNIT	Watt	150	100	100	150		150	100		150			100	150 Watt		150	
141	CAVITY FILTER	MAKE		WEBB			Circulator # 940912-049		WEBB		ISOLATOR						NONE		
142	CAVITY FILTER	TYPE		CF 500-0			Notch Filter		CF 500-0		940912/073						7340		
143	CAVITY FILTER	QUANTITY	No	1 #538					1 # 570		HARMONIC FILTER						1		
144	CAVITY FILTER	RATING	Watt	BAND PASS					BAND PASS		941104/0221								
145	SUB-AUDIO TONE	MAKE		MICROTONE					MICROTONE										
146	SUB-AUDIO TONE	TYPE		MT 108					MT 108										
147	SUB-AUDIO TONE	QUANTITY		2					2										
148	SUB-AUDIO TONE	STANDARD		(IN RADIO)															
149	5-TONE	MAKE							YES										
150	5-TONE	TYPE																	
151	5-TONE	QUANTITY		1					1										
152	5-TONE	STANDARD																	

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWO
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	SWARTKOP								VAN REENEN			VERNON CROOKES					
1	SITE	NUMBER		56								61			62						
2	RADIO UNIT	NUMBER		56.1	56.2	56.3	56.4	56.5	56.6	56.7	56.8	61.1	61.2	61.3	62.1	62.2	62.3	62.4	62.5	62.6	
3	UPDATED	DATE		2022/05/26								2022/05/26			2022/05/26						
4	SITE	NAME		ZWARTKOP								VAN REENEN			VERNON CROOKES						
5	SITE	DISTRICT		PIETERMARITZBURG								VAN REENEN			UMZINTO						
6	SITE	FARM		TRIBAL TRUST LAND								WUTHERING									
7	SITE	CO-ORDINATES	LAT, LONG	-29.582851, 30.253562								-28.382778, 29.400278			-30.268205, 30.625303						
8	SITE	ALTITUDE	m	1441								1824			443						
9	SITE	OWNER		DEPARTMENT OF PUBLIC WORKS								DEPARTMENT OF WORKS			DEPARTMENT OF PUBLIC WORKS						
10	SITE	USER NAME		DOT:EMS:KZE:DOW								DOT : EMS :			DOT;EMS						
11	SITE	ACCESS 1		Take Sweetwaters/Hilton rd. Turn right @ Knoll Dr. Follow rd to site.								@ REENEN POLICE STATION MAKE U TURN - FIRST			UMZINTO/IXOPO RD : PAST UMZINTO TURNOFF;						
12	SITE	ACCESS 2										GATE ON LEFT : PAST HUTS; TOWARDS MICROWAVE TOWE			SIGNPOST TO RESERVE; FOLLOW RD TO SITE.						
35	POWER ACCOUNT	SUPPLY AUTHORITY		PMB CORPORATION								ESKOM			ESKOM						
36	POWER ACCOUNT	ACCOUNT No.		Installation Nr: PT862								6057799519			5017612116						
37	POWER ACCOUNT	PAYEE		DEPARTMENT OF WORKS								DEPARTMENT OF WORKS			DEPARTMENT OF WORKS						
38	POWER ACCOUNT	CONTACT PERSON		S. MATHONSI								S. MATHONSI			S. MATHONSI						
39	POWER ACCOUNT	POSTAL ADDRESS		191 PRINCE ALFRED STREET, PMB								191 PRINCE ALFRED STREET, PMB			191 PRINCE ALFRED STREET, PMB						
40	POWER ACCOUNT	TEL NO.		033 355 5527								033 355 5527			033 355 5527						
41	POWER ACCOUNT	FAX NO																			
42	POWER SUPPLY	TYPE		230 V								230 V			230						
43	SURGE ARRESTOR	FLASHTRAB		1																	
44	SURGE ARRESTOR	MAKE		PHOENIX								PHOENIX			PHOENIX						
45	SURGE ARRESTOR	FLT 60-400										2			2						
46	SURGE ARRESTOR	VAL MS-230		2								2			2						
47	SURGE ARRESTOR	LT-35		2								2			2						
48	SURGE ARRESTOR	SURGE PLUG		1								1			1						
49	SURGE ARRESTOR	DETAIL		D8260/E14/105								D8260/E14/105			D8260/E14/105						
50	SOLAR PANELS	MAKE																			
51	SOLAR PANELS	TYPE																			
52	SOLAR PANELS	QUANTITY	No																		
53	SOLAR PANELS	RATING/UNIT	Watt																		
54	SOLAR REGULATOR	MAKE																			
55	SOLAR REGULATOR	TYPE																			
56	SOLAR REGULATOR	QUANTITY	No																		
57	SOLAR REGULATOR	RATING/UNIT	Amp																		
58	WIND GENERATOR	MAKE																			
59	WIND GENERATOR	TYPE																			
60	WIND GENERATOR	QUANTITY	No																		
61	WIND GENERATOR	RATING/UNIT	Watt																		
62	BATTERY	MAKE		RAYLITE NEW LOADSHED Smart Battery Prot								RAYLITE NEW LOADSHED Smart Battery Prot			RAYLITE NEW LOADSHED Smart Battery Prot						
63	BATTERY	TYPE		M SOLAR CELLS 3 MIL 15 S MONO BLOC								M SOLAR CELLS 3 MIL 15 S MONO BLOC			M SOLAR CELLS 3 MIL 15 S MONO BLOC						
64	BATTERY	VOLTAGE	VOLT	12				24				12			12			24			
65	BATTERY	NO OF UNITS	No	1								6			1						
66	BATTERY	RATING	AH	530 AH (C100)								1			530 AH (C100)						
67	BATTERY	CONDITION		New - OK								300									
68	BATTERY CHARGER	MAKE		Victron Centaur 12V 60A				Mecer Inverter				JSM			Victron Centaur 12V 60A			Mecer Inverter			
69	BATTERY CHARGER	TYPE		12V 60Amp				24V DC							12V 60Amp			24V DC			
70	BATTERY CHARGER	SERIAL NUMBER		HQ1609T1YZL																	
71	BATTERY CHARGER	RATING/UNIT	Amp	60								60			60						
72	EARTH MAT																				
73	EARTH MAT	EARTH RESISTANCE	Ohm																		
74	EARTH MAT	DATE MEASURED																			
75	MAST	MAKE		COMTOWER											WEBB						
76	MAST	TYPE		GUYED LATTICE								GUYED LATTICE (SNOW)			SS21						
77	MAST	HEIGHT	m	30								18			21						
78	MAST	OWNED BY		DEPARTMENT OF WORKS								DEPARTMENT OF WORKS			DEPARTMENT OF PUBLIC WORKS						
79	MAST	CONDITION		Erected: 1997 - Acceptable condition								Acceptable condition			Erected: 1990 - Poor condition - To be replaced						
80	SITE ACCOMMODATION	TYPE		STEEL CONTAINER								FIBREGLASS - POOR CONDITION			STEEL ENCLOSURE						
81	SECURITY FENCE	TYPE		MESH WIRE & FLAT COIL RAZOR WIRE								MESH WIRE & FLAT COIL RAZOR WIRE			STEEL PALLISADE; ELECTRIC						
82	SECURITY FENCE	GATE		PEDESTRIAN								PEDESTRIAN									
83	SECURITY FENCE	LOCKS	No	2								3			2						
84	SECURITY FENCE	SURFACE		GROUND								GROUND			GROUND						
85	RADIO UNIT	NUMBER		56.1	56.2	56.3	56.4	56.5	56.6	56.7	56.8	61.1	61.2	61.3	62.1	62.2	62.3	62.4	62.5	62.6	
86	USER			KZE	DOT	EMS (HB)	KZW	EMS (MB)	DOT	KZE	DOT	DOT		EMS	DOT	KZW	DOT	DOT	DOT	DOT	
87	UNIT TYPE			Midband Analogue	Multilcast Slave	Highband Analogue	Midband Analogue	Midband Analogue	IP Link Radio	Analogue Link	GSU Sync Unit	Midband Digital		Midband Digital	Midband Digital	Midband Analogue	Simulcast Slave	IP Link Radio	IP Link Radio	GSU Sync Unit	
88	RADIO UNIT 1	MAKE		TAIT	KAIROS - DMR		TAIT	TAIT	RADWIN	TAIT	RADWIN	KAIROS - DMR		KAIROS - DMR	KAIROS - DMR	TAIT	KAIROS - DMR	RADWIN	RADWIN	RADWIN	
89	RADIO UNIT 1	MODEL		TB7100	KA-80 M/B		T800/II	T800/II	2000D IP	TB7100	RW-9924-0070	KA-80 M/B		KA-80 M/B	KA-80 M/B	T826/15	KA-160 H/B	2000D IP	2000D IP	RW-9924-0070	
90	RADIO UNIT 1	CHANNEL	No	8					Simulcast Link 4	1		20		20	20			Simulcast Link 3	Simulcast Link 6		
91	RADIO UNIT 1	SERIAL No.		18251851	TBC		13122821(exciter)	13061525 (RX)	TBC	18249496	TBC	KA8331		KA8330	KA5947	379548 (PA)	KA5944	P1199E000A003BF	P16650E000A009A6	P09270E700A00C6F	
92	RADIO UNIT 1	FREQUENCY BAND		69-77	66-88		69-77	69-77	4900-6000	450-460	GPS	66-88		66-88	66-88		136-174	4900-6000	4900-6000	GPS	
93	RADIO UNIT 1	TONE																			
94	RADIO UNIT 1	MAKE					TAIT	TAIT								TAIT					
95	RADIO UNIT 1	MODEL					T800/II	T800/II								T825/15					
96	RADIO UNIT 1	CHANNEL																			
97	RADIO UNIT 1	SERIAL No.					13126001 (RX)	13061535(exciter)								834546 (RX)					
98	RADIO UNIT 1	FREQUENCY BAND					69-77	69-77													
99	RADIO UNIT 1	TONE																			
124	ANTENNA 1	MAKE		Q TENNA	WEBB (2-stack)	ZS	WEBB	WEBB	Ubiquity MW	WEBB	RADWIN	WEBB		WEBB	WEBB (2-stack)	WEBB	Colinear	Ubiquity MW	Ubiquity MW	RADWIN	
125	ANTENNA 1	TYPE		QFD 70	TBC	COLLINEAR	QFD 70	QFD 70	5GHz 34dBi	UHF COLINEAR	GPS Antenna	QFD 70		QFD 70	TBC	FD72	High Band	5GHz 34dBi	5GHz 34dBi	GPS Antenna	
126	ANTENNA 1	QUANTITY	No	2	1	1	2	2	1	1	1	2		2	1	2	1	1	1	1	
127	ANTENNA 1	INSTALLATION DATE			2019																
128	ANTENNA 1	RATING/UNIT	dB	3	3	3	3	3	34dBi	6		3		3	3	3		34dBi	34dBi		
133	DUPLEXOR 1	MAKE		QD	TBC	WEBB		QD		TBC		WEBB		WEBB	TBC	TBC	TBC				
134	DUPLEXOR 1	TYPE		QSDT 4/10		DR77	DR66/I	DR 66/5				DM66/6		DR66							
135	DUPLEXOR 1	QUANTITY		1		1	1	1				1 #672		1							
136	DUPLEXOR 1	RATING/UNIT	Watt	150	100	150	50	150				50		100	100	100	100				
141	CAVITY FILTER	MAKE		WEBB	CELLWAVE																
142	CAVITY FILTER	TYPE		DJ 500-0	24710																
143	CAVITY FILTER	QUANTITY	No	1 #208	1																
144	CAVITY FILTER	RATING	Watt	BAND PASS	BAND PASS																
145	SUB-AUDIO TONE	MAKE		MICROTONE																	
146	SUB-AUDIO TONE	TYPE		MT 108																	
147	SUB-AUDIO TONE	QUANTITY		2																	
148	SUB-AUDIO TONE	STANDARD																			
149	5-TONE	MAKE																			
150	5-TONE	TYPE		2																	
151	5-TONE	QUANTITY																			
152	5-TONE	STANDARD																			

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWO
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	VRYHEID					BLUFF (SANDF)										
1	SITE	NUMBER		63					64										
2	RADIO UNIT	NUMBER		63.1	63.2	63.3	63.4	63.5	64.1	64.2	64.3	64.4	64.5	64.6	64.7	64.8	64.9	64.10	64.11
3	UPDATED	DATE		2022/05/26					2022/05/26										
4	SITE	NAME		VRYHEID					BLUFF (SANDF)										
5	SITE	DISTRICT		ZUNGWINI					DURBAN										
6	SITE	FARM		NOOITGEDACHT															
7	SITE	CO-ORDINATES	LAT, LONG	-27.741250, 30.794997					-29.898056, 31.038889										
8	SITE	ALTITUDE	m	1666					93										
9	SITE	OWNER		DEPARTMENT OF WORKS					SANDF										
10	SITE	USER NAME		DOT;EMS;KZW					EMS; KZW										
11	SITE	ACCESS 1		Vryheid to PaulP/burg: 1st right to Grootverwacht dam. Green farm hse on corner					SANDF BLUFF: Lighthouse road:										
12	SITE	ACCESS 2		(dam entr.) Go till fence: Turn right first gate on left. Past huts, over river.															
35	POWER ACCOUNT	SUPPLY AUTHORITY		ESKOM					SANDF										
36	POWER ACCOUNT	ACCOUNT No.																	
37	POWER ACCOUNT	PAYEE		DEPARTMENT OF WORKS															
38	POWER ACCOUNT	CONTACT PERSON		S. MATHONSI															
39	POWER ACCOUNT	POSTAL ADDRESS		191 PRINCE ALFRED STREET, PMB															
40	POWER ACCOUNT	TEL NO.		033 355 5527															
41	POWER ACCOUNT	FAX NO																	
42	POWER SUPPLY	TYPE		230 V					230 V										
43	SURGE ARRESTOR	FLASHTRAB																	
44	SURGE ARRESTOR	MAKE		PHOENIX					PHOENIX										
45	SURGE ARRESTOR	FLT 60-400		2					2										
46	SURGE ARRESTOR	VAL MS-230		2					2										
47	SURGE ARRESTOR	LT-35		2					2										
48	SURGE ARRESTOR	SURGE PLUG		1					1										
49	SURGE ARRESTOR	DETAIL		D8260/E14/105					D8260/E14/105										
50	SOLAR PANELS	MAKE																	
51	SOLAR PANELS	TYPE																	
52	SOLAR PANELS	QUANTITY	No																
53	SOLAR PANELS	RATING/UNIT	Watt																
54	SOLAR REGULATOR	MAKE																	
55	SOLAR REGULATOR	TYPE																	
56	SOLAR REGULATOR	QUANTITY	No																
57	SOLAR REGULATOR	RATING/UNIT	Amp																
58	WIND GENERATOR	MAKE																	
59	WIND GENERATOR	TYPE																	
60	WIND GENERATOR	QUANTITY	No																
61	WIND GENERATOR	RATING/UNIT	Watt																
62	BATTERY	MAKE		RAYLITE NEW LOADSHED Smart Battery Prot					RAYLITE NEW LOADSHED Smart Battery Prot										
63	BATTERY	TYPE		M SOLAR CELLS 3 MIL 15 S MONO BLOC					M SOLAR CELLS 3 MIL 15 S MONO BLOC										
64	BATTERY	VOLTAGE	VOLT	12					12				24						
65	BATTERY	NO OF UNITS	No	1					1										
66	BATTERY	RATING	AH	530 AH (C100)					530 AH (C100)										
67	BATTERY	CONDITION		New - OK					New - OK										
68	BATTERY CHARGER	MAKE		Mean Well					Powermaster				Mecer Inverter						
69	BATTERY CHARGER	TYPE											24V DC						
70	BATTERY CHARGER	SERIAL NUMBER																	
71	BATTERY CHARGER	RATING/UNIT	Amp	60					60										
72	EARTH MAT																		
73	EARTH MAT	EARTH RESISTANCE	Ohm																
74	EARTH MAT	DATE MEASURED																	
75	MAST	MAKE		WEBB					On water tower										
76	MAST	TYPE		SS21															
77	MAST	HEIGHT	m	21					On top of watertower - on poles. Dangerous										
78	MAST	OWNED BY		DEPARTMENT OF WORKS					SANDF										
79	MAST	CONDITION		Erected: 1998 - Acceptable condition					+/-1998										
80	SITE ACCOMMODATION	TYPE		STEEL CONTAINER					Fibre glass Hut										
81	SECURITY FENCE	TYPE		MESH WIRE & FLAT COIL RAZOR WIRE					MILITARY SECURITY										
82	SECURITY FENCE	GATE		PEDESTRIAN					BOOM GATE AT ENTRANCE										
83	SECURITY FENCE	LOCKS	No	2					2 x Locks										
84	SECURITY FENCE	SURFACE		GROUND					Concrete Slab										
85	RADIO UNIT	NUMBER		63.1	63.2	63.3	63.4	63.5	64.1	64.2	64.3	64.4	64.5	64.6	64.7	64.8	64.9	64.10	64.11
86	USER			DOT	EMS	KZW	EMS	KZE	DOT	EMS	KZW	EMS	DOT	DOT	DOT	DOT	DOT	DOT	KZE
87	UNIT TYPE			Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Multicast Master	Midband Analogue	Midband Analogue	Highband Analogue	Simulcast Master	IP Link Radio	IP Link Radio	IP Link Radio	IP Link Radio	GSU Sync Unit	Analogue Link
88	RADIO UNIT 1	MAKE		QD	TAIT	TAIT		TAIT	KAIROS - DMR	TAIT	TAIT	TAIT	KAIROS - DMR	RADWIN	RADWIN	RADWIN	RADWIN	RADWIN	TAIT
89	RADIO UNIT 1	MODEL		Q8000	T826/15	T800/II		T856/25	KA-80 M/B	TB7100	T800/II	TB7100	KA-160 H/B	2000D IP	2000D IP	2000D IP	2000D IP	RW-9924-0070	T2000II
90	RADIO UNIT 1	CHANNEL	No		1			1	20					Simulcast Link 1	Simulcast Link 2	Simulcast Link 3	Simulcast Link 7		
91	RADIO UNIT 1	SERIAL No.		MC809247	926215 (VHF TX)	13081671		926561 (UHF TX)	KA-5941	18251853	13126408(exciter)	18250837	KA-5942		PP1199E000A003B0	P1199E000A003AC		P09270E700A00C6F	17292672
92	RADIO UNIT 1	FREQUENCY BAND		69-77	69-77	69-77		450-460	66-88	69-77	69-77	145-155	136-174	4900-6000	4900-6000	4900-6000	4900-6000	GPS	450-460
93	RADIO UNIT 1	TONE																	
94	RADIO UNIT 1	MAKE			TAIT	TAIT		TAIT			TAIT								
95	RADIO UNIT 1	MODEL			T825/25	T800/II		T855/15			T800/II								
96	RADIO UNIT 1	CHANNEL			1			1											
97	RADIO UNIT 1	SERIAL No.			925530 (UHF RX)	13083371		922536 (VHF RX)			13125997								
98	RADIO UNIT 1	FREQUENCY BAND			69-77	69-77		450-460			69-77								
99	RADIO UNIT 1	TONE																	
124	ANTENNA 1	MAKE		WEBB	WEBB	WEBB	Duplexer	Q TENNA	WEBB (2-stack)	WEBB	WEBB	WEBB	Colinear	Ubiquity MW	Ubiquity MW	Ubiquity MW	Ubiquity MW	RADWIN	WEBB
125	ANTENNA 1	TYPE		FD 70	FD 70	CD 70	TCL 840	YAGI	TBC	Folded Dipole	Folded Dipole		High Band	5GHz 34dBi	5GHz 34dBi	5GHz 34dBi	5GHz 34dBi	GPS Antenna	YAGI
126	ANTENNA 1	QUANTITY	No	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
127	ANTENNA 1	INSTALLATION DATE							2019	2004/01	2004/01	2003/11	2019						
128	ANTENNA 1	RATING/UNIT	dB	3	3	3	3	9	3	0	0	3		34dBi	34dBi	34dBi	34dBi		9
133	DUPLEXOR 1	MAKE		WEBB	QD	PROCOM	WEBB	TBC	TBC	WEBB	WEBB	TBC	TBC						TBC
134	DUPLEXOR 1	TYPE		DR66	QDF 4/10		DR 66/5			DR66	DM66/6								
135	DUPLEXOR 1	QUANTITY		1 #60043	1	6 CAVITY				1 # 60055	1 #829	1							
136	DUPLEXOR 1	RATING/UNIT	Watt	100	100	50	100		100	100	50	50	100						
141	CAVITY FILTER	MAKE		No Cavity															
142	CAVITY FILTER	TYPE																	
143	CAVITY FILTER	QUANTITY	No	1															
144	CAVITY FILTER	RATING	Watt																
145	SUB-AUDIO TONE	MAKE								YES (CTCSS)									
146	SUB-AUDIO TONE	TYPE								ON REPEATER									
147	SUB-AUDIO TONE	QUANTITY																	
148	SUB-AUDIO TONE	STANDARD																	
149	5-TONE	MAKE																	
150	5-TONE	TYPE																	
151	5-TONE	QUANTITY																	
152	5-TONE	STANDARD																	

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWO
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	WORLDSVIEW	UMZIMKULU						INANDA - 2				
1	SITE	NUMBER		65	81						87				
2	RADIO UNIT	NUMBER		**65.1**	**81.1**	**81.2**	**81.3**	**81.4**	**81.5**	**81.6**	**81.7**	**87.1**	**87.2**	**87.3**	**87.4**	**87.5**
3	UPDATED	DATE		2022/05/26	2022/05/26							2022/05/26				
4	SITE	NAME		WORLDSVIEW	UMZIMKULU											
5	SITE	DISTRICT		PIETERMARITZBURG	STRAALHOEK											
6	SITE	FARM		MUNICIPAL AREA												
7	SITE	CO-ORDINATES	LAT, LONG	-29.583056, 30.331389	-30.347222, 29.847222							-29.671389, 30.9579				
8	SITE	ALTITUDE	m	826	1435											
9	SITE	OWNER		DEPARTMENT OF WORKS	DEPARTMENT OF PUBLIC WORKS (SAPS)											
10	SITE	USER NAME		DOT	DOT;EMS;KZW;KZE;SAPS;ESKOM											
11	SITE	ACCESS 1		Old Howick Road: Tourist view point	Collect keys @ Umzimkulu SAPS. Travel +-10 km to Straalhoek Timber Mill/											
12	SITE	ACCESS 2			Forest on right. +- 10 km to site next to old Capital Radio 604 mast.											
35	POWER ACCOUNT	SUPPLY AUTHORITY		Msunduzi Municipality												
36	POWER ACCOUNT	ACCOUNT No.		01333193												
37	POWER ACCOUNT	PAYEE		RADIO CONTRACTOR												
38	POWER ACCOUNT	CONTACT PERSON														
39	POWER ACCOUNT	POSTAL ADDRESS														
40	POWER ACCOUNT	TEL NO.														
41	POWER ACCOUNT	FAX NO														
42	POWER SUPPLY	TYPE		230 V	230 V											
43	SURGE ARRESTOR	FLASHTRAB		POWERTRAB FM2												
44	SURGE ARRESTOR	MAKE			PHOENIX											
45	SURGE ARRESTOR	FLT 60-400		1	2											
46	SURGE ARRESTOR	VAL MS-230			2											
47	SURGE ARRESTOR	LT-35			2											
48	SURGE ARRESTOR	SURGE PLUG			1											
49	SURGE ARRESTOR	DETAIL		SPARSE												
50	SOLAR PANELS	MAKE														
51	SOLAR PANELS	TYPE														
52	SOLAR PANELS	QUANTITY	No													
53	SOLAR PANELS	RATING/UNIT	Watt													
54	SOLAR REGULATOR	MAKE														
55	SOLAR REGULATOR	TYPE														
56	SOLAR REGULATOR	QUANTITY	No													
57	SOLAR REGULATOR	RATING/UNIT	Amp													
58	WIND GENERATOR	MAKE														
59	WIND GENERATOR	TYPE														
60	WIND GENERATOR	QUANTITY	No													
61	WIND GENERATOR	RATING/UNIT	Watt													
62	BATTERY	MAKE		RAYLITE NEW LOADSHED	RAYLITE											
63	BATTERY	TYPE		M SOLAR CELLS 3 MIL 15 S MONO BLOC	M SOLAR CELLS 3 MIL 15 S MONO BLOC							6 x MIL Solar Cells				
64	BATTERY	VOLTAGE	VOLT	12	12							12		24		
65	BATTERY	NO OF UNITS	No	1	1											
66	BATTERY	RATING	AH	530 AH (C100)	530 AH (C100)											
67	BATTERY	CONDITION		Old - Deteriorated	New - OK							Old - Deteriorated				
68	BATTERY CHARGER	MAKE		JSM	JSM							Victron Centaur 12V 80A		Mecer Inverter		
69	BATTERY CHARGER	TYPE		15V 60Amp	12V 60Amp							12V 80Amp		24V DC		
70	BATTERY CHARGER	SERIAL NUMBER		021	019							HQ1706MNFN4				
71	BATTERY CHARGER	RATING/UNIT	Amp	60	60											
72	EARTH MAT															
73	EARTH MAT	EARTH RESISTANCE	Ohm													
74	EARTH MAT	DATE MEASURED														
75	MAST	MAKE		WEBB								WEBB				
76	MAST	TYPE		SS21	GUYED LATTICE							SS21				
77	MAST	HEIGHT	m	21	24							21				
78	MAST	OWNED BY			SAPS											
79	MAST	CONDITION		Erected: 1980 - Acceptable condition	Very poor condition - To be replaced							Acceptable condition				
80	SITE ACCOMMODATION	TYPE		FACE BRICK/CONRETE ROOF	MOBILE HOME							BRICK BUILDING				
81	SECURITY FENCE	TYPE		CORRODED (NON EXISTENT)	RIOT BARBED WIRE											
82	SECURITY FENCE	GATE		NONE	DOUBLE											
83	SECURITY FENCE	LOCKS	No	1	3											
84	SECURITY FENCE	SURFACE		GROUND	GROUND											
85	RADIO UNIT	NUMBER		**65.1**	**65.2**	**81.1**	**81.2**	**81.3**	**81.4**	**81.5**	**81.6**	**81.7**	**87.1**	**87.2**	**87.3**	**87.4**	**87.5**
86	USER			DOT	EMS	KZW	DOT	EMS	EMS	KZE	EMS	KZE	EMS	DOT	DOT	DOT	DOT
87	UNIT TYPE			Midband Analogue	Midband Analogue	Midband Analogue	Midband Analogue	Analogue Link	Midband Analogue	Midband Analogue	Analogue Link	Analogue Link	Midband Analogue	Simulcast Slave	IP Link Radio	IP Link Radio	GSU Sync Unit
88	RADIO UNIT 1	MAKE		TAIT	TAIT	TAIT	SIMOCO	TAIT	QD	QD	ICOM	ICOM	TAIT	KAIROS - DMR	RADWIN	RADWIN	RADWIN
89	RADIO UNIT 1	MODEL		TB7100	T800/II	T800II	TSF Lite	T856/25	Q8000	Q8000	F410	F310	TB7100	KA-160 H/B	2000D IP	2000D IP	RW-9924-0070
90	RADIO UNIT 1	CHANNEL	No	1		13132641 (Exciter)		1							Simulcast Link 2	Simulcast Link 5	
91	RADIO UNIT 1	SERIAL No.		18080383	13061523 (RX)		L2ISE011224HMZ	926560 (RX)	LC 301165	MC111225	721119	0301315	18255664	KA-5943	P11990E000A003AD		P09270E700A00C3A
92	RADIO UNIT 1	FREQUENCY BAND		69-77	69-77	69-77	69-77	450-460	69-77	69-77	450-460	450-460	69-77	136-174	4900-6000	4900-6000	GPS
93	RADIO UNIT 1	TONE															
94	RADIO UNIT 1	MAKE				TAIT		TAIT									
95	RADIO UNIT 1	MODEL				T800II		T855/15									
96	RADIO UNIT 1	CHANNEL				13131659 (RX)		1									
97	RADIO UNIT 1	SERIAL No.						889075 (TX)									
98	RADIO UNIT 1	FREQUENCY BAND				69-77		450-460									
99	RADIO UNIT 1	TONE															
124	ANTENNA 1	MAKE		WEBB	WEBB	WEBB	WEBB	COLINIER	WEBB	WEBB	WEBB	WEBB	WEBB FD70	Colinear	Ubiquity MW	Ubiquity MW	RADWIN
125	ANTENNA 1	TYPE		CD 70 FD	CD70FD	FD 70	QFD 70			CD 72	YAGI 7 E	YAGI 7 E		High Band	5GHz 34dBi	5GHz 34dBi	GPS Antenna
126	ANTENNA 1	QUANTITY	No	2	2	1	2	1	2	2	1	1	1	1	1	1	1
127	ANTENNA 1	INSTALLATION DATE												2019			
128	ANTENNA 1	RATING/UNIT	dB	3		0	3	3	3	3	9	9			34dBi	34dBi	
133	DUPLEXOR 1	MAKE		WEBB		WEBB	Q TENNA	TBC	TBC	TBC	TBC	TBC	TBC	TBC			
134	DUPLEXOR 1	TYPE		DR66/6		DR6615	QDSF 4/10		?	DR 66							
135	DUPLEXOR 1	QUANTITY				1	1										
136	DUPLEXOR 1	RATING/UNIT	Watt	100		150	150			100							
141	CAVITY FILTER	MAKE		Circulator/Harmonic & isolator Filters			CIRCULATOR										
142	CAVITY FILTER	TYPE		#2004: #010129/012& 0196			6351/F										
143	CAVITY FILTER	QUANTITY	No				1										
144	CAVITY FILTER	RATING	Watt														
145	SUB-AUDIO TONE	MAKE															
146	SUB-AUDIO TONE	TYPE															
147	SUB-AUDIO TONE	QUANTITY															
148	SUB-AUDIO TONE	STANDARD															
149	5-TONE	MAKE															
150	5-TONE	TYPE															
151	5-TONE	QUANTITY															
152	5-TONE	STANDARD															

PROVINCE OF KWAZULU-NATAL: RADIO COMMUNICATION NETWO
REPEATER SITE DATABASE

ITEM	ITEM DESCRITION		UNIT	RES- HILLS	GLENDALE	SHALLCROSS		MARIANHILL	SOMOPHO HILLS	
1	SITE	NUMBER		91	92	93		94	95	
2	RADIO UNIT	NUMBER		**91.1**	**92.1**	**93.1**	**93.2**	**94.1**	**95.1**	**95.1**
3	UPDATED	DATE		2022/05/26	2022/05/26	2022/05/26		2022/05/26	2022/12/12	
4	SITE	NAME								
5	SITE	DISTRICT								
6	SITE	FARM								
7	SITE	CO-ORDINATES	LAT, LONG	-29.80069, 30.92658	-29.342256, 31.090736	-29.882739, 30.856875		-29.83197, 30.83040	-28.656884, 31.844271	
8	SITE	ALTITUDE	m							
9	SITE	OWNER						Department of Transport	Private	
10	SITE	USER NAME								
11	SITE	ACCESS 1							4 x 4 Vehicle required to access	
12	SITE	ACCESS 2								
35	POWER ACCOUNT	SUPPLY AUTHORITY								
36	POWER ACCOUNT	ACCOUNT No.								
37	POWER ACCOUNT	PAYEE								
38	POWER ACCOUNT	CONTACT PERSON								
39	POWER ACCOUNT	POSTAL ADDRESS								
40	POWER ACCOUNT	TEL NO.								
41	POWER ACCOUNT	FAX NO								
42	POWER SUPPLY	TYPE								
43	SURGE ARRESTOR	FLASHTRAB								
44	SURGE ARRESTOR	MAKE								
45	SURGE ARRESTOR	FLT 60-400								
46	SURGE ARRESTOR	VAL MS-230								
47	SURGE ARRESTOR	LT-35								
48	SURGE ARRESTOR	SURGE PLUG								
49	SURGE ARRESTOR	DETAIL								
50	SOLAR PANELS	MAKE								
51	SOLAR PANELS	TYPE								
52	SOLAR PANELS	QUANTITY	No							
53	SOLAR PANELS	RATING/UNIT	Watt							
54	SOLAR REGULATOR	MAKE								
55	SOLAR REGULATOR	TYPE								
56	SOLAR REGULATOR	QUANTITY	No							
57	SOLAR REGULATOR	RATING/UNIT	Amp							
58	WIND GENERATOR	MAKE								
59	WIND GENERATOR	TYPE								
60	WIND GENERATOR	QUANTITY	No							
61	WIND GENERATOR	RATING/UNIT	Watt							
62	BATTERY	MAKE			RAYLITE NEW LOADSHED Smart Battery Prot					
63	BATTERY	TYPE			M SOLAR CELLS 3 MIL 15 S MONO BLOC				Royal 1150k	
64	BATTERY	VOLTAGE	VOLT		12	24		24	12	
65	BATTERY	NO OF UNITS	No		1				8	
66	BATTERY	RATING	AH		530 AH (C100)				530 AH (C100)	
67	BATTERY	CONDITION			New - OK				New - OK	
68	BATTERY CHARGER	MAKE			Mean Well	Mecer Inverter		Mecer Inverter	Mean Well	
69	BATTERY CHARGER	TYPE			12V 60Amp	24V DC		24V DC	12V 60Amp	
70	BATTERY CHARGER	SERIAL NUMBER							TC25082819	
71	BATTERY CHARGER	RATING/UNIT	Amp		60					
72	EARTH MAT									
73	EARTH MAT	EARTH RESISTANCE	Ohm							
74	EARTH MAT	DATE MEASURED								
75	MAST	MAKE								
76	MAST	TYPE								
77	MAST	HEIGHT	m							
78	MAST	OWNED BY								
79	MAST	CONDITION		Pole	SHARED - BY OWNER	CROWDED			SHARED - BY OWNER	
80	SITE ACCOMMODATION	TYPE		BRICK BUILDING	BRICK BUILDING	BRICK BUILDING			STEEL CONTAINER	
81	SECURITY FENCE	TYPE								
82	SECURITY FENCE	GATE								
83	SECURITY FENCE	LOCKS	No							
84	SECURITY FENCE	SURFACE								
85	RADIO UNIT	NUMBER					**93.2**	**94.1**		
86	USER			EMS	EMS	DOT	DOT	DOT	EMS	EMS
87	UNIT TYPE			Midband Analogue	Midband Analogue	IP Link Radio	IP Link Radio	IP Link Radio	Midband Analogue	Midband Analogue
88	RADIO UNIT 1	MAKE				RADWIN	RADWIN	RADWIN	SIMOCO	TAIT
89	RADIO UNIT 1	MODEL				2000D IP	2000D IP	2000D IP	TSF2000	TB7100
90	RADIO UNIT 1	CHANNEL	No			Simulcast Link 7	Simulcast Link 8	Simulcast Link 8		
91	RADIO UNIT 1	SERIAL No.							3RE0X12403VP122	18086206
92	RADIO UNIT 1	FREQUENCY BAND				4900-6000	4900-6000	4900-6000	69-77	69-77
93	RADIO UNIT 1	TONE								
94	RADIO UNIT 1	MAKE								
95	RADIO UNIT 1	MODEL								
96	RADIO UNIT 1	CHANNEL								
97	RADIO UNIT 1	SERIAL No.								
98	RADIO UNIT 1	FREQUENCY BAND								
99	RADIO UNIT 1	TONE								
124	ANTENNA 1	MAKE		COLINEAR		Ubiquity MW	Ubiquity MW	Ubiquity MW	WEBB	WEBB
125	ANTENNA 1	TYPE				5GHz 34dBi	5GHz 34dBi	5GHz 34dBi	CD 70 FD	CD70FD
126	ANTENNA 1	QUANTITY	No	1		2	1	1	1	1
127	ANTENNA 1	INSTALLATION DATE								
128	ANTENNA 1	RATING/UNIT	dB	3		34dBi	34dBi	34dBi	3	
133	DUPLEXOR 1	MAKE		WEBB	TBC				WEBB	
134	DUPLEXOR 1	TYPE		DH 33/6 (Duplexer)					DR66/6	
135	DUPLEXOR 1	QUANTITY								
136	DUPLEXOR 1	RATING/UNIT	Watt							
141	CAVITY FILTER	MAKE								
142	CAVITY FILTER	TYPE								
143	CAVITY FILTER	QUANTITY	No							
144	CAVITY FILTER	RATING	Watt							
145	SUB-AUDIO TONE	MAKE								
146	SUB-AUDIO TONE	TYPE								
147	SUB-AUDIO TONE	QUANTITY								
148	SUB-AUDIO TONE	STANDARD								
149	5-TONE	MAKE								
150	5-TONE	TYPE								
151	5-TONE	QUANTITY								
152	5-TONE	STANDARD								

REPEATER INSPECTION AND SERVICE REPORT

Contract Number	

Name of installation			Date of Service	20 / /
Repeater user			Date of Call out	20 / /
Location			Date of Inspection	20 / /
RADIO :	[VHF (1)]	[VHF (2)]	[UHF (1)]	[UHF (2)]
Manufacture				
Model				
Serial no.				

Microphone check (Yes/No) :		Loudspeaker check (Yes/No) :	

RADIO MEASUREMENTS :

TRANSMITTER :		VHF Transmitter	UHF 1 Transmitter	UHF 2 Transmitter
Tx Frequency measured	Mhz			
RF Power before duplexer	watt			
RF Power after duplexer	watt			
VSWR	watt			
Deviation	khz			
Tone frequency	hz			
Tone level	hz			
RECEIVER :		VHF Receiver	UHF 1 Receiver	UHF 2 Receiver
Tx Frequency measured	Mhz			
Sensitivity 12dB Sinad	micro volt			
Sensitivity 20dB Sinad	micro volt			
Squelch set at:	micro volt			

TALK-THROUGH MEASUREMENTS :

1kHz tone signal in		kHz out		VHF in	2.5 kHz	VHF out		kHz
2kHz tone signal in		kHz out		VHF in	2.5 kHz	UHF out		kHz
				UHF in	2.5 kHz	VHF out		kHz
				UHF in	2.5 kHz	UHF out		kHz

POWER SUPPLY :	Mains Voltage	V	Batt charger Volt	V	Charger current		A
	Battery Volts (charger switched off for 5 min)			V			

SOLAR PANELS :

PANEL NO.	1	2	3	4	5	6	7	8	9
Regulator in Volt									
Regulator out Volt									
Visual condition									
Light/weather conditions									

BATTERIES :

BATTERY 1 CELLS	1	2	3	4	5	6
Cell Voltage : Volt						
Cell S.G.						
Visual condition						
Quantity of Water ?	ml	ml	ml	ml	ml	ml
BATTERY 2 CELLS	7	8	9	10	11	12
Cell Voltage : Volt						
Cell S.G.						
Visual condition						
Quantity of Water ?	ml	ml	ml	ml	ml	ml

BATTERY MAINTENANCE (Yes/No)	
Terminals cleaned ?	
Water topped up ?	

ANTENNA CHECKS : (Yes/No)

Connectors checked ?		Feeder cable checked ?		Baluns checked ?	
Mountings checked ?		Antennas checked ?		Earthing checked ?	
Direction checked ?		Mast bolts checked ?		Earth resistance (Ohm)	

SITE : (Yes/No)

Hut cleaned ?		Site cleaned ?		Fence/gate checked ?	

Description of repairs required :

ON-AIR TESTS : (Please state the name of person contacted) :

SERVICE / INSPECTION DETAIL :

Name			Representing	
Arrival time	___ hrs__	Departure time	___ hrs__	
Vehicle registration number				.....
Vehicle kilometer reading				Signature

REPEATER INSPECTION AND SERVICE REPORT

Contract Number	

Name of installation			Date of Service	20 / /
Repeater user			Date of Call out	20 / /
Location			Date of Inspection	20 / /
RADIO :	VHF Repeater	IP Link 1	IP Link 2	IP Link 3
Manufacture				
Model				
Serial no.				
Master/Slave				
IP Address				

RADIO MEASUREMENTS : **LINK MEASUREMENTS :**

DSP MEASURES

TX Frequency			IP Link 1	IP Link 2	IP Link 3
DMR Packets out of Window		Link Name			
ANA packets out of Window		Location			
DMR Packets Safety Margin		Link ID			
Time Error (µs)		Frequency			
PPS Position (µs)		Band			
RX MEASURES		Channel Bandwith			
RX Frequency		TX Ratio			
Peak Deviation (Hz)		Range (Km)			
Estimated Sinad [p] (dB)		Status			
Offset of Received Carrier (Hz)		RSS (dBM) Ant 1			
ANALOGUE MEASURES		RSS (dBM) Ant 2			
Input Voltage (V)		Throughput (Mbps)			
TX Temperature (°C)		Rate			
TX Input Current (A)		Ethernet RX Rate			
Forward Power (W)		Ethernet TX Rate			
Reflected Power (W)					
SWR					

DMR SATUS	**TSA**	**TSB**		**TSA**	**TSB**
Internal Second / Timeslot			Last RX Colour Codes		
Last Received Timeslot			Last TX Data Types		
Frequency Offset RX (ms)			RSSI Main (dBm)		
Time Offset RX (ms)			RSSI Diversity (dBm)		
Error Vector					

POWER SUPPLY (12V):	Mains Voltage (AC)	V	Batt charger Volt	V	Inverter Output	V
	Battery Volts (charger switched off for 5 min)			V	Charger current	A
POWER SUPPLY (24V):	Mains Voltage (AC)	V	Batt charger Volt	V	Charger current	A
	Battery Volts (inverter switched off for 5 min)			V	Battery Charge	%

BATTERIES :

BATTERY 1 CELLS (12V)	1	2	3	4	5	6	**BATTERY MAINTENANCE** (Yes/No)	
Cell Voltage : Volt								
Cell S.G.							Terminals cleaned ?	
Visual condition							Water topped up ?	
Quantity of Water ?	ml	ml	ml	ml	ml	ml		

ANTENNA CHECKS : (Yes/No)

Connectors checked ?		Feeder cable checked ?			Baluns checked ?	
Mountings checked ?		Antennas checked ?			Earthing checked ?	
Direction checked ?		Mast bolts checked ?			Earth resistance (Ohm)	

SITE : (Yes/No)

Hut cleaned ?		Site cleaned ?		Fence/gate checked ?	

Description of repairs required :

ON-AIR TESTS : (Please state the name of person contacted) :

SERVICE / INSPECTION DETAIL :

Name			Representing		
Arrival time	___ hrs__		Departure time	___ hrs__	
Vehicle registration number					.....
Vehicle kilometer reading					Signature

VOLKSRUST
WAKKERSTROOM
PAULPIETERSBURG
KZN 9
FRISCHGEWAAGD
KZN 17
PONGOLA
JOZINI
KZN 26
LOUWSBURG
KZN 28
UBOMBO
MKUZE
SODWANA BAY
UTRECHT
KZN 63
VRYHEID
NEWCASTLE
KZN 42
NONGOMA
KZN 86
THULASIZWE
HLUHLUWE
KZN 21
HLABISA
KZN 10
GLENCOE
DUNDEE
NQUTU
MAHLABATINI
HARRISMITH
KZN 61
VAN REENAN
ULUNDI
KZN 3
BABANANGO
KZN 45
MTUBATUBA
ST. LUCIA ESTUARY
KZN 74
LADYSMITH
KZN 27
POMEROY
MELMOTH
NKANDLA
LOSKOP
BERGVILLE
WINTERTON
KZN 80
WEENEN
TUGELA FERRY
KZN 37
EMPANGENI
RICHARDS BAY
KZN 12
ESHOWE
KRANSKOP
ESTCOURT
KZN 13
KZN 16
GREYTOWN
MANDINI
MOOIRIVER
KZN 82
KZN 92
KZN 29
TUGELA MOUTH
STANGER
NDWEDWE
KZN 56
PIETERMARITZBURG
KZN 65
TONGAAT
MPENDLE
KZN 24
KZN 66
BULWER
UNDERBERG
CAMPERDOWN
KZN 1
KZN 91
PHOENIX
KZN 94
PINETOWN
KZN 22
KZN 64
DURBAN
KZN 93
RICHMOND
UMLAZI
UMBUMBULU
CREIGHTON
AMANZIMTOTI
IXOPO
SWARTBERG
KZN 18
KZN 95
KZN 62
UMKOMAAS
KZN 51
SCOTTBURGH
UMZIMKHULU
KZN 81
HIGHFLATS
UMZINTO
PARK RYNIE
KZN 5
KOKSTAD
HARDING
HIBBERDENE
KZN 78
PADDOCK
KZN 34
PORT SHEPSTONE
MARGATE

Item No	Site No	Radio Site Name
1	1	Alverstone -29.776944, 30.712778
2	3	Babanango -28.392222, 30.995556
3	5	Bokkiesberg -30.378628, 29.289792
4	9	Dumbe Mountain -27.447222, 30.841944
5	10	L'Mpati / Dundee -28.125556, 30.215
6	12	Eshowe -28.867109, 31.300805
7	13	Estcourt (Hidcote) -29.121714, 29.926898
8	16	St. Michaels / Greytown -29.032222, 30.505833
9	17	Groenvlei -27.49136, 30.330602
10	18	Highflats\Kunata -30.269444, 30.253333
11	21	Hluhluwe -28.069444, 32.033889
12	22	Durban / Howard College -29.866389, 30.981111
13	24	Netherby -29.658889, 29.631111
14	26	Itala -27.617222, 31.322222
15	27	Jobskop -28.579167, 30.212778
16	28	Nkangala/Josini -27.561667, 32.045
17	29	Kearsney/Stanger -29.276667, 31.2025
18	34	Mara Farm -30.816389, 30.248889
19	37	Matshane Mountain -28.750833, 31.842778
20	42	Nongoma -27.901111, 31.65
21	45	Mtonjaneni -28.439722, 31.402222
22	56	Swartkop -29.582851, 30.253562
23	61	Van Reenen -28.382778, 29.400278
24	62	Vernon Crookes -30.268205, 30.625303
25	63	Vryheid -27.710833, 30.854167
26	64	Bluff (Sandf) -29.898056, 31.038889
27	65	Worldsview -29.583056, 30.331389
28	81	Umzimkulu -30.347222, 29.847222
29	87	Ndwedwe Clinic / Infotrunk Site -29.513056, 30.936944
30	91	Res- Hills
31	92	Glendale -29.342256, 31.090736
32	93	Shallcross -29.882739, 30.856875
33	94	Marianhill -29.83197, 30.83040
34	95	As Salam School -30.29723, 30.54422

LEGEND

REPEATER SITE IDENTIFIED BY PREFIX KZN

1 : 500 000

KILOMETER 10 5 0 10 20 30 40 50 60 70 80 90 100 110

NOTE
BOUNDARY LAYER CREATED BY GIS UNIT OF HEALTH INFORMATICS:
DEPARTMENT OF HEALTH KWAZULU- NATAL
PIETERMARITZBURG

REVISIONS

CA du Toit

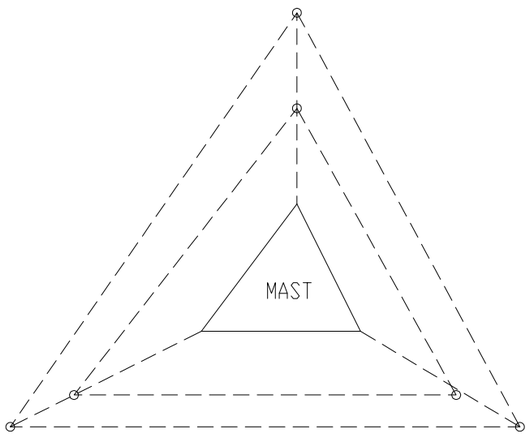
PROJECT TITLE
PROVINCE OF KWAZULU-NATAL

DRAWING TITLE
KZN REPEATER SITES

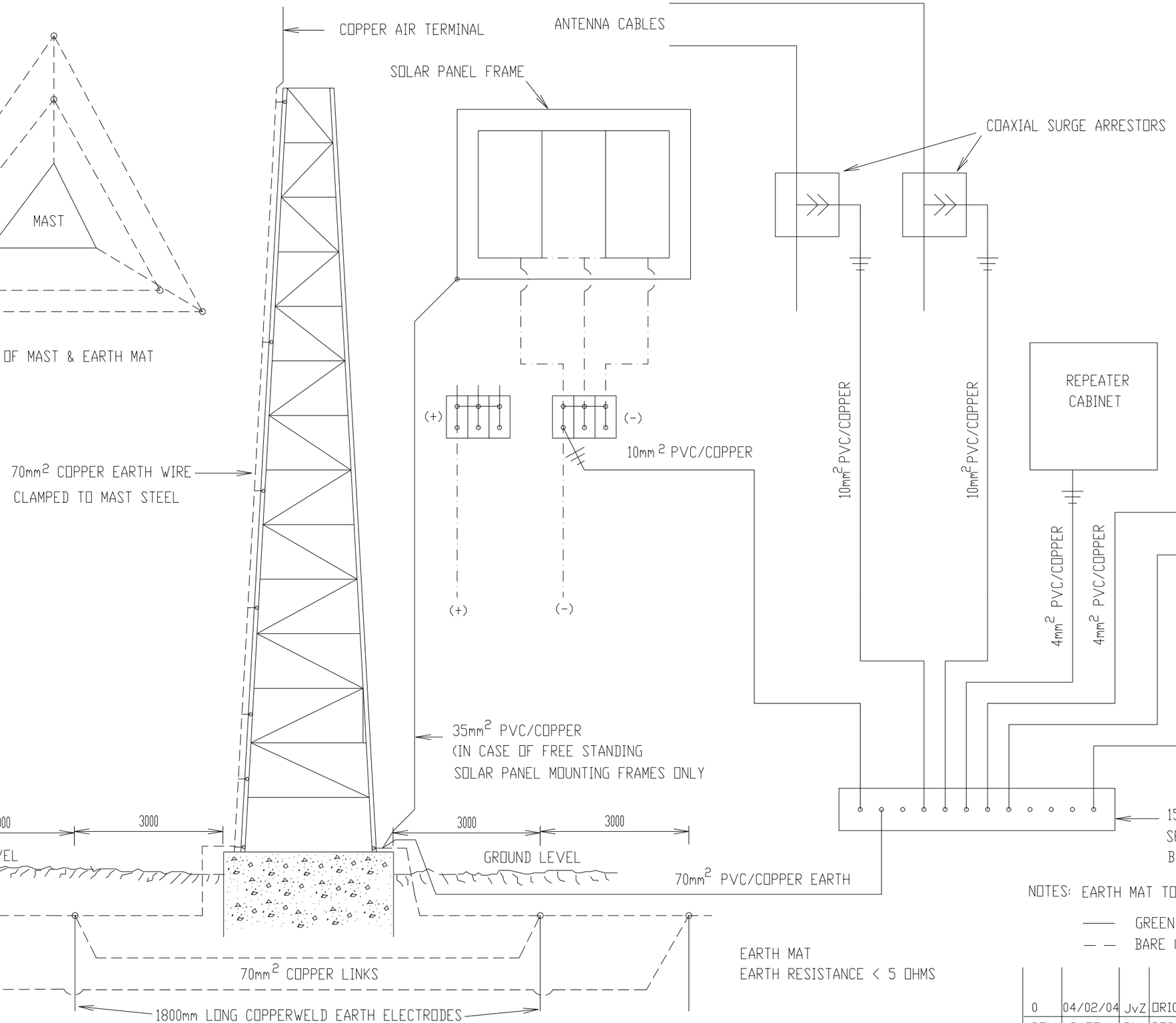
SCALE NTS
DATE 27-02-2023

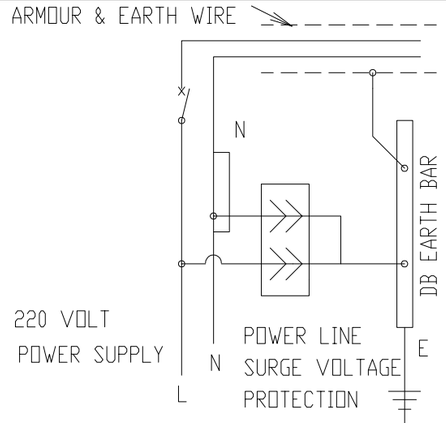
DRAWING No. D8260/E14/01

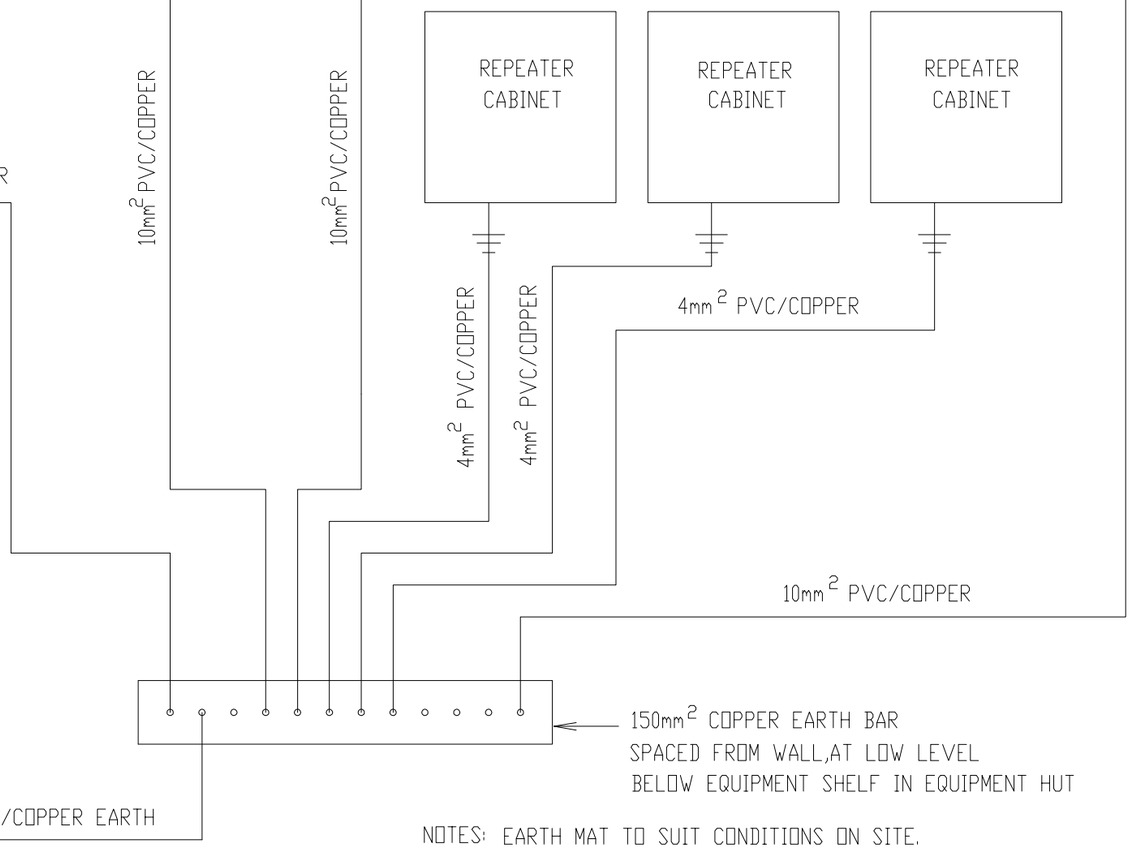
REVISION 1



PLAN VIEW OF MAST & EARTH MAT







EARTH MAT
EARTH RESISTANCE < 5 OHMS

NOTES: EARTH MAT TO SUIT CONDITIONS ON SITE.

—— GREEN PVC INSULATED EARTH WIRE.

– – BARE COPPER EARTH WIRES.

REV	DATE	BY	DESCRIPTION
0	04/02/04	JvZ	ORIGINATED D5797E14-101

PROJECT
PROVINCE OF KWAZULU - NATAL

INSTALLATION
SCHEMATIC DIAGRAM
EARTHING ARRANGEMENT AT RADIO REPEATER SITES

MECHANICAL/ELECTRICAL ENGINEERS
P.O. BOX 863
WESTVILLE
TEL 031-2669608
FAX 031-2669608

CA duToit (Pty) Ltd

SCALE
N.T.S.

DATE
2004-02-04

DRAWING NO.
D8260E14-101 REV. 0

55W SOLAR PANEL

1 2 3 4 5 6 7 8

(-) (+)

CABLE MARKER

(DIRECT TO TERMINAL BLOCKS)

(4mm² PVC/COPPER)

55W SOLAR PANEL

(DIRECT TO TERMINAL BLOCKS)

FROM SOLAR PANELS

FROM SOLAR PANELS

(+)

(-)

BRIDGE BAR

PANEL NUMBERS

10mm² PVC/COPPER

30A SOLAR REGULATOR (PDI) POWER SENSE

30A LOW VOLTAGE LOAD SHED (PDI) POWER SENSE

30A LOW VOLTAGE LOAD SHED (PDI) POWER SENSE

30A SOLAR REGULATOR (PDI) POWER SENSE

10mm² PVC/COPPER

TO DC DISTRIB. BOARD

150mm² COPPER BATTERY BUSBARS AT BATTERIES

2.5mm² PVC/COPPER

BOLTED LUGS

10mm² PVC/COPPER

1 2 3 4

BATTERIES

LEGEND

SOLAR PANEL TERMINAL BLOCK (PHOENIX CONTACT UK10)

PANEL SPECIFICATION

VOC. 21.6V (OPEN CIRCUIT VOLTAGE)
ISC. 3.4A (SHORT CIRCUIT CURRENT)

NOTE: EQUIPMENT QUANTITIES AS INSTRUCTED FOR EACH REPEATER SITE.

WIRING COLOUR CODED: POSITIVE - RED
NEGATIVE - BLACK

DATE 2004-02-04

SCALE N.T.S.

REVISION REV. 0

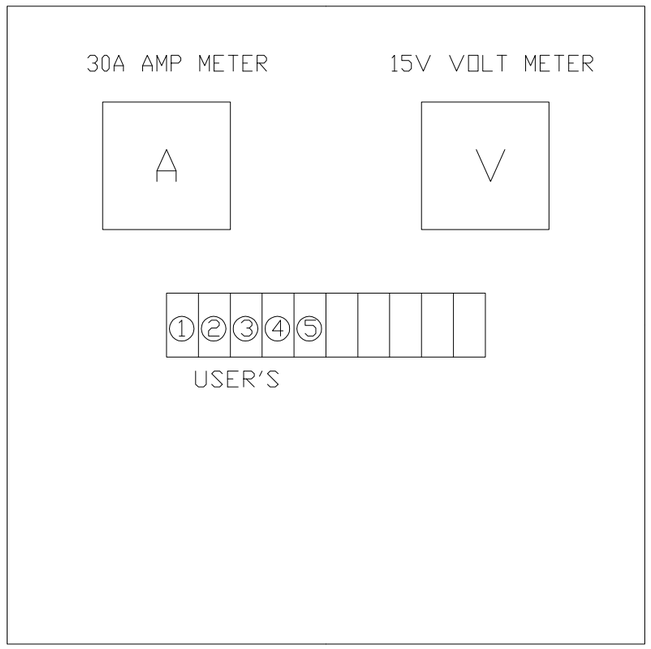
DRAWING NO. D8260/E14/102

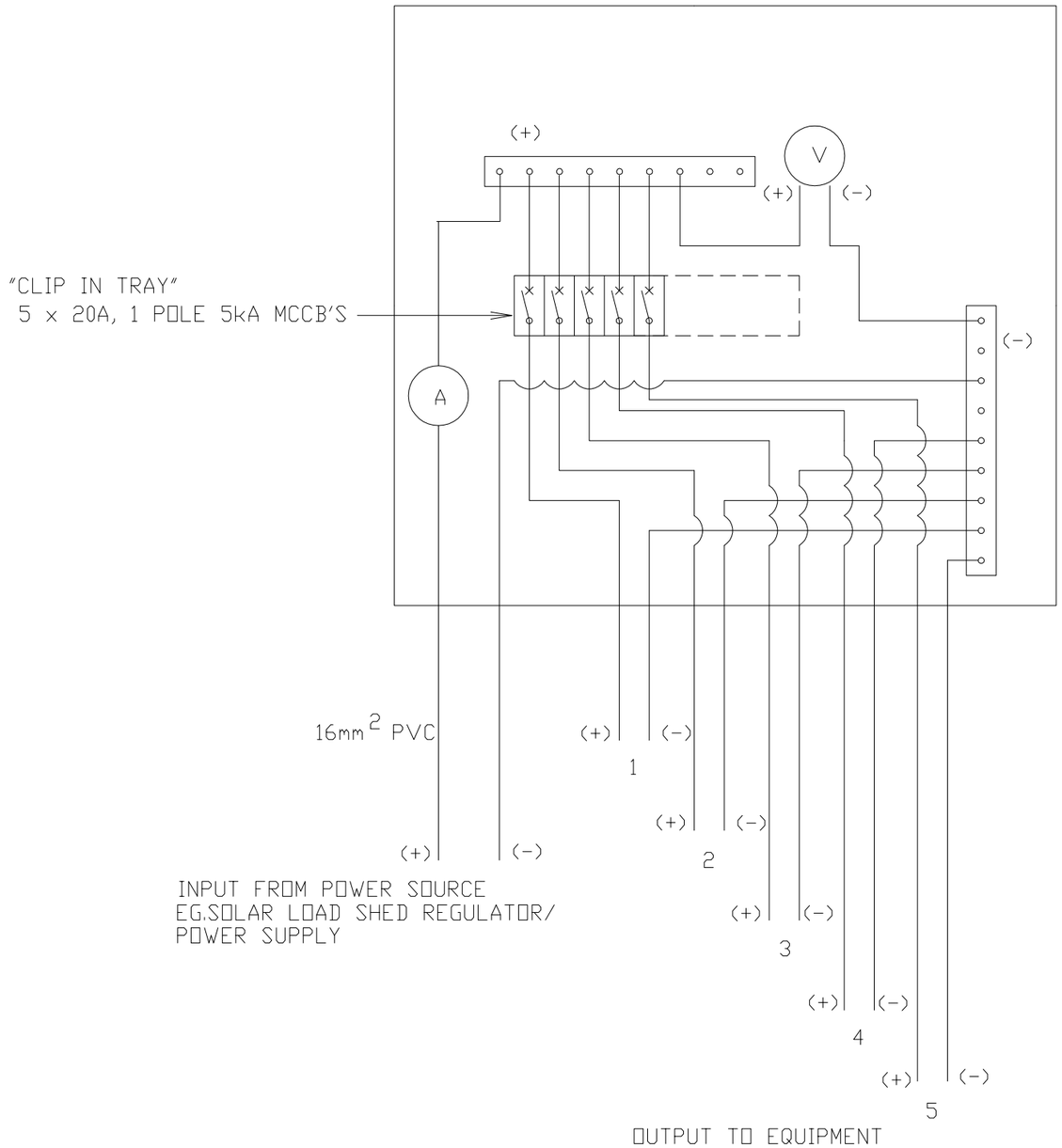
CA duTOIT (Pty) Ltd
MECHANICAL/ELECTRICAL ENGINEERS
P.O. BOX 863
WESTVILLE
TEL 031-2669608
FAX 031-2669608

REV	DATE	BY	DESCRIPTION
0	4/2/04	JvZ	ORIGINATEDD5797E14-102 (REV. 1)

PROJECT PROVINCE OF KWAZULU - NATAL

INSTALLATION SCHEMATIC DIAGRAM : TYPICAL SOLAR INSTALLATION AT REPEATER SITES





NOTES: 1 FIBRE GLASS 10 WAY SINGLE PHASE DISTRIBUTION BOARD

2 20mm COMPRESSION GLANDS FOR CABLE ENTRY/EXIT

3 LABELS : LABEL EACH CIRCUIT BREAKER FOR EQUIPMENT

4 1 X CIRCUIT BREAKER PER REPEATER

REV	DATE	DESCRIPTION
0	FEB 04	ORIGINATED D5797E14-103 Rev. 2)

PROJECT

PROVINCE OF KWAZULU - NATAL

INSTALLATION SCHEMATIC DIAGRAM

DC DISTRIBUTION BOARD with METERS for REPEATER STATION

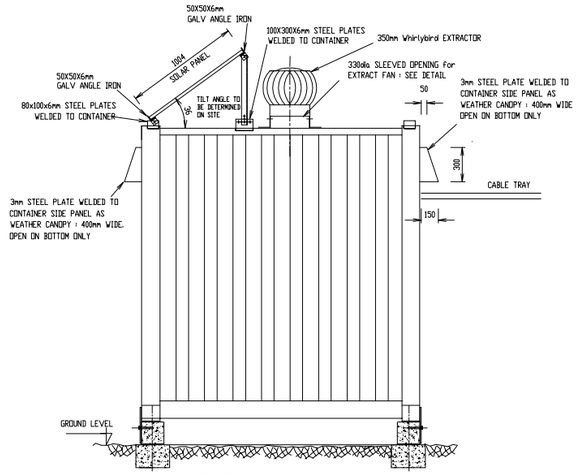
MECHANICAL/ELECTRICAL ENGINEERS
P.O. BOX 863
WESTVILLE
TEL 031-2669608
FAX 031-2669608

CA duToit (Pty) Ltd

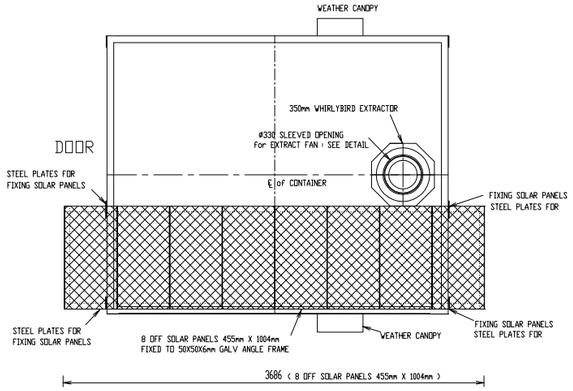
SCALE N.T.S.

DATE 2004-02-04

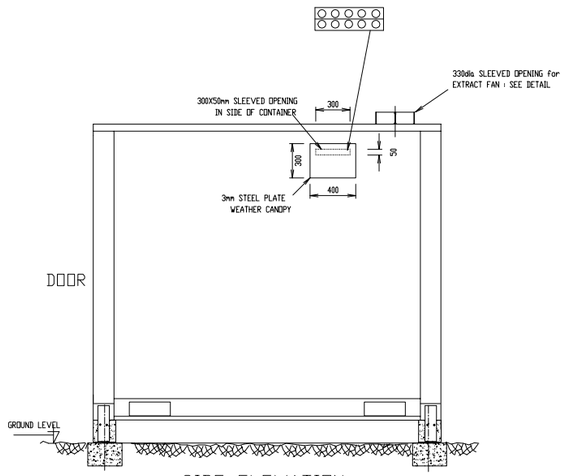
DRAWING NO. D8260E14-103 REV 0



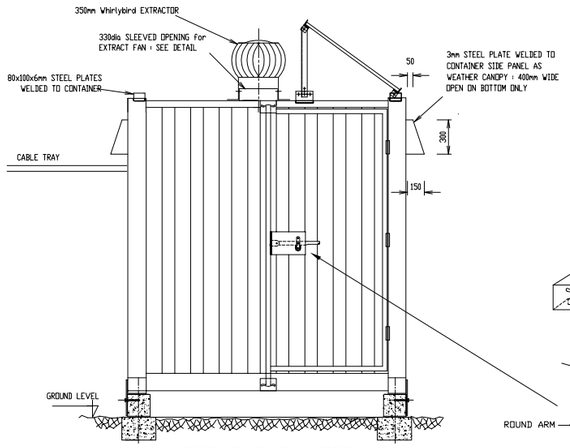
BACK ELEVATION



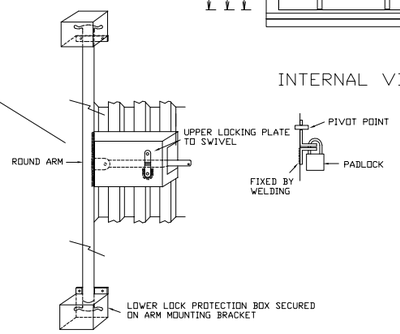
ROOF PLAN



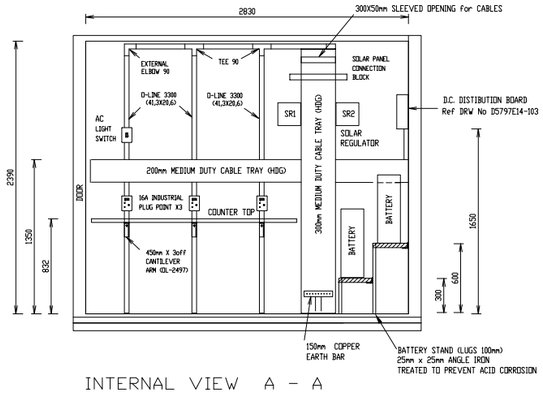
SIDE ELEVATION



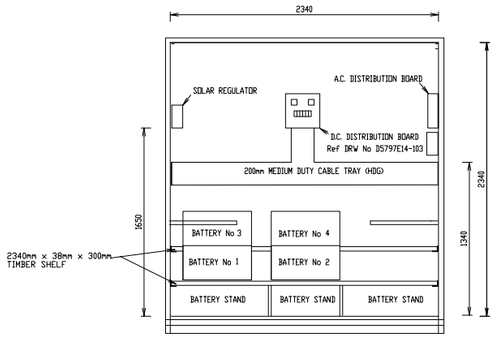
FRONT ELEVATION



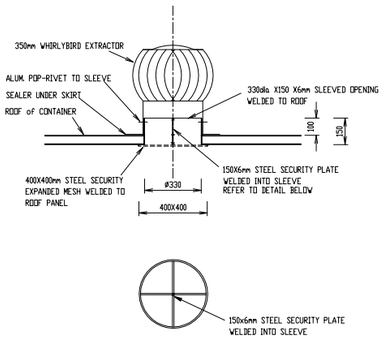
TYPICAL LOCK PROTECTION



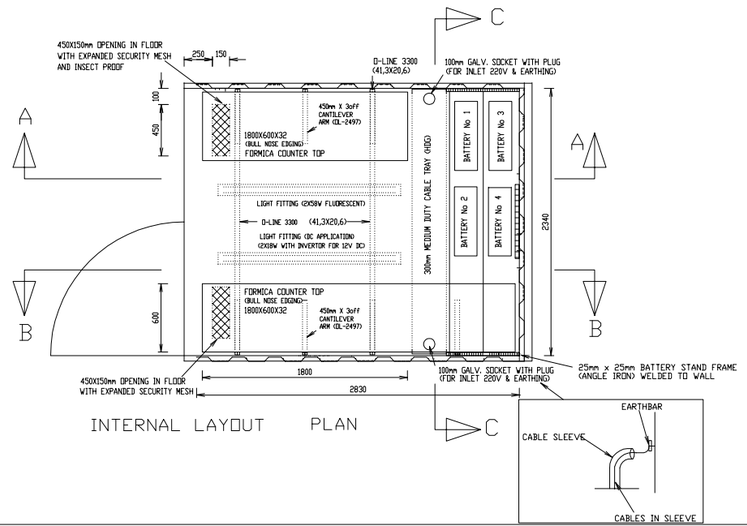
INTERNAL VIEW A - A



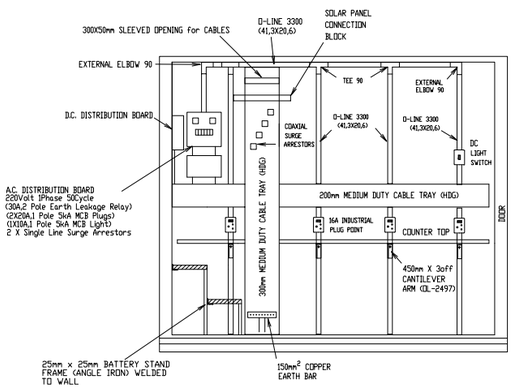
INTERNAL VIEW C - C



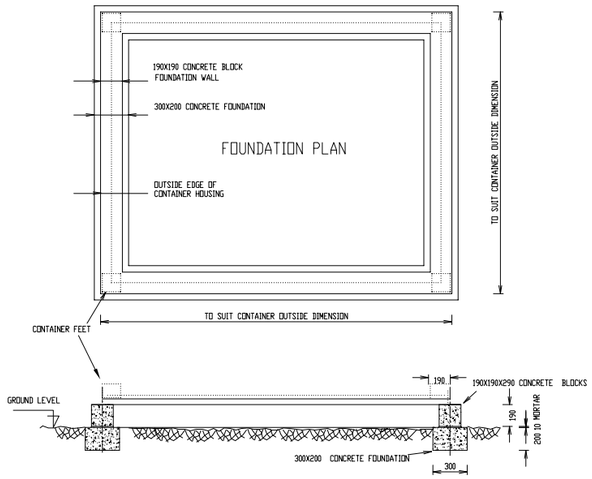
EXTRACT FAN & OPENING



INTERNAL LAYOUT PLAN



INTERNAL VIEW B - B



SECTION

NOTES :

1. THE MINIMUM AMOUNT OF PENETRATION TO BE MADE TO THE OUTER SHELL WHERE POSSIBLE. ALL ATTACHMENTS TO BE DONE BY WELDING. WHERE UN-AVOIDABLE PENETRATION POINTS TO BE SEALED BEFORE PAINTING.

3. FOUNDATIONS : PROVISION MUST BE MADE FOR-
   - (A) 230V CABLE
   - (B) EARTH CABLE
   - (C) SECURING STEEL HOUSING TO FOUNDATION
   - (D) FOUNDATION TO SUIT STEEL HOUSING OUTSIDE DIMENSION

REFER TO SPECIFICATION FOR DETAILED INFORMATION

No	DATE	BY	DESCRIPTION
0	04-02-04	JvZ	ORIGINATED D5797E14-104 (REV 4)

REVISIONS

MECHANICAL/ELECTRICAL ENGINEERS
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WESTVILLE
TEL 031-2669688
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CA duToit & Partners Inc

PROJECT TITLE

RADIO INSTALLATIONS

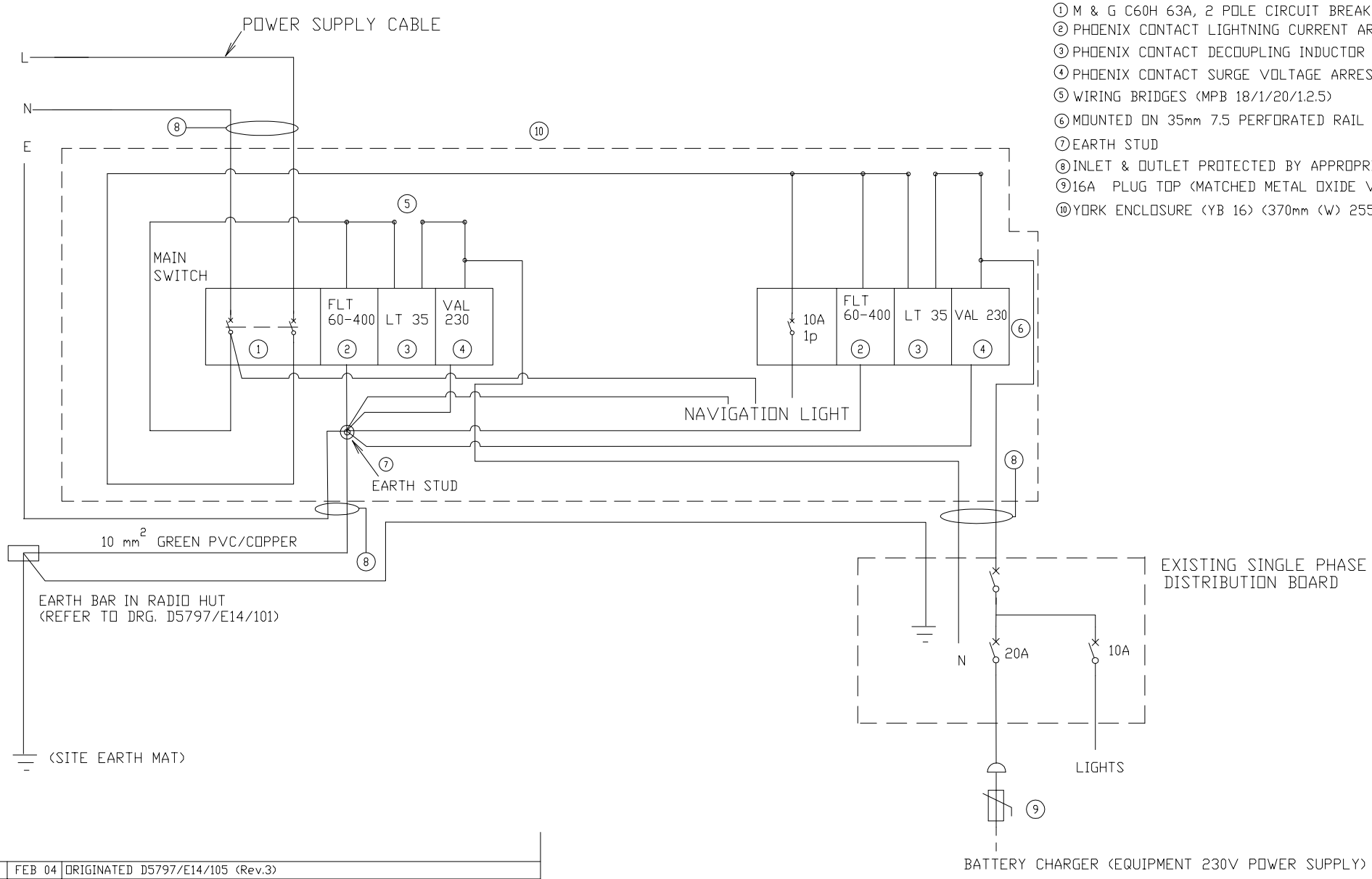
DRAWING TITLE

RADIO REPEATER HOUSING
CONTAINER TYPE
RADIO REPEATER STATION

SCALE	DATE
1 : 20	FEB 2004

DRAWING No. D8260E14-104 REV 0

REVISION



NOTES

1. M & G C60H 63A, 2 POLE CIRCUIT BREAKER (CURVE D)
2. PHOENIX CONTACT LIGHTNING CURRENT ARRESTER (FLT 60-400)
3. PHOENIX CONTACT DECOUPLING INDUCTOR (LT 35)
4. PHOENIX CONTACT SURGE VOLTAGE ARRESTER (VAL MS 230)
5. WIRING BRIDGES (MPB 18/1/20/1.2.5)
6. MOUNTED ON 35mm 7.5 PERFORATED RAIL
7. EARTH STUD
8. INLET & OUTLET PROTECTED BY APPROPRIATE CABLE GLANDS
9. 16A PLUG TOP (MATCHED METAL OXIDE VARISTOR)
10. YORK ENCLOSURE (YB 16) (370mm (W) 255mm (H) 73mm (D).)

REV	DATE	DESCRIPTION
0	FEB 04	ORIGINATED D5797/E14/105 (Rev.3)

PROJECT
PROVINCE OF KWAZULU - NATAL

INSTALLATION
SCHEMATIC DIAGRAM : TYPICAL SINGLE PHASE LIGHTNING PROTECTION INSTALLATION

MECHANICAL/ELECTRICAL ENGINEERS
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CA duToit (Pty) Ltd

SCALE N.T.S.

DATE FEBRUARY 2004

DRAWING NO.
D8260/E14/105 REV 0

COPPER AIR TERMINAL

70mm² COPPER EARTH WIRE
CLAMPED TO MAST STEEL

INSTALL AS PER MAST
INSTALLATION SPEC.

3000
3000
3000
3000
3000

GROUND LEVEL

300

MIN 300 DEEP

3000 3000

3000 3000

GROUND LEVEL

70mm² PVC/COPPER EARTH

EXTENDED TO 6m BEYOND
ANCHOR POINT

EARTH MAT
EARTH RESISTANCE < 5 OHMS

1800mm LONG COPPERWELD EARTH ELECTRODES

120° MAST 120° 120°

GUY ANCHOR

PLAN VIEW OF MAST & EARTH MAT

U-BOLT CLAMPS

6mm GALVANISED
GUY WIRE

GALVANISED STEEL
(ZINC)

10mm SOLID
COPPER

COPPER RODS

CONCRETE BLOCK

SIDE VIEW OF A PROPERLY GROUNDED GUY ANCHOR. CORRECTLY DRESSED AND INSTALLED, THE GROUND WIRE PREVENTS SURGE CURRENTS FROM WELDING TURNBUCKLES AND DAMAGING THE SAFETY LOOP.

ANTENNA CABLES

SOLAR PANEL FRAME

COAXIAL SURGE ARRESTORS

(+) (-)

10mm² PVC/COPPER

(+) (-)

35mm² PVC/COPPER
(IN CASE OF FREE STANDING
SOLAR PANEL MOUNTING FRAMES ONLY

10mm² PVC/COPPER

10mm² PVC/COPPER

REPEATER CABINET

REPEATER CABINET

REPEATER CABINET

4mm² PVC/COPPER

4mm² PVC/COPPER

4mm² PVC/COPPER

150mm² COPPER EARTH BAR
SPACED FROM WALL,AT LOW LEVEL
BELOW EQUIPMENT SHELF IN EQUIPMENT HUT

NOTES: EARTH MAT TO SUIT CONDITIONS ON SITE.

—— GREEN PVC INSULATED EARTH WIRE.

– – BARE COPPER EARTH WIRES.

REV	DATE	DESCRIPTION
0	FEB 04	ORIGINATED D5797E14/106 (Rev 1)

PROJECT PROVINCE OF KWAZULU - NATAL

INSTALLATION SCHEMATIC DIAGRAM

EARTHING ARRANGEMENT FOR 30m GUYED LATTICE MAST

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SCALE N.T.S.

DATE FEBRUARY 2004

DRAWING NO. D8260E14-106 REV 0