

TENDER DATA

Project title:	Appointment of a Panel of Service Providers for the Design, Supply, Installation, Commissioning and Maintenance of outdoor cabinets and / or steel poles, including electrical connections and HVAC, for a period of 3 years as and when required.
Bid no:	SENT/045/2024-25

1. BACKGROUND

Sentech is a state-owned company and is the largest broadcasting signal distributor in South Africa. Sentech is a licensed Electronic Communications Network Service provider in South Africa. It currently operates many telecommunication networks for Satellite, Television, Radio, Internet and more. As such, Sentech is a global enabler of broadcasting and digital content delivery.

Sentech seeks to appoint a panel of service providers for the design, supply installation and maintenance of outdoor cabinets, and/or steel poles including electrical connections and HVAC. These cabinets will be deployed on 3rd party sites.

The Panel will work on the quotation basis, on an “as and when” required basis; Sentech therefore does not promise successful bidder(s) on the panel any quantum of work.

The primary requirements are the following:

1. Supply and installation of outdoor cabinets.
2. Supply and installation of steel poles where required.
3. Site preparation for installing outdoor cabinets and poles where required.
4. Installation of external AC reticulation between outdoor cabinets and Site Owner/Eskom/Municipality power supply.
5. Install cable sleeves/tray between outdoor cabinet and the mast.

TENDERERS CAN INDICATE PREFERENCE FOR WORK IN ONE OR MORE THAN ONE PROVINCE IN THE TABLE BELOW

PROVINCE	STATED PREFERENCE, e.g., GAUTENG	COMPANY NAME	NAME OF PERSON COMPLETING THIS DOCUMENT
Eastern Cape			
Free State			
Gauteng			
Kwa Zulu Natal			
Limpopo			
Mpumalanga			
Northern Cape			
North West			
Western Cape			

2. SUBMISSION OF BIDS and CLOSING

2.1 This Bid closes on the date and time stipulated on the Notice and Invitation to Bid (SBD1). Bids can be submitted electronically via the eTender Portal and/or by hand to the tender box at Sentech Offices, Octave Road, Radiokop Ext 3, Honeydew, Johannesburg.

- a) Bidders that opt to deposit their bid documents in the tender box must do so on or before the closing date and time, during working hours only (08:30-15:30). No late submissions will be accepted.
- b) Bidders who opt to submit via the Sentech eTender Portal ("the eTender Portal") are advised that the eTender Portal has a files size limit of 30MB. Bidders must upload their tender documents timeously. The eTender Portal is available 24hrs a day. No late submissions will be accepted.
- c) It is incumbent on the bidder to ensure that their bids are submitted timeously via the selected method before the closing date and time. Sentech will not take any responsibility of any incomplete submissions or late tenders, for any reason whatsoever.
- d) Telegraphic, telephonic, telex, facsimile, e-mail and late Bids will not be accepted.

2.2 This is a two-envelope system for Bid Evaluation. Bidders must submit their proposal and all supporting documentation in a sealed envelope, clearly marked as follows:

- a) For manual submissions, Envelope One must consist of "Original Technical Proposal together with a soft copy in PDF format of an electronic medium e.g. USB etc. The soft copy will consist of a single PDF document containing the complete response. The envelope must contain all information and documents relating to the Bid. (Refer to list of returnable documents).
- b) No Financial Information must be included in Envelope One.
- c) Envelope Two "Original Financial Proposal" (Contract Date and Pricing schedule/schedule of rates as applicable) together with 1 copy of "Financial Proposal" together with a soft copy in PDF format of an electronic medium e.g. Compact Disk (CD), USB etc. The soft copy will consist of a single PDF document containing the complete Financial Proposal.
- d) Bidders are required to place the sealed Envelope One together with the sealed Envelope Two into one sealed envelope or container. The sealed envelope or container must be marked with the following information:

For Attention:

- HEAD OF SUPPLY CHAIN MANAGEMENT
 - BID REFERENCE NO: ##
 - TECHNICAL AND FINANCIAL PROPOSALS
 - INSERT CLOSING DATE AND TIME
 - BIDDER'S NAME AND ADDRESS
- e) Bidders that combine their Technical Proposal with the Financial Proposal (or any financial information) will be automatically disqualified and not be evaluated further.
 - f) The financial proposal will only be opened and evaluated should the technical proposal be found to be responsive, being that the technical proposal has met the minimum technical evaluation criteria that are set out in the Bid Documents.
 - g) The Bidders shall insert a table of contents and bind (ring bind or similar method) the proposal documents and verify the page numbers, as Sentech will not accept any liability with regard to any disputes arising from pages that are missing or duplicated in the aforementioned documents.
 - h) Bidders are required to complete and sign all the returnable documentation (refer to list of returnable documents) and initial all pages, drawings and brochures which are included in the

reply as Sentech will not accept any liability with regard to any disputes arising from pages that are missing or duplicated in the aforementioned documents.

- i) Late submissions will not be considered.
- j) For online submissions via the e-Tender portal, submission requirements are directed by the system. Bidders must follow instructions in the Bidder's manual.

3. SIGN AND INITIAL

Bidders are required to complete and sign the Bid Forms where required and initial the bottom of all pages, drawings and brochures which are included in the submission as Sentech will not accept any liability with regard to any disputes arising from pages that are missing or duplicated in the aforementioned documents.

Only original signatures will be accepted.

4. COMPLETION OF BID DOCUMENTS

Bidders must ensure that they complete all sections of the Bid Documents as per the requirements in the Bid.

Bidders must use only the Bid documents provided by Sentech. Photocopying of the Bid document is permitted however Bidders must not retype or redraft the Bid documents.

5. COSTS OF PREPARING THE BID SUBMISSION

Bidders shall bear all costs associated with the preparation and submission of the proposals. Sentech shall under no circumstances be held responsible or liable for any costs incurred during the bidding process.

6. ADMINISTRATIVE RESPONSIVENESS CRITERIA

Bidders are required to ensure that they meet all the Administrative Responsiveness Criteria.

7. BBBEE CODES AT SENTECH

Sentech complies with the codes of good practice as prescribed by the DTI, to advance Broad Based Black Economic Empowerment.

8. SUBCONTRACTING AS A CONDITION OF BID

The successful Bidder must subcontract a minimum of _____% of the value of the contract to _____ (specify the designated group targeted).

9. TRANSFORMATION PLAN

A transformation plan is a record of activities an entity intends to undertake to improve its BBBEE Level through Ownership, Management and Control; Skills Development; Enterprise and Supplier Development and Socio-Economic Development.

Sentech reserves the right to request a BBBEE transformation plan with clearly defined timelines and milestones if the recommended Bidder does not meet Sentech's transformation goals. These milestones must be achieved over the term of the contract. This transformation plan must be submitted within 10 working days from the written request, failing which Sentech reserves the right to withdraw its appointment of the preferred recommended Bidder.

10. LOCAL PRODUCTION AND CONTENT

In the case of designated sectors, where in the award of Bids, local production and content is of critical importance, such Bids will contain a specific bidding condition that only locally produced goods, services or works or locally manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

Does this requirement fall under any designated sector as prescribed by the DTI?	Yes	No
If yes, specify the sector		
Specify minimum threshold applicable		

*Bidders must fill in the SBD6.2 for Local Content and Production

11. EVALUATION CRITERIA

The evaluation criteria are stipulated in 18 below. It is the Bidder's responsibility to ensure that it has responded to the evaluation criteria. Failure to meet the evaluation criteria will result in the Bidder not being evaluated further. Bidders must ensure that they have included all supporting documentation required to support their response to the Bid.

12. OBJECTIVE CRITERIA

Sentech reserves the right not to consider proposals from Bidders who are currently involved in litigation with Sentech. Sentech further reserve the right not to award this tender to any Bidder based on the proven poor record of accomplishment of the Bidder in previous projects with Sentech. Bidders who are blacklisted or have committed any acts of fraud and/or misrepresentation of facts e.g. tax compliance, BBBEE, company financials, etc. will be eliminated from the bid.

13. AWARD OF BID/S

Sentech may appoint one or more suppliers, in whole or in part, or not appoint any supplier/s at all, and/or cancel the bid in its entirety, at Sentech's sole and exclusive discretion, in order to satisfy various needs which may be identified, and to manage certain risks associated with the supply of goods or services specified in respect of the Bid.

14. ALTERNATIVE/SUBSTITUTE PRODUCTS

In the case of contracts and/or panels which are in excess of 12 (twelve) months, Sentech shall be entitled to consider alternative products and product upgrades during the tenure of the contract and/or panel in order to accommodate new products and upgrades in the market. Bidders are required to bring all such developments to the attention of Sentech for approval. No alternative products may be supplied without Sentech's prior written approval.

15. BRIEFING SESSION

Should there be a compulsory briefing session for this Bid, Bidders must ensure that they attend the briefing session and sign the attendance register, as non-attendance or failure to sign the attendance register will automatically disqualify a Bidder from submitting a proposal for this Bid.

All questions raised by Bidders post the briefing session will be consolidated and shared with all Bidders at least seven (7) calendar days prior to closing.

16. CLARIFICATION

Enquiries related to Bid documents may be addressed to the Bid Administrator and Supply Chain Official as stated in SBD 1 Notice and Invitation to Bid.

17. BID EVALUATION METHOD

This Bid will be evaluated as described in the table below.

A 80/20 system will be followed for Technical and Price offer	1. Stage 1 – Administrative Responsiveness Evaluation All the Technical Proposals will be evaluated against the Administrative responsiveness requirements as set out in the list of returnable documents. 2. Stage 2 –Mandatory Evaluation All Proposals that qualify based on the administrative responsiveness requirements will be evaluated against the Mandatory Evaluation Criteria. Bidders must COMPLY TO ALL the Mandatory Evaluation Criteria in order to qualify for further evaluation. 3. Stage 3 – Functional Evaluation All Proposals that qualify based on the mandatory evaluation requirements will be evaluated against the Functional Evaluation Criteria. Bidders must meet the minimum qualifying score (60) in order to qualify for further assessment. 4. Stage 4 – Risk Assessment Bidders that have qualified on the basis of achieving the required evaluation score may undergo a further risk assessment and can still be disqualified from being evaluated further should the risk assessment so warrant or there are compelling and justifiable reasons to disqualify a bidder. The risk assessment will be based on any identified risks that arise out of the bidder's responses and any other risks that Sentech may identify. A physical visit and survey of the bidder's or customer's premises may be requested, as deemed necessary. Bidders that qualify based on the risk assessment will qualify for further evaluation.
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18. ADMINISTRATIVE RESPONSIVENESS REQUIREMENTS

To be administratively responsive, Bidders must ensure that they meet all the below mentioned criteria. Bidders that do not meet all the below mentioned criteria may not qualify to be awarded the Bid. Sentech reserves its rights in respect of the below criteria.

- Complete and return all documentation stipulated in the LIST OF RETURNABLE DOCUMENTS.
- All correspondence must be in English.
- Bidders must fill in all sections of this document (where applicable).
- **BLACK INK** must be used when completing the Bid documents.
- Bidders must use only the Bid documents provided by Sentech. Photocopying of the Bid document is permitted however Bidders must not retype or redraft the Bid documents.
- All corrections must be initialled. The use of corrective fluid is strictly prohibited.

- Bidders are required to fill in and sign the Bid Forms and initial all pages, drawings and brochures which are included in the reply as Sentech will not accept any liability with regard to any disputes arising from pages that are missing or duplicated in the aforementioned documents.
- Bidders must complete an attendance register at each compulsory site meeting attended.
- Appointment of a Bidder will be subject to signing, declaration and submission of SBD 1, 3.1, 3.2, 3.3, 4, 5, 6, 1, 6.2 8, and 9 depending on applicability.
- Complete and sign the Contract Data.
- Should this be a 2 envelope or 2 stage system, Bidders MUST separate the technical proposal from their financial proposal. The technical and financial proposals must be placed in two separate sealed envelopes.

19. AUTOMATIC DISQUALIFICATION

Sentech reserves the right to automatically disqualify Bidders from being awarded this Bid. The following will lead to automatic disqualification:

- Failure to submit a financial proposal, if required.
- The Bidder is or has been involved in any act of corruption or fraud or bribery or collusion or attempt to influence any employee of Sentech to award this Bid or any other Bid to it.

20. TECHNICAL RESPONSIVENESS COMPLIANCE

The Technical Evaluation will encompass evaluation of:

- Mandatory Criteria
- Functional / Technical Criteria

21. TECHNICAL EVALUATION CRITERIA

21.1 Mandatory Eligibility Criteria

The following criteria's are mandatory to ALL BIDDERS:

Mandatory Eligibility Criteria	Attach evidence	Provide a detailed reference of where info will be found. (Section, paragraph page number, etc. in your proposal)
21.1.1 Cabinets to be supplied must be fully reticulated (i.e., AC, DC, Batteries, Rectifier, HVAC, etc.) in accordance with Sentech specification in Annexure A	Provide a statement of commitment on company letterhead.	
21.1.2 Bidder to provide the cabinet concept design/layout and data sheets for all the equipment in accordance with Sentech specification in Annexure A	Provide data sheets for all the equipment and high security cabinet concept design/layout	
21.1.3 All deployed infrastructure must comply with Sentech specifications, "Sentech Broadband Site Build Specifications," and regulatory requirements (SABS, SANS, etc.).	Provide a statement of commitment on company letterhead.	
21.1.4 Factory and Site acceptance tests to be witnessed by Sentech in accordance to scope of work, before equipment is delivered to site and after equipment commissioning on site.	Provide statement of commitment on company letter-head	
21.1.5 Cabinets, equipment, and workmanship to have a warranty period of at least 12 months. All defects are to be repaired at no cost to Sentech during the 12 months. The bidder is fully responsible for honouring all warranties of equipment supplied.	Provide a statement of commitment on company letterhead	
21.1.6 Valid Letter of Good Standing with Department of employment & labour's Compensation Commissioner - Compensation for Occupational Injuries and Disease Act 130 Of 1993 (COIDA) or Federated Employers Mutual (FEM) or Rand Mutual Assurance (RMA).	Provide valid letter of Good Standing from DOEL's CF or FEM or RMA	
21.1.7 The electrician must be registered with the Department of Labour as a 3-phase electrician (IE/MIE number).	Registration proof to be provided (3 Phase wireman's license). Expired licenses would not be accepted.	

NOTE: Bidders that do not comply with all the above criteria or do not present proof of compliance will not be eligible to be evaluated further.

21.2 Functional Criteria

Bidders must supply proof of their capability and capacity to do the required work and be included on the Panel of Pre-qualified service providers. Bidders will score points as indicated in the table below, based on proof supplied on the minimum criteria.

Functionality Criteria	Weighting factor
21.2.1 Number of previous related projects (<i>deployment of the cabinet</i>) completed. Bidder must provide reference or completion letters on client's letterhead confirming completion of the project not older than 10 years More than 10 projects – 50 points Between 6 and 9 projects – 40 points Between 3 and 5 projects – 30 points Between 1 and 2 projects – 20 points Zero projects – 0 points <i>Note: Bidders are to use Table 1 to capture the projects</i>	50 Points
21.2.2 Qualification and CV of the Lead technical personnel in relation to the scope of work. More than 10 years' experience – 50 points Between 6- and 9-years' experience - 40 points Between 3- and 5-years' experience – 30 points Between 1- and 2-years' experience – 20 points Less than 1 year experience – 0 points	50 Points
The total minimum qualifying functional score is 60 points.	100 points

Functional Criteria

The minimum qualifying functional score for Section A is 60 points.

22. Evaluation of Price and Preference

This Bid will be evaluated using a points system based on a weighted average score for Price and Preference, as per the Preferential Procurement Framework Act of 2000 (Act 5 of 2000).

23. Preference Point allocation – 80/20

Price / Preference	Weighting percentage
Preference:	20%
Price:	80 %
Total must equal:	100%

Sentech will award preference points as follows:

Goal	Points	Evidence required
Historically disadvantaged by unfair discrimination on the basis of Race	10	A valid BBBEE Certificate showing at least 51% black ownership
	5	A valid BBBEE Certificate showing at least 25.1 – 50% black ownership
	3	Black owned company showing at least 5 – 25% black ownership
	0	Below 5%
Historically disadvantaged by unfair discrimination on the basis of Gender (women)	8	A valid BBBEE Certificate showing at least 51% women ownership
	4	A valid BBBEE Certificate showing at least 25.1 – 50% women ownership
	2	A valid BBBEE Certificate showing at least 5-25% women ownership
	0	A valid BBBEE Certificate showing at less than 5% women ownership
Historically disadvantaged by unfair discrimination on the basis of disability	2	A doctor's note confirming disability, confirmation of disability from the Department of Labour, BEE certificate or equivalent confirmation
Total Points	20	

24. Price Calculation 80/20

The following formula will be used to calculate the points for price.

$$P_s = 80 \left[\frac{1 - (P_t - P_{min})}{P_{min}} \right]$$

Where:

P_s = Points scored for price of bid under consideration

P_t = Rand value of bid under consideration

P_{min} = Rand value of lowest acceptable bid

25. Declaration of Authority

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this Bid Data are understood, and all requirements will be adhered to.

Name of Bidder	Signature	Date	Designation

TABLE 1: REFERENCES

Please complete the customer reference table and relevant Contact telephone number and attach reference letters.

Customer		Service Provided	Number of cabinets deployed	Contractual commencement date	Contractual completion date
1					
2					
3					
4					

5					
6					
7					
8					

Name of Tenderer	Signature	Date

Annexure: A

Broadband

Site Build Specification

Broadband
(Network Planning & Design)
Document Revision : Version 1.05
Revision Date : 2024-07-22

1. DOCUMENT CONTROL DETAILS

DOCUMENT DETAILS			
DOCUMENT NO :	BROADBAND SITE BUILD SPEC V1.05	DOCUMENT DATE :	2024/07/22
DOCUMENT SUMMARY	BROADBAND SITE BUILD SPECIFICATIONS		

GENERAL CONDITIONS PERTAINING TO THIS SPECIFICATION

1. SENTECH Ltd. will be referred to as SENTECH within this specification.
2. All details, dimensions and instructions shown on any drawings, diagrams and specifications quoted herein, shall be taken as forming part of this specification.
3. If there is any discrepancy between drawings and specifications, the specifications shall be followed.
4. SENTECH is not liable for damages resulting from, or attributable to the provision of this specification. Users of the specification do so at their own risk.
5. The contents of this specification may not be published, advertised or given to a third party without the prior written permission from SENTECH.

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ACRONYMS

AC	Alternating Current
A/C	Air Conditioning
COP	Coefficient of Performance
D	Depth
DC	Direct Current
EC	Electronically Commutated
EER	Energy Efficiency Ratio
ETS	European Telecommunication Standard
H	Height
HTB	High Temperature Battery
HVAC	Heating, ventilation, and Air Conditioning
IEC	International Electro-technical Commission
ISO	International Organization for Standardization
KPA	Key Performance Area
MET	Main Earth Terminal
OHSA	Occupational Health and Safety Act
OHSACT	Occupational Health and Safety Act
PSU	Power Supply Unit
Qty	Quantity
RC	Reinforced Concrete
RF	Radio Frequency
RFP	Request for Proposal
SABS	South African Bureau of Standards
SANS	Clarifies that a certification body in South Africa is accredited by the South African National Accreditation System (SANAS)
U	The height of the electronic modules standardized as multiples of 1.752 inches (44.50 mm) or one rack unit or U (less commonly RU).
UPS	Uninterrupted Power Supply
URS	User Requirement Specification
V	Volt
W	Width

2. SCOPE

This document contains the general and specific technical specifications for the preparation and site building requirements to support Sentech Broadband Network Infrastructure.

3. RESPONSIBILITY

All infrastructure work contained in these specifications shall be performed by a qualified technician(s) / engineer(s) with experience in the manufacture and installation of the equipment concerned.

The technician(s) / engineer(s) shall submit competencies [certificate] related to task in the work or parts of the said works to the SENTECH tender committee.

The Supplier shall be responsible for the proper construction and certification of all equipment.

SENTECH shall be responsible for the approval of the details, plans, designs etc., although this function may be delegated to another entity.

The approval does not constitute the acceptance of all, or any responsibility by SENTECH, as this responsibility shall be totally incumbent upon the contractor / project technician.

4. BROADBAND SITE

The main purpose of the Broadband Site Build Specification is to provide a standard for accommodating broadband equipment in an outdoor environment mostly located in rural areas.

Basic main elements:

- AC connection point to the main grid or 3rd party infrastructure provider (e.g. cell phone site sharing);
- Pole with a maximum height of 10m (including the lightning spike) to accommodate antenna infrastructure;
- Outdoor Cabinet on a concrete plinth;
- Cable Tray between pole and outdoor cabinet;
- Fencing with gate surrounding Mast pole and outdoor cabinet;

Some sites would only require a cabinet resulting in the exclusion for the requirement for a Pole & fencing (e.g. 3rd party sites).

If the contractor determines that the outdoor cabinet requires A/C instead of being free cooling / passive cooling in high temperature environments the site layout and orientation the A/C units shall be positioned on the south side of the container to avoid over heating of the refrigerant gas. (I.e. the AC system is not able to dissipate heat into the surrounding environment.)

5. TECHNICAL SPECIFICATIONS: POLE

This section contains the general and basic technical specifications for short pole which would be required to support broadband equipment.

The following type of Pole shall be used:

1. Pole with a maximum height of 10 meters (including 1.2-meter lightning spike);

5.1.1 POLE AND FOUNDATION DESIGN CERTIFICATION

Pole and foundation designs shall be conducted by an ECSA registered Geotechnical and Structural Engineer and should comply towards the following minimum requirements:

- Site investigation shall be conducted to confirm parameters for the determination of wind loading factors for the mast design;
- Geotechnical investigation to ascertain founding conditions for the mast foundation design;
- Detailed design and drawings for a mast and foundation solution to suit Sentech's requirement;
- Inspection and certification of foundation founding prior to casting of foundation;
- Inspection and certification of foundation reinforcement prior to casting of foundation;
- Certification of foundation concrete cube test results;
- Factory fabrication inspection and certification of the mast, pre-galvanizing;
- Inspection and certification of the mast post-erection;
- End of defects liability inspection and certification.

5.1.2 APPLICABLE CODES OF PRACTICE

The Mast / Pole and related civil works shall be designed to recognize relevant codes of practice that include the latest amendments and revisions.

Codes of practice to which the mast and the design & construction thereof shall comply towards (where relevant) are as follow:

1. SANS 10160 - Parts 1 to 8:2011 to 2019 Basis of structural design and actions for buildings and industrial structures;
2. SANS 10162 - Parts 1 and 2:2011 The structural use of steel;
3. SANS 10100 – Parts 1 and 2:2000/2014 The structural use of concrete;
4. SANS 10225:2012 – The design and construction of lighting masts;
5. SANS 1200 series of documents of 1980 to 1996 - Standardized specification for civil engineering construction
6. OHS regulations;

Mast / Pole manufacturers and installers shall be responsible for keeping abreast with the latest industry standards and revisions.

5.1.3 POLE DESIGN

The Contractor shall submit full design details of each Mast / Pole design, clearly indicating but not limited to the following:

- SANS design codes, used together with the relevant clauses, linked to the assumptions,
- Design software packages used, Step-by-step layout of the design stating the following:
- All assumptions relating to the wind pressure,
- Application of wind loads from antennas, members, platforms, waveguides, cat- ladders, etc. together with the relevant correction factor values used,
- Ultimate limit states used in the design,
- Allowance for fatigue.

5.1.4 FOUNDATION DESIGN

The design engineer shall take into consideration all services and components forming part of the site build in order to optimize the mast foundation by using additional component's weight and footprint into consideration to minimize duplication and unnecessary civil work.

5.1.5 CORROSION PROTECTION

All masts / poles must be hot dip galvanized to the latest **SANS 121:2011** specifications. Applicable galvanizing certificates must be available to Sentech on request. If painting is required for whatever reason, it shall carry a 5-year material and workmanship guarantee and it shall be applied strictly in accordance with the coatings manufacturer's requirements of a quality to achieve 80% colour fastness over a 5-year service life. Non-structural fittings and attachments pigmented or pre-coated shall be of a quality to achieve 80% colour fastness over a 5-year service life. The Hot Dip Galvanizers Association of South Africa's codes of practice and engineering specification documentation shall be consulted when designing a painting application.

5.1.6 GUARANTEE

The Contractor shall guarantee the work with regard to latent defects attributable to faulty or inadequate design as well as poor workmanship and materials on all masts for a period of 5 (five) years from the date of issue of the Certificate of Final Completion of the works, fair wear and tear accepted. The Contractor shall further guarantee the Mast / Pole against fatigue for a period of 15 (fifteen) years from the date of issue of the Certificate of Final Completion of the works.

Approval of the works by the Design Engineer or his representative shall not imply any relaxation of the guarantee or relieve the Contractor of his responsibility to guarantee the work.

5.1.7 LOADING, DEFLECTIONS AND ROTATION

Loading calculations shall be based on the positioning of all equipment on or above the highest / point / platform / crow nest (where applicable). The Mast / Pole antennae mounting points shall be able to withstand breakage at wind speeds of up to 180km/h (50m/s). The maximum deflection at the designed wind speed compared to the height must from an angle of less than 1°.

The design engineer shall determine the wind loadings for each category's equipment specified and for each category the maximum shall be designed for. Results and full calculation methods shall be provided as part of the response to this RFP.

The following typical dimensions and weight can be expected as per the tables below for calculations for the pole and the lattice mast structures:

Table 2: Typical Antenna Load Information for Pole Structure (Maximum height 10 meter including 1.2-meter lightning spike)

Self-Supporting Pole structure - typical antenna load						
Type	Description	Qty	Weight (kg)	H(mm)	W(mm)	D(mm)
Radwin Jet Duo	Sector Antenna	1	4.5	371	356	94
Turbo Gain Antenna	Flat Panel	1	2	335	335	30
VHLPX3-7W/A	Parabolic	1	17	900	900	600

5.1.8 POLE ACCESSORIES

All masts / poles shall be fully equipped with all the required accessories.

Accessories shall include the following:

- Safe and easy access shall be provided;
- Suitable anchorage points must be provided to permit a competent person to access all equipment, whilst always remaining attached to the structure;
- Anchor points are to be tested in line with the requirements of EN795;
- Stand-off antenna mounting poles, hot-dip galvanized, ± 1 meter length (± 80 mm diameter), to be provided on each one of the four-legged lattice mast structure legs;
- A 1200mm long galvanized lightning spike shall be installed at the top of all masts / poles and bolted to the mast / pole spine or leg.
- Lightning protection equipment shall be fitted to all Mast / Poles to ensure the protection to all equipment, cables and feeders on structures;
- Mast / Pole earthing plates shall be installed at the base of the mast / pole and top in the areas where equipment would be mounted;
- The navigation warning lights shall be of the outdoor weatherproof type complete with aluminium alloy body and "aviation red" glass lens. The various components of the navigation warning light assembly shall be linked to each other by means of a stainless-steel cable to ensure that all parts and components remain "captive" during maintenance operations. The light output shall be steady and shall comply with the requirements of Civil Aviation Authority;

6. TECHNICAL SPECIFICATIONS: OUTDOOR CABINET

6.1.1 OBJECTIVE

This technical specification refers outdoor cabinets to be supplied under the scope of this project. The contractor shall be responsible for the plans of the cabinets and respective plinths, beams and/or foundations.

6.1.2 General

The outdoor cabinet shall form a rugged weatherproof enclosure capable of supporting and protecting the installed telecommunication equipment by remaining structurally and serviceably sound by withstanding harsh weather and loading conditions whilst requiring minimal maintenance.

Cabinet shall be designed to be a stand-alone, fully insulated and accessible from the front and rear.

The cabinet shall be factory assembled, transported to site and shall be positioned in the planned location on to the agreed-upon location. Sufficient support shall be provided for lifting and handling of the cabinet.

The cabinet shall be provided equipped with the following:

- Front and rear access for maintenance staff to access broadband equipment (Contractor can alter access points but reasons need to be provided);
- Front access only recommended for batteries;
- Security measures;
- Telemetry connection block (entry alarm, power alarms & additional space for broadband equipment alarms);
- 9U Space for broadband equipment;
- 2 x 19" cabinet tray / shelf
- AC termination and isolation panel and distribution board;

- DC termination and isolation panel and distribution board;
- Inverter;
- Rectifier;
- Batteries;
- Cooling
 - Air-conditioning /Blower units;
 - Free Cooling / Passive Cooling
- DC light inside cabinet to assist maintenance personnel;
- AC UPS plug Sockets for equipment & test equipment (14 x sockets);
- The outdoor cabinet should be a minimum of IP65

6.1.3 OUTDOOR CABINET CLASSIFICATIONS AND APPLICATION

Cabinets can be classified and applied based on the following:

6.1.4 GEOGRAPHICAL AND ENVIRONMENTAL

The geographical location and exposure to harsh corrosive environmental conditions categorize cabinets in the following two types:

- Inland: further than 10km from the coast;
- Coastal: within 10km from the coast and not exposed to harsh environmental conditions.

6.1.5 6.3.2 SITE SECURITY RISK AND IMPORTANCE

The security risk at site and the importance of the site necessitates the need for high security cabinets:

6.2 OUTDOOR CABINET EQUIPMENT AND CABLE SPACE

Cabinets need to be a modular design to accommodate and support broadband equipment. For the purpose of this RFP the cabinets dimensions need to be as compact as possible with **indicative** footprint of 900 mm (w) x 900 mm (d) (w x d);

Modular system design:

- Sentech require 9U of 19" rack space inside the outdoor cabinet which excludes the following:
 - Battery area at the bottom of the Cabinet with front access;
 - Area for the air-conditioner and free-flow system;
 - AC distribution board;
 - DC distribution board;
 - Area for non-electrical cable routing considering minimum bending radius;
 - Area for electrical cable routing considering minimum bending radius.

6.3 MINIMUM DOOR SPECIFICATIONS:

The weak points are the door, hinges and locking mechanisms. Innovative designs are therefore needed to limit the risk of accessing and breaching these security barriers. The door security details shall be illustrated for evaluation purposes. All doors shall have a minimum of three locking points. The door and hinges shall be designed to carry the necessary weight of accessories fitted in or to the door i.e. filter cartridges, fans, heat exchangers, active cooling units, security locks, etc. All doors shall be capable of being locked by an ABLOY padlock which will be protected by an external lock box.

6.3.1 HIGH SECURITY OUTDOOR CABINET

High security cabinets shall be designed especially for high-risk areas.

For high security outdoor cabinet solutions, the following strategy can be followed:

Minimum sheet metal specifications:

- Minimum sheet metal specification;
- 6mm 3CR12 (Coastal);
- 6mm Mild Steel (Inland);
- Powder coated or hot dipped galvanized.

BATTERY AREA INSIDE CABINET

The battery area in the cabinet shall provide ease of access to the batteries with the aid of sliding rails for replacement purposes. **Access to batteries should only be from the front. Battery bank should preferably be installed on one level only.**

6.3.2 CONSTRUCTION

The structural frame of the cabinet shall be of sturdy construction without any twist. The cabinet is to be supported by adjustable feet located at the four corners of the base frame and at intermediate locations as required. All components shall be cut on numerically controlled high precision laser cutting and punching plant providing the highest quality of finish. Sheet metal handling shall be mechanised to provide consistent accuracy of bending and welding.

6.3.2.1 FREE COOLING INTAKE AND OUTLET LOUVERS AND FILTER CARTIDGE FRAMES

All intake louvers shall be designed to prevent the:

- Injection of flammable liquids into the cabinet (high security containers);
- Ingress of Insects, rodents and snakes;

All components that are in the ultimate installation exposed to the outdoor environment and direct sunlight shall be manufactured from powder coated Stainless Steel 304. Components that are not exposed to the outdoor environment may be manufactured using high-grade mild steel. No other material will be allowed to form part of the structural elements of the housings. All structural sheet metal components shall be of a minimum 1,2mm plate material.

Aluminium will in the interest of the low weight that is required be allowed on the gravitation louvers only.

The Intake Louver System shall be equipped and secured with 304 Stainless Steel Security bars to prevent knock out and entry through the intake louver.

6.4 ENTRY PLATES

The following entry plates shall be catered for where applicable:

- Feeder gland plate;
- Floor entry plates (if required);
- Power gland plate;

NOTE: Number of entry points, knock out diameters and layout shall be finalized with successful candidates.

CABLE / FEEDER DUCTING & RETICULATION SUPPORT

Suitable cable ducting and cable grids shall be provided to secure the Cables (RF Feeder, AC, DC, Alarm, etc.) are neatly and securely routed. Separate ducting shall be used for DC and AC power cables. Where space is limited, the necessary means shall be implemented to securely reticulate and protect cables taking ease of access for maintenance in consideration.

6.5 DOCUMENT HOLDER

Each cabinet shall be equipped with a document holder for product documentation, schematics, operation manuals, logbooks etc.

6.6 OUTDOOR CABINET INDICATIVE DIMENSIONS

For the purpose of this RFP the cabinets dimensions need to be as compact as possible with **indicative** footprint of 1000 mm (w) x 1000 mm (d) (w x d)

Dimensions are for benchmarking purposes and may vary in shape size and for especially due to different door locations, HVAC, power etc. design proposals from suppliers / manufacturers. The technical design team should therefore evaluate the proposed solution based on their discretion and the minimum internal space requirements and application requirements set in this URS.

6.6.1 OTHER ACCESSORIES

The outdoor cabinets shall be equipped with:

6.6.1.1 ALARM SYSTEM

Alarms to be placed within the enclosure shall be the following:

1. Intrusion Alarm.
2. Smoke Alarm.

6.6.1.2 CLIMATE UNIT

Integrated climate control shall be fitted to the enclosure and shall consist of one air-conditioner (AC) or free cooling system to ensure that the climate is properly maintained within the enclosure.

If the contractor determines that the outdoor cabinet requires A/C instead of being free cooling / passive cooling in high temperature environments the AC units shall be positioned on the south side of the container to avoid over heating of the refrigerant gas. (I.e. the AC system is not able to dissipate heat into the surrounding environment.).

6.6.1.3 EMERGENCY VENTILATION SYSTEM

An emergency ventilation system shall also be included which shall consist of a DC powered fan assembly with a weather protected louvre that includes gravity shutters. The air-intake filter assembly shall be mounted on the enclosure wall for easy filter replacement. The main purpose will be to provide passive cooling in cases of active cooling failure.

6.6.1.4 BATTERY RACK

The enclosure shall be equipped with a pre-installed 48 Volt battery rack on sliding rails for easy access on one level. Access to the battery bank should only be via one door.

6.6.1.5 EARTH BAR

A Main Earth Terminal (MET) shall be located inside the enclosure for internal earth cables to connect the enclosure to the ground. Main Earth Terminal Bar must be connected to the Main DB with 16mm² earth Conductor (Green/Yellow).

6.7 PAINT FINISH

All exposed steel components shall be supplied in white powder coat finish. Components that will be exposed to direct sunlight shall be finished in an UV stabilised medium.

6.8 IDENTIFICATION

Each Cabinet has to be identifiable by a plate showing:

- Supplier name and address
- Date of manufacture (month/year)
- Cabinet model
- Lifting weight (maximum all up lifting weight)
- Cabinet serial No.

Moreover, each significant component shall be provided with bar code identification by part number and serial number.

6.9 TRANSPORT

The unit shall be transportable by conventional container vehicle.

It must be possible for the cabinet to be lifted by means of:

- A sling slung underneath the steel base
- Lifting hooks/brackets

The fixing method shall avoid any constructional damage to the cabinet.

It shall be possible to lift a fully equipped cabinet with a suitable forklift (concrete containers excluded).

Great care must always be taken when handling the cabinet as in most cases it is being transported with fragile electronic already installed within.

The company transporting the cabinet shall ensure that they comply with all regulations and that all necessary permits have been acquired prior to transporting the cabinet.

All holes (air-conditioners, DC fan, gland plates, etc.) must be closed before shipping the container.

6.10 INTERNAL SPACE REQUIREMENTS

The design of the cabinets shall be as compact as possible to reduce transport costs and footprint without jeopardizing the effectiveness and performance of the equipment and operational maintenance thereof.

In general, the minimum internal capacity requirements for equipment are:

- 19" Rack with 9U equipment internal space
- 2 x 19" cabinet tray/ shelves
- Space to accommodate cable routing and minimum bending radius etc.;

The minimum space needed for the battery bank options shall be determined from the battery manufacturer's specifications listed in this document.

The space required for ventilation and cooling shall be determined by the:

- HVAC configuration i.e. Active-Passive-Hybrid
- HVAC design
- HVAC components
- Filters
- Intake and Outlet Louvres

The Cabinet shall have sufficient and properly sized access routes and termination points for:

- RF Feeders
- DC Cables
- AC Cables
- Earth and Bonding Cables

Sufficient space shall be provided for termination, access and the required bending radius specifications as per the cable supplier/manufacturers specification.

The necessary security measures shall be incorporated to prevent unauthorized access to cables and termination points.

6.11 HVAC REQUIREMENTS

6.11.1 KEY PERFORMANCE AREA (KPA)

The HVAC systems KPAs are:

- Design and implementation of active and free cooling systems.
- Ensure equipment operates at specified temperature ranges to guarantee service levels, achieve optimum lifetime and comply with warranty conditions;
- Optimize energy consumption by reducing active cooling runtime and extending free cooling runtime in favourable conditions;
- Limit the risks by controlling and preventing emergency conditions associated with high temperatures;

6.11.2 GENERAL

The cabinet's ventilation system shall be designed to effectively dissipate the internal heat load.

The cabinet's envelope shall be designed to provide the necessary insulation in order to limit the internal heat build-up due to external solar radiation.

Any thermal insulation material used shall be durable, noncorrosive, flame retardant and impervious to damage from moisture, insects, and vermin.

Any part of the HVAC system shall be easily replaceable, and any maintenance and/or replacement shall be without disturbing the operations of the cabinet's equipment.

The cabinet and cooling design shall allow for easy exchange or retrofitting of the different components.

All options shall include DC driven fans and low energy consumption control system. In some instances, fans used in cabinets (Air Ventilation or Heat Exchanger) shall be speed controlled to support optimal temperature condition inside cabinet, minimizing the acoustic emission and to support minimum energy consumption.

They shall be managed by a speed controller with at least two different speeds.

Fans shall also generate fan failure signal for remote management purposes (where applicable).

The climate system shall be designed according to the anticipated heat load of the implemented configuration and the type of batteries used.

The HVAC equipment shall be installed and commissioned according to supplier specifications and relevant standards.

It is the responsibility of the bidder to ensure that the system operates as per the requirements.

The bidder shall submit the proposal for approval before commencement of any work and procurement.

6.11.3 OPERATING CONDITIONS

The nominal set-point of the regulated temperature within the enclosure shall be measured in the middle of the cabinet.

The allowable tolerance on the regulated set point: $\pm 5^{\circ}\text{C}$.

6.11.4 THE REGULATED SET POINT SHALL BE CAPABLE OF BEING ADJUSTED BETWEEN THE TEMPERATURE RANGE SPECIFIED BY THE EQUIPMENT MANUFACTURER HVAC SYSTEM COMPONENTS

The following cooling options or combinations thereof shall be implemented and designed for:

6.11.4.1 ACTIVE COOLING SYSTEM

Active cooling has a low energy efficiency and is high on equipment and maintenance cost.

Active cooling contributes approximately 30-40% of the overall site consumption and it is therefore crucial to implement measures to manage and reduce its operating time.

All Active Cooling Systems shall be sized according to the site building configuration and the total heat load.

All Active Cooling Systems shall be integrated with a free cooling feature with DC driven fans. The active cooling will be switched on only in case of high external temperatures when the capacity of the Free Cooling System or Heat Exchanger will not be enough to dissipate the internal heat load. Condensation must be well drained.

Air conditioners with the best SEER specification shall be preferred.

The operating efficiency shall meet the following minimum requirements:

- *SEER > 5.5

6.11.4.2 FREE COOLING

6.11.4.2.1 GENERAL

Free Cooling shall be implemented in all sites without known humidity issues.

The system shall use DC driven fans and shall be speed controlled.

Sizing shall be done according to the site building configuration and the total heat load to ensure the internal temperature is maintained. The Intake Louvre and Filter arrangement shall be designed to meet the required air flow in the cabinet.

6.11.4.2.2 FREE COOLING COMPONENTS

A. FREE COOLING CONTROL

This function resides within the site controller and will monitor and control the environmental conditions and Free Cooling modes of the cabinet.

B. DC FAN

The standard configuration is to use n+1 extraction fans. The heat load will determine the required fan size and number of fans to accommodate the required airflow for heat extraction and dissipation. The active axial fan element shall be powered by a brushless, DC, EC motor.

C. FREE COOLING OUTLET LOUVER / VENT

The Free Cooling outlet louver will be designed to house the standardized fan and quantities and shall comprise of an exterior weather louver and internal protective grill. For active cooled solutions the louver shall be fitted with an integral gravity louver to effectively close off the discharge air route when the fan is not in operation and active cooling is running. An insect screen shall be provided behind the weather louver to prevent the ingress of any creeping or flying insects.

The Free Cooling Outlet Louvre should be so positioned at the top of the cabinet to ensure efficient extraction of rising hot air from the cabinet and prevent exhaust air from returning into the cabinet. The Outlet Louver shall not cause any decrease in airflow of the DC fan.

D. FREE COOLING INLET LOUVER AND FILTER

The intake louver arrangement shall comprise of an exterior weather louver and internal protective grill. The intake louver assembly shall be fitted with an integral filter frame (304 Stainless Steel) and retaining grill that allows for the removal and replacement of the filter element without the use of any hand tools. The cloth filter should be of EU4 grade or similar. The intake louver shall be supplied complete with one filter element plus one spare replacement element. The weather louver shall similarly be fitted with an insect screen.

The Free Cooling Inlet Louvre should be so positioned to ensure efficient air circulation throughout the cabinet towards the Free Cooling Outlet louver. The Inlet

Louver with Filter design shall not cause any decrease in airflow of the DC fan when not clogged.

6.11.5 VENTILATION AND COOLING MODES

The following modes shall be controlled and monitored with the environmental functions of the site controller as per the defined set points:

- A) **PASSIVE COOLING MODE (FREE COOLING)**
This mode disables active cooling by shutting down the air conditioner and activates passive cooling by starting the DC fan.
- B) **ACTIVE COOLING MODE**
This mode disables passive cooling by shutting down the DC Fan and closing the outlet louver and activates active cooling by starting the aircon.
- C) **EMERGENCY VENTILATION MODE**
This mode is used in excessive high temperature conditions due to aircon failure and high ambient temperatures. The mode will be activated during the following conditions:
- On High Room Temperatures exceeding the set point.
- The Emergency Ventilation system consists of an outlet louver and DC FAN.
- D) **FIRE BREAKOUT MODE**
This mode shall be activated in case of a fire breakout within the container and shall be activated in case of a Smoke Detector and High Temp alarm activation.
- This mode will shut down all fans and aircons and close all intake and outlet louvers to prevent fresh air from entering and circulating in the cabinet in order to diminish the fire outbreak.

6.11.6 AC/DC POWER REQUIREMENTS

6.11.6.1 AS-BUILD DOCUMENTATION

Each Installation shall be issued with an as build schematic related to the COC. A copy of the latest schematic shall always be available in the document holder of the cabinet.

6.11.6.2 CODES OF PRACTICES AND REGULATIONS

All designs are to comply with the SABS codes of practice or National Building Regulations.

In the absence of coverage on any item in the SANS codes of practice the Professional engineer shall base his assumptions on conclusive testing and results based on experiments and research done in that field of design.

Should there be any contradictory requirements between the documents referenced and other specifications that have been quoted, this specification will receive precedence.

6.11.6.3 WIRING CODE

All electrical installations shall comply with the regulations stipulated in SANS 10142-1 (Wiring Code). Should a conflict exist between a requirement in this specification and a requirement in the Wiring Code, then the more stringent of the specifications will be applicable.

All distribution boards shall be constructed and wired according to the Wiring Code, SANS 10142-1. All electrical components used shall be SABS approved as required by the Wiring Code.

6.11.6.4 SABS & IEC / ISO APPROVAL

All switchgear and components shall be approved by at least one of the following organizations:

- SABS
- ISO/IEC

6.11.6.5 OHSACT NO.85 OF 1993 – ELECTRICAL INSTALLATIONS REGULATIONS

The minimum requirements as stipulated in the Electrical Installations Regulations Act shall be followed to provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery.

Essentials:

- All components must be of good quality and suitable for the environment in which they are being used;
- All live electrical parts must be insulated or enclosed in secure and clearly labelled containers;
- All cables must be routed to prevent physical damage;
- All connections and distribution systems must be sufficient for the loading placed on them;

6.11.6.6 CERTIFICATE OF COMPLIANCE

On completion of the contract, the contractor shall be required to provide a Certificate of Compliance for the complete installation, as per SANS 10142-1.

6.17.8.7. AC/DC POWER DISTRIBUTION REQUIREMENTS

This section provides a basic breakdown of the required AC/DC power distribution.

Equipment to be connected **to non-protected A/C supply** (Not operating via UPS and / or Inverter and connected straight to A/C):

Equipment to be connected directly to **AC uninterrupted power supply** via Inverter & UPS:

- Point-to-Multipoint wireless system (Uninterrupted A/C power supply required);
- Router / Switch (Uninterrupted A/C power supply required);
- At least one AC socket for test equipment;

Equipment to be connected directly to **D/C supply via UPS**:

- Microwave system (Uninterrupted D/C supply required);
- Ventilation Fan (Uninterrupted D/C supply required);
- DC Lights;

6.17.8.8. UNINTERRUPTED AC & DC POWER LOADS

This section provides a basic breakdown of AC & DC UPS power loads (uninterrupted). Application	Max (W)	Typical (W)	Backup (hrs.)	Minimum Required Backup (Ah)
DC Power Supply	1000	750	4-8	±167

AC Power Supply	1000	750	4-8	±167
Total A/C & D/C	2000	1500	4-8	±334

6.17.9. DC POWER REQUIREMENTS

The following DC Power equipment shall be installed and commissioned according to the Sentech approved supplier specifications and relevant standards:

6.17.9.1. DC LOADS

The maximum & typical DC loads that can be designed for is summarized in the table below:

Table 3: DC Loads Application	Max (W)	Typical (W)	Backup (hrs.)	Minimum Required Backup (Ah)
D/C Power	1000	750	4-8	±120

Uninterrupted DC loads are for the following equipment:

- Microwave system (Uninterrupted D/C supply required);
- Ventilation Fan (Uninterrupted D/C supply required);
- D/C lights;

6.17.9.2. DC POWER SYSTEM - RECTIFIER

The Standard Rectifier shall have a DC PDU containing circuit breakers of suitable ratings for:

- Broadband Equipment;
- Batteries;
- Site Controller/Router;
- Access Control;
- DC FAN;
- DC Lights;

All circuit breakers and other protection devices shall be suitably marked to indicate their functions. The breakers shall be installed from left to right in descending rating order, i.e. the breakers with the higher ratings shall be mounted on the left-hand side.

The size of the DC Distribution Panel will be such that it can fit into its designated location in the rectifier, but still allow for ease of maintenance.

The DC Distribution Panel shall have a protective cover or be recessed to prevent accidental activation or de-activation of CBs. The DC Distribution Panel shall facilitate easy access to the breakers and cabling for maintenance purposes.

Circuit breakers sizes should be adjusted according to the equipment manufacturer's specifications. For Retrofit the maximum output capacity of the rectifier and the cable sizes should be taken into account.

6.17.10. DESIGN REQUIREMENTS: AC POWER

A/C Power shall be designed and build strictly according to the Electrical Installations Regulations Act. The designed A/C system shall ensure the health and safety of persons at work and for the health and safety of persons in connection with the use of the system and site and limit the risk of damage to equipment.

Both interruptible and uninterruptable AC power would be required.

6.17.10.1. INTERRUPTABLE AC (NON-BACKUP)

Connected **directly to AC supply** (Not operating via UPS and Inverter and connected straight to /C)

6.17.10.2. UN-INTERRUPTABLE A/C (BACKUP)

Connected directly to **AC uninterrupted** power supply via Inverter & UPS:
Point-to-Multipoint wireless system (Uninterrupted AC power supply required);
Router / Switch (Uninterrupted AC power supply required);

6.17.11. BATTERY BACKUP SYSTEM

The total AC & DC load with a maximum load of 2000 Watt require $\pm 334\text{Ah}$ battery system to provide a backup of eight (8) hours:

- Total Current Drawn = $2000 \text{ Watt} / 48\text{V} = 42 \text{ Amps}$;
- Total Amp Hours required = $42 \text{ Amps} \times 8 \text{ Hours} = 334 \text{ Ah}$;

Although the calculated Amp Hours required is 334Ah, the planned Depth of Discharge (DoD) should also be considered to extend the battery life.

- Total load Watt Hours (Wh) for 8 hours = $2000 \text{ Watts} \times 8 \text{ Hours} = 16000 \text{ Wh}$;
- 4 x 48V Battery blocks providing 120 Ah each will provide a total of $4 \times 120\text{Ah} = 480\text{Ah}$;
- A total of 480 Ah at 48 V = 23040 Watt Hours;
- 23040.00 Wh battery capacity on total load of 16000 Wh = 0.347 (Dod);
- This means that it would be providing a Planned Depth of Discharge (DoD) of 69.4%;

The battery backup system should therefore comprise of **four 48V** battery blocks which comply with the following specifications (except battery size which is indicative):

- System Voltage = 48 Volt.
- Single Battery Voltage = 12 Volt.
- Single Battery Capacity (10 H to 1.8 VPC at 20°C) = 120 Ah.
- Battery Short Circuit Current (A) (IEC 60896 21-22) = $\pm 3000 \text{ Amp}$.
- Internal Resistance (mOhm) = $\pm 4 \text{ mOhm}$.

6.17.12 AC Main Supply

Supply will be provided by the site owner. Main circuit breaker shall be sized, by the contractor, to be installed at the site owners DB. The AC supply cable and breaker shall be designed in accordance with full load capacity. Should the supply cable be buried in the ground it must be armoured. Should a cable not be armoured then it must be enclosed in a PVC conduit of appropriate size.

Where trenching is required, the trench should be made at a minimum depth of 0,5m

Should trenching not be required then the supply cable must be routed via a cable tray. Cable trays for data cables must be separate from power cables.

The supply cable shall be accompanied by a separate earth cable to be the same size as the AC supply cable.

The AC supply cable shall be connected to the AC breaker contained with the AC DB of the supplied cabinet.

Main Circuit breakers shall be Schneider or similar.

6.17.13 AC and DC Distribution Panels

The Contractor shall supply Circuit Breakers that are SABS approved. Circuit Breakers shall be either Schneider or similar. The AC Distribution Board shall be bonded to the earthing system with a bare Cu earth conductor via the MET.

The following forms of protection are to be taken into consideration during the design.

- Over current protection.
- The exposed conductive parts of all the equipment must be earthed through the protection conductor with the aim to protect persons from indirect contacts.
- Earth fault protection.
- Surge protection utilising the appropriate SPDs.

A single-phase power meter shall be installed within the AC DB. Power meter shall be equipped with communication capabilities having the relevant communication protocols i.e., SNMP, MODBUS, etc.

6.12 SPECIFICATIONS: OUTDOOR CABINET PLINTH

All construction works shall be conducted in accordance with SANS 1200 and OHS regulations.

6.12.1 CONCRETE PLINTH WORKING AREA

Maintenance staff might be required to stand in the rain or stand on very wet ground and work on live 220-volt reticulation. Regulation (5) Design and construction, and the remainder of the Electrical Installation Regulations, plus Electrical Machinery Regulations plus General Machinery Regulations of the OHS Act, all apply and have bearing on the design.

The following would be required in the plinth design:

- a) The concrete plinth must extend a minimum of 1 meter on the front and rear of the container;
- b) The concrete plinth must protrude a minimum of 100 millimetres above the surrounding ground;
- c) A suitable static free non-conductive mat must be provided for the front and rear of each container and mat must be stowed in the container;
- d) A suitable warning and instruction sign is included in the front and rear doors of the container, concerning working on live equipment in inclement conditions.
- e) New concrete plinth must have an earthing mat, which must be covered 50mm minimum on all sides, earthing mat to also have 2x tails, one to be exposed at the
- f) top plinth for the container, and the other tail to be connected to the existing site earthing (e.g. site fence/pole or site mast/tower).
- g) 25 x 3mm copper earthing to be used as an earthing mat

6.12.2 EXISTING REINFORCED CONCRETE SUBBASE

Procedure, process and specifications for constructing Reinforced Concrete (RC) subbase:

- Site handover to Contractor and site establishment;
- Set out plinth footprint to the dimensions prescribed by Sentech and scabble existing concrete surface to expose aggregate;
- Minimum plinth depth 150mm;
- Erect smooth faced formwork for sides of new plinth. Formwork to include 25 x 25 fillets for exposed horizontal and vertical plinth chamfers;
- Seal gaps in formwork, apply shutter oil;
- Apply proprietary wet to dry bonding agent to scabbled concrete surface;
- Mesh ref 193 to be placed a min of 50mm down from the top of the plinth, on concrete cover blocks or plastic chairs;
- Min 50mm cover to plinth sides;
- Cast machine mixed 25MPa/19mm concrete;
- Vibrate, strike and finish by steel float;
- Cure concrete surface;
- Remove formwork on completion of curing process;
- Remedy any defects in the completed plinth;
- Clean works area to original pre-site handover conditions, remove all rubble from site and dispose of at a Municipal dumping site;
- Dis-establish site and hand site back to client.

6.12.3 GREENFIELD (LEVEL SITE PLATFORM)

Procedure, process and specifications for constructing Greenfield platform:

- Site handover to Contractor and site establishment;
- Set out plinth footprint to the dimensions prescribed by Sentech;
- Clear and grub the plinth footprint area as well as a 1m wide strip around the footprint area;
- Excavate to a minimum depth of 400mm below ground level and set aside for spreading on site;
- Form the correct founding level with G5/G6/G7 fill material mechanically compacted to 93% mod AASHTO, in layers not exceeding 150mm;
- Minimum plinth depth: 150mm;
- Minimum height of plinth above ground level: 100mm;
- Erect smooth faced formwork for sides of new plinth. Formwork to include 25x25 fillets for exposed horizontal and vertical plinth chamfers;
- Seal gaps in formwork, apply shutter oil;
- Mesh ref 245 to be placed a min of 50mm down from the top of the plinth, on concrete cover blocks or plastic chairs;
- Mesh ref 245 to be placed a min of 50mm up from the plinth founding level, on concrete cover blocks;
- Min 50mm cover to plinth sides;
- Cast machine mixed 25MPa/19mm concrete;
- Vibrate, strike and finish by steel float;
- Cure concrete surface;
- Remove formwork on completion of curing process;
- Remedy any defects in the completed plinth;
- Backfill and compact around plinth to ground level with G5/G6/G7 fill material mechanically compacted to 93% mod AASHTO, in layers not exceeding 150mm;
- Spread stockpiled excavated material on site, clean works area to original pre-site handover conditions, remove all rubble from site and dispose of at a Municipal dumping site;
- Dis-establish site and hand site back to client

6.13 SPECIFICATIONS: COMPACTING, FILLING, FLOOR & FENCING

All filled areas shall be properly compacted.

6.13.1 STATION INTERIOR

A layer of herbicide shall be applied to the interior of the station. Subsequently, the entire station interior area shall be paved with a layer of no. 2 gravel with a consistent thickness of 0.05m.

6.13.2 FENCING

To prevent access by the public and animals, the station shall be fenced along the entire perimeter with a green galvanised and plasticized BEKAERT NYLOFOR 3D fencing, including the posts with a maximum spacing of 2,55 m with a section of 60 x 60 mm and a height of 2,30 m linked by posts at 45° at the corner posts.

To prevent vandalism and increase the safety of the station area, three rows of razor wire shall be placed along the top of the fence. The razor wire shall be placed on the supporting posts inclined towards the interior at 45°.

6.14 TECHNICAL SPECIFICATIONS: SIGNAGE

6.14.1 WARNING SIGNS

Warning signs shall be provided according to the OHSA which shall include warning signs for the following:

1. Unauthorised Access Prohibited;
2. Unauthorized Climbing Prohibited (Red sign);
3. Electromagnetic radiation signs;
4. Electricity warning signs;
5. Safety clothing: Harness, Hard Hat, Safety Shoes, Gloves (Blue signs);
6. Suitable warning and instruction sign should be included in the front and rear doors of the container, concerning working on live equipment in inclement conditions.

6.14.2 Site identification & information signs

Site identification & information sign boards shall be provided on the site, cabinet and mast structure indicating the following:

1. Information on Service provider SENTECH;
2. Site identification code;
3. Contact number.

THE END