

| PART 2: DATA PROVIDED BY THE CONTRACTOR |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.8                                     | <p>The name of the Contractor is</p> <p>.....</p> <p>(insert the legal name of the Contractor, as well as the Contractor's registration number, if applicable)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 1.2.2                                   | <p>The addresses of the Contractor, where the Contractor shall receive notices, are as follows:</p> <p>Physical Address:</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>Postal Address:</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>Facsimile: ..... Telephone: .....</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 7.1                                     | <p>The security to be provided by the Contractor:</p> <p>(a) in respect of contracts up to R1 million, the security to be submitted by the Contractor to the Employer will be a retention of 5% of the Value of Works (excluding VAT)</p> <p>(b) in respect of contracts above R1 million, the Contractor will provide, as security, one of the following:</p> <p>(1) cash deposit of 10 % of the Contract Sum (excluding VAT) Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>(2) variable construction guarantee of 10 % of the Contract Sum (excluding VAT) Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>(3) retention of 10% of the Value of Works (excluding VAT) Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>(4) cash deposit of 5% of the Contract Sum (excluding VAT) and a retention of 5% of the Value of Works (excluding VAT) Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>(5) fixed construction guarantee of 5% of the Contract Sum (excluding VAT) and a retention of 5% of the Value of Works (excluding VAT) Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p><b>NB. Guarantees submitted must be issued by either an insurance company duly registered in terms of the Short-Term Insurance Act, 1998 (Act 35 of 1998) or by a bank duly registered in terms of the Banks Act, 1990 (Act 94 of 1990) on the pro-forma referred to above. No alterations or amendments of the wording of the pro-forma will be accepted.</b></p> |

101

**APPOINTMENT OF CONTRACTOR FOR SUPPLY, INSTALLATION AND  
MAINTENANCE OF GENERAL ELECTRICAL SERVICES AND STANDBY  
GENERATORS IN EASTERN CAPE PROVINCE: TWENTY ONE (21)  
DEVOLVED POLICE STATIONS FOR THE PERIOD OF EIGHTEEN (18)  
MONTHS**

**BID: 19/1/9/1/112TB(22)**

**PART C**

**CONTRACT**

**PART C.2**

**SCOPE OF WORK, GENERAL REQUIREMENTS, SPECIFICATIONS AND  
SCHEDULE OF QUANTITIES**



**SOUTH AFRICAN POLICE SERVICE**

**SUPPLY, INSTALLATION AND MAINTENANCE  
STANDBY GENERATORS**

**EASTERN CAPE PROVINCE**

**(VARIOUS FACILITIES: 21 STATIONS)**

**Engineering Contract: 18 Months**

**COMPILED BY: SAPS, Division Supply Chain Management:  
March 2022**

**Chief Engineer Electrical: Colonel D Mtsweni**  
**Tel: 012 349 6094**  
**E-Mail: [NgomaMandla@saps.gov.za](mailto:NgomaMandla@saps.gov.za)**



## TABLE OF CONTENTS

| Chapter | Description                                                                | Page |
|---------|----------------------------------------------------------------------------|------|
| 1.      | INTRODUCTION .....                                                         | 5    |
| 2.      | SCOPE OF WORKS .....                                                       | 5    |
| 3.      | NORMATIVE REFERENCES .....                                                 | 6    |
| 4.      | DETAIL REQUIREMENTS .....                                                  | 7    |
| 5.      | TRANSPORT COST .....                                                       | 7    |
| 6.      | NOTICE TO BIDDER .....                                                     | 8    |
| 7.      | GENERAL REQUIREMENTS AND SPECIFICATION .....                               | 9    |
| 8.      | SITE CONDITIONS AND LOCATION .....                                         | 12   |
| 9.      | CONDITIONS OF CONTRACT .....                                               | 13   |
| 10.     | FACILITIES .....                                                           | 14   |
| 11.     | DESCRIPTIONS OF THE WORKS RELATED TO STANDBY GENERATORS .....              | 15   |
| 12.     | MATERIAL AND WORKMANSHIP .....                                             | 19   |
| 13.     | SCHEDULE OF EQUIPMENT .....                                                | 21   |
| 14.     | TECHNICAL SPECIFICATIONS .....                                             | 23   |
| 15.     | MECHANICAL PRIME MOVER – DIESEL ENGINE .....                               | 25   |
| 16.     | ALTERNATOR .....                                                           | 29   |
| 17.     | CONTROL PANEL .....                                                        | 31   |
| 18.     | SPECIFICATIONS FOR MATERIALS AND EQUIPMENT OF ELECTRICAL INSTALLATIONS ... | 34   |
| 18.1.   | DISTRIBUTION BOARD (DB) .....                                              | 34   |
| 18.2.   | CABLE TRAYS .....                                                          | 34   |
| 18.2.1. | METAL CABLE TRAYS .....                                                    | 34   |
| 18.2.2. | ACCESSORIES .....                                                          | 34   |
| 18.3.   | PVC - INSULATED CABLES .....                                               | 34   |



**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**

|        |                                                           |    |
|--------|-----------------------------------------------------------|----|
| 18.4.  | PVC - SHEATHED ALUMINIUM-COVERED CABLES.....              | 35 |
| 18.5.  | LABELLING.....                                            | 35 |
| 18.6.  | CIRCUIT BREAKERS .....                                    | 35 |
| 19.    | INSTALLATION OF CABLES.....                               | 35 |
| 20.    | TRENCHING .....                                           | 36 |
| 21.    | INSPECTIONS, TESTING, COMMISSIONING AND HANDING OVER..... | 39 |
| 22.    | CLEANING OF SITE .....                                    | 40 |
| 23.    | PREAMBLES TO SCHEDULE OF QUANTITIES .....                 | 40 |
| 24.    | SCHEDULES OF QUANTITIES .....                             | 41 |
| 24.1.  | IDA POLICE STATION.....                                   | 42 |
| 24.2.  | KUBUSIEDRIFT POLICE STATION .....                         | 44 |
| 24.3.  | STERKSTROOM POLICE STATION .....                          | 46 |
| 24.4.  | MACLEAR POLICE STATION .....                              | 48 |
| 24.5.  | ROSSOUW POLICE STATION .....                              | 50 |
| 24.6.  | TYLDEN POLICE STATION .....                               | 52 |
| 24.7.  | TINA FALLS POLICE STATION .....                           | 54 |
| 24.8.  | MBIZENI POLICE STATION .....                              | 56 |
| 24.9.  | MQANDULI POLICE STATION.....                              | 58 |
| 24.10. | PUNZANA POLICE STATION.....                               | 60 |
| 24.11. | BALFOUR POLICE STATION.....                               | 62 |
| 24.12. | BERLIN POLICE STATION .....                               | 64 |
| 24.13. | GAMBLEVILLE POLICE STATION .....                          | 66 |
| 24.14. | HOGSBACK POLICE STATION .....                             | 69 |
| 24.15. | PEARSTON POLICE STATION.....                              | 71 |
| 24.16. | RIEBEECK EAST POLICE STATION .....                        | 73 |
| 24.17. | TARKADSTAD POLICE STATION .....                           | 75 |



**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**

|        |                                               |    |
|--------|-----------------------------------------------|----|
| 24.18. | ALICE POLICE STATION.....                     | 77 |
| 24.19. | KEI MOUTH POLICE STATION .....                | 79 |
| 24.20. | ELANDS HEIGHT POLICE STATION.....             | 81 |
| 24.21. | BUFFALO FLATS POLICE STATION .....            | 83 |
| 25.    | FINAL SUMMARY OF SCHEDULE OF QUANTITIES ..... | 85 |
| 26.    | JOB CARD.....                                 | 86 |



## **1. INTRODUCTION**

The South African Police Service under Supply Chain Management Division has a requirement to install Diesel Standby Generators at various facilities throughout the Eastern Cape Province, occupied by the South African Police Service (SAPS) for a contract period of 18 months.

## **2. SCOPE OF WORKS**

This specification covers the SAPS minimum requirements for the design, manufacturing, testing, and supply, delivery to site, installation, commissioning and energizing of Diesel Generators (DG) Systems, suitable for use in areas accessible to the public.

The standby generators shall be manufactured in accordance with the requirements of SANS 8528-1:2008 and ISO 8528-1:2018 only new generators will be accepted. Outdoor generators will be installed on newly constructed concrete reinforced plinths with canopies and indoor generators will be installed inside the existing generator plant-rooms.

The Contractor will provide all equipment, labour, material and transportation to supply, install and commission of diesel standby generators including all components and sundries, tests, etc., required to bring the installations to the working order intended, compliance and guarantee.

The successful Contractor shall carry out a 240 hour type or at a six monthly interval service and 480 hour type or at 12 months service (depending on whichever occurs first for date of acceptance or handover).

Existing non-compliance concrete reinforced plinth shall be removed completely and make clean for a newly cast on site concrete plinth as per specification, only in the stations specified in the schedules of quantities.

Existing non-compliance Palisade Fence shall be replaced by galvanised Palisade Fence as per specification, only in the stations specified in the schedules of quantities.

The successful contractor will be required to submit safety file prior to commencement of the project.

The Contractor shall ensure that he/she is conversant with the technical specification and applicable standards.



### 3. NORMATIVE REFERENCES

The entire installation shall be carried out to the satisfaction of the SAPS, Division Supply Chain Management, and shall be carried out in accordance with the following Standard Specifications and Regulations.

- ISO 9000/9001 Quality Management Systems.
- SANS 342 Automotive diesel fuel
- SANS 1186 Symbolic safety signs
- SANS 1507 Electric cables with extruded solid dielectric insulation for fixed installations
- SANS 1632 Batteries
- SANS 1652 Battery chargers – industrial type
- SANS 8528-1 Reciprocating internal combustion engine driven alternating current generating sets (all parts)
- SANS 10140 Identification colour marking
- SANS 60034 Rotating electrical machines
- SANS 60529 Degrees of protection provided by enclosures
- SANS 60947 Low-voltage switchgear and control gear – Part 7-1: Ancillary equipment – Terminal blocks for copper conductors
- SANS 10142-1 Wiring of Premises
- SANS 62-1 Steel pipes Part 1
- SANS 301-12 Palisade fence
- SANS 10198-8 Cable laying and Installation
- SANS 10131 Petroleum products, above ground storage and tanks.
- SANS 60947 All low voltage switchgear and control gear assemblies
- SANS 10400 Building regulations
- SANS 61084-1-2 Electrical Installation Ducting and Trunking Systems on walls and ceilings
- SANS 61305-1-2.4 Electrical Installation Conduit Fittings
- SANS 767- 1-2 Electrical Earth Leakage Protection units
- SANS 45001 Occupational Health and Safety Act No. 85 of 1993
- The municipal by-laws and any specific requirements of the Local Supply Authority of the area or district concerned.
- Local Fire Regulations

108



#### 4. DETAIL REQUIREMENTS

This particular specification must be read with, and shall form part of the Technical Specification contained in this document. **Bidders may submit quotes for standard equipment which comply as closely as possible with the specification.** Any deviation from the specification must be fully defined. Outdoor generators will be installed on newly constructed or existing plinths with canopies and indoor generators will be installed inside the existing generator plant-rooms. Outdoor units will be enclosed with palisade fencing, as per specification. The plinth, earthing, and palisade fencing will be supplied, installed and constructed by the appointed contract (including required supply cabling and switch gear).

All connections, installations and terminations of the required cabling and switch gear will form part this contract. The diesel generators may be connected to Uninterrupted Power Supplies (UPS) systems, radio communication systems and dedicated power outlets and interrelated circuitry.

All equipment shall be intergraded with existing infrastructure and therefore additional care should be taken to protect all equipment in terms of excessive voltage spikes, over current protection, lighting protection and voltage drops. When all conductors of an alternating current (AC) installation are carrying their design load, the difference in voltage between the point of supply and any point of outlet or terminals of fixed appliances should not exceed 5% of the standard or declared voltage. In the case of a 230/400 V system, the voltage drop for single-phase circuits should not exceed 11, 5 V (5% of 230 V) and the voltage drop for three-phase circuits should not exceed 20V (5% of 400V).

#### 5. TRANSPORT COST

**Transport cost will include the cost of wages and overheads for personnel during transport to the site and running cost of the vehicle.**

Transport cost will be calculated from **East London Police Station at (3 Fleet St, East London CBD 5200) as a central point**, Eastern Cape to the site (Stations) specified. Transport cost involved for any additional instructions executed on the same day or at the station will be calculated from point "A" (the first station) to point "B" (second station) to point "C" (third station) etc. Under no circumstances will separate transport costs for instructions executed on the same day or at the same station in the same areas be allowed.

The Contractor shall make the necessary arrangements to have the required material or equipment available to execute the repairs, therefore no claims for delivery cost or transport cost to collect material or equipment shall be accepted.



## 6. NOTICE TO BIDDER

This Tender is for the supply, install, commission and energizing of standby generators, and maintenance of the supplied generators, at various facilities, occupied by the South African Police Service (SAPS). Various facilities which are not equipped or with existing need to replace outmoded equipment shall be supplied with new standby generators. Decommissioning of outmoded equipment will form part of this contract. All decommissioned equipment will remain the property of the SAPS. Particulars regarding decommissioned generators and new generators will be updated on the Asset Register by the Section: Asset Operations Management. The contractor will be obligated in terms of this contract to ensure that first delivery of all generators installation, commissioning and energizing within a period of six (06) months, after receiving an official order form and/or in terms of the approved Program of Works. The contractor shall fully acquaint themselves with the nature of the work carried out, the locality of the plant and any possible hindrances in the execution of the installation, servicing, maintaining and to allow for these entire factors in their price, as any later claim based on unforeseen events or knowledge will not be entertained. The contract shall be entirely responsible for referencing all relevant standard specification of the SAPS and SANS or other applicable published standard whether such standard is referenced in this document or not and ensuring compliance with the Engineering Works therewith. The references in this document to standard specification shall not be construed as limiting, and are given merely as a guide for basic reference. Where SABS is stated, the applicable SANS shall apply.

**The contractor shall commence with the servicing of standby generators after six months upon finishing practical completion of the commissioning.**

**It is a specific condition that if it is necessary to replace any equipment, (not part of this contract) that the SAPS reserve the right to source additional quotations and to accept a specific quotation, in term of the SAPS acquisition regulation and standard. The SAPS further reserve the right to accept or decline such variations.**

Any equipment or part of the equipment shall not be removed from devolved facility for repairs or unless permission is granted by police station in consultation with either Province and/or SCM Head Office: Facility Management, Programme and Project Management. If it happens that such equipment or part of the equipment is removed without the permission, such equipment or part of the equipment will be returned to where it was taken at no cost to SAPS.



## 7. GENERAL REQUIREMENTS AND SPECIFICATION

| STATE UNDER PARTICULAR OF TENDER AGAINST EACH REQUIREMENT WHETHER THE TENDER COMPLY OR DO NOT COMPLY WITH THE REQUIREMENT OF THE SPECIFICATION FAILURE TO THAT WILL DISQUALIFY THE BID (PLEASE DO NOT TICK ✓/x) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | COMPLY/DO NOT COMPLY |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 6.1                                                                                                                                                                                                             | This Tender is for supply, delivery, install, commission and maintenance of the generators at various facilities in Eastern Cape Province, occupied by the South African Police Service (SAPS). Decommissioned or outmoded or damaged equipment will remain the property of the SAPS (as specified in this document).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                      |
| 6.2                                                                                                                                                                                                             | The Contractor will be obligated in terms of this contract to ensure that first delivery of all generators installation, commissioning and energizing within a period of six (06) months. The Contractor shall fully acquaint themselves with the nature of the work to be carried out, the locality of the plant and any possible hindrances in the execution of the installation, services and maintenance, and to allow for all of these factors in their prices, as any later claim bases on unforeseen events or knowledge will not be entertained. (as specified in this document)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      |
| 6.3                                                                                                                                                                                                             | All generator sets shall be installed on newly constructed concrete reinforced plinth or in existing generator plant rooms, which will form part of this contract. Generators will vary in capacity; water or air-cooled, standby generators, mounted on newly constructed or existing plinths, and rated for single step full load application is required. Inclusive of Automatic Mains Failure (AMF) or Automatic Transfer Switch (ATS), control panel, battery, exhaust and integrated fuel tank. All cabling connection and related works are included in this contract. The Bidder shall guarantee that the diesel/governor and alternator/ Automatic Voltage Regulator (AVR) combination will be compatible with the site loads. The fuel tank shall be an integral part of the base frame of the generator set, with a minimum capacity of 180 liters, including filters, Gauges, Removable inspection cover, Drain, Filler cap, Low level and extra low shutdown/alarm sensors. Fuel pipe-work is to be in accordance with SANS 62-1: 2013. (as specified in this document) |                      |
| 6.4                                                                                                                                                                                                             | Supply and install symbolic safety signs in compliance with SANS 1186-4: 2011. Ensure that all required warning signs on the outside of the building or generator plant are to be in position. The signs on the outside must be fixed onto the doors of the emergency generator room /plant. The lettering must be readable and visible and in a good state. (as specified in this document)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                      |
| 6.5                                                                                                                                                                                                             | Service and Maintenance – The successful Contractor shall carry out a 240 hour type or at a six monthly interval service and 480 hour type or at 12 months service (depending on whichever occurs first for date of acceptance or handover). Job cards will be signed off and certified by the relevant Station Commander/ SCM Representative. All original job-cards must be attached to the applicable invoices, for payment purposes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |
| 6.6                                                                                                                                                                                                             | Final Delivery - Final Delivery will not be taken unless proof can be provided, by means of signed job cards by the Project Manager/Electrical Representative from Head Office: Facility Management, Programme and Project Management on site, indicating that such services were carried out. The applicable documentation, such as load test certificates, COC, and photo's, should be attached to the job-cards, as part of the supporting documentation. The contractor will supply job cards in accordance with the example included herein. The job card must be completely legibly in black ink after completion of each service and/or maintenance.                                                                                                                                                                                                                                                                                                                                                                                                                          |                      |
| 6.7                                                                                                                                                                                                             | Operation and Maintenance Manuals – The contractor shall hand over, at the completion of the works one (1) original and two (2) copies of the necessary operating and maintenance manuals, required for all plant and equipment supplied and installed by him or her as part of the works. A complete description of all operating procedures and safety measures shall be included in the manual. A basic "Fault Finding Guide" shall also be included. (as specified in this document)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      |

**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**

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|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 6.8  | Electrical Connections – Electrical connections to the AMF or ATS panel form part of this contract. Wiring must be designed and installed as prescribed by SANS 10142-1:2017 wiring of buildings. (as specified in this document)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| 6.9  | Throughout the work shall be executed to the highest standards and to the entire satisfaction of the SAPS, SCM Representative who shall interpret the meaning of the Contract Document and shall have the authority to reject any work and materials, which, in his judgment, are not in full accordance therewith. <u>All condemned material and workmanship shall be replaced or rectified as specified in the scope of work.</u> All work shall be executed in a first-class manner by qualified tradesman. The Contractor shall warrant that the materials and workmanship shall be of the highest grade, that the equipment shall be installed in a practical and first-class manner in accordance with the best practices and ready and complete for full operation. It is specifically intended that all material or labour which is usually provided as part of such equipment as is called for and which is necessary for its proper completion and operation shall be provided without additional cost whether or not shown or described in the Contract Document.                                                                                                                                                                   |  |
| 6.10 | The Contractor shall comply with the requirements of the Health & Safety Specification and applicable regulations. The contractor shall refer to the site information, and the specifications describing the scope of the Engineering Works, for information about the type of environment in which the work is to be executed. Notwithstanding anything stated in this document the contractor shall be responsible for determining the safety requirements of the site. (as specified in this document)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
| 6.11 | The plinth shall be constructed. The generator set shall be mounted on a reinforced concrete plinth. Plinth shall be cast on site. The top of the plinth shall protrude at least 200mm above the final surrounding from ground level. The concrete plinth shall protrude approximately 100mm beyond the edges of the generator set to form an apron. The concrete apron and plinth shall be wood float finished and shall slope from the base to permit rain water runoff. Cable ducts shall be providing in the plinth to accommodate all the incoming and outgoing supply cables. The cable ducts shall be sealed to prevent entry of rodents. The earth mat will be installed at a minimum depth of 1200mm below the plinth, with earth spikes, or as per the required ground impedance. A non-compliance concrete plinth shall be removed completely and make clean for a newly cast on site concrete plinth as per specification.                                                                                                                                                                                                                                                                                                         |  |
| 6.12 | Outdoor Generators to be enclosed with palisade fencing and matching gate. All palisade fencing, gates and components shall be galvanized to SANS 301-12:2004 standards. All poles and horizontal bearers shall be manufactured from 2mm cold rolled steel formed material. All poles shall be fixed with anti-vandal bolts and fastened with shear off nuts. Complete installations shall be of a minimum height of 1800mm. Posts shall be fitted within concrete foundations of minimum of 500x500x500mm. The swing gate will be manufactured to match the palisade accordingly. (as specified in this document)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
| 6.13 | The engine and generator shall be mounted on one common steel-supporting frame manufactured of channel iron or other equivalent steelwork to provide a rigid and solid foundation. The main frame shall be of "skid" base type. If no "skid" base is provided, suitable for free standing, holding down bolts and vibration eliminators to the generator set manufacturer's specification must be provided. This sub-frame shall be supported from a main frame by anti-vibration mountings. Duplex anti-vibration mounts shall be used. The inner frame and its support shall be of sufficient height above floor level to permit installation of a drip tray and for drainage of engine oil. The drip tray must be sloped and made of mild steel. It must be fixed in the frame beneath the engine and alternator and a drip pipe fitted with a plug must be extended from the lowest point of the drip tray to beyond the frame in an easily accessible position. The outer casing of the alternator, the engine, the sub-frame and main base frame shall be bonded together electrically and connected to the earth via a connection to the earth bar in the control panel and from there to an earth mat. (as specified in this document) |  |
| 6.14 | The entire installation shall be carried out to the satisfaction of the SAPS, Facility Management, and shall be carried out in accordance with the following Standard Specifications and Regulations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |



## PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS

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|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|      | <ul style="list-style-type: none"> <li>- The Technical Specification for Diesel Driven Generator Sets, (which is included in this document).</li> <li>- ISO 9000/9001 Quality Management Systems.</li> <li>- SANS 342 Automotive diesel fuel</li> <li>- SANS 1186 Symbolic safety signs</li> <li>- SANS 1507 Electric cables with extruded solid dielectric insulation for</li> <li>- SANS 1632 Batteries</li> <li>- SANS 1652 Battery chargers – industrial type</li> <li>- SANS 8528-1 Reciprocating internal combustion engine driven alternating current generating sets</li> <li>- SANS 10140 Identification colour marking</li> <li>- SANS 60034 Rotating electrical machines</li> <li>- SANS 60529 Degrees of protection provided by enclosures</li> <li>- SANS 10142-1 Wiring of Premises</li> <li>- SANS 62-1 Steel pipes Part 1</li> <li>- SANS 301-12 Palisade fence</li> <li>- SANS 10400-G Excavation</li> <li>- SANS 10131 Petroleum products, above ground storage and tanks.</li> <li>- SANS 60947 All low voltage switchgear and control gear assemblies</li> <li>- SANS 10400 Building regulations</li> <li>- SANS 61084-1-2. Electrical Installation Ducting and Trunking Systems on walls and ceilings</li> <li>- SANS 61305-1-2.4. Electrical Installation Conduit Fittings</li> <li>- SANS 767- 1-2. Electrical Earth Leakage Protection units</li> <li>- SANS 45001 Occupational Health and Safety Act No. 85 of 1993</li> <li>- The municipal by-laws and any specific requirements of the Local Supply Authority of the area or district concerned.</li> <li>- Local Fire Regulations</li> <li>- The contractor should fully familiarize himself/herself with these documents prior to quoting.</li> </ul> |  |
| 6.15 | Speed governing shall be by a solid state, asynchronous electronic speed governor conforming to of SANS 8528-1:2008. The SAPS reserves the right to inspect the locally available stock of spares prior to granting approval for the use of any particular type of speed regulator. The speed regulation (droop) of the governor shall be adjustable between 0% and 15%, and the steady state speed band 0, 25% asynchronous control. The operating voltage for the governor shall be the nominal voltage of the starting battery (normally 24 volts). Speed variation of the set between no load and full load may not exceed 4%. Engines must be fitted with flywheels correctly sized to eliminate visible flicker of lights fed by the generator set. Cyclic irregularity must be as stipulated in terms of SANS 8528-1:2008.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| 6.16 | Exhaust gas shall be piped, the piping being fitted with expansion joints and silencer and discharged to atmosphere. The expansion joints shall be of the stainless steel, concertina type, flexible, flanged and bolted to the exhaust manifold or turbo-charger outlet as applicable. Stainless steel bolts and nuts of the appropriate size must be used. Care must be exercised that exhaust pipe and silencer supports at the expansion joints are so positioned that no strain is placed on the manifold joint, turbo-charger, piping or silencer. The silencer shall be of stainless steel, of the baffle or absorption type of a size construction such that a sound level of 75 dB absolute is not exceeded within seven meters of the exhaust. The exhaust pipe shall be of stainless steel, insulated, and sufficient size to ensure that the backpressure is acceptable within the limits of the engine manufacturer. The exhaust system shall be offset from the center line of the plant to allow for hoists or cranes to remove the engine. Stainless steel nuts and bolts must be used in assembling the exhaust system. Flanged joints are required to aid dismantling. Exhaust piping over 100mm diameter must have a minimum thickness of 1,6mm. The outdoor generator exhaust pipe shall be supplied with a complete hinged flap that swings open when the generator is running.                                                                                                                                                                                                                                                                                                                                |  |
| 6.17 | A factory load test, prior to any installations, will be performed and such test certificates will be supplied to the SAPS. The contractor shall supply all fuel, lubricants, connections, consumables, etc. required for the specified testing. On successful completion of the specified testing, the generator set, panel and all equipment, fittings and materials required for the installation of the generator set, as specified shall be delivered to site and installed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |

**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**

|      |                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 6.18 | All newly installed as well as replaced generators must be placed on SAPS Asset Register. The updating of the Asset Register is the responsibility of the Section Head: Asset Operation Management: FACILITY MANAGEMENT: Pretoria. It will be the responsibility of the appointed contractor to forward detailed descriptions, model references, fabrication, serial numbers and a COC for the purpose of upgrading the asset register. |  |
| 6.19 | All electrical cables, unarmored and armored, shall be locally manufactured and shall bear the SABS stamp of approval.                                                                                                                                                                                                                                                                                                                  |  |
| 6.20 | All new generators will be designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002 standards.                                                                                                                                                                                                                                                                                     |  |
| 6.21 | New equipment and material shall be supplied with a written guarantee confirming a defects liability period of 12 months from date of practical completion. These guarantees shall be furnished in favour of the SAPS.                                                                                                                                                                                                                  |  |
| 6.22 | Equipment and material installed shall be new and unused.                                                                                                                                                                                                                                                                                                                                                                               |  |
| 6.23 | The fuel tank shall be an integral part of the base frame of the generator set, with a minimum capacity of 180 liters for 25KVA (Single Phase) and 220 liters to 400L for 30KVA to 200KVA (three phase) Generators.                                                                                                                                                                                                                     |  |
| 6.24 | The enclosure must be completely vermin-proof, removable from the generator set and must be constructed of 3CR12 stainless steel of a minimum thickness of about 1.5mm, when within 80 kilometers from the coast line, alternatively mild steel. All panels, the roof and doors shall be suitably braced and stiffened to ensure rigidity and to prevent warping.                                                                       |  |
| 6.25 | The Contractor shall ensure that all safety regulations and measures are applied and enforced during repair work on cabling, wiring and distribution boards.                                                                                                                                                                                                                                                                            |  |
| 6.26 | Transport cost will be calculated from East London Police Station at (3 Fleet St, East London CBD 5200) as a central point, Eastern Cape to the site (Stations) specified                                                                                                                                                                                                                                                               |  |

**8. SITE CONDITIONS AND LOCATION**

The following stations will be covered by this contract (locations to be confirmed by Bidder);

| No. | Station                 | Address                                         | Telephone number |
|-----|-------------------------|-------------------------------------------------|------------------|
| 1   | Ida                     | 16 Church Street Arlington 9202                 | (058) 453 6001   |
| 2   | Kubusiedrift            | Kubusiedrift Farm Stutterheim 4930              | (043) 782 0636   |
| 3   | Sterkstroom             | 2 Van reebek street                             | (045) 966 0006   |
| 4   | Maclear                 | Pote Street Postal address 5480                 | (045) 932 1357   |
| 5   | Rossouw                 | Nepgan Street Postal address 5437               | (045) 944 1032   |
| 6   | Tylden                  | Queenstown Private Bag x 5320<br>Postal address | (045) 839 1103   |
| 7   | Tina Falls              | Qumbu Private Bag x 448 Postal<br>address 5780  | (045) 553 0041   |
| 8   | Mbizeni                 | Koeqana Street Postal address<br>4779           | (039) 257 3090   |
| 9   | Mqanduli                | Main Street Postal 5080                         | (047) 553 0041   |
| 10  | Punzana                 | Punzana SAPS, Zwelitsha 5608                    | (040) 655 1735   |
| 11  | Balfour                 | New street, Balfour 5740                        | (040) 864 9261   |
| 12  | Berlin                  | 1 Ballie Street, Berlin, 5660                   | (043) 685 2233   |
| 13  | Gambleville<br>(Kamesh) | 76 Kamesh Road, Thomas<br>Gamble, Uitenhage     | (042) 988 8719   |
| 14  | Hogsback                | 3 Main Road, Hogsback 5721                      | (045) 962 1030   |

114

**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**

|    |                |                                   |                |
|----|----------------|-----------------------------------|----------------|
| 15 | Pearston       | 33 Hudson Street, Pearston        | (042) 246 1101 |
| 16 | Riebeeck East  | Morgan Street, Riebeck East       | (046) 622 7878 |
| 17 | Tarkastad      | 244 Van Riebeck Street, Ugie 5470 | (045) 933 1148 |
| 18 | Alice          | 1 bell street,Alice 5700          | (040) 653 1817 |
| 19 | Kei Mouth      | 13 Main st, Kei Mouth,5260        | (043) 841 1080 |
| 20 | Elands Heights | Maclear, Elands Heights, 5480     | (045) 932 1762 |
| 21 | Buffalo Flats  | Greenpoint Rd, East London, 5209  | (043) 709 5506 |

The scope of works is for various facilities throughout the Eastern Cape Province, occupied by the South African Police Service (SAPS).

| NO              | STATIONS             | GENERATOR SIZE | SCOPE OF WORKS GENERATORS                    |
|-----------------|----------------------|----------------|----------------------------------------------|
| 1               | Ida                  | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 2               | Kubusiedrift         | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 3               | Sterkstroom          | 50KVA)         | <b>Supply,Installation And Commissioning</b> |
| 4               | Maclear              | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 5               | Rossouw              | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 6               | Tylden               | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 7               | Tina Falls           | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 8               | Mbizeni              | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 9               | Mqanduli             | 60KVA          | <b>Supply,Installation And Commissioning</b> |
| 10              | Punzana              | 100KVA         | <b>Supply,Installation And Commissioning</b> |
| 11              | Balfour              | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 12              | Berlin               | 120KVA         | <b>Supply,Installation And Commissioning</b> |
| 13              | Gambleville (Kamesh) | 200KVA         | <b>Supply,Installation And Commissioning</b> |
| 14              | Hogsback             | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 15              | Pearston             | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 16              | Riebeeck East        | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 17              | Tarkastad            | 100KVA         | <b>Supply,Installation And Commissioning</b> |
| 18              | Alice                | 50KVA          | <b>Supply,Installation And Commissioning</b> |
| 19              | Kei Mouth            | 150KVA         | <b>Supply,Installation And Commissioning</b> |
| 20              | Elands Heights       | 100KVA         | <b>Supply,Installation And Commissioning</b> |
| 21              | Buffalo Flats        | 100KVA         | <b>Supply,Installation And Commissioning</b> |
| <b>Stations</b> |                      | 21             |                                              |

The Bidder must verify the above-mentioned details. It is the responsibility of the Bidder to evaluate electrical and generator conditions at all the stations, for the purpose of pricing.

## 9. CONDITIONS OF CONTRACT

The Contractor shall comply with the obligations and requirements of the Agreement and Contract Data documents contained in Part C1 including the General Conditions of Contract 2010 (GCC 2004).



The Contractor shall allow for all the responsibilities and obligations in terms of the conditions of contract and contract data, including;

- Risks, costs and obligations in terms of the General Conditions of Contract, the Contract Data and of the standardized specifications, except where provision is made in the Project Specifications to cover compensation for any of these items.
- Head office, site overheads and supervision.
- Profit and financing costs.
- Sureties, employment related expenses, statutory expenses.
- Indemnities & insurances: The contractor will only be permitted to perform work on the site if a valid insurance policy document and proof of cover or premium payment have been submitted and approved.
- The Contractor shall maintain current registration and have paid the necessary fees to the Compensation Commissioner in compliance with the Compensation for Occupational Injuries and Diseases Act, No 130 of 1993 (COID). The contractor will only be permitted to perform work on any site if a valid Letter of Good Standing issued by the Compensation Commissioner has been submitted and approved.
- A detailed program for the execution of the engineering works, Maintenance works and Installation works for the whole of the contract period, listing each plant, its location and fixed dates of maintenance. The contractor will be required to comply with the program at all times.
- Expenses of a general preliminary and general nature not specifically related to any item or items of permanent or temporary work.

## 10. FACILITIES

The following facilities shall be provided by the contractor for the duration of the contract.

### 9.1 Administrative Facilities, Equipment and Materials

The following administrative facilities shall be provided.

- Fax or E-mail - Will be used as an official correspondence for instructions and liaison. Each generator plant will be supplied with a maintenance register (supplied by contractor).
- Communications Facilities - Telephone (landline) and email services shall be provided at the contractor's offices. Such facilities shall be reliable since instructions and document will be issued electronically to the Contractor.
- Electricity & Water on site - The employer will allow the use of water and electricity for construction free of charge. The contractor shall provide suitable temporary facilities such as electricity extension cables, water hoses and water containers as necessary while work is being performed.



## 11. DESCRIPTIONS OF THE WORKS RELATED TO STANDBY

### GENERATORS

**Foundations** - All outdoor generator sets shall be installed on newly constructed or existing plinth, which will form part of this contract. Outdoor Generators shall be installed with canopy, within facility precinct. Outmoded or unrepairable existing generators will be replaced with new equipment, either inside existing generator plant-room, on an existing plinth or on a newly constructed re-enforced concrete foundation.

**Generator Set** - Vary in capacity, water or air cooled, stand-by generator set, mounted on newly constructed or existing plinths, generator plant room and rated for single step full load application is required. Inclusive of AMF or ATS control panel, battery, exhaust and fuel embedded tank. All associated fuel piping and control wiring, etc. All cabling connection and related works included in contract.

**Requirements** - The Bidder shall guarantee that the **diesel/governor** and alternator/AVR combination will be compatible with the site loads which can consist of a combination of switch mode and/or thyristor controlled rectifiers and UPS systems etc. This shall be a condition of Tender.

**Fuel Tank** - The fuel tank shall be an integral part of the base frame of the generator set, with a minimum capacity of 180 liters of 25KVA (Single phase) Generators and with a minimum capacity of 220L to 400L between 30KVA to 200KVA (Three phase) Generators.

**The tanks shall be fitted with:** Filter, Gauge, Removable inspection cover, Drain, Filler cap. Low level and extra low shutdown/alarm sensors. These shall activate an audible and visible signal on the control panel. Fuel pipe-work is to be in accordance with SANS 62-1: 2013.

**Factory Testing** - On completion of the generator set assembly: The panel shall be tested, for compliance. The engine shall be tested with the following amendment: Load Test: 5 min. @ 20% load, 10 min. @ 60% load, 20 min. @ 100% load, 20 min. @ 110% load, 5 min. @ Nil load (cool down). The contractor shall supply all fuel, lubricants, connections, consumables, etc. required for the specified testing. On successful completion of the specified testing, the generator set, panel and all equipment, fittings and materials required for the installation of the generator set, as specified shall be delivered to site and installed.

**Symbolic Safety Signs** - **Fuel Tank:** Supply and install symbolic safety signs in compliance with SANS 1186-4: 2011. **Generator set:** Supply and install standard safety compliance signs:

- Standard procedure in case of electrical shock.
- "Warning - this machine may start automatically without warning."



**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**

**Commissioning and Testing** – On completion: commission, test and demonstrate to the SAPS, Facility Management, or a representative.

The test shall include:

- Test the fuel system, pumps, float switches etc.
- Test alarms and cut-outs.
- Automatic mains failure test.
- Test plant status modern facility.
- Earthing.
- Noise level.

**Service and Maintenance** – Service – a standard schedules form to be supplied by successful Contractor. The successful Contractor shall carry out a 240 hour type or at a six monthly interval service and 480 hour type or at 12 months service (depending on whichever occurs first for date of acceptance or handover). Job cards will be signed off and certified by the relevant Station Commander or SCM Representative. All original job-cards must be attached to the applicable invoices, for payment purpose.

**Final Delivery** - Final Delivery will not be taken unless proof can be provided, by means of signed job cards by the Project Manager/Electrical Representative from Head Office: Facility Management, Programme and Project Management on site, indicating that such services were carried out. The applicable documentation, such as load test certificates, COC, and photo's, should be attached to the job-cards, as part of the supporting documentation. The contractor will supply job cards in accordance with the example including herein. The job card must be completely legibly in black ink after completion of each service and/or maintenance

**Unplanned maintenance**

The South African Police Service will report any plant faults or breakdowns (complaints) which may occur. The SAPS personnel (appointed member at facility) will report such plant faults, breakdowns and electrical malfunction to the relevant Provincial SCM, Facility Management, of South African Police Service, who will log the complaint and transmit it by e-mail to the Contractor. The contractor shall respond to the complaint as necessary in accordance with the assigned priority level & the breakdown (complaint) shall be repaired as necessary to restore the plant and / or electrical equipment to full operation in the minimum time. On completion of the complaint remedy the contractor shall complete a Job Card and submit to the Provincial SCM, Facility Management with a copy of the faulty concerned. Job cards will be signed off and certified by the Station Commander/Shift commander or SCM representative. The particular reference number of the Occurrence Book (OB) and/or "Day-to Day" Maintenance Register (SAPS 456) number must be printed on the job card and related invoice. The Contractor shall attach to the Job Card the following documents associated with the complaint.



**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**

- Copies of vendor tax invoices for materials used, each endorsed with the Complaint Number, the Contractor's stamp and the Contractor's original signature.
- Travel log sheet for travel exclusively incurred in attending to the Complaint. If the Complaint was repaired during a scheduled service visit to the plant concerned, then the travel log for the complaint shall be appropriately endorsed.
- Further information which may be necessary or instructed.

The Provincial SCM, Facility Management, South African Police Service, will be responsible for closing the call. The Contractor shall be responsible for obtaining the e-mail of each facility and establishing to whom the e-mail must be sent. Should the contractor not be able to complete the

required breakdown repair work within the maximum down-time period allowed, it shall be his responsibility to obtain extension of down-time from the Facility Management, SCM, South African Police Service. The written report shall clearly state the reasons for the extension, as well as the actual extension required. Extension of down-time will only be granted by the SAPS if;

- The maximum down-time is unreasonable in relation to the scope of the repair work required.
- The delivery time of a new component/subassembly/machine or spares required for the repair of the defective component/subassembly do not enable the contractor to successfully complete the repair work within the maximum breakdown down-time allowed. Due to the fact that all the facilities, covered in this project, are totally reliant on Generator supply, any form of breakdown will be regarded as a fatal breakdown priority level.

| <u>Priority Level</u>                                    | <u>Maximum Down-Time Allowed (MDTA)</u> |
|----------------------------------------------------------|-----------------------------------------|
| <u>Fatal breakdown where specified (generator plant)</u> | <u>8 hours (immediate response)</u>     |

"Maximum down time" shall mean the period of time allowed repairing a breakdown, and "actual down-time" shall mean the measured period from the instant when the breakdown was logged with the contractor until the installation has been repaired to its functional specification.

**Operation and Maintenance Manuals** – The contractor shall hand over, at the completion of the WORKS one (1) original and two copies of the necessary operating and maintenance manuals, required for all plant and equipment supplied and installed by him or her as part of the WORKS. A complete description of all operating procedures and safety measures shall be included in the manual. A basic "Fault Finding Guide" shall also be included.

**Note:** Laminated and framed copies of operating procedures, wiring diagrams, and basic fault finding guides are to be fixed to the inside of the control panel access door. Each copy of the operating and maintenance manual shall be separately bound in an acceptable manner, and shall contain the following data where applicable:



- Scope of Work
- Operating Instructions
- Normal Operation
- Safety Measures
- Fault Finding Guide
- Equipment Information
- Schedule of Information
- List of Spares and Agents
- Design Data
- As **Commissioned** Data
- Maintenance Requirements
- Approved Service Schedules
- Manufacturer's Services Recommendations
- Manufacturer's Literature
- Equipment Brochures
- Proprietary Drawings
- As Built Drawings
- Electrical Drawings
- System Layouts and Schematics
- Training Certificates

**Maintenance Requirements** – The manufacturer's recommendation with regard to the routine servicing and maintenance of all equipment shall be included in the manual. This data shall include the recommended service interval and the estimated hours required for each type of service, for each item of equipment, together with a list of agents/contractors authorized to carry out service/maintenance. All equipment and workmanship will be guaranteed for a period of 12 months or a maximum of 480 hours, whichever occurs first from date of acceptance/handover.

**Electrical Connections** – Electrical connections to the AMF or ATS panel forms part of this contract, and will be conducted by the appointed contractor. Wiring must be designed and installed as demanded by SANS 10142-1:2017 wiring of buildings.

**Training** – Training shall be given to two staff members at station, who shall be operating the equipment. Training certificates must be signed on completion of training and proof shall be submitted to Project Manager: Electrical Engineering SCM: Facility Management.

**Dimensions** – All dimensions/conditions are to be verified on site prior to ordering of fabricating any materials or equipment.



## 12. MATERIAL AND WORKMANSHIP

The work throughout shall be executed to the highest standards and to the entire satisfaction of the Project Manager: Electrical Engineering SCM: Facility Management who shall interpret the meaning of the Contract Document and shall have the authority to reject any work and materials, which, in his judgment, are not in full accordance therewith. **All condemned material and workmanship shall be replaced or rectified as directed and approved by the SAPS. Facility Management: Pretoria.** All work shall be executed in a first-class manner by qualified tradesman.

The Contractor shall guarantee that the materials and workmanship shall be of the highest grade, that the equipment shall be installed in a practical and first-class manner in accordance with the best practices and ready and complete for full operation. It is specifically intended that all material

or labour which is usually provided as part of such equipment as is called for and which is necessary for its proper completion and operation shall be provided without additional cost whether or not shown or described in the Contract Document.

The Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper installation work. The Contractor shall also be prepared to promptly furnish any information relating to his own work as may be necessary for the proper installation work and shall co-operate with and co-ordinate the work of others as may be applicable.

All components and their respective adjustments, which do not form part of the equipment installation work, but influence the optimum and safe operation of the equipment shall be considered to form part of, and shall be included in the Contractor's scope of works. All control equipment and serviceable items shall be installed and positioned such that they will be accessible and maintainable.

The Contractor shall make sure that all safety regulations and measures are applied and enforced during the installation and guarantee periods to ensure the safety of the public and the User Client. The Contractor is to include for all scaffolding and "tools of trade" required for completing the scope of work.

**Safety** – The Contractor shall comply with the requirements of the Health & Safety Specification referenced above. The contractor shall refer to the site information, and the specifications describing the scope of the Engineering Works, for information about the type of environment in which the work is to be executed. Notwithstanding anything stated in this document the contractor shall be responsible for determining the safety requirements of the site.



**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**

The premises in which the generating plant is situated will be occupied by staff during the contract period. Working areas shall therefore be demarcated by means of suitable signs and warning tape which shall be removed on completion of work. Work in building interiors with gas torches or welding machines for joining pipe-work shall be executed with care and temporary protection for any adjacent timber, ceiling, tile roof or other flammable material shall be employed.

A dry powder fire extinguisher shall be provided by the contractor in the immediate vicinity of any work involving flame or electric arc. The contractor will further supply and install one (1) x 9 kg, dry chemical powder fire extinguisher in the generator plant-room. A comprehensive H&S Plan shall be prepared and submitted for approval.

A copy shall be available in the contractor's vehicle when attending any site to perform maintenance work. Asbestos risk analysis & safe work procedures shall be included if applicable.



### 13. SCHEDULE OF EQUIPMENT

The Schedule of equipment offered shall be fully completed by the Bidder.

#### ENGINE

|                     | KVA RATING 50KVA | KVA RATING 60KVA | KVA RATING 100KVA |
|---------------------|------------------|------------------|-------------------|
| MAKE                |                  |                  |                   |
| MODEL               |                  |                  |                   |
| GOVERNOR            |                  |                  |                   |
| TANK<br>CAPACITY(L) |                  |                  |                   |

#### ALTERNATOR

|       | KVA RATING 50KVA | KVA RATING 60KVA | KVA RATING 100KVA |
|-------|------------------|------------------|-------------------|
| MAKE  |                  |                  |                   |
| MODEL |                  |                  |                   |

#### ENCLOSURE

|              | KVA RATING 50KVA | KVA RATING 60KVA | KVA RATING 100KVA |
|--------------|------------------|------------------|-------------------|
| MANUFACTURER |                  |                  |                   |
| MODEL        |                  |                  |                   |

#### CONTROL PANEL

|              | KVA RATING 50KVA | KVA RATING 60KVA | KVA RATING 100KVA |
|--------------|------------------|------------------|-------------------|
| PANEL        |                  |                  |                   |
| MANUFACTURER |                  |                  |                   |
| MODEL        |                  |                  |                   |



The Schedule of equipment offered shall be fully completed by the Bidder.

**ENGINE**

|                  | KVA RATING 120KVA | KVA RATING 150KVA | KVA RATING 200KVA |
|------------------|-------------------|-------------------|-------------------|
| MAKE             |                   |                   |                   |
| MODEL            |                   |                   |                   |
| GOVERNOR         |                   |                   |                   |
| TANK CAPACITY(L) |                   |                   |                   |

**ALTERNATOR**

|       | KVA RATING 120KVA | KVA RATING 150KVA | KVA RATING 200KVA |
|-------|-------------------|-------------------|-------------------|
| MAKE  |                   |                   |                   |
| MODEL |                   |                   |                   |

**ENCLOSURE**

|              | KVA RATING 120KVA | KVA RATING 150KVA | KVA RATING 200KVA |
|--------------|-------------------|-------------------|-------------------|
| MANUFACTURER |                   |                   |                   |
| MODEL        |                   |                   |                   |

**CONTROL PANEL**

|              | KVA RATING 120KVA | KVA RATING 150KVA | KVA RATING 200KVA |
|--------------|-------------------|-------------------|-------------------|
| PANEL        |                   |                   |                   |
| MANUFACTURER |                   |                   |                   |
| MODEL        |                   |                   |                   |



## 14. TECHNICAL SPECIFICATIONS

**General** – This technical specification is for diesel driven standby generators with automatic mains failure controls.

**The Diesel Engine** – This includes for all requirements of the engine, mountings, coupling, etc. up to the generator.

**The Generator/Alternator** – This covers the requirements of the electrical generating plant complete with automatic voltage regulation, etc.

**Control Panel** – This item covers the entire protection, changeover, timing sequence, etc. for both engine and generator.

**Outdoor canopy** specification: –

**General:**

The enclosure must be completely vermin-proof, removable from the generator set and must be constructed of 3CR12 stainless steel of a minimum thickness of about 1.5mm, when within 80 kilometers from the coast line, alternatively mild steel.

The enclosure must allow easy access to the engine, alternator, radiator filler cap and control cubicle for maintenance purposes.

The door will be flush with the rest of the canopy and of the side opening type. A minimum of four doors are required that is to on either side.

The door hinges and locking bars will be of a heavy duty type and manufactured on an alloy or mild steel which is hot dip galvanized and will be fitted with a grease nipple.

Suitable door restraints must be fitted to all the doors, enclosure including the control panel to prevent wind damage. The restraint will consist of a steel rod in a steel groove or slide with a spring loaded catch, which is to be manually regenerator set to close the door.

No flexible restraints will be accepted.

The diesel fuel level indicator and alternator rating plate must be visible with the doors open. Unless specified, the silencers will be mounted on the roof of the enclosure.



Perforated sheeting will be fitted over all the insulating material inside the canopy of all soundproof generator sets

Rubber seals on the door will be equal to or similar to rubber pinch weld, wind lace (Max – Norton).

**Design:**

The enclosure must be designed to be weather-proof (IP65) and sound-proofing as specified. Rivets or self-tapping screw must be under no circumstances be allowed for fixing the various sections of the enclosure. Only cadmium coated nuts and bolts are acceptable.

The roof of the enclosure must be constructed for proper drainage of water.

**Lamp fitting:**

A lamp fitting and it's associated on/off door switch will be inside the enclosure for illumination of the control panel.

**Sound proofing:**

The sound proofing on canopy engine generator sets will be such that the maximum noise level generated by the generator set under any load condition will not exceed 75 db measured in any direction at a distance of 7meters from the center of the generator set with the doors closed.

The supply and discharge air paths will require separate attenuators on soundproof generator sets.

**Padlock and keys:**

Padlock and keys will be supplied for all the doors of the enclosure. The padlock will be of the A82 keyed or close to that with stainless steel shackles type.

Suitable brass metal plates will be installed behind each lock for the protection of the enclosure against scratching or damaging, where the locks are hanging.

**Concrete plinth** – The plinth shall be constructed by the contractor. The generator set shall be mounted on a concrete plinth. Plinth shall be cast on site. The top of the plinth shall protrude at least 200mm above the final surrounding, from ground level. The concrete plinth shall protrude approximately 100mm beyond the edges of the generator set to form an apron. The concrete apron and plinth shall be wood float finished and shall slope from the base to permit rain water runoff. Cable ducts shall be provided in the plinth to accommodate all the incoming and outgoing



cables. The cable ducts shall be sealed to prevent entry of rodents. The earth mat will be installed at a minimum depth of 1200 mm below the plinth with earth spikes (or in accordance with ground impedance).

**Palisade fencing** – To be performed by contractor. Generator set to be enclosed with palisade fencing and matching gate. All palisade fencing, gates and components shall be galvanized to SANS 301-12:2004 standards. All poles and horizontal bearers shall be manufactured from 2mm cold rolled steel formed material. All pales shall be fixed with anti-vandal bolts and fastened with shear off nuts. Complete installation shall be of a minimum height of 1800mm. Posts shall be fitted within concrete foundations of 500x500x500mm. The swing gate will be manufactured to match the palisade accordingly. The palisade fence shall surround the generator and it shall be 1.5m apart from the generator. A non-compliance Palisade Fence shall be replaced by galvanised Palisade Fence as per specification.

## 15. MECHANICAL PRIME MOVER – DIESEL ENGINE

### **Engine Specifications:**

|                          |                                                    |
|--------------------------|----------------------------------------------------|
| Design:                  | In-line, naturally aspirated (4 or 6 cylinders)    |
| Starting Voltage:        | 12 volt, negative ground                           |
| Fuel System:             | Direct Injection                                   |
| Fuel Filter:             | Spin-on fuel filters with water separator          |
| Air Cleaner Type:        | Dry replaceable element                            |
| Lube Oil Filter Type:    | Spin on full flow filter                           |
| Standard Cooling System: | 50°C ambient radiator with coolant Recovery System |

**General** – The engine may be turbo-charged or naturally aspirated.

**Speed and Number of Strokes** – The engine must be of the four strike solid injection, compression ignition type, with running speed, for reciprocating engines up to 750kW, not exceeding 1500rpm.

**Fuel Classification** – The engine shall be rated for diesel fuel as normally available in the applicable area and in compliance with SANS 342:2016

**Rating of Plant** – The rating of the engine shall take cognizance of the site conditions, site altitude and include all auxiliary equipment such as radiator and fan, oil pump, water pump, air filters, governor, battery charger (generator) etc. The engine output must be re-rated in accordance with SANS 8528-1:2008 for the site conditions stated in the particular specification.



**Overload Facility** – The set shall be capable of delivering 10% overload for (1) hour in any 12-hour period of continuous running. The engine must be supplied complete with an automatic controlled rated at 40% of full load capacity of the Generator set.

**Engine Appearance** – The engine shall be of neat appearance and all water, lubricating and diesel oil lines, filters and stopcocks shall be of top quality and completely leak free.

**Time Limits** – The starting period from “switch on” until the take-over of the full load shall not exceed 10 seconds.

**Service Connections** – All service connections to the engine shall be flexible to prevent vibration being transmitted between plant and building, and to prevent damage to these lines and connections.

**Support Framework** – The engine and generator shall be mounted on one common steel-supporting frame manufactured of channel iron or other equivalent steelwork to provide a rigid and solid foundation. The main frame shall be of “skid” base type. If no “skid” base is provided, suitable for free standing, holding down bolts and vibration eliminators to the generator set manufacturer’s specification must be provided. This sub-frame shall be supported from a main frame by anti-vibration mountings. Duplex anti-vibration mounts shall be used. The inner frame and its supports shall be of sufficient height above floor level to permit installation of a drip tray and for drainage of engine oil. The drip tray must be sloped and made of mild steel. It must be fixed in the frame beneath the engine and alternator and a drip pipe fitted with a plug must be extended from the lowest point of the drip tray to beyond the frame in an easily accessible position. The outer casing of the alternator, the engine, the sub-frame and main base frame shall be bonded together electrically and connected to the earth via a connection to the earth bar in the control panel and from there to an earth mat.

**Heat Protection** – All engine piping, whether flexible or rigid, shall either be of the heat resistant type or adequately protected against damage by radiant heat. This also applies to any wiring attached to the engine.

**Crankcase Vent Pipe** – The crankcase vent pipe shall be taken to the drip tray to collect oil condensate.

**Bearings** – Engine bearings for the crankshaft and connection rods, big and small ends shall be of the bush type, split sleeve type, or roller type. The bearing types and metals shall be suitable for operating in the worst site conditions.

**Lubrication** – The lubrication shall be by means of the force fed pressure system supplying circulating oil to all bearings, gear trains and important moving parts. A gear driven oil pump shall



be incorporated with an oil-cooler if necessary. The oil cooler shall have a thermostatically controlled oil bypass valve to control the oil inlet temperature by proportionate by passing 250 Hour running time, full flow oil filters with automatic bypass and replaceable elements shall be fitted. An isolating valve shall be fitted in the oil line from the makeup tank to the sump in order to facilitate sump draining without the loss of new oil from the makeup tank.

**Cooling** – Air ducts shall be provided to positively exhaust hot air and to prevent re-circulation. Integral engine mounted fans are required to ensure airflow across the various components in the order listed above. Discharge ducting must be taken straight up through the roof of the plant room and must be made with strategically placed flange joints, etc. to enable the removal of the set without having to remove the ducting. Quick action type lock nuts or screws to enable quick and easy dismantling of ductwork are required. Self-tapping screws are unacceptable. The ducting must be fixed to the roof structure and must be flashed to render the exit point waterproof and must be fitted with an expanded metal bird screen at the discharge end(s).

**Speed Control** – Speed governing shall be by a solid state, asynchronous electronic speed governor conforming to SANS 8528-1:2008. The SAPS reserves the right to inspect the locally available stock of spares prior to granting approval for the use of any particular type of speed regulator. The speed regulation (droop) of the governor shall be adjustable between 0% and 15%, and the steady state speed band 0, 25% asynchronous control. The operating voltage for the governor shall be the nominal voltage of the starting battery (normally 24 volts). Speed variation of the set between no load and full load may not exceed 4%. Engines must be fitted with flywheels correctly sized to eliminate visible flicker of lights fed by the generator set. Cyclic irregularity must be as stipulated in SANS 8528-1:2008.

**Air System** – The air system shall consist of two items, via the incoming combustion air and the exhaust air.

**Combustion Air** – Combustion air filtration shall be by means of dry type, cartridge, high efficiency air filters fitted and sized for 500 hour operation and supplied complete with a service indicator. Oil bath air filters may be fitted and used in existing plant only.

**Exhaust Gas** – Exhaust gas shall be piped, the piping being fitted with expansion joints and silencer and discharged to atmosphere. The expansion joints shall be of the stainless steel, concertina type, flexible, flanged and bolted to the exhaust manifold or turbo-charger outlet as applicable. Stainless steel bolts and nuts of the appropriate size must be used. Care must be exercised that exhaust pipe and silencer supports at the expansion joints are so positioned that no strain is placed on the manifold joint, turbo-charger, piping or silencer. The silencer shall be of stainless steel, of the baffle or absorption type of a size construction such that sound level of 75 dB absolute is not exceeded within seven meters of the exhaust. The exhaust pipe shall be of stainless steel, insulated, and sufficient size to ensure that the backpressure is acceptable within



the limits of the engine manufacturer. The exhaust system shall be offset from the center line of the plant to allow for hoists or cranes to remove the engine. Stainless steel nuts and bolts must be used in assembling the exhaust system. Flanged joints are required to aid dismantling. Exhaust piping over 100mm diameter must have a minimum thickness of 1,6mm.

**Engine Fuelling** – Engine fuelling shall be by means of an engine mounted pump with the governor controlled fuel injection pump(s) and injectors all arranged for easy access and maintenance. A fuel filter with replaceable elements shall be fitted between the lift pump and the injection pump, suitable for the full flow of fuel at a full load. The filter must take out particles down to 5 microns in size, or less by approved manufacture. A primary, heavy-duty filter/water separator shall be fitted before the lift pump in the fuel line from the tank. This water separator shall be of an approved manufacture, shall be suitable for 250 hour operation and to be easily maintained. Copper tubing shall be used from the sludge filter to the engine components, but steel tubing may be used on the overflow from the injectors to the fuel tank.

**NOTE:** Galvanized piping is not acceptable.

**Starter Motor** – Starting of the plant shall be by means of an engine mounted electric starter motor. The starter motor(s) shall be suitable sized to easily spin the plant under “cold start” winter. The starter motor(s) shall be 12 or 24 volts DC fitted with an approved device for positive engagement. The starter motor shall be controlled from the plant panel.

**Battery** – The battery shall be 12 volt low maintenance type suitably sized to start the engine. The battery shall be as close as is practical to the starter motor, but separate from any vibrating parts of the set. The battery discharge capacity with full cranking current for 60 seconds at a temperature of 5°C shall not fall below a cell voltage of 1,5 volts. The voltage is considered the minimum to satisfactorily operate the 12 or 24 volts. DC control equipment on the control panel (i.e. after three starting attempts, each of 10 seconds, the panel control voltage shall not be below 20 volts DC). The battery cables must be run clear of all exhaust piping and other hot surfaces and must be fixed in position so as to ensure correct reconnection of the cables in the event of the battery being changed or removed. The cables must be liberally sized in order to minimize the voltage drop to the starter motor.

**Protection Equipment on Engine** – Alarm signal system in wall mounted or floor standing control board for indicating “shut down” of the following items:

- Fail to start/starter circuit lockout.
- High water temperature (sensed on engine side of the thermostat) or high head temperature in the case of air cooled engines.
- Low oil pressure.



- High oil temperature.
  - Low fuel pressure.
  - Engine over/under speed (sensed through alternator frequency).
- Gauges in the floor standing control pane showing:
- Lubricating oil pressure.
  - Engine water temperature.
- All necessary sensors for alarm circuits.
- All necessary fuel cut off solenoids.
- A manual shut off valve before the lift pump in the fuel line at the day tank.

**Fuel Piping** – The fuel lines shall all be medium class steel to SANS 62-1: 2013 (but not galvanized) with appropriate bends to provide an expansion facility. Copper shall only be used from the primary filter to the engine pumps. All underground piping shall be fully wrapped with Denso tape (or similar, equal and approved equivalent). The tape wrapping shall have a minimum overlap of 15mm. A fusible link mounted directly above the set and connected to a dead weight operated fuel shut-off valve is required.

**Fuel Pumps** – A diesel fuel pump, suitably sized, shall be fitted on the day tank. This shall be a centrifugal pump complete with electric motor, starter, and isolator and float switch. Level control and float switches for control of the pump shall be mounted on the services tank. Float switches shall be level controller by approved manufacture. Three float switches will be required, one to operate the pump (on/off), one for a low level alarm and the other for an extra low level engine cut-out. A facility for running the pumps manually is required. In addition a float switch is required in the bulk tank wired to operate a low level alarm and to disable the electric fuel transfer pump(s). It must be possible to mute all alarms but the indicator light(s) must remain on until the tank(s) are re-filled at which time they should cancel automatically. The float switches shall be of such a type that they can be tested manually without opening the tank(s). They must further be installed in such a manner that they do not foul each other. In addition to the electric pump a manual hand pump shall be incorporated into the fuel line to be operated in the event of power failure. Each pump must have fuel isolating valves on either side of the pump to cater for servicing. A non-return valve is required after each of the electric and hand pumps to prevent short cycling.

## 16. ALTERNATOR

**General** – The alternator shall be suited for low speed operation, self-excited, brushless, 3 phase and/or single phase, complying with SANS 60034-1:2010. To be determined by site conditions and loads.



**Rating** – The rating shall be based on a power factor 0,8 shall be not less than the rating of the prime mover/engine. In addition to rating shall take into account the site location, height above sea level and the conditions of the engine room. The KVA rating shall also include for a 10% overload for one hour in any 12 hour period and shall be sustained at a temperature of 40°C.

**Enclosure** – The housing shall be closed, self-ventilated, drip proof enclosure with screened apertures. The enclosure will incorporate two bearings of the grease able, dust proof, ball or roller type.

**Windings** – Windings shall be tropically insulated, fully impregnated with oil resisting anti-track varnish. Stator windings shall have a minimum Class F insulation. Both the rotor and the armature shall be within the limits SANS 60034-11:2005. The rotor windings shall be suitable braced, balanced and reinforced to allow for over speed of 20%. All magnetic poles shall be of the laminated type, reducing eddy currents.

**Excitation and Regulation** – Excitation shall be provided by means of the standard, rotating armature AC exciter mounted on the main shaft. The AC exciter shall be coupled to a full wave automatic voltage regular (AVR). The rotating silicon diodes shall have electrical protection against voltage spikes (selenium diodes or other approved means). The entire exciter shall be brushless, self-ventilating, solid state with AVR. The automatic voltage regulator must also be suitably protected should the frequency fall below 48 Hz. The self-regulation of the alternator and exciter shall not exceed plus or minus 2,5% of the nominal voltage at all loads with the power factor between unity and 0,8; and within be provided for a range of +5% to -5% of voltage.

**Performance** – The normal, nominal voltage shall be 400 volts/230 volts, 3 phase or single phase, 50 Hz alternating current, with full-load and a power factor of 0,8. The frequency shall be maintained to within 2% of the sated 50 Hz under steady load conditions. The generator shall have the following limits:

- Voltage variation: -5% to +5% at 380 V.
- Transient voltages: -20% to +15% returning within 30 cycles, line to line.
- Unbalanced voltages: 2, 5% of arithmetic average.

The alternator shall comply with the radio interference suppression requirements of BS 800 of 1997 and Telkom (latest regulations).

**Wave Form** – A good sinusoidal waveform free slot triple is essential. At no-load the waveform distortion shall be less than 2%. At full load unity and 0,8 power factor (p.f) lag linear loads the



total waveform distortion shall be less than 5% with no individual harmonic exceeding 3%. The maximum waveform distortion of the alternator voltage when supplying 70% non-linear load shall not exceed 15%.

## 17. CONTROL PANEL

The controller will provide a number of control and monitoring features with expansion capability, to meet remote communications. The controller will meet power measurement, including full power monitoring instrumentation and powerful auto-sync functions. The controller will interface to the engine governor and AVR. The controller will be fitted with a RS232 port in order to allow comprehensive remote control and monitoring.

**Control** – A programmable logic controller is required, with an event logging facility. Provides a record of the most recent fault conditions with control hours' time stamp. Up to 5 events are stored in the control non-volatile memory.

**Sheet Metal Work** – The control panel and components shall be of approved design, manufacture and construction and shall be complete in all respects with all necessary equipment, bars, connections, wiring and accessories. The panel shall be robustly constructed, shall be in accordance with standard accepted practice, comply with the relevant S.A.N.S. Code of Practice, and shall have an attractive appearance. The panel shall be totally enclosed, dust and moisture proof as well as rodent and insect proof.

**Components** – All components where possible shall bear the SABS mark. Bus bars and connections shall be adequately tinned, shall conform the SANS 1195:2010 and be taped with distinctive phase colors for the full length. Bus bars and connections must be compatible with the fault rating of the switchgear. Adequately rated full length extendible copper earth bars shall be fitted. All components shall be suitably rated for their application and the switchgear shall be suitable for the site and location. Space shall be provided for the incoming and outgoing cable circuits. All cut edges and drilled holes of Bakelite or similar insulation board must be treated with electrical varnish. All equipment levers, handles, keys, etc. required for operation of the panel must be included together with suitable clips or trays to store these when not in use.

**Guarantee** – The whole of the panel and components shall be guaranteed for a period of 12months/480 hours depending on whichever occurs first from date of acceptance or handover.

**Equipment** – The following equipment shall be included in the panel (or similar approved). All fuses, circuit breakers, control and other equipment will be installed in compliance with the manufacturer's ratings, instructions and regulations (combined LCD digital display).

- Timers for power return, mains return, etc.



- Programmable logic controller and phase failure and phase reversal relay.
- Illuminated re-settable fault indicators, coupled to a common continuously rated hooter or low current electronic type yodel alarm for: low oil pressure, high oil temperature, high water temperature, engine over speed, failure to start, alternator overload, low fuel level, extra low fuel level engine trip.
- Mode selector switch for:
  - Off/Reset: Control system off and alarm condition reset.
  - Auto: Automatic starting and stopping of the set.
  - Manual: Starting and stopping activated manually (in this mode the load will not be transferred in the event of mains failure).
  - Test: The set will start automatically and the load will be taken by the alternator in the event of mains failure.
- Battery charger.
- By-pass mains selector.
- Main isolator for outgoing circuit.
- MCB's for: Battery charger, Jacket water heater, Fuel transfer pumps.
- One surge arrester (as per SANS 60099-5:2018) per phase fitted to the main circuit breaker.
- SMS Alert/Notification interface to allow for remote control via cell phone communication.

**Sequence of Operation** – The control panel shall be so designed to provide the following:

- A mains voltage/phase failure sensing relay which in the event of a mains failure the timing sequence shall be:
- A positive disconnection of the mains via the operation of the auto changeover switch – this shall also be effective in the event of single phasing or phase angle deviation.
- An immediate command to the engine to start.
- Once the engine is up to "speed", and the "mains" have not been restored, the changeover switch shall immediately close.
- In the event of the "mains" being restored after the start-up time of the engine, but before changeover to alternator supply, a timer shall hold the engine in the run position for approximately 1 minute before allowing the engine to "close down". Thereafter the engine close down shall proceed as described hereunder.



- Upon return of the "mains supply" when the alternator is on load a timer shall delay changeover for a further three minutes (to confirm continuity of supply). After changeover to "main supply", an adjustable timer (1 to 5 minutes) shall delay engine close down.
- Once the command to start has been given, three start attempts shall be allowed each of 10 seconds delay between each attempt. In the event of failure to start within 3 initial attempts, the starting system shall switch off and a L.V. alarm shall be initiated. Any further starting attempts may be only carried out when the plant is in the "manual" position.
- Fault reset after identification and rectification off same shall be by switching the selector to the "off" position and then back to the desired mode.

|  |                             | Hooter or Siren | Visual Light Indicator | Lock Out | Fuel Solenoid Off |
|--|-----------------------------|-----------------|------------------------|----------|-------------------|
|  | Over speed                  | X               | X                      | X        | X                 |
|  | Under speed or Overload     | X               | X                      | X        | X                 |
|  | High Temperature            | X               | X                      | X        | X                 |
|  | Low oil Pressure            | X               | X                      | X        | X                 |
|  | 3 Start Failure             | X               | X                      | X        | X                 |
|  | Lower Fuel Alarm            | X               | X                      |          |                   |
|  | Battery Charger Failure     | X               | X                      |          |                   |
|  | Selector Switch not in Auto |                 | X                      |          |                   |
|  | Extra low Fuel Cut-out      | X               | X                      | X        |                   |

All the above shall have the necessary re-set buttons.

**Battery Charger** – The charger module shall be mains (230 V) operated unit to continuously trickle charge the engine starter battery. It must be of the automatic modulating type. A "loss of charge" alarm relay shall be provided to indicate failure of the charger. This should be a current monitor. The output voltage (27,6 volts DC or 13,8 volts if applicable) shall be via full wave rectification and be kept within 1% of the float charger voltage. The 230 volt input voltage may vary between 207/253 volts and the equipment, (transformer etc.) must be capable of handling this discrepancy. During the "cranking/start" period and during running of the diesel engine the battery charger shall be disconnected via a relay. Charging of the battery shall then be by means of engine mounted alternator.

The battery charger shall be fully incorporated into the main control panel.



**Ventilation**– The position of the battery charger must not be placed under any switch gears or relays to allow good ventilation.

## **18. SPECIFICATIONS FOR MATERIALS AND EQUIPMENT OF ELECTRICAL INSTALLATIONS**

### **18.1. Distribution Board (DB)**

The construction must be in accordance with SANS 10142-1:2017.

All distribution boards must be surface mounted and must have doors.

Openings into distribution boards must tie up with the installation.

### **18.2. Cable Trays**

#### **18.2.1. Metal Cable Trays**

Metal cable trays shall be manufactured from perforated rolled steel. Metal trays manufactured to the following standards shall be use:

- Less than 150 mm wide 1,2 mm minimum thickness with 12 mm minimum return.
- 150 mm to 457 mm 1,2 mm minimum thickness with 19 mm minimum return.
- 460 mm to 610 mm (Heavy duty) 2,5 mm minimum thickness with 76 mm return.

#### **18.2.2. Accessories**

Horizontal and vertical bends, T-junctions and cross connections shall be supplied by the Contractor. The dimensions of these connections shall correspond to the dimensions of the linear sections to which they are connected. The radius of all bends shall be 1m minimum. The inside dimensions of horizontal angles or connections shall be large enough to ensure that the allowable bending radius of the cables is not exceeded. Sharp angles shall be 45° mitered.

### **18.3. PVC - Insulated Cables**

This section covers the requirements for PVC-insulated cables for general installations under normal environmental conditions.

Cables shall be manufactured in accordance with SANS 1507-3:2015, shall come only from fresh stocks, and shall be constructed as follows:



- Armored cables PVC-insulated/~~PVC-bedded~~/ armored/black extruded PVC outer sheath.

Cable shall be manufactured and supplied in one length to the lengths specified unless these lengths exceed a standard drum length in which case a ruling shall be obtained from the SAPS.

At the option of the SAPS acceptance tests shall be carried out on production runs of the cable in accordance with SANS 1507-3:2015.

#### **18.4. PVC - Sheathed Aluminium-Covered Cables**

Aluminum-covered cables shall comprise PVC-insulated copper conductors protected by an aluminum foil tape screen and a PVC sheath. Cable ends shall be made off with compression glands fitted with a neoprene ring to seal the end. Aluminum sheathed cable shall be installed on surface only using matching saddles installed at suitable intervals to prevent sagging. Where exposed to sunlight, the cable shall have a stabilized black outer sheath.

#### **18.5. Labelling**

Care shall be taken to ensure that all equipment is fully labelled and that accurate descriptions and safety warning notices appear in English.

Engraved plastic or ivory-sandwiched strips shall be used throughout. The strips shall bear white lettering on black background for normal labels and red letters on a white or yellow background for danger notices.

#### **18.6. Circuit breakers**

All moulded-case circuit breakers shall be flush mounted with only the toggles protruding. Miniature circuit breakers may be installed in clip-in trays mounted on the frame. All other circuit breakers shall be bolted to the chassis. Special provision shall be made for large main switches when designing the framework. Care shall be exercised that the rear studs of circuit breakers are properly insulated from the steel chassis. Where necessary, insulating material shall be installed that the toggles are in the up position when "ON" and "OFF."

### **19. INSTALLATION OF CABLES**

This section covers the installation of cables for the distribution of power in buildings, other structures and in ground for system voltages up to 11 kV, 50 Hz.

#### **19.1. Cable Types**



- All cables and jointing and termination accessories used for power distribution shall comply with SANS 10142-1:2017.
- Cables with copper conductors shall be used throughout unless otherwise specified or approved.
- All unarmoured cables shall be installed in metal trunking, sleeves or conduits unless clearly specified to the contrary.
- XLPE Cables shall only be used in exceptional circumstances with the written permission of the Project Manager: SCM Facility Management.

#### **19.2. Identification of Cables**

- Cables shall be identified at all terminations by means of punched metallic bands or marked with labels or tags. (Also refer to SANS 10142-1:2017).
- The use of PVC tape with punched characters is not acceptable.
- The identification numbers of cables shall be shown on "as-built" drawings of the installation.

### **20. TRENCHING**

- The Contractor shall be responsible for all trenching excavations unless specified to the contrary.
- The Contractor shall, before trenching commences, familiarise himself with the routes and site conditions and the procedure and order of doing the work shall be planned in conjunction with the general construction programme for other services and building requirements.
- The Contractor shall acquaint himself with the position of all the existing services such as storm water pipes, water mains, sewer mains, gas pipes, telephone cables, etc. before any excavations are commenced. For this purpose he shall approach the local municipal authority and any other authority which may be involved, in writing.
- The Contractor will be held responsible for damage to any existing services brought to his attention by the relevant authorities and shall be responsible for the cost of repairs.
- The Contractor shall take all the necessary precautions and provide the necessary warning signs and/or lights to ensure that the public and/or employees on site are not endangered.
- The Contractor shall ensure that the excavations will not endanger existing structures, roads, railways, other site constructions or other property.



## **20.1. Trenching**

- Trenching shall be programmed in advance and the approved programme shall not be departed from except with the consent of the Project Manager: SCM Facility Management.
- Trenches shall be as straight as possible and shall be excavated to the dimensions indicated in this specification.
- The bottom of the trench shall be of smooth contour, and shall have no sharp dips or rises which may cause tensile forces in the cable during backfilling.
- The excavated material shall be placed adjacent to each trench in such a manner as to prevent nuisance, interference or damage to adjacent drains, gateways, trenches, water furrows, other works, properties or traffic. Where this is not possible, the excavated materials shall be removed from site and returned for backfilling on completion of cable laying.
- Surplus material shall be removed from site and disposed of at the cost of the Contractor.
- Trenches across roads, access ways or footpaths shall not be left open. If cables cannot be laid immediately, the Contractor shall install temporary "bridges" or cover plates of sufficient strength to accommodate the traffic concerned.
- In the event of damage to other services or structures during trenching operations, the Contractor shall immediately notify the SCM Facility Management and institute repairs.
- Prior to cable laying, the trench shall be inspected thoroughly and all objects likely to cause damage to the cables either during or after laying shall be removed.
- Where ground conditions are likely to reduce maximum current carrying capacities of cables or where the cables are likely to be subjected to chemical or other damage or electrolytic action, the SCM Facility Management shall be notified before installing the cables. The Project Manager: SCM Facility Management will advise on the course of action to be taken.

## **20.2. Dimensions of trenches**

- A trench must be excavated at a depth of 500mm and a width of 300mm. An electrical warning tape must be laid 300mm above the depth of 500mm trench.
- The width shall be increased where more cables are installed to allow for the spacing as stipulated above.



## **PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**

- Where trenches change direction or where cable slack is to be accommodated, the Contractor shall ensure that the requirements of the relevant SANS 10198-8:2016 specification regarding the bending radii of cables are met when determining trench widths.

### **20.3. Joint Holes**

Where cable joints are required to be made in the course of a cable run, a joint hole shall be excavated of sufficient size to enable the cable jointer to work efficiently and unimpeded.

### **20.4. Bedding**

- The bottom of the trench shall be filled across the full width with a 75 mm layer of suitable soil sifted through a 6 mm mesh and levelled off.
- Only sandy clay or loam soil with a satisfactory thermal resistivity (not exceeding 1.5 °C m/W) may be used for this purpose. Sea or river sand, ash, chalk, peat, clinker or clayey soil shall not be used. The use of crusher sand is acceptable.
- Where no suitable soil is available on site, the Contractor shall import fill from elsewhere and make all the necessary arrangements to do so. The cost of importing soil for bedding purposes shall be included in the unit rates for excavations.
- After cable laying, a further layer of bedding shall be provided to extend to 75 mm above the cables.
- The bedding under joints shall be fully consolidated to prevent subsequent settling.

### **20.5. Cable Sleeves**

- Where cables cross under roads, railway tracks and other service areas, etc. and where cables enter buildings, the cables shall be installed in Polyethylene (6 mm thickness), pipes or earthenware pipes. Pitch fibre and PVC pipes are not acceptable because of the adhesion that occurs after a period of time between the pipe and the sheathing or outer serving of the cables.
- Pipes shall be joined in accordance with the manufacturer's instructions.
- Sleeves shall cross roads and railway tracks at right angles.
- A diameter of 110 mm cable sleeve to be installed at the standby generator plinth and also where the cable is crossing the roadway.



- Cable sleeves shall be installed to the spacing and depths stated below.
- Galvanised metallic sleeves up to and including 76 mm dia. shall be supplied and installed by the contractor.
- The ends of all sleeves shall be sealed with a non-hardening watertight compound after the installation of cables. All sleeves intended for future use shall likewise be sealed.

## **20.6. Backfilling**

- The Contractor shall not commence with the backfilling of trenches without prior notification to the SCM Facility Management so that the cable installation may be inspected. Should the Contractor fail to give a timeous notification, the trenches shall be re-opened at the Contractor's cost. Such an inspection will not be unreasonably delayed.
- The tape shall be yellow, marked with the words "**ELECTRICAL WARNING TAPE**" in black.
- Backfilling shall be undertaken with soil suitable to ensure settling without voids. The maximum allowable diameter of stones present in the backfill material is 75 mm.
- The Contractor shall have allowed in his tender for the importation of suitable backfill material if required.
- The backfill shall be compacted in layers of 150 mm and sufficient allowance shall be made for final settlement. The Contractor shall maintain the refilled trench at his expense for the duration of the contract. Surplus material shall be removed from site and suitably disposed of.
- On completion, the surface shall be made good to match the surrounding area.
- In the case of roadways or paved areas the excavations shall be consolidated to the original density of the surrounding material and the surface finish reinstated.

## **21. INSPECTIONS, TESTING, COMMISSIONING AND HANDING OVER**

### **21.1. PHYSICAL INSPECTION PROCEDURE**

- Once the Contractor has completed the installation, written notice shall be given to the Project Manager: SCM Facility Management in order that a mutually acceptable date can be arranged for a joint inspection.



- During the course of the inspection, the Project Manager/Engineer will compile a list of items (if any) requiring further attention. A copy of this list will be provided to the Contractor who will have a period of 7 days in which to rectify the offending items of the installation.
- The Contractor shall then provide written notice that he is ready for an inspection of the remedial work to the offending items.
- This procedure will continue until the entire installation has been correctly completed to the satisfaction of the Project Manager/Engineer.

## **21.2. TESTING AND COMMISSIONING**

- All installed equipment shall be commissioned and tested as per the manufacturer's recommendations. The results of all tests must be recorded and submitted to SAPS, SCM, Facility Management for approval.
- Routine factory tests reports shall accompany all equipment supplied and shall be given to the SAPS, SCM, Facility Management, prior to the equipment being installed and commissioned.
- Contractor to provide COCs and all relevant test certificates to SAPS Project Manager/Engineer prior to energizing of equipment.

## **22. CLEANING OF SITE**

- After completion of construction activities, the contractor shall remove all his equipment, rubbish, rubbles & waste and leave the site in a tidy condition. The cost thereof must be included for in the P & G's.

## **23. PREAMBLES TO SCHEDULE OF QUANTITIES**

### **PRICE SCHEDULE**

**General** – The Schedules of Quantities define the scope of the Engineering Works in terms of the measurement and payment parameters specified. The Schedules shall be read in conjunction with the General Conditions of Contract. The quantities stated on the schedules are provisional and are subject to re-measurement upon completion. Bidders shall quote for all equipment and all accessories specified within this document. The procurement of this equipment shall take place as needed, spread over the one year period. Servicing and maintenance of all newly installed equipment and components and guaranteeing free of defects for the full maintenance period of one year, will form part of this contract.

142



**Descriptions & Measured Items** – The Schedule of Quantities consists of Descriptions followed by measured items (Item lines) which specify the items of differing dimensions, ratings, etc. which comply with the overall requirements of such Description. The measured items may add, subtract or in any other way vary the Description. Below each item line the measured quantities applicable to each of the applicable sections of the Works appears under the relevant column heading, the total of which is shown under the Quantity column. The terms used and Schedule layout are defined in the *Schedule of Quantities* Legend which is presented at this Preamble. The Schedule of Quantities is based upon the Standard system of measurement modified as necessary. **Fixed Rates** – Rates shall be fixed for the duration of the contract. **All inclusive** – The Descriptions and item lines are of necessity abbreviated summaries of the specifications and unless otherwise stated or elsewhere measured, shall include all necessary components and accessories required or necessary for the correct functioning or performance of the item when incorporated into the Engineering Works. The rates and prices shall accommodate the nature of the Engineering Work and any restrictions which apply to the Works Environment and the Site of the Works, shall include all the costs and expenses that may be required in and for the construction of the Works described and shall include the cost of all general obligations, risks and liabilities stated or implied in the contract documents.

## 24. SCHEDULES OF QUANTITIES

**NOTE 1:** THE FOLLOWING WORK IS TO BE CARRIED OUT BY AN APPROVED SPECIALIST SUPPLIER – Supply, install and commissioning of Standby Generator Set: the following systems including all components and sundries, tests, etc. required to bring the installations to the working order intended & comply with written guarantee.



## 24.1. Ida Police Station

| IDA POLICE STATION                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                |                  |     |      |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----|------|--------|
| Item                                                                                                                                                                                                                                                                                                                                    | Description                                                                                                                                                                                                    | Unit             | Qty | Rate | Amount |
| <b>NOTE 1: THE FOLLOWING WORK IS TO BE CARRIED OUT BY AN APPROVED SPECIALIST SUPPLIER – Supply, install and commissioning of Standby Generator Set: the following systems including all components and sundries, tests, etc. required to bring the installations to the working order intended &amp; comply with written guarantee.</b> |                                                                                                                                                                                                                |                  |     |      |        |
| 1                                                                                                                                                                                                                                                                                                                                       | Preliminary & General: 1.1. Prepare & submit Health & Safety Plan; 1.2. Prepare & submit Programme of the works; 1.3. Removal of Rubbish, Rubbles & waste on site; 1.4. Warrantee agreement for 12 months      | Sum of           | 1   |      |        |
| 2                                                                                                                                                                                                                                                                                                                                       | Supply, deliver, install, commissioning and energizing an outdoor <b>50 KVA</b> standby generator (three phase) of fuel tank of <b>220L</b> , as per Specification, including protection gear, all accessories | No.              | 1   |      |        |
| 3                                                                                                                                                                                                                                                                                                                                       | Factory load test of the specified for <b>50 KVA</b> standby generator, inclusive of fuel, consumables, load bank etc.                                                                                         | No.              | 1   |      |        |
| 4                                                                                                                                                                                                                                                                                                                                       | Supply and construct the plinth on site, the top of the plinth shall protrude at least 200mm above the ground level and 100mm beyond the edges of the generator set.                                           | sum              | 1   |      |        |
| 5                                                                                                                                                                                                                                                                                                                                       | Supply diesel fuel; Commissioning and replenishment during inspections                                                                                                                                         | L                | 220 |      |        |
| 6                                                                                                                                                                                                                                                                                                                                       | Construct and install complete galvanized palisade fencing, including matching entrance gate and locking mechanism as per specification (Palisade fence must be 1.5m away from the generator)                  | sum              | 1   |      |        |
| 7                                                                                                                                                                                                                                                                                                                                       | Excavation depth of 0.5 m and width of 0.3 m of soft/rock/hard rock and backfilling                                                                                                                            | P/m <sup>3</sup> | 4   |      |        |
| 8                                                                                                                                                                                                                                                                                                                                       | Supply and install XLPE cable, low voltage, 4 core PVC/SWA SHEATHED (16mm <sup>2</sup> ) (from generator room to main supply)                                                                                  | m                | 20  |      |        |

144

**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**



|                  |                                                                                                                                                                            |                  |      |  |  |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------|--|--|
| 9                | Supply and install XLPE cable, low voltage, 4 core PVC/SWA SHEATHED (16mm <sup>2</sup> ) (from main supply to parkhomes kiosk)                                             | m                | 40   |  |  |
| 10               | Supply and install 60 Amp, three pole 3kA, circuit breaker                                                                                                                 | No.              | 1    |  |  |
| 11               | Training of end user operating staff (two) in the station and submit proof thereof to Project Manager                                                                      | No.              | 2    |  |  |
| 12               | Supply operating instructions, maintenance manuals and fault finding instructions and symbolic signs                                                                       | sum              | 1    |  |  |
| 13               | supply and install PVC, non-sheath copper conductor/cable, low voltage single core, stranded(10mm <sup>2</sup> )                                                           | m                | 10   |  |  |
| 14               | Reinstate concrete/paving/soil and installation of electrical warning tape.                                                                                                | P/m <sup>3</sup> | 4    |  |  |
| 15               | Safety compliance as per OHS act and specification, including DCP Fire extinguisher Cabinet and 9 kg dry powder fire extinguisher combo in the generator plant             | No.              | 1    |  |  |
| 16               | Site handing over with client including meeting and final delivery                                                                                                         | No.              | 3    |  |  |
| 17               | Generator services: Six monthly service                                                                                                                                    | No.              | 2    |  |  |
| 18               | Testing and Certification: Certification of Compliance (COC), with regards to all electrical reticulation, connections, wiring, equipment & commissioning of new generator | No.              | 1    |  |  |
| 19               | Artisan                                                                                                                                                                    | Hrs              | 80   |  |  |
| 20               | Semi-Skill                                                                                                                                                                 | Hrs              | 80   |  |  |
| 21               | Casual Labour                                                                                                                                                              | Hrs              | 80   |  |  |
| 22               | Travelling                                                                                                                                                                 | Km's             | 5420 |  |  |
|                  | <b>SUB-TOTAL</b>                                                                                                                                                           |                  |      |  |  |
|                  | <b>ADD VAT: 15%</b>                                                                                                                                                        |                  |      |  |  |
| <b>TOTAL - 1</b> |                                                                                                                                                                            |                  |      |  |  |



## 24.2. Kubusiedrift Police Station

| KUBUSIEDRIFT SAPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                           |        |     |      |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----|------|--------|
| <b>NOTE 1:</b> THE FOLLOWING WORK IS TO BE CARRIED OUT BY AN APPROVED SPECIALIST SUPPLIER – Supply, install and commissioning of Standby Generator Set: the following systems including all components and sundries, tests, etc. required to bring the installations to the working order intended & comply with written guarantee.<br><b>NOTE 2:</b> UNITS: <b>no</b> represent number, <b>m</b> represent metre, <b>L</b> represent liter and <b>sum of</b> represent total amount for two or more items. |                                                                                                                                                                                                                                                                                                                                                           |        |     |      |        |
| ITEM NO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | DESCRIPTION                                                                                                                                                                                                                                                                                                                                               | UNIT   | Qty | RATE | AMOUNT |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Preliminary & General: 1.1. Prepare & submit Health & Safety Plan; 1.2. Prepare & submit Programme of the works; 1.3. Removal of Rubbish, Rubbles & waste on site; 1.4. Warrantee agreement for 12 months                                                                                                                                                 | Sum of | 1   |      |        |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Supply, deliver(including transport to site),install, commissioning and energizing of an outdoor <b>50 KVA</b> standby generator (three phase) complete with base tank of <b>220L</b> including plinth, AMF control panel, sound attenuation canopy, electrical protection switchgear located inside the generator control panel and warning safety sign. | no     | 1   |      |        |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Factory load test of the specified for 50 KVA standby generator, inclusive of fuel, consumables, load bank etc.                                                                                                                                                                                                                                           | no     | 1   |      |        |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Supply diesel fuel: Commissioning and replenishment during inspections.                                                                                                                                                                                                                                                                                   | L      | 220 |      |        |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Construct and install complete galvanized palisade fencing, including matching entrance gate and locking mechanism as per specification (Palisade fence must be 1.5m away from the generator)                                                                                                                                                             | sum    | 1   |      |        |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Supply and install symbolic safety sign for fire extinguisher.                                                                                                                                                                                                                                                                                            | no     | 1   |      |        |

146



|                  |                                                                                                                                                        |                  |      |  |  |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------|--|--|
| 7                | Excavation depth of 0.5 m and width of 0.3 m and length of 5m of soft/rock/hard rock, backfilling and laying of electrical of warning tape.            | P/m <sup>3</sup> | 5    |  |  |
| 8                | Reinstate concrete/paving/soil and installation of electrical warning tape.                                                                            | P/m <sup>3</sup> | 5    |  |  |
| 9                | Supply and install PVC SWA copper conductor Armoured cable, low voltage 4 core stranded 16mm <sup>2</sup> complete with mechanical cable glands.       | p/m              | 10   |  |  |
| 10               | Supply and install, non-sheathed, copper conductor/cable, single core, stranded 10mm <sup>2</sup> complete with accessories.                           | p/m              | 5    |  |  |
| 11               | Supply and install three phase 60A circuit breaker with a kA rating of 5kA.                                                                            | no               | 1    |  |  |
| 12               | Supply and install PVC cable sleeve with a diameter of 110mm.                                                                                          | m                | 4    |  |  |
| 13               | Supply and install cable tray with a size of 200*50mm complete with accessories.                                                                       | p/m              | 6    |  |  |
| 14               | Site hand-over with client including first and final delivery.                                                                                         | no               | 3    |  |  |
| 15               | Generator services: Six monthly service or 240hours.                                                                                                   | no               | 2    |  |  |
| 16               | Training of end user operating staff in the station and submit proof thereof to Project Manager.                                                       | no               | 2    |  |  |
| 17               | Safety compliance as per OHS act and specification, including safety plan and supply and installation of waterproof 9 kg dry powder fire extinguisher. | no               | 1    |  |  |
| 18               | Test and commissioning, Certificate of Compliance (COC) with regards to all electrical reticulation, connections, wiring of generator set.             | no               | 1    |  |  |
| 19               | Artisan, normal time.                                                                                                                                  | hrs              | 80   |  |  |
| 20               | Semi-skilled, normal time.                                                                                                                             | hrs              | 80   |  |  |
| 21               | Labourer, normal time.                                                                                                                                 | hrs              | 80   |  |  |
| 22               | Transport: To the level of LDV.                                                                                                                        | km               | 1170 |  |  |
|                  | <b>SUB-TOTAL</b>                                                                                                                                       |                  |      |  |  |
|                  | <b>ADD VAT: 15%</b>                                                                                                                                    |                  |      |  |  |
| <b>Total - 2</b> |                                                                                                                                                        |                  |      |  |  |

147



## 24.3. Sterkstroom Police Station

| STERKSTROOM SAPS                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                           |        |     |      |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----|------|--------|
| <b>NOTE 1:</b> THE FOLLOWING WORK IS TO BE CARRIED OUT BY AN APPROVED SPECIALIST SUPPLIER – Supply, install and commissioning of Standby Generator Set: the following systems including all components and sundries, tests, etc. required to bring the installations to the working order intended & comply with written guarantee. |                                                                                                                                                                                                                                                                                                                                                           |        |     |      |        |
| <b>NOTE 2:</b> UNITS: <b>no</b> represent number, <b>m</b> represent metre, <b>L</b> represent liter and <b>sum of</b> represent total amount for two or more items.                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                           |        |     |      |        |
| ITEM NO                                                                                                                                                                                                                                                                                                                             | DESCRIPTION                                                                                                                                                                                                                                                                                                                                               | UNIT   | Qty | RATE | AMOUNT |
| 1                                                                                                                                                                                                                                                                                                                                   | Preliminary & General: 1.1. Prepare & submit Health & Safety Plan; 1.2. Prepare & submit Programme of the works; 1.3. Removal of Rubbish, Rubbles & waste on site; 1.4. Warrantee agreement for 12 months                                                                                                                                                 | Sum of | 1   |      |        |
| 2                                                                                                                                                                                                                                                                                                                                   | Supply, deliver(including transport to site),install, commissioning and energizing of an outdoor <b>50 KVA</b> standby generator (three phase) complete with base tank of <b>220L</b> including plinth, AMF control panel, sound attenuation canopy, electrical protection switchgear located inside the generator control panel and warning safety sign. | no     | 1   |      |        |
| 3                                                                                                                                                                                                                                                                                                                                   | Factory load test of the specified for 50 KVA standby generator, inclusive of fuel, consumables, load bank etc.                                                                                                                                                                                                                                           | no     | 1   |      |        |
| 4                                                                                                                                                                                                                                                                                                                                   | Decommissioning and remove of existing standby generator.                                                                                                                                                                                                                                                                                                 | no     | 1   |      |        |
| 5                                                                                                                                                                                                                                                                                                                                   | Supply diesel fuel: Commissioning and replenishment during inspections.                                                                                                                                                                                                                                                                                   | L      | 220 |      |        |
| 6                                                                                                                                                                                                                                                                                                                                   | Construct and install complete galvanized palisade fencing, including matching entrance gate and locking mechanism as per specification (Palisade fence must be 1.5m away from the generator)                                                                                                                                                             | sum    | 1   |      |        |
| 7                                                                                                                                                                                                                                                                                                                                   | Supply operating instructions, maintenance manuals and fault finding instructions and symbolic safety signs.                                                                                                                                                                                                                                              | no     | 1   |      |        |

148

**PART C 2: CONTRACT: SUPPLY, INSTALLATION AND MAINTENANCE OF STANDBY GENERATORS**



|                 |                                                                                                                                                        |                  |      |  |  |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------|--|--|
| 8               | Excavation depth of 0.5 m and width of 0.3 m and length of 5m of soft/rock/hard rock, backfilling and laying of electrical of warning tape.            | P/m <sup>3</sup> | 20   |  |  |
| 9               | Reinstate concrete/paving/soil and installation of electrical warning tape.                                                                            | P/m <sup>3</sup> | 20   |  |  |
| 10              | Supply and install PVC SWA copper conductor Armoured cable, low voltage 4 core stranded 16mm <sup>2</sup> complete with mechanical cable glands.       | p/m              | 40   |  |  |
| 11              | Supply and install, non-sheathed, copper conductor/cable, single core, stranded 10mm <sup>2</sup> complete with accessories.                           | p/m              | 20   |  |  |
| 12              | Supply and install three phase 60A circuit breaker with a kA rating of 5kA.                                                                            | no               | 1    |  |  |
| 13              | Supply and install cable tray with a size of 200*50mm.                                                                                                 | p/m              | 4    |  |  |
| 14              | Supply and install PVC cable sleeve with a diameter of 110mm.                                                                                          | p/m              | 4    |  |  |
| 15              | Supply and install cable trucking with a size of 200*50mm.                                                                                             | p/m              | 2    |  |  |
| 16              | Site hand-over with client including first and final delivery.                                                                                         | no               | 3    |  |  |
| 17              | Generator services: Six monthly service or 240 hours.                                                                                                  | no               | 2    |  |  |
| 18              | Training of end user operating staff in the station and submit proof thereof to Project Manager.                                                       | no               | 2    |  |  |
| 19              | Safety compliance as per OHS act and specification, including safety plan and supply and installation of waterproof 9 kg dry powder fire extinguisher. | no               | 1    |  |  |
| 20              | Test and commissioning, Certificate of Compliance (COC) with regards to all electrical reticulation, connections, wiring of generator set.             | no               | 1    |  |  |
| 21              | Artisan, normal time.                                                                                                                                  | hrs              | 80   |  |  |
| 22              | Semi-skilled, normal time.                                                                                                                             | hrs              | 80   |  |  |
| 23              | Labourer, normal time.                                                                                                                                 | hrs              | 80   |  |  |
| 24              | Transport: To the level of LDV.                                                                                                                        | km               | 5000 |  |  |
|                 | <b>SUB-TOTAL</b>                                                                                                                                       |                  |      |  |  |
|                 | <b>ADD VAT: 15%</b>                                                                                                                                    |                  |      |  |  |
| <b>Total- 3</b> |                                                                                                                                                        |                  |      |  |  |



## 24.4. Maclear Police Station

| MACLEAR POLICE STATION                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                    |                  |     |      |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----|------|--------|
| Item                                                                                                                                                                                                                                                                                                                                    | Description                                                                                                                                                                                                        | Unit             | Qty | Rate | Amount |
| <b>NOTE 1: THE FOLLOWING WORK IS TO BE CARRIED OUT BY AN APPROVED SPECIALIST SUPPLIER – Supply, install and commissioning of Standby Generator Set: the following systems including all components and sundries, tests, etc. required to bring the installations to the working order intended &amp; comply with written guarantee.</b> |                                                                                                                                                                                                                    |                  |     |      |        |
| 1                                                                                                                                                                                                                                                                                                                                       | Preliminary & General: 1.1. Prepare & submit Health & Safety Plan; 1.2. Prepare & submit Programme of the works; 1.3. Removal of Rubbish, Rubbles & waste on site; 1.4. Warrantee agreement for 12 months          | sum              | 1   |      |        |
| 2                                                                                                                                                                                                                                                                                                                                       | Supply, deliver, install, commissioning and energizing an outdoor <b>50 KVA</b> standby generator (three phase) with a fuel tank of <b>220L</b> , as per Specification, including protection gear, all accessories | No.              | 1   |      |        |
| 3                                                                                                                                                                                                                                                                                                                                       | Factory load test of the specified for <b>50 KVA</b> standby generator, inclusive of fuel, consumables, load bank etc.                                                                                             | No.              | 1   |      |        |
| 4                                                                                                                                                                                                                                                                                                                                       | Supply and construct the plinth on site, the top of the plinth shall protrude at least 200mm above the ground level and 100mm beyond the edges of the generator set.                                               | sum              | 1   |      |        |
| 5                                                                                                                                                                                                                                                                                                                                       | Supply diesel fuel: Commissioning and replenishment during inspections                                                                                                                                             | L                | 220 |      |        |
| 6                                                                                                                                                                                                                                                                                                                                       | Construct and install complete galvanized palisade fencing, including matching entrance gate and locking mechanism as per specification (Palisade fence must be 1.5m away from the generator)                      | m                | 22  |      |        |
| 7                                                                                                                                                                                                                                                                                                                                       | Excavation depth of 0.5 m and width of 0.3 m of soft/rock/hard rock and backfilling                                                                                                                                | P/m <sup>3</sup> | 10  |      |        |
| 8                                                                                                                                                                                                                                                                                                                                       | Supply and install XLPE cable, low voltage, 4 core PVC/SWA SHEATHED (16mm <sup>2</sup> ) (from generator room to main supply)                                                                                      | m                | 190 |      |        |