



SCM SUBMISSION: SPECIFICATION

PURPOSE OF SUBMISSION	To seek the approval of the Bid Specification Document for the appointment of a contractor needed for the execution of construction work on seven (7) substations for the period of six (6) Months
DESCRIPTION OF GOODS / SERVICES / WORK	Gauteng Region: The reconstruction of the 3 kV DC Traction, and AC Distribution Substations between Anglers Train Station and Houtheuvel Train Station.
REQUEST FOR TENDER NUMBER	
DIVISION	PRASA Technical
USER DEPARTMENT	Strategic Infrastructure Chief Engineer (Electrical)
DATE SUBMITTED	



TABLE OF CONTENTS

- 1. INTRODUCTION**
- 2. BACKGROUND INFORMATION**
- 3. OBJECTIVE OF THE PROPOSED PROJECT**
- 4. SCOPE OF WORKS AND AREAS OF FOCUS**
- 5. SPECIFICATION OF THE WORK OR PRODUCTS OR SERVICES REQUIRED**
- 6. TECHNICAL SPECIFICATIONS RELATED TO THIS PROJECT**
- 7. TIME FRAMES / PROGRAMS**



1. INTRODUCTION

- 1.1. This submission serves as a Bid Specification Document for the appointment of a Contractor needed to perform the construction work activities for the project: The reconstruction of the 3 kV DC traction, and AC distribution substations between the Anglers Train Station and Houtheuwel Train Station. The project's desired outcome is a fully operational 3 kV DC Traction, and AC Distribution Substations between Anglers Train Station and Houtheuwel Train Station, which comply with all applicable PRASA/Transnet specifications, equipment specifications or manuals, technical standards, regulations, laws of the land and international laws.
- 1.2. The section between the Anglers Train Station and Houtheuwel Train Station has four (4) 3kV DC Traction Substations, and three (3) AC Distribution Substations, which form an integral part of the electrical traction and distribution power network in the Gauteng South Region. The electrical substations are critical power supply points for the traction power supply, Signal Cabin, Telecommunication systems, High Mast lights in the yards, PRASA offices, Security systems, Guardrooms, Depots, Train station buildings, and Train Station Platforms.
- 1.3. The information gathered from substation yards during inspection indicates that all substations equipment and conductors for both DC traction substations and AC distribution substations between the Anglers Train Station and Houtheuwel Train Station have been vandalised beyond economical repair, this includes ESKOM and Municipalities' supply points. Therefore, the reconstruction of all substations on this corridor is a major priority for the Electrical Infrastructure department to provide a reliable power supply for train operations and associated services.
- 1.4. The scope of work in this bid specification will cover the following traction and distribution substations:
 - 1.4.1. List of traction substations covered in this bid specification.
 - a) Anglers 3kV DC Traction Substation, single unit at 88kV nominal voltage.
 - b) Stretford 3kV DC Traction Substation, single unit at 88kV nominal voltage.
 - c) Residensia Tie-Station; and
 - d) Houtheuwel 3kV DC Traction Substation, single unit at 88kV nominal voltage.
 - 1.4.2. List of the AC Distribution Substations covered in this bid specification.
 - a) Stretford 88kV/6.6kV Distribution Substation (inside traction substation);
 - b) Houtheuwel Tie-Station; and
 - c) Houtheuwel 88kV/6.6kV Distribution Substation (inside traction substation).



- 1.5. The scope of work will include design, detailed project specification document, and execution of construction work activities.

2. BACKGROUND INFORMATION FOR THE PROJECT

Due to extensive overhead traction cable theft and infrastructure damage, in November 2019, Metrorail was forced to suspend its train services. The sustained vandalism and theft of overhead and signalling infrastructure prevented the reinstatement of train services. The vandalised assets include train stations, power supply systems such as overhead traction equipment (OHTE), substations, and signalling systems.

The declaration of a national state of disaster on 15 March 2020 and the lockdown from 26 March 2020 due to the COVID-19 pandemic resulted in all commuter rail services being prohibited for the duration of the lockdown at level 5. This resulted in a total loss of fare revenue for three months. Crime increased exponentially after the announcements, with the unprecedented destruction of the national rail network.

Furthermore, most of the insulators were obsolete and Porcelain insulators are easy to vandalise, therefore antivandal-proof insulators are proposed in the specification. The latest bond specification requirements are bolted bonds, by implementing this project will assist PRASA to comply with RSR requirements. Lastly, all traction substations will be constructed with 6 MVA traction transformer/s, which will increase available power capacity in the section and be able to accommodate Electric Module Unit (EMU) sets.

2.1. STATUS QUO

The substations' equipment has been subjected to theft and vandalism and needs to be replaced urgently.

2.2. PROBLEM STATEMENT

Due to several of PRASA substations being out of service, there is an inadequate traction power supply to run a reliable and safe train service to commuters.

2.3. PICTORIALS

The present status of vandalised substations equipment is shown in the pictorial format below.



Figure 2.1: 88kV AC Outdoor Vandalised Equipment



Figure 2.2: Vandalised Indoor Equipment



3. OBJECTIVE OF THE PROPOSED PROJECT

The objectives of the project are outlined in detail in the following sections:

3.1. DESIRED OUTCOMES FOR CARRYING OUT THE PROPOSED PROJECT

The desired outcomes for a successful implementation of this project shall yield the following benefits in the Gauteng South Region:

- 3.1.1 PRASA traction system will comply with National Regulation requirements and Engineering Safety Instructions.
- 3.1.2 Refurbished traction substations and distribution substations will be fitted with adequate security systems to protect substations, which will guarantee continuous reliable power supply to train operations.
- 3.1.3 Latest technology electrical equipment with enhanced safety features and monitoring systems; and
- 3.1.4 Improved safety of personnel executing maintenance in the substation. Newly installed electrical assets will be free from polychlorinated biphenyls (PCBs). PCB materials and PCB-contaminated materials must be phased out from the year 2023 as per the Government Gazette, Notice No. 37818 issued on 10 July 2014;
- 3.1.5 Improved compliance with the National Railway Safety Regulator Act, 2002 (Act 16 of 2002, as amended); Occupational Health & Safety Act, 1993 (ACT 85 of 1993, as amended), and National Environmental Management Act, 1998 (Act No. 107 of 1998, as amended).

3.2. PROJECT BENEFITS TO PRASA

PRASA as a business shall realise the following significant benefits after the implementation of the project:

- 3.2.1 Modernisation of the substation electrical equipment.
- 3.2.2 Improved risk factors with reliable and stable electrical assets that guarantee the safe movement of trains;
- 3.2.3 Stimulate economic activities and positive social impact on the surrounding communities.
- 3.2.4 Restore train services, contribute to social activities, and generate income revenue.
- 3.2.5 Improved protection of overhead track equipment with the installation of modern protection technology;



- 3.2.6 Reduced maintenance costs with new electrical assets in the substations having a low failure rate and replacement of components;
- 3.2.7 Enhanced capacity in the new substations with the installation of transformers with a higher power rating;
- 3.2.8 New Substations will be equipped with efficient security systems and technologies, this will reduce incidents of theft and vandalism, hence improving the security of electrical assets; and

3.3. CURRENT MECHANISMS IN PLACE TO ADDRESS THE PROBLEM

- 3.3.1 None

4. SCOPE OF WORK AND AREAS OF FOCUS

The contractor's applicable and relevant high-level scope of work is outlined in the following sections.

4.1 SCOPE OF WORK FOR THE CONSTRUCTION

4.1.1 Civil and Electrical High-level Scope

- 4.1.1.1 Prepare a risk management plan & risk assessment for the construction phase;
- 4.1.1.2 Prepare a quality management plan and implement it accordingly;
- 4.1.1.3 Prepare and submit minutes of all project-related meetings;
- 4.1.1.4 Prepare and submit monthly progress reports;
- 4.1.1.5 Monitor construction work activities on site;
- 4.1.1.6 The bidder will have to clear the identified site for site establishment. Currently, the proposed site camp is Stretford Substation;
- 4.1.1.7 Construct new access roads to the substation site;
- 4.1.1.8 Demolish unused old structures including the buildings;
- 4.1.1.9 De-commission and dismantle the vandalised equipment;
- 4.1.1.10 Dispose of waste from the site and ensure compliance with the National Environmental Management Act, 1998 (Act No. 107 of 1998, as amended);
- 4.1.1.11 Detect, Trace and Reroute all existing services, i.e. Water pipes, Telecommunication cables and fibre, Electrical cables and wires, Sewer pipes, and Service roads in the yard;



- 4.1.1.12 Load, transport, and off-load the equipment from the construction site to the identified PRASA storage which is Driehoek Stores.
- 4.1.1.13 Prepare and clean substations yards and surroundings inside and outside the perimeter boundaries. cleaning works include the removal of trees, pruning trees, and shrubs;
- 4.1.1.14 The bidder has to make provision for the structural engineer services. The professional Civil (structural) Engineer has to do all applicable tests to check the integrity of the existing DC traction substations and AC Distribution Substations buildings, foundations, drains, and other structures, thereafter, issue a report and a certificate of occupancy in accordance with National Building Regulation (NBR);
- 4.1.1.15 The bidder shall submit a report to PRASA for review and final acceptance;
- 4.1.1.16 The bidder has to make provision for the services of a Civil (Geotechnical) Engineer or scientist for bearing tests and soil condition assessment before the construction of equipment plinth and other civil structures. The desired outcome is a Geotech report.
- 4.1.1.17 The bidder shall submit the Geotech report to PRASA for review and final acceptance.
- 4.1.1.18 The bidder shall consider all recommendations stipulated in the Civil (Structural and Geotechnical) report during the design and implementation phases.
- 4.1.1.19 The bidder has to liaise with ESKOM and Municipalities before and during the design and implementation phases for approval and compliance;
- 4.1.1.20 The bidder will be expected to manage the process of integration of PRASA electricity connection points and Municipalities or ESKOM connection points on all substations within this section.
- 4.1.1.21 The bidder will be expected to develop and sign the design drawings as well as the project specification of Civil, Electrical, Security and Telecommunication systems, with final details for both DC traction substations and AC distribution substations.
- 4.1.1.22 The bidder shall source the services of an electrical protection specialist.
- 4.1.1.23 The bidder shall ensure that telecommunication and CCTV systems are properly integrated with adjacent substations, control centres and protection service monitoring centres.
- 4.1.1.24 The designs shall comply with all applicable TRANSNET/PRASA specifications, All applicable specifications, standards, regulations, and laws of the land.
- 4.1.1.25 The bidder shall submit the design documentation to PRASA for a review process and final acceptance;
- 4.1.1.26 Refurbish existing buildings for indoor equipment and outdoor yards in accordance with building specifications, standards and regulations;
- 4.1.1.27 Perform earthworks for the substations.
- 4.1.1.28 Excavate and cast foundations for the electrical equipment in the outdoor yard.
- 4.1.1.29 Supply and install support steelwork for the electrical equipment in the outdoor yard.
- 4.1.1.30 Supply and install the new electrical equipment.



- 4.1.1.31 Supply and install new switch structures complete with track switches and section insulators.
- 4.1.1.32 Supply and install 3 kV DC positive feeder cables/wires complete with the negative return cables/wires.
- 4.1.1.33 Install military-graded steel fencing around the substation including the bonding system for proper earthing functionality.
- 4.1.1.34 Construct bund walls around the new traction and auxiliary transformers.
- 4.1.1.35 Supply and install 88 kV power cables complete with sleeves from the Eskom power supply point to the new intake points.
- 4.1.1.36 Test and commission the new electrical equipment.
- 4.1.1.37 Ensure the correctness and completeness of the operation and maintenance manuals for all equipment installed;
- 4.1.1.38 Prepare and issue as-built drawings for both DC traction substations and AC distribution substations; and
- 4.1.1.39 Issue Completion Certificate including the "Close Out" Report.

4.1.2 Telecommunication High-level Scope

- 4.1.2.1 The bidder will be expected to develop and sign the design drawings as well as the project specification of Telecommunication systems, with final details for both DC traction substations and AC distribution substations.
- 4.1.2.2 Supply and installation of Telecontrol Transmission Network Node, Din rail mount, and complete accessories at Electrical Substations.
- 4.1.2.3 Supply, install, rehabilitate, test and commission Telecontrol Transmission Network Node, Din rail mount 19"INCH at Electrical Substations. PoE: IEEE 802.3af and 802.3at compliant.
- 4.1.2.4 Designated PRASA personnel, in conjunction with the Contractor, shall carry out the final commissioning test. The bidder shall carry out any remedial work, if necessary.
- 4.1.2.5 Issue Completion Certificate including the "Close Out" Report.

The detailed Project Specification Document outlines the scope of construction work activities and is attached as **Annexure 1**.

4.1.3 OCCUPATIONAL HEALTH, SAFETY, AND ENVIRONMENTAL REQUIREMENTS

- 4.1.3.1 The work activities of the contractor shall comply with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993, as amended); National Environmental Management Act,



- 1998 (Act No. 107 of 1998, as amended); including the Construction Regulations of 2014, as amended). Items for legal compliance shall be included in the tendered rates.
- 4.1.3.2 The copies of the relevant Acts, as well as the approved Safety File Document, shall be kept on-site for the duration of the project.
- 4.1.3.3 The Contractor shall be responsible for the safety of their personnel on site.
- 4.1.3.4 A detailed Safety Plan Document shall be submitted with the tender offer for a proper evaluation process at PRASA.
- 4.1.3.5 The Safety Plan Document needs to entail the transportation of equipment & personnel including the transportation, storage, and handling of hazardous equipment.
- 4.1.3.6 The Site Access Certificate shall only be issued to the Contractor post the evaluation process including the approval of the Safety Plan Document.
- 4.1.3.7 The Contractor shall comply with all the applicable legislation including PRASA's safety requirements adopted from time to time and the instructions shall be issued by the Project Manager / Technical Officer.
- 4.1.3.8 The Contractor is responsible for the applicable financial cost implications related to the legal compliance and shall be deemed to have been allowed for in the rates and prices in the contract.
- 4.1.3.9 The Contractor shall ensure that a Safety Officer is always on site.
The Contractor shall report all incidents in writing to the Project Manager / Technical Officer. Any incident emanating from the injury or death of any person on site shall be reported within 1 hour of its occurrence and any other incident shall be reported within 24 hours of its occurrence.
- 4.1.3.10 The Contractor shall make necessary arrangements for the sanitation facilities of each gender, water, and electricity on sites during the construction phase.
- 4.1.3.11 The Contractor shall also provide the eating facility for its employees on-site, and the stated facility needs to have proper shelter from the sun, wind, and rain; and
- 4.1.3.12 The Contractor shall ensure compliance with COVID-19 Regulations, as amended.

4.1.4 QUALITY MANAGEMENT

- 4.1.4.1 Develop project quality management processes cover all three main processes i.e., quality planning, assurance, and control.
- 4.1.4.2 Produce quality metrics, perform audits, perform quality improvement, and prepare reports; Audit forms and Metrics shall have space to allow the PRASA project manager to do quality audits independently.
- 4.1.4.3 The Contractor shall submit the relevant literature consisting of the detailed technical specifications, construction details, dimensions, and clear illustrations of the equipment offered including the installed new electrical equipment.



- 4.1.4.4 The Contractor shall submit the Type Test Certificates for the entire new electrical equipment that needs to be procured, supplied, delivered to the site, installed, and commissioned for operations in this capital project. The stated Type Test Certificates shall be issued in English.
- 4.1.4.5 The Project Manager shall be notified timeously for the inspection of the new electrical equipment before the delivery process to the site.
- 4.1.4.6 The Testing and Commission Schedules shall be provided for the entire new electrical equipment provided under this contract.
- 4.1.4.7 The Contractor shall issue a Method Statement Document for the construction phase work activities applicable to the project. This document shall be subjected to a review process and the final approval thereafter in PRASA.
- 4.1.4.8 The Contractor shall submit the Quality Control Plan to PRASA for a review process and final approval.

4.1.5 SITE SECURITY REQUIREMENTS FOR THE CONSTRUCTION

- 4.1.4.1 The security companies appointed by the Contractor shall be PSIRA registered with valid letters of good standing.
- 4.1.4.2 The security personnel shall all be PSIRA registered with a clear criminal record including non-pending criminal cases.
- 4.1.4.3 The security to be provided by the Contractor shall be responsible for safeguarding both the appointed contractor's and PRASA's assets on site until the site is handed over to PRASA. A list of all functioning equipment that does not form part of this scope of work will be shared with the successful bidder and shall be signed off by both the successful bidder and PRASA's representative.
- 4.1.4.4 Any lost, damaged, or stolen material shall be dealt with in terms of the approved Contract Document between PRASA and the Contractor.
- 4.1.4.5 The boundary limits for the substation will include all assets in the substation up to the perimeter fence.
- 4.1.4.6 The Contractor shall provide on-site security for personnel and material and should ensure that patrols are in place. The stated patrols need to commence as soon as the site has been handed over for the construction phase until the handing over back to PRASA has been finalized.
- 4.1.4.7 Furthermore, the Contractor's responsible for ensuring that valuable items such as copper are subjected to an adequate protection process while in transit to-and-from site.

- 4.1.4.8 The Contractor shall make sure that all material removed from the site is quantified, counted, logged in the site diary, and that it is co-signed by a PRASA representative on site before it is removed from the site.
- 4.1.4.9 The demolished equipment and scrap metal shall be adequately protected until it is delivered to an identified site.
- 4.1.4.10 PRASA reserves the right to conduct ad-hoc inspections to ensure compliance thereof.
- 4.1.4.11 The Contractor shall take full responsibility for the Work in Progress (WIP) including any assets belonging to PRASA on site from the site handover date for the Construction Phase.
- 4.1.4.12 The stated responsibility is also applicable to the plant intended for incorporation into the Construction Phase period including the material delivered for the incorporation into the works until the site handing over the process back to PRASA.

4.1.5 Security Guardroom

- 4.1.5.1 Supply and delivery wooden House which is water resistance with the 1.8m*2.4m with door, windows with ceiling and all other accessories.
- 4.1.5.2 The wooden house must have electricity energise from the Substation building with lights.
- 4.1.5.3 The wooden house must accommodate 3 guards, three chairs and one (1) table.



Figure: 4.1 Wooded House with (1.8m*2.4m) Dimensions

4.2 DETAILS ON THE PREFERRED SOLUTION



The preferred solution to address the problem outlined in Section 2.2 is for PRASA to reconstruct all vandalised substations and Install adequate security systems with the latest technology in the market such as circuit breakers and protection equipment, this will minimise theft and vandalism in the substations. Lastly, establish good relations with communities along the railway reserves.

4.3 TARGETED AREA OF THIS PROJECT

The project will be implemented in the Gauteng South Region between Anglers Train Station and Houtheuwel Train Station.

4.4 EXTENT AND COVERAGE OF THE PROPOSED PROJECT

The project will be limited to the area outlined in Section 4.3. The construction work activities shall entail the earthworks for the refurbishment of substations, including refurbishing incoming electrical power cables and wires from Eskom.

4.5 INSURANCES

The contractor will be required to take out insurance as outlined in clause 34 of the conditions of the contract.

4.6 MEASUREMENTS AND PAYMENT

Progress measurements and payments will be carried out as stipulated in clause 24 of the conditions of the contract.

FORM OF CONTRACT

The form of contract to be used is the PRASA Conditions of Contract in respect of construction work. The document is attached as Annexure 5.

4.7 OTHER RELATED PROJECTS

Below is a list of related projects:

- 4.8.1 Electrical infrastructure corridor recovery project between Johannesburg and Naledi Station". The project is managed by the Gauteng Region Electrical Department.



Regional Engineers reviewed the scope and Site walks were conducted to ensure that the scope of work is not duplicated.

- 4.8.2 The reconstruction of 3kV DC Traction substations, Tie-Substation and Distribution substations between Langlaagte train station and Randfontein Yard". Managed by PRASA Tech (ENG) head office;
- 4.8.3 Reinstatement of the 3kv dc OHTE network between Johannesburg station and Randfontein station in Gauteng. Managed by PRASA Tech (ENG) head office; and
- 4.8.4 Reinstatement of the 3kv dc OHTE network between Johannesburg station and Residensia station in Gauteng. Managed by PRASA Tech (ENG) head office.
- 4.8.5 Other project is "The reconstruction of 3kV DC Traction substations, Tie-Substation and Distribution substations between Langlaagte train station and Randfontein Yard". Managed by PRASA Tech (ENG) head office.

5 SPECIFICATION OF THE WORK OR PRODUCTS OR SERVICES REQUIRED

5.1. OVERALL STAFFING AND KEY PROFESSIONAL STAFF

5.1.1 The contractor shall provide qualified, experienced professional staff for the following positions.

- 5.1.1.1 Project /Construction Manager
- 5.1.1.2 Civil Construction Supervisors
- 5.1.1.3 Electrical Installation Supervisors
- 5.1.1.4 Electrician
- 5.1.1.5 Occupational Health & Safety Officers
- 5.1.1.6 Optical Transport Network Technician

5.1.2 Bidder to complete the Compliance Specification Sheet: Complete **YES** to confirm compliance to the listed technical specifications. A sheet with a **NO** or **NOT FULLY COMPLETED** sheet will be regarded as non-compliant to the specific technical specification.

5.2 Minimum Qualifications of the technical staff listed above are outlined below. All educational qualifications should be (South African Qualifications Authority) SAQA accredited.



5.2.1 PROJECT / CONSTRUCTION MANAGER

- 5.2.1.1 BSc or B Tech in Electrical Engineering (Heavy Current);
- 5.2.1.2 Registered with the Engineering Council of South Africa (ECSA) as a Professional Engineer or Technologist.
- 5.2.1.3 Registered with the South Africa Council for the Project and Construction Management Professions (SACPCMP) as a professional manager.

5.2.2 CIVIL CONSTRUCTION SUPERVISORS

- 5.2.2.1 National Certificate level 3 (N3) in Civil Construction Engineering.
- 5.2.2.2 Trade test certificate.

5.2.3 ELECTRICAL INSTALLATION SUPERVISORS

- 5.2.3.1 National Certificate level 3 (N3) in Electrical Engineering (Heavy Current) or valid A-brown certificate.
- 5.2.3.2 Trade test certificate.

5.2.4 ELECTRICIAN

- 5.2.4.1 National Certificate level 3 (N3) in Electrical Engineering (Heavy Current) or valid A-brown certificate.
- 5.2.4.2 Trade test certificate.

5.2.5 OCCUPATIONAL HEALTH AND SAFETY OFFICERS

- 5.2.5.1 National Diploma or Certificate in Safety, Health, Environment, Risk and Quality (SHERQ).
- 5.2.5.2 Professional registered with SACPCMP.

5.2.6 OPTICAL TRANSPORT NETWORK (OTN) TECHNICIAN

- 5.2.6.1 OTN Systems Certified on installations and commissioning of OTN systems.



6. TECHNICAL SPECIFICATIONS RELATED TO THIS PROJECT

The following comprehensive list of technical specifications and standards is related to this capital project. The outlined list in the following sub-headings is an extract from the Project Specification.

6.1. GENERAL STANDARDS AND ACTS

SANS 1921-6	Part 6: HIV/Aids awareness;
SANS 1921-1	Part 1: General Engineering and Construction Works;
SANS 1200AB	Section AB: Engineer's Office;
SANS 1200A	Section A: General;
RSR Act	Railway Safety Regulator Act, 2002 (Act No. 16 of 2002, as amended);
OHS Act	Occupational Health and Safety Amendment Act, No. 85 of 1993, as amended); and
OHS Act	Machinery and Occupational Safety Act, 1983 (Act No. 6 of 1983, as amended).

6.2. BUILDING STANDARDS

SANS 10400	The application of the National Building Regulations;
SANS 791	uPVC pipes for underground non-pressure application;
SANS 558	Boxes and manhole and inspection covers and frames;
SANS 1200LC	Cable ducts;
SANS 1200LB	Bedding (pipes);
SANS 1200GE	Pre-cast concrete (structural);
SANS 1200GB	Concrete (ordinary buildings);
SANS 1200G	Concrete (structural);
SANS 1200DB	Earthworks (pipe trenches);
SANS 1200DA	Earthworks (small works); and
SANS 1200C	Site Clearance.

6.3. SANS ELECTRIC LIGHT AND POWER STANDARDS

SANS 60309-1	Plugs, Socket-outlets, and couplers for industrial purposes (Part 1: General requirements);
SANS 60269-1	Low-voltage fuses – Part 1: General requirements;



SANS 60168	Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 000 V;
SANS 60076-7	Power transformers Part 7: Loading guide for oil-immersed power transformers;
SANS 60076-5	Power transformers Part 5: Ability to withstand short circuit;
SANS 60076-4	Power transformers Part 4: Guide to the lightning impulse and switching impulse testing - Power transformers and reactors;
SANS 60076-3	Power transformers Part 3: Insulation levels, dielectric tests, and external clearances in the air;
SANS 60076-2	Power transformers Part 2: Temperature rise for liquid-immersed transformers;
SANS 60076-1	Power Transformers;
SANS 60060-1	High-voltage test techniques Part 1: General definitions and test requirements;
SANS 60056	High Voltage alternating current circuit-breakers;
SANS 60044-2	Instrument Transformers, Part 2- Inductive Voltage Transformers;
SANS 60044-1	Instrument Transformers, Part 1- Current Transformers;
SANS 529	Heat resisting wiring cables;
SANS 50054-7	Fire detection and fire alarm systems Part 7: Smoke detectors – Point detectors using scattered light, transmitted light, or ionisation;
SANS 50054-5	Fire detection and fire alarm systems Part 5: Heat detectors – Point detectors;
SANS 1799	Watt-hour meters – AC electronic meters for active energy;
SANS 1777	Photoelectric control units for lighting (PECUs);
SANS 1765	Low Voltage switchgear and control gear assemblies (distribution boards) with a rated-short circuit withstand strength up to and including 10 kA;
SANS 1619	Small power distribution units (ready boards);
SANS 156	Moulded case circuit breakers;
SANS 1433-2	Electrical terminals and connectors – Part 2: Flat push-on connectors;
SANS 1433-1	Electrical terminals and connectors – Part 1: Terminal blocks having a screw and screwless terminals;
SANS 1411-1	Materials of insulated electric cables and flexible cords – Part 1: conductors;
SANS 1239	Plugs, socket outlets, and couplers for industrial purposes;
SANS 1213	Mechanical cable glands;
SANS 1195	Busbars;
SANS 1063	Earth rods and couplers;



SANS 10313	Protection against lightning;
SANS 10142-2	The wiring of premises Part 2: Medium-voltage installations above 1 kV AC not exceeding 22 kV AC and up to and including 3 000 kW installed capacity; and
SANS 10142-01	Wiring of premises Low-voltage Installation.

6.4. IEC STANDARDS

IEC 62271	Specification for AC metal-enclosed switchgear and control gear, for voltages above 1 kV up to and including 52 kV;
IEC 61869-2	Instrument Transformers - Part 2: Current Transformers;
IEC 61869	Instrument Transformers: Additional General Requirements for Low Power Instrument Transformers;
IEC 60947-7-1	Low-voltage switchgear and control gear - Ancillary equipment - Terminal blocks for copper conductors;
IEC 60947-6-2	Low-voltage switchgear and control gear - Multiple function equipment - Control and protective switching devices for equipment;
IEC 60947-6-1	Low-voltage switchgear and control gear - Multiple function equipment - Automatic transformer/Transfer switching equipment;
IEC 60947-4-3	Low-voltage switchgear and control gear - Contactors and motor-starters - AC semiconductor controllers and contactors for non-motor loads;
IEC 60947-4-2	Low-voltage switchgear and control gear - Contactors and Motor Starters - AC Semiconductor motor controllers and starters;
IEC 60947-4-1	Low-voltage switchgear and control gear – Electromechanical Contactors and Motor Starters;
IEC 60947-3	Low-voltage switchgear and control gear - Switches, disconnectors, switch disconnector;
IEC 60947-2	Low-voltage switchgear and control gear - Circuit Breakers;
IEC 60947-1	Low-voltage switchgear and control gear - General rules;
IEC 60815:	Guide for the selection of insulators in respect of polluted conditions;
IEC 60730-2-9.	Automatic electrical controls for household and similar use Part 2-9: Particular requirements for temperature sensing controls;
IEC 60529	Degrees of protection provided by enclosures (IP Code);
IEC 60502-4	Power cables with extruded insulation and their accessories for rated voltages;
IEC 60502-2	Power cables with extruded insulation and their accessories for rated voltages;
IEC 60502-1	Power cables with extruded insulation and their accessories for rated voltages;
IEC 60298	AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV;



IEC 60297-1:	Dimensions of mechanical structures;
IEC 60296	Fluids for Electrotechnical Applications - Unused Mineral Insulating Oils for Transformers and Switchgear;
IEC 60255-5	Electrical Relays - Insulation Coordination for Measuring Relays and Protective Equipment- Requirements and Tests;
IEC 60255-22	Measuring Relays and Protection Equipment - Part 22-5: Electrical Disturbance Tests - Surge Immunity Test;
IEC 60255-121	Measuring Relays and Protection Equipment - Part 121: Functional Requirements for Distance Protection;
IEC 60255-11	Measuring Relays and Protection Equipment - Part 11: Voltage Dips, Short Interruptions, Variations and Ripple on Auxiliary Power Supply Port;
IEC 60255-1	Measuring Relays and Protection Equipment - Part 1: Common Requirements;
IEC 60099-4	Surge Arresters - Part 4: Metal-Oxide Surge Arresters without Gaps for AC Systems;
IEC 60092-352	Choice & Installation of Cables for Low Voltage Power Systems;
IEC 60092_376	Cable for Control & Instrumentation Circuits;
IEC 60092_375	General Instrumentation, Control & Communication Cables;
IEC 60076-8	Power transformers - Application guide;
IEC 60076-7	Power transformers Part 7: Loading guide for oil-immersed power transformers;
IEC 60076-5	Power transformers - Ability to withstand short circuit;
IEC 60076-4	Power transformers - Guide to the lightning impulse and switching impulse testing;
IEC 60076-3	Power transformers - Insulation levels, dielectric tests, and external clearances in the air;
IEC 60076-2	Power transformers - Temperature rise;
IEC 60076-10	Power transformers - Determination of sound levels;
IEC 60076-1	Power transformers – General;
IEC 60051-1	Direct Acting Indicating Analogue Electrical Measuring Instruments and their Accessories - Part 1: Definitions and General Requirements Common to all Parts; and
IEC 60044-2:	Instrument transformers- Part 2: Inductive voltage transformers.

6.5. SANS BUILDING MANAGEMENT AND ENERGY EFFICIENCY STANDARDS

SANS 941	The energy efficiency of electrical and electronic apparatus;
SANS 50285	The energy efficiency of electric lamps for household use - Measurement methods;
SANS 50001	Energy management systems - Requirements with guidance for use;



SANS 204-3	Energy efficiency in buildings Part 3: The application of the energy efficiency requirements for buildings with artificial ventilation or air conditioning;
SANS 204-2	Energy efficiency in buildings Part 2: The application of the energy efficiency requirements for buildings with natural environmental control;
SANS 204-1	Energy efficiency in buildings Part 1: General requirements
SANS 204	Energy efficiency in buildings; and
SANS 10400-XA	The application of the National Building Regulations (Part X: Environmental sustainability Part XA: Energy usage in buildings).

6.6. SANS ENVIRONMENTAL STANDARDS

SANS 61753-2-1	Fibre optic interconnecting devices and passive components performance standard Part 2-1: Fibre optic connectors terminated on single-mode fibre for category U - Uncontrolled environment;
SANS 61000-6-5	Electromagnetic compatibility (EMC) Part 6-5: Generic standards - Immunity for power station and substation environments;
SANS 61000-2-3	Electromagnetic compatibility (EMC) Part 2: Environment Section 3: Description of the environment - Radiated and non-network-frequency-related conducted phenomena;
SANS 61000-2-2	Electromagnetic compatibility (EMC) Part 2-2: Environment - Compatibility levels for low frequency conducted disturbances and signalling in public low voltage power supply systems;
SANS 60793-1-5	Optical fibres Part 1: Generic specification Section 5: Measuring methods for environmental characteristics;
SANS 300132-3	Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment Part 3: Operated by a rectified current source, alternating current source or direct current source up to 400V;
SANS 300132-2	Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment Part 2: Operated by direct current (DC);
SANS 23045	Building environment design - Guidelines to assess the energy efficiency of new buildings;
SANS 1760	Land mobile communication equipment - Technical characteristics and additional requirements of environmental tests;
SANS 16818	Building environment design - Energy efficiency – Terminology; and
SANS 1574-2	Electric flexible cables with solid extruded dielectric insulation Part 2: PVC insulated flexible cables for domestic, office, and similar environments (cords).

6.7. SANS ELECTRICAL AND STEEL STRUCTURES STANDARDS



SANS 780	Distribution Transformers;
SANS 62305	Physical Damage to Structures and Life Hazard Protection Against Lightning Part 1, 2, And 3;
SANS 62271-102	High-voltage switchgear and control gear Part 102: Alternating current disconnectors and earthing switches;
SANS 62271-100	High-voltage switchgear and control gear Part 100: Alternating- current circuit breakers;
SANS 62262	Degrees of Protection Provided by Enclosures for Electrical Equipment against External Mechanical Impacts (IP Code);
SANS 62208	Empty Enclosures for Low-Voltage Switchgear and Control Gear Assemblies- General Requirements;
SANS 61439-2	Low-voltage switchgear and control gear assemblies Part 2: Power switchgear and control gear assemblies;
SANS 60670	Boxes and Enclosures for Electrical Accessories for Household and Similar Fixed Electrical Installations Part 1: General Requirements;
SANS 60529	Degrees of Protection Provided by Enclosures (IP Code);
SANS 60439-5	Low-voltage switchgear and control gear assemblies Part 5: Particular requirements for assemblies for power distribution in public networks;
SANS 60439-4	Low-voltage switchgear and control gear assemblies Part 4: Particular requirements for assemblies for construction sites (ACS);
SANS 60439-3	Low-voltage switchgear and control gear assemblies Part 3: Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards;
SANS 60439-2	Low-voltage switchgear and control gear assemblies Part 2: Requirements for busbar trunking systems (busways);
SANS 60439-1	Low-voltage switchgear and control gear assemblies Part 1: Type-tested and partially type-tested assemblies;
SANS 60137	Insulated Bushings for Alternating Voltages above 1000 V;
SANS 60099-4	Requirements for Metal Oxide Surge Arresters without Gaps for AC systems;
SANS 60044-2	Instrument transformers Part 2: Inductive voltage transformers;
SANS 60044-1	Instrument transformers Part 1: Current transformers;
SANS 555	Unused and Reclaimed Mineral Insulating Oils for Transformers and Switchgear (Uninhibited);



SANS 50025-6	Replacement of SANS 1431, Hot rolled products of structural steels Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition;
SANS 50025-5	Replacement of SANS 1431, Hot rolled products of structural steels Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance;
SANS 50025-4	Replacement of SANS 1431, Hot rolled products of structural steels Part 4: Technical delivery conditions for thermo-mechanical rolled weld-able fine grain structural steels;
SANS 50025-3	Hot Rolled Products of Structural Steels Part 3: Technical Delivery Conditions for Normalized Rolled Weldable Fine Grain Structural Steels;
SANS 50025-2	Replacement of SANS 1431, Hot rolled products of structural steels Part 2: Technical delivery conditions for non-alloy structural steels;
SANS 50025-1	Replacement of SANS 1431, Hot rolled products of structural steels Part 1: General technical delivery conditions;
SANS 50025	Hot Rolled Products of Structural Steels;
SANS 2063	Thermal Spraying - Metallic and other Inorganic Coatings - Zinc, Aluminium, and their Alloys;
SANS 2001	Construction Works Part CS1: Structural Steelwork;
SANS 1574	Electric Flexible Cores, Cords and Cables with Solid Extruded Dielectric Insulation;
SANS 156	Moulded Case Circuit Breakers;
SANS 1507	Electric Cables with Extruded Solid Dielectric Insulation for Fixed Installations (300/500 V to 1900/3300 V);
SANS 1274	Coatings Applied by the Powder-Coating Process;
SANS 121	Hot Dip Galvanized Coatings on Fabricated Iron and Steel Articles - Specifications and Test Methods;
SANS 1200H	Structural Steelwork;
SANS 1200 HC	Standardized Specification for Civil Engineering Construction Section HC: Corrosion Protection of Structural Steelwork;
SANS 1200 HA	Standardized Specification for Civil Engineering Construction Section HA: Structural Steelwork (Sundry Items);
SANS 1186	Symbolic safety signs Part 1: Standard signs and general requirements;
SANS 1091	National Colour Standard;
SANS 10400	The Application of the National Building Regulations;



SANS 10313	Protection Against Lightning - Physical Damage to Structures and Life Hazard;
SANS 10222-5-1-3	Electrical security installations Part 5-1-3: CCTV installations - CCTV surveillance systems for use in security applications - Installation, planning and implementation requirements;
SANS 10222-2-7	Access Control Systems: Barriers;
SANS 10222-2-2	Access Control;
SANS 10222-2-1	Access Control Systems: General Requirements;
SANS 10222-1-8	Environmental Testing;
SANS 10222-1-7	Intruder Alarms: Power Units;
SANS 10222-1-5	Intruder Alarms Systems, Passive Infra-Red Detectors;
SANS 10222-1-2	Intruder Alarms Systems, Infra-red Beam Interruption Detectors;
SANS 10222-1-1	Electrical security systems Part 1-1: Intruder alarm systems - General requirements;
SANS 10199	The Design and Installation of Earth Electrodes;
SANS 1019	Standard Voltages, Currents and Insulation Levels for Electricity Supply;
SANS 10142-2	The Wiring of Premises Part 2: Medium-Voltage Installations above 1 kV AC Not Exceeding 22 kV AC and up to and Including 3000 kW Installed Capacity; and
SANS 10142-1	The Wiring of Premises Part 1: Low-Voltage Installations.

6.8. NATIONAL RATIONALISED SPECIFICATIONS (NRS)

NRS 048-2	Electrical supply – Quality of supply Part 2; and
NRS 030	Electromagnetic voltage transformers for rated AC voltages from 3,6 kV up to and including 145 kV.

6.9. BRITISH STANDARDS

BS EN 62271-100	AC Circuit Breakers of Rated Voltage above 1 kV;
BS EN 61439-2:2011	Low-voltage switchgear and control gear assemblies. Power switchgear and control gear assemblies;



BS EN 60730	Electrical Controls for Domestic Appliances;
BS EN 60099-1	Surge Diverters for Alternating Current Systems;
BS EN 60044-1	Current Transformers;
BS 7354	Code of Practice for the design of high voltage open-terminal stations;
BS 5486-1	Specification for factory-built assemblies of switchgear and control gear for voltages up to and including 1000 V AC and 1200 V DC; and
BS 159	Busbars and Busbar Connections.

6.10 PRASA / TRANSNET SPECIFICATIONS

BBB.5452	Specification for 3 kV DC Substation Installation
BBC.0198	Requirements for the Supply of Cables
BBB.1616	450 Volt Gas Arrester Type Spark Gap for Traction Supplies
BBB.2502	Requirements for Battery Chargers for 3 kV DC Traction Substations
BBB.3005	3 kV DC Undervoltage Relay Manufacturing Specification
BBB.3059	3 kV DC Traction Substation Earthing System for High Voltage Outdoor Yards
BBB.0496	3 kV DC Rectifier for Traction Substations
BBB.4724	Positive Isolator Switch for 3 kV DC Traction Substations
BBB.2721	AC Primary Circuit Breaker Panel and AC/DC Control Panel for 3 kV DC Traction Substations
BBB.5019	Requirements for Traction Transformers for 3 kV DC Traction Substations in accordance with BS 171 And SANS 60076-1
BBB.3139	Wave Filter Capacitors for 3 kV DC Substations
BBB.3162	Wave Filter Inductors for 3 kV DC Traction Substations
BBB.3890	DC Reactor for 3 kV DC Traction Substation
BBB.0845	Requirements for Metal Oxide Surge Arrester in Accordance with SABS IEC 99-4
BBB.7842	Outdoor, High Voltage Alternating Current Disconnectors Combined with Earthing Switches
BBB.8204	Medium Voltage Distribution and Supply Transformers in Accordance with SANS780
BBB.4182	Indoor, medium voltage metal-enclosed switchgear and control gear in accordance with IEC 62271-200
BBB.1267	Requirements for outdoor alternating current circuit breakers for traction and distribution substations
BBC.0330	Requirements for Isolation Transformers



S.420	Specification for Concrete Work
CEE.0023	Specification for Installation of Cables
CEE.0088	Specification for the Installation of Electrical Equipment in Indoor Substation
CEE.0045	Painting of Steel Components of Electrical Equipment
CEE.0224	Drawings, Catalogues, Instruction Manuals and Spares Lists for Electrical Equipment Supplied under Contract
CEE.0099	3 kV DC High-Speed Circuit Breakers for Traction Substations
CEE.0227	The Manufacture of 3 kV DC Breaker Cells and Trucks
CEE-T-T6E-006	Specification for 3 kV DC Electrification Overhead Track Equipment
CEE-PA-0019	Symbols for Electrical Installations
CEE.0128	Maintenance of 3 kV DC Electrification
CEE.0183	Specification for Hot Dip Galvanising and Painting of Electrification Steelwork
CEE.0200	11 kV, Outdoor, Three Phase, Air Break Isolating Switch
CEE.0017	Provision of Foundations for Electrification Masts
CEE.0228	Manually Operated 3 kV DC Track Sectioning Switches and Isolating and Earthing Switches
CEE.0054	Specification for Section Insulators for 3 kV DC Overhead Track Equipment for both Low and High-Speed Traffic
CEE-0059	Earthing and bonding of 3 kV DC Electrification
CEE-0166	Insulating Pads, Washers and Bushes for Traction Mast Bases
SPK7/1	Specification for Works On, Over, Under, or Adjacent To Railway Lines and Near High Voltage Equipment
E4E	Safety Arrangements and Procedural Compliance with the Occupational Health and Safety Act, 1993 (Act 85 Of 1993, as amended) and Applicable Regulations
SHE Specification	Occupation Health and Safety Specification

7. TIME FRAMES / PROGRAMS

The timeframe/program for the project six (6) months.



8.1.1. PRICING

The pricing instructions with respect to the tender are contained in Volume 2 of the RFP.

8.1.2. BILL OF QUANTITIES

The document to be used for the pricing of the document is the Bill of Quantities (BOQ) which forms part of Volume 2 as a separate document.



8.1.3. CONTRACT PRICE ADJUSTMENT

All variations to the contract will be done in accordance with clause 24 of the conditions of contract.