| BID SPECIFICATION- APPOINTMENT OF A CONTRACTOR FOR THE REINSTATEMENT OF THE 3KV OVERHEAD TRACK EQUIPMENT IN THE KAALFONTEIN-JOHANNESBURG PHASE 2 CORRIDOR FOR THE GAUTENG REGION | |
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| SCM SUBMISSION: SPECIFICATION / SCOPE OF WORK | |
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| PURPOSE OF SUBMISSION | BID SPECIFICATION- APPOINTMENT OF A CONTRACTOR FOR THE REINSTATEMENT OF THE 3KV DC OVERHEAD TRACK EQUIPMENT IN THE KAALFONTEIN – JOHANNESBURG PHASE 2 CORRIDOR FOR THE GAUTENG REGION. |
| DESCRIPTION OF GOODS / SERVICES / WORK | SUPPLY, INSTALLATION AND COMMISSIONING OF 3KV DC OVERHEAD TRACK EQUIPMENT IN KAALFONTEIN – JOHANNESBURG PHASE 2 CORRIDOR FOR THE GAUTENG REGION |
| REQUEST FOR PROPOSAL NUMBER | TBA |
| DIVISION | PRASA TECH |
| USER DEPARTMENT | GAUTENG INFRASTRUCTURE ELECTRICAL |
| DATE SUBMITTED | 20 May 2023 |

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## 1. INTRODUCTION

The Kaalfontein-Johannesburg corridor phase 2 in Gauteng region covers a span of 75 km of Overhead Track Equipment (OHTE). This corridor was under severe attack of theft and vandalism towards the end of 2019 which led to the decision of the Gauteng region to stop running rail services on this corridor. Therefore, the 3kV DC infrastructure and network which provides traction power to the trains requires urgent restoration for the rail services to be reinstated in the Gauteng region.

The Gauteng Region is a network of commuter rail services in Gauteng province in South Africa, servicing the Johannesburg and Pretoria metro areas. It is operated by Metrorail, a division of the Passenger Rail Agency of South Africa (PRASA). Metrorail routes spread out across the province from three main hubs: Park Station in Johannesburg, Germiston Station on the East Rand, and Pretoria Station. Routes service central Johannesburg, the East Rand, Soweto, the Vaal Triangle, the West Rand, central Pretoria, and suburbs to the north, east and west of Pretoria.

Gauteng Region consists of the following corridor:

- Johannesburg–Dunswart–Daveyton: services Johannesburg, Germiston, Boksburg and Daveyton.
- Johannesburg–Springs: services Johannesburg, Germiston, Boksburg, Benoni, Brakpan and Springs.
- Springs–Nigel: services Springs and Nigel.
- Germiston–Kwesine: services Germiston and Katlehong.
- Germiston–Kliprivier–Vereeniging: services Germiston, Katlehong, Meyerton and Vereeniging.
- Germiston–New Canada: services Germiston and the Reef south of central Johannesburg.
- Johannesburg–New Canada–Vereeniging: services Johannesburg, Orlando, Lenasia, Sebokeng and Vereeniging.
- Johannesburg–Oberholzer: services Johannesburg, Orlando, Westonaria and Carletonville.
- George Goch–Johannesburg–Naledi: services Johannesburg and Soweto.

- Johannesburg–Randfontein: services Johannesburg, Roodepoort, Krugersdorp and Randfontein.
- Johannesburg–Leralla/Pretoria: services Johannesburg, Germiston, Kempton Park, Tembisa, Centurion and Pretoria.
- Pretoria–Saulsville: services Pretoria, Pretoria West and Atteridgeville
- Pretoria/Belle Ombre–De Wildt / Mabopane: services Pretoria, Pretoria North, Ga-Rankuwa and Soshanguve.
- Pretoria–Pienaarspoort: services Pretoria, Hatfield and Mamelodi.
- Hercules–Capital Park–Pienaarspoort: services Pretoria North and Mamelodi.

## 2. BACKGROUND INFORMATION

### 2.1. STATUS QUO

The Overhead Track Equipment (OHTE) in the Gauteng Region has been affected by severe acts of theft and vandalism resulting in several lines across the region being closed to the movement of trains.

### 2.2. PROBLEM STATEMENT

OHTE forms part of the power supply system, the main functions include supplying power to the rolling stock used to transport passengers/ goods. It is made up of electrical wires and structures, figure 1 below shows the typical layout of the OHTE infrastructure. The following are the descriptions of some of the Over-Head Track Equipment:

2.2.1. Contact Wire – used to provide power to the trains by making contact with the (moving) pantograph, the pantograph exerts pressure on this wire thereby maintaining constant contact.

2.2.2. Catenary Wire – used to suspend the contact wire using droppers.

2.2.3. Feeder Wire – this wire carries the bulk of the electric current (over long distances) that eventually gets supplied to the trains.

2.2.4. Masts – these are steel structures which suspend the OHTE.

2.2.5. Foundations – concrete structures on which masts are planted.

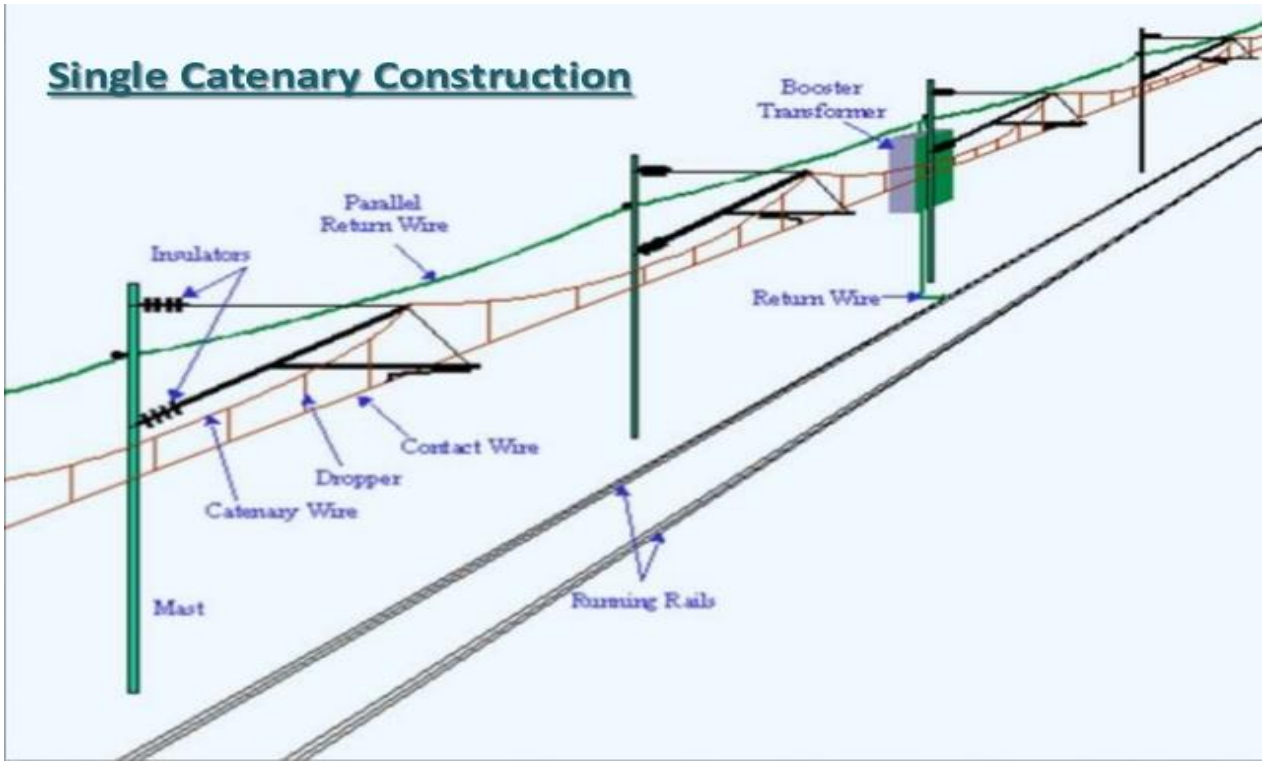


**Figure 1: OHTE Layout**

There are other smaller components such as steady arms, hockey sticks, track switches, section insulators, droppers, and insulators, Feeder Catenary Contact jumpers which make the OHTE complete and functional.

In addition, there is a 11 kV (or 6,6kV) transmission line network which supplies the distribution network. This includes signalling equipment, buildings, and platform lighting. As can be seen from the above most of the components are made of metal (copper, steel, and aluminium). Aside from the normal wear because of pantograph/ contact wire interaction, there has been a lot of theft in the past couple of years. in some areas the theft has left the infrastructure paralysed completely where even the rails have been stolen.

## 2.3. PICTORIALS

**Fig 2.1: Stolen OHTE wires.**

**Fig 2.2: Vandalised Track Switch and OHTE wires**

## 3. OBJECTIVES OF THE PROPOSED PROJECT

### 3.1 DESIRED OUTCOMES FOR CARRYING OUT THE PROPOSED PROJECT

The project aims to restore the OHTE infrastructure to enable the running of the train service using Electric trains. The strategy will be to appoint a contractor for the supply, installation, testing and commissioning of the OHTE system on the Kaalfontein-Johannesburg Corridor.

### 3.2 PROJECT BENEFITS TO PRASA

The Project will assist the organisation to reinstate lines and corridors that have been closed due to the challenges on the OHTE. This will therefore assist PRASA in achieving its primary mandate of providing a reliable rail transport service to Gauteng commuters and enable the business to collect fare revenue from those commuters. By restoring the OHTE system to its design specification; train disruptions that are due to the OHTE system failures will be reduced by improving the service offering.

3.3 CURRENT MECHANISMS IN PLACE TO ADDRESS THE PROBLEM

- None

## 4. SCOPE OF WORK AND AREAS OF FOCUS

### 4.1 SCOPE OF THE DESIRED SOLUTION

The scope will focus on the supply, installation, and commissioning of the following:

4.1.1 OHTE Wires

4.1.2 Track switches (complete set)

4.1.3 Hockey sticks, steady arms, push pulls.

4.1.4 Insulators

4.1.5 Small Part Steel Components and all other components required for the full functionality of the OHTE system.

### 4.2 DETAILS ON THE PREFERRED SOLUTION.

4.2.1 The preferred solution is to procure a supplier that will supply and install OHTE components for the Kaalfontein - Johannesburg section.

4.2.2 The figure below shows the layout of the Gauteng Region's electrical network.

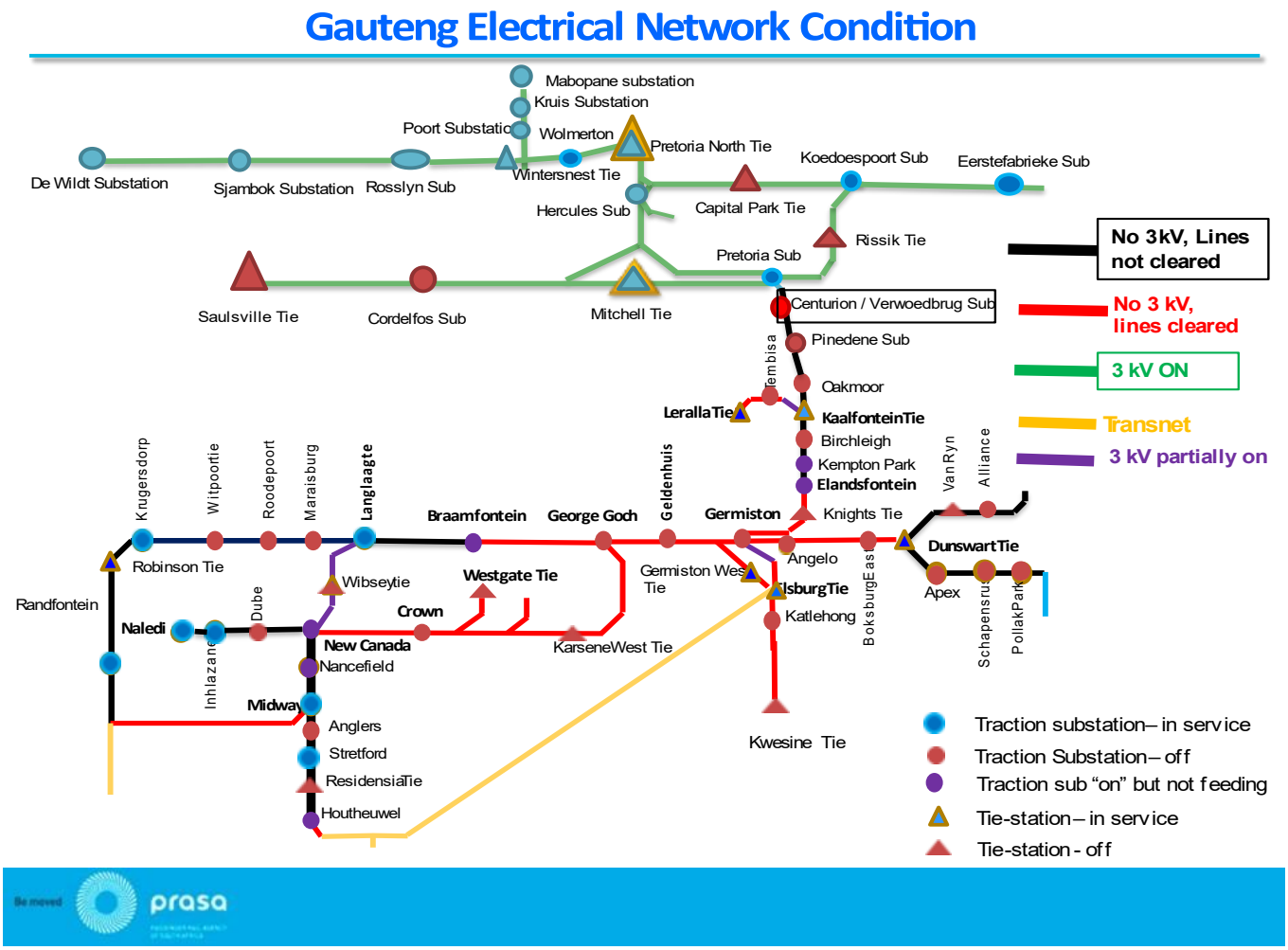


**Figure 4.1: Gauteng Electrical Network Condition**

4.3 AREA TARGETED BY THIS PROJECT

The place of work shall be between Kaalfontein - Johannesburg in the Gauteng region.

4.4 EXTENT AND COVERAGE OF THE PROPOSED PROJECT

The project will cover the Kaalfontein – Johannesburg Corridor.

4.5 OTHER OHTE RELATED PROJECTS

- Refurbishment of OHTE in the Germiston-Kwesine Corridor.
- Refurbishment of OHTE in the Germiston-Daveyton Corridor.
- Refurbishment of OHTE in the Dunswart-Springs Corridor.
- Refurbishment of OHTE in the Randfontein-Johannesburg Corridor.
- Refurbishment of OHTE in the New Canada-Residentia Corridor.

## 5. SPECIFICATION OF THE WORK OR PRODUCTS OR SERVICES REQUIRED

5.1 SCOPE OF WORKS AND AREAS OF FOCUS

Bidder to complete the Compliance Specification Sheet: Complete Yes (a sheet with a No, or that is not fully completed, or where the bidder does meet the minimum requirements as set in the compliance specification sheet, will lead to disqualification).

5.1.1 *WIRE WORKS*

5.1.1.1 Any conductors supplied as supplementary to the existing system shall match the existing unless specified otherwise. New make-off wiring shall be spliced onto the existing wiring where new termination structures are required. Standard conductor sizes are:

5.1.1.2 Contact wire: 161 mm² copper wire shall be supplied in continuous lengths of 1830 meter accordance with BBD 7267 Version 2 and installed in accordance with CEE 241.

5.1.1.3 Catenary wire: 160mm² Aluminium Conductor Steel Reinforced (ACSR).

5.1.1.4 Feeder wire: 800mm$^2$ hard drawn Aluminium in accordance with SABS 182.

5.1.1.5 Feeder Catenary Contact Jumpers (FCC's): 160mm$^2$ to be replaced with a 160mm² all-aluminium soft stranded jumper in accordance with BBH 2161 Version 1 in line with drawing BBH 2164.

5.1.1.6 Earth wire: 61mm$^2$ ACSR Conductor shall be supplied and installed.

5.1.1.7 Dropper wire: shall be the stainless-steel type.

5.1.1.8 Maximum span length in the Gauteng region is 67m.

5.1.1.9 All terminations shall comply with Drawing CEE-TPB-3.

5.1.1.9.1 Spring terminations devices shall apply across the section and all thimbles and Crosby clamps shall be stainless steel throughout.

5.1.1.9.2 All phase and earth conductors shall be 50 mm$^2$ AAC "ANT" (greased) conductor and suspended onto the structures in a vertical configuration.

5.1.1.9.3 Aerial Bundled Conductors (ABC) shall be supplied and installed under bridges. The supplied ABC shall be 12 kV rated to SABS 1339 (adapted) with a minimum cross-sectional area of 70 mm². ABC – 70 mm$^2$ 3-core (6.6 /11 kV), ABC cable with PVC served galvanised steel wire catenary.

5.1.1.9.4 Double back guides shall be installed on both sides of the bridges - one to support the ABC and the other to support the phases.

### 5.1.2 *SECTION INSULATORS*

5.1.2.1. The contractor shall supply and install Section Insulators at identified locations, these shall conform to the specification CEE-0054-83.

5.1.2.2. Section insulators shall only be cut into the overhead wires where the separation between contact and catenary wires is not less than 750 mm after installation of the section insulator.

5.1.2.3. The contractor shall supply and install numbering plates for all section insulators supplied under this contract.

5.1.2.4. It is the contractor's responsibility to smooth out kinks on contact wire because of tensioning or other activities.

### 5.1.3 *INSULATORS*

5.1.3.1. All insulators shall be replaced with the vandal proof type.

5.1.3.2. All such new Insulators shall be of the silicone composite type, adequately rated for the specific voltage and have an ultimate mechanical strength in tension of not less than 54kN, and to SANS standards. The minimum creepage path shall be 450 mm.

### 5.1.4 *EQUIPMENT AT BRIDGES*

All existing bridge cross spans shall be replaced as per CEE-TP-157 and CEE-TN-274. This work shall include the following:

5.1.4.1. Cross span to be of a tiger wire 160mm².

5.1.4.2. Replacement of all insulators (composite).

5.1.4.3. Replacement of cross span wiring (Live and Earth cross-spans). All turnbuckles and Crosby's shall be stainless steel.

5.1.4.4. Replacement of all steel supports (including brackets at steel bridges).

5.1.4.5. Greasing of equipment.

5.1.4.6. Replacement of bolts and plates.

5.1.4.7. Re-instating bonds and all OHTE and transmission line components.

5.1.5 *EARTHING, BONDING AND SURGE SURPPRESSION*

5.1.5.1. Before any welding connection, the surface(s) shall be thoroughly prepared as per detailed instructions to ensure a strong and continuous bond. The galvanizing of the structures shall be removed with a grinder, and the surface where the exothermic weld is to be performed should be thoroughly cleaned.

5.1.5.2. The area where the galvanizing was removed shall be treated with zinc spraying, hot – patch soldering, or coated with zinc-rich paint complying with the requirements of SABS 920.

5.1.5.3. All welded joints shall be "hammer tested" to ensure that the mechanical strength of the joints is sound. Welded joints shall also be painted.

5.1.5.4. PRASA's Technical Officer shall inspect and approve the work before any Grading Ring is covered by soil.

5.1.5.5. Rail continuity Bonds – All joints in the rail shall be bonded with 4 x 96 $mm^2$ PVC sheeted steel cables. The continuity bonds shall be bolted to the web of the rail using the Expanding collar system. The ends of the bonds shall have lugs crimped to it, which shall then be fastened to the rail using the Expanding collar system.

5.1.5.6. Cross bonds – are applied between various tracks that share the return current. It consists of a 96 $mm^2$ PVC sheeted composite bond that is fastened to the web of the rail using the Expanding collar system. Cross bonds shall be provided at intervals not exceeding 500 m.

5.1.5.7. Mast to rail bonds – shall exist in spacing not exceeding 350 m (5 spans). They shall consist of a 2x 96 $mm^2$ PVC sheeted bond that is fastened with WAM Stud and Lug to the mast and fastened to the web of the rail using the Expanding collar system. The end bolted to the rail shall have a lug crimped to it, which shall be fastened to the rail with a WAM stud. Where no earth wire is connected to the mast, 4 Mast to rail bonds shall be provided.

5.1.5.8. Switch Structure – shall be provided with double mast to rail bonds of 96 $mm^2$ PVC sheath steel cable.

5.1.5.9. The bridges may not be connected directly to the “traction earth wire” or to “rail” but shall be connected to rail via spark gap at 2 separate positions. Furthermore, the “dead” side of the 3kV DC insulators shall be insulated from the structure either by means of an additional disc insulator or insulating pads, bushes or washers between the insulator support bracket and the fixing bolts, the insulator support brackets then being connected to rail either directly or via a common earth wire, with two earth paths. Where only one earth cross span exists, a second shall be installed. The earth conductor protecting each set of “live” cross-spans shall be so arranged as to provide a ring connection with dual connections for every earth point.

5.1.5.10. Spark gaps to be supplied as per specification BBB1616 and installed as indicated on drawing CEE-TU-100.

5.1.5.11. A 95$mm^2$ composite cable shall be supplied and installed for all mast to rail bonds. Rail bonding fasteners shall comply with BBB6017.

5.1.5.12. Lightning arrestors compliant to specification BBB2141 shall be supplied and installed as per specification BBB2144.

### 5.1.6 *SMALL PART COMPONENTS (SPC)*

The contractor shall supply and install the following small parts in accordance with the specifications as indicated:

5.1.6.1.1 Push Pull Offs shall be to Drawing CEE-TMGC-14

5.1.6.1.2 Cross Spans to DB’s shall be to Drawing CEE-TMGC-13

5.1.6.1.3 Vertical members shall be to CEE-TMF-106.

5.1.6.1.4 Cross arms: Intermediate transmission line X-arms shall be to Drawing CEE-TPF-4

5.1.6.1.5 Suspension arm arrangements for supporting Aerial Bundled Conductors on concrete masts and through bridges shall be to drawing CEE-TMGC-22.

5.1.6.1.6 The Contractor shall allow for the clamping brackets (back-straps) to be modified (i.e., extended) to include a 14 mm ø hole for bonding cable.

5.1.6.1.7 Shop drawings of all the SPC shall be required for approval prior to manufacture.

### 5.1.7 *SCRAPPING OF MATERIALS*

5.1.7.1 PRASA staff shall be allowed to scrutinize the scrap material and have first choice to remove re-useable materials to the store supervised stores.

5.1.7.2 The contractor shall be responsible for the safe movement of salvaged scrap to Driehoek Store.

5.1.7.3 Abandoned steel components shall not be left unattended on site. The steel shall be removed from the track side after each occurrence, safely stored temporarily (if required) and transported to the Driehoek store as soon as practically possible. All care shall be taken to avoid unlawful removal of these components from site.

5.1.7.4 All occurrences shall be documented in the site diary and signed by both parties.

5.1.7.5 The cost to be allowed for here is:

a. Administration
b. Transport
c. Loading and off-loading

5.1.8 *DEMOLITION*

5.1.8.1 The contractor shall be responsible for demolition of existing equipment and transporting released material to the Driehoek store which shall be indicated to the appointed contractor.

5.1.9 *CARE FOR SITE*

5.1.9.1 From the date on which the Site is handed over to the Contractor to the date of the issue of a Certificate of Completion, the Contractor shall take full responsibility for the care of the Works and the Employer's Assets on the Site and of all Plant intended for incorporation into the Works and materials on the Site intended for incorporation into the Works.

5.1.10. *GRASS CUTTING AND TREE FELLING*

5.1.10.1. All trees and overhang branches shall be felled within eight meters(8m) on either side of the tracks, and the work area shall be measured from the centre of the tracks.

5.1.10.2. For tree felling, payment will be based on the Contractor's rate per tree size category as stated in the Schedule of quantities and prices.

5.1.10.3. All low-risk trees shall be felled at the base with chainsaws.

5.1.10.4. All medium risk trees will be guided with ropes and felled at the base.

5.1.10.5. conditions allow for this; if space is limited the trees will be felled from the top down.

5.1.10.6. All high-risk trees close to structures, shall be felled from the top down, all felled stems and branches will be secured and lowered with ropes.

5.1.10.7. All trees and large bushes will be felled with chainsaws and re-growth controlled by means of cut-stump application of herbicides with a knapsack sprayer.

5.1.10.8. The herbicide will be immediately applied after felling and a dye will be added to the mix for identification purposes.

5.1.10.9. All low growing bushy and herbaceous weeds will be controlled by means of foliar application of herbicides.

5.1.10.10. Large trees and bushes will be felled with chainsaws and the stumps controlled by means of cut-stump treatment with Hatchet or Browser at 2% application rate in addition 0.5% concentration Crop oil will be used in conjunction with Browser.

5.1.10.11. Small trees, bushes, will be controlled by means of foliar application with Browser at 2% application rate in addition with 0.5% concentration Crop oil.

5.1.10.12. Herbicides will be carefully applied to cut stumps to prevent spillage and damage to adjacent vegetation.

5.1.10.13. For foliar application only Browser will be used to prevent damage to grasses.

5.1.10.14. All herbicides will be applied with knapsack sprayers.

5.1.10.15. Photograph of before and after the work commence with actual references of same area and date stamp on Photos must be submitted as proof with every invoice submitted.

5.1.10.16. The contractor shall cut all vegetation comprising grass, perennial weeds, reeds, sapling and brush within the area between boundary fences, where no boundary fences are percent, the area will be defined as twenty meters wide on either side measured from the centre of the tracks.

5.1.10.17. The grass shall be cut uniformly and as close to ground as possible, but no higher than 150mm above soil level, all cut material shall be removed from site to municipal dump site.

5.1.10.18. For cutting of vegetation payment will be based on the Contractor's rate per $m^2$ as stated in the Schedule of quantities and prices.

5.1.10.19. No payment will be made for rejected areas where the cutting of vegetation is too high, or the cutting is not uniform or patchy.

5.1.10.20. Payment of rejected areas will be withheld until the prescribed standards of workmanship has been achieved.

5.1.10.21. Photograph of before and after the work commence with actual references of same area and date stamp on Photos must be submitted as proof with every invoice submitted.

5.1.10.22. The contractor shall apply herbicides to the area on the tracks measured from the centre of track three meters wide on either side.

5.1.11. *OVERALL STAFFING AND KEY PROFESSIONAL STAFF*

The contractor shall apply herbicides to the area on the tracks measured from the centre of track three meters wide on either side.

- Project/ Construction Manager
- Site Supervisor
- Erectors or Traction Linesman
- Flagman
- Construction Health and Safety Officer

5.1.12. *MINIMUM QUALIFICATION OF KEY PROFESSIONAL STAFF*

**Project/Construction Manager**

5.1.12.1. BSc or B Tech in Electrical Engineering (Heavy Current).

5.1.12.2. Registered with the Engineering Council of South Africa (ECSA) as a Professional Engineer or Technologist.

5.1.12.3. Registered with the South Africa Council for the Project and Construction Management Professions (SACPCMP) as a professional manager.

5.1.12.4. **Site Supervisor**

5.1.12.5. Each team of Erectors or Traction Linesmen shall be supervised by a Site Supervisor.

5.1.12.6. All work shall be supervised by a Site Supervisor with experience in the installation, construction, and commissioning of 3kV Overhead Traction DC System.

5.1.12.7. A minimum of two site supervisors required.

**Erectors**

5.1.12.8. A minimum of two teams comprising of 8 (Erectors or Traction Linesmen) per team.

5.1.12.9. All staff that will climb on structures shall have experience in the installation of 3kV DC OHTE.

**Flagman**

5.1.12.10. A minimum of three qualified flagmen shall be deployed for each occupied section.

**Construction Health and Safety Officer**

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

NB. Provide certified copies of original qualifications and certificates of professional bodies. The copies must be certified by commissioner of oath. The date on the stamp shall be three months or less old, before the closing date of the tender. Please provide South African Qualifications Authority (**SAQA)** accredited qualification.

## 5.2. TO BE PROVIDED BY THE CONTRACTOR

5.2.1. Site books (each in triplicate) to record:
5.2.2. All incidents as well as the progress of work during the occupation.
5.2.3. All instructions pertaining to the technical details of the work being performed at that time.
5.2.4. Upon appointment, the contractor shall supply machinery, equipment, material, labour and consumables, etc. necessary for the undertaking and completion of the works to satisfaction of the client.
5.2.5. The client will require conformance documentation for each item of material procured by the contractor for installation used in this contract.
5.2.6. Any damage caused to the property of PRASA will be for the contractor's account.
5.2.7. Before commencing construction in any particular area, the contractor shall verify the positions of services. Where any underground services are shown on the drawings, the contractor shall have the equipment available on site for as long as is necessary to detect and locate such services and, if so ordered, he or she shall excavate by hand to expose such services in areas and in a manner and at a time agreed upon with the technical officer.
5.2.8. Protection of cables- Before any excavations take place near identified service cables, the contractor shall contact the technical officer. The contractor shall advise the Prasa technical officer at least 7 days in advance of the actual date on which to excavate near any cable. The contractor shall not use mechanical equipment to excavate within 3m of the estimated position of identified cable and shall, if necessary, expose the cable by means of hand excavation carried out under proper supervision.

## 5.3. MEASUREMENT OF QUALITY OF CONSTRUCTION

5.3.1. The works shall be quantified by the contractor with the assistance of PRASA personnel, the payment will be subject to the rates submitted in the tender.

5.3.2. Where the condition of the site is such that the specified performance standards cannot be achieved, the contractor should record all relevant information in conjunction with the Prasa Technical Officer before and after working. Correctness and final approval shall be the responsibility of PRASA.

## 5.4. RECTIFICATION OF SUB-STANDARD WORK

5.4.1. Where the specified standards of workmanship and accuracy are not attained, the Contractor shall rectify at his own cost within 7 working days. should the contractor fail to honor the stipulated notified days he can be reported to the National Treasury for non-performance and may be blacklisted (prevented from doing any business with the state).

## 5.5. GENERAL

5.5.1. Should any claim arise due to damage caused by any action of work by the Contractor to property of PRASA and his employees or any other person/s, the Contractor shall be held liable to settle such claims at his own cost.

5.5.2. The contractor shall provide transport, equipment, tools, consumables, supervision, protection, and labor necessary to successfully complete the contract.

## 5.6. SAFETY

5.6.1. The Contractor shall comply with requirements of safety legislations and regulations in all respects.

5.6.2. All drivers shall be in possession of valid driver's licenses and Public Drivers Permits (PDP) where applicable. Crane operators will be required to have a valid Crane Operator's certificate. All vehicles shall be roadworthy.

5.6.3. The Contractor shall be responsible for all protective clothing and –equipment for his employees. All employees required to climb structures shall be issued with suitable harnesses.

5.6.4. The contractor shall be responsible for security of personnel and material onsite as well as during transit.

5.6.5. All work shall always comply with the E7/1 Specification attached hereto.

5.6.6. Normal protection measures in accordance with the Protection Manual shall apply.

5.6.7. An effective safety procedure to be followed by all personnel on any work site in the case of approaching rail traffic shall be compiled by the Contractor and implemented before any work

commences. This procedure shall be updated whenever the need arises, and any changes shall be communicated to all employees on a works site before work proceeds.

5.6.8. It is the requirement of this contract that the contractor should provide PRASA with a detailed safety plan prior to being issued with a site access certificate, in accordance with the latest version of the OHS Act and the SPK7 and the E4E.

## 5.7 MEASUREMENTS AND PAYMENTS

5.7.1. Claims for payment will be made monthly.

5.7.2. Any rejected and incomplete work will not be paid.

5.7.3. All rates in the schedule of quantities must be made per unit as requested and should be an all-inclusive rate.

5.7.4. The rate quoted by the Tenderer(s) and accepted by PRASA must hold well till the completion of the work and shall not be subject to any escalation due to an increase in the local market rates for materials & labor. No claim on this account whatsoever shall be entertained at any stage including the extended period.

5.7.5. The amount of the Preliminaries to be included in each monthly payment certificate shall be assessed as an amount prorated to the value of the work duly executed in the same ratio as the preliminaries bears to the total of prices excluding any contingency sum, the amount of the Preliminaries and any amount in respect of contract price adjustment if provided for in the contract.

## 5.8. BONDS AND GUARANTEES

Surety in the amount equal to either ten percent (10%) of the contract price, as elected by the Contractor, shall be provided by the Contractor for the due and faithful performance by him in terms of the Contract. Such security shall be in the form of:

5.8.1. Government or approved Municipal stocks in negotiable form, or

5.8.2. A deed of suretyship furnished by an approved bank, insurance or guarantee corporation in such form as may be prescribed by PRASA, provided however that the Project Manager may, upon written application by the Contractor, return to the Contractor the whole or part of such security held by PRASA when the retention money has reached an amount which the Project Manager in his sole discretion considers sufficient for the protection of PRASA. PRASA is entitled to hold all or portion of the security until the completion of the contract and expiry of the defects liability and maintenance period.

5.8.3. Either five or ten percent of the value of the work completed, as reflected by the nett monthly amounts certified for payment, will be retained by PRASA for the due and proper fulfilment of the contract, until such retention money is sufficient, in the opinion of Project Manager, for the protection of PRASA.

## 5.9. PAYMENT CERTIFICATE

5.9.1. On or after the assessment date, the Supervisor and the Contractor will together assess the quantities of the progress on each item in the Bill of Quantities and complete the Progress Assessment Detail form, where after the Progress Assessment Certificate will be issued.

5.9.2. The Contractor shall then submit a VAT invoice and attach the above Progress Certificate for payment by the Employer.

5.9.3. Contractor to provide the Employer with the necessary details regarding banking details to enable the Employer to make electronic payments.

## 5.10. PRICING AND THE WORKS.

5.10.1. The contractor is required to provide firm prices/ rates for material and labor for the duration of the contract.

5.10.2. The contract period shall be inclusive of the delivery and installation period as well as an additional period of at least one year starting from the date of acceptance by the client of the last unit.

5.10.3. The costs for normal servicing shall be reflected separately and shall be paid quarterly for the duration of the service period.

5.10.4. The contractor shall make provision for the costs (direct or otherwise) associated with works on, over or adjacent to railway lines. The Contractor is advised to study the requirements of the SPK 7/1 and ensure that all works can be completed in accordance with these requirements.

5.10.5. The contract offer shall be based on the rates as indicated in the bill of quantities. The quantities shall be agreed during construction per section.

## 5.11. PENALTIES

5.11.1. If the Contractor fails to complete the Services within the time a stipulated in this Contract for completion of Services or a part or portion of Services, the Contractor shall be liable to the Employer for an amount calculated at 0.3% of the Contract Price per delayed Day per order, which shall be paid for every Day which shall elapse between the time for due completion and

completion of the relevant Services. However, the total amount due under this sub-clause shall not exceed the maximum of 10% of the Contract Price.

5.11.2. The imposition of such penalty shall not relieve the Contractor from its obligation to complete Services or from any of its obligations and liabilities under the Contract,

5.11.3. PRASA may set off or deduct from the fees due to the Contractor any penalty amounts due and owing by the Contractor in terms of clause 5.11.1

## 5.12. COMMISSIONING TESTS AND COMPLETION

5.12.1. Designated PRASA personnel, in conjunction with the Contractor, shall carry out the final commissioning test. The Contractor shall carry out any remedial work, if necessary.

## 5.13. HANDING OVER

5.13.1.1. The handovers shall be for each portion of the work when the Electrical System is tested and commissioned to the satisfaction of the Technical Manager, in accordance with the details as set out in the handing over documentation of PRASA.

## 5.14. GUARANTEE

5.14.1 All work undertaken by the Contractor shall be subject to a guarantee for a period of one year (12 months) against faulty and/or inferior workmanship and material.

5.14.2 The guarantee period shall commence the day the installation is formally handed over to and accepted by the local Metrorail staff (practical completion).

5.14.3 The Contractor shall undertake to repair all faults or defects due to bad workmanship and/or faulty materials during the guarantee period.

5.14.4 Any defects that may become apparent during the guarantees period shall be rectified to the satisfaction of and free of cost to the Client.

5.14.5 The Contractor shall undertake work on the rectification of any defects that may arise during the guarantee period within the time noted in the Contract Document, from the time of being notified by the Client.

5.14.6 Should the Contractor fail to do any remedial works within twenty-eight days of receipt written order from the Project manager, PRASA shall be entitled to undertake the necessary repair work or effect replacement of defective apparatus or material, and the Contractor shall reimburse PRASA the total cost of such repair of replacement, including the labour costs incurred in replacing defective material.

## 6. CONSTRUCTION RELATED SECURITY

### 6.1. MANDATORY SECURITY REQUIREMENTS

6.1.1. All security companies used by the Contractor shall be PSIRA registered with valid letter of good standing.

6.1.2. Security personnel shall all be PSIRA registered with a clear criminal record no criminal pending cases and preferably be sourced from the local community.

6.1.3. All personnel employed by the Contractor including sub-contractors shall have undergone a Health and Safety Induction.

6.1.4. Permits to work (in line with Covid-19 regulations) shall be issued at the cost of the contractor to all personnel on that shall be signed and stamped by the authorized PRASA Official responsible for Risk Management.

6.1.5. The security to be provided by the contractor shall be responsible for both the appointed contractor's assets and PRASA's assets on site until the site is handed over to PRASA. A list of all functioning equipment that do 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.

6.1.6. PRASA assets that shall be guarded by the contracted security includes Permanent way assets, All Train Authorisation on track elements, all train stations (with all assets included) along the section and all functioning equipment along the corridor.

6.1.7. Any lost or stolen material shall be replaced by the contractor at his own cost.

6.1.8. The contractor shall provide on-site security for personnel and material stock and should ensure that patrols are in place at the section handed over to the contractor and until the completed work is handed over to PRASA. No claims of material or losses shall be lodged with the client for stolen goods during the construction before the completed work is handed over to PRASA.

6.1.9. Furthermore, it is the contractor's responsibility to ensure that valuable metal i.e., copper is adequately protected while in transit to and from site.

6.1.10. The contractor shall make sure that all material removed from 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 site.

6.1.11. Scrap metal removed from the section shall be adequately protected until it is delivered to PRASA's stores.

6.1.12. PRASA reserves the right to conduct ad-hoc inspections to ensure Compliance.

## 7. LIST OF TRANSNET/ PRASA SPECIFICATIONS THAT FORM PART OF THIS SCOPE OF WORK.

| | | |
|---|---|---|
| 7.1. | BBB2141 | Lightning Arrester on 3kV DC Cantilever Structure |
| 7.2. | BBB3569 | Symbols |
| 7.3. | BBC 1678 | Bonding on All Types of Rails |
| 7.4. | CEE 0038.87 | Compression Fittings on Stranded Aluminium Conductors |
| 7.5. | CEE-0045.2002-1 | Painting of Electrification Steelwork |
| 7.6. | CEE-0054 ISS 83 | Section Insulators for 3kV DC OHTE for both High and Low Speed Traffic |
| 7.7. | CEE 0057.90 | Supply of Cables |
| 7.8. | CEE 0059.84 | Earthing and Bonding 3KV DC Electrification |
| 7.9. | CEE 0107 ISS 85 | Supply of ABC |
| 7.10. | CEE 0128.85 | Maintenance of 3kV DC Electrification |
| 7.11. | CEE 0159.98 | Restressed Concrete Mast for Electrification Projects |
| 7.12. | CEE 0166-96 | Insulating Pads, Washers and Bushes for Traction Mast Bases |
| 7.13. | CEE 0172.86 | SATS Traction Power Supplies Handbook |
| 7.14. | CEE 0177.86 | Earth Systems for Electric Light and Power and Traction Installations |
| 7.15. | CEE 0183 IS 2002 | Hot-dip Galvanising and Painting of Electrification Steelwork |
| 7.16. | CEE-TW-646 | Jig Stencilling and Structure Numbering |
| 7.17. | BBD 7267 | Specification for grooved copper-magnesium contact wire for electrical traction purposes |
| 7.18. | CEE241 | Installation of Contact wire |
| 7.19. | BBH2161 | Requirements for 160 square millimetre All Aluminium Jumper Conductor |
| 7.20. | BBH 2164 | Typical layout of FCC's and C-Jumper |
| 7.21. | CEE TPB 3 | Termination |
| 7.22. | SABS 1339 | ABC |
| 7.23. | CEE-0054 ISS 83 | Section Insulators for 3kV DC OHTE for both High and Low Speed Traffic |
| 7.24. | SABS 920 | Galvanising |

| | | |
|---|---|---|
| 7.25. | BBB 1616 | 450 Volt gas arrestor spark gap for traction power supply |
| 7.26. | CEE TU 100 | Spark gap drawing |
| 7.27. | BBB 6017 | Rail and Mast bond Fasteners |
| 7.28. | BBB2141 | Lightning Arrestors Arrangement on 3kV DC Cantilever Structures |
| 7.29. | BBB2144 | Components. Lightning arrestor arrangement on 3kV DC Cantilever Structure |
| 7.30. | CEE TMGC 14 | Push pull Offs |
| 7.31. | CEE TMGC 13 | Cross span to DB |
| 7.32. | CEE TMF 106 | Vertical Member drawings |
| 7.33. | CEE-TPF-4 | 11kV Transmission Line cross arm structure arrangement on OHTE Mast |
| 7.34. | CEE-TMGC-22. | Suspension arm arrangement for ABC |
| 7.35. | CEE-TW-646 | Mast pole numbering |
| 7.36. | BBB2141 | Lightning Arrester on 3kV DC Cantilever Structure |
| 7.37. | BBB1649 | Concrete Foundation Direct Plant (Concrete Mast) |

7.38. CIDB

Class of Work: EP

Minimum Grade: 9

7.39. PROJECT SPECIFIC TERMS AND CONDITIONS.

Refer to the specification on section 5.

7.40. PROJECT SPECIFIC SAFETY RELATED REGULATIONS.

7.40.1. The Contractor shall comply with requirements of safety legislations and regulations in all respects.

7.40.2. All drivers shall be in possession of valid driver's licenses and Public Drivers Permits (PDP) where applicable. Crane operators will be required to have a valid Crane Operator's certificate. All vehicles shall be road worthy.

7.40.3. The Contractor shall be responsible for all protective clothing and –equipment for his employees. All employees required to climb structures shall be issued with suitable harnesses.

7.40.4. All work shall always comply with the E7/1 Specification attached hereto.

7.40.5. Normal protection measures in accordance with the Protection Manual shall apply.

7.40.6. An effective safety procedure to be followed by all personnel on any work site in the case of approaching rail traffic shall be compiled by the Contractor and implemented before any work

commences. This procedure shall be updated whenever the need arises, and any changes shall be communicated to all employees on a works site before work proceeds.

7.40.7. It is the requirement of this contract that the contractor should provide PRASA with a detailed safety plan prior to being issued with a site access certificate, in accordance with the latest version of the OHS Act and the SPK7 and the E4E.

7.40.8. Occupational Safety Act, 1993 (Act No: 85 of 1993).

7.40.9. Electrical Safety instruction (BBF 3690, Version 2).

7.40.10. National Environmental Management Act 107 of 1997.

7.40.11. Construction regulation 2014.