



## Free State OU

### NEW ENGINEERING CONTRACT

**FS-STM-1905-331031-0002 Welbedacht Dam - Van Stadensrust 11 kV Capacitor Bank (C.DO03374)**

**FS-STM-1905-331031-0003 Driedorp Boesmanskop 22kV line to Workshop Substation (C.DO03444)**

**FS-STM-1905-33103-0004 Koria 11kV line from Workshop Substation (C.DO03445)**

### DESIGN PACKAGE

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## ELECTRICAL

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## PART 1

### 1. Project Works Information:

#### 1.1 Description of the works

The *Works* should be executed in total to *Employer's* discretion, as per designs and in accordance with the relevant specifications and *Employer* standards.

##### 1.1.1 GENERAL

- **Construct new three phase Fox line from DBK t-off to the newly proposed 22/11kV Workshop Substation.**
- **Build another Fox line from the load side of the Substation to the WSR pick up point.**
- **Install new pole mounted reclosers outside the Substation on the 22 and 11kV side.**
- **Install new CT/VT unit on the 11kV side after the closer.**
- Supply *Employer* approved material (as listed in paragraph 1.17.3) and collect *Employer* supplied material (listed in paragraph 1.17.2) from stores.
- Construct MV, LV and House connections as per the attached design drawings and specifications.
- The material listed in paragraph 1.17.3 is an estimation of the quantities and materials the *contractor* should provide. It is the *contractor's* responsibility to ensure the accuracy of this material.
- No compensation will be allowed should the BOM as listed be incorrect.
- All material will comply with Eskom standards as per Eskom Distribution Standards, Part 9. All conductors will be Eskom marked.

#### 1.2 Work to be performed by the Contractor for the works

##### 1.2.1 Scope of Works

##### Preliminary, General Costs and Site Establishment

##### Site Establishment

###### 1.2.1.1 Contractor's Yard Fencing

The cost to the *Contractor* to make provision for and to erect, alter as necessary, maintain, remove and make good on completion of the *Works* suitable fencing with access gates, etc as necessary for the enclosure of the *contractor's* yard, all to the satisfaction of the *Employer's* Representative. If other suitable and safe storage facilities have already been provided, **this item need not be priced.**

###### 1.2.1.2 Contractor's insurance (insurance payments, provide certificates)

The cost to the *Contractor* to make provision to pay all deductibles (excesses) for the risks that he may encounter during the execution of the *Works*, further explained in the Contract document.

###### 1.2.1.3 Site Offices (establish & maintain)

Cost to the *Contractor* to make provision for a site office, suitable for regular site meetings, which must also serve as the office for the *Contractor's* site supervisor. Adequate workspace must also be provided for the *Project Manager* or his Representative, as well as a place of safekeeping for his site plans and documentation.

###### 1.2.1.4 Site Stores (establish & maintain for safe keeping of the materials)

Cost to the *Contractor* to make provision for the safe storage of material on site against theft as well as protection against damage due to wind or weather.

###### 1.2.1.5 Accommodation of Employees

Cost to the *Contractor* to make provision for accommodation for his employees that are working on a site which is not close to their home base for an extended period.

###### 1.2.1.6 Contractor's Plant, Equipment & Tools (establish, maintain and remove)

The cost to the *Contractor* to make provision for the necessary Plant, Equipment and Tools for the execution of the Works, maintain it in a proper and safe working condition and remove on Completion.

#### **1.2.1.7 Sanitary Facilities**

The cost to the *Contractor* to make provision for and maintain in a thoroughly clean and tidy condition and remove on completion of the Works, proper toilets for the use of the workmen

#### **1.2.1.8 Water Supplies**

The cost to the *Contractor* to make provision for all water necessary for the execution of the Works, including all temporary plumbing, removing same and making good on completion of the Works. Portable drinking water should also be made available for the workmen.

#### **1.2.1.9 Electricity Supplies**

The cost to the *Contractor* to make provision for all electricity and artificial lighting necessary for the execution of the Works, including all temporary installation work, removing same and making good on completion of the Works.

#### **1.2.1.10 Communications (telephones, e-mail, faxes)**

The cost to the *Contractor* to make provision and to maintain a proper telephone or cell phone communication system as well as an e-mail and a fax facility until completion of the Works.

#### **1.2.1.11 Security (24 hours)**

Cost to the *Contractor* to make provision for all appropriate measures for the general security of the Works.

#### **1.2.1.12 Setting out the Works.**

Cost to the *Contractor* to provide templates, jigs, instruments (dumpy levels) etc. and to set out lines and levels for excavations, concrete plinths, buildings, structures, fencing, drainage, etc, if required.

#### **1.2.1.13 Management & Programme for the works (appointment of a Supervisor) (Compulsory to list the name of supervisor for the duration of contract in part 3, paragraph 4.)**

The cost to the *Contractor* to make provision for the employment of a competent supervisor to supervise and manage the execution of the Works as well as to prepare a detailed programme and supporting documentation for the execution of the contract including the work of all approved *subcontractors* engaged by *Employer*, representing the information that is required by the Works Information in sufficient detail to enable the *Employer's* Representative to assess the progress of the works at all times in comparison with the programme.

### **1.3. Health & Safety (OHS Act, Construction Regulations and Eskom Safety Specifications)**

#### **1.3.2.1 Personal protective equipment:**

Cost to the *Contractor* to make provision to replace PPE only when required and not to purchase new PPE for each project. Only the PPE required for the risks exposed to during the Contract period should be priced. Typical PPE (Hard hats, Safety goggles or shields, Respirators, Gloves, Safety shoes, Overalls, Fall Arrest Systems, Testing of equipment.

#### **1.3.2.2 Compliance with safety plan & safety file**

The cost to the *Contractor* to make provision to comply with the list of requirements to draw up a H & S plan for the project and compile and maintain a H & S File.

#### **1.3.2.3 Health & Safety Training**

The cost to the *Contractor* to make provision for H&S training as well as the cost of the idle (unproductive) time of his employees whilst undergoing H & S training.

#### **1.3.2.4 Legal appointments in terms of the OHS Act and Regulations**

The cost to the *Contractor* to make provision for the appointees in terms of the OHS Act and Regulations i. e., qualified first aider, construction site Health and safety officer, incident / Accident investigator, if not part of the

construction teams of the *Contractor*, and appointed full time for this purpose. The additional cost of their employment which cannot be recovered through contract rates, should be allowed here.

#### **1.3.2.5 Other Health and Safety items deemed necessary to comply to OHS Act, Regulations and Eskom Safety specifications.**

The cost to the *Contractor* to make provision for the cost to comply to any other requirement of the OHS Act, i.e., to notify the Department of Labour of the Construction project, time and cost to do and record daily Risk assessments, taking responsibility of Sub *Contractors'* compliance in terms of the OHS Act (Safety Plan and File), constant updating of the Health and Safety File, etc.

#### **1.3.2.6 Provision of Standards and Specifications**

The cost to the *Contractor* to obtain Standards and Specifications that are referred to in this Contract document but are not supplied in hard copy format by Eskom.

#### **1.3.2.7 Special transport of workers to, at and from site i. t. o. OHS Act. (Provide Registration No. of Vehicle that will be used. If hired provide copy of contract as part of returnable for tender)**

The cost to the *Contractor* to provide safe transport to his employees at, to and from the construction site in terms of the Construction Regulations Clause 21 (2) (a) and (i)

### **1.4 Environmental Management**

#### **Compliance with environmental legislation as well as environmental specifications included in or referred to in this document.**

The cost to the *Contractor* to obtain permits should it become necessary to cut a protected tree, ensure that waste is disposed of on a permitted, legal waste site and all relevant costs payable to dumping site.

#### **1.4.1 General**

##### **1.4.1.1 Completion and submission of the Expanded Public Works Programme Report**

The cost to the *Contractor* to complete the report (one page) attached to this Contract document and submitted to the *Project Manager* upon completion of Electrification, Sub-transmission and Refurbishment projects and with each invoice for Minor Reticulation projects.

##### **1.4.1.2 Provide for the repair to damaged water reticulation pipes**

Projected cost to the *Contractor* of repairing damaged water reticulation and/or other underground services that were not indicated on drawings or which a superficial search by the *Contractor*, did not reveal.

##### **1.4.1.3 Collecting, updating and processing of CC&B information on site**

The cost of employment of a person(s) to collect, update and to process the Customer (CC&B) Data on site **only if required**.

##### **1.4.1.4 Numbering of houses on site as per *Employer* FSOU standard**

- The cost to the *Contractor* to supply and fix in position the house number as per the *Employer's* standard.
- 100 x 240mm x 0,6mm Yellow Chromadec plate with two pre-drilled 6 mm holes (rust-free metal).
- Fixed with two 6mm x 75mm nylon anchor or 6mm Zink bolt and 2x nuts.
- All corners rounded.
- Clear powder coat finish.
- Cast vinyl with 75mm Helvetica Compact script.

##### **1.4.1.5 Items deemed necessary for the completion of this Assessment Stage (must be specified and listed in Price list, under Site Establishment. If not, the cost will not be considered by *Employer* as part of the "Prices".)**

Any other cost or contingency identified by the *Contractor* which is not covered in the Site Establishment and could have a cost implication to the *Contractor*, must be specified to warrant inclusion in the Price Schedule.

**Notes:**

- a) The *Contractor* is referred to the contract documents for the full intent and meaning of each clause or item. He shall allow opposite each clause or item herein contained whatever payments he may consider necessary for the carrying out and observance of such item.
- b) The *Contractor* shall price the Preliminaries and General Activities, in respect of all payments required for any item of work, risk, contingency or obligation, whatsoever that is not described in the Activity Schedule and which is the responsibility of the *Contractor* under the contract.
- c) The *Contractor* shall, when requested by *Employer*, make available to *Employer* the detailed breakdown of each priced item in Activity Stage 1: Preliminaries and General.
- d) In the event of the *Contractor* not pricing the items of the Preliminaries and General Activities in sufficient detail, the *Employer* reserves the right to exercise its own discretion in the apportionment to individual items of the total Preliminary and General prices within the contract documents.

**1.5 MV Distribution****FS-STM-1905-331031-0002 Welbedacht Dam - Van Stadensrust 11 kV Capacitor Bank Installation of new Cap Bank and relocation of an existing Voltage Regulator**

- Erect new strain structure between WSR 200-31 and WSR 200-32 and install new switched on 0.9MVar capacitor bank (as per D-DT 1747,1832 & 1849 and use 11m pole with 200mm pole top diameter).
- Relocate the existing voltage regulator from WSR 124 to a new position between WSR29 and WSR30.
- Voltage regulator to be supported on 10m poles with 200mm pole top diameter as per D-DT 1833 (out-of-line structure).

**FS-STM-1905-331031-0003 Driedorp Boesmanskop 22kV line to Workshop Substation New 22kV Fox line from DBK feeder to the new Substation**

- Create new tee-off at DBK 360-8 and build new Fox line approximately 3.7km to the new Workshop Substation (as per D-DT 1743, 1747, 1746, 1763, 1764, 1804,1870 & 1873).
- Install a new recloser on the closing span (DBK 360-43) in front of the Substation (as per D-FS 15735,1847,1763 &1852).
- Recloser to be installed on an H-pole using 12m poles with 180mm pole top diameters.
- The line should be constructed with poles of 160mm pole top diameters and 13m poles should be used on the railway crossing.
- Label all MV poles as indicated on the spanning sheets.
- Pegging of ALL poles to be done by Eskom surveyor before construction of the project.

- Any deviation from construction drawing should be done in consultation with the relevant PE.

**FS-STM-1905-33103-0004 Koria 11kV line from Workshop Substation**  
**New 11kV Fox line from the Substation to pick up portion WSR feeder**

- The name of the new 11kV feeder from the Sub is Workshop Koria (**WKR**).
- Build new Fox line approximately 410m from the Sub to pick portion of WSR line at WSR 200-86-68-50.(as per **D-DT 1746,1763,1764 &1870**).
- Install new recloser at WKR 1 and CT/VT unit at WKR 2 outside of the Substation (as per **D-FS 15735,1841, 1847,1763 &1852**).
- Recloser to be installed on an H-pole using 12m poles with 180mm pole top diameters
- CT/VT unit to be installed on an H-pole using 11m poles with 180mm pole top diameters
- Create normally open (N/O) point at WSR 200-72.
- Label all MV poles as indicated on the spanning sheets.
- Pegging of ALL poles to be done by an Eskom surveyor before construction of the project.
- Any deviation from spanning sheets should be done in consultation with the relevant PE.

The Eskom DISTRIBUTION STANDARDS Parts 4 and 22 as well as specific requirements applicable to the Free State OU web site (Technology and Quality) forms the basis on which the *Contractor* has to construct the works.

**MV FOCUS AREAS TO BE APPLIED WHERE APPLICABLE**

- Pistol grip straining clamps to be fitted at all road crossings (proclaimed roads)
- Angle to be done by using 2,5m wooden cross-arms, D-DT 1746 and T-off 1804. (Vertical angles will not be accepted, accept when motivated and approved). All MV feeders through towns will be constructed with the 2m steel cross arms, bird friendly (D-DT 1870B etc.)
- Ensure that struts (D-DT 0351) and stay rods are planted according to the correct depth and not bended (D-DT 0350). **No struts or stays to be planted inside a stand except for on the boundary. Stays or struts not to block access to the stand e.g. inside existing drive ways or gates.**
- Ensure stays, poles and struts are compacted.
- Ensure dead-ends are fitted with a regulating eye tool. The *contractor* must have this tool as part of his equipment on site.
- PG clamps to be used on all non-tension joints and fitted according to manufacturer requirements?**
- No BIL down wires to be fitted on any structures inside towns.
- Cross arms (take-offs) (rural lines) fitted to an existing or new pole with a BIL down wire must not be bonded and the BIL wire not to be removed.
- Barbed wire to be used as anti-climbing device and installed at all positions as stipulated in technical bulletins 05TI-09 and 03TB-08. Danger signs as per specifications will be installed on all strut poles and poles

with equipment.

- j) Ensure that the clearances in game reserves / farms adhere to the minimum height as stipulated in the Technical Bulletin 04TB-27
- k) Discrepancies between any of the Construction Drawings, *Employer's* DDT Drawings, Spanning sheets, Bill of Materials and Specifications will be brought immediately to the attention of the Project Engineer via the Project Co-ordinator. **Feeder lines will be surveyed by Employer. All internal survey (MV & LV) will be done by the contractor.** The *contractor* to survey according to the approved SG plan **AND NOT ACCORDING TO THE YARD FENCES ON SITE. The MV ASCII file to be completed by Employer Survey and the contractor to arrange for this to be done via the COW once pegged.** PM to ensure that *Employer* survey is involved and aware of the project prior to the construction of the project. The *contractor* to ensure that the networks surveyed adhere to the following requirements:
  - Clearances between conductors and ground, houses/dwellings, vegetation, Telkom etc. are according to the *Employer* minimum requirements
  - Ensure that lines do not cross graveyards, soccer fields etc.
  - Applications were done for rail and road crossings in conjunction with the *Employer* survey department prior to construction.

The *Contractor* may not change routes that will influence voltage drops, have an influence on the costs or the practical operation and maintenance of the electrical network. If areas of uncertainty exist, the Engineer will be contacted immediately.

- l) No trees will be trimmed or totally cut without the permission from the Land Owner and in rural areas from the Local Leader. Trees that are legally protected may only be cut with a permit. The *Contractor* to ensure that these permits are in place before any trees is cut.
- m) The following are general construction related aspects and will take preference to any other drawing and / or specification.

All conductors will be tensioned according to Technical Bulletin 02TB-034 and Tension Charts provided. The following steps will be followed:

- A calibrated Dynamometer, Thermometer and calculation material will be used.
- Measure the distances between strain points.
- Calculate the equivalent span length according to the following formula:

$$Leq = \sqrt[3]{(L1^3 + L2^3 + L3^3 + \dots) / (L1 + L2 + L3 + \dots)}$$

Where

Leq: Equivalent Span Length

L1, L2 etc: Intermediate Span Lengths between Strain Points

- Read the relevant Tension from the Sag and Tension charts using the conductor temperature and equivalent span length.
- The phases will protrude above the top of the pole and cut in staggered lengths. All phases will be tensioned. The following data that will be handed to the Project Coordinator as part of the Handing Over Document:
  - Date, Span (between tension poles), Temperature, Equivalent Span Length, tension.
- n) All open excavations will be considered as dangerous. It will be clearly marked with danger tape that is at least 1 m from the edge of the excavation and at least 1m in height.
- o) All drilled holes to be treated with creosote.
- p) All incorrectly drilled holes in wood poles must be painted with creosote and plugged with dowels that fit the hole firmly. MV poles to be labelled according to the Works Procedure for Labelling of MV Overhead lines



- DISPVWAA3 rev2 (latest revision)
- q) Cables to be installed in accordance with the following specifications: following are general construction related aspects and will take preference to any other drawing and / or specification.
- All cables to be installed in accordance with *Employer* Distribution Standards, Part 22. **All cables will be tested in accordance to the following Technical Instruction: 04TI-20 REVISION 0**  
Part 22 : CABLES, COMMISSIONING TESTS FOR NEWLY INSTALLED MV, IV AND LV CABLES
  - Cables to be laid directly into the ground, D-DT-0854, latest revision.
  - Install warning tape, D-DT-8013, directly above the cable at a depth of 300 mm below ground level, (MV and LV and underground service cables).
  - Cables crossing runways or slipways to be installed to D-DT-8018.
  - Cable route markers, D-DT-8012, to be installed at each bend, road crossing and cable trench crossing. The base of the cable marker to be at a depth of 250 mm below natural ground level.
  - The following shall be punched onto the aluminium plate of the cable route marker:
    - an arrow indicating the cable route,
    - cable type and size,
    - the circuit number indicated on the electrical diagram.
- r) Jumpers to MV auxiliary equipment must adhere to Technical Bulletin 02TB 023.
- s) The *Contractor* must comply with Technical Instruction 02 TI 012 (latest) when the MV structure D-DT's 1743, 1744, 1746 & 1747 is constructed. Structure to be constructed in according to D-DT 0320, OPTION B.
- t) Poles, Stays & Struts planted in type 3 and 4 soils to be installed according to Technical Instruction 06TI-019, as well as Technical Bulletin 06TB-035, dated 15 January 2007.
- u) The *contractor* must have a cable car on site. Damaged MV conductor unrolled wrongly will be replaced at the *contractors* cost. Empty cable drums must be returned to the stores by the *contractor*. Failure to comply will be for the *contractors* account.
- v) Only the standard MV porcelain type stay insulator to be used. **The fibre glass rod type will not be accepted.**
- w) It is the *Contractors* responsibility to ensure that wooden poles delivered on site is stacked according to the required standard, DISPVABY3.
- x) The *contractor* to tender for normal soil or as specified by the Design Engineer in the Price List. The *Contractor* to provide a rate for all other soil types in Part 2: Type 4 (very soft soil), Type 3 (soft to firm), Type 2 (very soft rock), Type 1 (soft rock) and Hard rock. The *contractor* will only be remunerated for the actual soil types on site. To claim for other soil types as tendered for the COW will have to confirm the soil types on site before closing the holes. No payments will be made if the before mentioned are not verified and confirmed by the appointed COW.
- y) No transformers to be installed on corners and the designer to try and prevent any LV road crossings from the transformer structures.
- z) **Stay wire to be made of at least 300mm below ground level and binded to the stay rod with 3 x cable ties, SAP no 0168521, 100mm apart or be cut beneath the stay thimble and as close to the thimble as possible. The stay wire not to be bended to prevent any injury to animal or human.**
- aa) At the same time the NEC is handed to Procurement in order to issue tenders for the appointment of a contractor, Project Management must submit the Asset Disposal Office with a spreadsheet containing the details of the scrap materials that will be available for disposal and their decision regard the return of the materials to the RDC or the materials to be disposed from the construction site (Other method of disposal other than the mentioned methods needs first be discussed between Project Management and Asset Disposal and approval be obtained from the applicable authority (Tender Committee))

## 1.6 LV DISTRIBUTION

- N/A

**1.7 SERVICE CONNECTIONS**

- N/A

**1.8 AUXILIARY EQUIPMENT**

- Install new recloser at WKR 1 and CT/VT unit at WKR 2 outside of the Substation (as per D-FS 15735,1841, 1847,1763 &1852) on the 11kV side.
- Install new recloser at DBK 360-43 outside of the Substation (as per D-FS 15735,1841, 1847,1763 &1852) on the 22kV side.
- Install new 0.9MVA switched capacitor bank between WSR 200-31 and WSR 200-32 as per D-DT 1832,1747 & 1849.
- Transformer Fuse elements will be supplied by the CNC. The contractor should inform the CNC at the beginning of the project of his requirements with reference to the fuse element ratings and quantities.
- All transformer bushing connections (MV & LV) to be done via lugs.

**1.9 OTHERS**

- Testing, commissioning and handing over of networks to *Employer* as per Handing-Over Procedure, SCSASABZ1.
- Produce As-Built drawings of constructed networks and hand over to the *Employer* as per Eskom Standard, ESKPVAEG8.

**1.10 Final Inspection, taking over of the Works and clearing site**

- a) "As Built" drawings to be supplied at the final inspection according to the as built process ESKPVAEG8 (latest).
- b) During final inspection, the *Project Manager* or his *representative* will ensure that the quality control check sheets are completed and signed by all the interested and affected parties. Only after signing of this document, will the site be handed over for Commercial Operation. (See Eskom standard, SCSASABZ1 rev 1)
- c) Removal of site office and stores and discontinuation of services provided for the site office.
- d) Clearing of all rubble, waste and rubbish, resulting from the construction activities, removal from site and re-instatement of terrain.
- e) Removal of all excess material (Copper, etc.) from site and returning of such material to the nearest *Employer* stores.
- f) All the parties concerned at the completion of the *works*, prior to the taking over of the *works*, will hold a final inspection.
- g) In the event of the *Contractor* not pricing the items of the Final Inspection and Taking Over of the Works Activities in sufficient detail, the *Employer* reserves the right to exercise its own discretion in the apportionment to individual items of the total Final Inspection and Taking Over of the Works prices within the contract documents.

**1.11 Power Line Gates**

- a) All work to be in strict accordance with TRMSCAAC1- Section 4.5, the Fencing Act No. 31 of 1963, SABS 675 and to detail servitude gate drawings D-FS-12051 All sheets & D-FS-13409 All sheets, latest revisions. Prior to the commencement of any other construction activities, the power line access gates shall be installed at all points where the power line crosses any fence in which there is no suitable gate within the extend of the power line way leave , unless otherwise indicated on the Route Plan.
- b) No construction work shall be allowed to commence on any section of the line, unless all gates in that section have been installed.
- c) Existing gates situated near and/or in the power line way leave and which are unsuitable for construction vehicle access must also be clearly marked. The *Clerk of Works* will be responsible to evaluate all marked fences prior to the installation of the line servitude gates.
- d) Existing access gates outside the power line way leave shall only be used after written approval is obtained from the relevant *Landowner*, for the use thereof.
- e) The *Project Manager's Clerk of Works* will be responsible to evaluate all marked fences and gates, prior to the installation of new line servitude gates and/or replacement of existing gates.
- f) The *Contractor* will be responsible for the detail setting-out of the gate- post and strut positions.
- g) The *Contractor's* work comprises:
- Transport all line servitude gates, gate & fencing material and all other gate construction material;
  - Setting-out of gate & fence post and strut positions;
  - Evaluating sub-soil conditions for foundation nominations;
  - Drilling/Excavating of holes for poles and struts;
  - Excavating of earth strap trenches;
  - Complete installation of all gate & fence posts and struts in **15MPa** concrete footings;
  - Curing of concrete footings;
  - Install gate leafs and cut and re-tension existing fence wires;
  - Install earth straps, backfill and compact trenches;
  - Treatment of all damaged sections on gate leaf frames, poles, struts, etc.
- h) The in-situ soil condition at each gate position will determine the type of gate post foundation to be installed.
- i) Servitude gates shall be erected with a gap no more than **100mm** between the bottom of the gate leaf and the natural ground level.
- j) Where gates are to be installed in jackal proof fences and game fences, a suitable concrete threshold as shown on the detail drawings shall be constructed at the gate opening. Gate leafs shall be covered with diamond mesh as specified on detail drawings.
- k) All gate and fence posts as well as post struts are to be installed in **15MPa** concrete footings. The concrete footings must be properly cured, in the most suitable method, for at least **14 days** prior to the tensioning of the fence wires.
- l) Earth strap trenches to backfilled slightly watered and thoroughly compacted in layers not exceeding **200mm** in thickness.
- m) For soil formations with a very high resistivity the earth strap trenches to be backfilled with a **3:1 soil/agricultural gypsum** mixture.
- n) The initial tensions to be maintained in all existing fence wires. Where required, the *Contractor* shall replace rusted or damaged wire strands on either side of the gate with similar new wiring to prevent the movement of live stock and other animals. The *Project Manager's Clerk of Works* will determine the extent of replacing fence wires and a written instruction shall be given accordingly.
- o) The *Contractor* shall provide padlocks for all servitude gates. The *Contractor* shall furthermore ensure that all power line servitude gates and any other existing gate, used for construction purposes, in or outside the power line servitude are kept closed and/or locked when not in immediate use.
- p) The *Contractor's* supervising personnel and the *Project Manager's Clerk of Works* will be the only site personnel issued with keys for these padlocks. No keys shall be provided to *Landowners* to avoid conflict situations between *Landowners*.

- q) *Landowners* will be allowed to attach their personal padlocks in the lock chain, only after acceptance of the *Employer's Clerk of Works*.
- r) After the completion of all construction activities and the taking over of the works, the *Contractor* shall recover all his padlocks and replace it with padlocks supplied by the *Employer*.

### 1.12 Special requirements

- a) All construction vehicles shall pass through gates when crossing fences and the *Contractor* shall not be allowed to drop fences temporarily for the purpose of driving over it. No construction work shall be allowed to commence on any section of the line, unless all gates in that section have been installed.
- b) Installation of gates in fences on national road reserves shall comply with the ordinances of the relevant *Provincial Authority*. No servitude gates shall be installed in highway servitude fences.
- c) Existing gates within or close to the power line servitude, which are unsuitable for the access of construction vehicles must be removed by the *Contractor* and replaced with a new power line servitude gate, only when instructed by the *Project Manager's Clerk of Works*.
- d) The use of existing gates in or outside the power line servitude must be negotiated with and accepted by the relevant *Landowner*, prior to the use thereof.
- e) In terms of *Employer's* servitude agreement, *Employer* (and/or its appointed *Contractor*) has the right to enter and be present on a property at any time (in an appropriately marked vehicle), whether it be to perform work on the property itself or to gain access to adjacent properties. In order to assist with access, *Employer* may erect gates as necessary, in consultation with the *Landowner*.
- f) **No power line servitude gate shall be installed in the Spoornet Railway servitude fences, unless otherwise negotiated and agreed upon with the relevant Spoornet Authorities.**

### 1.13 Other Access

- a) In situations where private roads must be used for construction purposes, the condition of the said roads must be recorded (e.g. Photographed) prior to the use thereof and be agreed upon by the *Employer*, the *Landowner* and the *Contractor*.
- b) All private roads used as access to the site of work by the *Contractor*, shall be maintained by him at all times at his expense, and upon completion of the work, be left in at least the condition prior to the commencement of the construction activities.
- c) Where possible access along the power line must be established by vehicles passes over the same track on natural ground.
- d) Temporary access roads shall only be constructed and maintained where necessary at watercourses, steep slopes or where boulders and rocks prohibit vehicular traffic.
- e) No access roads shall be constructed in and/or outside the power line servitude without the written instructions from the *Clerk of Works*.
- f) Upon completion of the project, all construction access roads shall be closed unless otherwise specified by the *Employer* and/or *Landowner*.
- g) All temporary access roads shall be constructed in strict accordance with specification **TRMSCAAC1 Section 4.4**, and to the satisfaction of the relevant *Landowner*.
- h) Loose boulders which obstruct the construction access as well as for running out the conductors shall be removed from the servitude.

### 1.14 Bush clearing

- a) All work to be in strict accordance with TRMSCAAC1, The Environmental Conservation Act No. 73 of 1989, the Conservation of Agricultural Resources Act No. 43 of 1983, the Standards and Specifications for the control and cutting of trees and bush within overhead line servitude's SCSASAAZ9 and the Environmental Management Plan for the **specific project and spanning sheets**.
- b) Trees and bush to be cut and/or trimmed on a careful and selective basis to ensure the required electrical clearances from all conductive equipment and to ensure the safety of the power line structures.
- c) A minimum **4,0m wide strip** on the centre of the power line servitude all trees, bush and shrubs shall be cut **at ground level** to ensure proper access for construction purposes along the line. All wood must be removed from the servitude.
- d) Additional maximum **3,0m wide strips** on either side of the mentioned **4,0m wide centre strip** all trees, bush and shrubs shall be cut **at maximum 150mm above ground level** to ensure no interference with construction activities along the line. All wood must be removed from the servitude.
- e) Where tall trees are to be cut in the power line servitude, the total width of the servitude must be cleared, as well as the selective trimming of trees outside the servitude to ensure the safety of the overhead conductors and power line structures. The *Clerk of Works* will give the *Contractor* a written instruction for any trees to be trimmed outside the servitude.
- f) Trees that are felled shall be cut within **150mm** above ground level, with the exception of a **four meter (4,0m)** wide access down the centre of the power line servitude in which the trees shall be cut as close as possible to ground level. Stumps need not be removed, unless conflict with a structure, guy anchor or access is involved, or if requested by the *Clerk of Works*.
- g) All stumps from trees, bush and shrubs shall be chemically treated immediately after cutting, to prevent any further growth thereof. The chemical treatment must be approved by the *Employer's Environmental Practitioner* prior to the purchasing and application thereof.
- h) Where no trees, bush or shrubs are present the clearing of access shall be done by crushing of small brush rather than the uprooting thereof. Scalping of the earth, or any unnecessary disturbance, will not be allowed as any means of clearing the servitude, except on steep side slopes where cuts and fills are required.
- i) Between structures, where no traffic is required, there shall be no removal of vegetation except as required for stringing of the power line. Access for the stringing of the power line shall be limited to one single track for all pulls. No cutting of bush and shrubs will be permitted across bush filled ravines or gullies where the bush will not interfere with the strung conductor. Alternative means shall be used to string the power line conductors.
- j) All chopped trees and bush will remain the property of the relevant *Landowners*, unless otherwise negotiated with the *Employer's Clerk of Works*.

### 1.15 Special bush clearing requirements

- a) One week written notice must be given to the *Employer's Environmental Practitioner* before commencement with construction activities
- b) The *Contractor* shall use only approved and/or accredited weed killer applicators.
- c) The *Contractor* will not be allowed to cut and/or trim any **endangered** trees or shrubs in the servitude, unless written prove of the required permits, obtained by the *Contractor*, is given to the *Employer's Clerk of Works*.
- d) The use of existing gates and private roads in or outside the power line servitude for bush clearing purposes must be discussed with and accepted by the relevant *Landowner*, prior to the use thereof.
- e) All vehicles used for bush clearing shall pass through gates when crossing fences and the *Contractor* shall not be allowed to drop fences temporarily for the purpose of driving over it.

### 1.16 Constraints on how the Contractor Provides the Works

- a) The *contractor* must list the name of the experienced construction supervisor for the duration of the contract below. This is compulsory and if not adhere to might result in the tender to be null and void.

Name	I.D. number	Years of experience	Other

- b) Written notice will be given by the *contractor* to *Employer*, forty days prior to any switching that may be required by the *contractor*. The outage must be cancelled at least 5 working days prior to the actual date should anything happens and the outage cannot take place. All stake holders to be informed by the COW in writing.
- c) The risk of all material (including conductor and material once supplied by *Employer*) lies with the *contractor* until that section of line is energized.
- d) Inform each landowner before entering their property and treat property with respect. The *Contractor* shall use the private farm roads with the necessary respect and maintain it throughout the construction period.
- e) Sign off all form/letter with each hand over to ensure that the customer is happy with the work completed on his property.
- f) The *Contractor* is to provide the works strictly according to all the requirements of **Section 31 of the Occupational Health and Safety Act of 1993.**
- g) The *Employer* Standards and specifications as per Annexe A are the requirements of the *Contract*. The *Contractor* shall comply in full with Contract Quality Requirements, "Matrices A and C" of NWS 1814/C1.
- h) The *Contractor* shall be responsible for the relevant Quality Assurance Requirements to be imposed on his sub-*contractors* and suppliers of materials in terms of the above standards.
- i) No weather data are included in this specification and the *Contractor* is referred to the Weather Bureau, Department of Transport, Private Bag X097, Pretoria 0001 The *Contract* places the responsibility on the *Contractor* to foresee inclement weather. The *Contractor* shall take into account large variations in the weather patterns. No extensions of time will be granted for delays arising out of normal weather conditions. Where abnormal, unfavourable weather conditions are experienced, an extension of the *Contract* period may be considered by the *Employer*, by no claim for additional Preliminary and General or escalation of the *Contract Price* for the extended period will be granted.
- j) All work on site to be done in accordance with The Environmental Management Plan for this project.

### 1.17 Work and things supplied by the Contractor for the works

#### 1.17.1 Plant provided by the Employer

*Employer* will not supply any plant.

ITEM	DESCRIPTION	SAP - / D-DT- No	QTY
a)	<b>Employer will not supply any plant.</b>	<b>N/A</b>	<b>N/A</b>
b)			
c)			
d)			

#### 1.17.2 Materials supplied by the Employer

*Employer* will supply the materials listed in the table below to the *Contractor* during the construction phase. Refer to the *Price List* for more details on these material items.

The *Employer* will deliver the specified material to the *Contractor's* material yard on site.

<b>BOM - CAP BANK REGULATOR</b>			
<b>SAP NO.</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QUANTITY</b>
163343	WIRE STRAND,ST 7x4.00 1100MPA 1500m D3124	M	26
163345	WIRE STRAND.ST 3x3.35 1100MPA1500m D3124	M	15
163399	THIMBLE-ST TO FIT 14MM WIRE D3026	EA	2
163400	SHACKLE,D H/BACK PIN 70kN D3010	EA	18
163402	STAYROD 2000XM20 NON-ADJUST D3012	EA	2
163419	PLATE.STAY FOR 2000XM20 STAY ROD D3012	EA	2
163640	SET SCREW.HX GALV M12X30 NUT+WASH D3082	EA	4
167312	INSUL.STRAIN-STAY MV PORCELAIN D3144	EA	2
163768	BOLT,EYE GALV M20X250mm D3005	EA	10
163790	ROD,THREADED GALV M20X350 WASH+NUTD3015	EA	24
163803	COACH SCREW,GALV 75x12 HEX HD D3090	KG	0.36
163862	ROD,THREADED GALV M20X450 WASH+NUTSD3015	EA	9
163865	ROD,THREADED GALV M20X600 WASH+NUTSD3015	EA	3
163869	ROD.THREADED GALV M12X350 WASH+NUTSD3015	EA	4
163909	NUT,EYE 70kN M20X2,5-6H BOLT D3004	EA	9
163938	STAPLE,GALVANISED WIRE 40LG X 4 W D3129	KG	0.86
163941	NAIL.CLOUT 40mm GALV D3169	KG	0.11
164282	BRACKET.L FUSE-CUT/OUT 22kV WDXARM D3086	EA	12
164312	CLIP,BONDING 22D HOLE D3033	EA	36
164523	POLE.WOOD 10.0X200-219 TOP DIA D0052	EA	4
164551	XARM.WOOD 3.5X140-159 TOP DIA D0063	EA	1
164567	POLE.WOOD 11.0X180-199 TOP DIA D0051	EA	1
164568	POLE.WOOD 11.0X200-219 TOP DIA D0051	EA	1
164586	XARM.WOOD 2.0X120-139 TOP DIA D0060	EA	2
164615	WIRE.BARBED GALV 12SWG 12.5kg D3170	EA	0.4
165065	FUSEHOLDER 22kV 100A FUSE-CUT/OUT D3086	EA	3
165066	LINK.SOLID 22kV FOR FUSE CUT-OUT D3086	EA	9
165495	CLAMP.P/G 2B AL-AL 4 -15 DIA M+T D3058	EA	64
165559	CLAMP, EARTH ROD 16 RODPH/BRNZ	EA	8
165566	LINE TAP,TFR BRASS TINNED M12 D3048	EA	1
167492	INSUL,L/ROD 22kV 40kN 450C/L 20C D3042	EA	18
168265	BRACKET.TYPE F METER BOX 2400LG D3022	EA	2
168552	BRACKET.POLE TOP 402x60x110 ARM D3046	EA	2
168553	STRAP,TIE ST GALV 910x50x6 D3031	EA	12
168669	EARTH ROD CU 1500LGx16mm DIA TREADLESS	EA	8
171336	WIRE,ELECTRICAL:EARTH;16 MM2;CU;BARE D3139	M	45
172393	PLATE.BLANK ALU POLE MK 25X150 D3049	EA	6
172423	SIGN.DANGER 150x150x0.6 ELECTSAFETYD3202	EA	4

174939	FUSE-CUT/OUT BASE 22kV INLAND D3086	EA	12
179808	TAP CONN.T OFF 6.3- 9.0 I/C D3153	EA	26
179943	JOINT.NON-TEN AL 6.3-9.0 D I/C D3098	EA	3
179944	JOINT NON-TEN AL 9.0-15.0D I/C D3098	EA	3
180018	LUG.BI-MET 6.3- 9.0 M12 0 DEG I/C D3166	EA	18
183978	XARM.WOOD 6.0X160-179 TOP DIA D0066	EA	2
184235	BRACKET.EQUIP.PLATFORM 900mm ANGLE D3023	EA	2
184236	SUPPORT CRADLE.VOLT REG x1POLE MNT.D3220	EA	4
185949	GUY GRIP.DBL WRAP MAKE OFF 7/4.00 D7047	EA	2
187157	PADLOCK, ST LV MASTER FS OU - ORANGE - D6050	EA	2
189726	PLATFORM.REGUL H-POLE 2600mm LG. D3016	EA	2
197852	PIPE,NON MTLC:10 MM;LDPE;THK 1.6 MM D3127	M	28.004
197853	PIPE,NON MTLC:16 MM;LDPE;THK 2 MM D3127	M	4
216687	INSUL CAPPED POST 22KV 4kN 31 HVH D3017	EA	11
219854	SPINDLE SHORT M20 x 50 RATCHET D2050	EA	2
400660	WIRE.CU 16SQ 7/1.79 STR PVC BLK D3137	M	45
401310	CLAMP,REV PIST 3B 6.0 TO 16.0 D7022	EA	3
401314	S/ARR S/CL 11kV MCOV 12kV 20 D6216	EA	6
402509	GUYGRIP-D/END ST COND 7/4.0 D3069	EA	6
402517	TIE, TOP GRVE B/FOX INLAND D3081	EA	10
402521	DEAD END,HELICALLY FORMED FOX/35 D3065	EA	3
402527	DEAD END.HELICALLY FORMED MNK/PINE D3065	EA	6
402551	CLAMP , THIMBLE CLEV A-ALLOY 40kN D3007	EA	9
402575	TIE.TOP GRVE B/MINK INLAND D3081	EA	1
403027	COND.ACSR FOX 8.37D UNGRS D3136	M	96.25
404427	LUG.CRIMP CU 16.0SQxM12 F/H D3102	EA	5
571209	XARM,WOOD 2.5X140-159 TOP DIA D0061	EA	7

BOM - BOEMANSKOP 22KV LINES			
SAP NO.	DESCRIPTION	UNIT	BOM QTY
163343	WIRE STRAND,ST 7x4.0 1100MPA 1500m D3124	M	832
163345	WIRE STRAND,ST 3x3.35 1100MPA 1500m D3124	M	314
163399	THIMBLE,ST TO FIT 14mm DIA. WIRE D3026	EA	64
163400	SHACKLE,STRAIGHT PIN TYPE 70KN D3010	EA	160
163402	STAYROD 2000xM20 97kN NON-ADJUST D7023	EA	64
163419	PLATE,STAY 340x375x6 80x26 SLOT D3172	EA	65
163768	BOLT,EYE:20 MM;70 KN;SHNK LG 250 MM	EA	64
163790	ROD,THD:M20-2.5-6G;LG 350 MM	EA	86
163803	COACH SCREW,GALV 75x12 HEX HD D3090	KG	7.68
163862	ROD,THD:M20-2.5-6G;LG 450 MM	EA	50



163909	NUT,EYE 70kN FOR M20x2,5-6H BOLT D3004	EA	56
163938	STAPLE,GALVANISED WIRE 40LGx4WD D3129	KG	6.845
163941	NAIL,CLOUT 40mm GALV D3169	KG	0.59
164282	BRACKET,L FUSE-CUT/OUT 22kV WD XARM D3086	EA	14
164307	BRACKET,STRUT SWIVEL WOOD POLE D3150	EA	1
164312	CLIP,BONDING 22D HOLE GALV D3033	EA	165
164313	ANCHOR ASSY,ST SOIL 380x220x70 D3035	EA	1
164551	XARM,WOOD 3.5x140-159 TOP DIA D0063	EA	19
164562	POLE,WOOD 10.0m x 160-179 H4 D0052	EA	1
164566	POLE:WOOD;160-179MM TOP DIA X LG 11M	EA	43
164570	POLE:WOOD;160-179MM TOP DIA LG 12 M	EA	4
164572	POLE:WOOD;180-199MM TOP DIA X LG 12 M	EA	3
164575	POLE,WOOD 13.0 x 160-179 H4 D0056	EA	4
164615	WIRE,BARBED GALV 12SWG 12.5kg D3170	EA	0.3
165055	S/ARR DIST 22kV MCOV 19.2kV INLAND D3100	EA	6
165065	FUSE HOLDER 22kV 100A FUSE-CUT/OUT D3086	EA	2
165066	LINK,SOLID 22kV FOR FUSE-C/OUT D3086	EA	12
165495	CLAMP:P/G ;4-15 M; 4-15 T ;AL-AL	EA	154
165559	CLAMP,EARTH ROD 16 RODPH/BRNZ D3093	EA	4
165566	LINE TAP,TFR BRASS TINNED M12 D3048	EA	1
167312	INSUL:STRAIN STAY;LG 140 X WD 85 MM	EA	64
167492	INSUL,L/ROD 22kV 40kN 450C/L LM D3042	EA	160
168279	GLAND,CABLE:ADJUSTABLE;NO 2;BRS NI PLTD	EA	4
168534	CLAMP,SUSP CRADLE CON 8,0-18,0 D3008	EA	40
168553	STRAP,TIE ST GALV 910x50x6 D3031	EA	20
168669	EARTH ROD Cu 1500x16D THREADLESS D3091	EA	4
168689	XARM, ST INTERM T 90x65x8x2000LG L D3001	EA	20
171336	WIRE,ELECTRICAL:EARTH;16 MM2;CU;BARE	M	15
172393	PLATE,BLANK ALU POLE MK 25x150 D3049	EA	55
172423	SIGN,DANGER ELECT SYMB 150x150x0.6 D3202	EA	7
174939	FUSE-CUT/OUT BASE 22kV INLAND D3086	EA	14
175078	TFR 16kVA 22kV/240V COASTAL D3021	EA	1
175491	CONDUCTOR,ELEC:CU-CLAD ST ;EARTH	M	19
180018	LUG,BI-MET 6.3-9.0D M12 0 DEG I/C D3166	EA	24
185155	RECLOSER 11+22kV 400A 8kA WITH IRTU D3180	EA	1
185949	GUY GRIP,DBL WRAP MAKE OFF 7/4.00 D7047	EA	64
197852	PIPE,NON MTLC:10 MM;LDPE;THK 1.6 MM	M	18.938
197853	PIPE,NON MTLC:16 MM;LDPE;THK 2 MM	M	2
216687	INSUL,CAPPED POST 22kV 4kN HVH D3017	EA	26
219854	SPINDLE:SHORT M20 X 50MM RATCHET	EA	20
247519	CONNECTOR,LUG:FIRE WEDGE;(2) 14 MM;AL	EA	28
247523	CONNECTOR,TEE:RUN 48.20MM2 ACSR	EA	77
247525	CONNECTOR,TEE:RUN 73.65MM2 ACSR	EA	28

400900	BUCKLE,STRAP 12 C254 D3110	EA	45
400902	STRAP,TIE DOWN:WD 12MM X THK 0.75MM	EA	1.15
401310	CLAMP,STRAIN:3B;70 KN;15-6 MM	EA	45
402509	GUYGRIP, D/END ST COND 7/4 D3069	EA	192
402517	TIE,TOP GRVE B/FOX INLAND D3081	EA	26
402519	ARMOR ROD,HELICALLY FORMED FOX/35 D3064	EA	40
402521	DEAD END,HELICALLY FORMED FOX/35 D3065	EA	75
402551	CLAMP,THIMBLE CLEV A/ALLOY 40kN D3007	EA	75
403027	COND,ACSR FOX 8.37D UNGRS D3136	M	11937.55
404122	CABLE ELECT:1 KV;2C;CU;4 MM <sup>2</sup> ;STL WIRE	M	10
404427	LUG, CRIMP CU 16.0SQxM12 F/H D3102	EA	5
571209	X/ARM,POLE:140-159 22MM HOLES;LG 2.5 M	EA	11

<b>BOM-KORIA 11KV LINE</b>			
<b>SAP NO.</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QUANTITY</b>
163343	WIRE STRAND,ST 7x4.0 1100MPA 1500m D3124	M	117
163345	WIRE STRAND,ST 3x3.35 1100MPA 1500m D3124	M	89.5
163399	THIMBLE,ST TO FIT 14mm DIA. WIRE D3026	EA	9
163400	SHACKLE,STRAIGHT PIN TYPE 70KN D3010	EA	57
163402	STAYROD 2000xM20 97kN NON-ADJUST D7023	EA	9
163419	PLATE,STAY 340x375x6 80x26 SLOT D3172	EA	9
163768	BOLT,EYE:20 MM;70 KN;SHNK LG 250 MM	EA	27
163790	ROD,THD:M20-2.5-6G;LG 350 MM	EA	50
163803	COACH SCREW,GALV 75x12 HEX HD D3090	KG	1.2
163862	ROD,THD:M20-2.5-6G;LG 450 MM	EA	31
163869	ROD,THD:M12-1.75-6G;LG 350 MM	EA	4
163909	NUT,EYE 70kN FOR M20x2,5-6H BOLT D3004	EA	24
163938	STAPLE,GALVANISED WIRE 40LGx4WD D3129	KG	2.645
163941	NAIL,CLOUT 40mm GALV D3169	KG	0.21
164282	BRACKET,L FUSE-CUT/OUT 22kv WD XARM D3086	EA	23
164312	CLIP,BONDING 22D HOLE GALV D3033	EA	93
164527	POLE,WOOD 7.0X120-139 TOP DIA D0050	EA	1
164551	XARM,WOOD 3.5x140-159 TOP DIA D0063	EA	11
164562	POLE,WOOD 10.0m x 160-179 H4 D0052	EA	1
164566	POLE:WOOD;160-179MM TOP DIA X LG 11M	EA	6
164567	POLE:WOOD;180-199MM TOP DIA X LG 11M	EA	2
164572	POLE:WOOD;180-199MM TOP DIA X LG 12 M	EA	2
164615	WIRE,BARBED GALV 12SWG 12.5kg D3170	EA	0.6

165054	S/ARR DIST 11kV MCOV 10kV INLAND D3100	EA	12
165065	FUSE HOLDER 22kV 100A FUSE-CUT/OUT D3086	EA	2
165066	LINK,SOLID 22kV FOR FUSE-C/OUT D3086	EA	21
165495	CLAMP:P/G ;4-15 M; 4-15 T ;AL-AL	EA	94
165559	CLAMP,EARTH ROD 16 RODPH/BRNZ D3093	EA	8
165566	LINE TAP,TFR BRASS TINNED M12 D3048	EA	2
167312	INSUL:STRAIN STAY;LG 140 X WD 85 MM	EA	9
167492	INSUL,L/ROD 22kV 40kN 450C/L LM D3042	EA	57
168265	BRACKET,TYPE F METER BOX 2400LG D3022	EA	2
168279	GLAND,CABLE:ADJUSTABLE;NO 2;BRS NI PLTD	EA	6
168534	CLAMP,SUSP CRADLE CON 8,0-18,0 D3008	EA	6
168552	BRACKET,POLE TOP 402x60x110 ARM D3046	EA	2
168553	STRAP,TIE ST GALV 910x50x6 D3031	EA	14
168627	KIOSK METER:3PH ;CT/VT	EA	1
168669	EARTH ROD Cu 1500x16D THREADLESS D3091	EA	8
168689	XARM, ST INTERM T 90x65x8x2000LG L D3001	EA	3
171336	WIRE,ELECTRICAL:EARTH;16 MM2;CU;BARE	M	30
172393	PLATE,BLANK ALU POLE MK 25x150 D3049	EA	12
172423	SIGN,DANGER ELECT SYMB 150x150x0.6 D3202	EA	14
174939	FUSE-CUT/OUT BASE 22kV INLAND D3086	EA	23
175077	TFR 16kVA 11kV/240V COASTAL D3021	EA	1
175465	PLATFORM,EQUIP H-POLE 2600mm LG. D3020	EA	1
175466	BRACKET,EQUIP PLATFORM 620mm ANGLE D3023	EA	1
175491	CONDUCTOR,ELEC:CU-CLAD ST ;EARTH	M	37
180018	LUG,BI-MET 6.3-9.0D M12 0 DEG I/C D3166	EA	42
185155	RECLOSER 11+22kV 400A 8kA WITH IRTU D3180	EA	1
185949	GUY GRIP,DBL WRAP MAKE OFF 7/4.00 D7047	EA	9
197852	PIPE,NON MTLC:10 MM;LDPE;THK 1.6 MM	M	24.941
197853	PIPE,NON MTLC:16 MM;LDPE;THK 2 MM	M	2
216687	INSUL,CAPPED POST 22kV 4kN HVH D3017	EA	14
219854	SPINDLE:SHORT M20 X 50MM RATCHET	EA	5
247519	CONNECTOR,LUG:FIRE WEDGE;(2) 14 MM;AL	EA	46
247523	CONNECTOR,TEE:RUN 48.20MM2 ACSR	EA	47
247525	CONNECTOR,TEE:RUN 73.65MM2 ACSR	EA	46
400900	BUCKLE,STRAP 12 C254 D3110	EA	17
400902	STRAP,TIE DOWN:WD 12MM X THK 0.75MM	EA	0.5
401310	CLAMP,STRAIN:3B;70 KN;15-6 MM	EA	21
402167	CT+VT 11kV-110V B 3VT+3CT I/LD D3118	EA	1
402509	GUYGRIP, D/END ST COND 7/4 D3069	EA	27
402517	TIE,TOP GRVE B/FOX INLAND D3081	EA	14
402519	ARMOR ROD,HELICALLY FORMED FOX/35 D3064	EA	6
402521	DEAD END,HELICALLY FORMED FOX/35 D3065	EA	30
402551	CLAMP,THIMBLE CLEV A/ALLOY 40kN D3007	EA	30

403027	COND,ACSR FOX 8.37D UNGRS D3136	M	1424.5
404122	CABLE ELECT:1 KV;2C;CU;4 MM2;STL WIRE	M	10
404427	LUG, CRIMP CU 16.0SQxM12 F/H D3102	EA	8
404761	CABLE ELECT:1 KV;12C;CU;2.5 MM2;STL WIRE	M	8
571209	X/ARM,POLE:140-159 22MM HOLES;LG 2.5 M	EA	8

The **contractor** must ensure that the BOM correlate with the construction drawing /span plan.

### 1.17.3 Materials to be supplied by the **Contractor**.

All materials supplied by the *Contractor* to be approved by the **Project Engineering Specialist** and the **Technology and Quality (T&Q) Representative** before commencing with the project.

Please note that this list serves as an indication of material required, it remains the **contractors** Responsibility to ensure the accuracy thereof. No compensation will be made by the employer should the quantities or materials specified be incorrect. The contractor also to ensure that the BOM, the scope of works as well as the quantities and activities correlate with the activities and BOM in the Price List. Should this not be the same, the contractor to immediately inform the Employer as no compensation will be made after tender closure.

Once the plant and/or materials have been delivered to the *Contractor's* yard on site, the loading, transporting to site, off-loading and safekeeping thereof becomes the responsibility of the *Contractor*. He must make the necessary arrangements for safe storage on site, offering adequate protection against theft, damage, wind and weather. The responsibility for insurance of materials against any form of damage or theft after issue thereof rests with the *Contractor*.

It is essential that a good record-keeping system exist whereby control over quantities on site can be kept. All new deliveries to the site-store and all materials and plant issued for construction must be recorded. At any time, it must be possible for the *Project Manager* to establish from these records exactly what material and/or plant is kept in store or has been erected. These figures will regularly be compared to the actual quantities measured on site and the formal *Employer* issuing invoices.

At all times it will be assumed that the *Contractor* has been ensured upon issue of material and/or plant that no visible damage has occurred to it. In the case of damaged material and/or plant, acceptance must be refused. If a dispute arises, the *Project Manager* must be called in for a decision. Damaged material and/or plant found on site will be replaced at the cost of the *Contractor* and no extension of contract time will be granted for the extra delivery time.

Liability for inherent defects in material and/or plant issued does not lie with the *Contractor*. If defects in material, plant or in the *Works*, due to the use of patently defective material and/or plant are discovered, new material and/or plant will be issued free of charge. The *Contractor* will be compensated for any additional expenses incurred due to these defects, including delivery costs. If warranted, extension of contract time will also be granted.

If, however, it is established that defects in material, plant and/or the *Works* were due to damage caused to material and/or plant after issue, the *Contractor* will be held responsible for all replacement and repair costs to the material, plant and/or the *Works*, as well as loss of time. The decision concerning the cause and responsibility of defects as well as the extent of compensation (if any) rests with the *Project Manager*.

In a case where the *Contractor* met the required lead time for ordering and the material and/or plant is not available, any resultant standing time or additional expenditure incurred will be the responsibility of the *Employer*. Notice of this must be given to the *Project Manager* within two days of the occurrence thereof, who will then determine what the extent of lost of time and additional expenditure will be.

The *Contractor* must make the necessary arrangements for safe storage on site, offering adequate protection against theft, damage, wind and weather. The responsibility for insurance of materials against any form of damage or theft after issue thereof rests with the *Contractor*.

It is essential that a good record-keeping system exist whereby control over quantities on site can be kept. All new deliveries to the site-store and all materials and plant issued for construction must be recorded. At any time, it must be possible for the Client to establish from these records exactly what material and/or plant is kept in store or has been erected. These figures will regularly be compared to the actual quantities measured on site and the formal *Employer's* issuing invoices.

### Equipment

The *Contractor* shall supply all the equipment required to complete the works

### Holding Points of the works

No construction activities will commence until the site is officially handed over by the *Project Manager* or *his representative* to the *Contractor*.

No construction activities will commence prior to the submission of a detailed construction program and special tool calibration certificates, etc. by the *contractor*.

The *Employer's* Clerk of Works will have the prerogative to execute a proper inspection on the condition of all construction tools, equipment and vehicles prior to the commencement of any construction activities.

**The holding points shall be agreed between the *Contractor* and the *Employer Representative* and shall enforced as per the requirements of document 34-212, 'Inspection and Maintenance of High Voltage Cables'**

The *Contractor* will be held responsible for any construction errors, defects, claims, etc. for continuing with the construction activities at the "hold point" stages without the written instructions from the *employers'* Clerk of Works.

### 1.18 Other limitations

The *Contractor* shall use the private roads with the necessary respect and maintain it throughout the construction period.

The *Contractor* shall control his activities and processes in such a way as to ensure compliance with the specifications. He shall carry out as a minimum requirement all the tests laid down in the specifications and shall submit all the test results to the *Employer*.

### 1.19 Requirements for the programme

The *Employer* Standards, as indicated in Specifications of this document, are requirements of the Contract.

- a) Give two weeks written notice to Eskom, for inspection of the works.
- b) Submit a program together with the Tender to state the following:
  - Which activities will be completed by a certain date / TIME?
  - Which invoices will be submitted for payment by a certain date/ TIME?

The *Contractor* is to submit a construction programme based on the assessment stages as reflected in the Price List i.e. indicating the various assessment stages with activities like infrastructure, house connections, commissioning, etc.

- c) Reporting requirements are as follows:

### Two Weekly REPORTS

- Executive summary (typical one to two paragraphs).
- Physical progress on all aspects of the project on the Monday of the week before 12:00.
- Performances to date.
- Problems experienced.
- Priorities for the next two weeks.
- Corrective actions necessary and needed.
- Material list required or outstanding from the Employer

### Monthly Report

- Physical progress on all aspects of the project on the first working day of each month before 12:00.
- Capital projections report.

d) The tenderer's programme shall be based on and shall reflect inter alia, the following key dates

Activity No	Activity Description	Key Date
1	Site Handing Over	
2	Construction Kick off	
3	Progress meetings	
4	Site inspections	
5	Project completion and handover	

### 1.20 Invoicing and payment

In order that the Project Manager may assess the amount due at each assessment date, the Contractor is to submit the following information in the format and number of copies stated

#### SARS Requirements

- TAX INVOICE should be displayed in a PROMINENT PLACE on all invoices.
- Eskom's name should be stated "Eskom Holdings Limited."
- "Free State Operating Unit (FSOU)" should be displayed.
- Address and VAT registration of the recipient (That means Eskom address and VAT number)
- Name, address and VAT number of the contractor must be displayed.
- An INDIVIDUAL Serial number (Tax invoice number) and DATE issued.
- The Contract Order number.
- A description of goods and/or services supplied must be showed on the invoice. Refer to the specific Activity Stage and Item No, as stated in the Price Schedule. Clearly state the quantity or volume of goods or services supplied and the Tender Price for each item, the amount of the current claim for each item, the amount previously claimed for each item and the amount due for each item.
- The quantity or volume of goods or services supplied.
- The VAT amount showed on each invoice.
- Where the contractor is NOT registered for VAT the invoice must state only INVOICE in a prominent place

The Employer accepts only original invoices.

Examples of Payment Certificates and Tax Invoices for the Eskom NEC Engineering & Construction Short Contract are shown on the next two pages of this contract.

#### Payment certificate and Tax Invoice

This certificate is issued in terms of Clause 50 of the Conditions of Contract.

## TITLE OF THE CONTRACT:

<b>CONTRACTOR:</b>	<b>EMPLOYER:</b>
Contact Person:	Contact Person
Address:	Address:
Telephone No:	Telephone No:
Fax No:	Fax No:

<b>Contractor's Invoice Number:</b>	<b>Contract Order No.:</b>
<b>Date issued:</b>	
<b>Contractor's VAT No.:</b>	<b>Employer's VAT No.: 4740101508</b>

[50.3]	a)	Price for Work Done to Date (Excluding 14% VAT)	R
[60.1]	b)	Cumulative value of compensation events	R
	c)	<b>Sub-total (a) + (b):</b>	R
[50.6]	d)	Less ____% retention percentage on (a) + (b) (i) Planned first retention release date (completion date): ____/____/_____ (ii)Planned final retention release date (defects date): ____/____/_____ <b>Sub-total (c) – (d):</b>	R
	e)	<b>Sub-total (c) – (d):</b>	R
[50.3]	f)	Other amounts due to/by Contractor in terms of the Contract	R
	g)	<b>Sub-total (e) + or – (f):</b>	R
	h)	Add retention released	R
	i)	<b>Sub-total (g) + (h):</b>	R
[50.5]	j)	Less delay damages (if applicable)	R
	k)	<b>Cumulative amount certified excluding 14% VAT (i) – (j):</b>	R
	l)	<b>Less cumulative amount previously certified excluding 14% VAT</b>	R
	m)	<b>Sub-total this certificate excluding 14% VAT (k) – (l):</b>	R
	n)	<b>Add VAT at 14 % on (m)</b>	R
[50.3]	o)	<b>AMOUNT DUE TO/FROM THE CONTRACTOR including VAT (m) + (n):</b>	R

## Assessment Prepared By:

.....  
PRINT NAME                      SIGNATURE                      ASSESSMENT DATE

## Certified by the Programme Manager:

.....  
PRINT NAME                      SIGNATURE                      ASSESSMENT DATE

**Payment certificate and Tax Invoice****This certificate is issued in terms of Clause 50 of the Conditions of Contract.****TITLE OF THE CONTRACT:**

<b>CONTRACTOR:</b>	<b>EMPLOYER:</b>
Contact Person:	Contact Person
Address:	Address:
Telephone No:	Telephone No:
Fax No:	Fax No:

<b>Contractor's Invoice Number:</b>	<b>Contract Order No.:</b>
<b>Date issued:</b>	
<b>Contractor's VAT No.:</b>	<b>Employer's VAT No.: 4740101508</b>

DESCRIPTION	CUMULATIVE THIS CERTIFICATE	CUMULATIVE PREVIOUS CERTIFICATE	NOW DUE
Price for Work Done to Date	R	R	R
Compensation events	R	R	R
<b>Sub-totals:</b>	R	R	R
Less ____% retention percentage on (a) + (b) (i) Planned first retention release date ( <b>completion date</b> ): ____/____/____ (ii) Planned final retention release date ( <b>defects date</b> ): ____/____/____	R	R	R
<b>Sub-totals:</b>	R	R	R
Other amounts due to/by the <i>Contractor</i>	R	R	R
<b>Sub-totals:</b>	R	R	R
Add retention released	R	R	R
<b>Sub-totals:</b>	R	R	R
Less delay damages	R	R	R
<b>Sub-totals:</b>	R	R	R
Add VAT at 14 %	R	R	R
<b>AMOUNT DUE TO/FROM THE CONTRACTOR:</b>	R	R	R

**Assessment Prepared By:**.....  
PRINT NAME.....  
SIGNATURE.....  
DATE**Certified by the Programme Manager:**.....  
PRINT NAME.....  
SIGNATURE.....  
DATE





**Free State OU**

**NEW ENGINEERING CONTRACT**

**FS-STM-1905-331031-0002 Welbedacht Dam - Van  
Stadensrust 11 kV Capacitor Bank (C.DO03374)**

**FS-STM-1905-331031-0003 Driedorp Boesmanskop  
22kV line to Workshop Substation (C.DO03444)**

**FS-STM-1905-33103-0004 Koria 11kV line from Work-  
shop Substation (C.DO03445)**

**ELECTRICAL**

**PART 2: PROJECT SPECIFICATIONS**

## 2.1 Project Specifications and Standards

- This is a list of all the specifications and other documentation referenced or described as being part of the *Works Information*.
- This list includes publicly available standard specifications which may not be attached, but which are part of the *Works Information*.

**Table 1: Reference to National and International Specifications**

Topic	Document
Aerial Bundled Conductor	SABS 1418, Part 1 to 3 DTS 0105 (NRS 018)
Bolts and Nuts	SABS 135
Bolts, Eye	SABS 178
Busbars	SABS 1195
CNE	SABS 1268:1979 NRS 016:1991
Cables, installation of electric	SABS 0198:1988
Cables, low voltage	NRS 012:1991
Cables, medium voltage	NRS 013:1991
Cable (house service split concentric)	DTS 0084 (NRS 017)
Cable Glands	SABS 808
Cable Ties	DTS 0086 (NRS 020)
Clamps (strain for split concentric)	
Clamps (suspension for split concentric)	
Clamps Strain	SABS 178
Clevis Tongue Adaptor (twisted)	SABS 178
Clips for Wiring	
Compression Fittings	BS 3288 Part 1 (Tests)
Concrete Poles	SABS 470
	DTS 0106
Conductor ACSR/AAC and AAAC	SABS 182
Conductor, Covered	DTS 0087 (NRS 021)
Conduit Saddles	
Conduit	
Connectors, lug/termination	NRS 028
Connectors, insulation piercing	EDF 6737/HN 33 E60 (Main cable 350 mm <sup>2</sup> to 70 mm <sup>2</sup> , take-off 6 mm <sup>2</sup> to 35mm <sup>2</sup> )
Connectors, mid-span/full tension	BS 3288 (Tests)
Connectors, mid-span/no tension	SABS 0162
Connectors	SABS 1200 H/HA
Cross Arm Braces	
Cross Arms	SABS 0162
	SABS 1200 H/HA
D Fuses	DTS 0048 Rev 0
Earthing Rods	SABS 1063

	SABS 0199

Table 1 Continue.....

Topic	Document
Electricity Dispenser	SABS 1524-1
	NRS 009-1
Fittings (strain and suspension)	
ABC	DTS 0105 (NRS 018)
Fuse Holder	SABS 172
Fuses	BS 88
Galvanizing	SABS 763:1988
	SABS 935
Harness Wiring	
Insulator Hardware	IEC/NWS 1536
Insulator Spindle	DTS 0092
Isolators	SABS 0162
	SABS 1200 H/HA
Line Construction	NWS 1512
Links Tri-links	IEC/NWS 1536
Links, ganged 3 phase (isolators)	IEC/NWS 1536
Links, pull Stick (knife links)	IEC/NWS 1536
Links, single Pole "Huck-links"	IEC/NWS 1536
Long Rod Insulators	DTS 0092
Miniature Circuit Breakers OHASA Act (1993) and it's regulations and amendments	SABS 156
Pole Top Service Box	DTS 0104 (NRS 032)
Post Insulators	DTS 0092
Preformed Tension Wraps	SABS 178
Preformed Ties	
Ready Boards	DTS 0085 (NRS 019)
Reticulation LV	DTS 0090 (NRS 023)
Road crossing standard	DTS0060
Safety on Construction Sites	NWS 1058
Service box	DTS 0104 (NRS 032)
Stainless Steel Straps and Buckles	

Table 1 Continue.....

Topic	Document
Stay Assemblies	BS 16
Stay Attachment Brackets	SABS 0162
Stay Insulators	
Stay Wires	SABS 182, Part 5
Surfix Wiring	SABS 1507
Surge Diverters	NWS 1108
Symbolic Safety Signs	SABS 1186:1978
Thimbles	BS 464
Transformers, 100 kVA self-protected	DTS 0080 (NRS 027)
Transmission line hardware	NWS 1827
Washers	SABS 135
Wire, PVC Covered	SABS 182
Wire Rope Grips	BS 462
Wire, Stranded Copper, bare	
Wood Poles, pine gum	SABS 753
	SABS 754

Table2: Guidelines and Recommended Practices

Title	Document
Overhead Reticulation : Recommended Practice for Low Cost Urban Reticulation	NRS 023 : 1991 (DTS 0090)
Eskom Electrification Standard: Volumes 1 & 2.	
Code of Practice for the Application of CNE on Low Voltage Distribution Systems.	NRS 016 : 1991 (DTS 0103)
Power Line Crossings of Proclaimed Roads, Railway Lines, Tramways and Important Communication Lines.	DTS 0060 z
Code of Practice for the Joint use of Structures for Power and Telecommunication Lines.	NRS 043 of 1997

**Table 3: General National Standards and Acts**













Document	Rev./issue	Title and Publisher
Act no. 43	1983	Conservation of Agricultural Resources Act.
Act no. 73	1989	Environmental Conservation act.
Act no. 31	1963	Fencing Act.
Act no. 122	1984	Forest Act.
TRH14	1985	Guidelines for road construction materials
Act no. 63	1970	Mountain Catchments areas act.
Act no. 85	1993	Occupational health and safety act.
SAISC	1990	South African Steel Construction Handbook
NWP 3109		Standard drawing practice
		5. Eskom New Works Standards
NWS 1017		Accident Prevention
NWS 1494	3	Fire prevention and protection of contractors and Eskom premises on Engineering sites
NWS 1060		Injury prevention and protection
NWS 1814/C1		Quality assurance requirements for civil and building contracts
NWS 1058	4	Safety at construction sites: Requirements to be met by Contractors



**Table 3 General Eskom Standards**

Document	Rev./issue	Title and Publisher
ESKPVAAL7	2	Environmental impact assessment procedure for Eskom
34-479	0	Specification for Battery rooms
ESKPBAAD6		Environmental management policy
OPR 6204		Eskom Operating Regulations
DTOS 0071	0	Eskom Standard for Barricading
DTMG 0112		Guideline for the application of herbicides for weed eradication in substations
DTNG 0012		Guideline for the application of Herbicides for weed eradication in substations
ETP 023		Herbicide management policy
EVS 005	1	Quality requirements for quality related items and equipment
EVS 010		Quality requirements for quality related services
SCSASAAQ1	2	Quality Control Process for the Checking of Distribution Substation Construction Before Handing Over for Commercial Operation.
SCSPVABM	0	Co-ordination of Safety on Capital Projects
9		
D-DT-5240		Earthing Standard

THE ATTACHED DOCUMENTS FORM PART OF THIS LEGAL BINDING CONTRACT, THE CONTRACTOR CONFIRMS THAT HE HAS FAMILIARIZED HIMSELF WITH ALL THE EMBEDDED DOCUMENTS FROM 1 TO 12 AS INDICATED.

**DO NOT PRINT AND SEND THEM WHEN RETURNING THIS CONTRACT**

<u>No</u>	<u>UNIQUE IDENTIFIER</u>	<u>REVISION</u>	<u>DOCUMENT TITLE</u>
1	32 - 727	0	<b>SAFETY, HEALTH, ENVIRONMENT AND QUALITY (SHEQ) POLICY 32-727</b>  1_Eskom SHEQ Policy 32-727.pdf
2	32 - 136	0	<b>CONSTRUCTION SAFETY HEALTH AND ENVIRONMENTAL MANAGEMENT</b>  2_Construction Safety Health and En
3	32-524	0	<b>DEVELOPING A SAFETY, HEALTH AND ENVIRONMENTAL SPECIFICATION</b>  3_Developing a Safety, Health and En
4	34 - 333	1	<b>HEALTH AND SAFETY REQUIREMENTS TO BE MET BY PRINCIPAL CONTRACTORS EMPLOYED BY ESKOM DISTRIBUTION 34-333</b>  4_Health and Safety Requirements to be n
5	32 - 421	1	<b>ESKOM CARDINAL RULES 32-421</b>  5_Eskom Cardinal Rules (32-421).pdf
6	CONSTRUCTION REG 3		<b>NOTIFICATION OF CONSTRUCTION WORK TO DEPARTMENT OF LABOUR</b>  6_Notification of Construction Work to
7	CONSTRUCTION REG 4 & 5		<b>APPOINTMENT LETTERS FOR CLIENT REPRESENTATIVE, PRINCIPAL CONTRACTOR &amp; CONTRACTOR</b>  7_Appointment letters for Client repr
8 & 9	OHS ACT		<b>WRITTEN AGREEMENT ON OHS ACT SECTION 37(2) &amp; STANDARD CLAUSE</b>   8_Written agreement on OHS A           9_Standard clause Eskom Contracts Sect
10, 11 & 12	34 - 1063	0	<b>EXPANDED PUBLIC WORKS REPORT 34-1063.</b>    10_34-1063 EPWP Works Instruction.pdf           11_EPWP Guidelines Second edition 2005.           12_Eskom Dx EPWP report template rev 4

13	<a href="#">DST 34-961</a>	0	<b>LEGAL APPOINTMENTS AND AUTHORIZATIONS</b>  13_Legal Appointments and Au
14	<a href="#">TPC 41-55</a>		<b>TRANSPORTING PERSONS ON BACK OF VEHICLES</b>  14_Transporting of Passengers on the ba

### Acknowledgement by Contractor

**I/WE**, ..... DO HEREBY ACKNOWLEDGE HAVING READ AND UNDERSTOOD THE ABOVE ANNEXED DOCUMENTS FROM 1 TO 14 IN PART **2** OF THIS CONTRACT.

**I/WE** UNDERTAKE TO STUDY AND ABIDE BY THESE REQUIREMENTS AT ALL TIME.

SIGNED AT: ..... ON THE ..... DAY OF .....20.....

**Note:** Please return the above two pages with the other tender returnables to the Eskom office that issued this enquiry after complying with the above.



**Free State OU**

## **NEW ENGINEERING CONTRACT**

**FS-STM-1905-331031-0002 Welbedacht Dam - Van Stadensrust 11 kV Capacitor Bank (C.DO03374)**

**FS-STM-1905-331031-0003 Driedorp Boesmanskop 22kV line to Workshop Substation (C.DO03444)**

**FS-STM-1905-33103-0004 Korla 11kV line from Workshop Substation (C.DO03445)**

## **ELECTRICAL**

### **PART 3: PROJECT CRITICAL TASKS**

#### **3. Critical Task Analysis**

##### **CRITICAL TASK ANALYSES FROM DESIGN POINT OF VIEW**

The *contractor* is expected to acquaint himself with the contents of the following documents which are not necessarily attached to the contract document but definitely form part thereof:

- OHS Act Requirements to be met by Principal contractors employed by Eskom Distribution (Reference 34-333).
- Construction Safety, Health and Environmental Management (Reference 32-136)

#### **Risk Analysis:**

The Service Provider shall perform a Risk Analysis to determine the severity of the risks exposed to during



the course of this contract. In terms of the identified risk classification, preventative actions should be implemented. Included in this should be safe working procedures, etc.

The Risk Analysis should include all risks identified by the Service Provider or the *Employer*, as well as a risk assessment of all work carried out from an elevated position. The Service Provider is also responsible to identify any other risks unique to the specific project that may not be part of the generic list supplied by *Employer*.

Risks can be evaluated by using a risk assessment matrix.

### 3.1. Typical risks:

- Load equipment Injury/Damage/Loss
- Travel to/from worksite Injury/Damage/Loss
- Construction stands Injury/Damage/Loss
- Install equipment Injury/Damage/Loss
- Working in close proximity of energized networks Injury/electrocution
- Prepare equipment for installation (off site) Injury/Damage/Loss
- Do pre-commissioning (off site) Injury/Damage/Loss
- Commissioning (on site) Injury/Damage/Loss
- Poisonous or dangerous insects like bees, spiders etc. Injury/Damage
- Poisonous and / or dangerous animals, snakes, material or objects.
- Dangerous situations and terrain e.g. hijack area, restricted area etc.

### 3.2. Risk Identified by Design:

At all instances, access to high-voltage apparatus and equipment must be strictly controlled; no person shall carry out work of any description, on any part of high-voltage apparatus, unless:

- those parts are opened and,
- those parts are isolated,
- all practical steps are taken to lock such apparatus off from all live conductors;
- safety tested,
- effectively and adequately connected to earth at all points of disconnection from supply to such apparatus,
- and earthed on both sides of the workplace;
- barricaded (screened off) to prevent danger – warning notices affixed;
- Released for work by the issue of a work permit. .
- Plant New Pole - Normal approved construction techniques as per OHS Act requirements - Use of a vehicle mounted crane. Beware of working in close proximity of existing live electrical circuits. Employ supervision to ensure safe working clearances.
- Stringing - Normal approved construction techniques as per OHS Act requirements - Use of tensioning equipment from a vehicle mounted crane equipped with a bucket. Use of extended and single ladders. Beware of working in close proximity of existing live electrical circuits. Employ supervision to ensure safe working clearances. Watch for road traffic. Employ personnel to warn traffic of possible stringing hazards
- Transformer Installation - Normal approved construction techniques as per OHS Act requirements - Operation of a vehicle mounted crane. Use of single ladder. Use of power driven tools at elevated position
- Installation of Pole Top Box - Employ safe working techniques with respect to the use of a single - Use of power driven tools at elevated position on single ladder
- House Connection - Employ safe working techniques with respect to the use of power driven tools and a single ladder - Use of power driven tools at elevated position on single ladder.
- MV T-Off from Existing Network - Ensure existing network is switched off and earthed and are safe to work on. - Use of tensioning equipment from a vehicle mounted crane equipped with a bucket. Use of extended and single ladders. Beware of working in close proximity of other existing live electrical circuits. Employ supervision to ensure safe working clearances.

The risk analysis and workers register must be completed in conjunction with the relevant Regulations to safeguard the continuity of supply and obey safety rules and operating regulations.

### 3.3. Risk Identified on site:

Every employee or service provider not authorized shall work under the authority of an authorized person, and take reasonable care for the health and safety of him/her and other persons who may be affected by his acts or omissions, and obey the health and safety rules and procedures.

If any situation which is unsafe or unhealthy comes to his/her attention, as soon as possible or practicable, such situation must be reported to the authorized person.

Control must be exercised over system conditions and operating procedures at all times.

### 3.4. Possible risks for the Work at these points:

Before attempting any work at the designated substation or premises, care must be taken that the following steps are carried out:

- Trenches, care must be taken not to be injured in open trenches or pole holes.
- Electricity: 220VAC points isolated before working on SCADA equipment.
- Open or loose electric wires.
- Ground level: For SCADA and DC projects nobody must leave ground level at any time.

Item	Main Task	Safe Method of Execution	Risks Dealing with.
1	Plant New Pole	Normal approved construction techniques as per OHS Act requirements	Use of a vehicle mounted crane. Beware of working in close proximity of existing live electrical circuits. Employ supervision to ensure safe working clearances.
2	Stringing	Normal approved construction techniques as per OHS Act requirements	Use of tensioning equipment from a vehicle mounted crane equipped with a bucket. Use of extended and single ladders. Beware of working in close proximity of existing live electrical circuits. Employ supervision to ensure safe working clearances. Watch for road traffic. Employ personnel to warn traffic of possible stringing hazards
3	Transformer Installation	Normal approved construction techniques as per OHS Act requirements	Operation of a vehicle mounted crane. Use of single ladder.
4	Installation of Pole Top Box	Employ safe working techniques with respect to the use of a single ladder	Use of power driven tools at elevated position. Use of power driven tools at elevated position on single ladder
5	House Connection	Employ safe working techniques with respect to the use of power driven tools and a single ladder.	Use of power driven tools at elevated position on single ladder.
6	MV T-Off from Existing Network	Ensure existing network is switched off and earthed and are safe to work on.	Use of tensioning equipment from a vehicle mounted crane equipped with a bucket. Use of extended and single ladders. Beware of working in close proximity of other existing live electrical circuits. Employ supervision to ensure safe working clearances.



Free State OU

## NEW ENGINEERING CONTRACT

**FS-STM-1905-331031-0002 Welbedacht Dam - Van Stadensrust 11 kV Capacitor Bank (C.DO03374)**

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**FS-STM-1905-33103-0004 Korla 11kV line from Workshop Substation (C.DO03445)**

## ELECTRICAL

## PART 4: PROJECT RISK ANALYSIS

PROJECT RISK ANALYSIS									
Projects: FS-STM-1905-331031-0002 CAP BANK FS-STM-1905-331031-0003 BOESMANKOP 22kV LINE FS-STM-1905-331031-0004 KORLA 11kV LINE						DESIGNER: Maxwell Nkohla			
Portion of route affected:						Analysis No:		Date: 10-09-2021	
	50	Risk Rating				Effect on Cost	Effect on Time	Proposed Action Plan	
		0	1	2	3	None	None	Low risk / non-sensitive area	
<i>Risk Factors Description</i>		Zero	Low	Med	High			Construction to standards and environmental plan	
<b>ENVIRONMENTAL RISKS</b> (to be identified by Environmentalist and/or Surveyor)									
<b>Weather</b>									
Rainfall			1						

Winds		1					
Heat Stroke		1					
Snow / Hail	0						
Floods		1					
Fire		1					
<b>Agricultural Activity</b>							
Cultivated Lands		1					
Irrigation Equipment	0						
Maize Crops (young, mature)		1					
Sugarcane (young, mature)	0						
Other Crops (veg.)	0						
Livestock			3				
Tree stumps – logs		1					
Trees - young / old		1					
<b>Natural Features</b>							
Bush	0						
Indigenous trees	0						
Grasslands (tall grass)	0						
Grasslands (short grass)		1					
Wetlands		1					
Boulders	0						
Dongas		1					
Dams	0						
Streams / Water Furrows	0						
River Crossings	0						
<b>Fauna and Flora</b>							
Bird Interaction			2				
Dogs			2				
Game	0						
Snakes		1					
Wild Animals (lions)	0						

	0	1	2	3			
<b>Risk Factors Description</b>	<b>Zero</b>	<b>Low</b>	<b>Med</b>	<b>High</b>			
<b>Human Aspects</b>							
Houses - Normal / Informal		1					
Local Population		1					
Schools / Clinics	0						
Archaeological Sites	0						
Access for Vehicles		1					
<b>ENGINEERING RISKS (to be identified by Surveyor, Project Engineer and Construction Supervisor)</b>							
Legal access to site		1					
Statutory Approvals		1					
Incorrect survey pegs		1					
Quality of drawings		1					
Materials delivery delay		1					
Quality of materials	0						

delivered							
Incorrect materials delivered	0						
Vandalism of materials			2				
Protection of site & materials			2				
Use of appropriate equipment		1					
Machinery failure		1					
Existing cables	0						
Induction from other power lines		1					
Proximity to other power lines		1					
Telkom lines	0						
Water pipes		1					
Main / farm roads			2				
Motor vehicles / traffic			2				
Rail line crossings	0						
Damaged/rusted pylons	0						
Damaged/rusted hardware		1					
Damaged/rotten poles		1					
Damaged conductors		1					
Personnel skill level		1					
Correct method application		1					

	0	1	2	3			
Risk Factors Description	Zero	Low	Med	High			
<b>OTHER RISKS</b>							
Hi-jacking		1					
Theft			2				
Communications – radio		1					
Communications telephone		1					

Risk scoring method: If risks are identified then the maximum score = 60. When all the scores are added up on a specific project and the total = 45, then the project is considered to be in a "high risk / sensitive area". If however the total score is only 25, then the project is considered to be in a "low risk / non-sensitive area".

**CONTRACTOR**.....  
PRINT NAME.....  
SIGNATURE.....  
DATE**PROJECT ENGINEER**.....  
PRINT NAME.....  
SIGNATURE.....  
DATE**RISK & ENVIRONMENTAL**.....  
PRINT NAME.....  
SIGNATURE.....  
DATE**PROJECT MANAGEMENT**.....  
PRINT NAME.....  
SIGNATURE.....  
DATE



## Free State OU

### NEW ENGINEERING CONTRACT

**FS-STM-1905-331031-0002 Welbedacht Dam - Van Stadensrust 11 kV Capacitor Bank (C.DO03374)**

**FS-STM-1905-331031-0003 Driedorp Boesmanskop 22kV line to Workshop Substation (C.DO03444)**

**FS-STM-1905-33103-0004 Koria 11kV line from Workshop Substation (C.DO03445)**

## ELECTRICAL

### PART 5: SITE INFORMATION

#### 5. Site Information

Give information about the *site* such as the ground conditions and any other information, which is likely to affect the *Contractor's* work such as limitations on access and the position of adjacent structures.

- a) The site is situated near Van Stadensrus town, approximately 150km from Bloemfontein.
- b) The area is flat with some undulating areas.
- c) The *contractor* to tender for normal soil or as specified, however a rate to be provided for the following soil types: Type 4 (very soft soil), Type 3 (soft to firm), Type 2 (very soft rock), Type 1 (soft rock) and Hard rock. No payments will be made if the before mentioned are not verified and confirmed by the appointed COW.
- d) Poles, Stays & Struts planted in type 3 and 4 soils to be installed according to Technical Instruction 06TI-019, as well as Technical Bulletin 06TB-035, dated 15 January 2007
- e) The *Contractor* is responsible to point out and negotiate with the local community a site for the camp.

- f) Access to the site is available via tar and dirt roads. If rained, the roads are slippery
- g) In townships access to stands may be restricted due to the presence of occupants, existing fences and other structures.
- h) No geotechnical report is attached.
- i) The *Contractor* is responsible to obtain information on typical weather conditions that can be expected on the site.
- j) Other services on site include water mains, which are not indicated on the layout drawings.
- k) The *contractor* prior, to construction should familiarise himself of all existing services e.g. underground cables, Telkom networks, sewerage and water pipes. The community and or local municipality to be contacted in this regard. The *contractor* to make provision for unforeseen damages to other services in the "Schedule of Prices" as he will not be compensated should any services be damaged.
- l) Water erosion trenches do appear from place to place.



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## **ELECTRICAL PART:6 STRINGING CHARTS**



Stringing Charts  
-Boesmans.xlsx



Stringing Charts  
-Koria line.xlsx

All conductors will be tensioned according to Technical Bulletin 02TB-034 and Tension Charts provided. The following steps will be followed:

- A calibrated Dyno meter, Thermometer and calculation material will be used.
- Measure the distances between strain points.
- Calculate the equivalent span length according to the following formula:



$$Leq = \sqrt{((L1^3 + L2^3 + L3^3 + \dots) / (L1 + L2 + L3 + \dots))}$$

Where

Leq: Equivalent Span Length

L1, L2 etc: Intermediate Span Lengths between Strain Points

- Read the relevant Tension from the Sag and Tension charts using the conductor temperature and equivalent span length.
- The phases will protrude above the top of the pole and cut in staggered lengths. All phases will be tensioned. The following data that will be handed to the Project Coordinator as part of the Handing Over Document:
- Date, Span (between tension poles), Temperature, Equivalent Span Length, tension.



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## **ELECTRICAL**

### **PART 7: ENS DIAGRAMS**



ENS Diagram -Cap  
Bank Regulator.pdf



ENS Diagram-DBK  
22kV line.pdf



ENS Diagram-New  
11kV Koria line.pdf



New Regulator point  
WSR 30.pdf



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**NEW ENGINEERING CONTRACT**

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**ELECTRICAL**  
**PART 8: GPS COORDINATES**

Township name	Longitude	Latitude
Workshop Substation	27° 3' 53.1" (X)	-28° 0' 57.0" (Y)



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## **NEW ENGINEERING CONTRACT**

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## **ELECTRICAL**

## **PART 9 ENVIRONMENTAL DOCUMENT**



DESD for WSR and Screening report DBK  
DBK MV linesrev0.pdfWSR MV line-M Moer



Koria Boesm EMP  
rev0 June 2022.pdf

GA 509 of  
NWA\_Regs GenN 50

Boesmanskop GA  
confirmation letter.pdf



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**NEW ENGINEERING CONTRACT**

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Stadensrust 11 kV Capacitor Bank (C.DO03374)**

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shop Substation (C.DO03445)**

**ELECTRICAL**

**PART 10 HEALTH AND SAFETY REQUIREMENTS**

**FILE ATTACHED**



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### NEW ENGINEERING CONTRACT

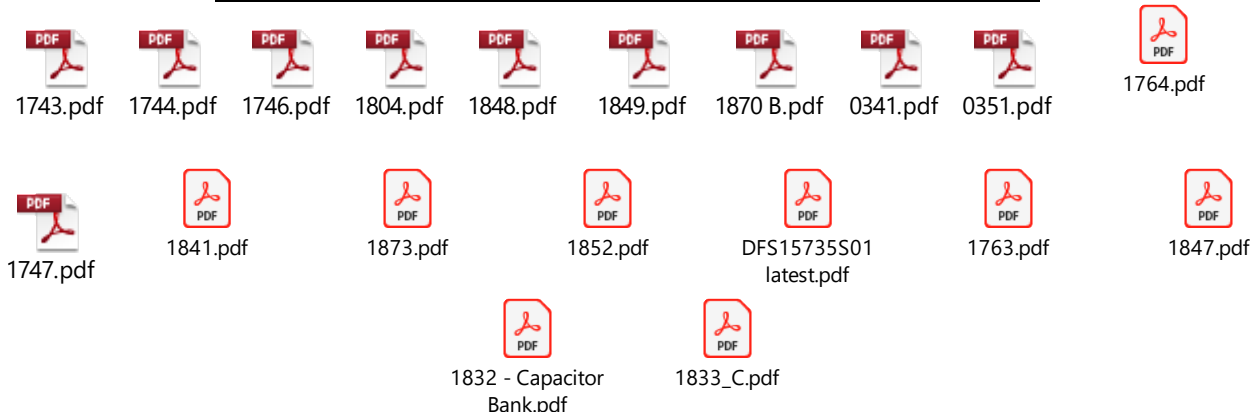
**FS-STM-1905-331031-0002 Welbedacht Dam - Van Stadensrust 11 kV Capacitor Bank (C.DO03374)**

**FS-STM-1905-331031-0003 Driedorp Boesmanskop 22kV line to Workshop Substation (C.DO03444)**

**FS-STM-1905-33103-0004 Koria 11kV line from Workshop Substation (C.DO03445)**

## ELECTRICAL

### PART 11 DESIGN DRAWINGS





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**NEW ENGINEERING CONTRACT**

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**FS-STM-1905-33103-0004 Koria 11kV line from Workshop Substation (C.DO03445)**

**ELECTRICAL**

**PART 12 CONTROL PLANT DESIGN**



FS-STM-1905-33103  
1-0001 Van Stadensrust



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## **ELECTRICAL**

## **PART 13 BILL OF QUANTITIES**



BOQ Cap  
Bank-Voltage Regulat



BOQ BOESMANSKOP  
LINES.xls



BOQ Koria 11kV line  
from Workshop subst