

	<b>Scope of Works</b>	<b>Transmission</b>
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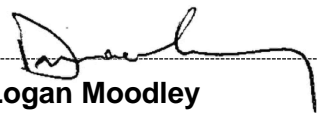
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### **CONTROLLED DISCLOSURE**

## **1. Introduction**

Eskom Telecommunication has several telecommunication sites of differing configurations. Most of these telecommunication sites have steel lattice towers, structures or masts installed on them. Eskom telecommunication is required to provide periodic maintenance of varying degrees and repair work on these towers, structures, and masts on as and when needed basis in order to comply with set standards and for the upkeep of this installed base.

## **2. Supporting Clauses**

### **2.1 Scope**

#### **2.1.1 Purpose**

The purpose of this document is to specify the scope of work for the maintenance and repair and/or dismantling (if required) of Eskom Telecommunications steel lattice towers, structure and mast installed at several telecommunications sites located throughout South Africa's nine (9) provinces (i.e. Eastern Cape, Western Cape, Northern Cape, North West, Gauteng, Limpopo, Mpumalanga, Free State and KwaZulu Natal). This document will be used to guide the service provider's expectations as to the scope requirements for the maintenance, repair and dismantling work on Eskom Telecommunications towers, structures, and masts.

#### **2.1.2 Applicability**

This document shall apply throughout Eskom Holdings Limited, its divisions, subsidiaries and entities wherein Eskom has a controlling interest.

#### **2.1.3 Effective date**

The implementation date is the date of the last authorising signature.

### **2.2 Normative/Informative References**

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

#### **2.2.1 Normative**

- [1] ISO 9001 Quality Management Systems
- [2] ISO 14001 Environmental Management.
- [3] ISO 45001 Occupational Health and Safety system
- [4] 240-119380820 Existing Towers: Structural Inspection Analysis Strengthening design and certification of Telecommunications Tower and Mast Infrastructure
- [5] 32-418 Working At Heights Standard
- [6] 240-141493501 Work At Height On Job Observation Form

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- [7] 240-56872313 Radio Station Earthing and Bonding  
[8] 240-5996738 New Tower: General Tower Specification For New Installations Of Eskom Telecommunications Tower And Mast Infrastructure

### 2.2.2 Informative

- [9] SANS 10160 The General Procedures And Loading To Be Adopted In The Design of Building  
[10] BS8100 Part 1 & 2 - Lattice Tower & Masts - British Standards Institution  
[11] ANSI 1019A  
[12] 32-1034: Eskom's Procurement And Supply Chain Management  
[13] 474-59: Internal Audit Procedure

### 2.3 Definitions

Definition	Description
<b>Radio Mast</b>	Any self-supporting structure consisting of a single element that is used to mount radio antennae for the purpose of transmission and reception of radio signals
<b>Radio Tower</b>	Any self-supporting lattice structure that is used to mount radio antennae for the purpose of transmission and reception of radio signals.
<b>Contractor</b>	An independent structural inspection authority appointed by Eskom for the purpose of the intended scope of work
<b>Site Inspection Document</b>	A document available in hard copy format to be used on site for completion and capturing all relevant site-specific information in a structured way during site visits.
<b>Third (3<sup>rd</sup>) Tier Member</b>	Redundant Bracing Members
<b>PLS Tower</b>	Software used for the structural analysis and design of lattice steel tower. Developed by Power Line Systems of Madison, Wisconsin, USA.
<b>PLS Pole</b>	Software used for the structural analysis and design of steel pole. Developed by Power Line Systems of Madison, Wisconsin, USA.
<b>Competent Person (As per OHS ACT)</b>	A person who – a) Has in respect of the work or task to be performed the required knowledge, training and experience and, where applicable, qualification, specific to that work or task: Provided that where appropriate qualifications and training are registered in terms of the provision of the National Qualification Framework Act, 2000 (Act No.67 of 2000), those qualifications and that training must be regarded as the required qualifications and training; and b) Is familiar with the Act and with the applicable regulations made under the Act;

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## 2.4 Abbreviations

Abbreviation	Explanation
(M)	"Mandatory" requirements needed to be complied with
CAA	Civil Aviation Authority
COC	Certificate of Compliance
CoE	Centre of Excellence
ECSA	Engineering Council of South Africa
EDC	Eskom Documentation Centre
ET	Eskom Telecommunications (TT -Transmission Telecoms)
ID	Identification
OHS Act	Occupational Health and Safety
SHEQ	Safety Health Environmental Quality
SME	Subject Matter Expert (Within Eskom)

## 2.5 Roles and Responsibilities

Role	Responsibilities
Technology	Design Engineering and Technical Support
Network Management Centre	Network Support and Access control
National Planning	Application Design/ Specialised Engineering
Programme Management	Project Management
Operations and Field services	Network support, equipment repair, maintenance, training, installation and commissioning
Business Services	Staff Training
SHEQ	SHEQ requirements
Contractor	Schedule and execution of the inspection as per specification

## 2.6 Process for Monitoring

Implementation of the scope will be monitored through the contract process. All stakeholders (Managers, Procurement, Engineers, etc.) are to check for compliance with this document as stipulated by the Eskom Procurement Management Process throughout the duration of the contract through the Internal Audit Procedure.

Structural analysis report will be provided by ET if required.

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### 3. Scope of Work

This scope of work must be read and used in conjunction with all applicable national and international standards and regulations as per the Eskom normative reference document “**240-119380820 Existing Tower: Structural Inspection, Analysis Strengthening, Design and Certifications Of Telecommunication Tower and Mast Infrastructure**”.

Contractor shall be appointed to perform the full maintenance and repair scope of work including all relevant certification requirements as per Eskom reference document **240-119380820 Existing Tower: Structural Inspection, Analysis Strengthening, Design and Certifications Of Telecommunication Tower and Mast Infrastructure**

#### 3.1 Description of the services required

The Provision of service, maintenance, and repairs on Eskom Telecommunications’ towers, masts and structures on an as and when required basis for a period of 60 months. Eskom Telecommunications Sites as listed:

Eskom Telecommunications undertake to carry out annual routine maintenance for the radio towers/ mast to ensure that no structure or part of it is loaded in a manner that pose threat to human life as prescribed in the Construction Regulation section of the Occupational Health and Safe Act 11(1) (a)(b) and 11(2)(a)(c). Eskom Telecommunications is further committed to the safety of employees, partners, and members of the public while conducting tower/ mast maintenance.

Eskom Telecommunications with the contractors will ensure that all telecommunication tower and mast infrastructure are structurally sound, compliant to the relevant regulations and laws and that maintenance and repairs performed on them conforms to the requisite Eskom standards and/or recommendations as prescribed by internal or external tower analysis reports.

The contractor shall have a minimum of three years’ collective relevant experience in the construction and/or maintenance of steel lattice towers, structures, and masts, to be able to fulfil the requirements of this scope. The contractor shall have the appropriate level of climber competency to operate safely on the structures involved.

The Contractor shall use other documents provided as reference.

##### 3.1.1 Structural Steelwork

1. Supply and fabrication of steelwork
2. Steelwork to be hot dipped galvanized as per the SANS 121 standard specification, complete with all the necessary cleats, brackets, gussets, packs, shop fasteners baseplates and the like, including cleaning of steelwork, shop priming and loading ready for dispatch to site and preparation of shop detail drawings

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3. All steel structural members shall be straight, free from lamination, flaws and other defects. All clippings, back-cuts, grinding and holes must be free from burrs. All parts of the fabricated members shall be free from kinks and twists. All holes, blocks and clips shall be made with sharp tools and shall be clean cut without torn or ragged edges.
4. All new manufactured members shall be fabricated in accordance to the dimensions, arrangements, sizes, thickness weights and quantities indicated specified and carried out in accordance with the recommendation from the Eskom SME (Subject Matter Expert) report to be issued to the contractor or as advised by an Eskom representative.
5. The contractor shall scrap and submit scrapping certificates for all corroded members which have been safety removed from the tower and lowered to the ground.
6. Where a diagonal member is replaced, a rigging pole is to be clamped to the horizontal member above the horizontal member below. Where a secondary diagonal of a K-brace needs to be replaced, a rigging pole is to be clamped to the primary diagonal of the K-brace up to the horizontal above.
7. All connections shall be bolted. welded connections shall not be permitted. If blind or partially blind holes, missing clips or any other minor miss-fabrication of steel members are discovered on site, the contractor shall notify the Eskom representative and receive his acceptance prior to effecting the repairs.
8. Towers must only be handled with the use of nylon or fabric ropes/slings and no unprotected wire slings will be permitted. Material is to be carefully offloaded, stacked and shall not be dropped or dumped off the truck.
9. Where drilling, punching or clipping to the new fabricated members is done on site, exposed steel surfaces shall be coated with a heavy layer of zinc-rich paint or an accepted equivalent
10. The storage of the new replacement members shall be on blocks lifting material off the ground. Sufficient blocks must be provided to prevent bending and wrapping of the replacement members.
11. Where members of the same size but different thickness are to be used, the difference in thickness shall not be more than 1mm. The Contact connections shall be clean and free from any foreign matter.
12. All left over cable lengths, steelwork off cuts or other waste material remain the property of the Contractor and are to be removed from site.

### **3.1.2 Erection bolts and clamps:**

1. Removal and scrapping of corroded bolts and nuts and washers to the entire steel structure tower.
2. Grade 8.8 bolts in shear and bearing type connections shall be tensioned by hand to the limit of the torque that can be applied using a standard spanner.

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3. Fitted bolts shall be long enough to ensure that no threaded portion is within the thickness of the connected parts required to develop the bearing load on the bolt ,and shall be provided with washers, under the nut, of thickness such as to ensure that at least one full thread (in addition to the thread runout) remains clear between the nut and the unthreaded shank.
4. Bolts at each connection cleat are to be removed and replaced one at a time to maintain the structural integrity of the tower
5. Connections shall be made in a manner to avoid eccentricity as much as possible. Erection bolts shall be located as near to the centre of gravity of the members as practicable.
6. Nuts and bolts that bear on sloping faces shall be provided with bevelled washers.
7. Spacers shall be provided as necessary for all gaps to prevent distortion of new fabricated members. Spacers between members where more than one bolt is involved shall be one plate of the required thickness. Where a single bolt is involved, the spacer may be made up of 3 pieces. The thickness of the individual spacers shall be limited to the following standard size: 5mm, 8mm and 12mm.
8. Proof of the Grade 8.8 bolts and nuts are to be issued to Eskom upon delivery together to prevent lower grade nuts being used with higher grade bolts.

#### **3.1.3 CAT ladder:**

1. Removal scrapping or replacement of corroded fitted U-bolts, washers and nuts.
2. The contractor will be required to supply, deliver to site and install new U bolts with washers and nuts.

#### **3.1.4 Cable rack:**

1. Remove and replace corroded feeder clamps.
2. Supply, deliver to site and install hot dipped heavy duty galvanized feeder trays with appropriate support clamps/ brackets/poles.

#### **3.1.5 Site Welding:**

1. Welding of structural steel components to appropriate positions (provisional).
2. Inspection and testing of welds: (certificates required).

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### **3.1.6 Grouting:**

1. Non-shrink, non-metallic, free-flowing grouting under base plates. As per standard

### **3.1.7 Holding Down Bolts and miscellaneous:**

1. Remove corroded Holding Down bolts and locknuts to structural steel tower base including nuts, steel washer and taper washers upon the instructions of the Structural Engineer and Eskom site representative
2. New holding down bolts and lock nuts shall be supplied, delivered to site and installed M42x930mm long galvanized, high strength, friction holding down bolt (Grade 4.8), including a thick plate of the appropriate thickness as recommended by the report from the Eskom SME (Subject Matter Expert) report and this thick plate shall be welded on at end, where cast into concrete, including nut, hardened steel washer, load indicating washer, taper washer where needed and sherardized.
3. Holding Down bolts shall be designed and detailed in accordance with design recommendations as per the latest version of the Southern African Steel Construction Handbook published by the South African Institute of Steel Construction.
4. Holding Down bolts must protrude sufficiently to allow double nut fixing per bolt with at least three threads above the last nut.
5. Lock nuts to be Grade 8.8 to match the existing Holding Down bolts. These new locknuts and old nuts are not to be torqued but only tightened with a spanner.

### **3.1.8 Structural Steelwork Corrosion Protection:**

1. The corroded platform grid floors must be stripped, safely lowered to the ground, cleaned and re-galvanised and re-erected. The rungs of the CAT ladder are to be cleaned in-situ and only the first and second High Build Aluminium surface Tolerant Epoxy coats are to be applied. non-passive galvanising shall apply to new replacement members.
2. The new steel is to be cleaned with a solvent detergent greaser (formulated by paint supplier) and then water rinsed by hosing with high pressure water spray
3. There shall be no drilling in members of the structure after galvanising
4. Application of Abrasive blast cleaning to existing structural steelwork in accordance to SABS 064.

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5. Apply first coat Modified Vinyl Primer of a dry film thickness of 50 to 70 micrometres and second coat MIO modified Vinyl of a dry film thickness of 90 to 110 micrometres to new members (The recommendation from the Eskom SME report will however take precedence to the approach applied)
6. Paint the entire tower over its full height two coats of twin pack High Build Aluminum Surface Tolerant Epoxy (80-100 micrometers) and one coat Twin Pack Aliphatic Acrylic Polyurethane Enamel (30-40 micrometers) in terms of the SA CAA regulations in 7 equal bands of alternative Signal Red: S1580 and Cloud White: S0505-G20Y, with red applied to the highest and lowest bands (The recommendation from the Eskom SME report will however take precedence to the approach applied).
7. Apply ProStruct Carbonate locknuts to Holding Down bolts or as per the recommendation from the Eskom SME report.

#### **3.1.9 Earthing:**

1. Where earthing repair works needs to be done, the contractor shall supply, deliver and lay equipment earthing, earth straps, including excavation in all material, risk of collapse, bedding, backfill, compaction and testing at depths up to (See Earth Mat Specifications here to attached). All flat copper to be supplied in accordance 240-56872313 Radio Station Earthing and Bonding standard.
2. Supply and Installation of earthing components and equipment includes for all equipment, tools, materials, labor, and supervision to attach earthing stingers to earthing pads, structural steel, and equipment earthing pads in accordance with 240-56872313 Radio Station Earthing and Bonding standard. Also includes splicing and exothermal welding or bolting stingers as required.

#### **3.1.10 Minor Works:**

1. Replace any defective aviation lights as supplied or recommended by an Eskom Telecommunications representative. Wherein the supplier is requested to provide the replacement aviation light, these contain a sock resistant UV stabilised polycarbonate material and stainless-steel brackets, threaded bolts and nuts powered by 48V (DC) and they must be installed at appropriate levels as per standard.

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2. Supply and install PVC armoured cable fixed by means of clamps to the cable runway, wiring of light points and provision of twilight switches for operation of the light on the tower. PVC insulated armoured copper cable to be used.
3. Where it is necessary to use a scaffolding, the contractor shall supply, erect and certifying the erecting of the scaffolding. The contractor shall be responding for the dismantling and removal the scaffolding.
4. Replacement of rusted supporting antenna mounting hardware as applicable (U-bolts, brackets, etc)

#### **3.1.11 Concrete and Tower Plinth Repairs:**

1. Any concrete or work that needs to be done on the tower plinth shall be done in accordance with the recommendations as advised by the Eskom SME (subject matter expert) report.

#### **3.1.12 Decommissioning of towers:**

1. Towers that have been condemned and no longer fit for purpose shall require to be decommissioned. Eskom Telecommunications will identify and communicate the towers that require to be decommissioned.
2. Qualified Riggers are to supervise the dismantling of the tower as per approved Safe Working Procedures (SWP).
3. The decommissioned tower structural steel and attachments shall be disposed of by the contractor from site.
4. Eskom Telecommunications shall advise the Contractor if there is a need to remove the tower foundation and site re-instatement as applicable, based on space constraints and the need to utilise the tower footprint in future. The contractor shall provide rates only for this activity (jackhammer for concrete breaking and rubble removal from site.)

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#### 4. Acceptance

This document has been seen and accepted by:

Name	Designation
Alison Maseko	Senior Manager: Eskom Telecommunications
Craig Pitt	Manager: BCS
Joe Manyisa	Manager: Network Management Centre
Bheki Nala	Manager: Application Engineering and Planning
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Mfundiso Hina	Regional Manager: Eastern Region
Muzi Mlangeni	Regional Manager: Central Region
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#### 5. Revisions

Date	Rev.	Compiler	Remarks
November 2021	0.1	SU Dyantyi	Developed the scope of work for purposes of establishing a Tower Maintenance and Repair enabling contract
June 2022	1	P Kortje	Final draft for publishing
October 2022	2	L Moodley	Addition of tower decommissioning scope.

#### 6. Development Team

The following people were involved in the development of this document:

- Unathi Dyantyi
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#### 7. Acknowledgements

Eskom Telecommunication and Field Services Managers

Facilities Management Workgroup

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