

 Eskom	<b>Report</b>	<b>Transmission</b>
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Title: **Scope of Work for the Installation of Plastic Bird Perch Diverters and Stainless-Steel Straps on the (Western) Grid Lines**

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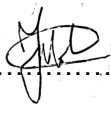
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Date: 27/09/2022	Date: 20 Oct 2022	Date: 20/10/2022

**REVIEW**

<b>Name</b>	<b>Functional Responsibility</b>	<b>Date</b>	<b>Signature</b>
Timothy Sibi	Snr Technologist (LES – PEER REVIEW)	19/10/2022	
Tony Baloka	Western Grid representative	27/09/2022	

**REVISION CONTROL**

<b>Revision</b>	<b>Date</b>	<b>Brief details of updates</b>
1	April 2022	First issue

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**CONFIDENTIAL**

## **1. INTRODUCTION**

This project is justified as a statutory requirement. Transmission Lines Faults has been identified as one of the key factors that affect the overall performance of Transmission Lines. In 2019/20 bird faults contributed ~43% (326) of the total number of line faults experienced on the Transmission network. Bird faults are one of the contributors to System Minute losses, in the event of trip & lockouts. Improvement of lines performance has been identified as one of the key objectives of the Performance Operational Excellence (OE) stream, driven by the Group Executive hence this project to install bird guards.

The poor performing lines identified in the Western Grid that require mitigation are listed in section 2.1 below.

## **2. SCOPE OF WORK**

The scope of work is for installation of plastic bird perch diverters and stainless-steel straps for Western Grid Lines. Plastic bird perch diverters must be collected at the following address

Western Grid: Muldersvlei Substation (Western Cape)

GPS Coordinates: -33.817868S 18.808316E (is used as an approximate guideline, however, the correct location is the Muldersvlei substation in the Western Cape)

These plastic bird perch diverters and stainless-steel straps must then be installed as per the installation guideline contained in the specification mentioned in Section 2.2. The lines and quantities to be installed on these lines are indicated in the table in Section 2.1 below.

### **2.1 PACKAGING DETAILS**

The plastic bird perch diverters and stainless-steel straps must be collected at the location/s indicated above and transported to the individual lines/sites as indicated below for installation.

<b>Line Name</b>	<b>Bird perch diverters</b>	<b>Stainless Steel straps</b>
<b>Bacchus-Kappa 1</b>	<b>7680</b>	<b>23040</b>
<b>Bacchus-Proteus</b>	<b>8580</b>	<b>25740</b>
<b>Droerivier-Kappa 1</b>	<b>10200</b>	<b>30600</b>
<b>Droerivier-Kappa 2</b>	<b>9120</b>	<b>27360</b>
<b>Kappa - Muldersvlei</b>	<b>9060</b>	<b>27180</b>
<b>TOTAL</b>	<b>44640</b>	<b>133920</b>

Any bird perch diverter and/or straps left over after the installation must be returned to the location/s indicated above to be kept as spares for maintenance and/or for any additional installations if necessary.

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## **2.2 DESIGN DRAWING AND STANDARDS**

Plastic bird perch diverters and stainless-steel straps must be installed in accordance with the Installation Guideline (240-156074235) referred below:

<b>Document Name</b>	<b>Document Number</b>
Plastic Bird Perch Diverter Installation Guideline	<b>240-156074235</b>

**Refer to Annex A for installation Schedule and Annex C for the tower type outline diagrams. The Strain tower will be considered as triple “I-string” for the installation of the plastic bird perch diverters.**

**NB.** Western Grid, the strategy will be to appoint contractor that will execute the project for the installation of Plastic Bird Perch Diverters on live lines (OFF ARC), under “Close Proximity”. The contractors’ tower climbers will approach live structure for access to non-electrical equipment, conduct risk assessments before executing the work. Should there be a poor response to this initial strategy approach, then the strategy will need to be reassessed.

## **2.3 DEFINITIONS**

### **2.3.1 Disclosure Classification**

**Controlled Disclosure:** The information is readily available to Eskom employees (internal use). Information may also be accessed by or disclosed to third parties with specific authorisation or consent (either enforced by law or discretionary).

This information includes a wide spectrum of internal business data that can be used by all employees and can be shared with authorised business partners.

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## **ANNEX A: PLASTIC BIRD PERCH DIVERTERS INSTALLATION SCHEDULE**

The estimated quantity of plastic bird perch diverters that can be installed per tower based on the various insulator configurations will be as follows:

<b>Insulator</b>	<b>Left Outer Phase</b>	<b>Centre Phase</b>	<b>Right Outer Phase</b>	<b>Total per Tower</b>
<b>V – V – V</b>	24 x 1m	24 x 1m	24 x 1m	72m
<b>I – V – I</b>	8 x 1m	24 x 1m	8 x 1m	38m
<b>I – I – I</b>	8 x 1m	16 x 1m	8 x 1m	32m
<b>Strain Bend Right</b>	8 x 1m	16 x 1m		24m
<b>Strain Bend Left</b>		16 x 1m	8 x 1m	24m
<b>Inline Strain</b>	8 x 1m	16 x 1m	8 x 1m	32m

### **1. DETAIL INFORMATION OF LINES AND TOWERS**

The contractor will need to indicate the number of towers that can be installed per day based on insulator configuration. The Installation Guideline for plastic bird perch diverters 240-156074235 has been referenced regarding details for the installation; refer to Section 3 for (V-V-V), (I-V-I) and (I-I-I) installation configurations. The strain towers are categories into two types (Bend and Inline), for Bend's the installation should be done on two phases and for the Inline the installation should be done on all phases (the contractor must target to install the plastic bird perch diverters over the Jumper – insulators for strain towers are installed horizontally).

**During tender process, the Contractor is required to submit the estimated number of towers that can complete per day for installation of Plastic Bird Perch Diverters.**

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## 1.1 BACCHUS KAPPA 1 400KV

- For the Bacchus Kappa No1 400kV Line the base scope is to do 128 towers on this line.
- The identified bird hotspot zones that require bird guards are for the towers: 6-26; 150-172; 211-273; 305-325.
- This equates to installing bird guards on 14 x 510A; 4 x 510B; 3 x 510E; 2 x 517E; 3 x 517B; 2 x 517F; 7 x 504C; 2 x 504D; 79 x 504A; 12 x 504B.

Refer to Annex C for the outline drawings.

Section		Total Suspension Towers with I – I – I	Total Suspension Towers with I – V – I	Total Suspension Towers with V – V – V	Total Strain Towers (Bend or Inline)
<i>From Tower</i>	<i>To Tower</i>				
1 BA/KA 6	1 BA/KA 26	0	4	14	3
1 BA/KA 150	1 BA/KA 172	0	14	3	6
1 BA/KA 211	1 BA/KA 273	0	56	0	7
1 BA/KA 305	1 BA/KA 325	0	21	0	0
<b>Total Number of Towers</b>		<b>0</b>	<b>95</b>	<b>17</b>	<b>16</b>

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## 1.2 BACCHUS PROTEUS 1 400 kV LINE

- For the **Bacchus Proteus No1 400kV Line** the base scope is to do **143** towers on this line.
- The identified bird hotspot zones that require bird guards are for the towers: **76-96; 182-204; 225-265; 383-419; 550-570.**
- This equates to installing bird guards on **101 x 515H; 31 x 515B; 3 x 515E; 3 x 515D; 2 x 515G; 3 x 515C**

Refer to Annex C for the outline drawings.

Section		Total Suspension Towers with I – I – I	Total Suspension Towers with I – V – I	Total Strain Towers (Bend or Inline)
From Tower	To Tower			
1 BA/PR 76	1 BA/PR 96	0	20	1
1 BA/PR 182	1 BA/PR 204	0	22	1
1 BA/PR 225	1 BA/PR 265	0	36	5
1 BA/PR 383	1 BA/PR 419	0	34	3
1 BA/PR 550	1 BA/PR 570	0	20	1
<b>Total Number of Towers</b>		<b>0</b>	<b>132</b>	<b>11</b>

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### 1.3 DROERIVIER KAPPA 1 400KV LINE

- For the Droerivier Kappa No1 400kV Line the base scope is to do 170 towers on this line.
- The identified bird hotspot zones that require bird guards are for the towers: 156-178; 392-414; 444-464; 473-496; 525-545; 567-589; 623-657.
- This equates to installing bird guards on 160 x 501A; 5 x 501N; 5 x 501S.

Refer to Annex C for the outline drawings.

Section		Total Suspension Towers with I – I – I	Total Suspension Towers with I – V – I	Total Strain Towers (Bend or Inline)
From Tower	To Tower			
1 DRO/KA 156	1 DRO/KA 178	0	23	0
1 DRO/KA 392	1 DRO/KA 414	0	23	0
1 DRO/KA 444	1 DRO/KA 464	0	21	0
1 DRO/KA 473	1 DRO/KA 496	0	23	1
1 DRO/KA 525	1 DRO/KA 545	0	18	3
1 DRO/KA 567	1 DRO/KA 589	0	21	2
1 DRO/KA 623	1 DRO/KA 657	0	35	0
<b>Total Number of Towers</b>		0	164	6

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#### **1.4 DROERIVIER - KAPPA 2 400KV LINE**

- For the Droerivier Kappa No2 400kV Line the base scope is to do 152 towers on this line.
- The identified bird hotspot zones that require bird guards are for the towers: 89-110; 206-226; 390-410; 465-486; 509-574.
- This equates to installing bird guards on 138 x 501A; 6 x 501N; 5 x 501S; 3 x 501P

Refer to Annex C for the outline drawings.

<b>Line Section</b>		<b>Total Suspension Towers with I – V – I</b>	<b>Total Suspension Towers with V – V – V</b>	<b>Total Strain Towers (Bend or Inline)</b>
<i>From Tower</i>	<i>To Tower</i>			
2 DRO/KA 89	2 DRO/KA 110	0	21	1
2 DRO/KA 206	2 DRO/KA 226	0	21	0
2 DRO/KA 390	2 DRO/KA 410	0	18	3
2 DRO/KA 465	2 DRO/KA 486	0	20	2
2 DRO/KA 509	2 DRO/KA 574	0	58	8
<b>Total Number of Towers (152)</b>				

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## 1.5 KAPPA MULDERSVLEI 1 400 kV LINE

- For the **Kappa Muldersvlei No1 400kV Line** the base scope is to do **151** towers on this line.
- The identified bird hotspot zones that require bird guards are for the towers: **106-135; 174-237; 250-285; 411-431**.
- This equates to installing bird guards on **11 x 504C; 5 x 504D; 35 x 504B; 100 x 504S**.

Refer to Annex C for the outline drawings.

Line Section		Total Suspension Towers with I – V – I	Total Suspension Towers with V – V – V	Total Strain Towers (Bend or Inline)
From Tower	To Tower			
1 KAP/MUL 106	1 KAP/MUL 135	28	0	2
1 KAP/MUL 174	1 KAP/MUL 237	53	0	11
1 KAP/MUL 250	1 KAP/MUL 285	30	0	6
1 KAP/MUL 411	1 KAP/MUL 431	20	0	1
<b>Total Number of Towers</b>		131	<b>0</b>	20

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## **1.6 ANNEX B: TECHNICAL EVALUATION CRITERIA**

### **1) Scope**

This section covers the criteria for the technical evaluation of the contractor for the installation of Plastic Bird Perch Diverter within Eskom Holdings SOC (Ltd). The document addresses the standard documented technical evaluation criteria to be used when evaluating contractors for qualification to be appointed for execution of the project. This will be in line with the Eskom Holdings SOC (Ltd) requirements, and it is applicable to all the technical evaluations for the related tender submissions.

### **2) Requirements**

The technical tenders received will be evaluated via a document evaluation (desktop assessment) process. The evaluations are done to establish whether all the key tender deliverables are met. A minimum total of 70% is required to pass the technical requirements.

The evaluation exercise is performed by the appointed Eskom technical team. This initial part of the evaluation starts when submissions are opened and assessed for the first time. The submitted documents will be evaluated against the evaluation criteria as stated in this document.

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1. Installation of Plastic Perch Bird Diverters on Lattice Structures					
Item No.	Item	Weighted (60%)			
		Weight (W)	Actual (A)	Max (M)	Result(R) (A / M) X W
1.1	Provide Method Statements/Safe Work Procedure for the installation of Plastic Bird Perch Diverters under close proximity conditions (the line will be live and OFF ARC).	20%		5	0.0%
1.2	Provide task manual for the installation of Plastic Bird Perch Diverters under close proximity conditions (the line will be live and OFF ARC).	20%		5	0.0%
1.3	Provide a list of equipment with valid certificates that are used for this part (Test or inspection certificates where necessary).	10%		5	0.0%
1.4	Provide pictures where similar work has been carried out on lattice structures and line voltages (220 kV and above).	10%		5	0.0%
Result (R) = (A / M) X W		Maximum: 60%			
Subsection = sum of Result (R)		0.0%			
Comments					
1.1	Copy for job specific [5]				
1.2	Copy for job specific [5]				
1.3	Comprehensive list [5]				
1.4	Various pictures from at least two projects [5]				

2. Feedback from contractor's Client					
Item No	Item	Weighted (15%)			
		Weight (W)	Actual (A)	Max (M)	Result(R) (A / M) X W
2.1	Provide evidence that similar work has been undertaken by the tenderer during the last three years. References must include the project name, the voltage level (220 kV and above on lattice structures), the scope of work and the contact details of the client(s).	15%		5	0.0%
Result (R) = (A / M) X W		Maximum: 15%			
Subsection = sum of Result (R)		0.0%			
Comments					
2.1	Evidence of similar work or relevant projects (220 kV and above lattice structures): At least one 220 kV line project and above. The tenderer must have done the full scope of work. Subcontracted parts of the scope are not acceptable. [2]				
	List of relevant projects (2005 to 2021) earlier than 2005 gets zero: At least one 220 kV project and above (lattice structure) the tenderer must have done the full scope of work. [2]				
	Voltage Levels (400 kV and above lattice structure): At least one 400 kV project. The tenderer must have done the full scope of work. [1]				

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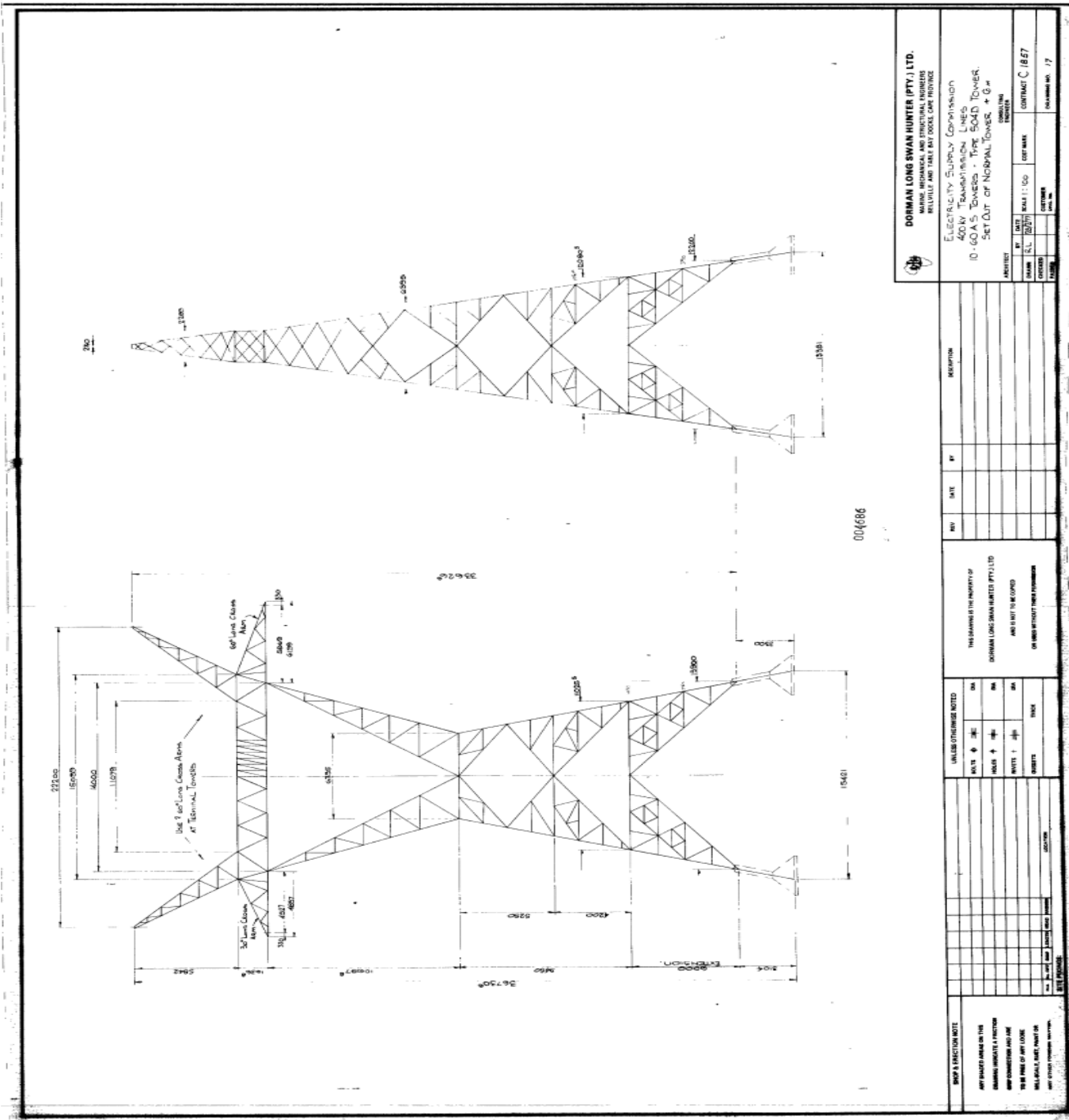
3. Project and construction management					
Item No.	Item	Weighted (25%)			
		Weight (W)	Actual (A)	Max (M)	Result(R) (A / M) X W
3.1	Project and site organograms indicating key personnel and staffing including authorised personnel.	5%		5	0.0%
3.2	Provide job profile for all key project and construction management personnel (including project managers and site manager).	10%		5	0.0%
3.3	Materials Management (Provide system and documentation to substantiate this).	10%		5	0.0%
	Explain the process you follow to compile a set of AS-BUILT documentation. This documentation should be a complete file including all final tower positions, number of installed Plastic Bird Perch Diverters.				
Result (R) = (A / M) X W		Maximum: 25%			
Subsection = sum of Result (R)		0.0%			
Comments					
3.1	➤ Head office organograms [2] ➤ Project site office organograms [2] ➤ Integration of head office staff with site office [1]				
3.2	➤ Provide job profile for the project manager [2] ➤ Provide job profile for the construction site manager [2] ➤ Provide job profile for the construction supervisors [1]				
3.3	➤ Materials management system [1] ➤ Materials management documentation (e.g., delivery notes, etc.) [2] ➤ Process for As-built documentation [2]				

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ANNEX C: TOWER OUTLINE DIAGRAMS

504D



<b>DORMAN LONG SWAN HUNTER (PTY) LTD.</b> MARINE, MECHANICAL AND STRUCTURAL ENGINEERS RELLEVILLE AND TAYLOR BAY COASTAL PROVINCE	
ELECTRICITY SUPPLY CORPORATION 4001 TROMPSBURG 10-604.5 TROMPSBURG TOWER SET OUT OF ORIGINAL TOWER + 0.00	
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BY	SCALE 1:100
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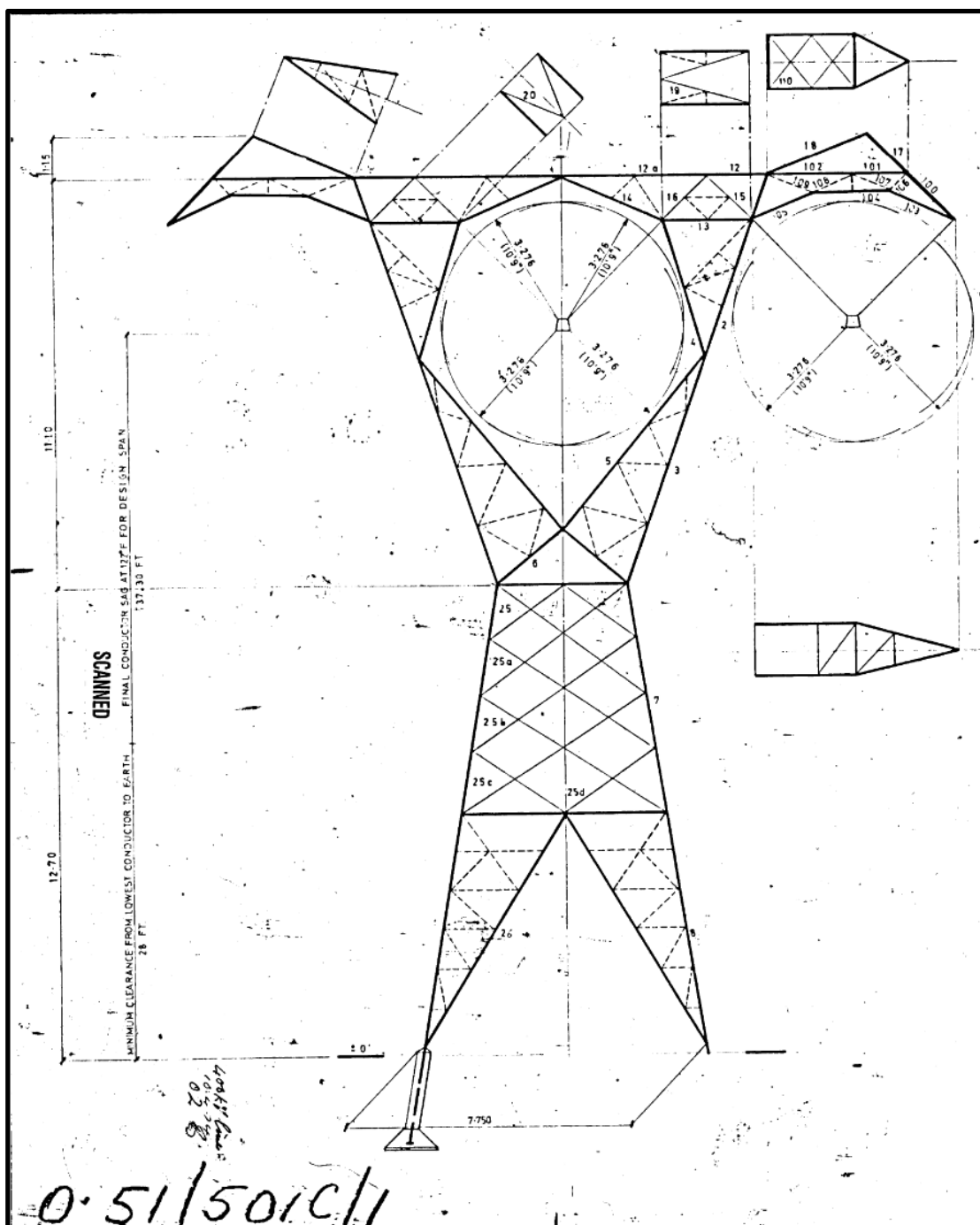
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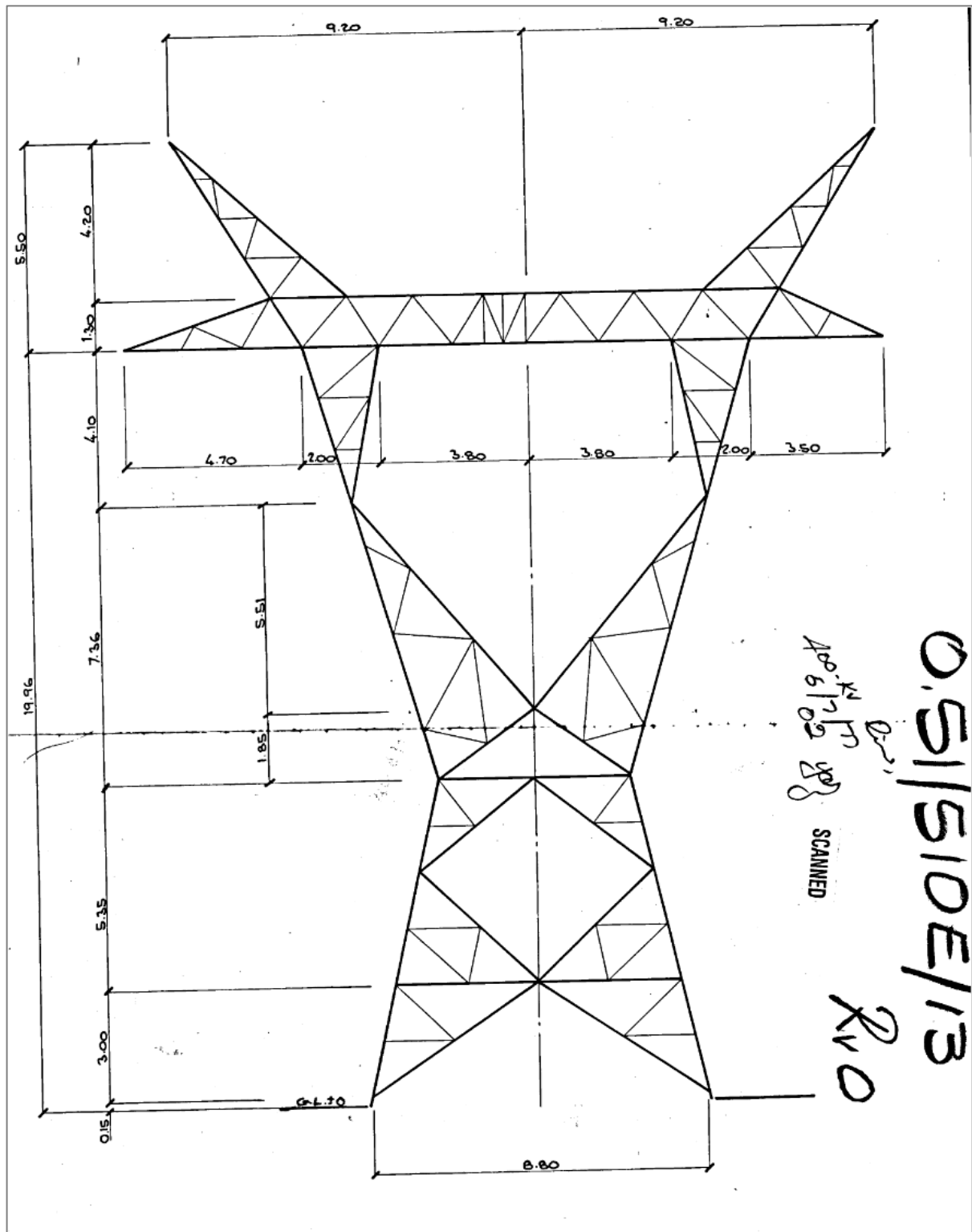


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The drawing illustrates the structural design of a transmission tower. It features several cross-sectional views labeled SECTION A-A through SECTION J-J, each showing different parts of the tower's geometry and internal bracing. The main elevation view shows the tower's profile with dimensions such as 9900, 1525, 3020, 1935, 3420, 4115, 3607, 300, 1250, 1000, 2140, 100, 1610, 275, 500, 325, 5902, 5802, 3200, 110°, 3000, 160, 165, 320, 20, 54, 2700, 1000, 2700, 100, 32.5, 100, 67.0, 945, 14355 to 20385, and 15° max. ground slope (any direction). It also indicates the top of footing and the location of guy wires.

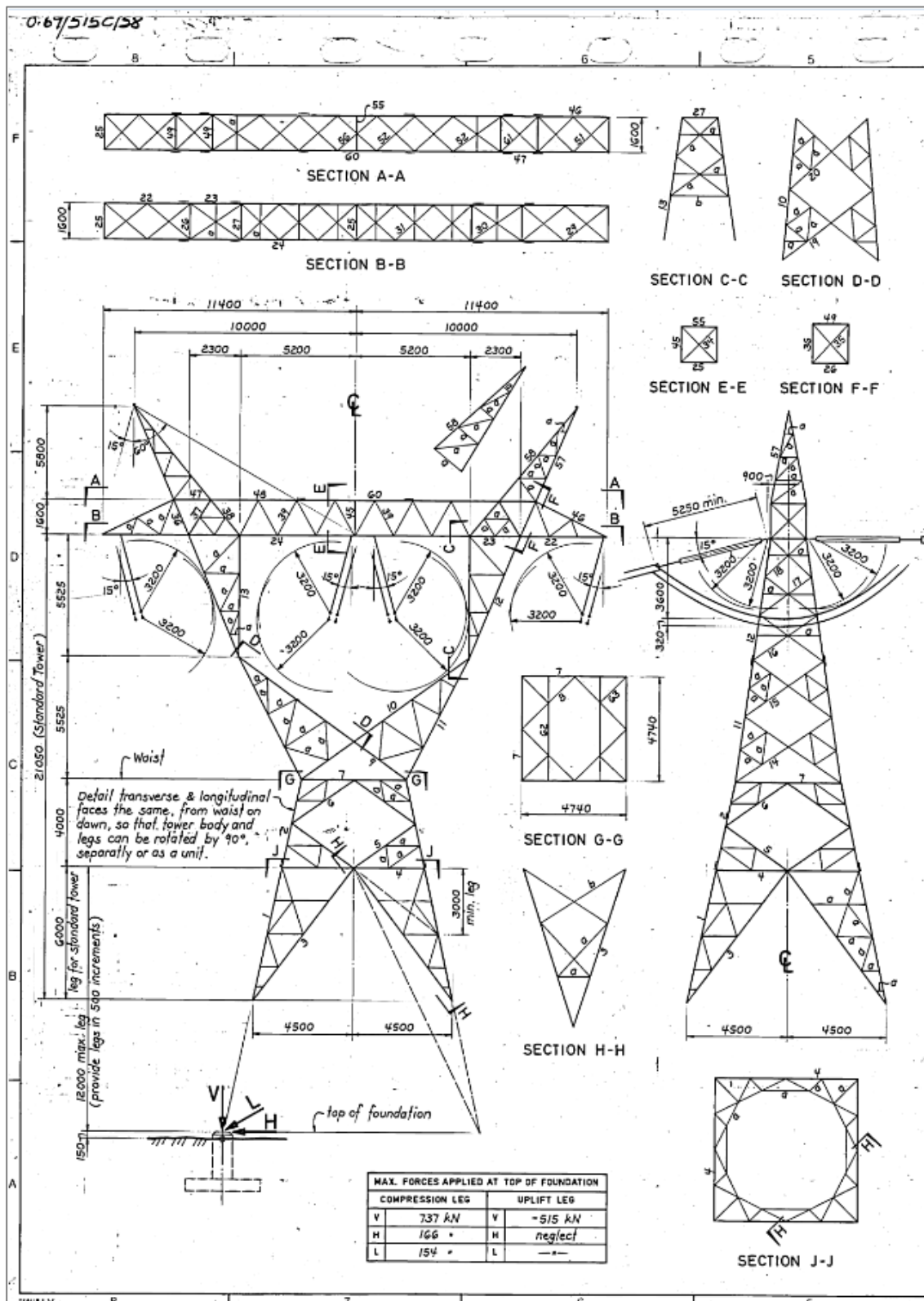
* NOMINAL	ACTUAL
17952	
18000	
19500	
21000	
22500	
24000	
25500	
27000	

Additional notes include:

- 21750 to 30750 in 1500 increments (nominal)
- 18000 to 27000 in 1500 increments (nominal)
- 25610 (21.0 m tower)
- 0.5L @ 150 = 15150
- 0.5L @ 150 = 24750
- 0 to 9000 in 1500 increments
- 22mm φ (1400 MPa) guy, max. allowable tension = 355.0 × 0.9 = 319.5 kN
- Conductor drop due to 15° vert. take-off angle
- tan<sup>-1</sup>(tan 15° cos 55°)
- tan<sup>-1</sup>(sin 15°)

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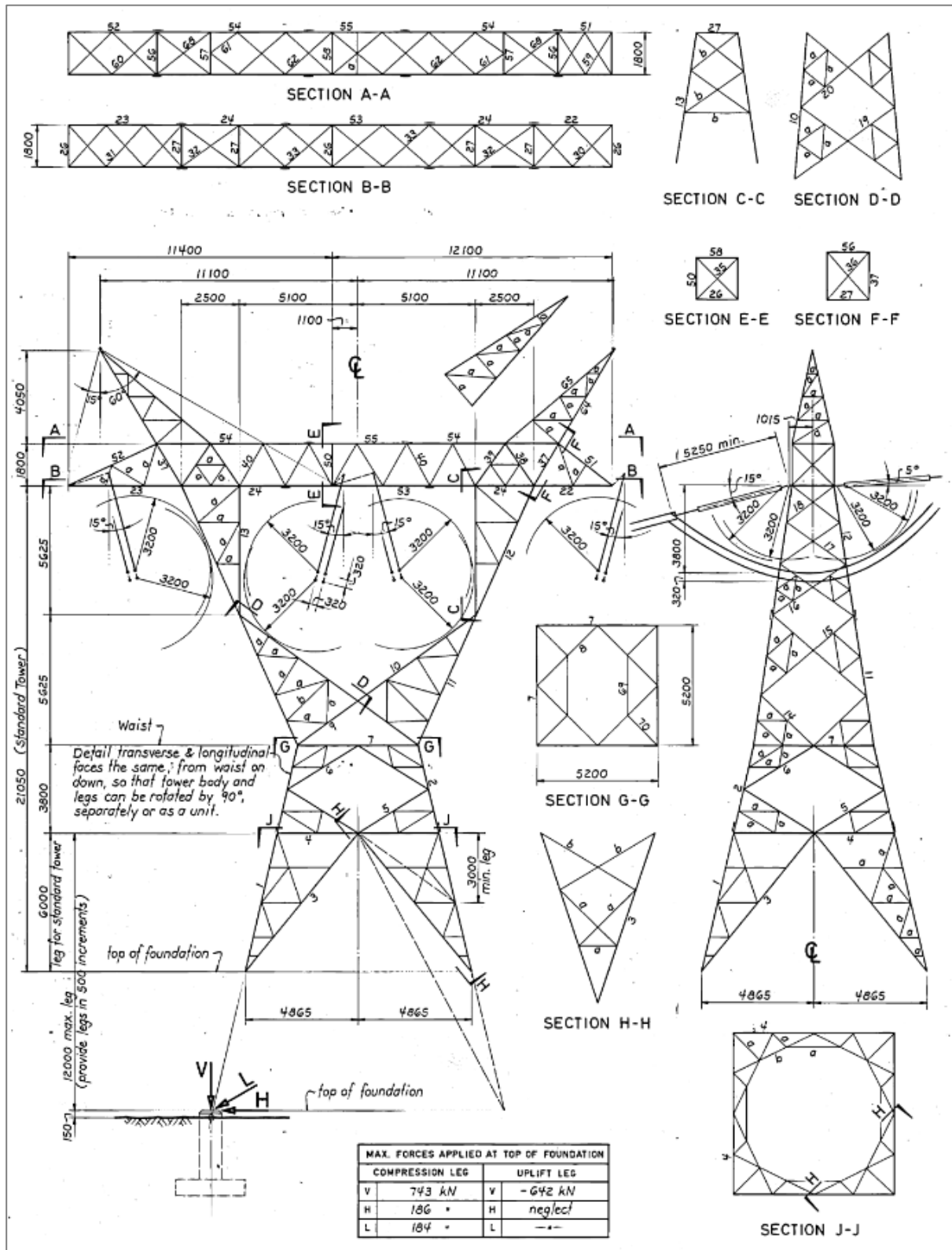
515 C Tower



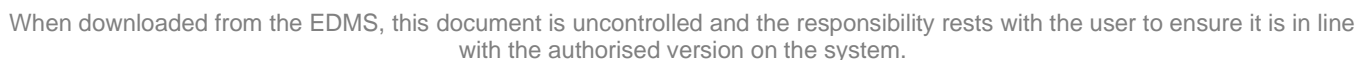
CONTROLLED DISCLOSURE



# 515D Tower



**CONTROLLED DISCLOSURE**



SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

SECTION E-E

SECTION F-F

SECTION G-G

SECTION H-H

SECTION J-J

SECTION K-K

SECTION L-L

NOTE: 3 METERS BODY EXTENSION TO BE USE WITH 515 B WIND AND WEIGHT SPANS ONLY.

MAX. FORCES APPLIED AT TOP OF FOUNDATION

COMPRESSION LEG		UPLIFT LEG	
V	530 kN	V	438 kN
H	21"	H	neglect
L	12"	L	

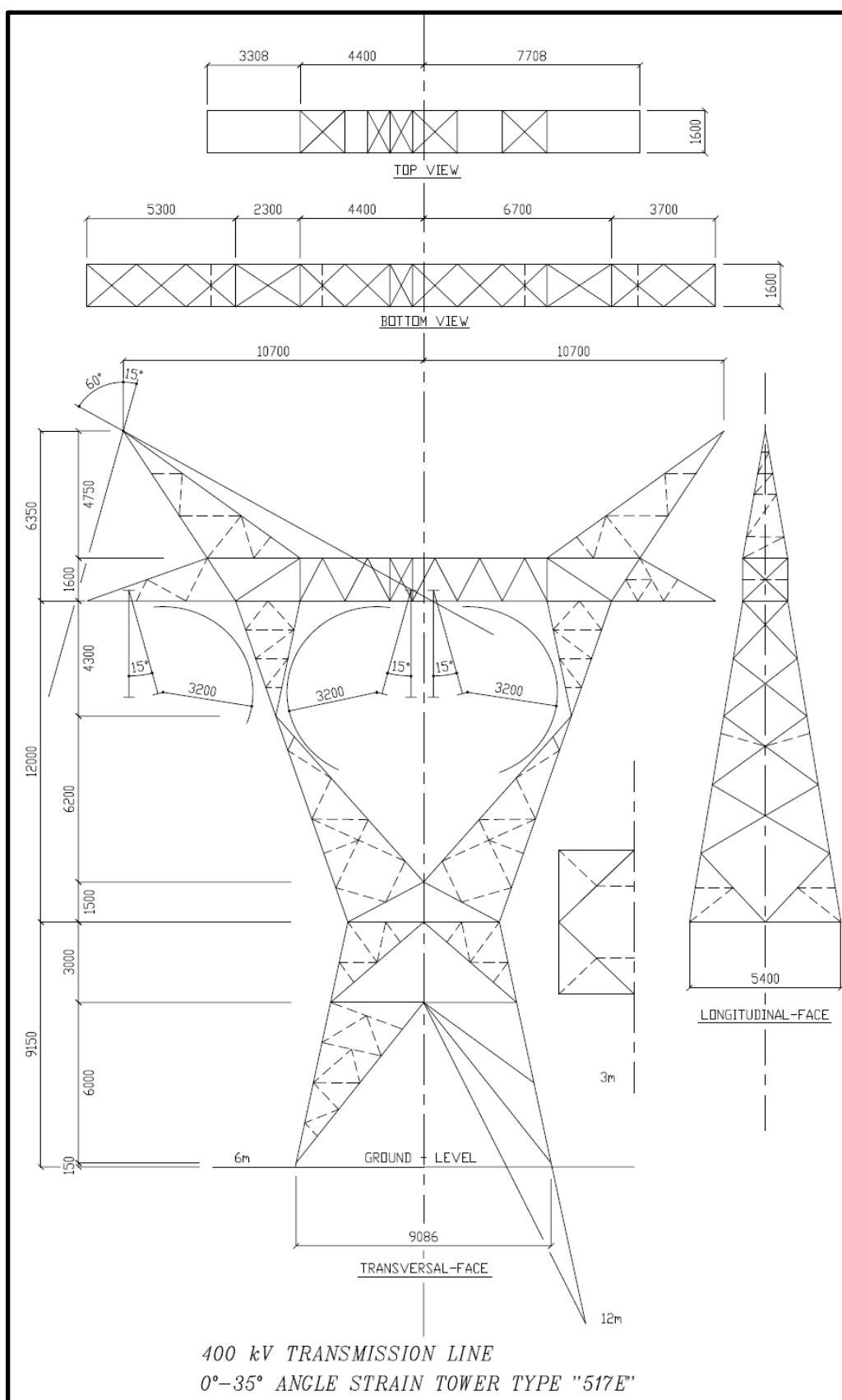
\*BRACING SHEARS

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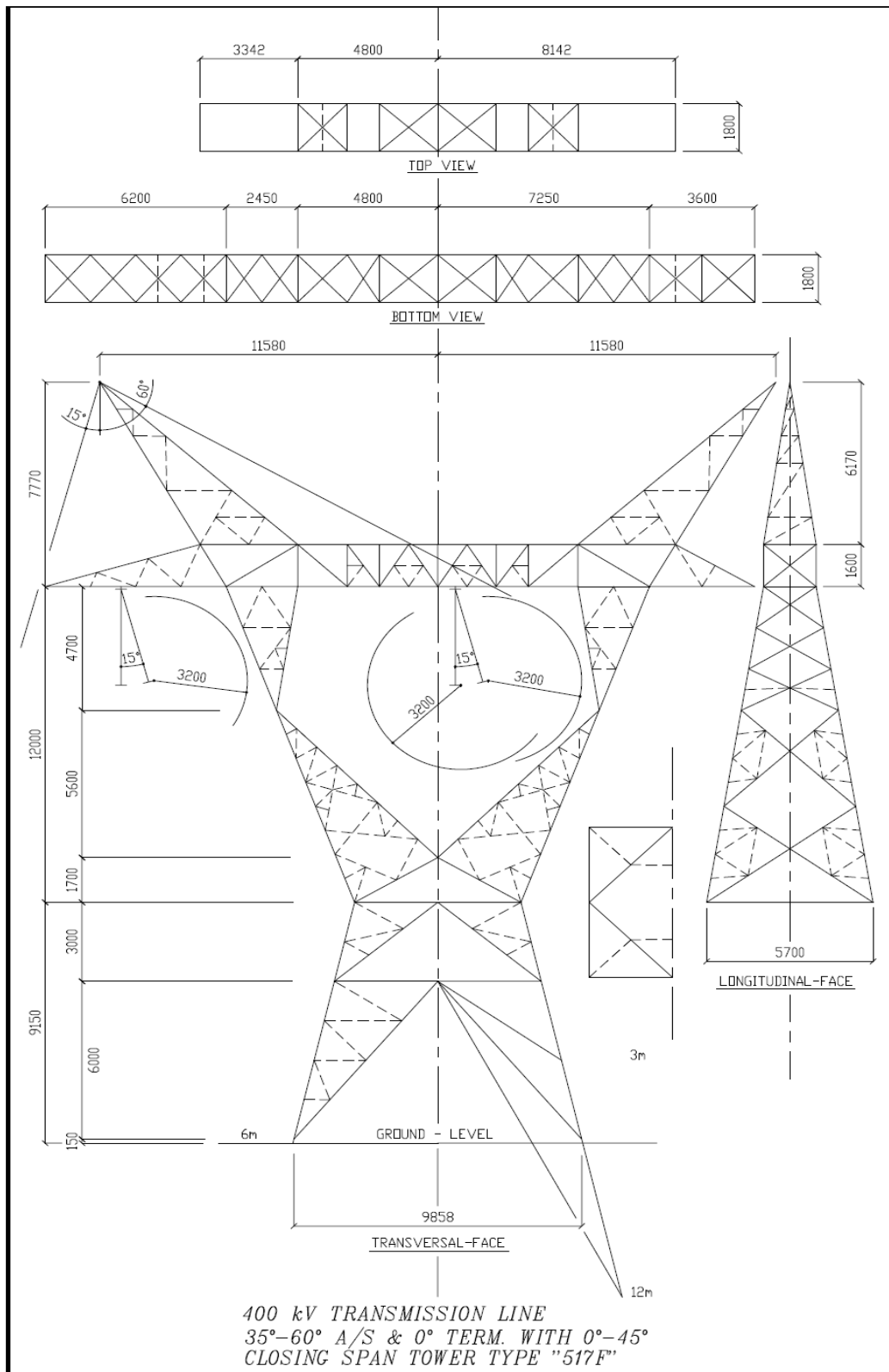
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16.80

11.10

7.712

510A

05/15/10

J. T. 1727

DRAWING RECORDS

28° SWING TYPE 510A

HYDRA PERSEUS N°3

Light Susp. Tower (28° SWING) TYPE 510A

1727

25-10-16

1-1

MINIMUM CLEARANCE FROM LOWEST CONDUCTOR TO EARTH 2.8 5.1m

FINAL CONDUCTOR SAG AT 112°F FOR DESIGN SPAN 57.00' 11.5m

6.0°

15°

2.97

25°

11.10

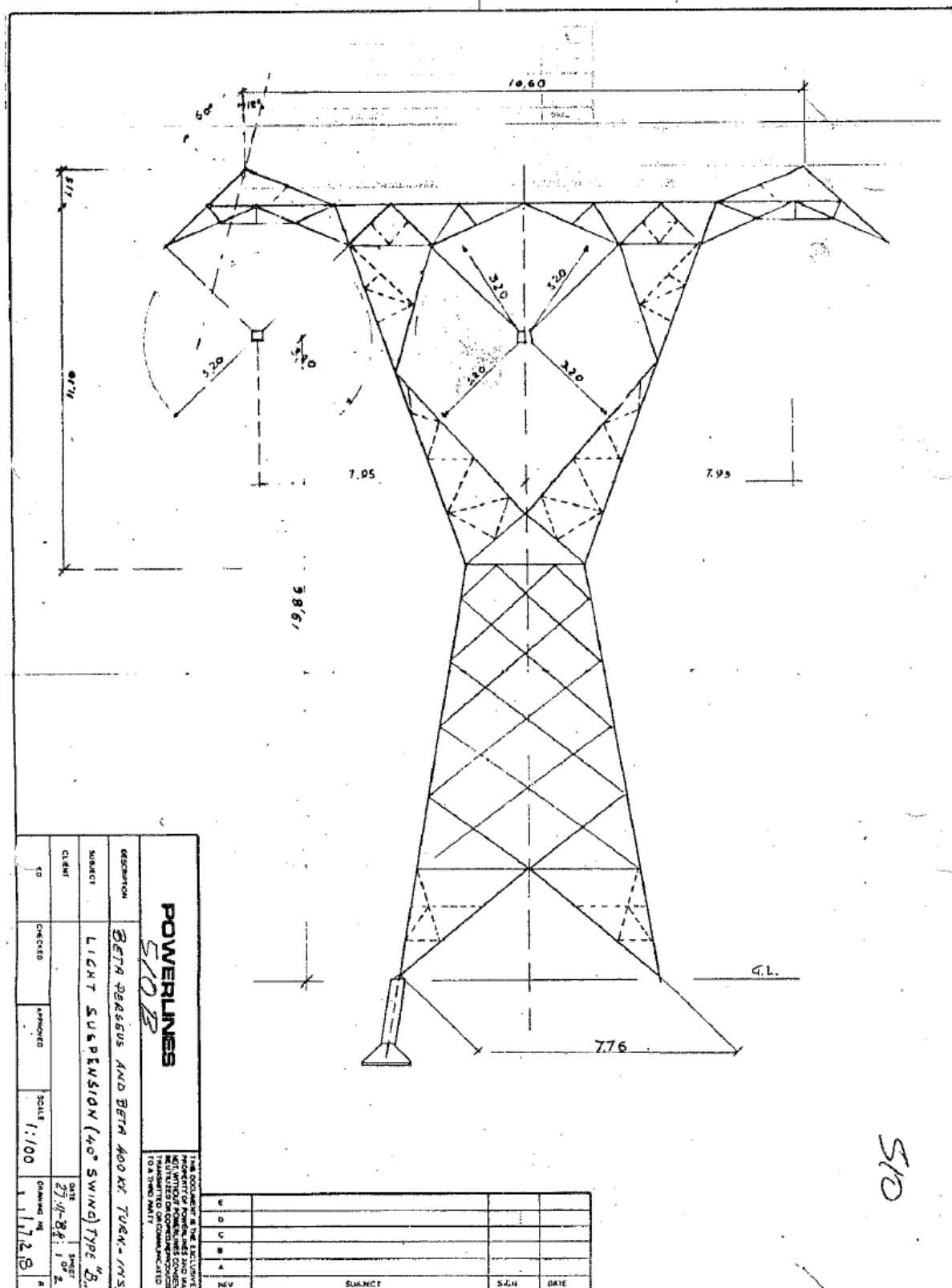
16.80

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510A

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510B

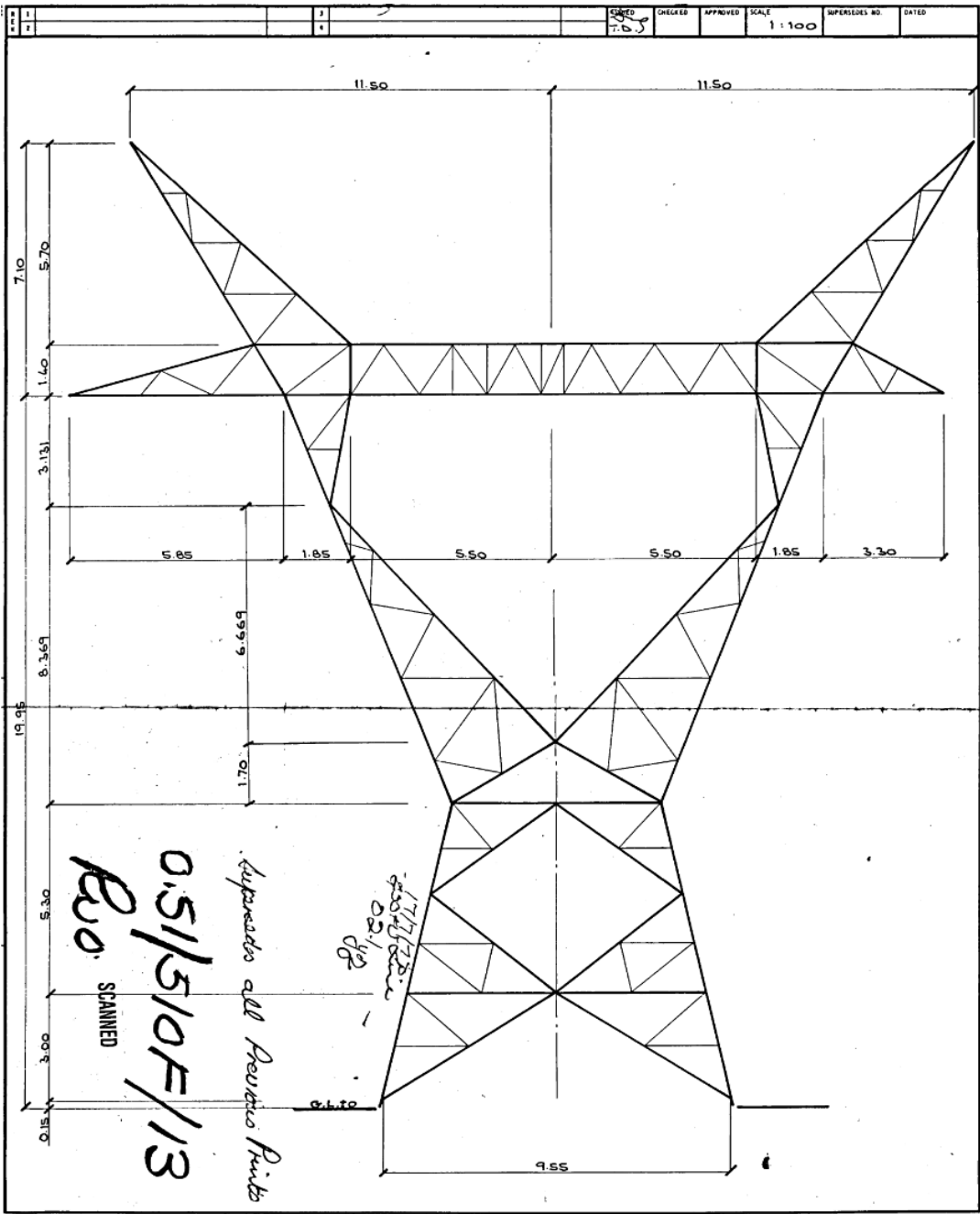


5/5

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510F



510F

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