Eskom	Scope of Work – Substation Engineering	Technology

Title: Upington 500MVA Transformer – Northern West Grid Scope of Work (Civils)

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Date: **02-06-2022**	Date: **02-06-2022**	Date: 02 - 06 - 2022

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1. INTRODUCTION

Upington MTS is a newly established substation in the Upington area forming part of the Northern West Grid.

This region of the North West is being developed to provide a source of solar power generation (via Eskom and various IPP's).

Upington MTS is a point of injection for the solar power being produced into the Transmission Network.

The purpose of this project is to install the 2nd 500MVA 400kV/132kV Transformer at Upington MTS.

The corresponding scope of work for Upington MTS shall comprise of the following:

400kV Yard:

- Extend 400kV Busbar
- Equip 400kV Diameter GB
- Install 500MVA 400kV/132kV Transformer 12
- Equip 400kV Transformer 12 Bay

132kV Yard:

- Extend 132kV Busbar
- Equip 132kV Transformer 12 Bay

2. REFERENCES

[1] (240-55922824) - Substation Layout Design Guideline

[2] (240-109644476) - Standard for Implementation of Substation Layouts for Transmission Substations

[3] South African Grid Code

[4] Occupational Health and Safety Act (OHS Act) 85 of 1993

[5] (32-1205) - Eskom Maintenance Management Policy

[6] (TST41-794) - Substation and Facility Maintenance

[7] (240-43008621) - Eskom Generation and Wires Operating policy

[8] (32-727) - Eskom Safety, Health, Environment and Quality policy

[9] (32-846) - Operating Regulations for High Voltage Systems

[10] (SANS 1200) – General Civil

[11] (IEEE 80) - Guide for Safety in AC Substation Grounding

[12] (240-606480018) - Terms of Reference for Design Review Teams presiding over Power Delivery Infrastructure Designs in Eskom

[13] (240-1001183119) - Standard for Fences in Eskom Transmission Stations

[14] (240-108982466) - Standard for HV Yard Stone in Eskom Substations

[15] (TST41-877) - Transmission Substations Design Earthing Standard

[16] (240-139282493) – Security Lighting for Eskom applications

[17] (240-83382076) – Standard for operational floodlighting in Substations

[18] (240-82172806) – Standard for Air conditioning in Transmission Substations

3. SCOPE OF WORK

Note that this document must be used in conjunction with the design report (**SOLP19P03-SE-D44)** Transformer 12 Plinth layout & details design drawing as well as all specifications, procedures, guidelines and standards mentioned therein. Work will be performed in a live substation, and therefore all necessary safety procedures and precautions must be adhered to.

The civil engineering scope of work for this project includes the following

3.1 TERRACE

A transformer plinth will be constructed on an existing terrace/ platform, there would not be any earthworks operations to take place

3.2 ACCESS ROAD

Access road is existing and fully functional

3.3 DRAINAGE & STORMWATER

Storm-water drainage has been constructed and fully active within the HV yard.

3.4 TRANSFORMER PLINTH AND SUPPORT FOUNDATIONS

- All reinforced concrete structural elements to be founded on ground bearing capacity of min 150KPa.
- Competency of founding material to be established on a geotechnical report or by a geotechnical engineer.
- Depth of a transformer plinth to be increased and/ or reinforcement be added if site conditions this necessary.
- Min cover to all reinforcement to be 50mm for the desired exposure conditions.
- Auxiliary transformer foundations to be at the same level as the top of concrete of a transformer plinth.
- All levels are relative to the top of concrete of a transformer plinth.

3.5 BUND WALLS

Bund walls must be built according to drawings **SOLP19P03-SE-D44**. It consists of the following:

- Bund walls to be constructed using clay bricks FBS to SANS 227 spec as per detail drawing 0.54/390SHT 46.
- The section of wall over concrete run-way to be built after a transformer is installed with straight brick joint.
- Brick-work to be stretcher bond with top to the brick on edge.
- Reinforce every course with brick force.

3.6 FIREWALLS

Firewalls should be constructed as per the issued Eskom standard drawings for firewalls in conjunction with 0.54/390 series.

3.7 FOUNDATIONS AND STEEL WORK

All new foundations and steel work should be constructed and erected as per the issued Eskom's standard drawings.

3.8 OIL DAM & PASSIVE FIRE PROTECTION

Connect new transformer plinth to the existing passive fire protection system

3.9 SECURITY & SAFETY FENCING

Installation of temporary safety fencing is required to separate the live equipment from the working areas

4. LIST OF LAYOUT DRAWINGS FOR UPINGTON SUBSTATION

No.	Drawing Title	Drawing Number
1	Transformer Plinth Layout & Details	SOLP19P03-SE-D44

5. AUTHORISATION

This document has been seen and accepted by:

Name	Designation
Zinhle Mkhize	Engineer Engineering – Civil
Andile Maneli	Middle Manager - Civil

6. REVISIONS

Date	Rev.	Compiler/s	Remarks
02 June 2022	0	Z Mkhize	First Issue

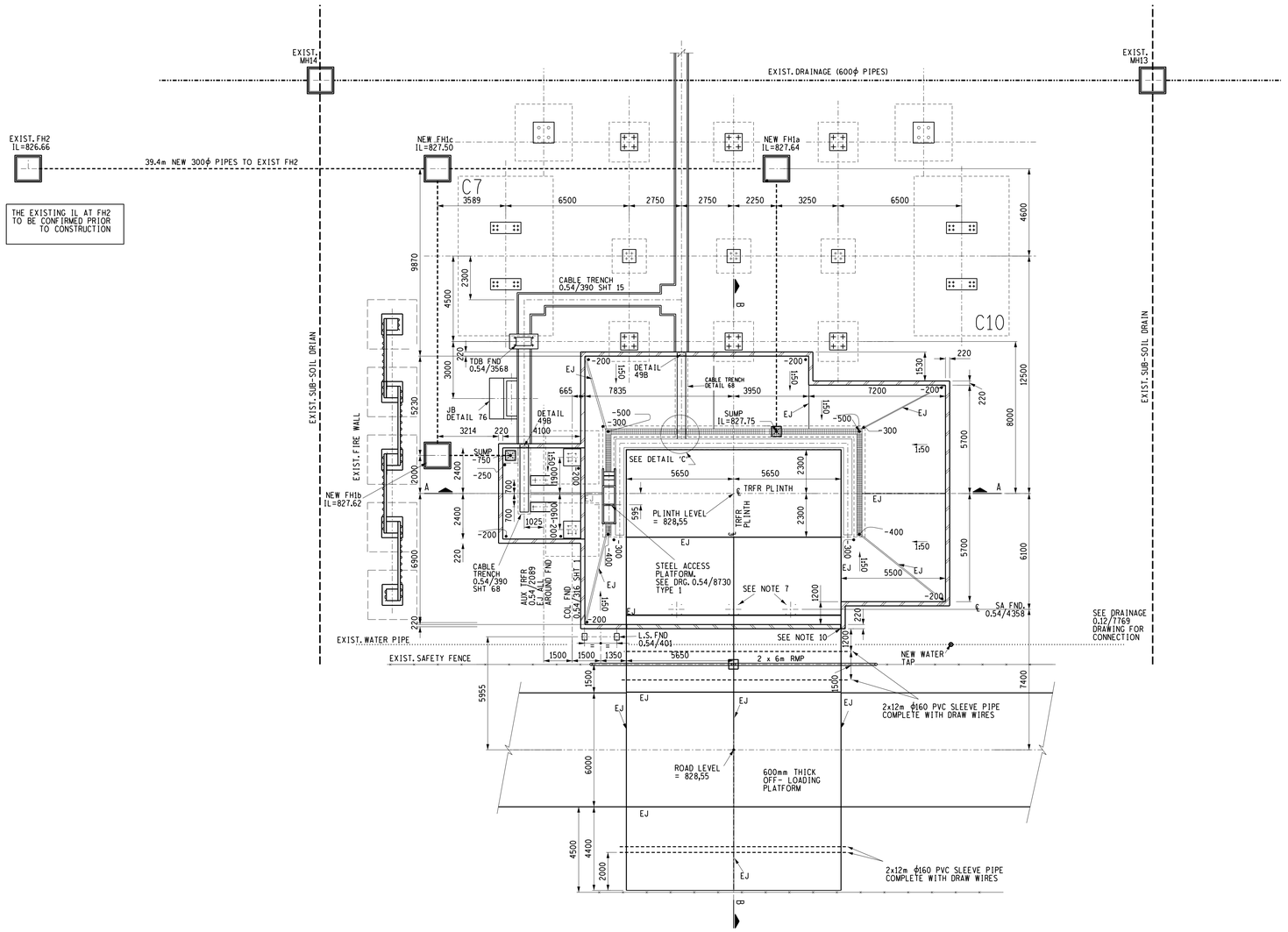
7. DEVELOPMENTAL TEAM

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

- Zinhle Mkhize

8. ACKNOWLEDGEMENTS

None



PLAN
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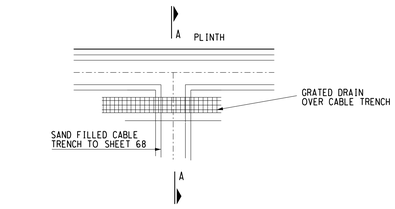
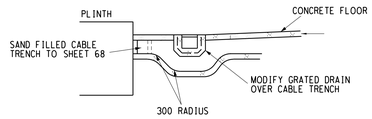
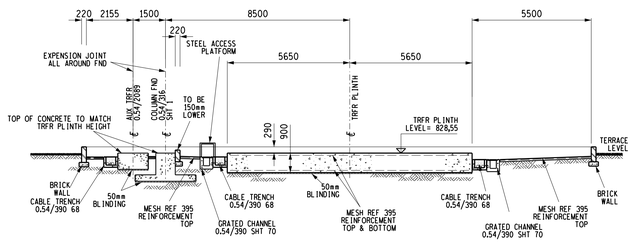


DETAIL 'C' PLAN



SECTION A-A



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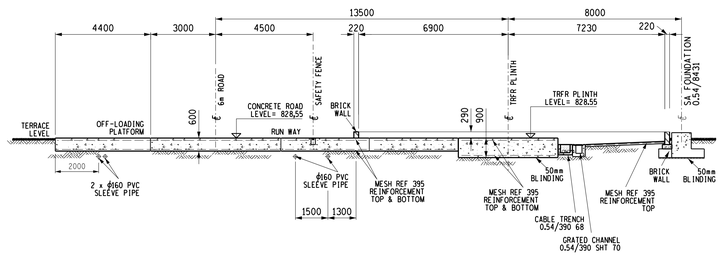

SECTION B-B
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FOUNDATION PLINTH TOLERANCES

TRANSFORMER PLINTH TOP FINAL LEVEL TO BE LEVEL WITHIN A TOLERANCE OF PLUS MINUS 3mm IN 3m IN ALL DIRECTIONS. LEVELS TO BE CONFIRMED WITHIN 5 DAYS AFTER CONSTRUCTION.

LEGEND :

- NEW BRICK WALL SEE DRG 0.54/390 SHT 46
- CABLE TRENCH ENTRY DRG 0.54/390 SHT 49b
- SAND FILLED CABLE TRENCH INSIDE TRFR BUND EREA DRG 0.54/390 SHT 68 INSIDE BUND AREA
- SINGLE CABLE TRENCH 0./390 SHT 15
- GRATED CHANNEL SEE DRG 0.54/390 SHT 70 GRATED CHANNEL SUMP DRG 0.54/390 DHT 71
- MANHOLE SEE DRG 0.54/390 SHT 1
- ϕ300 CLASS 50D SPIGOT AND SOCKET PIPES WITH NEOPRENE RINGS LAID ON CLASS B BEDDING
- SUMP SEE DRG 0.54/390 SHT 69 (AUX. TRFR)
- SAFETY FENCE DETAILS 0.54/4963 SHT 1-5
- SUB-SOIL DRAIN x1, x2 OR x3 ϕ160mm uPVC SLOTTED PIPES WITH FALL 1:100min. SEE DRG 0.54/390 12B
- DRAINAGE SYSTEM: VARIOUS DIAMETER CONCRETE PIPES (IJ-SC) TYPE CLASS 50D ON CLASS 'B' BEDDING
- FP FIRE PROTECTION MANHOLE
- MH STORMWATER MANHOLE

NOTES:

1. CONSTRUCTION WORK TO COMPLY WITH SANS 1200
2. CONCRETE STRENGHT AT 28 DAYS/STONE
   SIZE: BLINDING = 15/19
   FOUNDATION = 25/19
   CONCRETE CASED IN FOUNDATION: SLUMP VALUE 75mm (TOLERANCE ∓25mm)
3. MIN. CONCRETE COVER TO REINFORCEMENT = 50 mm.
4. FOUNDATIONS TO FOUND ON GROUND BEARING CAPACITY OF MIN. 150kPA. IN ALL CASES, COMPETENCY OF FOUNDING MATERIAL TO BE ESTABLISHED BY A GEOTECHNICAL ENG.
   DEPTH OF PLINTH TO BE INCREASED AND/OR REINFORCEMENT ADDED IF SITE CONDITIONS MAKE THIS NECESSARY
5. ALL TOP EDGES OF CONCRETE TO HAVE 20x20 CHAMFERS
6. FOR CIVIL CONSTRUCTION DETAILS SEE 0.54/390
7. NEW H.D. BOLTS SUPPLIED BY CIVIL CONTRACTOR COMPLETE WITH NUTS AND WASHERS TO BE HOT DIPPED GALVANIZED TO SABS 763 CHEMICAL ANCHORS OF 132kV SA TO BE FISHER RG M30- 4 OFF FOR EACH FND. BOLTS TO BE FIXED WITH RESIN ANCHOR CAPSULES, TO SUPPLIER SPECIFICATIONS (BOLTS NOT CASTED INTO RUNWAY)
8. H.D BOLTS TO BE SUPPLIED BY CIVIL CONTRACTOR COMPLETE WITH NUTS AND WASHERS.
9. STEEL TEMPLATE TO BE USED FOR SETTING H.D. BOLTS
10. BUND WALLS TO BE CONSTRUCTED WITH CLAY BRICKS CLASS FBS TO SABS 227 SPECIFICATION AS PER DETAIL ON DRG 0.54/390 SHT 46. THE SECTION OF WALL OVER CONCRETE RUNWAY TO BE BUILT AFTER TRFR IS INSTALLED WITH STRAIGHT BRICK JOINTS. BRICKWORK TO BE STRETCHER BOND WITH TOP TO BE BRICK ON EDGE. REINFORCE EVERY COURSE WITH BRICK FORCE.
11. AUX. TRFR FOUNDATIONS TO BE AT SAME LEVEL AS TOP OF CONC. OF TRANSFORMER PLINTH. ALL LEVELS ARE RELATIVE TO TOP OF TRANSFORMER PLINTH.
10. FOR EXPANSION JOINTS BETWEEN FLOOR/BUNDWALL AND FLOOR/GUTTER SEE DRG. 0.54/390 SHT 46 & 40.
11. CONCRETE FINISH : TOP OF FOUNDATION - WOODFLOAT FINISH
    : SIDES - SMOOTH OFF SHUTTER FINISH
12. ALL LEVELS AND DIMENSIONS TO BE CHECKED ON SITE.
13. ALL GRIDS AND ANGLES TO BE HOT DIPPED GALVANISED.
15. CENTER LINES OF PLINTH TO BE PERMANENTLY MARKED BY CONTRACTOR. FOR PLINTH POSITION TO BE CONFIRM ON FOUNDATION LAYOUT
16. SEE FND AND TRENCH LAYOUT FOR PLINTH POSITION.

					0.12/7769	DRAINAGE LAYOUT
					SE-D8	400kV TRFR 12 BAY
					SE-D16	FND & TRENCH
0	FIRST ISSUE				SOLP19P03- REFERENCE DRAWINGS	
REV	REVISION DESCRIPTION	DRAWN	CHKD	AUTH	DATE	

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Eskom

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UPINGTON MTS

500MVA 400/132/22kV TRANSFORMER 12
PLINTH DETAILS

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DRAWING NUMBER	SHEET NUMBER	REVISION
SOLP19P03-SE-D44	0	0

SIZE GROOTTE A0L