

	INPUT TO INTEGRATED TELECOMMUNICATION DESIGN	ETFM 1846
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Sub **Eskom Telecommunications** PROJECT **PRJ11229**
Division NUMBER:

Title: **PROJECT PLANNING BOOK FOR
PROJECT NAME: Philippi SS Strengthening
Site Name(s): Philippi SS, Kanonkop RS,
Bellville Office, Acacia SS, National Control,
Duvha Control.**

COMPILED BY	FUNCTIONAL RESP.	AUTHORISED BY
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TRC TICKSHEET

	Telecommunication Technical Review Committee Checklist	Template Identifier	240-65692689
		Document Identifier	xxx-xxx
		Document Revision	x.x
		Effective Date	01-Jul-16
		Eskom Telecommunications	
Project Number	Project Name	Project Revision	Date
PRJ11229	PHILIPPI SS STRENGTHENING	0	20.01.2020
1	<u>Financial</u>	<input checked="" type="checkbox"/> <input type="checkbox"/> NA	
1.1	Capex Form (240-139189078 Project and Turnkey Supporting Templates)	√	
1.2	Firm Quotation (240-139189078 Project and Turnkey Supporting Templates)	√	
1.3	ETGP0635 - Revenue Calculation Sheet or Protected Income	√	
1.4	ETFM1874 - Health and Safety Costing (to be used with ETFM 1723 only)	n/a	
2	<u>Detailed Design</u>		
2.1	ETFM1846 - Project Planning Book	√	
3	<u>Safety & Health</u>		
3.1	240-101716432 - Signed Health and Safety Requirements Checklist	√	
4	<u>Environmental</u>		
4.1	TRMFM0068 - Project Screening Form	n/a	
4.2	TRMFM0095 - Contractor Pre Assessment Form	n/a	
4.3	32-726- SHE Requirements for commercial purposes	n/a	
4.4	240-77471969 - Annexure C2 SHE Tender Evaluation Scoring Card - Completed (Low Risk)	n/a	
4.5	Applicable EIA/BA documents (Expansion / existing projects)	n/a	
4.6	ETPN1490 - Environmental Principles for EIA	n/a	
5	<u>Quality</u>		
5.1	240-98255445 - Approved Project Planning Quality Checksheet	√	
6	<u>Procurement</u>		
6.1	Sole Supplier Motivations (where required)	n/a	
6.2	240-77471651 - Annexure C1 SHE Tender Evaluation Scoring Card - Completed (High to Medium Risk)	n/a	
6.3	240-77471969 - Annexure C2 SHE Tender Evaluation Scoring Card - Completed (Low Risk)	n/a	
7	<u>Completion</u>		
7.1	Acceptance Test Procedures		
7.2	Commissioning Sheets		
7.3	240-110412152 - Quality Assurance sheet		
7.4	Completion Certificate (ETFM0715, ETFM0717)	n/a	
Region	Registered Person	Signature	Date
Western Cape	NN Ngalonkulu		20.01.2020
TRC Regional	Chairperson	Signature	Date
Western Cape	M. Jattiem		20.01.2020

SECTION 1: INTRODUCTION

1.1– Customer Request

Power Delivery Engineering (Transmission) requested Telecommunication services for Philippi SS. The circuits requested are listed in the URS's rev1 (dated 2018.09.10) below:

	TECHNOLOGY GROUP POWER DELIVERY ENGINEERING TELECOMMUNICATIONS USER REQUIRMENTS	Unique Identifier	
		Document Type	Template
		Template Revision	0
		Effective Date	26 June 2013
		Record Identifier	
		Record revision	
		Group Technology (Engineering)	

PROJECT INFORMATION

PROJECT NAME	City of Cape Town Strengthening	GRID:	Western
SUBSTATION NAME	Philippi	OPERATING UNIT:	Tx
GPS CO ORDINATES	-33.98760, 18.53714	WBS Nr	
PROJECT MANAGER	Charles Petje	PHONE NUMBER	083 444 9892
PROJECT ENGINEER	Lungie Nogela	PHONE NUMBER	011 871 2634
REQUIRED SERVICE DATE	To be confirmed by PM		
REQUEST DATE	10 Sep 2018		

TELECOMMUNICATIONS USER REQUIREMENTS

1. TELEPROTECTION

Line	Line Voltage	Equip	OPGW	Interface	Class of Service	Bd rate	Qty
		NSD570	Y/N	X.21	Silver	64kb/s	
		NSD570	Y/N	X.21	Silver	64kb/s	

2. SCADA

Equipment	Destination	Interface	Class of Service	Bd rate	Qty
ERTU	National Control Centre	RS 422/X.21	Platinum +	9600bd	1
ERTU	STABNAC	RS 422/X.21	Platinum +	9600bd	1
ERTU	Regional Control Centre	RS 422/X.21	Silver	9600bd	

3. OTHER REQUIREMENTS

Service required	Destination	Interface	Class of Service	Bd rate	Qty
1. Disturbance Recorder	National Control	Ethernet			1
2. TWS	National Control	Ethernet			1
3. Quality of Supply	National Control	RS 232	Silver	9600bd	
4. ION Meter (QOS)	National Control	Ethernet			3
5. EADS	National Control	Ethernet			1
6. PMU	National Control	Ethernet			1
7. IT LAN Points					

NB: A new control room is going to be built. The existing control room will no longer be utilized.

4. SWITCHED VOICE SERVICES

Service	Destination	Location	Qty
PAX 1	Local	Control Room	1
PAX 2	Local	Control Room	1
PAX 3	Local	Control Room	1
PAX 4	EA Office	Control Room	1
Direct Line	National Control	Control Room	1
Direct Line	STABNAC	Control Room	1
Hot Line	Regional	Control Room	

5. COST ALLOCATION

Capital Cost	To Project Manager
Monthly rental Cost	To the manager responsible for paying the account

REVISION:	1	DATE:	2018/09/10	Initial Request
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REQUESTER:	Lungie Nogela	DATE:	2018/09/10
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1.2 – Introduction

The City of Cape Town (CoCT) Strengthening Report (GP_08/70) of 2008 highlighted the problems experienced in the Peninsula Area, especially the supply of power to the CoCT's network. The CoCT supply is highly dependent on the availability of Philippi Substation. Any work being carried out at this substation will place a huge risk on the existing supply. Philippi Substation is located in the Cape Peninsula and supplies the South Peninsula, Southern Suburbs and Cape Flats covering suburbs such as Constantia, Retreat, Steenberg, Clovelly, Muizenberg, Grassy Park, Gugulethu, Landsdowne, Mitchell's Plain, Pellican Park and Philippi. The substation is approximately 4km north-west of the suburb of Philippi. PDE is upgrading the Philippi SS, and a new GIS station will be built next to the existing station. PDE requested Telecomms services for new Philippi GIS Substation. The procurement strategy for this project is of a turnkey nature (the contractor will procure, build and commission the station for ESKOM). The existing power line to Acacia SS (with fibre optic cable) will be swung over to the new GIS control room.

1.3 – High Level Scope of Works

❖ **Philippi SS**

Procure, install and commission the Cisco router, ABB Fox 615, OTN link between Philippi SS and Acacia SS and a 1+1 SD STM1 link between Philippi SS and Kanonkop RS. Configure the required SCADA circuits.

❖ **Kanonkop RS**

Procure, install and commission the 1+1 SD STM1 link between Philippi SS and Kanonkop RS. Patch the STM1 traffic to the 1410 ADM at Kanonkop RS.

❖ **Acacia SS**

Procure, install and commission the OTN link between Philippi SS and Acacia SS. Patch E1 links between OTN and Fox 615, to provide access for Philippi SS SCADA circuits.

❖ **Control Centres (Bellville, National and Duvha)**

Commission and test the SCADA circuits to from Philippi GIS station to the various control centres. Commission and test the direct lines and hotlines.

1.4 – Stakeholders & Contact details

Responsibility	Name	Cell-phone	Office
Project Engineer	Fefe Ngalonkulu	083 940 4010	021 980 3288
O&FS Cape Town	Deon Seale	072 391 9510	021 980 3055
Project Manager (ET)	Marcellus Adonis	079 418 5567	011 871 2484
NMC	Wicus van Aswegen	082 313 0491	043 703 2615
PDE KAM	Mmushi Langa	083 695 4629	011 800 4335
TRC Chair	Moeried Jattiem	072 418 8085	021 980 3484

1.5 – Abbreviations

NMC	Network Management Centre
O&FS	Operational and Field Services
PM	Project Management
MSAP	Multiple-services Access Platform
DC	Direct Current
FOP	Fibre Optic Panel
ATP	Acceptance Test Procedures
ETSF	Eskom Telecommunications Strategy Framework
DCN	Data Communication Network
X-21	Interface specification for connection Tele-Protection circuits
	Fox Multiplexer
ABB	ASEA Brown Boveri (manufacturer and supplier of the Fox 615 multiplexer)
OPEX	Operating Expenditure
IP/MPLS	Internet Protocol/Multiprotocol Label Switching
OT	Operational Technology
ET	Eskom Telecommunications
Tx	Eskom Transmission
Dx	Eskom Distribution
SCADA	Supervisory, Control and Data Acquisition
ADM	Add Drop Multiplexer
SLA	Service Level Agreement
STABNAC	Standby National Control Centre
SHEQ	Safety, Health, Environmental and Quality
CR	Control Room
KAM	Key Accounts Manager
MTS	Main Transmission Substation
TRC	Technical Review Committee
WCOU	Western Cape Operating Unit
SS	Substation
CoCT	City of Cape Town
PDE	Power Delivery Engineering
SD	Space Diversity
GIS	Gas Insulated Switchgear (Substation)
OTN	Optical Transport Network
SM	Single Mode
IDU	Indoor Unit
ODU	Outdoor Unit

1.6 – Site Access (Directions, Co-ordinates)

Find site co-ordinates below: These sites can easily be reached with a sedan.

Philippi SS	33°59'20.8"S 18°32'11.8"E
Acacia SS	33°53'2.4"S 18°32'14.3"E
Simmerpan NCC	26°13'31"S 28°09'36"E
Duvha STABNAC	25°57'47.3"S 29°20'6.0"E
Bellville Office	33°54'7.8"S 18°37'56.5"E

SECTION 2: FINANCIALS

There are no new circuits allocated for this project. The current revenue for Philippi SS will offset all circuit charges for Philippi GIS SS.

The CAPEX sheets only reflect the labour rates, and are expected to increase as per the SAP rates in each financial year:

- ❖ Labour component during ERA (commissioning at Philippi GIS SS).
- ❖ The project planning and design charges.
- ❖ The project management fees for Telecomms portion of this project will be absorbed within TPD (due to the integration of Project Management into a single group).
- ❖ Additional labour components for moving the other telecommunication equipment will be charged ad-hoc via the WBS number.

The total cost of materials and the installation costs will be borne by the appointed Group Capital EPC contractor.

Department	Labour Cost	Travelling Cost
O&FS Labour	R67 237.00	R7 314.00
NMC Labour	R19 353.00	R0.00
Planning & Design Labour	R40 541.00	R1 590.00

SECTION 3: DETAIL DESIGN

3.1 – Design Methodology

Based on the Telecommunications User requirements document submitted by PDE, this design meets the current design standards

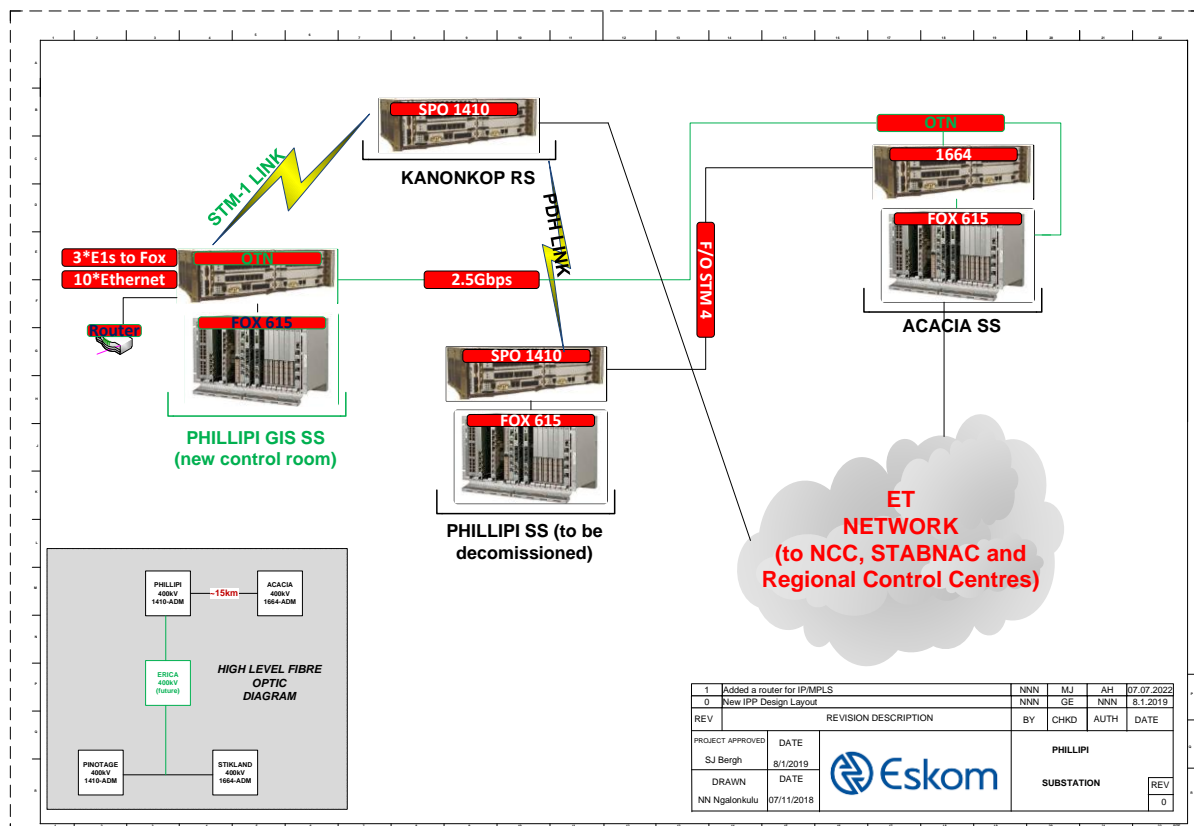
- Fox 615 Multiplexer **“240-70732272 - MSAP Design Guide”**
- Telecoms Transport Network Design Standard **“240-70783066”**
- Ceragon Split Unit Microwave Access Radio Design Guide **“240-170000675”**
- Standby Power Systems Topology and Autonomy for Eskom Site **“240-118870219”**
- Telecommunications Network Architecture Standard **“240-76666863”**
- OTN Design guide **“240-150755516”**

3.2 – Link Budgets

The link designs for the OTN will be the responsibility of the service provider. Eskom has a contract with Altron_Nexus to plan, design and deploy the Next Generation OTN network. The design of the OTN network is done by the supplier - Altron_Nexus, in consultation with Telecommunications to ensure seamless network integration to existing OTN network. The redundant path out of Philippi (for platinum+ services) will be via a Ceragon radio, with STM1 capacity. The path budget will be obtained from Mustek.

3.3 – Network Considerations

Philippi SS currently has an ADM 1410 (STM4 link to Acacia 400kV) and a PDH radio link to Kanonkop). The diagram below shows a high level integration diagram to provide services at Philippi GIS Substation, based on the URS. The new GIS control room will be built along the old control room; the Telecomms Tower will be left in the current position.



The OTN is the transport equipment proposed at Philippi GIS SS. A second route will be made available via the SDH radio to Kanonkop RS. The move from the old control room to the new control room at Philippi SS will require a careful planning from both Transmission and Telecomms, as some of the milestones might affect the regional ET OTN network rollout. The full OTN design will be done and concluded by Altron.

3.4 – Circuit Information Sheet

The list of circuits working on the current Philippi SS is listed below. The end state will be 1 substation working, therefore in consultation with Tx, a plan should be devised where the SCADA circuits shall be merged. The same circuit numbers will be re-used.

Circuit	Circuit Number	End Site
X-25	WTDD168A	IP services
SCADA Regional	DWCK002S	Bellville Control
Out of area extension	TWVT001A	Acacia 400kV
Out of area extension	TWVT002A	Acacia 400kV
Out of area extension	TWVT003A	Acacia 400kV
Out of area extension	TWVT013A	Acacia 400kV
Out of area extension	DWVT043A	Acacia 400kV
National Control	NCCCK050A	Simmerpan
Standby Control	SCCK050A	Duvha
Teleprotection	TWPI005A	Acacia 400kV
Teleprotection	TWPI007A	Acacia 400kV

3.5 – DC Equipment Loading

The DC supply at the substations is the responsibility of Transmission; the Site Owner will ensure the availability of the 50V (from Charger 1 & 2) for the Telecommunications equipment. The total current drawn from the equipment will be obtained from the respective suppliers, to ensure that the DC capacity at the new substation meets the standby requirements for a transmission station.

3.6 – Assets Capitalization (Eskom O&FS)

It is estimated that the migration of the equipment from the old control to the GIS control room will run over 5 years. This project will have the assets recovered in synch with the migration plan of the transmission equipment. The project plan has not been shared with Telecomms yet, it is envisaged that for a period both substations will be operational concurrently.

SECTION 4: SCOPE OF WORK

4.1 – GENERAL

- Ensure compliance to all standards, specifications and procedures listed in this document.
- Refer to the equipment supplier documentation for product specific setup, installation & commissioning details.
- Ensure all equipment is pre-commissioned and tested prior to installation on site.
- This scope of work is not listed in sequence of its implementation.
- On project completion, ensure that all changes in this Project Documentation are **RED** lined and returned to PM.
- The work as detailed in this SOW will be considered completed once the project's Completion Certificate is signed.
- The Quality Assurance person reserves the right to instruct a job to be re-done if he feels that the quality of workmanship is of an unsatisfactory nature or that there was a total disregard of standards.
- Label all telecommunication equipment, DC circuit breakers, cables and Krone Blocks correctly at both ends.
- Update equipment details of the sites on WORKPLACE and ASSET REGISTER on SAP.

4.2 – ROLE CLARIFICATION

Philippi GIS SS - Telecommunication Role clarification		
Planning and Design	Comments	
Detail design submission to relevant DRTs, (TDRT, Lines DRT, Substation DRT)	EPC	Design, incl. SOW & BOQ signed off by Eskom
Install a duct fibre optic cable (24 core single mode) between old Philippi SS to the Philippi GIS SS control room (ODF to ODF)	EPC	Design, incl. SOW & BOQ signed off by Eskom
DC supply (50V) at Philippi GIS SS (dual system)	EPC	Design, incl. SOW & BOQ
Transport equipment (as per BOQ obtained from the supplier)	EPC	Design, incl. SOW & BOQ
Multiplexor equipment (as per BOQ obtained from the supplier)	EPC	Design, incl. SOW & BOQ
IP/MPLS equipment (as per BOQ obtained from the supplier)	EPC	Design, incl. SOW & BOQ
Integration to existing ET network	ET	Design, incl. SOW & BOQ
Frequency application to ICASA (during ERA)	ET	Frequency management
Tower structural analysis, design and strengthen tower	EPC	Design, incl. SOW & BOQ
Standards and design guides documentation	ET	Electronic copies of applicable standards
Implementation		
Network circuit connections	ET	
Commissioning	ET	
QA (pre-commissioning)	ET	
Provide signed-off equipment ATPs for all equipment installations (cold commissioning results)	EPC	
As built documentation and drawings of the station	EPC	
Tower work (if applicable, depending on results of the analysis)	EPC	
Procure equipment as per ET BOQs (OTN, Multiplexor equipment, radio, routers)	EPC	
Installation of ET equipment within panels (OTN, Multiplexor, ADM, IP/MPLS)	EPC	
Control room reticulation/wiring (for telephones, security, and IT)	EPC	
SHEQS	EPC	
Optic fibre Testing	EPC	
Witness fibre testing with contractor	ET	
Moving of other equipment from old to new control room.	ET	

4.3 – PROJECT MANAGEMENT (TX)

NB.: ET need to commission the equipment 1 month prior to energizing the substation.

- Organise outages with NMC for the fibre optic link cut over.
- Manage the SHEQ requirements for the entire project.
- Obtain all signed ATPs of the telecommunications equipment's installations.
- Arrange a Pre-audit of the installed Telecommunication equipment before the site is officially accepted and QA'd.
- Perform a QA for the complete installation of this project, with Telecomms Engineering and O&FS.
- Sign off the commissioning sheets and completion certificates.
- Obtain a list of assets (equipment installed) with their serial numbers, for input in SAP asset register; use the ETFM 0859_Asset Identification Form as a guide.
- Liaise with ET stakeholders (service manager) for any services that require ET involvement for this project.
- Regular updates on the status of the project, between ET and Transmission to determine the impact of the OTN rollout in Western Cape and the Philippi GIS SS project.
- Assist Transmission contractor with DRT submissions and presentations.
- Issue a request for frequency application to Telecomms prior to Telecomms DRT submission.
- Issue workplace tasks for NMC to have the telecomms equipment (OTN, CGR router, and FOX615) commissioned onto the network.
- Provide a task in workplace to NMC to have all tributaries and circuits connected and configured (Fox 615 & OTN) as per Circuit Information Sheet (3.4).
- Manage ET resources during execution of this project (commissioning of the site).
- Sign off the commissioning sheets and completion certificates.
- Receive a list of assets (equipment installed) with their serial numbers, for input in SAP asset register; use the ETFM 0859_Asset Identification Form as a guide.
- Pre-audit the installation of the Telecommunication equipment before the site is QA'd, in conjunction with Engineering and O&FS.
- Liaise with the O&FS ET representative for commissioning of services requested as per Circuit Information Sheet.

4.4 – FIBRE OPTIC INSTALLATION (EPC CONTRACTOR)

The installation, termination and testing of the single mode fibre optic cables will be done as per the standards:

- Design, procure and install a duct fibre optic cable (Single Mode) linking the two control rooms (existing control room and GIS control room). Terminate the cable in patch panels (ODF – ODF).
- The testing of fibre and recording the test results based on Technology Document 240-70732888 - Fibre Optic cable system ATP.

4.5 – EQUIPMENT INSTALLATION (TRANSMISSION CONTRACTOR)

The installation of the telecommunications equipment and cabinets inside the control rooms will be done as per the standards:

- 240-56362336 - Installation of a Telecoms Equipment Cabinet Standard
- 240-132190480 - Telecommunication Equipment Installation Standard
- Earthing of the telecommunications equipment (indoor and outdoor), cabinets, shall be done according to the Technology specification 240-56872313 - Radio Station Earthing and Bonding and 240-64100247 - Standard for Earthing of Secondary Plant Equipment in Substations.
- Ceragon ATPs

- Installation Guide for FibeAir 1500HP/RFU-HP
- The testing of fibre and recording the test results based on Technology Document 240-70732888 - Fibre Optic cable system ATP.
- 240-62629353-Specification for Panel Labelling Standard
- 240-67907017 Fibre Optic Core Allocation Standard
- 240-70732902 - Fibre Optic Connector
- 240-46263618 - Fibre-optic cables and ODF labelling standard
- 240-70733995 - ODF / Patch Panel / Patch Box

PHILIPPI GIS SS

- Refer to the Control Room layout (from Transmission Drawing Office) for the position where the new 47U Telecomms cabinets will be installed. Complete the installations of the 47U panels, with the 50V supplied from dual station chargers. Label the cabinets appropriately. 47U Panels required will be for the OTN, Radio and MSAP equipment .
- Install 19 inch stainless steel back mount frame and Krone blocks to terminate the E1's tributaries.
- Patch the OTN 10 Gbps ports to the fibre optic cable completing the OTN link to Acacia SS.
- Terminate the E1 tribs of the Fox 615 onto the krone of the 24 panel RJ45 patch panel.
- Patch the E1s between the OTN and FOX, for traffic and MSAP DCN.
- Provide and install a 30 pair copper cable between the MSAP cabinet and the station IDF. Terminate the cable on Krone Blocks at both sides.
- Complete the microwave radio installation (antenna installation on the tower, laying of the IF cable from the IDU to the ODU, panning of the radio for maximum Rx levels).
- Patch the OTN-STM1 to the radio to complete the Microwave radio link to Kanonkop RS.
- Install the CGR router. Run a cat 5 cable between the router and the OTN equipment. Patch on ethernet port.
- Provision the IP phone, disturbance recorder, TWS meter, ION meter and EADS on the CGR router. Issue IP addresses to Transmission personnel.

CIVIL WORKS

- Plan for an optimal route for the IF cable (between the tower and control room).
- Install a cable tray between the tower and the new control room. (Split unit radio systems shall be able to operate with feeder cable lengths of up to at least 150m - 240-141847368 Microwave Radio Spec).
- Radio Tower's structural analysis need to be performed to determine the strength of the tower. The results will determine the strength and if the tower will be able to take the additional load of 2*0.9m microwave dishes for the Kanonkop RS link (1+1 space diversity configuration). Refer to the specifications 240-59967638 General Tower Specification, 240-119380820 Existing Tower Structural Inspection, Analysis, Strengthening, Design and Certification of Telecommunication Towers & Mast Infrastructure.
- Plan for an optimal route for the fibre cable (between the existing control room and the GIS control room), in a cable trench.

KANONKOP RS

- Complete the microwave radio installation (antenna installation on the tower, laying of the IF cable from the IDU to the ODU, panning of the radio for maximum Rx levels).
- Patch the STM1 from the Ceragon radio to the ADM 1410 on site.

ACACIA SS

- Wire the E1s between the MSAP and the ADM.
- Populate the 47U cabinet with OTN equipment.
- Patch the 10G port to the fibre optic cable; completing the OTN link to Philippi GIS SS.
- Patch the STM-4 port to the fibre optic cable; completing the OTN-ADM link from the OTN network to the ADM.
- Program and test the links.

4.6 – ET

O&FS WC

Commissioning of the SCADA circuits, IP circuits, CGR router and Fox 615 will be carried out as per the standard 240-132190480 Telecommunication Equipment Installation Standard.

- Sign off the commissioning sheets and completion certificates
 - ❖ [GENERIC QA TICK SHEET FOR PROJECTS rev1.pdf](#)
- Sign off the MSAP ABB Test Sheets :
 - ❖ [Equipment Test Instruction FOX615 612](#)
 - ❖ [Equipment Test Report FOX615 612](#)
- Decommission all extra equipment at Philippi SS (BME, 2811 Routers, redundant MSAP multiplexor).
- Sign off the Ceragon Radio Test Sheets :
 - ❖ [Ceragon ATPs](#)

NMC

Commissioning of the SCADA circuit and Fox 615 will be carried out as per the standard 240-132190480 Telecommunication Equipment Installation Standard. Configure and connect the ET equipment to the DCN networks.

- Assist with the commissioning of the respective circuits at Philippi GIS SS.
- Sign off the commissioning sheets and completion certificates for all the sites worked on.
- Connect the requested circuits as per the workplace tasks issued by PM (refer to section 1.1 for the requested circuits).
- Commission Philippi GIS substation's Fox615 Multiplexer onto the ET Network, and assist O&FS with routing and circuit connections.
- Commission Philippi GIS substation's OTN link to Acacia SS to the ET Network, and assist O&FS with routing.
- Commission Philippi GIS substation's STM1 radio link to Kanonkop RS SS to the ET Network, and assist O&FS with soak testing the link.
- Confirm that requested SCADA circuits are working.
- Sign off the commissioning sheets and completion certificates (Philippi GIS SS).
- Connect the requested circuits as per the workplace tasks issued by PM (refer to section 1.1 for the requested circuits).

4.8 – KAM

- Sign off the completion certificates.

SECTION 5: CONTRACTUAL

- The equipment will be procured by the appointed Transmission EPC contractor.
- Eskom has existing contracts for the following equipment:
 - ❖ OTN (Altron_Nexus Contract 4600066137),
 - ❖ Ceragon radio (Mustek Limited contract 4600069784) and
 - ❖ MSAP equipment (ABB contract 4600054543)
 - ❖ IP Voice (Nexio contract 4600068823)

SECTION 6: SHEQ

All work done by Transmission. SHEQ will be managed by Transmission PM.

4.1 Safety Requirements

4.1.1 – Hira

4.1.2 Environmental Compliance

4.1.3 Quality Requirements

- All the Activities must be conducted according to the Procedures, Standards, Design Guides as listed on **240-98255445**
- All Installation, Commissioning and Acceptance Tests and Inspections must be recorded on the relevant records as listed on **240-98255445**.

The equipment will be procured and by the self-build contractor, inclusive of:

- | Name | Philippi SS Strengthening | Number | PRJ11229 | | | | | | | | | | | |
|---|---|-----------------|--------------------|-------------|------|------------|-------------|-----------|--------------|----------|-----------|-------|-----------|-------------|
| Equipment Delivery Address | Brackenfell J Block Transmission Office | | 6 | | | | | | | | | | | |
| Item No. | BILL OF MATERIALS
(Standard Designs, Contract Items) | SAP Line Number | Material Number | Asset Class | Unit | Unit Price | Philippi GS | Aacida SS | Karoonkop RS | Belville | Simmerpan | Durba | Total Qty | Total Price |
| Description (enter contract number first, then enter descriptions) | | | | | | | | | | | | | | |
| 1 | 4600054543 - MPLS- FOX 615 | | | | | | | | | | | | | |
| 2 | SOFTWARE:ABB-MSP-LIC;FOX
(MANAGEMENT LICENSE FEE PER NODE) | 140 | 253454 | 3 | EA | | 1 | | | | | | 1 | |
| 3 | SHELF ASSY.ELECTR.ABBMSAP-6U;FOX;FFT
(LARGE SIZE RACK - 6U) | 180 | 253458 | 3 | EA | | 1 | | | | | | 1 | |
| 4 | ABB-MSP-E18
(E1 INTERFACE - 8 PORTS) | 230 | 253469 | 3 | EA | | 2 | | | | | | 2 | |
| 5 | ABB-MSP-FXS
(FXS & A TO RING DOWN INTERFACE - 16) | 250 | 253471 | 3 | EA | | 1 | | | | | | 1 | |
| 6 | ABB-MSP-UNIDA
(UNIVERSAL DATA INTERFACE - 4 PORTS) (X21 Interface Panels) | 210 | 253463 | 3 | EA | | 2 | | | 1 | 1 | | 4 | |
| 7 | ABB-MSP-UNIDA
(UNIVERSAL DATA INTERFACE - 4 PORTS) (RS232 Interface Panels) | 210 | 253463 | 3 | EA | | | | | 1 | | | 1 | |
| 8 | BB-MSP-CPU
(Redundant CPU) | 380 | 569429 | 3 | ea | | 1 | | | | | | 1 | |
| 9 | | | | | | | | | | | | | | |
| 10 | 4600067358-TIPROW ELECTRICAL | | | | | | | | | | | | | |
| 11 | CABINET.COMPLETE A-48U.WD 600 MM | 30 | 669353 | 3 | ea | | 3 | | | | | | 3 | |
| 12 | DC DISTRIBUTION PANELS | | | | | | | | | | | | | |
| 13 | DC Distribution Panels (2x10A, 4x6A Cct Breakers) - ESKO31/2/G/H/P | | | | | | 3 | | | | | | 3 | |
| 14 | | | | | | | | | | | | | | |
| 15 | ODF | | | | | | | | | | | | | |
| 16 | PANEL,PATCH.CDV1SR530048;19 IN (ODF) | 1770 | 591300 | 3 | ea | | 3 | | | | | | | |
| 17 | | | | | | | | | | | | | | |
| 18 | X21 SURGE PROTECTION | | | | | | | | | | | | | |
| 19 | X.21 Lightning Arrestor 19” 16 slots ful | 40 | 637505 | 3 | ea | | 1 | | | | | | 1 | |
| 20 | | | | | | | | | | | | | | |
| 21 | OTN Equipment | | | | | | | | | | | | | |
| 22 | 10G 1 Way Bundle - (Packet Enhanced Assembly Chassis(2ULC,with Fiber Storage); | No Line | No Material Number | 3 | ea | | 1 | 1 | | | | | 2 | |
| 23 | 10G 1 Way Bundle - ZAR Portion | No Line | No Material Number | 3 | ea | | 1 | 1 | | | | | 2 | |
| 24 | CoCare for Year 1 US\$ Portion | No Line | No Material Number | 3 | ea | | 1 | 1 | | | | | 2 | |
| 25 | CoCare for Year 1 ZAR Portion | No Line | No Material Number | 3 | ea | | 1 | 1 | | | | | 2 | |
| 26 | Site Survey | No Line | No Material Number | 3 | ea | | 1 | 1 | | | | | 1 | |
| 27 | | | | | | | | | | | | | | |
| 28 | CGR Router | | | | | | | | | | | | | |
| 29 | Cisco CGR2010 security bundle w/SEC license PAK | | 603218 | | | | 1 | | | | | | 1 | |
| 30 | EtherSwitch 8x 10/100T (4 PoE) ports + 2 100/1000 SFP | | 552925 | | | | 1 | | | | | | 1 | |
| 31 | DC (24/48VDC) Power Supply for CGR2010/CGS2520 | | 552924 | | | | 2 | | | | | | 2 | |
| 32 | Data License for Cisco CGR2010 | | 618164 | | | | 1 | | | | | | 1 | |
| 33 | Security License for Cisco CGR2010 | | 690733 | | | | 1 | | | | | | 1 | |
| 34 | | | | | | | | | | | | | | |
| 35 | 4600068823 - NEXIO | | | | | | | | | | | | | |
| 36 | Software: Lic-CUCM-12X-ENH.LICENSE | 330 | 690187 | 7 | ea | | 4 | | | | | | 4 | |
| 37 | Cisco UC Phone 7821 CP-7821-K9= | 1010 | 690733 | 7 | ea | | 4 | | | | | | 4 | |
| 38 | PoE | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | |
| 40 | 4600069784 - MUSTEK LIMITED | | | | | | | | | | | | | |
| 41 | 8 GHz 1+1 HSB/ 2+0 Indoor Unit (28 MHz Channel, STM-I, E1 Ethernet) | | | 9 | ea | | 1 | 1 | | | | | 2 | |
| 42 | IP-20N 2RU/10-slot base package w/ 2x48v | | | 9 | ea | | 1 | 1 | | | | | 2 | |
| 43 | IP-20 TCC-B2-XG-MC, w/ SD-Card | | | | | | | | | | | | | |

SECTION 8: COMPLETION

1. All check sheets and commissioning documentation to be filled in prior to QA inspection.
2. Hand-over approval certificate should be completed as per 240-139189078.
3. All ATP documents for the ADM and Fox multiplexor to be received from the Transmission PM.
 - [ABB Test Instructions](#)
 - [ABB Test results](#)
 - [Generic QA tick sheet for projects \(240-110412152\)](#)
 - [Fibre Optics Test results \(240-70732888\)](#)
 - [Ceragon ATPs](#)

SECTION 9: ANNEXURES

