












NAROK  
132/33KV SUBSTATION  
PROTECTION SINGLE LINE DIAGRAM




CHECKED BY	TSP		PROJECT:	DWG. TITLE:		CLIENT:
CHECKED BY	HS		NAROK 132/33KV SUBSTATION	PROTECTION SINGLE LINE DIAGRAM COVER		  
APPROVED BY	AMM					
DATE: 15.01.2024						
SCALE:		SIZE:		DWG. NO.:		

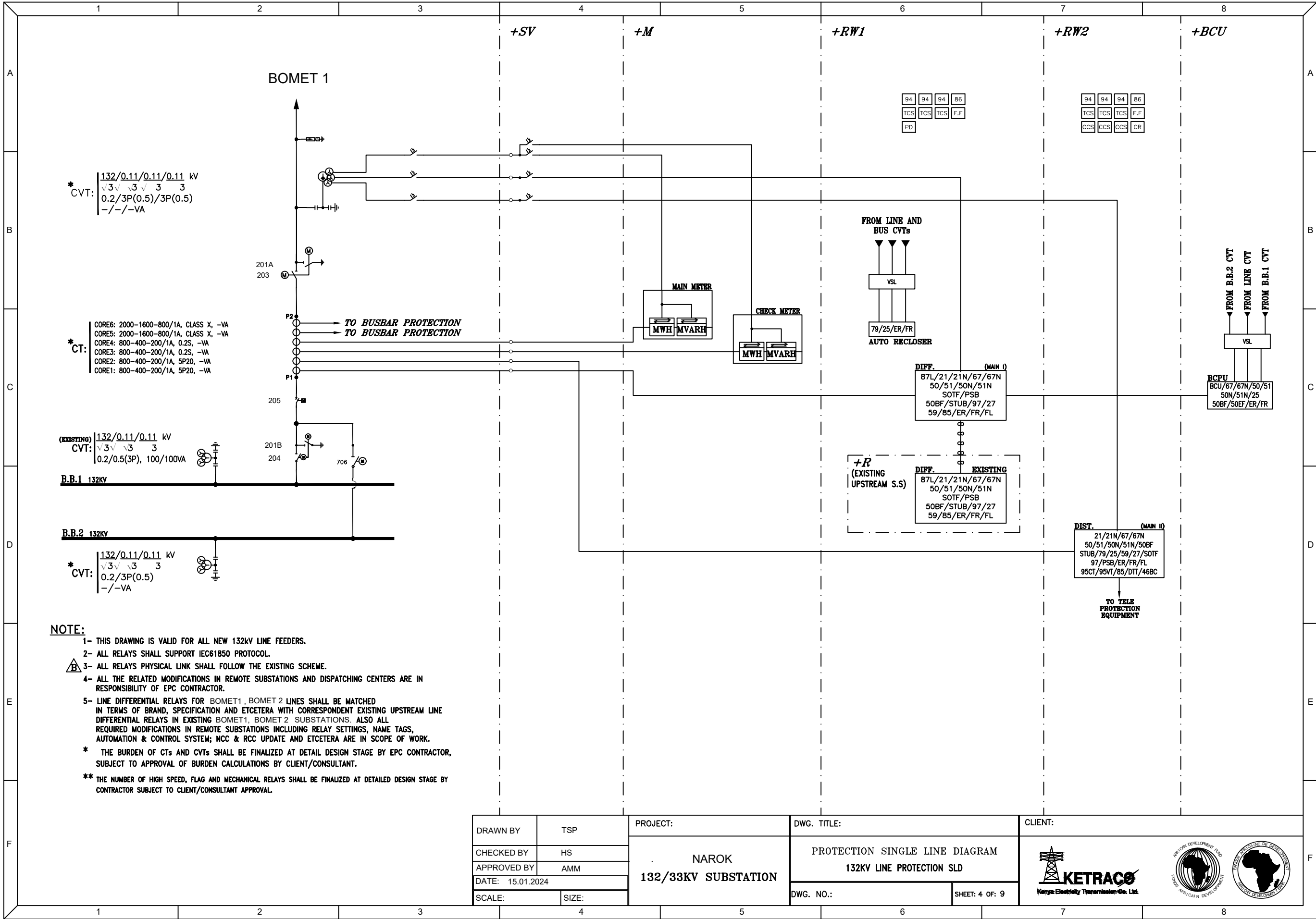
1	2	3	4	5	6	7	8
A							A
B							B
C							C
D							D
E							E
F							F

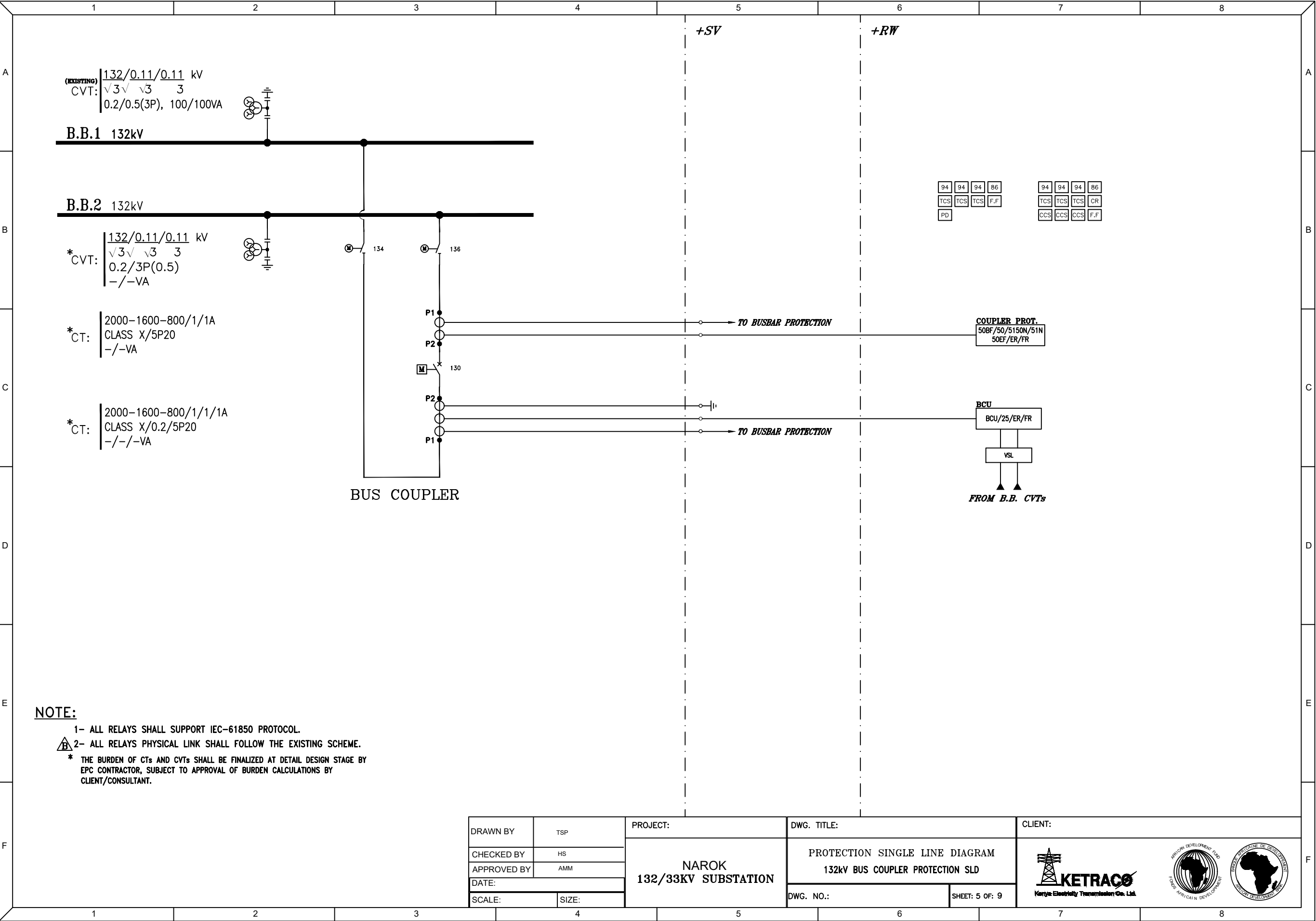
DESIGNATION OF	TITLE
1	COVERING SHEET
2	INDEX
3	LEGEND
4	132KV LINE PROTECTION SINGLE LINE DIAGRAM
5	132kV BUS COUPLER PROTECTION SINGLE LINE DIAGRAM
6	132/33kV TRANSFORMER PROTECTION SINGLE LINE DIAGRAM
7	132kV BUSBAR PROTECTION SINGLE LINE DIAGRAM
8	33kV BUS COUPLER PROTECTION SINGLE LINE DIAGRAM
9	33kV BUSBAR PROTECTION SINGLE LINE DIAGRAM
10	33kV FEEDER PROTECTION SINGLE LINE DIAGRAM

DESIGNED BY	TSP		PROJECT:	DWG. TITLE:	CLIENT:	
CHECKED BY	HS		NAROK 132/33KV SUBSTATION	PROTECTION SINGLE LINE DIAGRAM LIST OF DRAWINGS	  	
APPROVED BY	AMM			DWG. NO.:		SHEET: 2 OF: 9
DATE: 15.01.2024						
SCALE:		SIZE:				

	1	2	3	4	5	6	7	8
A	<div>2</div> TIME DELAY RELAY		<div>87B</div> BUSBAR DIFFERENTIAL PROTECTION		<div>ER</div> EVENT RECORDER		<div>ACTIVE ENERGY METER (BOTH DIRECTIONS) (MULTI TARRIF,CLASS 0.2)</div>	A
	<div>21/21N</div> DISTANCE RELAY WITH THREE ZONES		<div>87L</div> LINE DIFFERENTIAL PROTECTION		<div>FR</div> FAULT RECORDER		<div>REACTIVE ENERGY METER (BOTH DIRECTIONS) (MULTI TARRIF,CLASS 0.2)</div>	
	<div>24</div> OVER FLUX RELAY		<div>87NT</div> RESTRICTED EARTH FAULT PROTECTION RELAY FOR TRANSFORMER		<div>F.F.</div> FUSE FAILURE RELAY			
B	<div>25</div> SYNCHRO–CHECK RELAY		<div>87NR</div> RESTRICTED EARTH FAULT PROTECTION RELAY FOR REACTOR		<div>F.L</div> FAULT LOCATOR		C.U. CENTRAL UNIT	
	<div>27</div> UNDER(ZERO) VOLTAGE RELAY		<div>87NTV</div> RESTRICTED EARTH FAULT PROTECTION RELAY FOR EARTHING TRANSFORMER		<div>PD</div> POLE DISCORDANCE		B.U. BAY UNIT	
	<div>46BC</div> UNBALANCY PROTECTION / BROKEN CONDUCTOR		<div>87T</div> TRANS. DIFFERENTIAL PROT.(BIASED DIFF.)		<div>PSB</div> POWER SWING BLOCKING		BCPU BAY CONTROL AND PROTECTION UNIT	B
	<div>49</div> THERMAL OVER LOAD PROTECTION		<div>87R</div> REACTOR DIFFERENTIAL PROTECTION RELAY		<div>50EF</div> END FAULT / SHORT ZONE PROTECTION		POW POINT ON WAVE SWITCH	
	<div>50</div> INSTANTANEOUS OVER CURRENT RELAY		<div>87HVC</div> TRANSFORMER HV CIRCUIT DIFFERENTIAL PROTECTION		<div>SOTF</div> SWITCH ON TO FAULT		BCR BAY CONTROL ROOM	
C	<div>50BF</div> CIRCUIT BREAKER FAILURE RELAY(WITH 2–STAGE)		<div>87LVC</div> TRANSFORMER LV CIRCUIT DIFFERENTIAL PROTECTION		<div>STUB</div> STUB PROTECTION		<u>PANELS</u>	
	<div>50NS</div> INSTANTANEOUS SENSITIVE EARTH FAULT RELAY		<div>94</div> TRIP RELAY		<div>TCS</div> TRIP CIRCUIT SUPERVISION RELAY		+RW CONTROL AND PROTECTION PANEL	
	<div>50/51</div> INSTANTANEOUS AND INVERSE TIME OVER CURRENT RELAY		<div>94X</div> AUX. TRIP RELAY WITH HIGH SPEED CONTACT		<div>CCS</div> CLOSE CIRCUIT SUPERVISION RELAY		+W CONTROL PANEL	
	<div>50N/51N</div> INSTANTANEOUS AND INVERSE EARTH FAULT RELAY		<div>94Y</div> AUX. TRIP RELAY WITH FLAG		<div>VSL</div> VOLTAGE SELECTION LOGIC		+SV MARSHALING CUBICLE	
D	<div>51</div> INVERSE TIME OVER CURRENT RELAY		<div>95CT</div> CT SUPERVISION		<div>SBEF</div> STANDBY EARTH FAULT PROTECTION		+M MEASUREMENT PANEL	
	<div>59</div> OVER VOLTAGE RELAY		<div>95VT</div> VOLTAGE SUPERVISION				+BCU BAY CONTROL UNIT PANEL	
	<div>67</div> DIRECTIONAL OVER CURRENT RELAY WITH INVERSE TIME CHARACTRISTIC		<div>97</div> FUSE FAILURE (IN DISTANCE RELAY)				 FIBER OPTIC CABLE	C
	<div>67N</div> DIRECTIONAL EARTH FAULT RELAY		<div>2/MECH</div> TRANSFORMER MECHANICAL PROTECTION				 MINIATURE CIRCUIT BREAKER	
E	<div>79</div> AUTO RECLOSE RELAY SINGLE SHOT 1&3 PHASE		<div>BCU</div> BAY CONTROL UNIT				 REVISION MARK	
	<div>85</div> CARRIER INTERFACE/REMOTE TRIP		<div>C.R</div> CLOSE RELAY					D
	<div>86</div> LOCKOUT RELAY		<div>DTT</div> DIRECT TRANSFER TRIP					
F								E
								F
	1	2	3	4	5	6	7	8

DESIGNED BY	TSP		PROJECT:	DWG. TITLE:		CLIENT:
CHECKED BY	HS		NAROK 132/33KV SUBSTATION	PROTECTION SINGLE LINE DIAGRAM LEGEND		 Ketraco Electricity Transmission Co. Ltd.  AFRICAN DEVELOPMENT FUND  AFRICAN DEVELOPMENT BANK
APPROVED BY	AMM					
DATE: 15.01.2024						
SCALE:		SIZE:		DWG. NO.:		
				SHEET: 3 OF: 9		








**NOTE:**

1- ALL RELAYS SHALL SUPPORT IEC-61850 PROTOCOL.

2- ALL RELAYS PHYSICAL LINK SHALL FOLLOW THE EXISTING SCHEME.

\* THE BURDEN OF CTs AND CVTs SHALL BE FINALIZED AT DETAIL DESIGN STAGE BY EPC CONTRACTOR, SUBJECT TO APPROVAL OF BURDEN CALCULATIONS BY CLIENT/CONSULTANT.

DRAWN BY	TSP	PROJECT:	DWG. TITLE:	CLIENT:
CHECKED BY	HS	NAROK 132/33KV SUBSTATION	PROTECTION SINGLE LINE DIAGRAM 132kV BUS COUPLER PROTECTION SLD	  
APPROVED BY	AMM		DWG. NO.:	
DATE:			SHEET: 5 OF: 9	
SCALE:	SIZE:			

