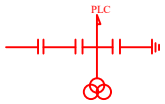
Typical and proposed Drawings For Renovation of Talkaif 11 kV MV Switchgears Substation.

LEGEND



CAPACITOR VOLTAGE TRANSFORMER
WITH DUAL SECONDARY WINDING
AND PLC COUPLING EQUIPMENT-OPTIONAL

CABLE SEALING END/BOX

DISCONNECTOR

EARTH SWITCH

CIRCUIT BREAKER

WITHDRAW ABLE
CIRCUIT BREAKER

THREE POSITION
SWITCH

EARTH

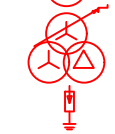
SHUNT
REACTOR

WOUND VOLTAGE
TRANSFORMER
(WITH 1,2 OR 3
SECONDARY)

CURRENT
TRANSFORMER

3 PHASE (SINGLE UNIT OR
BANK OF 3 SINGLE
PHASE)
AUTO TRANSFORMER
CONNECTION IN
STAR WITH ON-LOAD TAP
CHANGER

DOUBLE WOUND TRANSFORMER
(DELTA / STAR SHOWN)
WITH ON-LOAD TAP CHANGER



DOUBLE WOUND TRANSFORMER
(DELTA / STAR SHOWN)
WITH ON-LOAD TAP CHANGER

LIGHTING ADJUSTOR

CAPACITOR

LINE TRAP

START POINT

NEUTRAL EARTHLING RESISTOR

PROTECTOR

RESISTOR

FUSE

BATTERY

DIODE

NEON LAMP VOLTAGE INDICATOR

VOLTMETER

VOLTMETER SELECTION SWITCH

VAr METER

AMMETER

AMMETER SELECTION SWITCH

WATTMETER

AUTOMATIC CHANGEOVER SWITCH

CHANGEOVER SWITCH

FREQUENCY METER

TAP POSITION INDICATOR

POWER FACTOR METER

BC	BUS COUPLER
BT	BUS TIE (BUS SECTION)
DAS	DATA ACCUSATION SYSTEM
ET	EARTHLING TRANSFORMER
H	400kV CIRCUIT BREAKER
HB	400kV BUS-BAR
HL	400kV LINE
HLR	400kV LINE REACTOR
HLRN	400kV LINE NEUTRAL REACTOR
MB	132Kv BUS-BAR
MCB	MINIATURE CIRCUIT BREAKER
ML	132Kv LINE
NC	NORMALLY CLOSED CIRCUIT BREAKER
NO	NORMALLY OPEN CIRCUIT BREAKER
PLC	POWER LINE CARRIER
RCD	RESIDUAL CURRENT DEVICE
SCS	SUBSTATION CONTROL SYSTEM
SST	SUBSTATION SERVICE TRANSFORMER
T TR	400/132/11kV AUTO TRANSFORMER
TC	TERTIARY REACTOR TERTIARY BUS COUPLER

AUTO RECLOSE

VOLTAGE SELECTOR RELAY

kW INTEGRATING METER

MWh INTEGRATING METER

MAXIMUM DEMAND INDICATOR
MWh INTEGRATING METER

MVArh INTEGRATION METER

TRANSDUCER

OVER TEMPERATURE RELAY
(OIL TEMPERATURE)

OVER TEMPERATURE RELAY
(WINDING TEMPERATURE)

OVER LIQUID PRESSURE RELAY
(TRANSFORMER TANK OVER PRESSURE RELAY)

BUCHHOLZ PROTECTIVE DEVICE

OIL LEVEL RELAY

TAP CHANGE ALARMS

SINGLE POLE INSTANTANEOUS
OVER CURRENT RELAY

1/2/3 POLE OVER CURRENT RELAY
WITH ADJUSTABLE INVERSE TIME
CHARACTERISTIC AND AN
INSTANTANEOUS HIGH SET ELEMENT

3 POLE DEFERENTIAL RELAY
(BIASED/LOW IMPEDANCE)

3 POLE DEFERENTIAL RELAY
RESTORED EARTH FAULT
(HIGH IMPEDANCE)

SINGLE POLE EARTH FAULT RELAY

2/3 POLE DIRECTIONAL OVER CURRENT RELAY
WITH ADJUSTABLE INVERSE TIME CHARACTERISTIC

1/2/3 POLE DIRECTIONAL OVER CURRENT
RELAY WITH ADJUSTABLE INVERSE
TIME CHARACTERISTIC AND AN
INSTANTANEOUS HIGH SET ELEMENT

SINGLE POLE DIRECTIONAL EARTH
FAULT RELAY WITH ADJUSTABLE
DEFINITE TIME CHARACTERISTIC
(DIRECTIONAL EARTH FAULT 400kV)

SINGLE POLE DIRECTIONAL EARTH
FAULT RELAY WITH ADJUSTABLE
INVERSE TIME CHARACTERISTIC
(DIRECTIONAL EARTH FAULT 132kV & 33/11kV

SINGLE POLE DIRECTIONAL EARTH
WITH ADJUSTABLE INVERSE TIME
CHARACTERISTIC

SINGLE POLE EARTH FAULT RELAY WITH
ADJUSTABLE DEFINITE TIME CHARACTERISTIC
(RESTRICTED EARTH FAULT -33/11Kv)

SINGLE POLE EARTH FAULT RELAY WITH
ADJUSTABLE DEFINITE TIME CHARACTERISTIC
AND AN INSTANTANEOUS WITH SET ELEMENT

3 POLE OVER CURRENT RELAY WITH
ADJUSTABLE DEFINITE TIME CHARACTERISTIC
(BREAKER FAIL AND CT STACK PROTECTION)

BALANCED EARTH FAULT RELAY

OVER VOLTAGE / EARTH FAULT PROTECTION

SINGLE POLE VOLTAGE
EARTH FAULT RELAY

SINGLE POLE INSTANTANEOUS
OVER VOLTAGE RELAY

SINGLE POLE INSTANTANEOUS
UNDER VOLTAGE RELAY

3 POLE UNDER VOLTAGE RELAY WITH
ADJUSTABLE DEFINITE TIME CHARACTERISTIC

BATTERY VOLTAGE HIGH/LOW ALARM

3 POLE INSTANTANEOUS
OVER VOLTAGE RELAY

3 POLE OVER VOLTAGE
RELAY WITH ADJUSTABLE
INVERSE TIME CHARACTERISTIC

SINGLE POLE RESIDUAL OVER VOLTAGE RELAY
WITH ADJUSTABLE DEFINITE TIME CHARACTERISTIC
(NEUTRAL VOLTAGE DISPLACEMENT)

VAR RELAY

UNDER FREQUENCY RELAY (4 STAGE)

UNDER FREQUENCY RELAY WITH ADJUSTABLE
DEFINITE TIME CHARACTERISTIC

PLOT WITH SUPERVISION RELAY
(GENERAL)

DISTANCE RELAY
m/n-2 or 3

DTF-DISTANCE TO FAULT
PUR- PERMISSIVE UNDERREACH
BK- BLOCKING

UNBALANCED RELAY
(CAPACITOR BANKS)

VAR CONTROL RELAY
(VARMETIC OR SIMILAR)

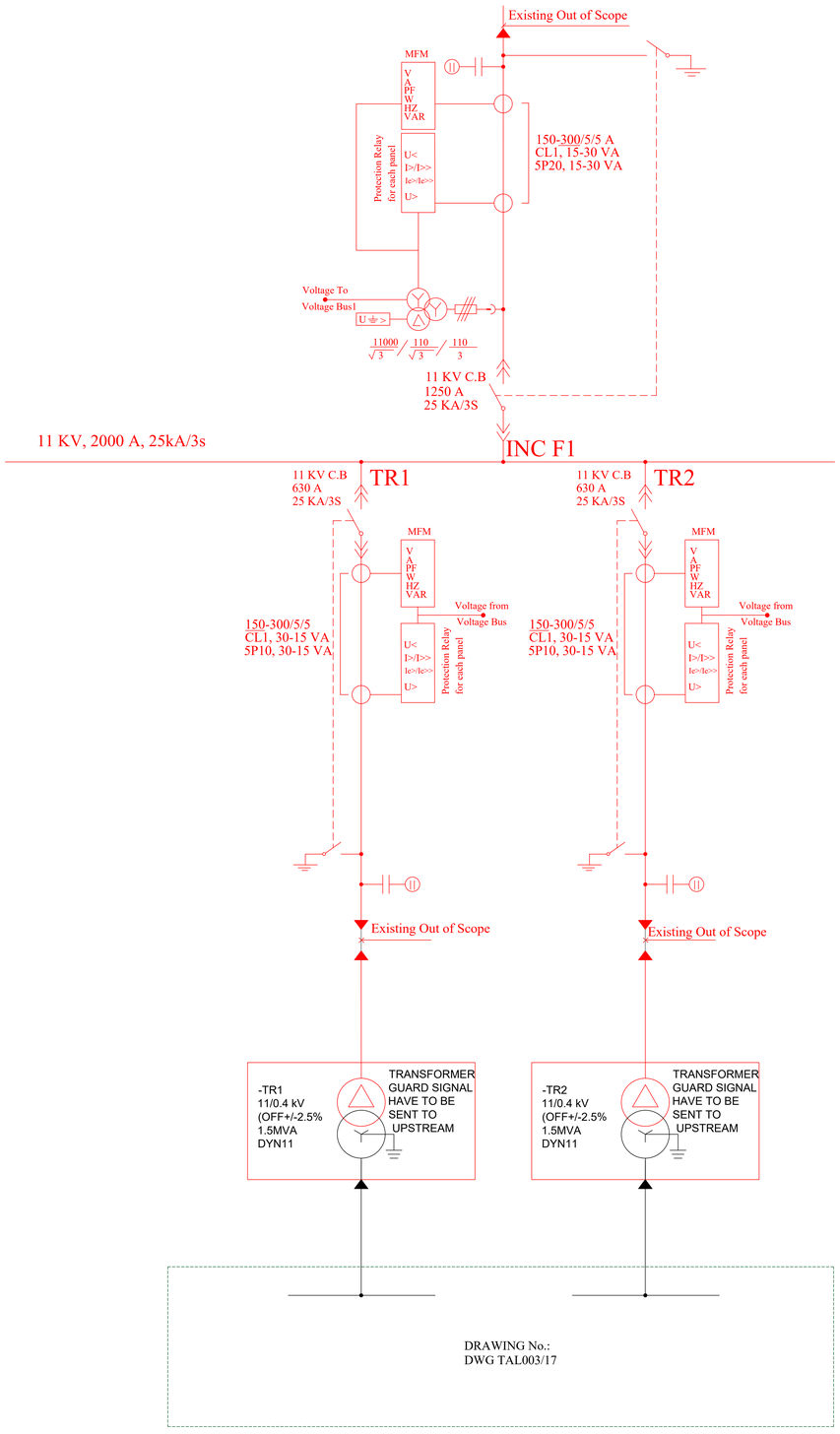
TRIP CIRCUIT SUPERVISION

GAS RECEIVER

AUTOMATIC VOLTAGE REGULATOR

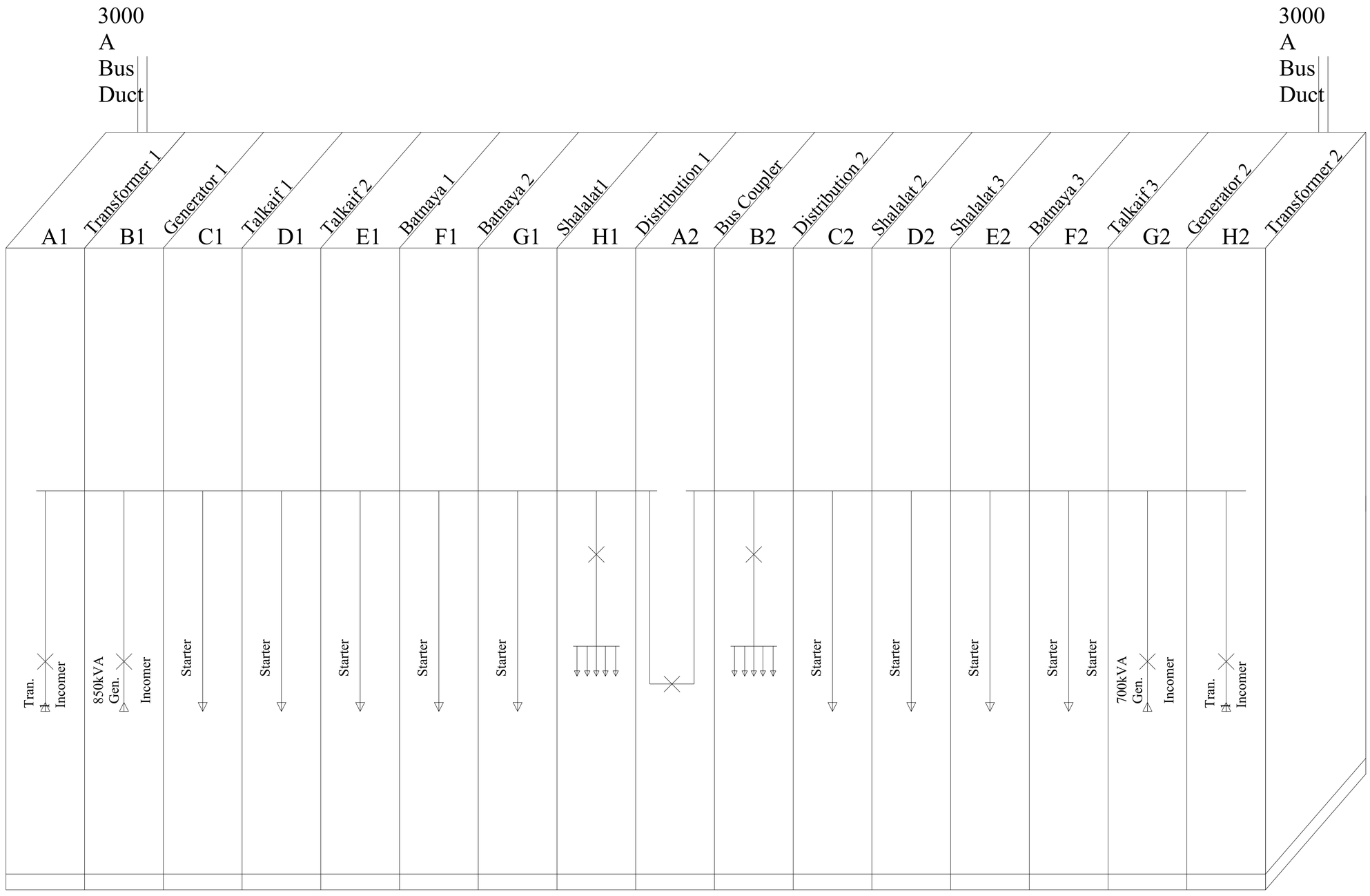
FOR TENDER PURPOSE ONLY

TALKAIF WATER PROJECT	U	N
SYMBOL LIST	D	P
APPROVED BY:		
DRAWN BY: AREE OMER QADIR	DRAWING No.: DWG TAL001/17	REV. No.: Rev A



- Safe and logical Interlock for the system is required, the interlocking system is subject of end users approval.
- All Circuit Breakers, should be protected with a protection relay, includes at least minimum protections required for the system, considering protection selectivity, The circuit measurements have to be monitored by digital Multi- Function meters includes all necessary readings, Both relays and multi- Function meters should have facility to be connected with SCS.
- Alarm annunciation devices is required.
- 110 V DC supply Including two set of charger (230VAC /110VDC automatic chargers, can be run in parallel, BOOST, Float and equalize charge) with one set of 110VDC 185 AH batteries and a DC distribution panel with enough output MCCB's for supplying protection, control, emergency lighting system and signaling systems are required.
- Size of current transformers, MCB's, wires and cables must be selected according to calculations, the calculations reports are subject of end user's approval.
- Transducers have to be used for all measuring points.
- Number of the panels, panels dimensions, plate thickness, painting type and paint color are subject of end users approval, selection has to be carried out according to standards.
- All creepage's and clearances have to comply with Standards.

TALKAIF WATER PROJECT	U	N
HIGH LIFT PUMP MV SWITCHGEAR ROOM	D	P
PROPOSED SINGLE LINE DIAGRAM		
APPROVED BY:		
DRAWN BY: DLSHAD HASAN M. ALI	DRAWING No.: DWG TAL002/17	REV. No.: Rev A



- Safe and logical Interlock for the system is required, the interlocking system is subject of end users approval.
- Generator 11 kV C.B. should have electrical interlock with related national grid C.B. and Automatic/ Manual changeover control should be provided.
- All Circuit Breakers, should be protected with a protection relay, includes at least minimum protections required for the system, considering protection selectivity, The circuit measurements have to be monitored by digital Multi- Function meters includes all necessary readings, Both relays and multi- Function meters should have facility to be connected with SCS.
- Alarm annunciation devices is required.
- 110 V DC supply Including two set of charger (230VAC /110VDC automatic chargers, can be run in parallel, BOOST, Float and equalize charge) with one set of 110VDC 145 AH batteries and a DC distribution panel with enough output MCCB's for supplying protection, control, emergency lighting system and signaling systems are required.
- Size of current transformers, MCB's, wires and cables must be selected according to calculations, the calculations reports are subject of end user's approval.
- Transducers have to be used for all measuring points.
- Number of the panels, panels dimensions, plate thickness, painting type and paint color are subject of end users approval, selection has to be carried out according to standards.
- All creepage's and clearances have to comply with Standards.

TALKAIF WATER PROJECT	U	N
HIGH LIFT PUMP LV DISTRIBUTION PANRLS	D	P
PROPOSED LV DB GENERAL LAYOUT		
APPROVED BY:		
DRAWN BY: AREE OMER QADIR	DRAWING No.: DWG TAL003/17	REV. No.: Rev A