132 kV Existing Kolari Substation

LEGEND:

- PRESENT SCOPE
- FUTURE / NOT IN SCOPE
- BOUNDARY
- FENCE

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2.

SYSTEM PARTICULARS :	132kV	33kV
a) NOMINAL VOLTAGE	132kV	33kV
b) HIGHEST SYSTEM VOLTAGE	145kV	36kV
c) ONE MIN. POWER FREQUENCY WITHSTAND VOLTAGE (RMS)	275kV	70kV
d) BASIC IMPLUSE WITHSTAND VOLTAGE(PEAK)	650kV	170kV
e) SHORT CIRCUIT LEVEL (kA/S)	40kA/3s	31.5kA/3s
f) NOMINAL CREEPAGE DISTANCE	25mm/kV (3625mm)	25mm/kV (900mm)

3.

MINIMUM CLEARANCES AS PER TECHNICAL SPECIFICATION.		
a) PHASE TO PHASE (PPC) (AS PER IEC 61936-1)	1300mm	320mm
b) PHASE TO EARTH (PEC) (AS PER IEC 61936-1)	1300mm	320mm
c) SECTIONAL CLEARANCE (SC) (AS PER CBIP)	4000mm	2800mm
d) GROUND CLEARANCE (GC) (AS PER CBIP)	4600mm	3700mm
e) SAFETY WORKING CLEARANCE (IE RULES 1956 AMD 2005 RULE 64)	3700mm	2800mm

4.

JACK BUS	SINGLE ZEBRA	SINGLE ZEBRA
MAIN BUS	TWIN ZEBRA	TWIN ZEBRA
AUX. BUS	SINGLE ZEBRA	–
TRAFO. BAY	SINGLE ZEBRA	TWIN ZEBRA
TBC BAY	SINGLE ZEBRA	–
LINE BAY	SINGLE ZEBRA	SINGLE ZEBRA
BC BAY	–	–
EQUIPMENT INTERCONNECTION	SINGLE ZEBRA	SINGLE ZEBRA/ TWIN ZEBRA
SUB CONDUCTOR SPACING	225mm	140mm

5.

INSULATORS		
a) TENSION DISC INSULATOR	120KN	70KN
b) SUSPENSION DISC INSULATOR	70KN	70KN
c) BPI FOR CONDUCTOR SUPPORT	4KN	4KN
d) BPI FOR ISOLATORS	4KN	4KN

6.

NO. OF DISC INSULATOR (ANTIFOG TYPE)		
a) TENSION STRING HARDWARE	10 NOS.	4 NOS.
b) SUSPENSION STRING HARDWARE	9 NOS.	4 NOS.

7. 7/3.15mm DIA. GI EARTHWIRE SHALL BE USED FOR LIGHTNING PROTECTION.
8. ALL THE BUS HEIGHTS ARE REFERRED FROM FGL.
9. THE POWER CONNECTERS & HARDWARES SHALL BE DESIGNED FOR 40kA/1Sec FOR 132kV & 31.5kA/1Sec FOR 33kV SYSTEM AS PER TECHNICAL SPECIFICATION
10. THE PLOT BOUNDARY MARKED IS INDICATIVE. THE SAME SHALL BE REVISED ON RECEIPT OF EXACT MARKING FROM SITE.
11. ROAD OUTSIDE BOUNDARY WALL & EQUIPMENT SHOWN AS "FUTURE" ARE NOT IN SCOPE OF WORK.
12. PLINTH HEIGHT OF FOUNDATION WILL BE +450MM FROM THE FINISHED GROUND LEVEL (F.G.L.) GRAVEL THICKNESS SHALL BE 150mm FROM FGL.
13. TERMINATION OF LINE SIDE SHIELD WIRE, TENSION CLAMP, INSULATOR STRING WITH HARDWARE AND CONDUCTORS ARE IN SCOPE OF WORK.
14. THE POSITION OF LIGHTING MASTS IS TENTATIVE AND WILL BE FINALISED UPON COMPLETION OF DIRECT STROKE LIGHTNING PROTECTION AND ILLUMINATION CALCULATIONS.
15. SHIELD WIRES WILL BE USED FOR DIRECT STROKE LIGHTNING PROTECTION WHEREVER THEY ARE AVAILABLE.
16. RESPECTIVE EQUIPMENT DRAWINGS SHALL BE REFERRED TO FOR EQUIPMENT DIMENSIONS AND DETAILS.
17. SPARES NOT INCLUDED.
18. LOCATION & QUANTITY OF LIGHTING MASTS (LM) SHALL BE FINALIZED AT THE TIME OF LIGHTING LAYOUT APPROVAL.

132kV EQUIPMENTS BILL OF MATERIAL

SR NO.	ITEM DESCRIPTION	QUANTITY
01	145kV SF6 CIRCUIT BREAKER 2000A, 40KA, 3SEC. (3 ph.)	6 Set.
02	145kV ISOLATOR WITH EARTHING BLADE 1250A, 40KA, 1 SEC. (3 ph.),MOTOR OPERATED MAIN SWITCH	2 Set
03	145kV ISOLATOR WITHOUT EARTHING BLADE 2000A, 40KA, 3 SEC. (3 ph.), MOTOR OPERATED	2 Set.
04	145kV ISOLATOR WITHOUT EARTHING BLADE 1250A, 40KA, 1 SEC. (3 ph.), MOTOR OPERATED	14 Set.
05	145kV CURRENT TRANSFORMER 40KA, 1SEC. 1600-800/1 A, 5C (1 ph.), CL-PS, PS, 0.2S, PS, PS	3 NOS.
06	145kV CURRENT TRANSFORMER 40KA, 1SEC. 800-400/1 A, 5C (1 ph.), CL-PS, PS, 0.2S, PS, PS	15 NOS.
07	145kV POTENTIAL TRANSFORMER (1 ph.) $\frac{132kV}{\sqrt{3}} / \frac{110V}{\sqrt{3}} / \frac{110V}{\sqrt{3}} / \frac{110V}{3}$, CL-3P, 3P, 0.2	6 NOS.
08	120kV, 10kA STATION CLASS, LIGHTNING ARRESTOR (PORCELAIN) (1 ph.)	6 NOS.
09	120kV, 10kA, STATION CLASS, LIGHTNING ARRESTOR (POLYMER) (1 ph.)	6 NOS.
10	145kV, COUPLING CAPACITOR, 6600pf (FOR ANY TWO PHASE) (1 ph.)	4 NOS.
11	145kV, WAVE TRAP, 1250A, 0.5mH (1 ph.)	4 NOS.
12	BUS POST INSULATORS (BPI)	15 NOS.

33kV EQUIPMENTS BILL OF MATERIAL

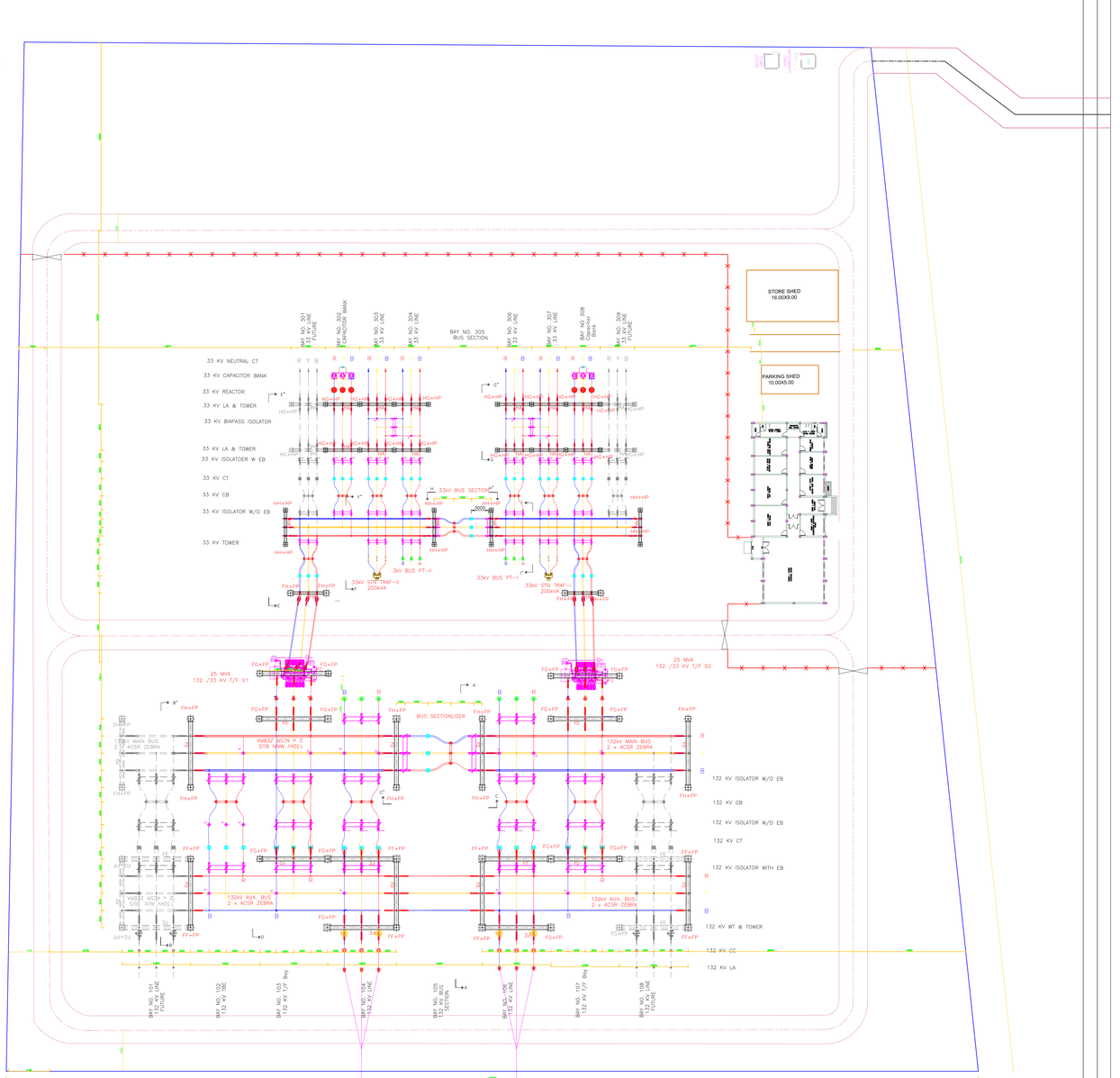
SR NO.	ITEM DESCRIPTION	QUANTITY
01	36kV VACCUM CIRCUIT BREAKER 1600A, 25KA, 3SEC. (3 ph.)	09 Set
02	36kV ISOLATOR WITH EARTHING BLADE 800A, 25KA, 1 SEC. (3 ph.), MOTOR OPERATED	04 Set
03	36kV ISOLATOR WITHOUT EARTHING BLADE 1600A, 25KA, 1 SEC. (3 ph.), MOTOR OPERATED	06 Set
04	36kV ISOLATOR WITHOUT EARTHING BLADE 800A, 25KA, 3 SEC. (3 ph.), MOTOR OPERATED	12 Set
05	36kV CURRENT TRANSFORMER 26.2KA, 1SEC. 1600-800/1 A, 4C (1 ph.), CL-PS, PS, 0.2S, PS,	9 NOS.
06	36kV CURRENT TRANSFORMER 26.2KA, 1SEC. 400-200/1 A, 3C (1 ph.), CL-PS, PS, 0.2S	18 NOS.
07	36kV POTENTIAL TRANSFORMER (1 ph.) $\frac{33kV}{\sqrt{3}} / \frac{110V}{\sqrt{3}} / \frac{110V}{\sqrt{3}} / \frac{110V}{3}$, CL-3P, 3P, 0.2	6 NOS.
08	30kV, 10kA, STATION CLASS, LIGHTNING ARRESTOR (PORCELAIN) (1 ph.)	18 NOS.
09	30kV, 10kA STATION CLASS, LIGHTNING ARRESTOR (POLYMER) (1 ph.)	6 NOS.
10	33kV/433V, 200kVA, DY11, STATION TRANSFORMER, Z=5%	2 NOS.
11	36kV HORN GAP FUSE (3 ph.), 10A	2 NOS.
12	BUS POST INSULATORS (BPI)	04 NOS.
13	5 MVAR CAPACITOR BANK	2 NOS.
14	NEUTRAL CURRENT TRANSFORMER	2 NOS.

BOM 132kV STRUCTURE

TOWER WITH PEAK		BEAM	
TYPE	QTY.	TYPE	QTY.
FH+FP	8	FD	12
FG+FP	14	FE	04
FF+FP	08	FC	02

BOM 33kV STRUCTURE

TOWER WITH PEAK		BEAM	
TYPE	QTY.	TYPE	QTY.
FH+FP	04	HA	18
HH+HP	08		
HG+HP	16		



REV. NO.	DATE	DESCRIPTION
R0	03.06.19	RELEASED FOR CONSTRUCTION

REVISION HISTORY

PROJECT : ESTABLISHMENT OF132/33kV SUBSTATION WITH ASSOCIATED BAYS AT KOLHARI, DIST. NAGPUR

LOA NO. : MSETCL/CO/C&M/Pre-T/SSPre Tender/4111DATED: .31.05.2019

AGENCY : M/S ESSKAY ELECTRICALS PVT LTD

MAHATRANSCO Maharashtra State Electricity Transmission Co. Ltd.

MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.
PLOT NO. C-19, E-BLOCK, PRAKASHGANGA, BANDRA – KURLA COMPLEX
BANDRA (E), MUMBAI – 400 051

DESIGN DEPARTMENT

TITLE : ELECTRICAL PLAN LAYOUT OF 132/33 kV KOLHARI S/S

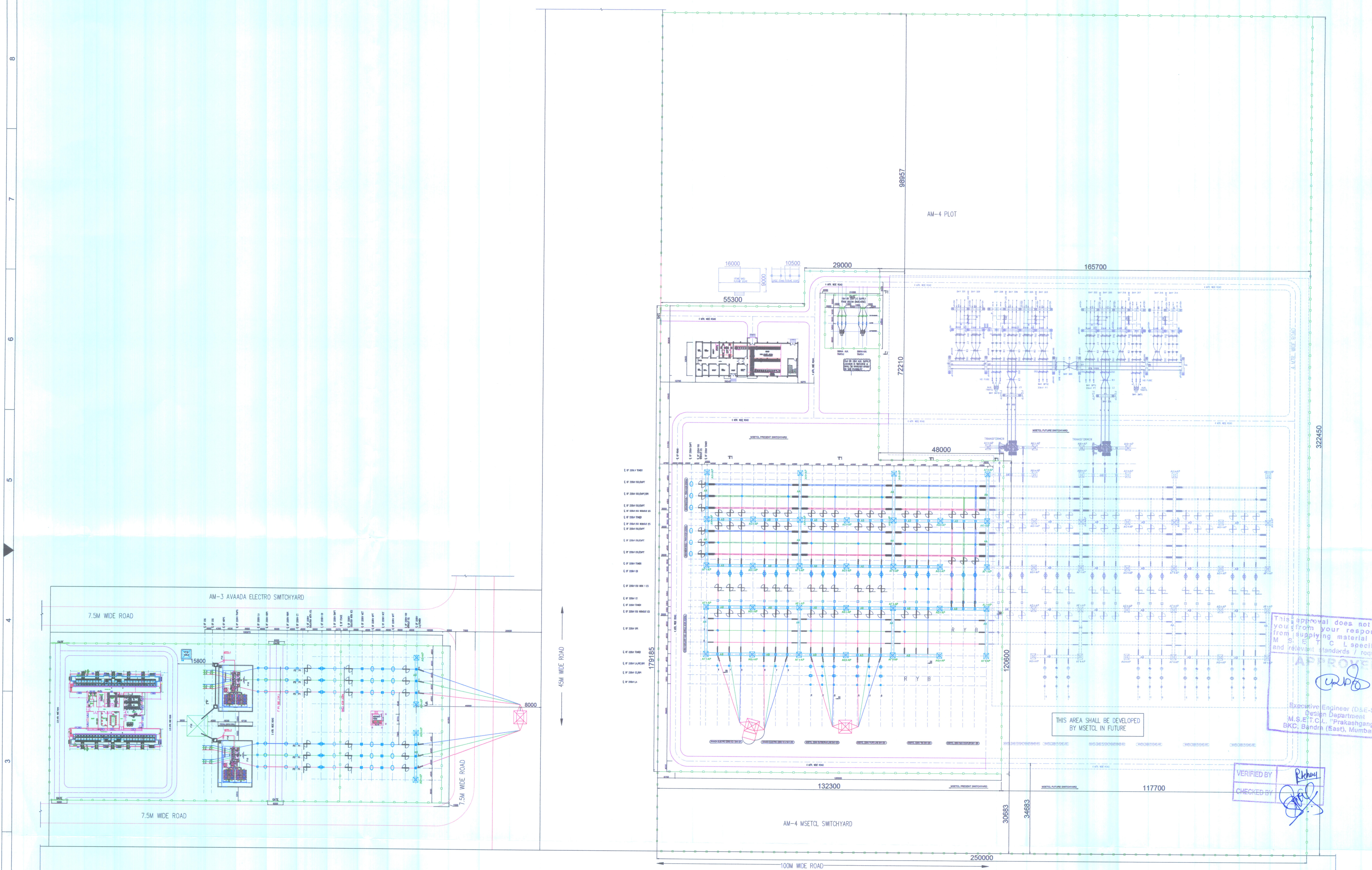
SCALE : 1:1000

	NAME	SIGN	DATE
APPROVED	S.E.		06.06.19
CHECKED	E.E.		06.06.19
DRAWN	ADD.E.E.		06.06.19

DRG. NO. : D&E-S2/252-766 REV. R0

SHEET NO. : 01 OF 01

220 kV Existing Addl. Buttibori Substation


AM-4 PLOT
98957
16000
10500
29000
165700
55300
72210
322450
48000
179185
120600
132300
117700
30683
34683
250000
AM-4 MSETCL SWITCHYARD
100M WIDE ROAD
45M WIDE ROAD
THIS AREA SHALL BE DEVELOPED BY MSETCL IN FUTURE
AM-3 AVAADA ELECTRO SWITCHYARD
7.5M WIDE ROAD
7.5M WIDE ROAD
7.5M WIDE ROAD
15800
8000
R Y B
R Y B
This approval does not absolve you from your responsibility from supplying material as per M.S.E.T.C.L specifications and relevant standards / requirements
APPROVED
Executive Engineer (DSE-S2)
Design Department
M.S.E.T.C.L. "Prakashganga"
BKC, Bandra (East), Mumbai-51
VERIFIED BY
CHECKED BY

REV	DATE	DESCRIPTION	DRAWN
01	21.03.2025	AS PER MSETCL SWITCHYARD SHIFTED 38M TOWARDS WEST SIDE & CONTROL ROOM	VY
00	29.01.2025	FIRST ISSUE	VY

PROJECT TITLE: 220kV SWITCHING STATION (COMBINED PLOT) BUTIBORI, DISTT. NAGPUR, MAHARASHTRA

CLIENT: MAHATRANSCO — M/s MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.

EPC CONTRACTOR : AVAADA — M/s AVAADA ELECTRO PVT. LTD

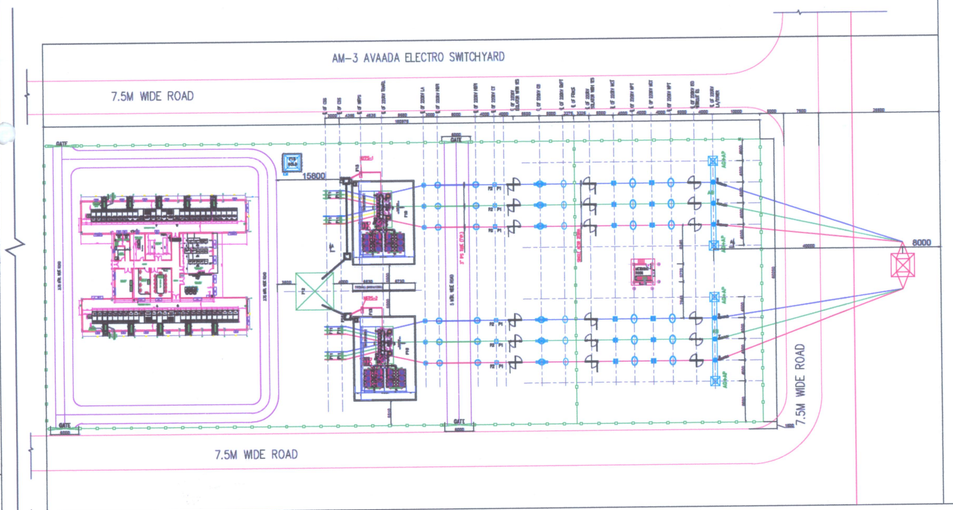
DRAWING TITLE: 220KV SWITCHING STATION - OVERALL PLAN LAYOUT

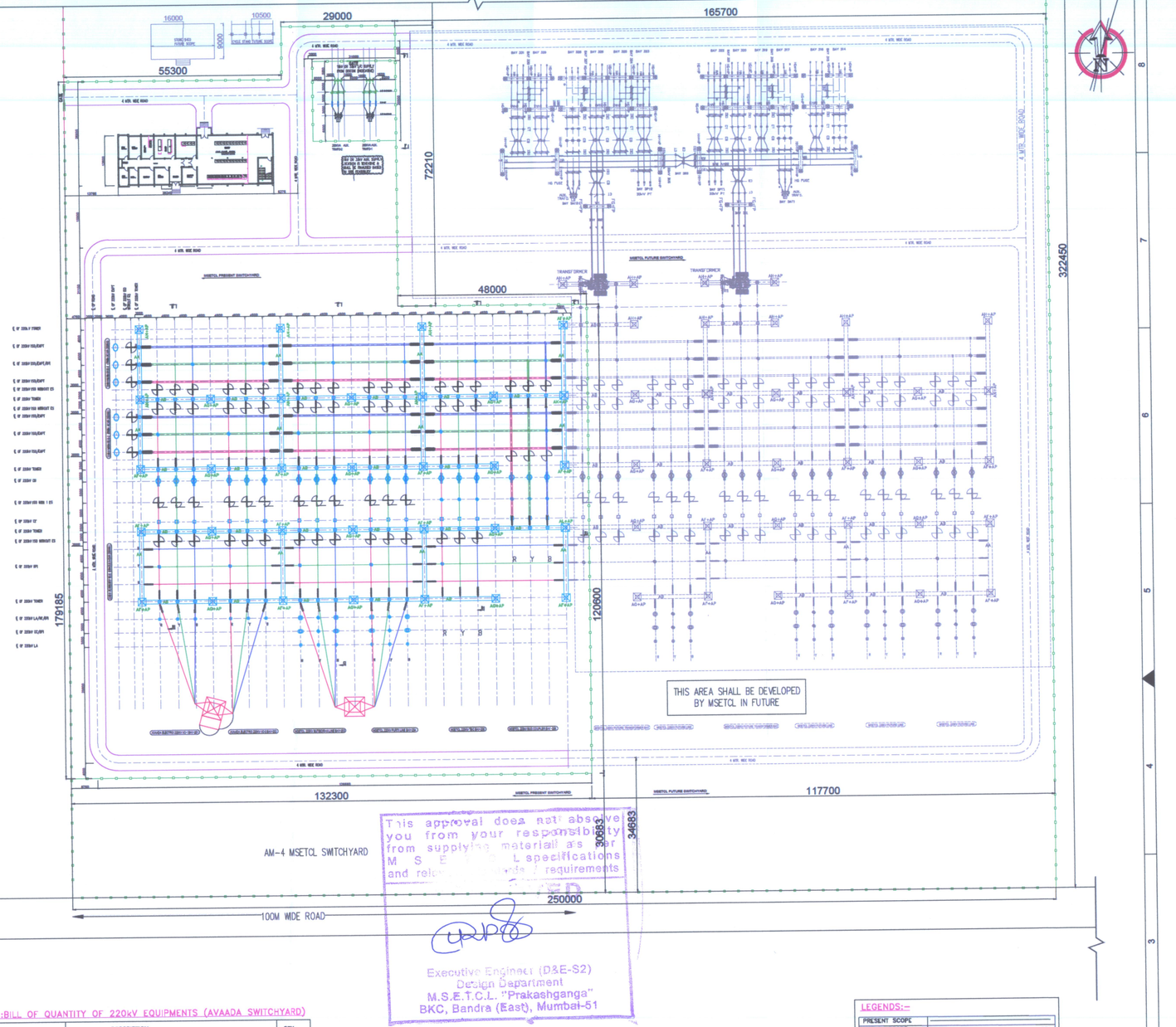
DRAWING NO :	AECBM1-AMF-228-EL-LYO-1201	SCALE	NTS
DRAWN	VY	SHEET NO	SH-01 OF SH-04
CHECKED	SM		
REVIEWED	KJ	PAPER SIZE	A1
APPROVED	VKJ		
DATE	21.03.2025	REV. NO.	R1

TABLE-6 :BILL OF QUANTITY OF 220kV EQUIPMENTS (MSETCL SWITCHYARD)#

ITEM No.	SYMBOL	DESCRIPTION	QTY
01		245kV,3150A,50kA FOR 3sec,SF6,3-PHASE CIRCUIT BREAKER	06 Set.
02		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITH ONE EARTH SWITCH (MOTOR OPERATED)	04 Set.
03		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITHOUT EARTH SWITCH (MOTOR OPERATED)	17 Set.
04		245kV,50kA FOR 1sec, 1-PHASE, CURRENT TRANSFORMER (LIVE TANK TYPE) 1600-800/1-1-1-1-1A	03 NOs.
05		245kV,50kA FOR 1sec, 1-PHASE, CURRENT TRANSFORMER (LIVE TANK TYPE) 800-400/1-1-1-1-1A	15 NOs.
06		0.5mH, 1250A, WAVE TRAP (2 PH. ONLY)	04 NOs.
07		6600pF COUPLING CAPACITOR (2 PH. ONLY)	04 NOs.
08		245KV,50KA FOR 1 SEC, 1-PH EMPT, 220KV/√3/110V/√3 CL:3P,200VA, 220KV/√3/110V/√3 CL:3P,50VA, 220KV/√3/110V/√3 CL:0.2,50VA,	06 NOs.
09		198kV,10kA, 1-PHASE, LIGHTNING ARRESTER	12 NOs.
10		220kV BUS POST INSULATOR 6kN	27 NOs.
11		BAY MARSHALLING KIOSK	06 NOs.
12		200KVA AUXILIARY TRANSFORMER	02 NOs.
13		FENCE	-----
14		CENTER LINE	-----
15		HORN GAPE FUSE	6 NOs.
16		33kV ISOLATOR	2 Sets.

THIS SWITCHYARD IS BEING DEVELOPED BY AVAADA ELECTRO ON COMPLETE REIMBURSEMENT BASIS BY MSETCL





This approval does not absolve you from your responsibility from supplying material as per M S E T C L specifications and relevant codes / requirements

Executive Engineer (D&E-S2)
Design Department
M.S.E.T.C.L. "Prakashganga"
BKC, Bandra (East), Mumbai-51

VERIFIED BY
CHECKED BY

TABLE-1 :SYSTEM PARAMETERS

Sl.No.	DESCRIPTION OF PARAMETER	UNIT	220kV SYSTEM	33kV SYSTEM
01	SYSTEM OPERATING VOLTAGE	kV	220	33
02	HIGHEST SYSTEM VOLTAGE	kV	245	36
03	ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE DRY AND WET (RMS)	kV	460	70
04	LIGHTING IMPULSE WITHSTAND VOLTAGE	kVp	1050	170
05	SWITCHING IMPULSE WITHSTAND VOLTAGE	kVp	–	–
06	MIN. CREEPAGE DISTANCE	mm/kV	25	25
07	SHORT CIRCUIT CURRENT (FOR 1 SEC.)	kA	50	25
08	FREQUENCY	Hz	50	50
09	CORONA EXTINCTION VOLTAGE	kV	156	–

TABLE-2:- MIN CLEARANCE DETAIL

Sl.No.	DESCRIPTION	220kV SYSTEM	33kV SYSTEM
01	PHASE TO PHASE	2100mm	320mm
02	PHASE TO EARTH	2100mm	320mm
03	SECTIONAL CLEARANCE	5000mm	2800mm
04	GROUND CLEARANCE	5900mm	3700mm
05	INSULATOR BOTTOM TO GROUND	>2440mm	-----

TABLE-4 :BILL OF QUANTITY OF 33kV EQUIPMENTS

ITEM No.	SYMBOL	DESCRIPTION	QTY
01		33kV CABLE SUPPORT STRUCTURE	08 NOs.
02		33kV BUS POST INSULATOR	48 NOs.
03		30kV SURGE ARRESTOR (POLYMER TYPE)	12 NOs.

TABLE-3:-220KV CONDUCTOR & STRINGING DETAILS R1

SL.NO.	DESCRIPTION	CONDUCTOR DETAILS	TENSION INSULATOR STRING/PHASE	SUSPENSION INSULATOR
01	MAIN BUS-1 MAIN BUS-2	TWIN ACSR ZEBRA CONDUCTOR WITH 330MM SUB-CONDUCTOR SPACING	DOUBLE TENSION 120kN PORCELAIN INSULATOR	SINGLE SUSPENSION 90kN PORCELAIN INSULATOR
02	JACKBUS FOR LINE BAY	SINGLE ACSR ZEBRA CONDUCTOR	SINGLE TENSION 120kN PORCELAIN INSULATOR	–
03	JACKBUS FOR BUS COUPLER BAY	TWIN ACSR ZEBRA CONDUCTOR	DOUBLE TENSION 120kN PORCELAIN INSULATOR	–
04	DROPPERS FOR LINE BAY	SINGLE ACSR ZEBRA CONDUCTOR	SINGLE TENSION 120kN PORCELAIN INSULATOR	SINGLE SUSPENSION 90kN PORCELAIN INSULATOR
05	DROPPERS FOR BUS COUPLER BAY	TWIN ACSR ZEBRA CONDUCTOR	DOUBLE TENSION 120kN PORCELAIN INSULATOR	SINGLE SUSPENSION 90kN PORCELAIN INSULATOR
06	EQUIPMENT INTERCONNECTION	SINGLE ACSR ZEBRA CONDUCTOR	–	NA
07	EARTH WIRE	7/3.15MM GAL. STEEL STRANDED EARTH WIRE	–	NA

TABLE-5 :BILL OF QUANTITY OF 220kV EQUIPMENTS (AVAADA SWITCHYARD)

ITEM No.	SYMBOL	DESCRIPTION	QTY
01		245kV,3150A,50kA FOR 3sec,SF6,3-PHASE CIRCUIT BREAKER	02 Set.
02		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITH ONE EARTH SWITCH (MOTOR OPERATED)	04 Set.
03		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITHOUT EARTH SWITCH (MOTOR OPERATED)	02 Set.
04		245kV,50kA FOR 1sec, 1-PHASE, CURRENT TRANSFORMER (LIVE TANK TYPE) 800-400/1-1-1-1-1A	06 NOs.
05		245kV,50kA FOR 1sec, 1-PHASE, METERING CURRENT TRANSFORMER (LIVE TANK TYPE) 400/1A	12 NOs.
06		245KV,50KA FOR 1 SEC, 1-PH MPT, 220KV/√3/110V/√3 CL:0.2,15VA,	12 NOs.
07		245KV,50KA FOR 1 SEC, 1-PH EMPT, 220KV/√3/110V/√3 CL:3P,200VA, 220KV/√3/110V/√3 CL:3P,50VA, 220KV/√3/110V/√3 CL:0.2,50VA,	06 NOs.
08		198kV,10kA, 1-PHASE, LIGHTNING ARRESTER	12 NOs.
09		220/33-33KV, 3-PH., 160/200MVA POWER TRANSFORMER	02 NOs.
10		NIFPS PANEL (POWER TRANSFORMER)	02 NOs.
11		220kV HIGH BUS POST INSULATOR 8kN	12 NOs.
12		OIL FILTRATION & WELDING RECEPTACLE	02 NOs.
13		LM	01 NO.
14		FENCE	-----
15		CENTER LINE	-----

NOTES:-
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED. ALL DIMENSIONS ARE TENTATIVE MAY CHANGE AS PER SITE CONDITIONS.
2. 7/3.15mm DIA. GI EARTHWIRE SHALL BE USED FOR LIGHTNING PROTECTION.
3. ALL THE BUS HEIGHTS ARE REFERED FROM FGL.
4. THE POWER CONNECTORS & HARDWIRES SHALL BE DESIGNED FOR 50kA/1 SEC. FOR 220 & 25kA/1 SEC FOR 33kV SYSTEM AS PER TECHNICAL SPECIFICATION, SECTION.
5. THE PLOT BOUNDARY MARKED IS INDICATIVE. THE SAME SHALL BE REVISED ON RECEIPT OF EXACT MARKING FROM SITE.
6. ROAD SIDE BOUNDARY WALL 7 EQUIPMENT SHOWN AS FUTURE ARE NOT IN SCOPE OF WORK.
7. BOTH 200 MVA, 220/33-33 KV POWER TRANSFORMERS SHALL OPERATE SIMULTANEOUSLY TO SUPPLY THE PLANT LOAD, WITH METERING DONE VIA SUMMATION METERING SYSTEM. IN THE EVENT OF AN OUTAGE OF EITHER TRANSFORMER, THE OTHER TRANSFORMER SHALL SUPPLY THE ENTIRE MANUFACTURING UNIT LOAD.
8. PLINTH HEIGHT OF FOUNDATION WILL BE +450MM FROM THE FINISED GROUND LEVEL (F.G.L) GRAVEL THICKNESS SHALL BE 150MM FROM F.G.L
9. TERMINAL OF THE SHIELD WIRE, TENSION CLAMP, INSULATOR STRING WITH HARDWARE AND CONDUCTORS ARE IN SCOPE OF LINE CONTRACTOR.
10. THE POSITION OF LIGHTING MASTS IS TENTATIVE AND WILL BE FINALISED UPON COMPLETION OF DIRECT STROKE LIGHTNING PROTECTION AND ILLUMINATION CALCULATIONS.
11. THE POSITION OF LIGHTING MASTS IS TENTATIVE AND WILL BE FINALISED UPON COMPLETION OF DIRECT STROKE LIGHTNING
12. SHIELD WIRE WILL BE USED FOR DIRECT STROKE LIGHTNING PROTECTION WHEREVER THEY ARE AVAILABLE.
13. RESPECTIVE EQUIPMENT DRAWINGS SHALL BE REFERRED TO FOR EQUIPMENT DIMENSIONS AND DETAILS.
14. SPARES NOT INCLUDED.
15. LOCATION & QUANTITY OF LIGHTING MASTS (LM) SHALL BE FINALIZED AT THE TIME OF LIGHTING LAYOUT APPROVAL.
16. BATTERY SUPPLY VOLTAGE : 220V DC & 48V DC SAN CONTAINER BATTERY ALONG WITH MICRO-CONTROLLER BASED BATTERY CHARGER FOR EACH BATTERY SET
17. LOCATION OF DEAD END TOWERS IS TENTATIVE AND WILL BE FINALIZED DDE AND DURING ACTUAL TOWER SPOTTING. R1

LEGENDS:-

PRESENT SCOPE	
NOT IN SCOPE	

REV	DATE	DESCRIPTION	DRAWN
01	21.03.2025	AS PER MSETCL SWITCHYARD SHIFTED 38M TOWARDS WEST SIDE & CONTROL ROOM	VY
00	29.01.2025	FIRST ISSUE	VY

PROJECT TITLE: 220kV SWITCHING STATION (COMBINED PLOT) BUTIBORI, DISTT. NAGPUR, MAHARASHTRA

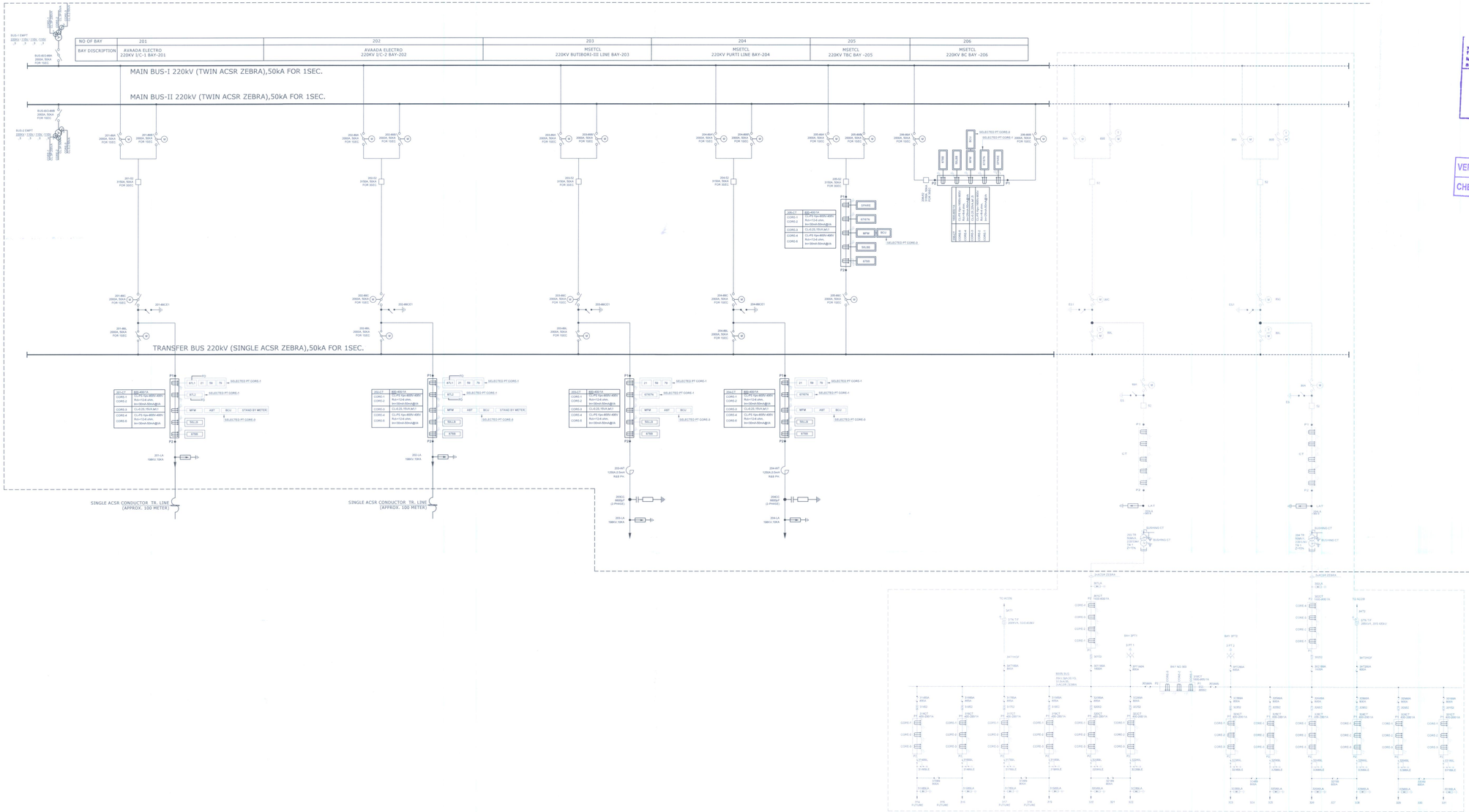
CLIENT: M/s MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.

EPC CONTRACTOR : M/s AVAADA ELECTRO PVT. LTD

DRAWING TITLE: 220kV SWITCHING STATION - PLAN LAYOUT AND SECTION

DRAWING NO : AECBM1-AMF-228-EL-LYO-1201

DRAWN	VY	SCALE	NTS
CHECKED	SM	SHEET NO	SH-02 OF SH-04
REVIEWED	KJ	PAPER SIZE	A1
APPROVED	VKJ	REV. NO.	01
DATE	21.03.2025		



220KV MSETCL SIDE

LEGENDS DESCRIPTION

ABT	AVAILABILITY BASED TARIFF METER BI-DIRECTIONAL
67,67N	IDMT DIRECTIONAL O/C AND E/F PROTECTION
50LBB	LBB PROTECTION
MFM	MULTIFUNCTION METER
59	OVER VOLTAGE PROTECTION
BCU	BAY CONTROL UNIT
79	AC-RECLOSING RELAY
21	LINE DISTANCE PROTECTION
87BB	BUS BAR PROTECTION
87L	LINE DIFFERENTIAL PROTECTION

TABLE-1 : BILL OF QUANTITY OF 220kV EQUIPMENTS (MSETCL SWITCHYARD)

ITEM No.	SYMBOL	DESCRIPTION	QTY
01		245kV,3150A,50kA FOR 3sec,SF6,3-PHASE CIRCUIT BREAKER	06 Set.
02		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITH TWO EARTH SWITCH (MOTOR OPERATED)	17 Set.
03		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITH ONE EARTH SWITCH (MOTOR OPERATED)	04 Set.
04		245kV,50kA FOR 1sec, 1-PHASE, CURRENT TRANSFORMER (LIVE TANK TYPE) 1600-800/1-1-1-1-1A	03 NOs.
05		245kV,50kA FOR 1sec, 1-PHASE, CURRENT TRANSFORMER (LIVE TANK TYPE) 800-400/1-1-1-1-1A	15 NOs.
06		EMPT 220KV / 110V / 110V / 110V 3 3 3 CORE-1 CL-3P-200VA, CORE-2 CL-3P-50VA, CORE-3 CL-0.2-50VA	06 NOs.
07		198kV,10kA, 1-PHASE, LIGHTNING ARRESTER	12 NOs.
08		0.5mH, 1250A, WAVE TRAP (2 Phase)	04 NOs.
09		6600pF COUPLING CAPACITOR (2 Phase)	04 NOs.

EQUIPMENT LEGEND 33kV SIDE

SYMBOLS	DESCRIPTION
	LIGHTING ARRESTER
	VOLTAGE TRANSFORMER
	ISOLATOR (HORIZONTAL DOUBLE BREAK MOTORIZED) WITH SINGLE E/S
	VACUUM CIRCUIT BREAKER(OUTDOOR)
68	CURRENT TRANSFORMER
	ISOLATOR (HORIZONTAL DOUBLE BREAK MOTORIZED) WITHOUT E/S
	33kV AUX TRANSFORMER

NOTES:-

1. EARTH SWITCH SHOULD HAVE MECHANICAL INTERLOCK WITH ISOLATOR.
2. EARTHING OF CT SECONDARY SHOULD BE DONE AT CRP END.
3. CONTROL POWER SUPPLY IS 220V DC FOR MSETCL SWITCHYARD.
4. LINE PANEL RELAYS SHALL BE AS PER MSETCL APPROVED MAKE AND MODEL.
5. ALL NUMERICAL/IED RELAYS, BCU SHALL BE CAPABLE OF COMMUNICATING WITH SAS USING THE IEC 61850 PROTOCOL.
6. ELECTRICAL INTERLOCK TO BE PROVIDED BETWEEN ISOLATOR AND CIRCUIT BREAKER SUCH THAT ISOLATOR CAN BE OPERATED ONLY WHEN THE BREAKERS IN OPEN CONDITION.
7. MFM'S SHALL BE COMMUNICATED THROUGH RS485/MODBUS TCP.
8. LINE LENGTH BEING APPROXIMATELY 100 METER, LINE DIFFERENTIAL PROTECTION IS ENVISAGED WHICH SHALL BE ACHIEVED BY DIRECT COMMUNICATION BETWEEN BOTH END RELAYS VIA OPCW FO CABLE @MSETCL AND AVAADA END.
9. MSETCL SWITCHYARD 220KV BUSBAR PROTECTION SCHEME SHALL BE CENTRALIZED TYPE.
10. THE AUXILIARY POWER SCHEME IS INDICATIVE. MSETCL HAS TO FACILITATE THE 11 OR 33KV SUPPLY FROM NEAREST MSEDCL SUBSTATION.

REV	DATE	DESCRIPTION	DRAWN
00	29.01.2025	FIRST ISSUE	SK

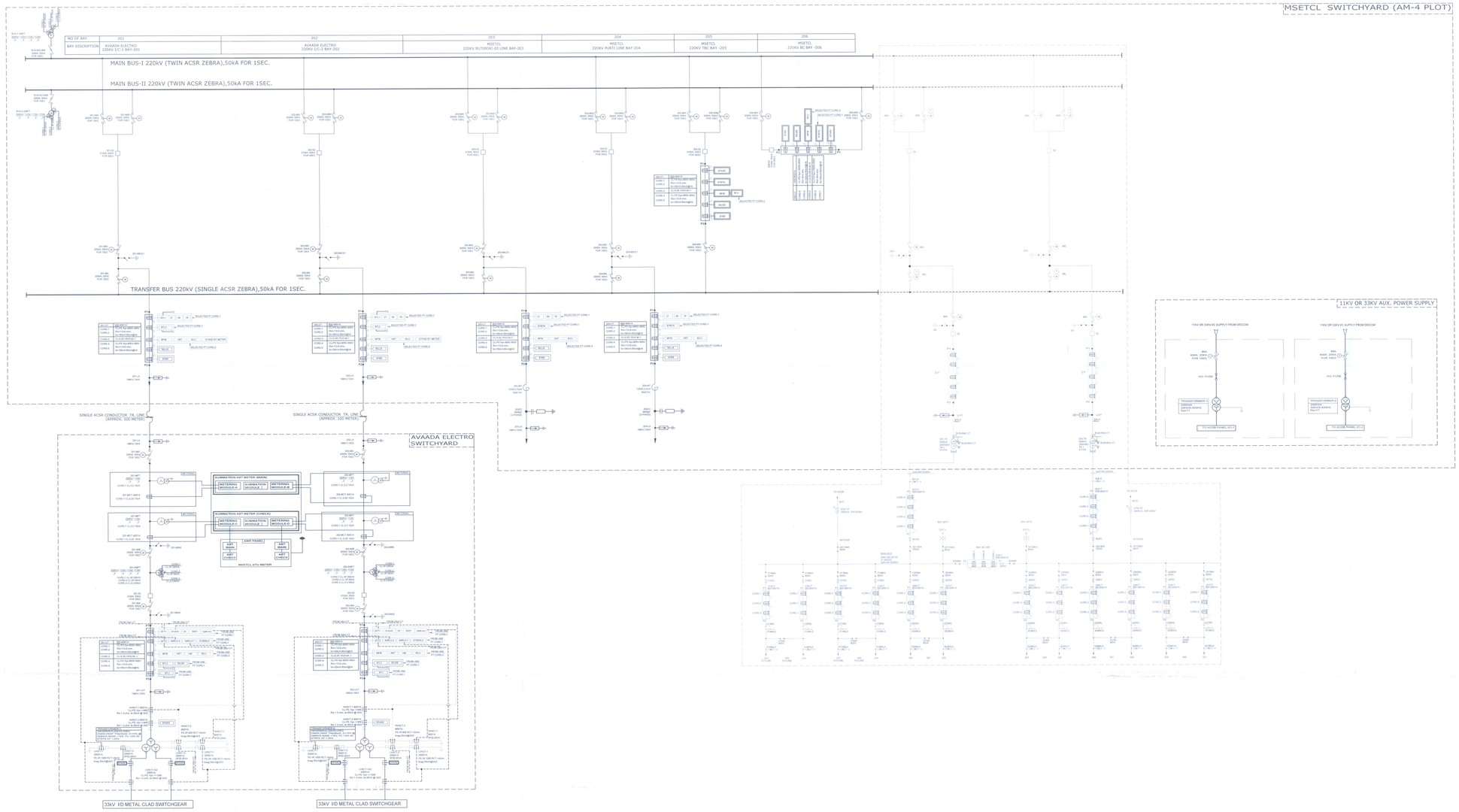
PROJECT TITLE: 220kV SWITCHING STATION (COMBINED PLOT) BUTIBORI, DISTT. NAGPUR, MAHARASHTRA

CLIENT: MAHATRANSCO — M/s MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.

EPC CONTRACTOR : AVAADA — M/s AVAADA ELECTRO PVT. LTD

DRAWING TITLE: 220kV SWITCHYARD KEY SINGLE LINE DIAGRAM

DRAWING NO : AECBM1-AMF-274-EL-SLD-1022			SCALE	NTS
DRAWN	VK		SHEET NO	SH-02 OF SH-02
CHECKED	VK			
REVIEWED	KJ		PAPER SIZE	A1
APPROVED	VKJ		REV. NO.	00
DATE	29.01.2025			



220KV AVAADA SIDE

LEGENDS	DESCRIPTION
ABT	AVAILABILITY BASED TARIFF METER BI-DIRECTIONAL
87L	LINE DIFFERENTIAL PROTECTION
87T	TRAFO. DIFFERENTIAL PROTECTION
64R	RESTRICTRD EARTH FAULT PROTECTION
50,50N	DEFINITE TIME O/C & EARTH FAULT PROTECTION. (NON DIRECTIONAL)
51,51N	IDMT O/C & EARTH FAULT PROTECTION. (NON DIRECTIONAL)
67,67N	IDMT DIRECTIONAL O/C AND E/F PROTECTION
51G	STANDBY E/F PROTECTION
24	OVER FLUXING PROTECTION
50LBB	LBB PROTECTION
MFM	MULTIFUNCTION METER
BCU	BAY CONTROL UNIT

220KV MSETCL SIDE

LEGENDS	DESCRIPTION
ABT	AVAILABILITY BASED TARIFF METER BI-DIRECTIONAL
67,67N	IDMT DIRECTIONAL O/C AND E/F PROTECTION
50LBB	LBB PROTECTION
MFM	MULTIFUNCTION METER
59	OVER VOLTAGE PROTECTION
BCU	BAY CONTROL UNIT
79	AC-RECLOSING RELAY
21	LINE DISTANCE PROTECTION
87BB	BUS BAR PROTECTION
87L	LINE DIFFERENTIAL PROTECTION

NOTES:-

1. EARTH SWITCH SHOULD HAVE MECHANICAL INTERLOCK WITH ISOLATOR.
2. EARTHING OF CT SECONDARY SHOULD BE DONE AT CRP END.
3. CONTROL POWER SUPPLY IS 220V DC FOR MSETCL SWITCHYARD & 110V DC FOR AVAADA SWITCHYARD.
4. 33 KV METAL CLAD SWITCHGEAR INCOMER AND BUS COUPLER SHALL HAVE MECHANICAL & ELECTRICAL INTERLOCK.
5. TRANSFORMER DIFFERENTIAL AND REF RELAY SHALL BE IDENTICAL TO EACH OTHER.
6. LINE PANEL RELAYS SHALL BE AS PER MSETCL APPROVED MAKE AND MODEL.
7. MSETCL APPROVAL IS SOUGHT ONLY FOR MSETCL SWITCHYARD ONLY.
8. BOTH 200 MVA, 220/33-33 KV POWER TRANSFORMERS SHALL OPERATE SIMULTANEOUSLY TO SUPPLY THE PLANT LOAD, WITH METERING DONE VIA SUMMATION METERING SYSTEM. IN THE EVENT OF AN OUTAGE OF EITHER TRANSFORMER, THE OTHER TRANSFORMER SHALL SUPPLY THE ENTIRE MANUFACTURING UNIT LOAD.
9. METERING SCHEME ALONG WITH CT & PT RATING AND CORE AS PER MSETCL/MSEDCL REQUIREMENTS.
10. ALL NUMERICALFED RELAYS, BCU SHALL BE CAPABLE OF COMMUNICATING WITH SAS USING THE IEC 61850 PROTOCOL.
11. ELECTRICAL INTERLOCK TO BE PROVIDED BETWEEN ISOLATOR AND CIRCUIT BREAKER SUCH THAT ISOLATOR CAN BE OPERATED ONLY WHEN THE BREAKERS IN OPEN CONDITION.
12. MFM'S SHALL BE COMMUNICATED THROUGH RS485/MODBUS TCP.
13. LINE LENGTH BEING APPROXIMATELY 100 METER, LINE DIFFERENTIAL PROTECTION IS ENVISAGED WHICH SHALL BE ACHIEVED BY DIRECT COMMUNICATION BETWEEN BOTH END RELAYS VIA OPGW TO CABLE @MSETCL AND AVAADA END.
14. MSETCL SWITCHYARD 220KV BUSBAR PROTECTION SCHEME SHALL BE CENTRALIZED TYPE.
15. THE AUXILIARY POWER SCHEME IS INDICATIVE. MSETCL HAS TO FACILITATE THE 11 OR 33KV SUPPLY FROM NEAREST MSEDCL SUBSTATION.

TABLE-1 : BILL OF QUANTITY OF 220kV EQUIPMENTS (MSETCL SWITCHYARD)

ITEM No.	SYMBOL	DESCRIPTION	QTY
01		245kV,3150A,50kA FOR 3sec,SF6,3-PHASE CIRCUIT BREAKER	06 Set.
02		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITH TWO EARTH SWITCH (MOTOR OPERATED)	17 Set.
03		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITH ONE EARTH SWITCH (MOTOR OPERATED)	04 Set.
04		245kV,50kA FOR 1sec, 1-PHASE, CURRENT TRANSFORMER (LIVE TANK TYPE) 1600-800/1-1-1-1-1A	03 NOs.
05		245kV,50kA FOR 1sec, 1-PHASE, CURRENT TRANSFORMER (LIVE TANK TYPE) 800-400/1-1-1-1-1A	15 NOs.
06		EMPT 220KV / 110V_ / 110V_ /110V 3 3 3 3 CORE-1 CL: 3P: 200VA, CORE-2 CL: 3P: 50VA, CORE-3 CL: 0.2: 50VA	06 NOs.
07		198kV,10kA, 1-PHASE, LIGHTNING ARRESTER	12 NOs.
08		0.5mH, 1250A, WAVE TRAP (2 Phase)	04 NOs.
09		6600pF COUPLING CAPACITOR (2 Phase)	04 NOs.

TABLE-2 : BILL OF QUANTITY OF 220kV EQUIPMENTS (AVAADA SWITCHYARD)

ITEM No.	SYMBOL	DESCRIPTION	QTY
01		245kV,3150A,50kA FOR 3sec,SF6,3-PHASE CIRCUIT BREAKER	02 Set.
02		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITHOUT EARTH SWITCH (MOTOR OPERATED)	02 Set.
03		245kV,2000A,50kA FOR 1sec, 3-PHASE HORIZONTAL DOUBLE BREAK ISOLATOR WITH ONE EARTH SWITCH (MOTOR OPERATED)	04 Set.
04		245kV,50kA FOR 1sec, 1-PHASE, CURRENT TRANSFORMER (LIVE TANK TYPE) 800-400/1-1-1-1-1A	06 NOs.
05		245kV,50kA FOR 1sec, 1-PHASE, METERING CURRENT TRANSFORMER (LIVE TANK TYPE) 400/1A	12 NOs.
06		245KV,50KA FOR 1 SEC, 1-PH MPT, 220KV/√3/110V/√3 CL:0.2,15VA,	12 NOs.
07		EMPT 220KV / 110V_ / 110V_ /110V 3 3 3 3 CORE-1 CL: 3P: 200VA, CORE-2 CL: 3P: 50VA, CORE-3 CL: 0.2: 50VA	06 NOs.
08		198kV,10kA, 1-PHASE, LIGHTNING ARRESTER	12 NOs.
09		220/33-33KV, 3-PH., 160/200MVA POWER TRANSFORMER	02 NOs.

EQUIPMENT LEGEND 33kV SIDE

SYMBOLS	DESCRIPTION
	LIGHTING ARRESTOR
	VOLTAGE TRANSFORMER
	ISOLATOR (HORIZONTAL DOUBLE BREAK MOTORIZED) WITH SINGLE E/S
	VACUUM CIRCUIT BREAKER(OUTDOOR)
	CURRENT TRANSFORMER
	ISOLATOR (HORIZONTAL DOUBLE BREAK MOTORIZED) WITHOUT E/S
	33kV AUX TRANSFORMER
	VACUUM CIRCUIT BREAKER (INDOOR)

REV	DATE	DESCRIPTION	DRAWN
00	29.01.2025	FIRST ISSUE	SK

PROJECT TITLE: 220kV SWITCHING STATION (COMBINED PLOT) BUTIBORI, DISTT. NAGPUR, MAHARASHTRA

CLIENT: M/s MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.

EPC CONTRACTOR : M/s AVAADA ELECTRO PVT. LTD

DRAWING TITLE: 220KV SWITCHYARD KEY SINGLE LINE DIAGRAM

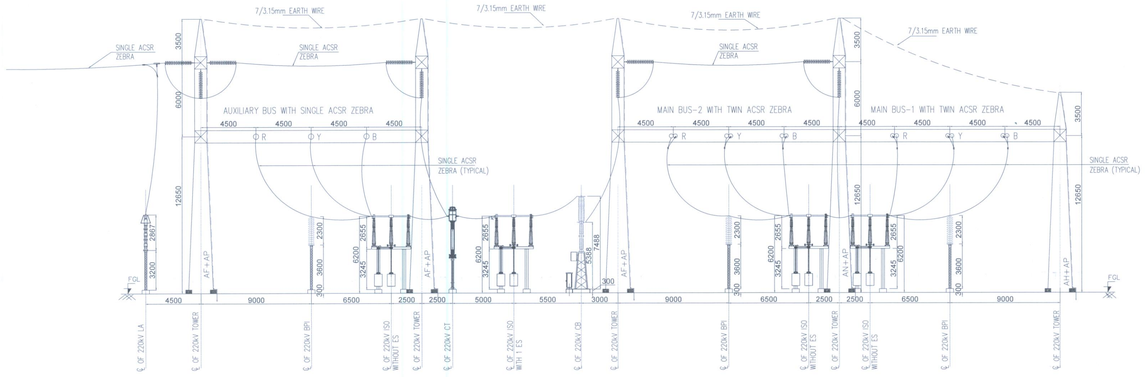
DRAWING NO : AECBM1-AMF-274-EL-SLD-1022

DRAWN	VY	SCALE	NTS
CHECKED	VY	SHEET NO	SH-01 OF SH-02
REVIEWED	KJ	PAPER SIZE	A0
APPROVED	VKJ	REV. NO.	00
DATE	29.01.2025		

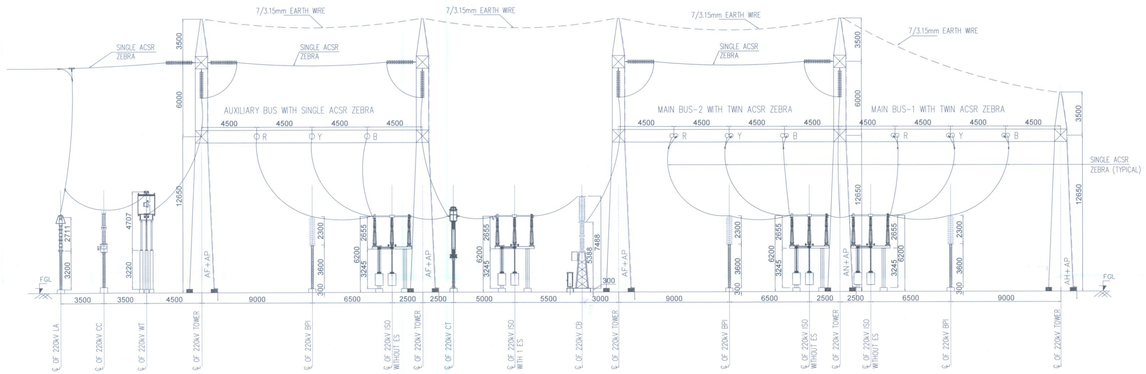
This approval does not absolve you from your responsibility from supplying material as per the specifications and relevant codes / requirements
APPROVED
Executive Engineer (O&C-02)
Design Department
M.S.E.T.C.L. "Prakashganga"
BKC, Bandra (East), Mumbai - 51.

VERIFIED BY
CHECKED BY

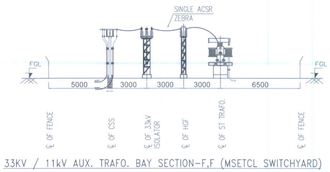
VERIFIED BY
CHECKED BY



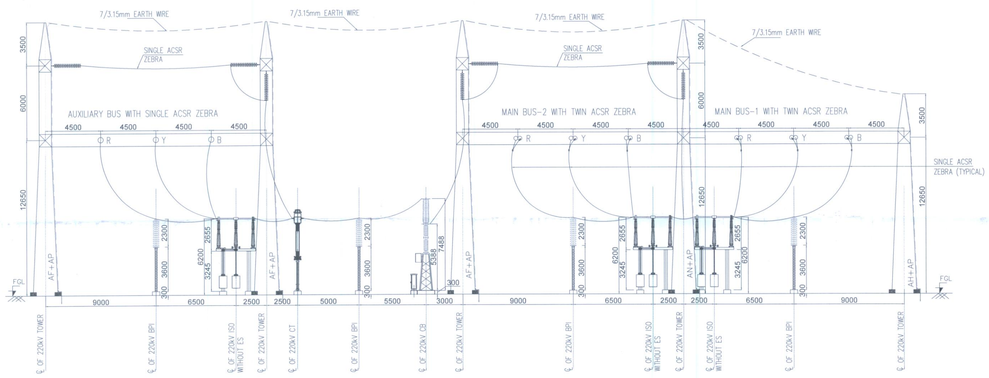
220KV SIDE LINE BAY SECTION-B,B (MSETCL SWITCHYARD)



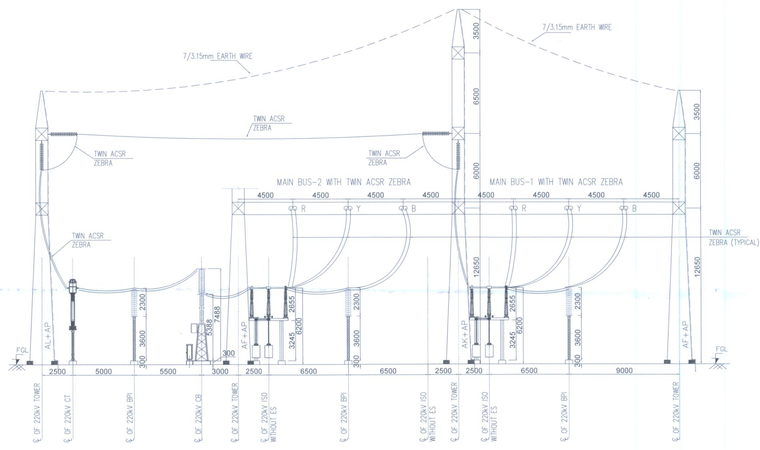
220KV SIDE LINE BAY SECTION-C,C (MSETCL SWITCHYARD)



33KV / 1.1kV AUX. TRAFO. BAY SECTION-F,F (MSETCL SWITCHYARD)



220KV SIDE TRANSFER BUS COUPLER BAY SECTION-D,D (MSETCL SWITCHYARD)



220KV SIDE BUS COUPLER BAY SECTION-E,E (MSETCL SWITCHYARD)

REV	DATE	DESCRIPTION	DRAWN
00	29.01.2025	FIRST ISSUE	VY

PROJECT TITLE: 220kV SWITCHING STATION (AM-4 PLOT) BUTIBORI, DISTT. NAGPUR, MAHARASHTRA

CLIENT: M/s MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.

EPC CONTRACTOR: M/s AVAADA ELECTRO PVT. LTD

DRAWING TITLE: 220KV SWITCHING STATION - PLAN LAYOUT AND SECTION

DRAWING NO : AECBM1-AMF-228-EL-LYO-1201

DRAWN	VY	SCALE	NTS
CHECKED	SM	SHEET NO	SH-03 OF SH-04
REVIEWED	KJ	PAPER SIZE	A1
APPROVED	VKJ	REV. NO.	00
DATE	29.01.2025		

OPGW and FOTE Details

400 KV Warora S/s		
Sr. No.	**Particulars**	**Details**
1	a. Existing Bus Bar Protection Scheme drawing along with following details:	
	1. Make:	ERL Sifang
	2. Model:	CSC-150
	b. Existing SAS Panel drawing along with following details:	
	1. Make:	ERL Sifang
	2. Model:	CSI-200EA
2	Is sufficient hardware is available in Bus Bar protection for connection of scope bays (Yes/No)	Yes
3	Provide the following details regarding existing FOTE:	**FOTE is not available**
	1. Make:	
	2. Model:	
	3. Capacity:	
	4. Spare optical port availability:	
4	OPGW availability (Yes/No)	Yes
5	OPGW -Fibre	Yes

Existing 220KV UMRED SS			
Sr. No.	**Particulars**	**Details**	
1	a. Existing Bus Bar Protection Scheme drawing along with following details:		
	1. Make:	ABB	
	2. Model:	REB 500	
	b. Existing SAS Panel drawing along with following details:		
	1. Make:	Not Available	
	2. Model:		
2	Is sufficient hardware is available in Bus Bar protection for connection of scope bays (Yes/No)	Spare Bay for integration is not Available .	
3	Provide the following details regarding existing FOTE:	**220KV Nagbhid Direction (Not Commissioned)**	**Praposed 220KV Pachgaon Direction**
	1. Make:	*M/s Amara Raja (M/s Rad)*	M/s Hitachi ernstwhile M/s ABB
	2. Model:	*Megaplex-4100*	FOX 615
	3. Capacity:	STM-4	STM-4
	4. Spare optical port availability:	Yes	Yes
4	OPGW availability (Yes/No)	Yes	Proposed
5	OPGW -Fibre	1. For 220KV Nagbhid Direction(48 Nos.) 2. For 220KV Pachgaon Direction (24 Nos.) yet to commisssion	

220KV Kanhan SS			
Sr. No.	**Particulars**	**Details**	
1	a. Existing Bus Bar Protection Scheme drawing along with following details:	**132 Kv level**	**220 Kv level**
	1. Make:	ABB	SEL
	2. Model:	RADSS	SEL 487B
	b. Existing SAS Panel drawing along with following details:	Not Available	
	1. Make:		
	2. Model:		
2	Is sufficient hardware is available in Bus Bar protection for connection of scope bays (Yes/No)	Spare bay is not Available	2 nos of spare bay available for new feeder integration .
3	Provide the following details regarding existing FOTE:	**Proposed 220KV Panchgaon Direction**	
	1. Make:	**M/s Hitachi ernstwhile M/s ABB**	
	2. Model:	**FOX 615**	
	3. Capacity:	**STM-4**	
	4. Spare optical port availability:	**Yes**	
4	OPGW availability (Yes/No)	Proposed	
5	OPGW -Fibre	For 220KV Pachgaon Direction (24 Nos.) yet to commisssion	

132 KV Mouda SS		
Sr. No.	**Particulars**	**Details**
1	a. Existing Bus Bar Protection Scheme drawing along with following details:	
	1. Make:	Not Available
	2. Model:	
	b. Existing SAS Panel drawing along with following details:	
	1. Make:	Not Available
	2. Model:	
2	Is sufficient hardware is available in Bus Bar protection for connection of scope bays (Yes/No)	Not Applicable
3	Provide the following details regarding existing FOTE:	
	1. Make:	Not Available
	2. Model:	
	3. Capacity:	
	4. Spare optical port availability:	
4	OPGW availability (Yes/No)	Not Available
5	OPGW -Fibre	Not Available

132 KV Kolari SS		
Sr. No.	**Particulars**	**Details**
1	a. Existing Bus Bar Protection Scheme drawing along with following details:	
	1. Make:	**Ashida**
	2. Model:	**P746**
	b. Existing SAS Panel drawing along with following details:	
	1. Make:	**Ashida**
	2. Model:	**19LRUTI0002**
2	Is sufficient hardware is available in Bus Bar protection for connection of scope bays (Yes/No)	Yes (Provision for 2 future bays is available)
3	Provide the following details regarding existing FOTE:	
	1. Make:	**Not Available**
	2. Model:	
	3. Capacity:	
	4. Spare optical port availability:	
4	OPGW availability (Yes/No)	Not Available
5	OPGW -Fibre	Not Available

220/132 KV Nagbhid S/s

Sr. No.	Particulars	Details	
1	a. Existing Bus Bar Protection Scheme drawing along with following details:	**132 Kv level**	**220 Kv level**
	1. Make:	GE	GE
	2. Model:	B90	B90
	b. Existing SAS Panel drawing along with following details:		
	1. Make:	GE	
	2. Model:	DS Agile	
2	Is sufficient hardware is available in Bus Bar protection for connection of scope bays (Yes/No)	Yes (Total bays - 15 Nos, Utilized Bay- 05Nos, Spare bay Available - 10Nos)	Yes (Total bays - 15 Nos, Utilized Bay- 06 Nos, Spare bay Available - 09 Nos)
3	Provide the following details regarding existing FOTE:		
	1. Make:	Amarraja	
	2. Model:	Megaplx	
	3. Capacity:	STM4 upgradable to 16	
	4. Spare optical port availability:	available	
4	OPGW availability (Yes/No)	Yes	
5	OPGW -Fibre	48	

220 KV Bhandara S/s			
Sr. No.	**Particulars**	**Details**	
1	a. Existing Bus Bar Protection Scheme drawing along with following details:	**132 Kv level**	**220 Kv level**
	1. Make:	NR	NR
	2. Model:	PCS-915 SC	PCS-915
	b. Existing SAS Panel drawing along with following details:	**Not Available**	
	1. Make:		
	2. Model:		
2	Is sufficient hardware is available in Bus Bar protection for connection of scope bays (Yes/No)	Yes (Total bays - 16 Nos, Utilized Bay- 13 Nos, Spare bay Available - 03 Nos)	Yes (Total bays: 11Nos. Utilized Bay: 08.Nos, Spare Bay: 03.Nos.)
3	Provide the following details regarding existing FOTE:	**Not Available**	
	1. Make:		
	2. Model:		
	3. Capacity:		
	4. Spare optical port availability:		
4	OPGW availability (Yes/No)	No	
5	OPGW -Fibre	No	