

Rev.	Description	Date	Prepa.	Check.	Releas.
G	/	--/--	/	/	/
F	/	--/--	/	/	/
E	Colour code changed	13/03/13	SP	SK	GR
D	High speed earth switch position changed	06/03/13	SP	SK	GR
C	Cone positions are changed	26/06/12	SP	SK	GR
B	Updated based on comments recived on 30/05/12	05/06/12	SP	SK	GR
A	First Issue	10/05/12	SP	SK	GR

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CREATION	MODIFICATION	VERIFICATION	APPROBATION
DATE 10/05/12 NAME PRABU S	DATE 13/03/13 NAME PRABU S	DATE 10/05/12 NAME KARTHI S	DATE 10/05/12 NAME GAUTAM R

A1H 

SCALE: NTS A0 : 3

Comm.No: GD035

Voltage : - 420kV

400kV GIS (T155)
GAS-SINGLE LINE DIAGRAM

ALSTOM	PAGE 1/2	GD53A000086	REVISION E
T&D GIS/CHENNAI INDIA			

SYSTEM PARAMETER	
Rated current (Ir)	
- Bus bar, Bus coupler, Line & ICT Bays	3150 A
Rated Voltage (Ur)	420 kV, fr =50Hz
Rated short circuit current (Ik)	50 kA, 3 Sec
Power frequency withstand voltage(Ud)	
-Phase to earth and between phases	650 kV rms
-Across open terminals	815 kV rms
Lightning impulse withstand Voltage (Up)	
-Phase to earth and between phases	1425 kVp
-Between open contacts	1425(+240) kVp
Switching impulse withstand Voltage (Us)	
-Phase to earth	1050 kVp
-Between open contacts	900(+345) kVp
Peak withstand current (Ip)	125 kA

VOLTAGE TRANSFORMER DATA (EMVT)						
According to IEC 60044-2						
VT NO	Quantity (1 phase)	Core	Ratio (kV)	Output (VA)	Class	Thermal Withstand in secondaries (VA)
T6-1 T6-2	6 Nos	VT-1	400/√3 0.11/√3	50	3P	1000
		VT-2	400/√3 0.11/√3	50	3P	
		VT-3	400/√3 0.11/√3	50	0.2	

CURRENT TRANSFORMER											
According to IEC 60044-1											
fr - 50 Hz		Ith - 50 kA / 3 s		Idyn - 100 kAp		Icth - 120 %			Iext = Icth		
CT No	Bay Name	Quantity (1 phase)	Alstom Ref	Ratio (A)	Accuracy class	Output (VA)	ISF	Max. KPv (V)	RCT (Ω) at 75deg C	Max. Exciting Current (mA) at V _k /2	
CT-1	Line-1 Line-2 ICT-1 ICT-2 ICT-3 Bus Coupler	P1	F1	3000 - 1000/1	PS	-	-	2000 - 750 V	12 - 4	50 mA	
			F1	3000 - 1000/1	PS	-	-	2000 - 750 V	12 - 4	50 mA	
			F1	3000 - 1000/1	PS	-	-	2000 - 750 V	12 - 4	50 mA	
			F1	3000 - 1000/1	PS	-	-	2000 - 750 V	12 - 4	50 mA	
		P2	N2	3000 - 1000/1	0.2	20	< 5	-	-	-	-

Notes - N2 Core: Accuracy class given only on the highest ratio. ISF < 5 applicalbe for both tappings. Ie - To be confirmed with supplier

APPROVED

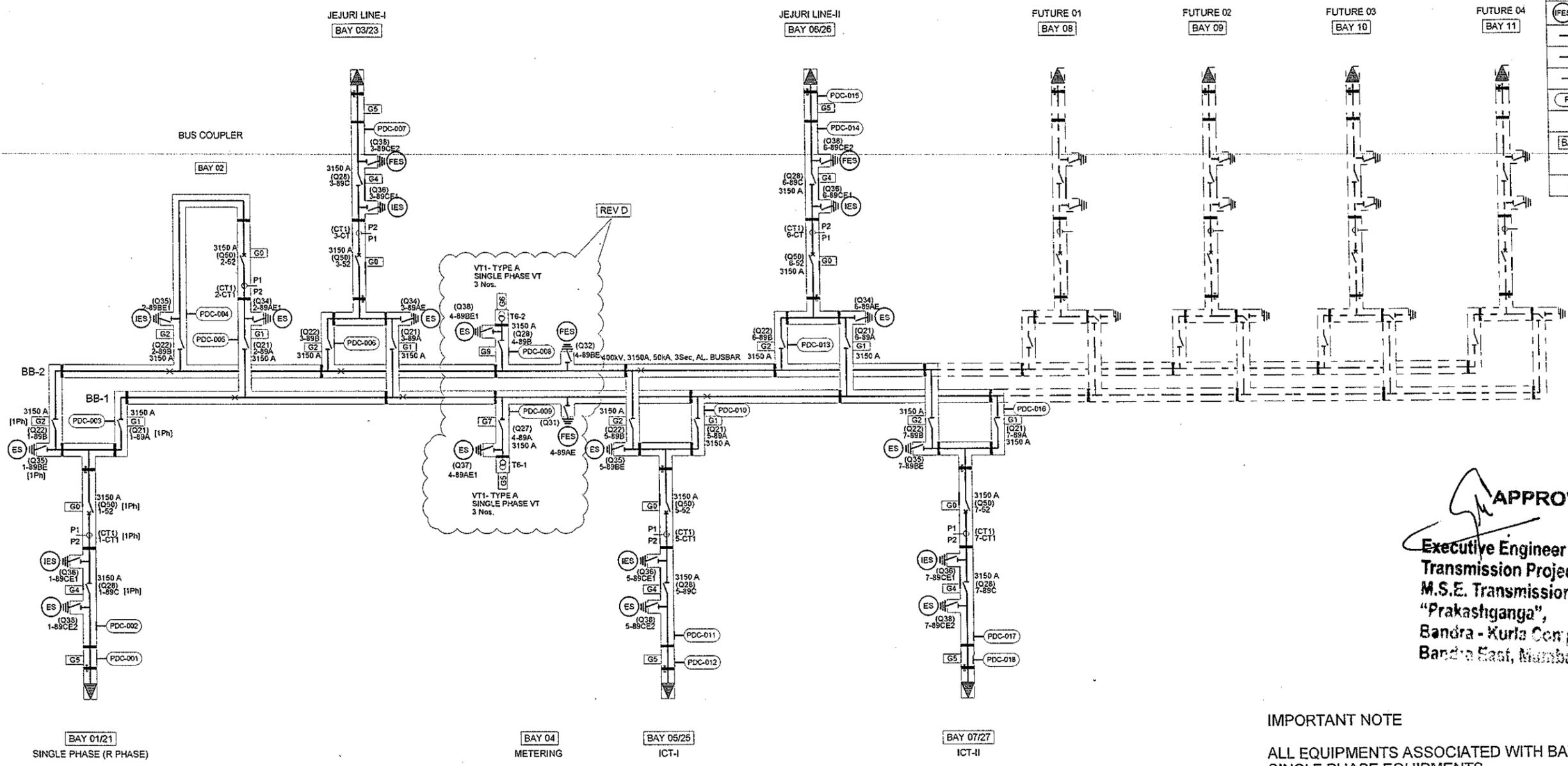
Executive Engineer (D & E-S2)
Transmission Projects Section,
M.S.E. Transmission Company Ltd.,
"Prakashganga",
Bandra - Kuria Complex,
Bandra East, Mumbai - 400 051

Reference Documents:-
Equipment layout and sectional views :- GD53A000087
Colour: Inside GIS hall RAL 7038
Outside GIS hall RAL 9016

EQUIPMENT BOM		
Tag No	Quantity	Description
Q50	5 Nos	Circuit Breaker (3 Ph)
Q50	1 No	Circuit Breaker (1 Ph)
Q2X	16 Nos	Motor Operated Disconnecter (3 Ph)
Q3X	2 Nos	Non Insulated / Insulated high speed Earthing switch (3 Ph)
Q3X	19 Nos	Non Insulated / Insulated low speed Earthing switch (3 Ph)
-	13 Nos	SF6 to Air bushing (1 Ph)

PROJECT	400 kV HINJEWADI-III GIS SUB-STATION		
OWNER		MAHARASHTRA STATE ELECTRICITY TRANS.CO.LTD.	
OWNER / EPC CONSULTANT	ALSTOM	ALSTOM T&D INDIA LTD Noida	
VENDOR	ALSTOM	ALSTOM T&D INDIA LTD Gas insulated substation ,chennai	
TITLE	400kV GIS - GAS SINGLE LINE DIAGRAM		
CUSTOMER DWG.NO.	Layout Drg no.-PEI-OP1104319839-HIN-LAY-001 (R0)		Sh.No:12
SCALE: NTS	PREPARED BY DATE	CHECKED BY DATE	APPROVED BY DATE
SH. SIZE	A1H PRABU S	KARTHI S	GAUTAM R
			REV. 01

LEGEND	
GB	INTERNAL DESIGNATION CUSTOMER'S DESIGNATION
(Q50)	CIRCUIT-BREAKER
	DISCONNECTOR
	BUSBAR
	CURRENT TRANSFORMER
	VOLTAGE TRANSFORMER
	MAINTENANCE EARTHING SWITCH
	FAST EARTHING SWITCH
	INSULATED MAINTENANCE EARTHING SWITCH
	INSULATED FAST EARTHING SWITCH
	REMOVABLE LINK
	TRANSFORMER CONNECTION
	SF6-AIR BUSHING
	PARTIAL DISCHARGE COUPLER
	MODIFICATION
[BAY 01]	AREVA NUMBERING
	GAS BARRIER (COMMUNICATION)
	GAS COMPARTMET



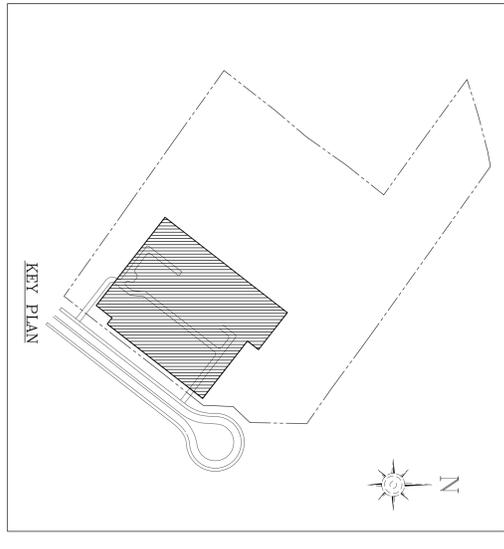
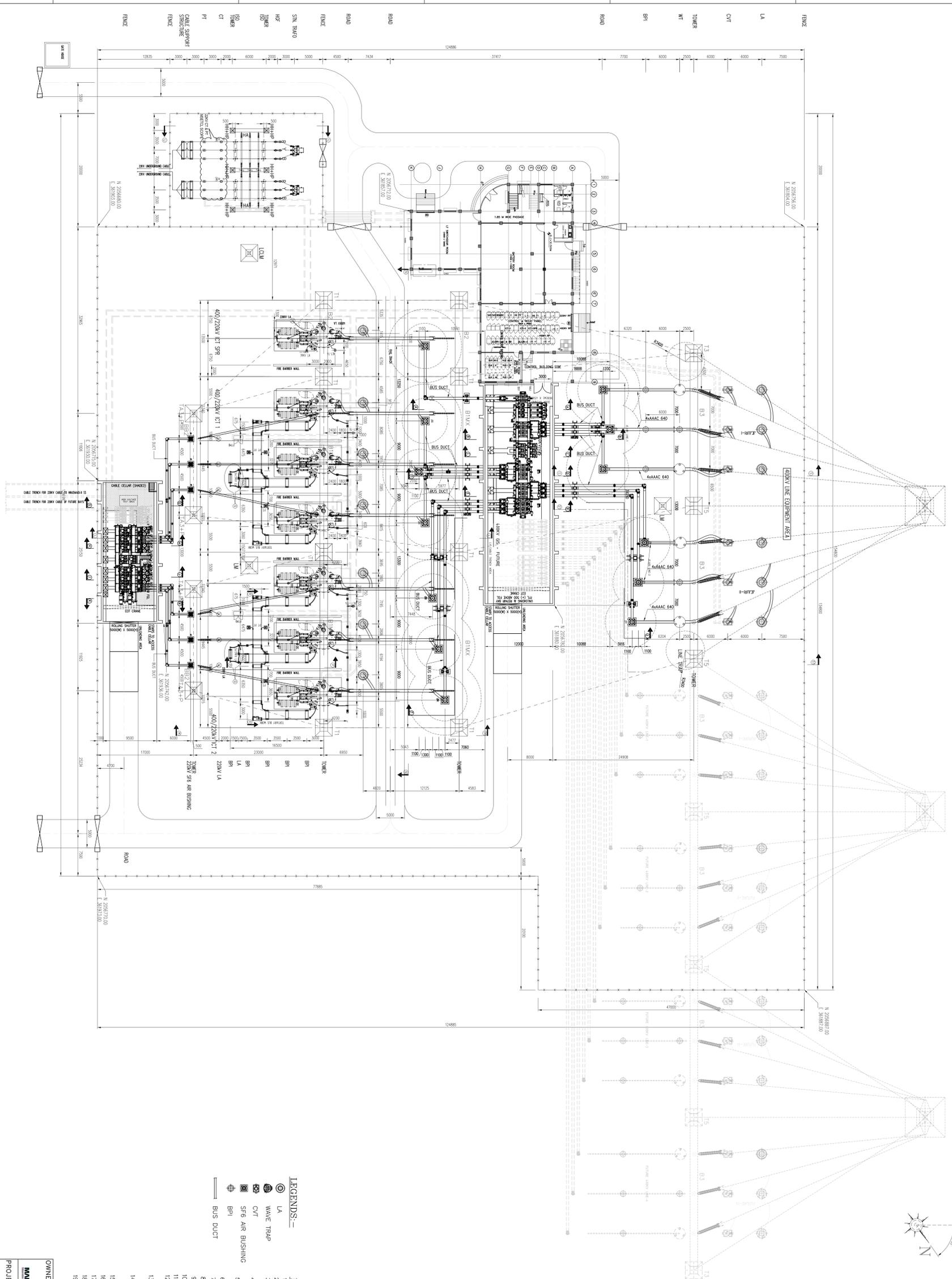
APPROVED
 Executive Engineer (D & E-S2)
 Transmission Projects Section,
 M.S.E. Transmission Company Ltd.,
 "Prakashganga",
 Bandra - Kurla Complex,
 Bandra East, Mumbai - 400 051

IMPORTANT NOTE
 ALL EQUIPMENTS ASSOCIATED WITH BAY01 ARE SINGLE PHASE EQUIPMENTS

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A1H		400kV GIS (T155)
Scale: NTS	AQ: 3	GAS-SINGLE LINE DIAGRAM
Comm. No: GD035		
Voltage: - 420kV		

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T&D GIS/CHENNAI INDIA			



SYSTEM PARAMETERS

S/NO	DESCRIPTION OF PARAMETER	400V SYSTEM	220V SYSTEM
1	SYSTEM OPERATING VOLTAGE	400V	220V
2	MAX. OPERATING VOLTAGE OF THE SYSTEM (rms)	400V	220V
3	RATED FREQUENCY	50Hz	50Hz
4	NO. OF PHASES	3	3
5	RATED INSULATION LEVELS	145kVp	100kVp
6	VOLTAGE B/W LINE TERMINALS & EARTH	100kVp	-
7	SWITCHING IMPULSE WITHSTAND VOLTAGE (250/2500microsec) B/W LINE TERMINALS & EARTH	100kVp	-
8	ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE (rms) BETWEEN ISOLATION (AS PER IEC 61936)	610V	460V
9	CORONA EXTINCTION VOLTAGE	320kV	-
10	MAX. RADIO INTERFERENCE VOLTAGE FOR FREQUENCY BETWEEN 0.5MHz & 2MHz AT 320kV rms FOR 400V SYSTEM	1000 microV	-
11	MIN. CREEPAGE DISTANCE	25MM/W (10500 MM)	25MM/W (6175 MM)
12	MIN. CLEARANCE	4200 MM (1) PHASE TO PHASE 4500 MM (2) PHASE TO GROUND 5500 MM (3) GROUND CLEARANCE	2100 MM (1) PHASE TO PHASE 2500 MM (2) PHASE TO GROUND 5000 MM (3) GROUND CLEARANCE
13	RATED SHORT CIRCUIT CURRENT FOR 2 SEC. DURATION	50KA	50KA
14	SYSTEM REFERRAL EXTERNING	SOLIDLY EARTHED	SOLIDLY EARTHED
15	CONDUCTOR	44kAAC 640	3x1C+1000 SQ.MM XLPE CU. CABLE
16	CT	24kAAC 640	24kAAC 640

LEGENDS:-

- LA WAVE TRAP
- CVT
- SFB AIR BUSHING
- BUS DUCT

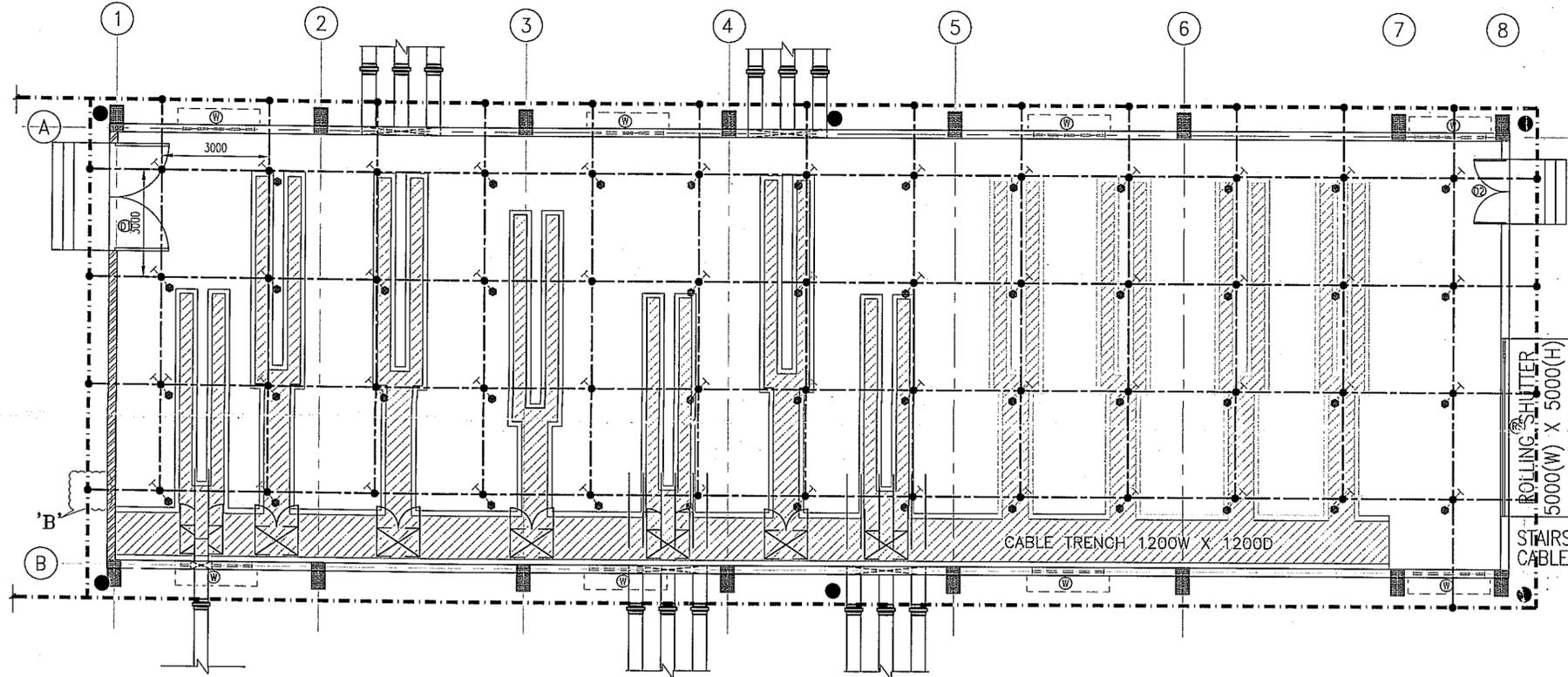
NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. INTER EQUIPMENT DIMENSIONS ARE INDICATIVE.
3. LINE CONDUCTOR ALONG WITH STRING INSULATOR, CLAMP CONNECTOR, HARDWARE & TERMINATION.
4. STRING INSULATOR FOR 400V COMPRISES OF 40 NOS. ANTIPOC DISC INSULATOR/ 2 NOS. OF POLYMER LONG ROV/ 2 NOS. OF GLASS LONG ROV/ 2 NOS. OF PORCELAIN LONG ROV WITH 25mm/WV CREEPAGE DISTANCE PER PHASE.
5. STRING INSULATOR FOR 220V COMPRISES OF 15 NOS. ANTIPOC DISC INSULATOR / 1 NO. OF POLYMER LONG ROV/ 1 NO. OF GLASS LONG ROV/ 1 NO. OF PORCELAIN LONG ROV WITH 25mm/WV CREEPAGE DISTANCE PER PHASE.
6. 24kAAC 640 SQ. MM CONDUCTOR SHALL BE USED FOR CONNECTION OF LA & CVT.
7. 44kAAC 640 SQ. MM CONDUCTOR SHALL BE USED FOR CONNECTION OF LINE TO WT AND WT TO SFB BUSHING.
8. 7/315mm DIA. GI EARTHING SHALL BE USED FOR LIGHTNING PROTECTION.
9. ALL THE BUS HEIGHTS ARE REFERRED FROM F.O.L.
10. THE POWER CONNECTORS & HARDWARES SHALL BE DESIGNED FOR 50kA/1sec FOR 400/220kV SYSTEM.
11. ROAD OUTSIDE BOUNDARY WALL & EQUIPMENT SHOWN AS 'TYPICAL' ARE NOT IN ALSTOM SCOPE OF WORK.
12. PLUMB HEIGHT OF FOUNDATION WILL BE +450MM FROM THE FINISHED GROUND LEVEL (F.G.L).
13. GRAVEL THICKNESS SHALL BE 150mm FROM F.O.L.
14. TERMINATION OF LINE SHD. SHED WEL. TENSION CLAMP INSULATOR STRING WITH HARDWARE AND CONDUCTORS ARE IN MASTER SCOPE OF WORK.
15. THE POSITION OF LIGHTING MASTS IS TENTATIVE AND WILL BE FINALISED UPON COMPLETION OF DIRECT STROKE LIGHTNING PROTECTION AND ILLUMINATION CALCULATIONS.
16. SHIELD WIRES WILL BE USED FOR DIRECT STROKE LIGHTNING PROTECTION WHEREVER THEY ARE AVAILABLE.
17. RESPECTIVE EQUIPMENT DRAWINGS SHALL BE REFERRED FOR EQUIPMENT DIMENSIONS AND DETAILS.
18. LEVELS SHOWN ARE TENTATIVE. TO BE DECIDED AT SITE AS PER SITE REQUIREMENT.
19. QUANTITY OF BUS POST INSULATORS (ALL VOLTAGE RATING) SHALL BE AS PER LAYOUT.
20. CABLE TRRENCHES BEYOND FENCE AREA IS NOT IN ALSTOM SCOPE.

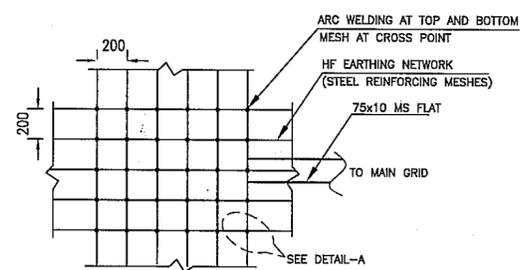
REFR. DRG. NO.	DESCRIPTION	REV.	DESCRIPTION	DATE	BY	CHECKED	DATE	APPROVED	DATE	STATUS
5427P041-HN3-E-SID-ARR-0001	OVERALL PLOT PLAN									
5427P041-HN3-E-SID-ARR-0002	400/220kV OUTDOOR YARD ELEVATION VIEWS									
5427P041-HN3-E-SID-ARR-0003	CONTROL ROOM BUILDING PLAN AND ELEVATIONS									
5427P041-HN3-E-SID-ARR-0007	400/220kV GIS ELEVATION VIEWS									
5427P041-HN3-E-SID-ARR-0008	400/220kV GIS BUILDING 400/220kV GIS SWITCHGEAR LAYOUT									

NO.	DATE	BY	CHECKED	DATE	APPROVED	DATE
1	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
2	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
3	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
4	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
5	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
6	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
7	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
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15	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
16	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
17	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
18	12/08/2012	NAME	NAME	12/08/2012	NAME	12/08/2012
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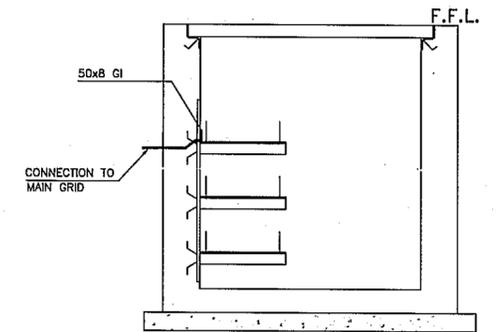
OWNER:	MAHARASHTRA STATE ELECTRICITY TRANS.CO.LTD.
PROJECT :	400/220kV GIS SUB-STATION
LOA REF :	WETD/00/20M/Contract/TKC-III/1-1102/Supply/Rev0/4012 DATED 20-03-2012
TENDER NO. :	T-1102 PACKAGE-7*
TITLE :	HINJEWADI-III, PUNE
DRAWING NO. :	5427P041-HN3-E-SID-ARR-0001
SCALE :	1:250
DATE :	12/08/2012



400kV GIS ROOM PLAN



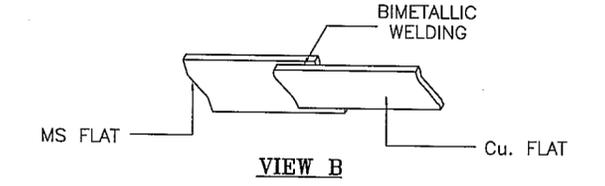
REINFORCED STEEL BARS IN GIS FLOOR



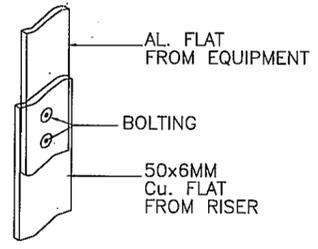
TRENCH DETAILS

LEGEND:-

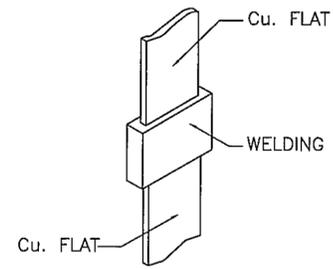
SL NO.	SUMBOL	DESCRIPTION
1.	---	50x8mm, Cu. FLAT
2.	- - - -	75x10mm MS FLAT
3.	⊥	RISER
4.	⊙	ACCESS FOR CONNECTION
5.	⊗	COUPLING PINS TO CONNECT HF EARTHING NETWORK TO 50/60 Hz Cu EARTING



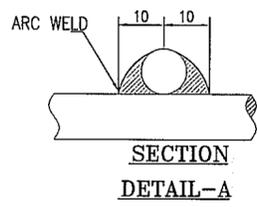
VIEW B



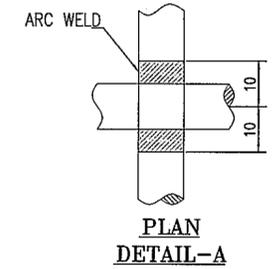
CONNECTION BETWEEN Cu. & AL. FLATS WITH BOLTING



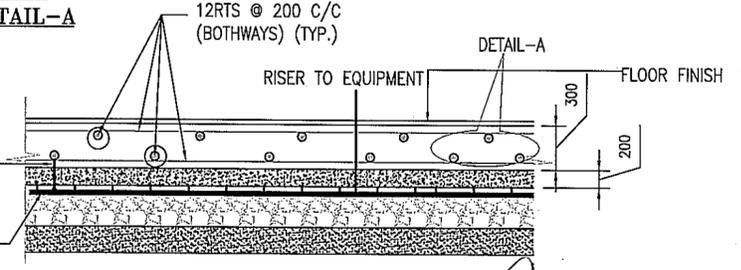
HORIZONTAL STRAIGHT CONNECTION BETWEEN 2 Cu. FLATS WITH WELDING



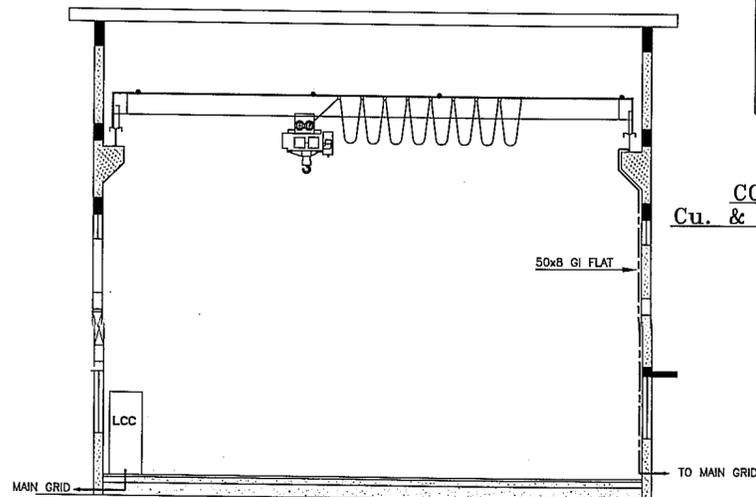
SECTION DETAIL-A



PLAN DETAIL-A



TYPICAL DETAIL OF GRADE SLAB (AS RECOMMENDED BY GIS MANUFACTURING UNIT)



CRANE AND LCC EARTHING DETAILS

NOTES :-

- 1) ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
- 2) ALL Cu. CONDUCTORS AND ITS TAP CONDUCTOR JOINT SHALL BE WELD TYPE.
- 3) CONNECTIONS AT EQUIPMENT END SHALL BE OF COMPRESSION TYPE THROUGH CONNECTORS AND CONNECTORS SHALL BE BOLTED TO RESPECTIVE EQUIPMENT.
- 4) ALL EQUIPMENT & RELATED NON CURRENT CARRYING METALLIC PARTS SHALL BE EFFECTIVELY GROUND.
- 5) GIS EQUIPMENT AND ITS ASSOCIATED BUSDUCT ACCESSORIES SHALL BE GROUNDED IN LINE WITH RECOMMENDATION OF GIS MANUFACTURER.
- 6) THE 50x6mm Cu. FLAT SHALL BE CONNECTED TO THE MAIN EARTHMAT AT MORE THAN TWO POINTS.

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 PROTO CONSTRUCTION
 DEPLANNING REFERENCE
 MANUFACTURING INDENT
 RECORD EXECUTION

ALSTOM T & D INDIA LTD
 Dt. 21/06/2013

APPROVED
 (AS RECOMMENDED BY GIS MANUFACTURING UNIT)
 Executive Engineer (D & E-S2)
 Transmission Projects Section,
 M.S.E. Transmission Company Ltd.,
 "Prakashganga",
 Bandra - Kurla Complex,
 Bandra - East, Mumbai - 400 051

OWNER:	MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.
PROJECT :	400/220KV GIS SUB-STATION HINJEWADI-III, PUNE
LOA REF TENDER NO.	MSETCL/CO/C&M/Contract/TKC-II/7-1102/Supply/Arwa/4012 DATED 20-03-2012 T-1102 PACKAGE-"A"
TITLE :	EARTHING LAYOUT FOR 400kV GIS BUILDING
ALSTOM	DRAWING NO. 5427PW041-HN3-E-SYD-EAR-0202
TOTAL SHEETS	02
SCALE	1:120
REV	1 OF 2

REFR. DRG. NO.	DESCRIPTION	DATE	BY	CHECKED	APPROVED	STATUS
REV2	REVISED AS PER MSETCL COMMENTS LETTER DT 12/08/2013					
REV1	AS PER MSETCL LETTER DT 06/05/2013 & DISCUSSION DT 03/06/2013					
REV0	FOR CLIENT APPROVAL					

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