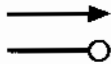


REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
01	27.9.12	CHECKED <i>[Signature]</i>			CHECKED			CHECKED
		APPD			APPD			APPD
NTPC DRAWING NO. REVISED.						JOB No.		

LEGEND



CONNECTION TO GROUND MAT THROUGH RISER.
CONNECTION TO ROD ELECTRODE WITH TEST PIT.

GENERAL NOTES:

- EARTH STRIP CLEATED TO LATTICE /PIPE TYPE STRUCTURE AT AN INTERVAL OF 1.0M SUITABLE PROVISION SHALL BE MADE WITH SUPPORT STRUCTURE.
- ALL EARTH STRIPS SHALL BE TAKEN ALONG EDGE OF STRUCTURE. ALL DRAWING SHOWS TYPICAL ARRANGEMENT ONLY.
- ALL STRUCTURES/EQUIPMENTS SHALL BE EARTHED AS SHOWN IN THE FOLLOWING SHEETS.
- BOLT SIZE FOR CONNECTING EARTHING FLAT TO THE EQPT/STRUCTURE SHALL BE TO SUIT RESPECTIVE HOLE SIZE.
- ALL EARTHING SHALL BE DONE IN ACCORDANCE WITH IS:3043 UNLESS OTHERWISE STATED IN TECHNICAL SPECIFICATION
- TWO EARTHING STRIPS CAN BE CONNECTED TO ONE RISER.
- EACH RISER OF A PARTICULAR EQUIPMENT SHALL BE CONNECTED TO A DIFFERENT EARTHROD (EITHER HORIZONTAL OR VERTICAL CONDUCTORS OF MAIN EARTHMAT).
- FOR WELDING DETAILS REFER SHEET #20 & 21
- E/WIRE DOWN CONDUCTOR SHALL BE CLEATED AT AN INTERVAL OF 2.0 M ALONG WITH STRUCTURE NO HOLES IN STRUCTURE IS ALLOWED FOR THIS PURPOSE

SHEET NO. DESCRIPTION

- TITLE
- NOTES
- 400KV & 132KV SF6 CIRCUIT BREAKER
- 400KV & 132KV CVT
- 400KV & 132KV POST INSULATOR (SOLID CORE TYPE)
- 390KV & 120KV LIGHTNING ARRESTER
- MARSHALLING KIOSK
- 400KV HORIZONTAL CENTER BREAK ISOLATOR WITH ONE EARTH SWITCH (TYPICAL)
- 400KV HORIZONTAL CENTER BREAK ISOLATOR WITH ONE EARTH SWITCH (TYPICAL)
- 132KV HORIZONTAL CENTER BREAK ISOLATOR WITH ONE EARTH SWITCH (TYPICAL)
- 132KV HORIZONTAL CENTER BREAK ISOLATOR WITH TWO EARTH SWITCH (TYPICAL)
- 132KV HORIZONTAL CENTER BREAK ISOLATOR WITHOUT EARTH SWITCH (TYPICAL)
- SHIELD WIRE TOWER
- TOWER WITHOUT PEAK
- 400KV & 132KV CURRENT TRANSFORMER
- CABLE TRENCH
- ROD EARTH ELECTRODE WITH TEST PIT

SHEET NO. DESCRIPTION

- RAIL BONDING
- AUXILIARY TRANSFORMER EARTHING.
- AUXILIARY EARTH MAT FOR ISOLATOR MAIN MECH./E/S MECH. BOX
- LIGHTNING MAST
- AC/DC DISTRIBUTION BOARDS CONTROL AND RELAY BOARD/AC KIOSK/BATTERY CHARGER PANELS/OPGW, PLC PANELS
- 400KV BUS REACTOR.
- GATE/FENCE POST
- TYPICAL ARRANGEMENT OF BOLTED JOINTS
- WELDING DETAILS
- WELDING DETAILS
- AUTO TRANSFORMER
- 132KV WAVE TRAP

NTPC DRAWING NO. 9881-230-01TB-PYE-E-00 2

OWNER :

THE SINGARENI COLLIERIES COMPANY LTD.

CONSULTANT :

NTPC Limited
(A Division of India Electricity Corporation Ltd.)

PROJECT :

SCCL COAL BASED THERMAL POWER PLANT
(2 x 600MW)

PACKAGE

BOILER TURBINE GENERATOR PACKAGE



BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION PROJECTS DIVISION
NEW DELHI

REV.	DATE	BY	CHKD	APPD
01	08.08.12			
02	08.08.12			
03	08.08.12			

TITLE **EQUIPMENT EARTHING PHILOSOPHY DETAILS & DRAWING**

W.O. No.	DEPT.	CODE
81009	TBEM	422

REV.	DATE	BY	CHKD	APPD
01	08.08.12			
02	08.08.12			
03	08.08.12			

DRAWING NO.	SCALE
TB-DG-4-353-509-014	
SHEET 01 OF 30	REV. 0

NOTES:-

1. SHIELDWIRE SHALL BE CLEATED AT 2 M INTERVAL. NO HOLES IN STRUCTURE ARE ALLOWED FOR THIS PURPOSE.
2. EARTH STRIPS TO BE LAID FLAT ALONG THE STRUCTURE AS FAR AS POSSIBLE.
3. CONNECTION TO ALL EQUIPMENT AND TOWERS SHALL BE BY BOLTED JOINTS. CONTACT SURFACES SHALL BE THOROUGHLY CLEANED BEFORE CONNECTIONS. EQUIPMENT BOLTED CONNECTIONS AFTER BEING TESTED AND CHECKED SHALL BE PAINTED WITH ANTI CORROSIVE PAINT/COMPOUND.
4. CONNECTIONS BETWEEN EQUIPMENT EARTHING LEADS AND BETWEEN MAIN EARTHING CONDUCTORS SHALL BE OF WELDED TYPE. FOR RUST PROTECTION THE WELDS SHOULD BE TREATED WITH RED LEAD COMPOUND AND AFTERWARDS THICKLY COATED WITH BITUMEN COMPOUND.
THE SURFACES TO BE WELDED SHALL BE CLEANED OF DIRT, OIL, GREASE AND OXIDES BEFORE WELDING. ANY OXIDE FILMS THAT MAY HAVE FORMED DURING WELDING MUST BE REMOVED FROM THE WELDED JOINT.
5. EARTHING CONDUCTOR FOR EQUIPMENT SHALL BE OF GALVANISED M.S. OF SIZE 75x12 mm. THE CONDUCTOR BELOW THE GROUND LEVEL SHALL BE 40 mm DIA BLACK MS ROD.
6. IN THE ATTACHED DRAWINGS GL REPRESENTS GROUND LEVEL.
7. ALL THE EQUIPMENTS SHALL BE EARTHED AT TWO POINTS WITH 75x12 mm. G.S. FLAT EVEN THOUGH THEY ARE SHOWN OR NOT IN THE DRAWING DUE TO CLARITY.
8. ALL JUNCTION BOXES, OPERATING MECHANISAM BOXES, GROUND MOUNTED CONTROL CABINETS SHALL BE EARTHED AT TWO POINTS WITH 50x6mm G.S. FLAT BY TWO SEPARATE AND DISTINCT EARTH CONNECTERS.
9. EARTHING CONDUCTORS FROM EQUIPMEMT STRUCTURES SHALL BE CONNECTED TO THE NEAREST POSSIBLE EARTH MAT RISER. EQUIPMENT EARTHING SHALL BE AS PER IS 3043.
10. ALL JOINTS BETWEEN 40 DIA M.S. ROD AND 75x12 mm. G.S. FLAT SHALL BE AS PER DETAIL-B OF SHEET NO.2.
11. ALL OFF-SITE AREAS SHALL BE INTERCONNECTED TOGETHER BY MINIMUM TWO PARALLEL CONDUCTORS.
12. EVERY ALTERNATE POST OF THE SWITCHYARD FENCE SHALL BE CONNECTED TO THE EARTHING GRID BY ONE GS FLAT AND GATES BY FLEXIBLE LEAD TO THE EARTHED POST.
13. STEEL RCC COLUMNS, METALLIC STAIRS, AND RAILS ETC. OF THE BUILDING HOUSING ELECTRICAL EQUIPMENT SHALL BE CONNECTED TO THE NEARBY EARTHING GRID CONDUCTOR BY ONE EARTHING ENSURED BY BONDING THE DIFFERENT SECTIONS OF HAND RAILS AND METALLIC STAIRS.
14. METALLIC SHEATHS/SCREENS, AND ARMOUR OF MULTI CORE CABLES SHALL BE EARTHED AT BOTH ENDS. METALLIC SHEATHS AND ARMOUR OF SINGLE CORE CABLES SHALL BE EARTHED AT SWITCHGEAR END ONLY UNLESS OTHERWISE INSTRUCTED BY THE EMPLOYER.
15. EQUIPMENT BOLTED CONNECTIONS AFTER BEING TESTED AND CHECKED SHALL BE PAINTED WITH ANTI CORROSIVE PAINT/COMPOUND.
16. LOCATION OF EARTHING CONDUCTORS/RISERS SHOWN IN THE EARTHING DRAWING MAY CHANGE TO SUIT THE SITE CONDITION.
17. FOR SURGE ARRESTER, EARTHING LEAD FROM SURGE COUNTER TO MAIN EARTH MAT SHALL BE SHORTEST IN LENGTH AS PRACTICALLY AS POSSIBLE.
18. AN ADDITIONAL AUXILIARY GRID OF 1500MMX1500MM COMPRISING OF CLOSELY SPACED(300MMX300MM) 40 DIA CONDUCTORS AT A DEPTH OF 300MM FROM FINISHED GROUND LEVEL SHALL BE PROVIDED BELOW THE OPERATING HANDLE OF ISOLATORS AND EARTH SWITCHES. THIS GRID SHALL BE CONNECTED TO THE MAIN GROUND GRID. THE EARTH CONNECTION TO OPERATING HANDLE SHALL BE MADE OF FLEXIBLE CONNECTION. THE MOM BOX OF THE ISOLATOR TO BE CONNECTED TO THIS AUX. GRID.



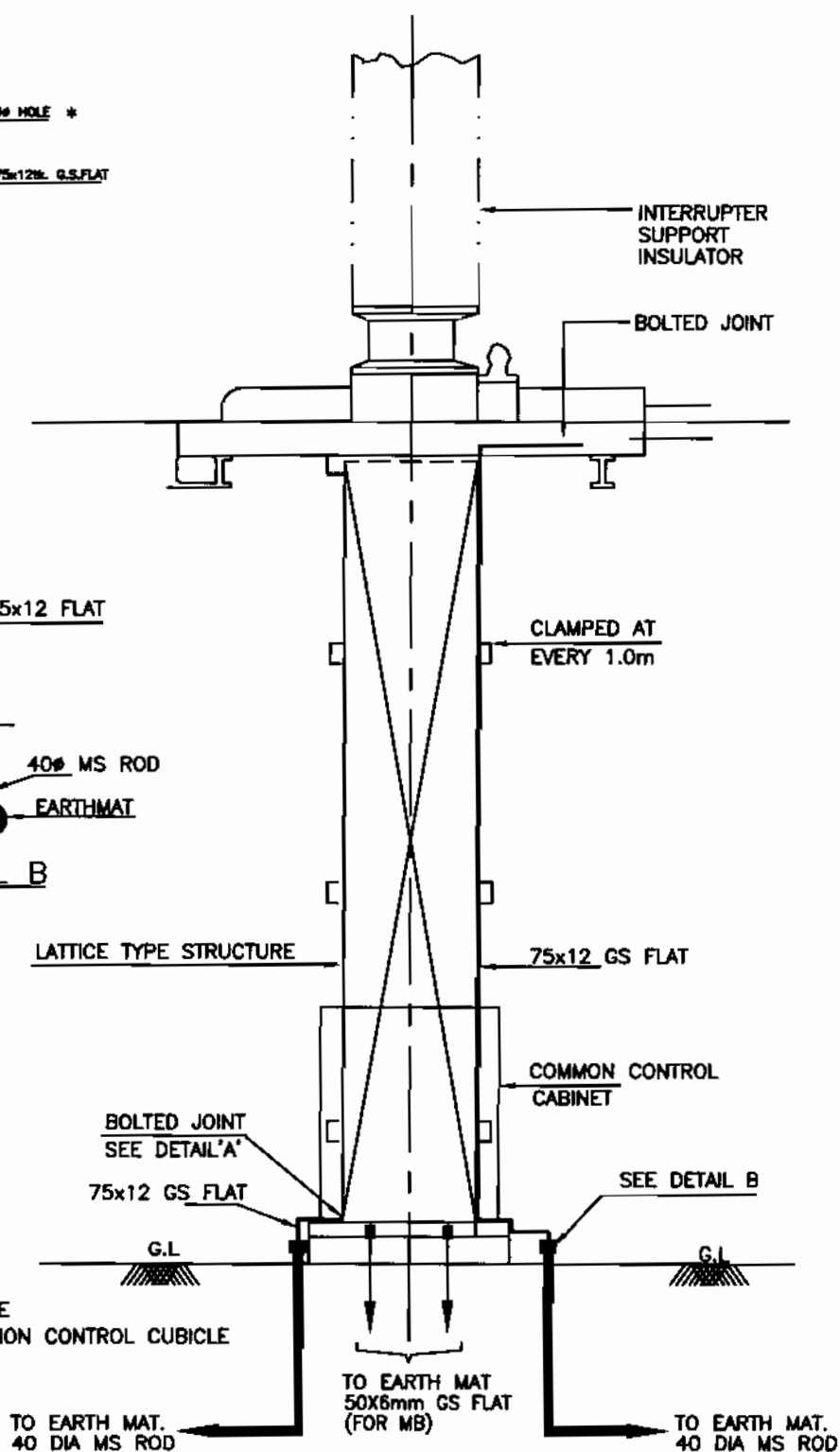
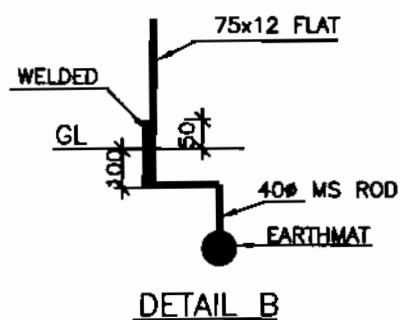
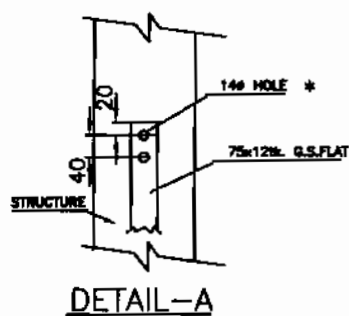
EQUIPMENT EARTHING DETAILS NOTES

DRG. No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
1A



NOS. OF RISERS
= 2 NOS. PER PHASE
+ 2 NOS. FOR COMMON CONTROL CUBICLE

NOTE:

1) * BOLT SIZE AND HOLE SIZE SHALL BE TO SUIT RESPECTIVE EQPT./STRUCTURE.



EQUIPMENT EARTHING DETAILS

400kV & 132kV SF6 CIRCUIT BREAKER

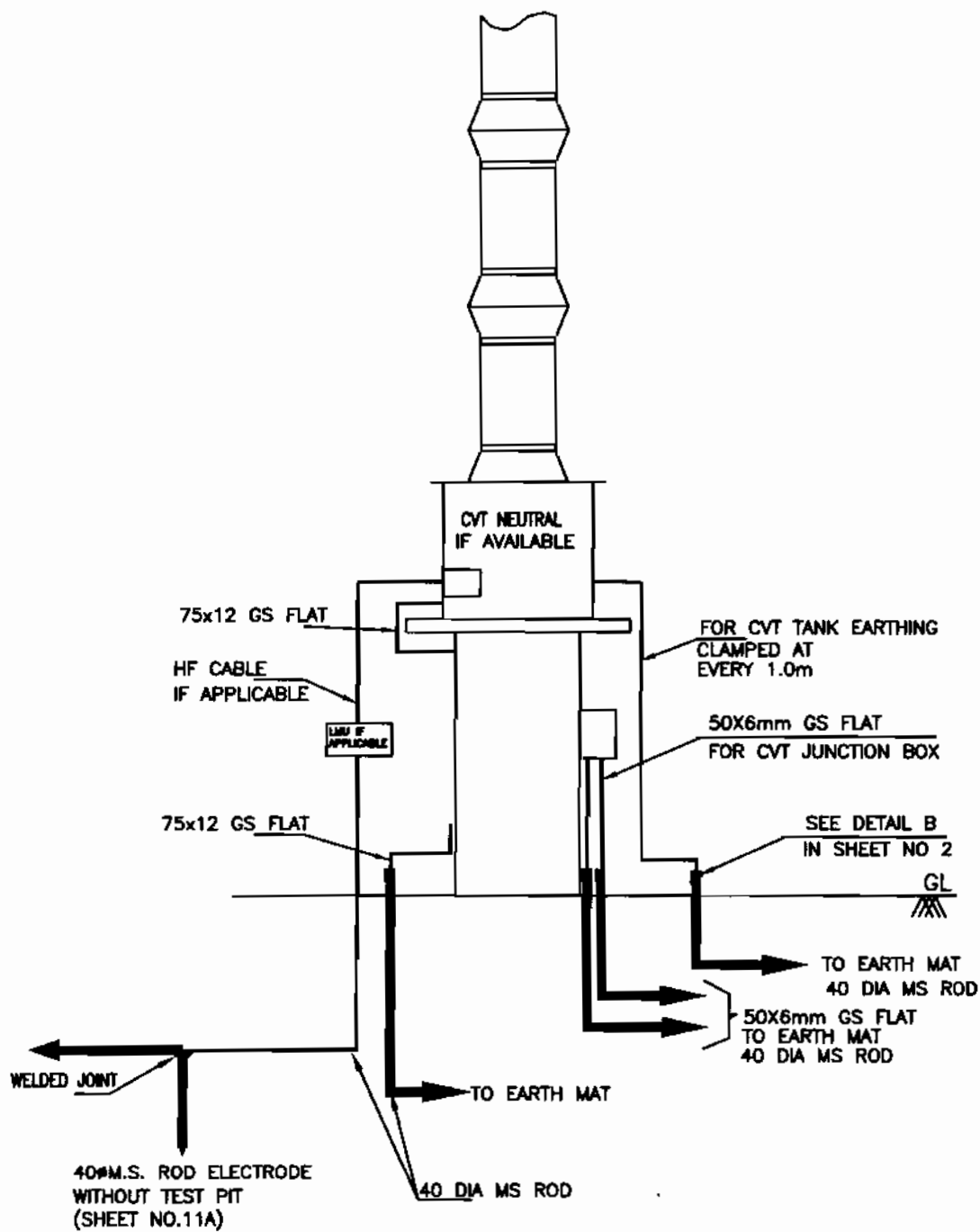
COMPUTER REF. NO.

DRG. No.

TB-DG-4-353-509-014

REV. 0.1

SHEET No.
2



NOS.OF RISERS

= 2 NOS. PER PHASE

+ 2 NOS. FOR CVT JUNCTION BOX

ROD ELECTRODE = 1 NO. PER CVT IF NEUTRAL IS CONNECTED TO GROUND VIA LMU



EQUIPMENT EARTHING DETAILS

400kV & 132kV CVT

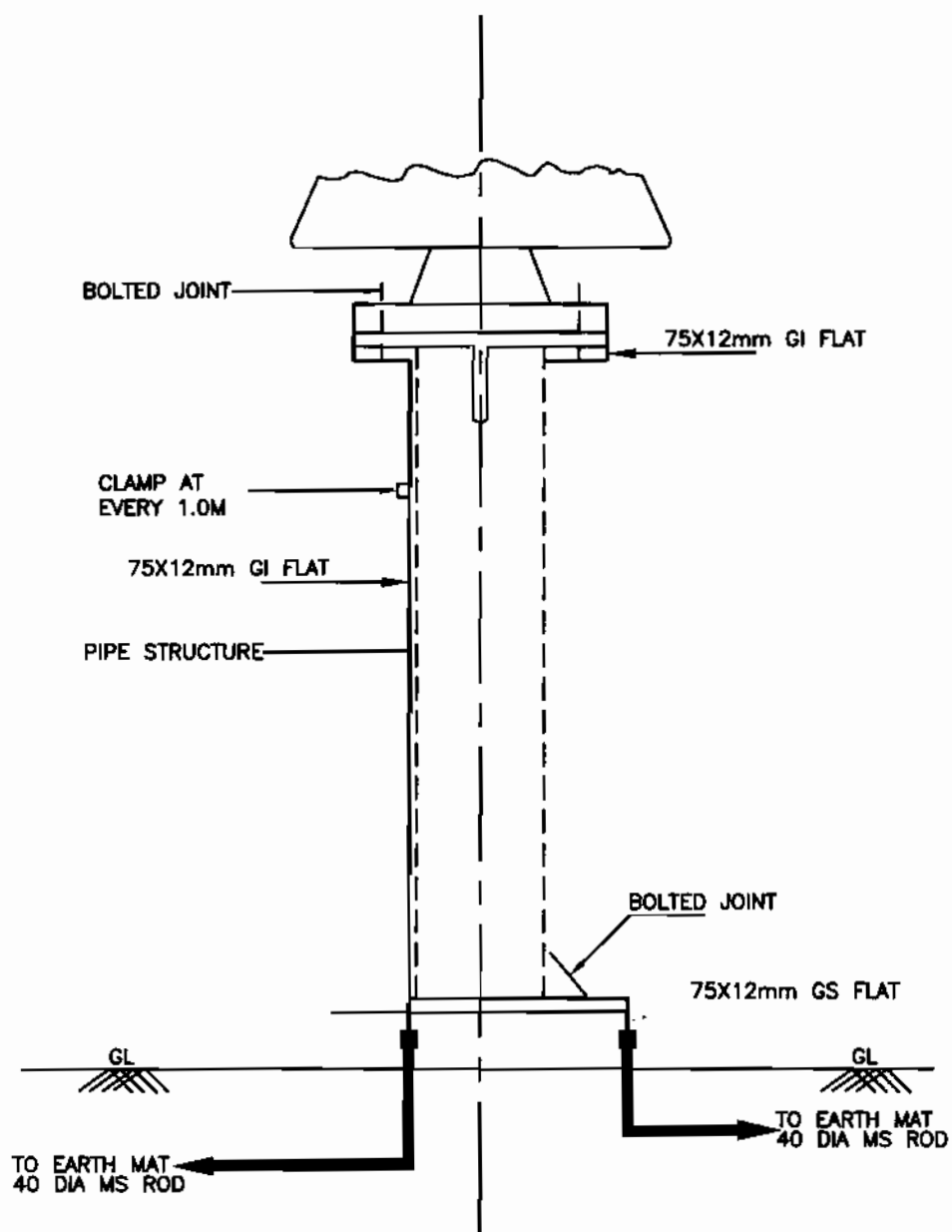
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DRG. No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
3



NOS.OF RISERS = 2 NOS.

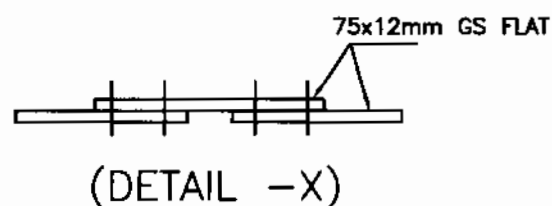
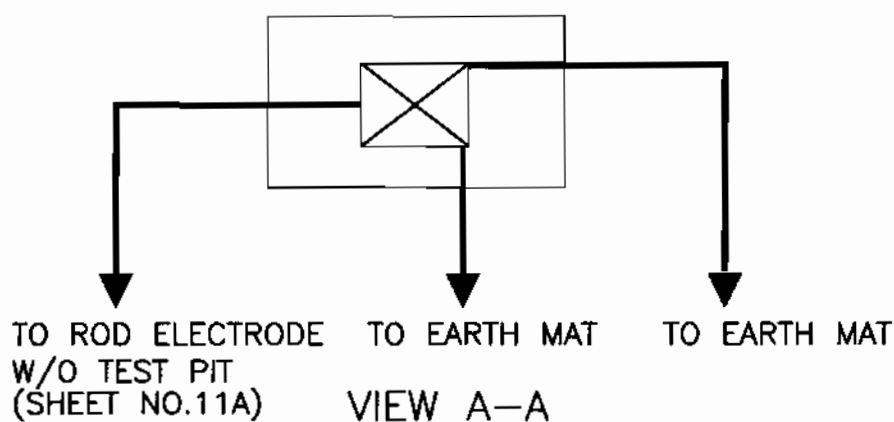
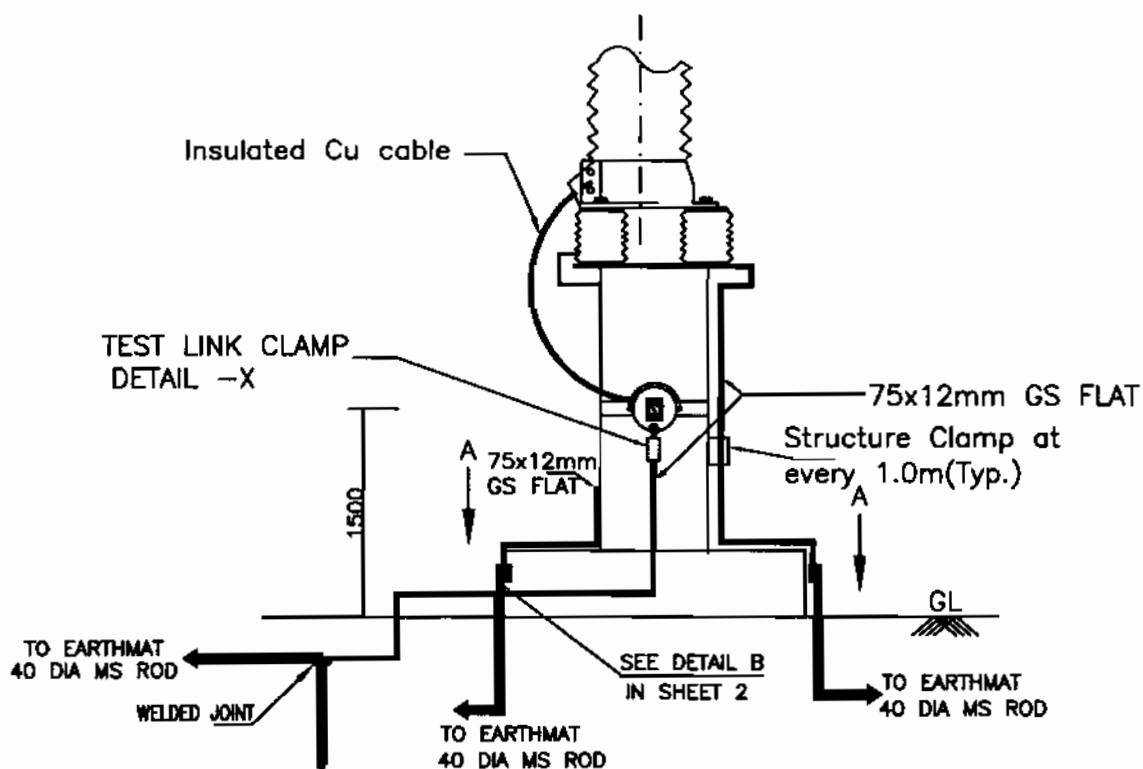


EQUIPMENT EARTHING DETAILS 400kV & 132kV POST INSULATOR (SOLID CORE TYPE)

DRG. No. TB-DG-4-353-509-014

REV. 0/

SHEET No.
4



NOTES;

1. LA SHALL BE EARTHED THROUGH EARTH TERMINAL OF SURGE COUNTER
2. NO. OF ROD ELECTRODE : 1 NO. PER PHASE,
NO OF RISERS = 2 NOS. PER PHASE.
3. TEST LINK SHALL HAVE PROVISION TO BOLT TEST LEAD BEFORE ISOLATING THE MAIN EARTHING CONNECTIONS (AS PER SKETCH ABOVE) = 1NO.



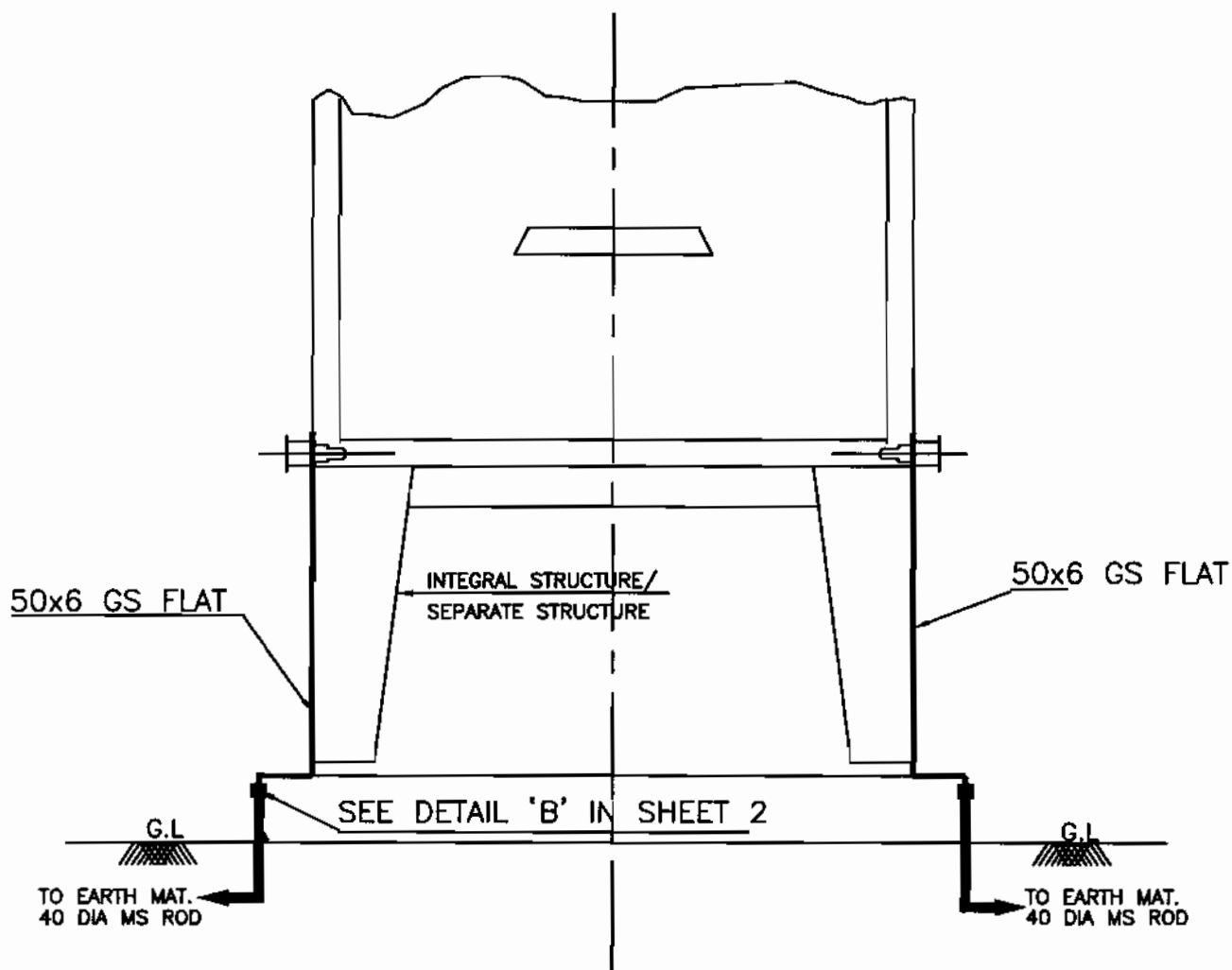
EQUIPMENT EARTHING DETAILS
LIGHTNING ARRESTER(390kV & 120kV)

COMPU. DRG. REF.

DRG.NO.

TB-DG-4-353-509-014 REV. 01

SHEET No.
5



NOS.OF RISERS = 2 NOS.



EQUIPMENT EARTHING DETAILS

MARSHALLING KIOSK

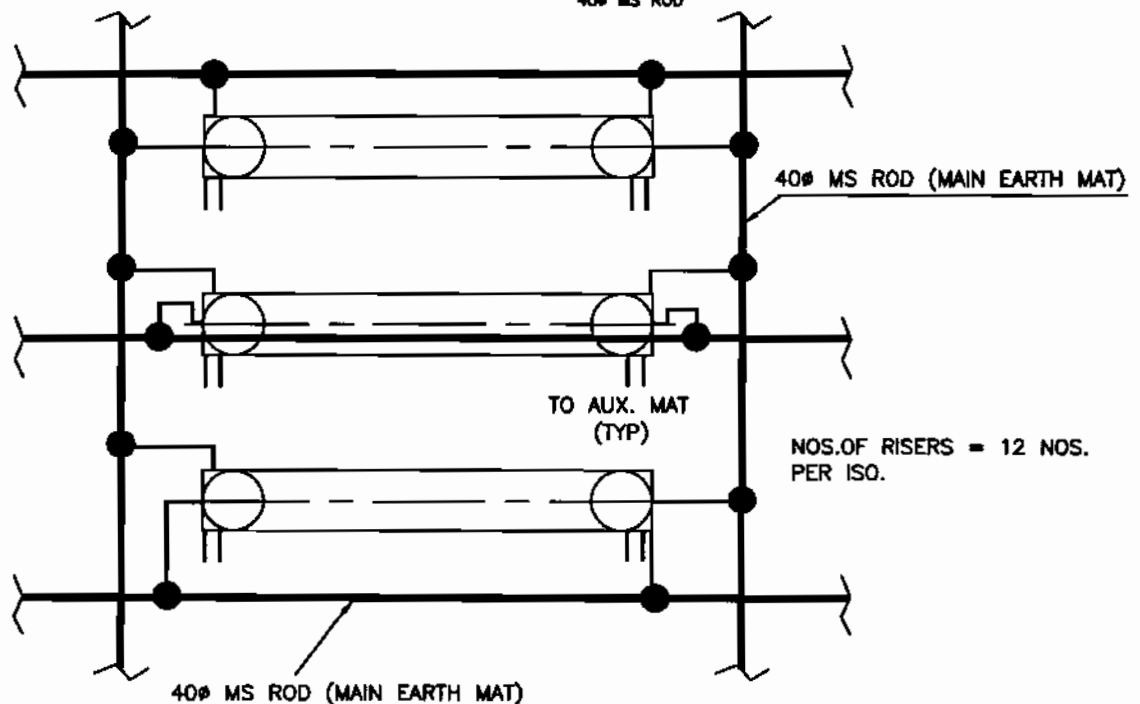
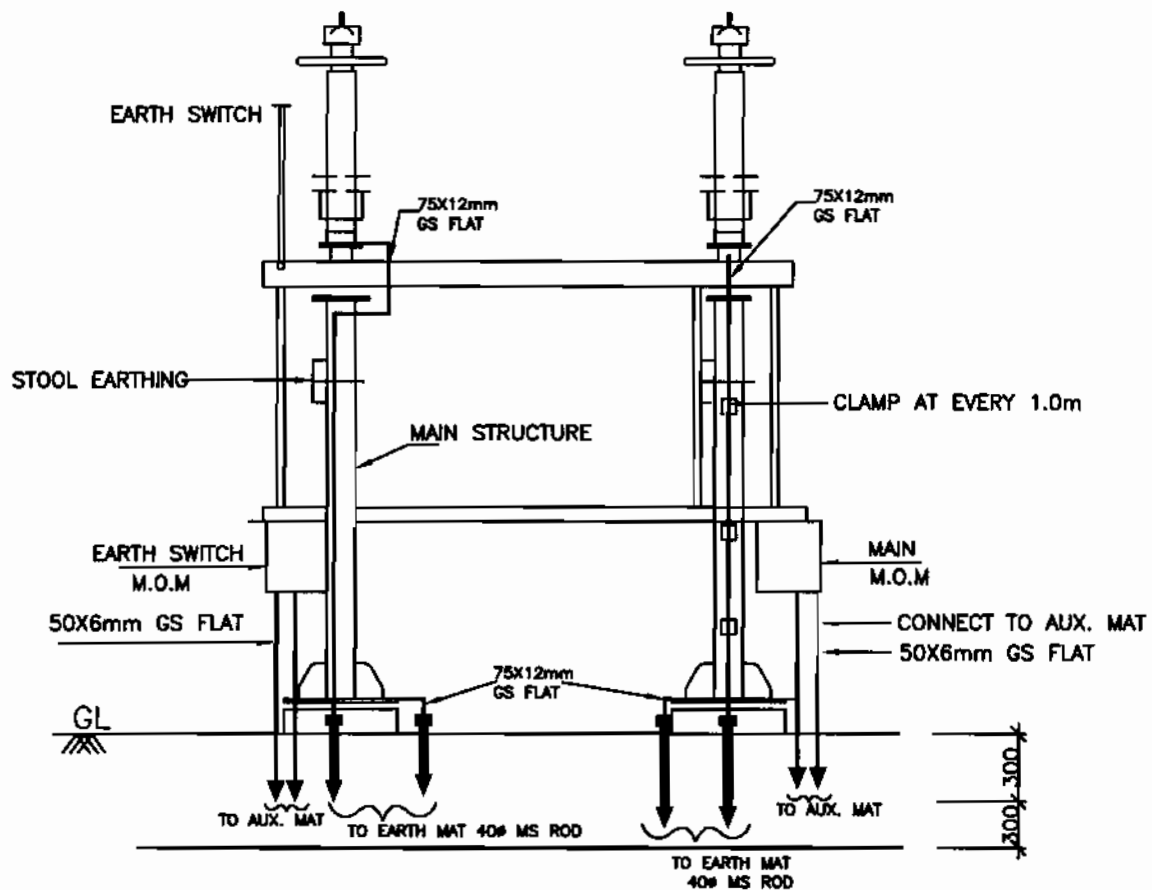
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DRG. No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
6



NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 14)

● RISER



EQUIPMENT EARTHING DETAILS

400KV HORIZONTAL CENTER BREAK ISOLATOR (TYPICAL) WITH ONE EARTHSWITCH

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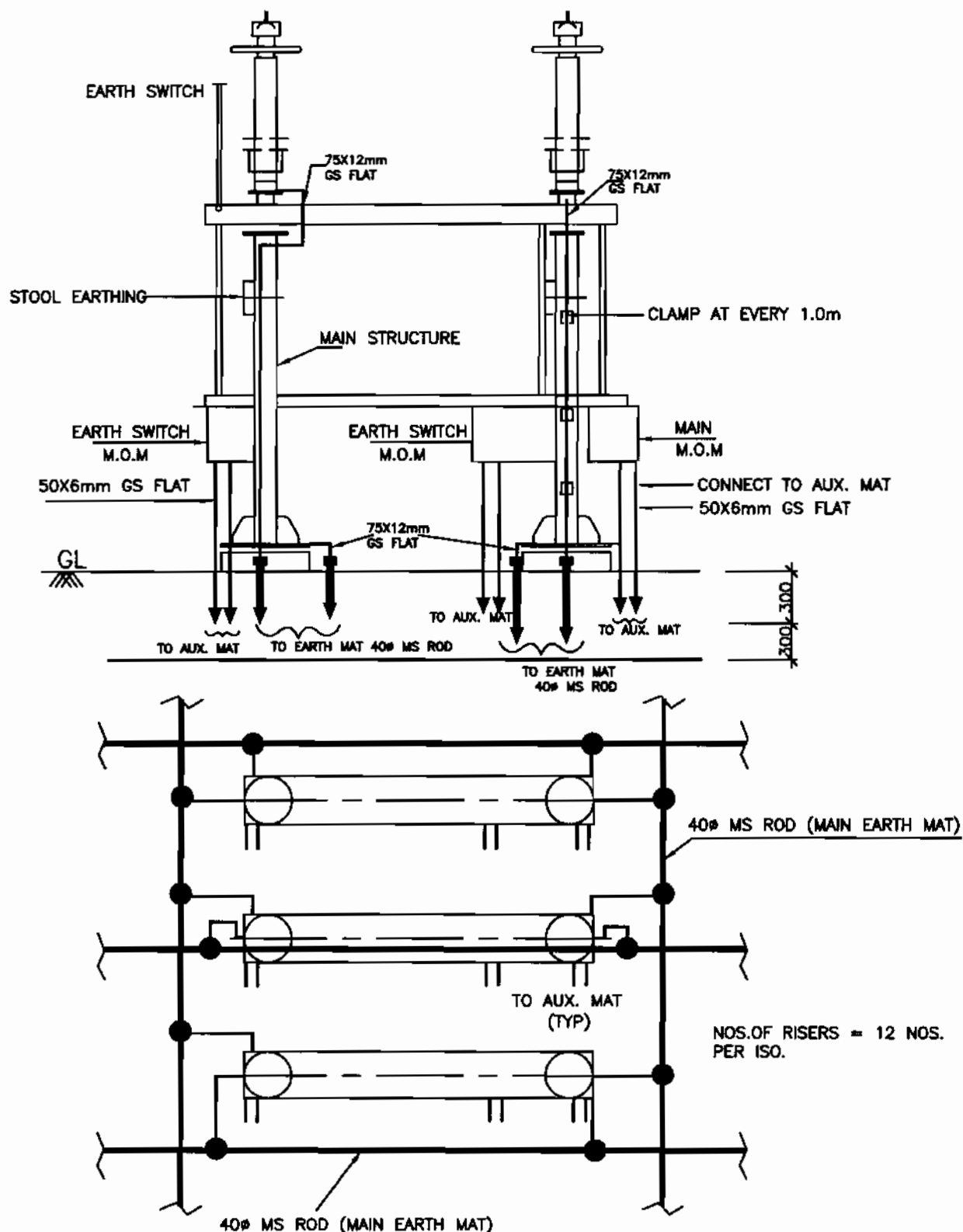
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TB-DG-4-353-509-014

REV. 01

SHEET No.

7



NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 14)

● RISER



EQUIPMENT EARTHING DETAILS

400KV HORIZONTAL CENTER BREAK ISOLATOR (TYPICAL) WITH TWO EARTHSWITCH

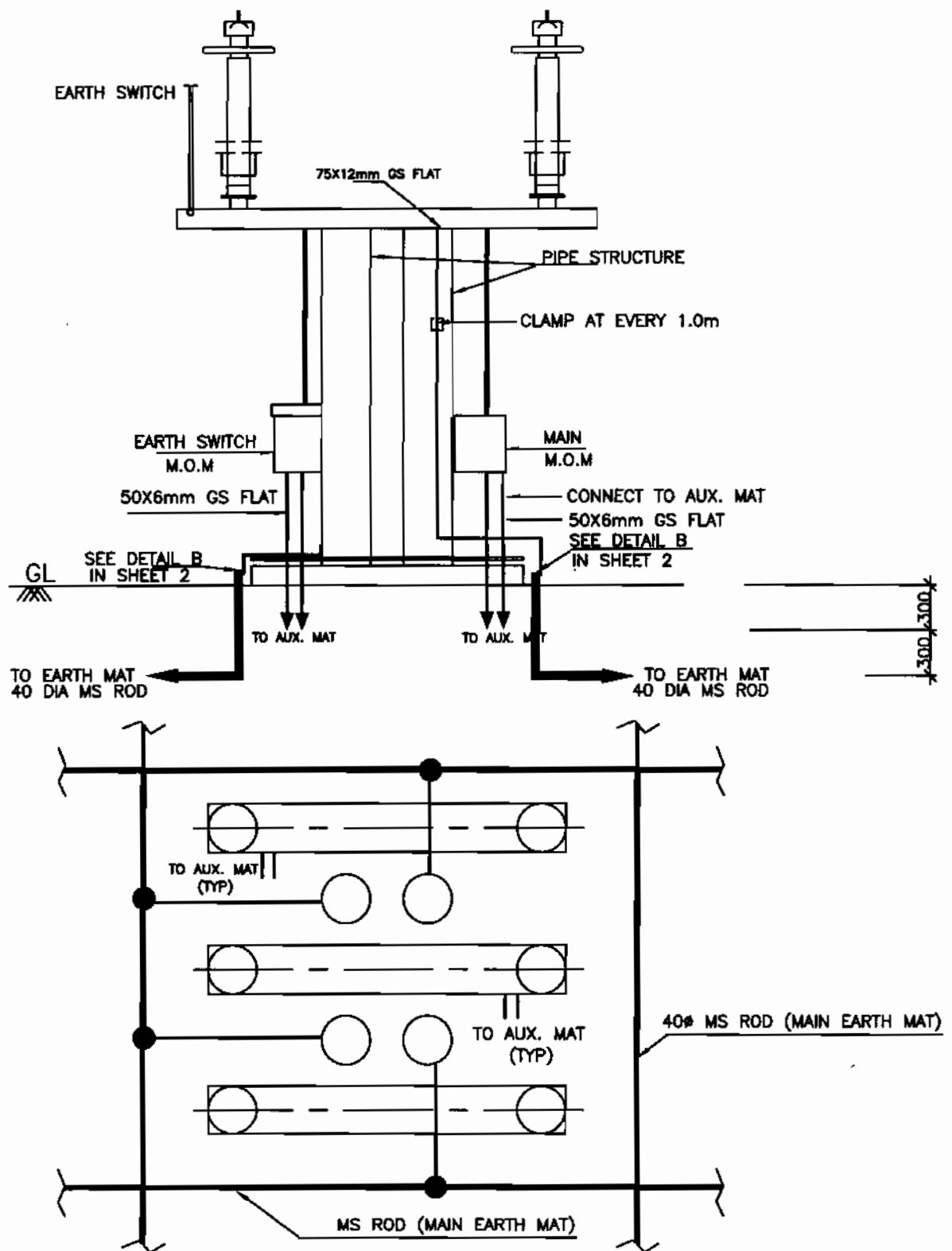
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DRG. No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
7A



NOTES

- AUXILIARY EARTH MAT SHALL BE PROVIDED NEAR EVERY MOM BOX (REFER SHEET 14)
- RISER



EQUIPMENT EARTHING DETAILS

HORIZONTAL CENTER BREAK 132kV ISOLATOR WITH ONE EARTH SWITCH

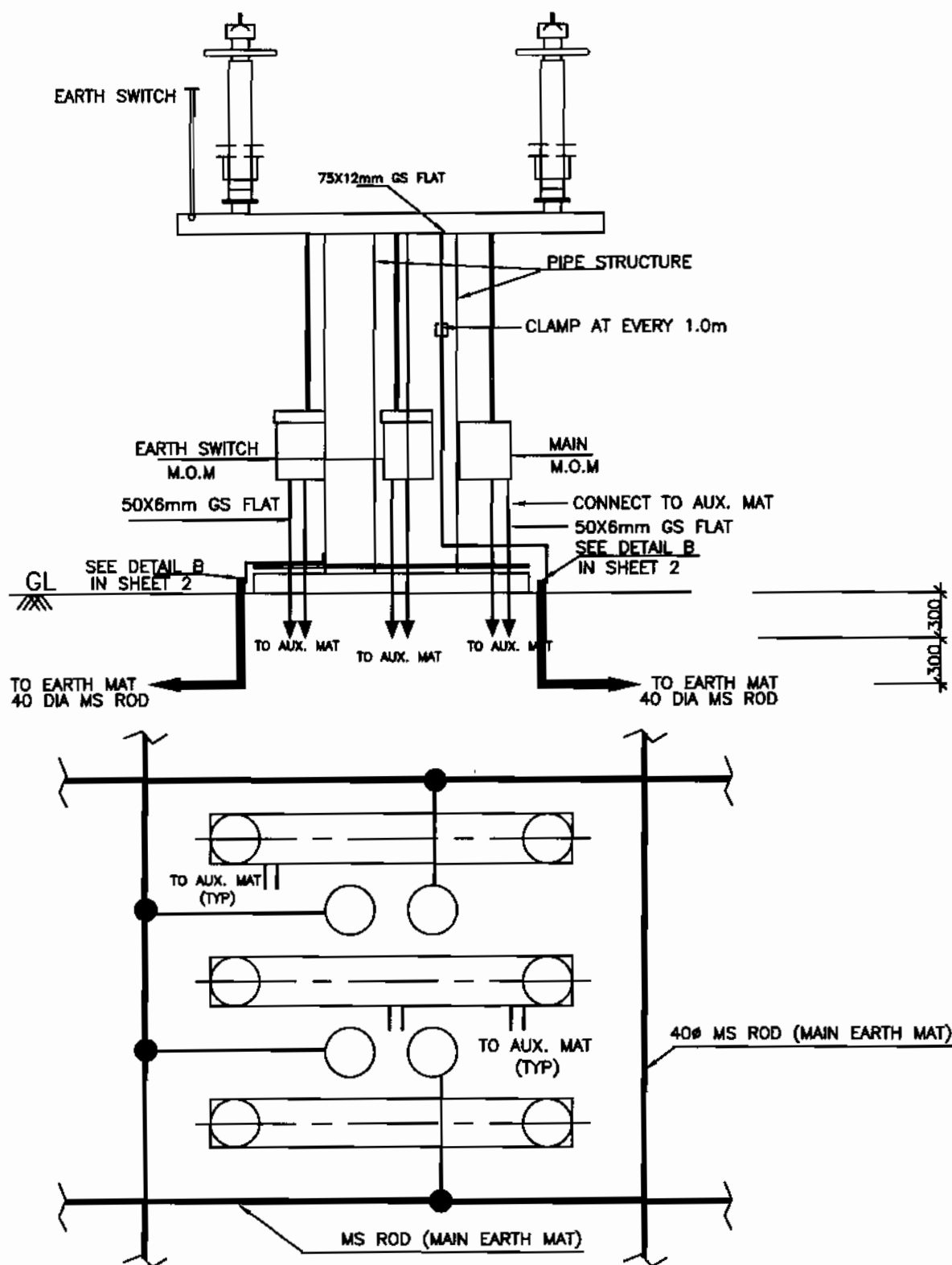
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DRG. No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
7B



NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED NEAR EVERY MOM BOX (REFER SHEET 14)
- RISER



EQUIPMENT EARTHING DETAILS

HORIZONTAL CENTER BREAK 132kV ISOLATOR WITH TWO EARTH SWITCHES

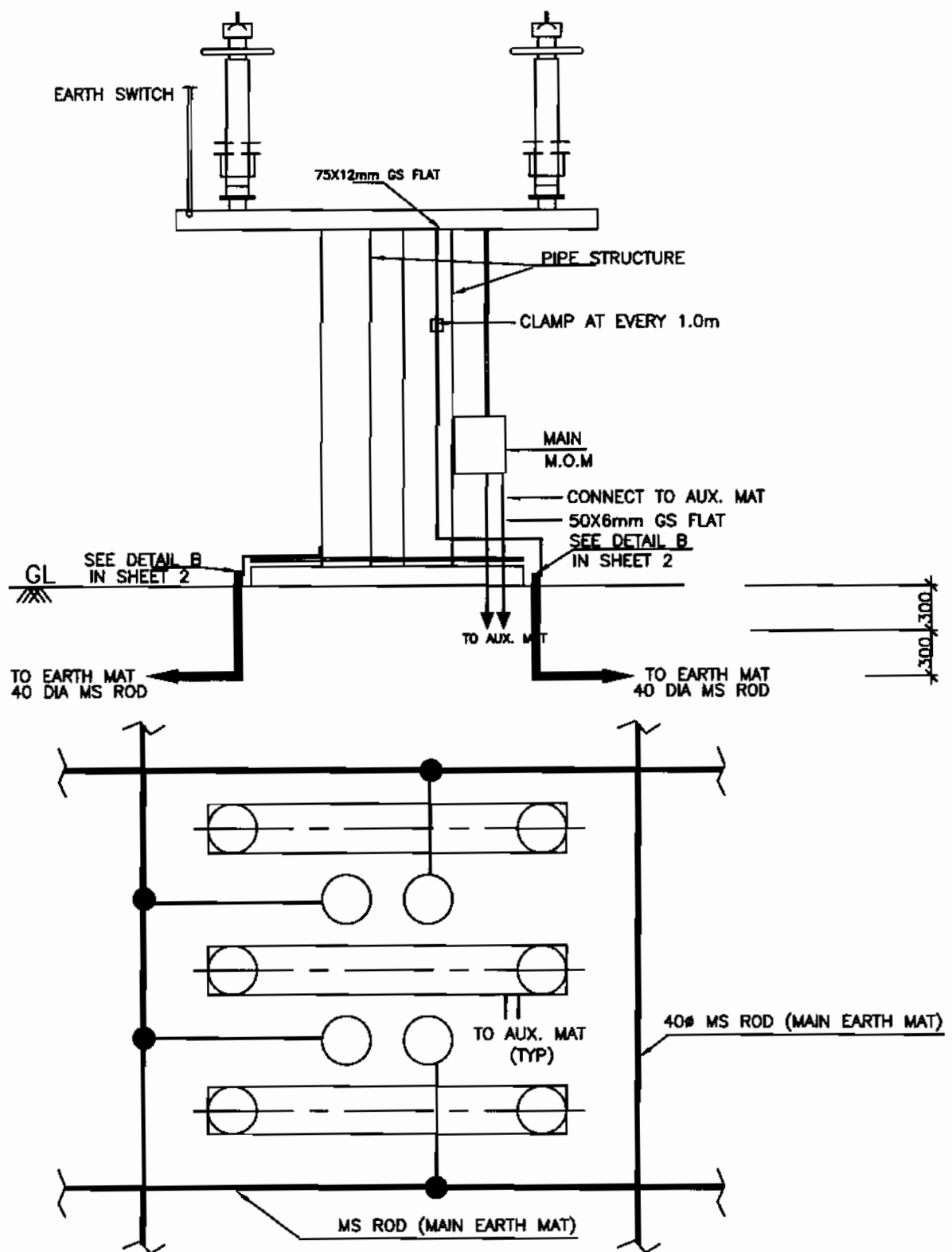
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DRG. No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
7C



NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED NEAR EVERY MOM BOX (REFER SHEET 14)
- RISER



EQUIPMENT EARTHING DETAILS

HORIZONTAL CENTER BREAK 132kV ISOLATOR WITHOUT EARTHSWITCH

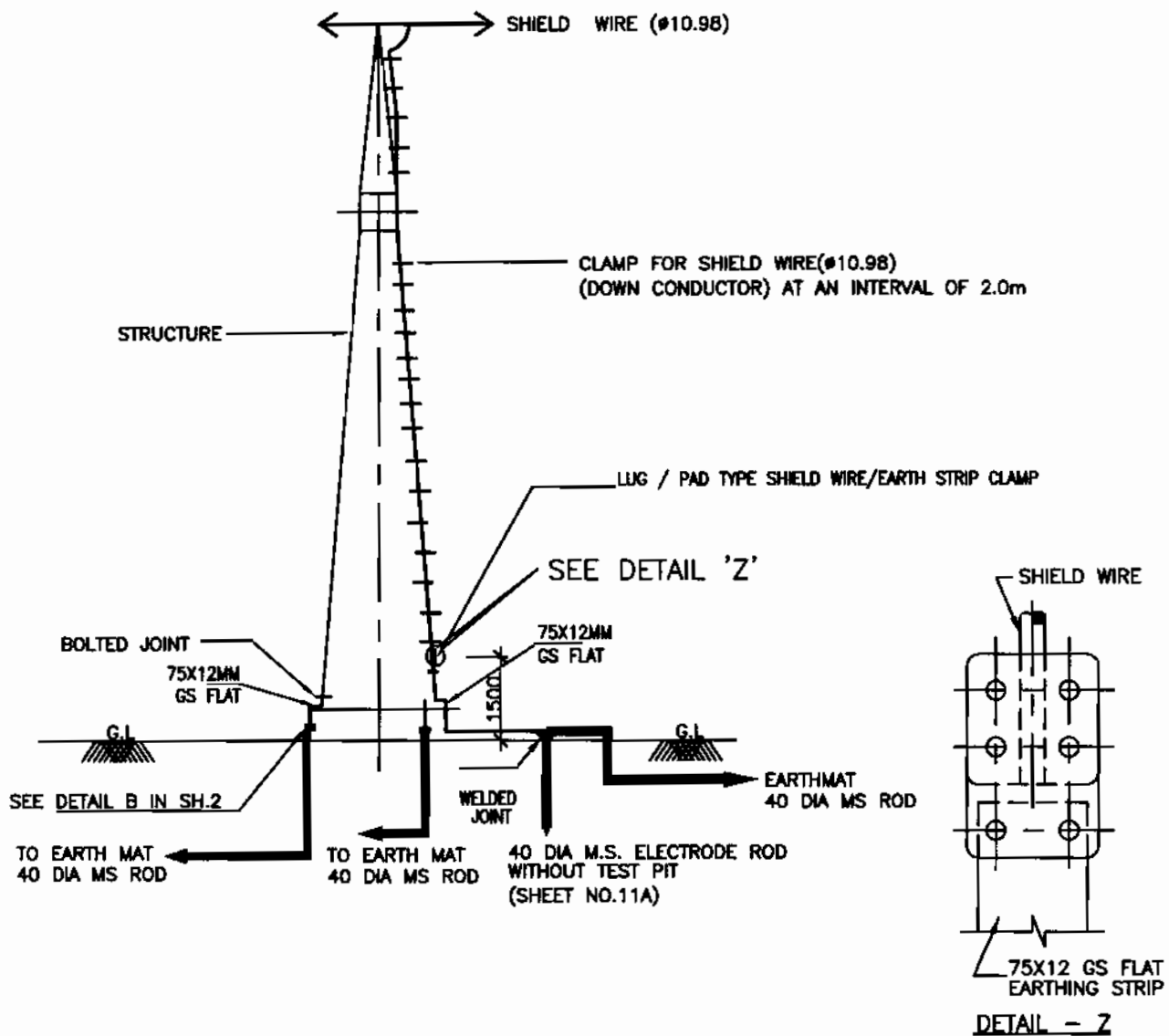
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DRG. No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
7D



NOTE:

1. NO. OF ROD ELECTRODE WITHOUT TEST PIT : 1 NO. PER TOWER WITH DOWN CONDUCTOR.

NOS.OF RISERS = 2 NOS. PER TOWER



EQUIPMENT EARTHING DETAILS
SHIELD WIRE TOWER

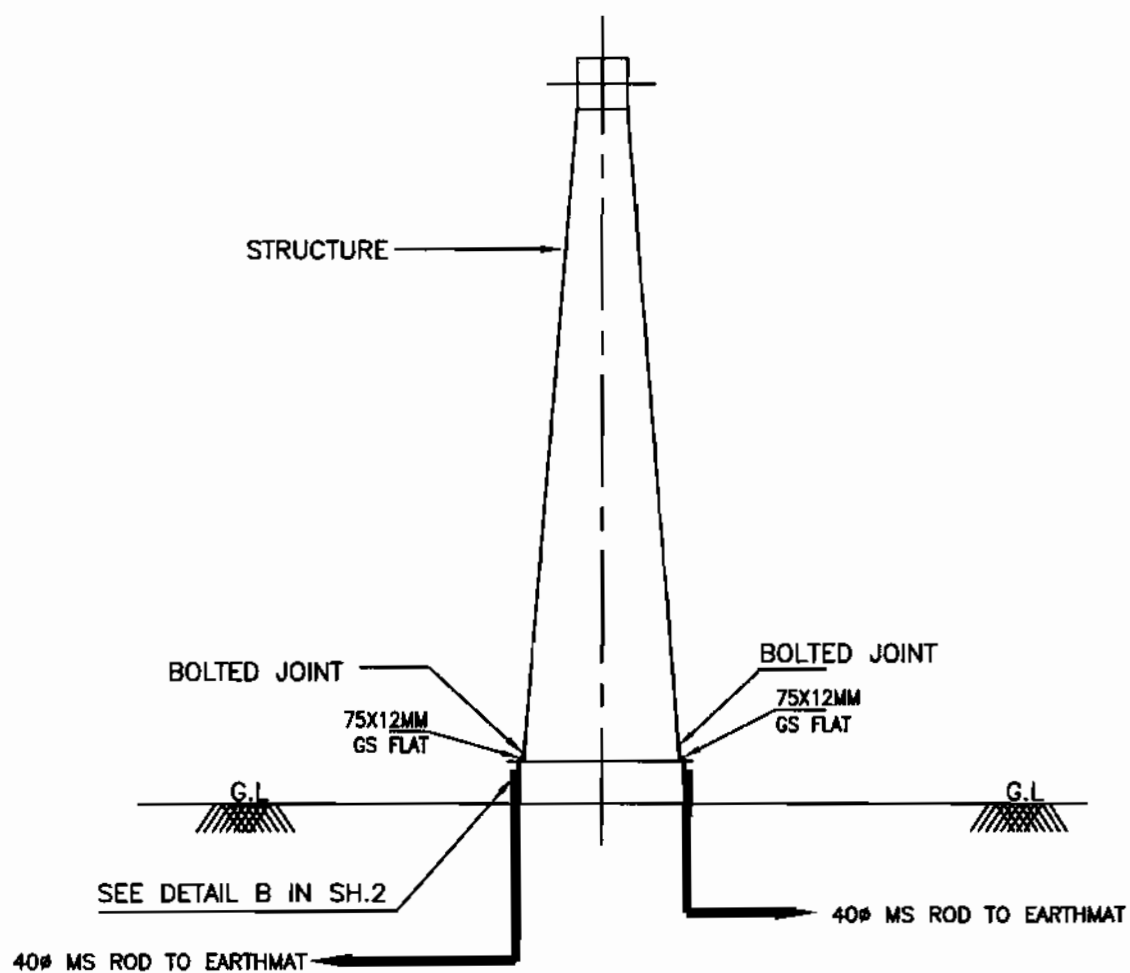
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TB-DG-4-353-509-014

REV. 01

SHEET No.
8



NOS.OF RISERS = 2 NOS. PER TOWER



EQUIPMENT EARTHING DETAILS TOWER WITHOUT PEAK

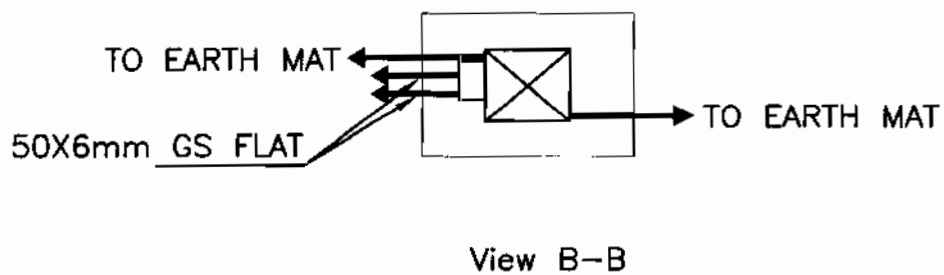
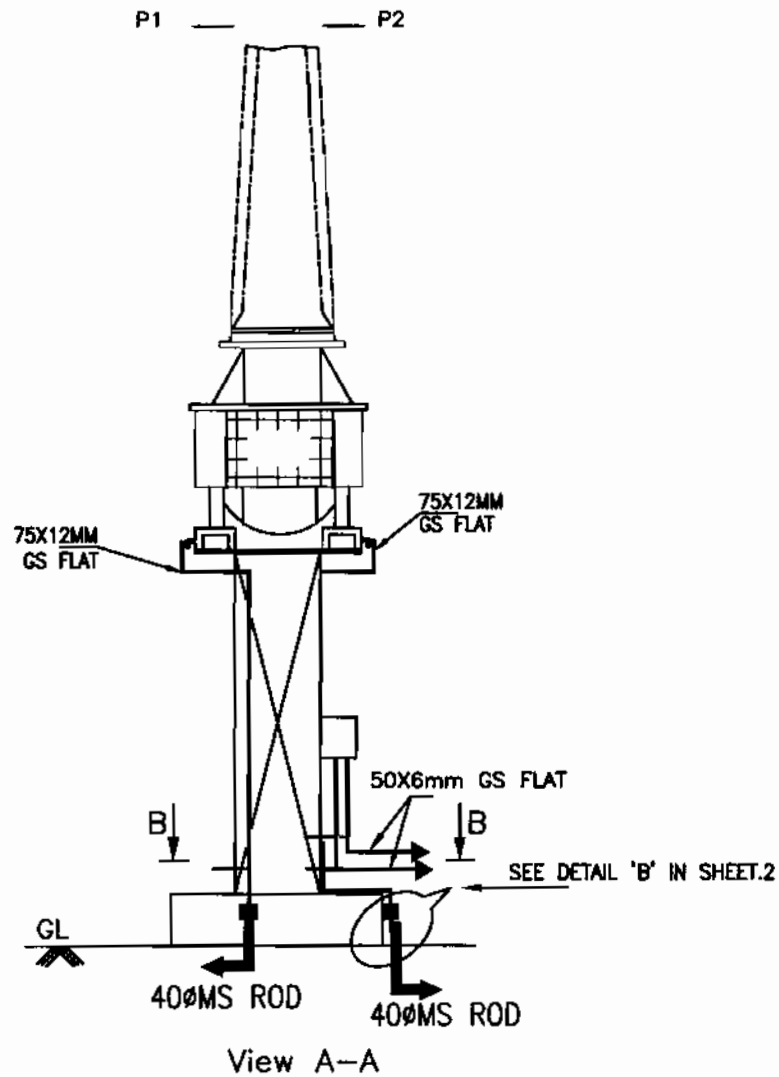
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DRG. No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
8A



NOS.OF RISERS
 = 2 NOS. PER PHASE
 + 2 NOS. FOR CT JB



EQUIPMENT EARTHING DETAILS 400kV & 132kV Current Transformer

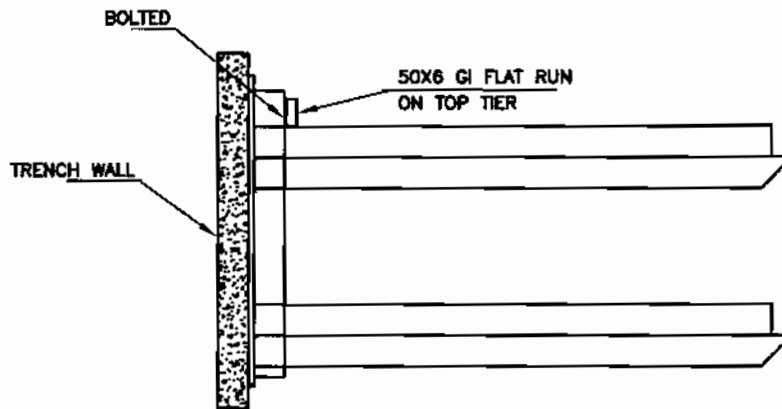
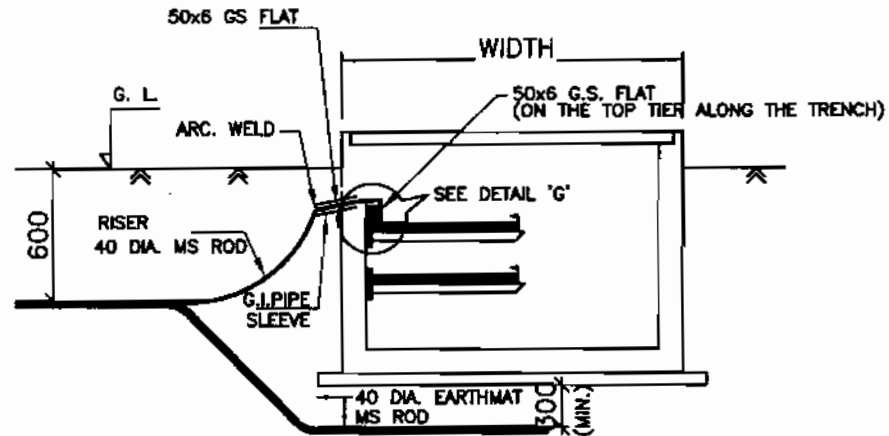
COMPU. DRG. REF.

DRG.NO.

TB-DG-4-353-509-014

REV. 01

SHEET No.
 9



DETAIL 'G'

DETAIL FOR CONNECTING GI FLAT RUNNING
ON TOP TIER TRENCH TO EMBEDDED PLATE.

NOTE:

1. ALL TRENCHES SHALL BE EARTHED AT AN INTERVAL OF 30M ALONG THE LENGTH OF TRENCH & FREE ENDS.
2. THE EARTH STRIP (50x6 G.S. FLAT) SHALL BE BOLTED TO TOP RACK ALONG THE TRENCH RUN & CONTROL ROOM AT EVERY 2M INTERVAL.
3. WHERE THE CABLE RACKS ARE PROVIDED ON BOTH SIDES OF THE TRENCH, BOTH SIDES SHALL BE EARTHED AS PER ABOVE.



EQUIPMENT EARTHING DETAILS CABLE TRENCH

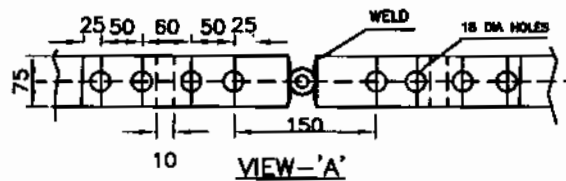
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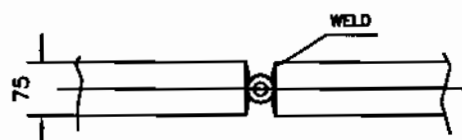
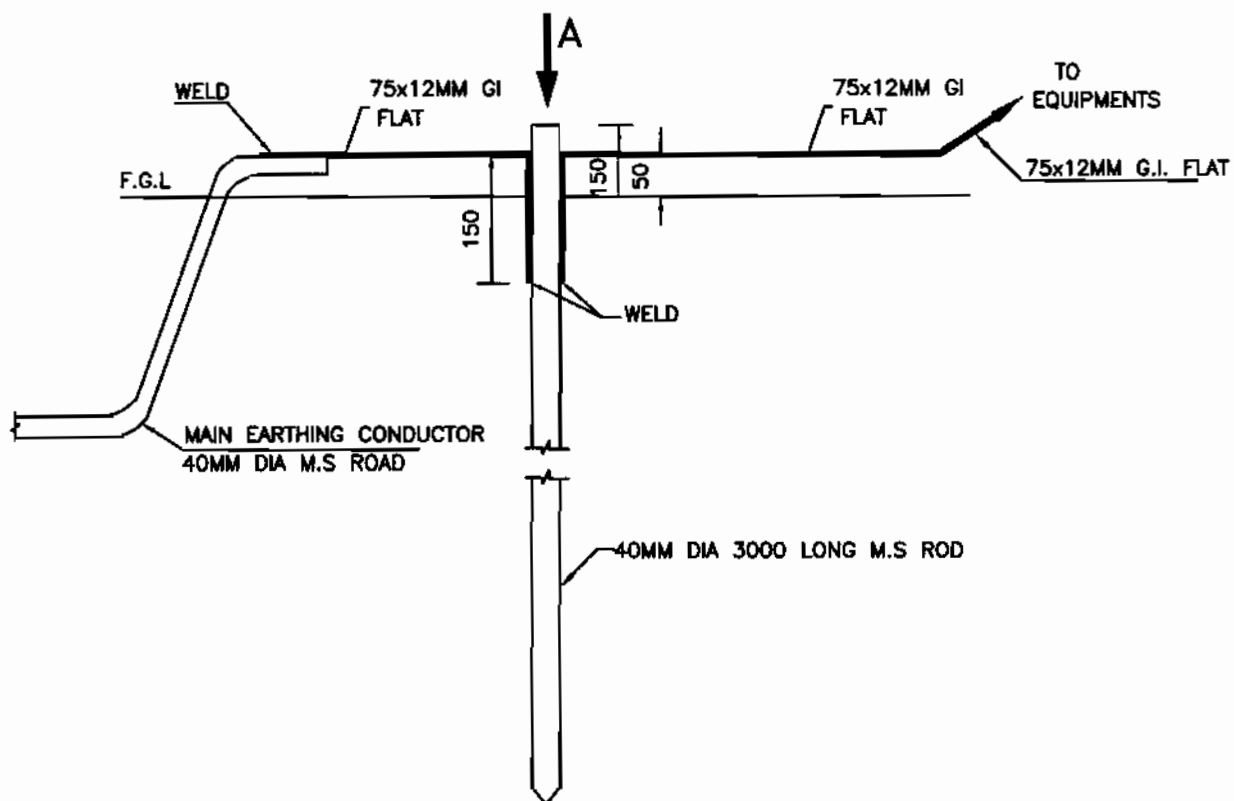
DRG. NO.

TB-DG-4-353-509-014

REV. 0.1

SHEET
10





VIEW-'A'

NOTES:-

1. SUPPLY OF FIXING BOLTS NUTS & WASHERS FOR GI FLAT EARTHING CONDUCTOR IS ALSO FORMS PART OF THE SCOPE.
2. ALL NUTS, BOLTS & WASHERS SHALL BE GALVANISED.



EQUIPMENT EARTHING DETAILS ROD EARTH ELECTRODE WITHOUT TEST PIT

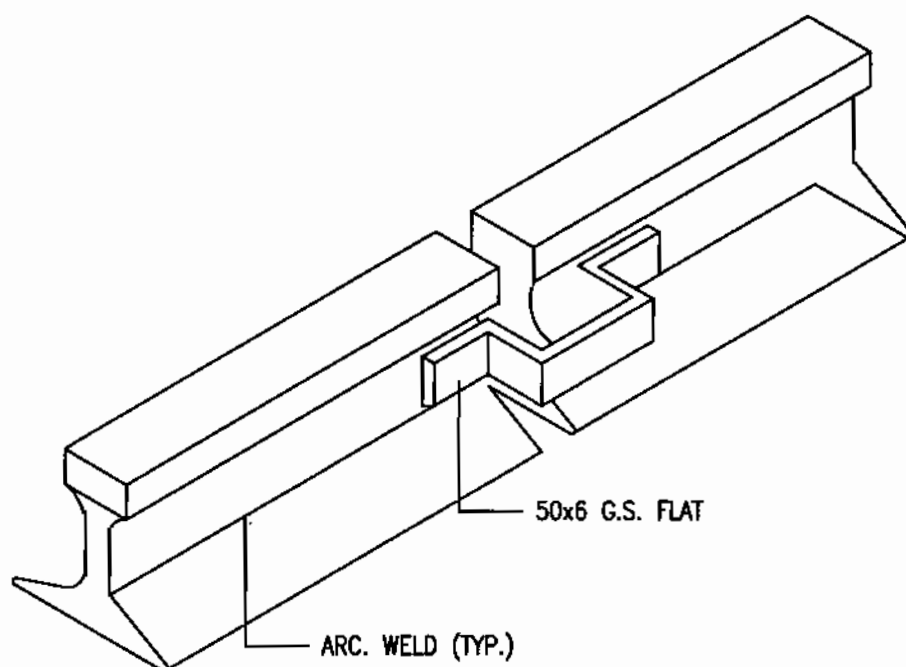
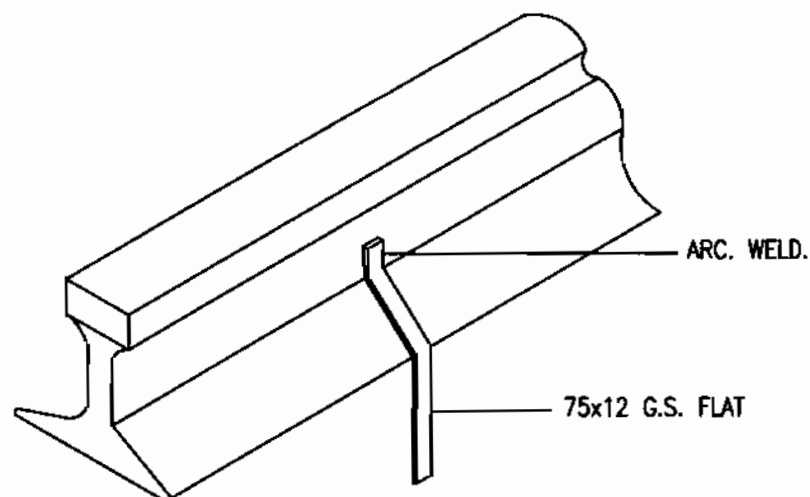
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DRG. No.

TB-DG-4-353-509-014

REV. 0.1

SHEET No.
11A



NOTE:—

1. RAILWAY TRACKS WITHIN SWITCHYARD AREA SHALL BE EARTHED AT A SPACING OF 30 m AND ALSO AT BOTH ENDS.



EQUIPMENT EARTHING DETAILS

RAIL BONDING

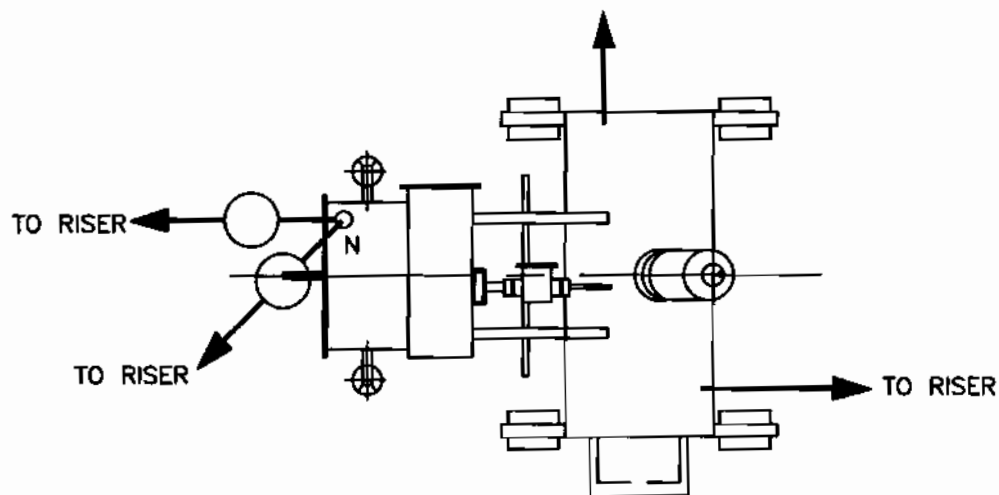
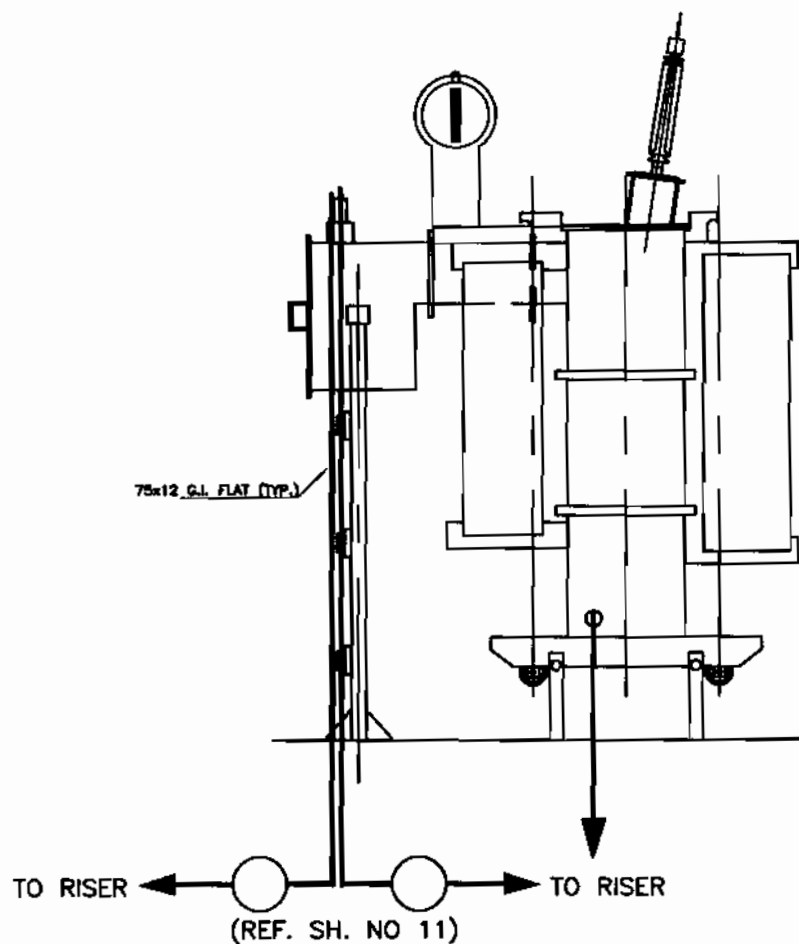
COMPU. DRG. REF.

DRG. NO.

TB-DG-4-353-509-014

REV. 01

SHEET No.
12



NO.OF ROD EARTH ELECTRODE WITH TEST PIT (REFER SHEET NO. 11) = 2 NOS.

NO.OF RISERS = 7 NOS. FOR EARTHING OF FOLLOWING PARTS OF AUXILIARY TRANSFORMER BY 50X6 GI FLAT (TWO EARTHING STRIPS CAN BE CONNECTED TO ONE RISER):

MAIN TANK - 2 Nos.

HV CABLE END BOX-4 Nos.

MARSHALLING BOX - 4 Nos.

LV CABLE END BOX-4 Nos.



EQUIPMENT EARTHING DETAILS AUXILIARY TRANSFORMER

COMPU. DRG. REF.

D:\PROJECT\MURADNAGAR\EQ-ERTH\SH28

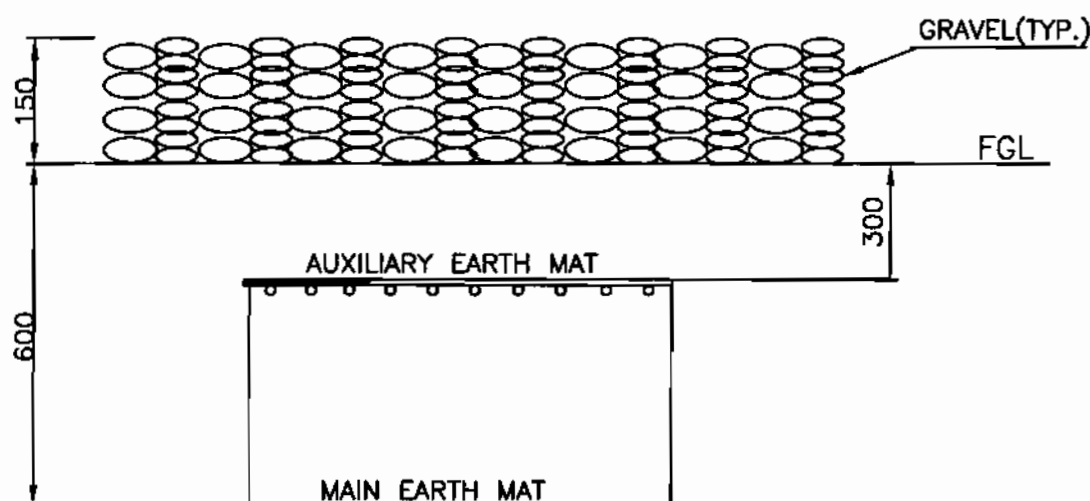
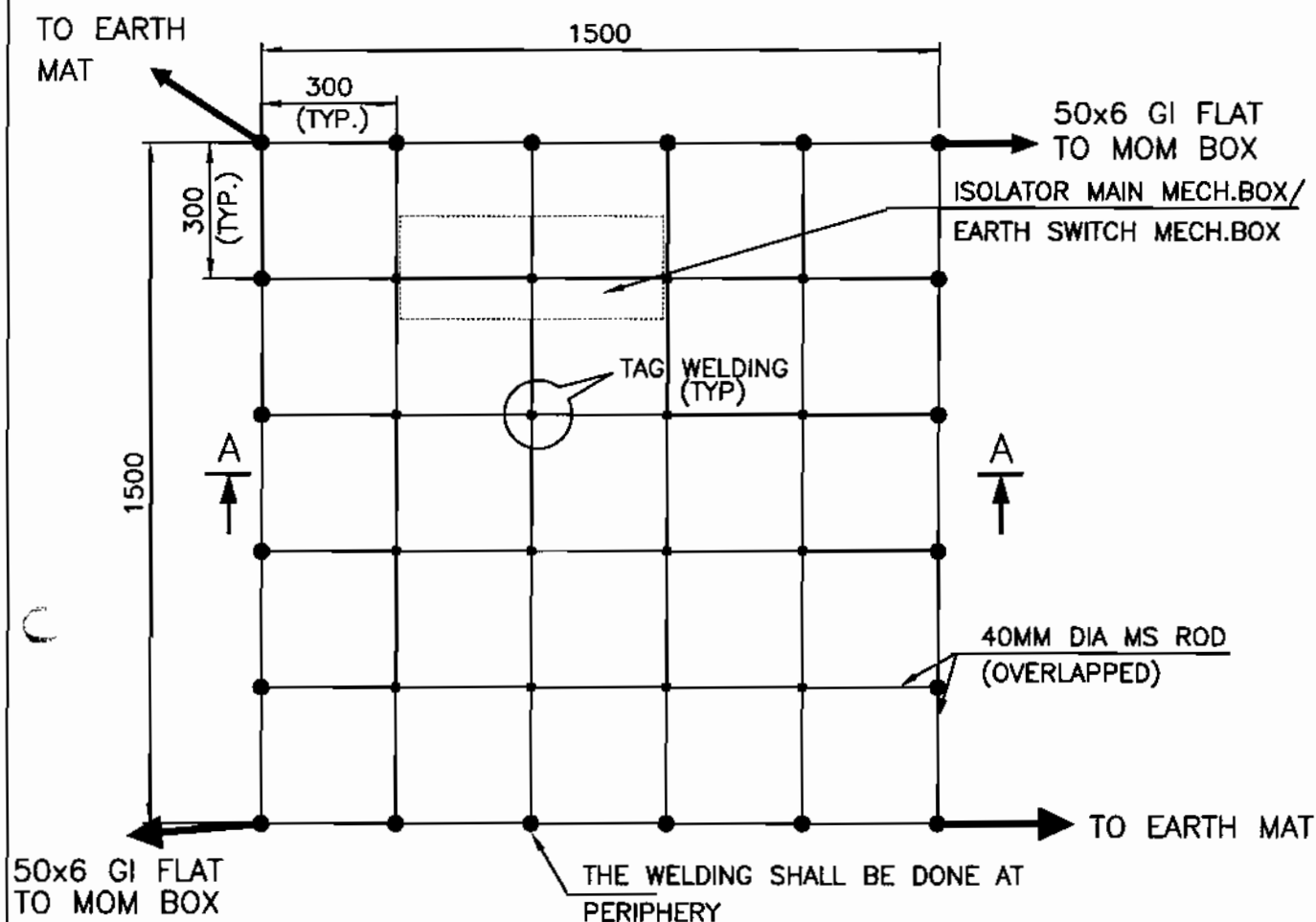
Report No.

TB-DG-4-353-509-014

REV. 01

SHEET No.

13



SECTION AA

NOTE:

AUX. EARTH MAT SHALL BE SO POSITIONED THAT THE FOOT OF THE OPERATOR ALWAYS LIE OVER THE AUX. EARTH MAT AREA WHILE ATTENDING / OPERATING THE MECH. BOX THE CABLE TRENCH ROUTING SHALL BE PLANNED ACCORDINGLY.



EQUIPMENT EARTHING DETAILS
AUXILIARY EARTH MAT FOR ISOLATOR MAIN MECH., E/S
MECH. BOX

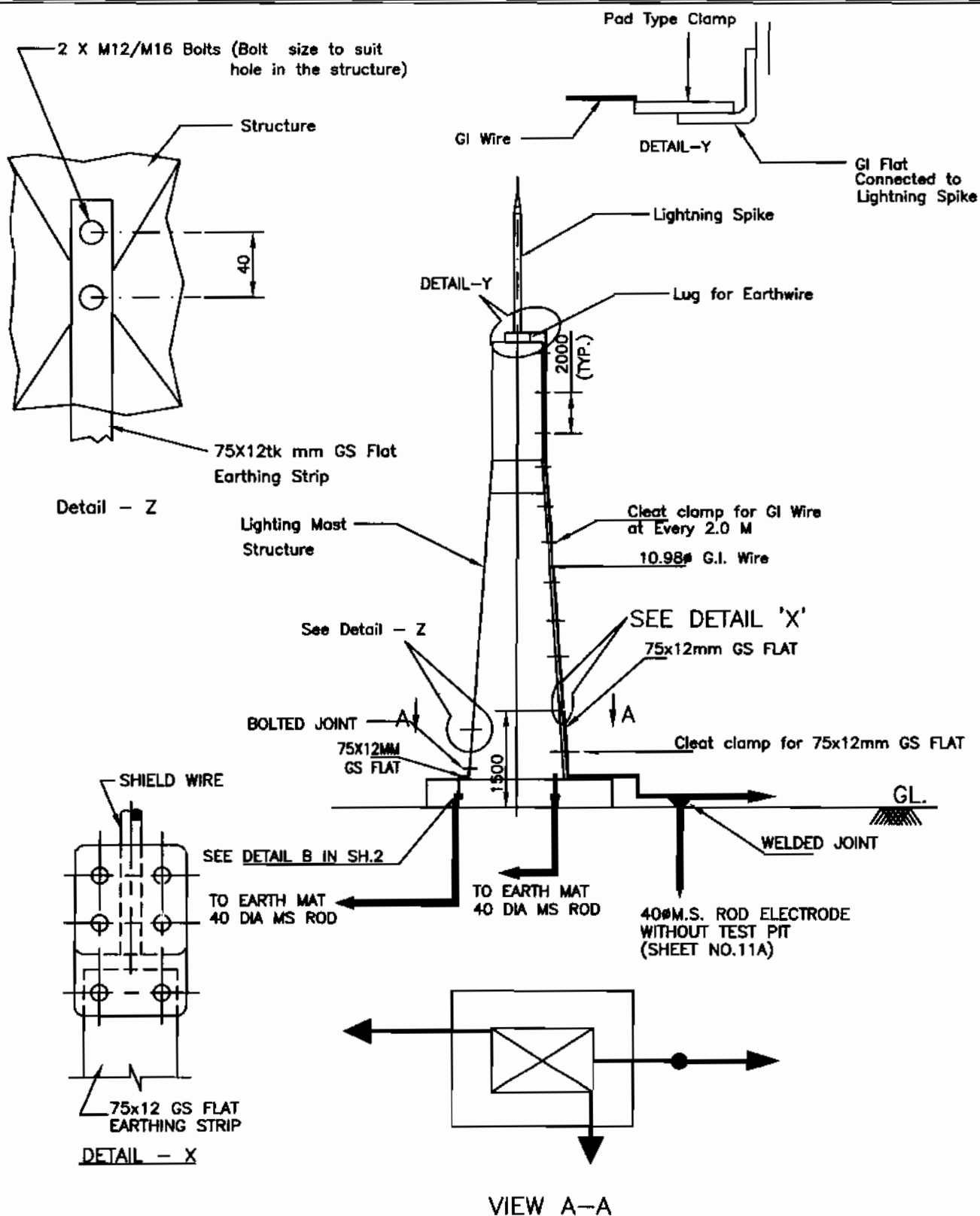
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Report No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
14



NOTE:

1. PAD TYPE CLAMP 1 NO.
2. NO. OF ROD ELECTRODE=1 NO. PER LIGHTNING MAST



EQUIPMENT EARTHING DETAILS

Lightning Mast

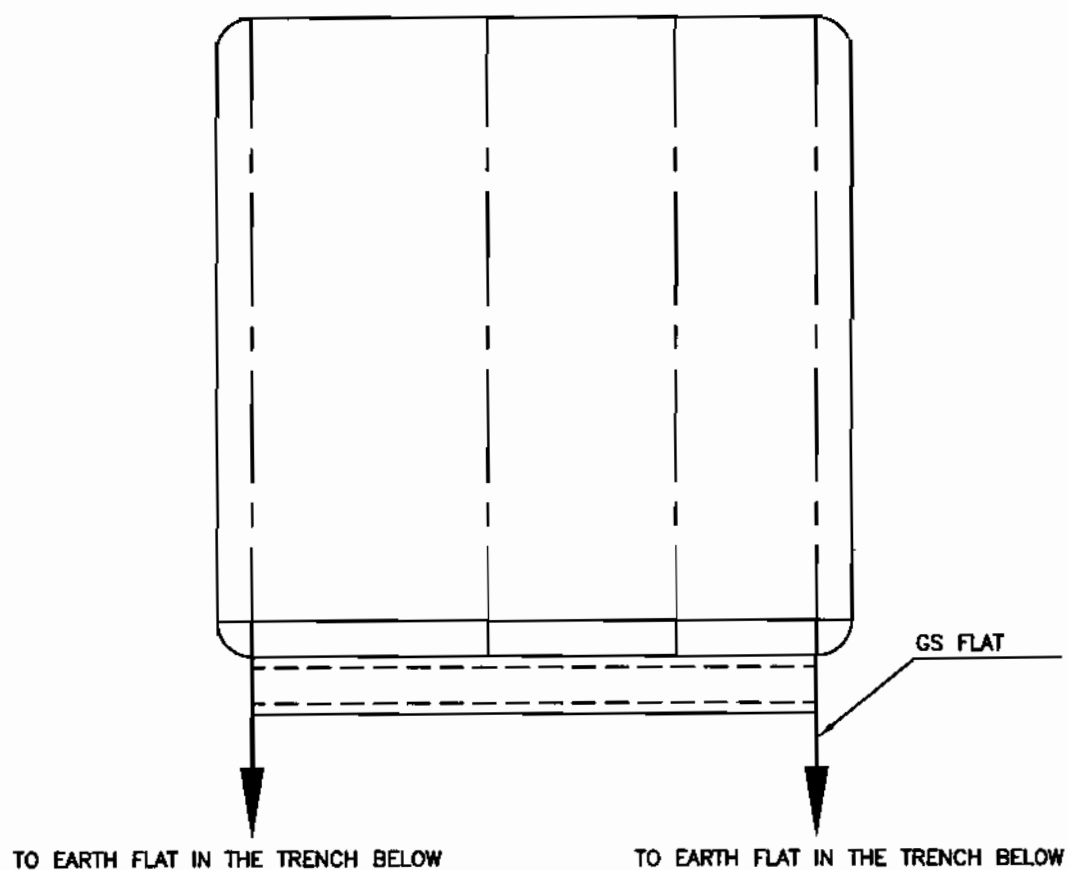
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DRG.NO.

TB-DG-4-353-509-014

REV. 01

SHEET No.
15



EQUIPMENT

FLAT SIZE

AC / DC DISTRIBUTION BOARDS	50X6 MM
CONTROL & RELAY PANELS	50X6 MM
AC KIOSK	50X6 MM
BATTERY CHARGER PANELS	50X6 MM
OPGW, PLCC PANELS	25X3 MM



EQUIPMENT EARTHING DETAILS

AC/DC DISTRIBUTION BOARDS CONTROL AND RELAY BOARD/AC KIOSK/
BATTERY CHARGER PANELS/OPGW, PLCC PANELS

DRG. No.

TB-DG-4-353-509-014

REV. 01

SHEET No.
16

MAIN TANK - 2 Nos.
RADIATOR SUPPORT - 2 Nos.
CONTROL CABINET - 2 Nos.



EQUIPMENT EARTHING DETAILS

400 KV BUS REACTOR

COMPU. DRG. REF.

DRG. NO.

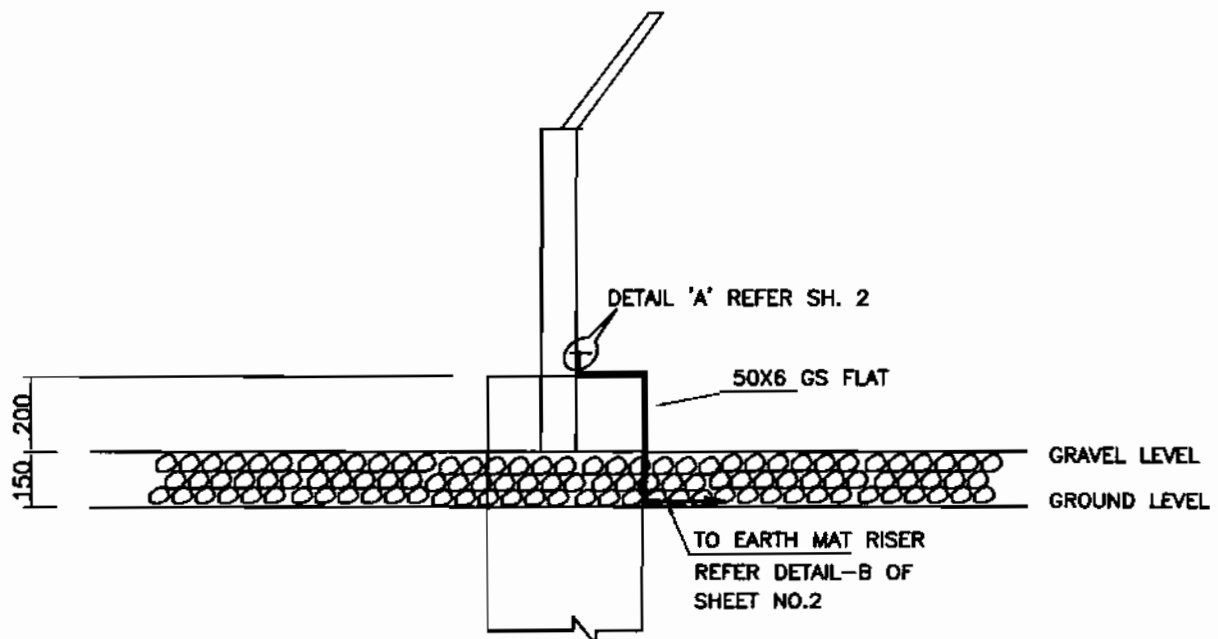
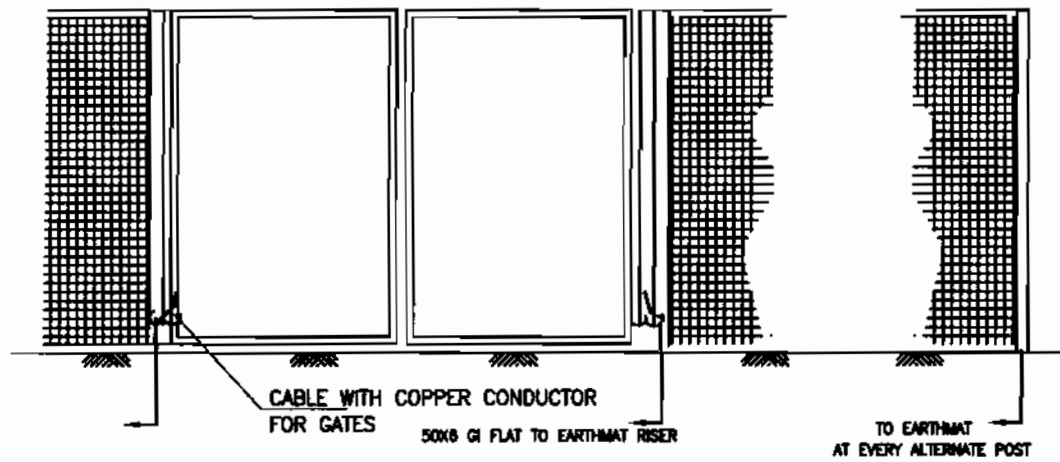
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SHEET
17

FENCE GATE

FENCE GROUNDING



EVERY ALTERNATE FENCE POSTS SHALL BE EARTHED BY 50X6 MM GS FLAT.

FENCE EARTHING



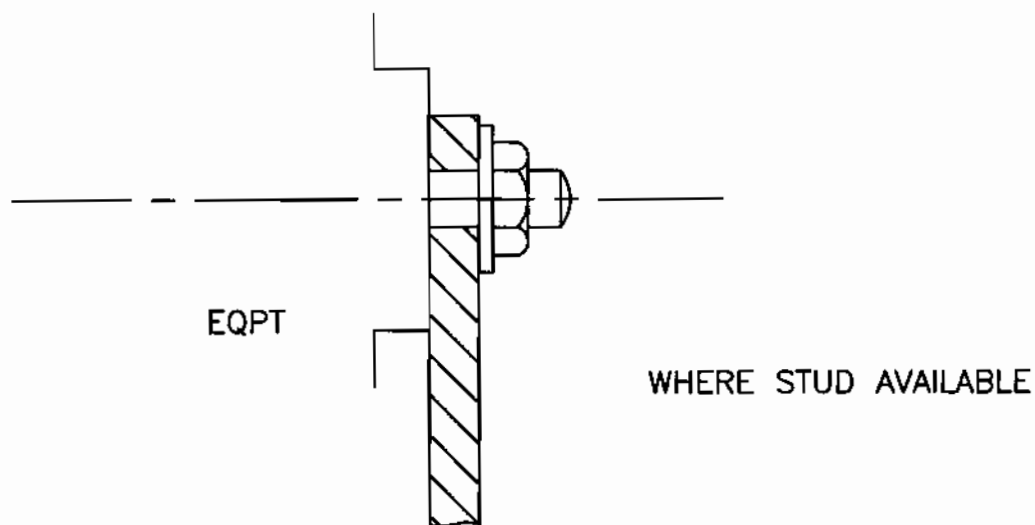
EQUIPMENT EARTHING DETAILS GATE/FENCE POST

DRG. No.

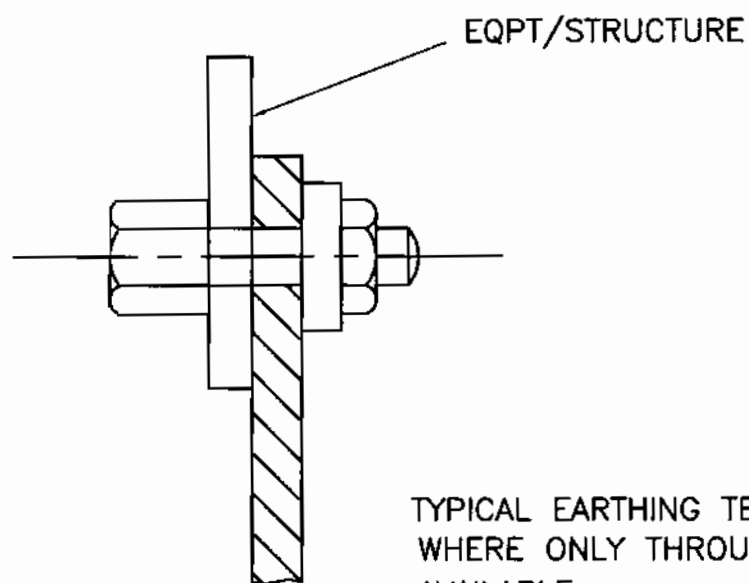
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18



TYPICAL EARTHING TERMINAL JOINT



TYPICAL EARTHING TERMINAL JOINT
WHERE ONLY THROUGH HOLE IS
AVAILABLE

NOTE

1. THIS IS GENERAL TYPICAL BOLTING ARRANGEMENT APPLICABLE TO ALL PANELS, EQUIPMENT, ETC, WHERE BOLTING ARRANGEMENT IS PROVIDED.
2. IN CASE EARTHING TERMINAL COMPRISES ONLY A TAPPED HOLE SUITABLE BOLT/ SCREW WITH WASHER MAY BE USED FOR EARTHING CONDUCTOR TERMINATION



EQUIPMENT EARTHING DETAILS TYPICAL ARRANGEMENT OF BOLTED JOINTS

DRG. No.

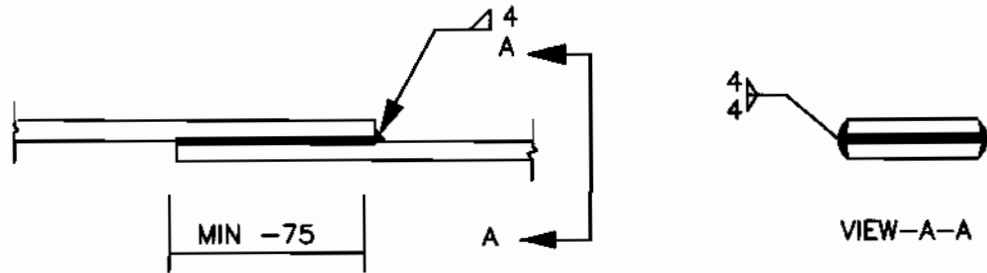
TB-DG-4-353-509-014

REV. 01

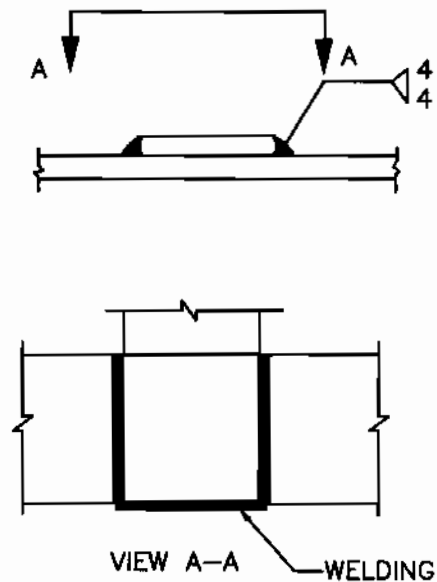
SHEET No.
19

C. STRIP TO STRIP (50X6 MS FLAT)

1. STRAIGHT LAP JOINT/RISER



2. CROSS LAP JOINT



EQUIPMENT EARTHING DETAILS WELDING DETAILS

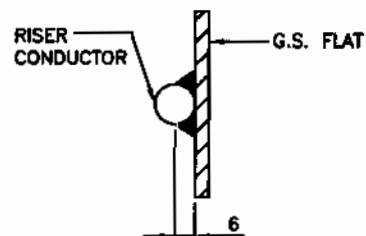
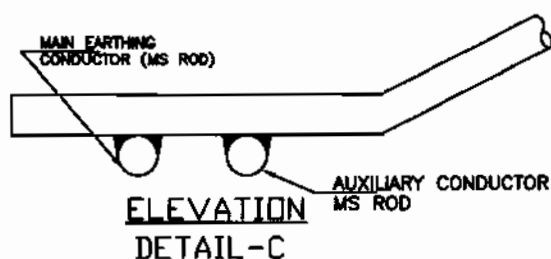
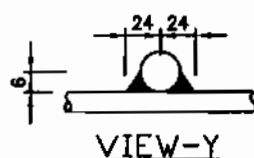
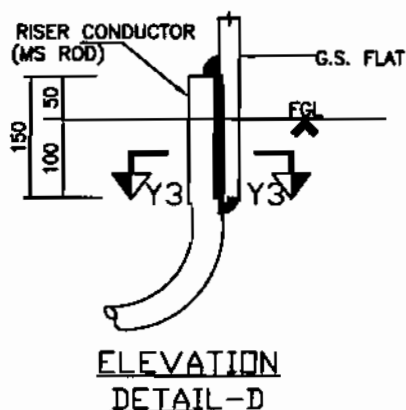
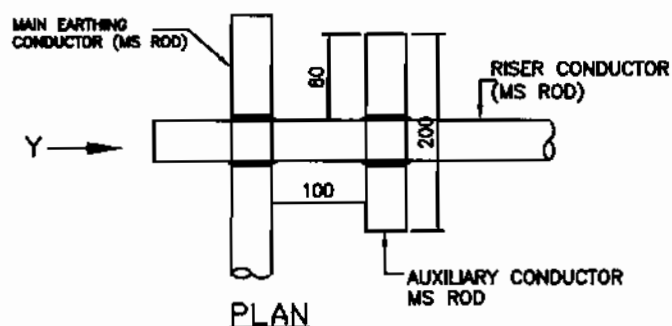
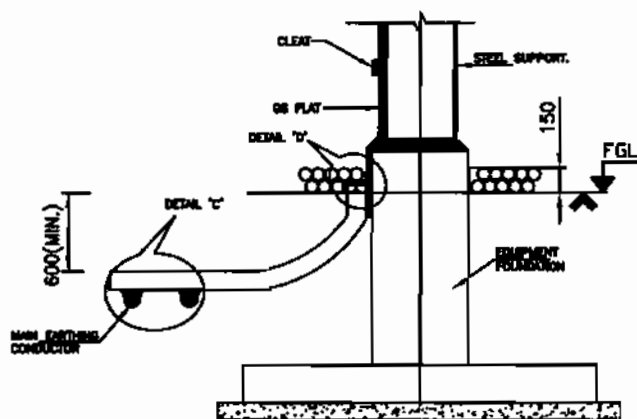
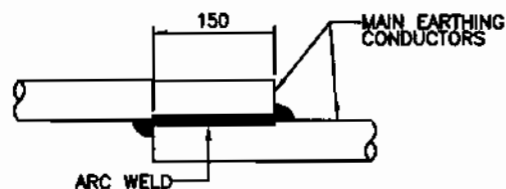
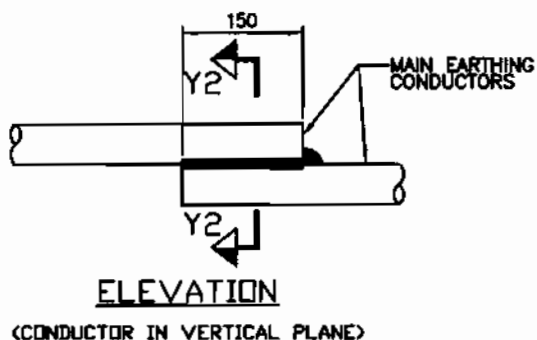
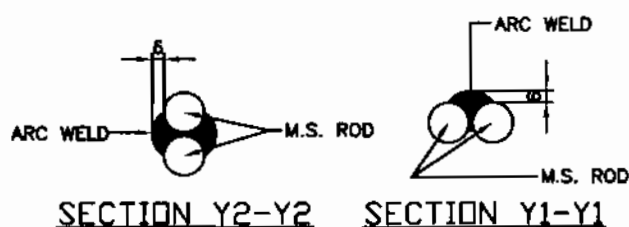
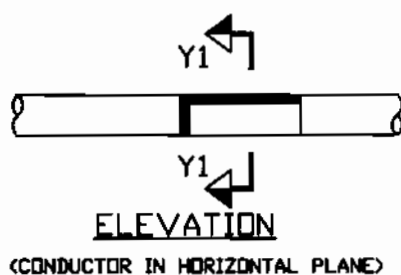
COMPUTER REF. NO.

DRG. No.

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SHEET No.
20



TYPICAL OVERLAPPING JOINT OF TWO CONDUCTORS



EQUIPMENT EARTHING DETAILS **WELDING DETAILS**

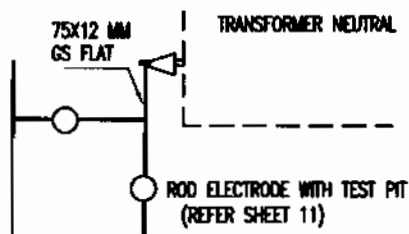
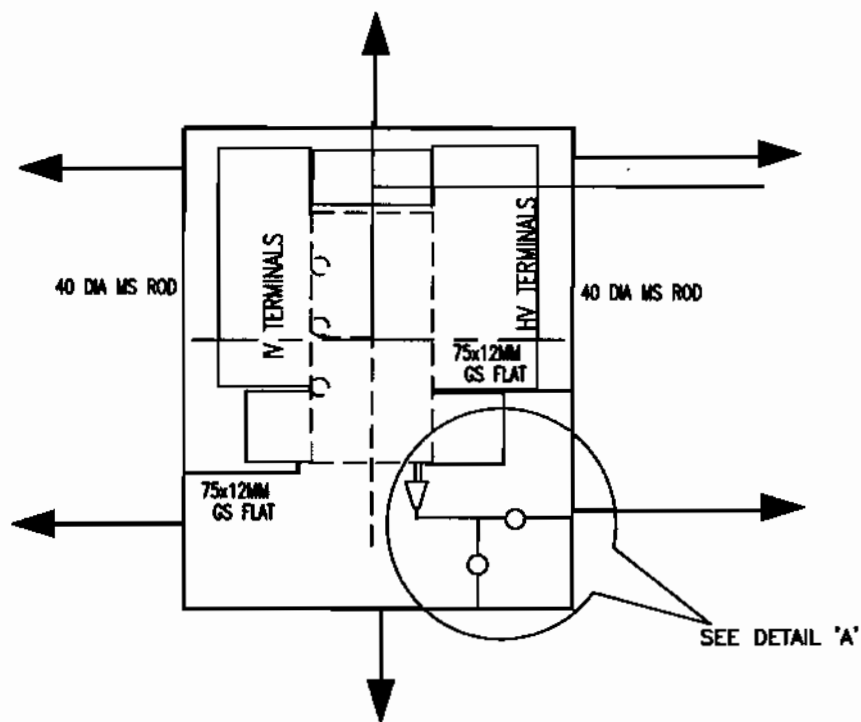
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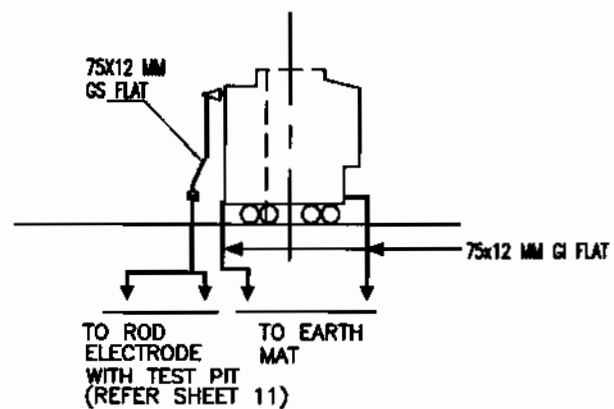
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DETAIL A



NO.OF ROD EARTH ELECTRODE WITH TEST PIT (REFER SHEET NO. 11) = 2 NOS.

NO.OF RISERS = 6 NOS. FOR EARTHING OF FOLLOWING PARTS OF 400KV AUTO TRANSFORMER BY 75X12MM GI FLAT :

MAIN TANK - 2 Nos.

RADIATOR SUPPORT - 2 Nos.

CONTROL CABINET - 2 Nos.



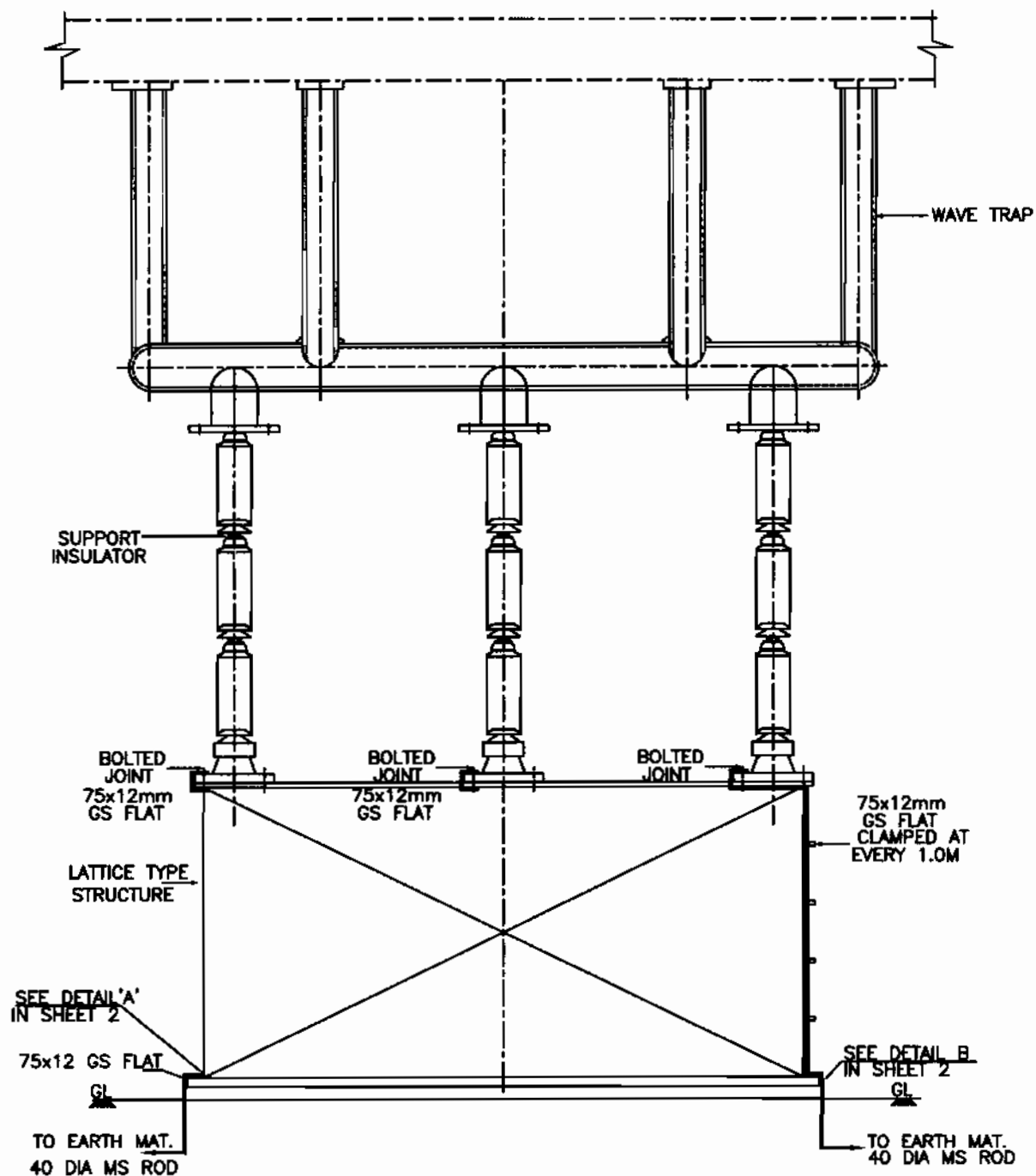
EQUIPMENT EARTHING DETAILS AUTO TRANSFORMER

DRG. No.

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REV. 0'1

SHEET No.
22



NO.OF RISERS = 2 NOS. PER WAVE TRAP



EQUIPMENT EARTHING DETAILS

132kV WAVE TRAP

COMPUTER REF. NO.

DRG. No.

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SHEET No.
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