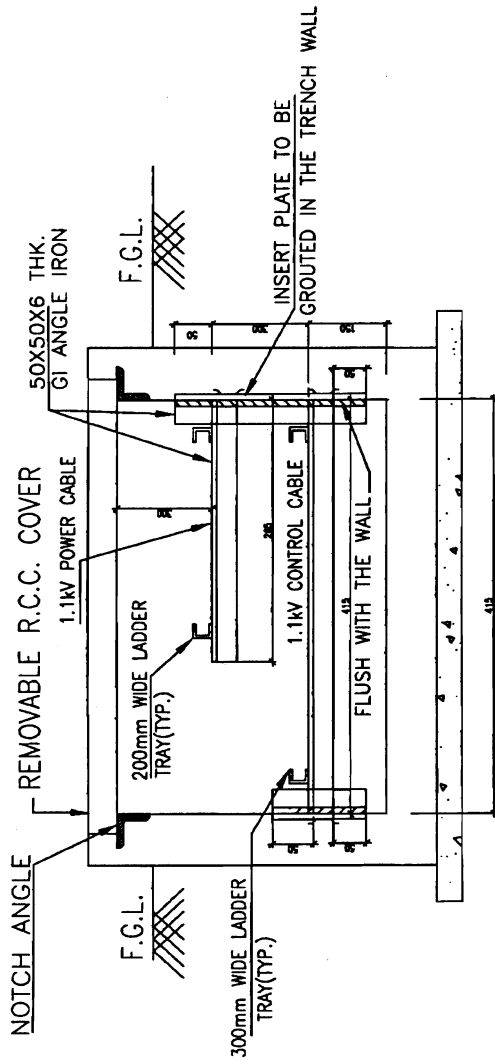


ANNEXURE -1



CABLE TRENCH SECTION TR-1 (FOR 1.1KV LT CABLE)

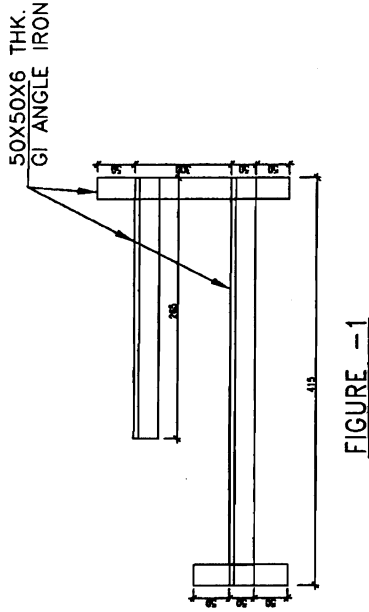
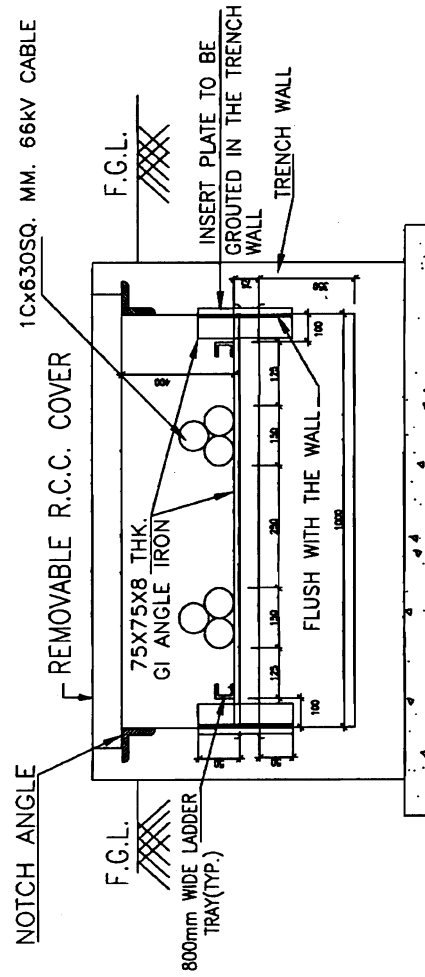


FIGURE -1



CABLE TRENCH SECTION TR-2 (FOR 66KV HT CABLE)

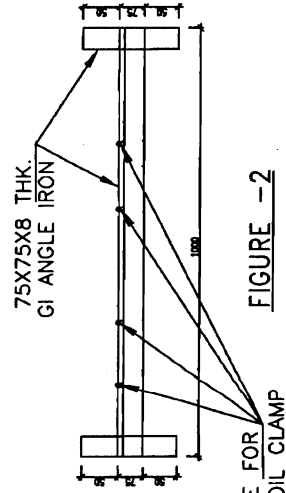


FIGURE -2

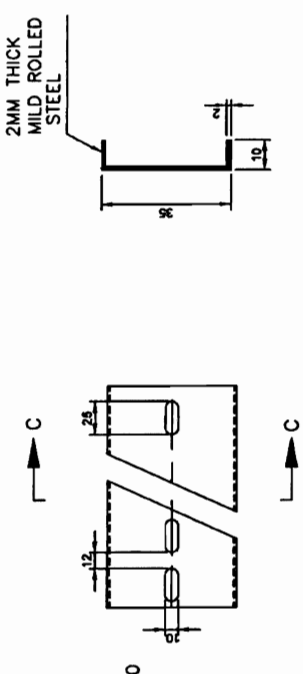
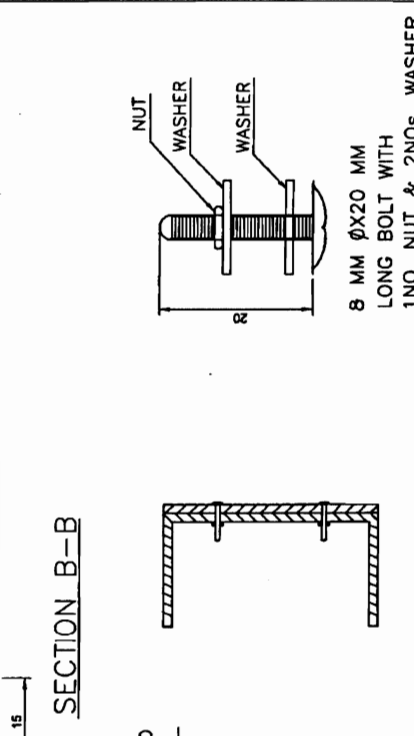
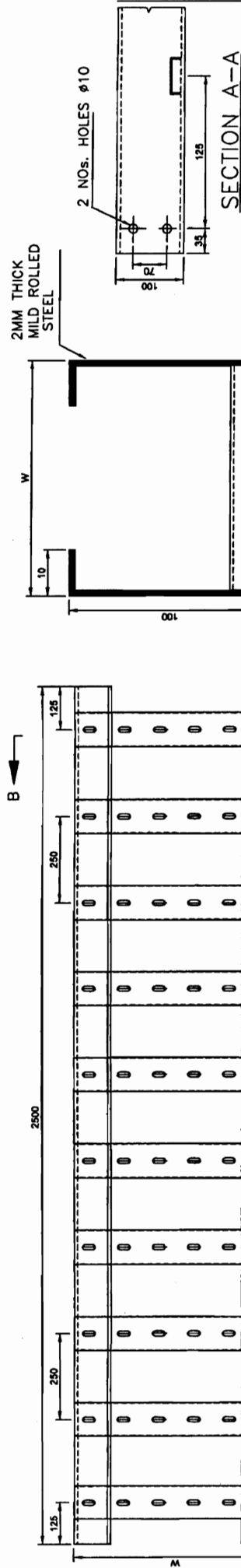
* 4 NOS. HOLE FOR FIXING TREFOIL CLAMP

NOTES:-

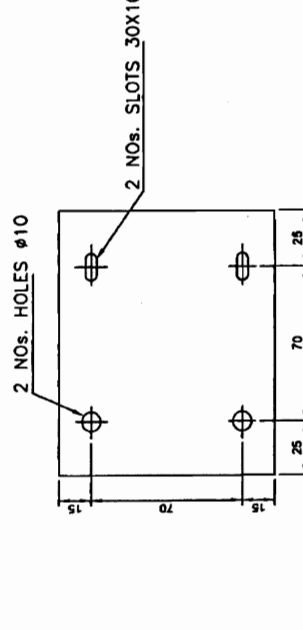
1. ALL DIMENSIONS ARE IN MM.
2. * = DETAILED DIMENSION OF HOLE FOR FIXING OF TREFOIL CLAMP SHALL BE INTIMATED DURING CONTACT STAGE.

Handwritten signature

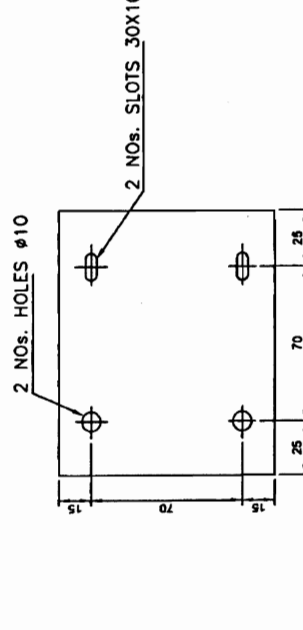
ANNEXURE-2



SLOTTED RUNG



COUPLER PLATE (3MM THICK)



TYPICAL JOINT OF TRAYS WITH COUPLER PLATE

W	800	300
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NOTE:-

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. LADDER TYPE CABLE TRAYS SHALL BE FABRICATED FROM ROLLED MILD STEEL, MINIMUM 2MM THICK FOR TRAYS AND 3MM THICK FOR COUPLER PLATE.
3. ALL NUTS, BOLTS AND WASHERS SHALL BE ZINC PASSIVATED.
4. CABLE TRAY ASSEMBLIES SHALL BE FABRICATED AS PER IS : 1079 GRADE "O" / IS : 2026 GRADE "A". OTHERWISE SPECIFIED.
5. CABLE TRAYS, SIDE COUPLER PLATES & CABLE RACK ASSEMBLIES SHALL BE HOT DIP GALVANISED AS PER IS : 2629
6. FABRICATION TOLERANCE ± 5 MM TO BE ALLOWED.
7. TOLERANCE ON THICKNESS ± 0.2 MM TO BE ALLOWED. OTHERWISE SPECIFIED. TOLERANCE ON DIMENSION - AS PER IS 1852.
8. 1 NO COUPLER PLATE TO BE SUPPLIED PER JOINT.

Signature

ANNEXURE-A
KRIBHCO HAZIRA EXTN PROJECT

TECHNICAL SPECIFICATION AND BOQ OF CABLE GLANDS

SECTION - I

TECHNICAL REQUIREMENTS

1.2.1 Type CGNC -- Double compression, Heavy Duty Nickel-Chromium plated (coating thickness not less than 10 microns) brass cable glands shall be provided by the vendor for all **PVC/Cu armoured** power and control cables to provide dust and weather proof terminations. The cable glands shall be tested as per BS: 6121. They shall comprise of heavy duty, brass casting, machine finished and Nickel plated, to avoid corrosion and oxidation. Rubber components used in cable glands shall be neoprene and of tested quality. The glands shall be dust proof, screw on type, shrouded complete with necessary armour clamp and tapered washers etc.

QUANTITIES

S. No.	Type of Cable Glands	Quantity in Nos.
	LT CONTROL CABLES	
1.	2 C X 2.5 sq mm PVC/CU	100
2.	5C X 2.5 sq mm PVC/CU	250
3	10C X 2.5 sq mm PVC/CU	100
4	14C X 2.5 sq mm PVC/CU	30
5	19C X 2.5 sq mm PVC/CU	20
	LT POWER CABLES	
6	4C X 6 sq mm PVC/Cu	70
7	3.5C X 35 sq mm PVC/Al	10
8	4C X16 sq mm PVC/Cu	20

ANNEXURE-A
KRIBHCO HAZIRA EXTN PROJECT
TECHNICAL SPECIFICATION AND BOQ OF CABLE GLANDS



All valid test reports as per relevant standard shall be furnished including Proof Torque Test, Tensile Test, Seal Test and Electrical Continuity Test as per BS 6121. Cable glands shall also be tested for dust proof and weather-proof termination. Bidders shall submit valid reports of type tests carried out within five years of bid opening. These reports should have been conducted on identical / similar equipment to those offered. In case less than five years old type test reports OR valid type tests are not furnished, the tests shall be conducted free of charge. No separate type test charges shall be paid.

Annexure - B

REV.	DATE	REASONS FOR REVISION	DRN.	PREPARED BY	CHECKED BY	APPROVED BY
------	------	----------------------	------	-------------	------------	-------------

NAME OF CUSTOMER/PROJECT **KRISHAK BHARATI COOPERATIVE LTD.
SURAT GUJARAT**

**EXTENSION OF 66kV SWITCHYARD FOR 1X72MW GTG BASED
REVAMP PROJECT OF CPP AT KRIBHCO, HAZIRA**

NAME OF CONSULTANT **FICHTNER CONSULTING ENGINEERS (INDIA) PVT. LTD.
MUMBAI**

BHARAT HEAVY ELECTRICALS LTD

UNIT: TRANSMISSION BUSINESS GROUP

<p style="text-align: center;">COPY RIGHT AND CONFIDENTIAL</p> <p>The information on this document is the property of BHARAT HEAVY ELECTRICAL LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company.</p>	DEPT		NAME	SIGN.	DATE
	CODE	DRN	RK	RK	07.05.12
		DESN	SK	<i>[Signature]</i>	
		CHD	SKS	<i>[Signature]</i>	
		APPD	AS	<i>[Signature]</i>	07/05/12

TITLE **EQUIPMENT & STRUCTURE EARTHING DETAILS
FOR 66kV KRIBHCO HAZIRA SUBSTATION**

CV	ME	EL	I&C			DEPT.	SCALE NTS	BHEL DRG NO.
						SIGN		TB-4-352-316-008
						DATE		SHEETS. ENCLOSED. 17

LEGEND

→ CONNECTION TO GROUND MAT THROUGH RISER.

● RISER

GENERAL NOTES:

1. EARTH STRIP CLEATED TO LATTICE TYPE STRUCTURE AT AN INTERVAL OF 1000mm.
2. ALL ELECTRICAL EQUIPMENTS SHALL BE EARTHED BY TWO SEPARATE AND DISTINCT EARTH CONNECTIONS AND SHALL BE CONNECTED TO DIFFERENT CONDUCTORS OF EARTHING GRID.
3. FOR WELDING DETAILS REFER SHEET #15, 16 & 17
4. E/WIRE DOWN CONDUCTOR SHALL BE CLEATED AT AN INTERVAL OF 2000mm ALONG WITH STRUCTURE.
5. NO HOLES IN STRUCTURE ARE ALLOWD FOR THIS PURPOSE.
6. 40 DIA MS ROD RISERS SHOULD BE BRING CLOSE TO EQUIPMENTS FOUNDATION.
7. 66KV CABLE EARTHING SHALL BE SHOWN IN SEPARATE DRWING.

SHEET NO. DESCRIPTION

- 02. 66KV SF6 CIRCUIT BREAKER
- 03. 66KV PT
- 04. 66KV POST INSULATOR (SOLID CORE TYPE)
- 05. 60KV LIGHTNING ARRESTER
- 06. MARSHALLING KIOSK
- 07. 66KV HORIZONTAL CENTER BREAK ISOLATOR WITH ONE EARTH SWITCH
- 08. TOWER WITH SHIELD WIRE
- 09. 66KV CURRENT TRANSFORMER
- 10. CABLE TRENCH

SHEET NO. DESCRIPTION

- 11. AUXILIARY EARTH MAT FOR ISOLATOR MAIN MECH., E/S MECH. BOX.
- 12. PANEL.
- 13. FENCE POST
- 14. TYPICAL ARRANGEMENT OF BOLTED JOINTS
- 15. WELDING DETAILS
- 16. WELDING DETAILS
- 17. WELDING DETAILS



EQUIPMENT EARTHING DETAILS

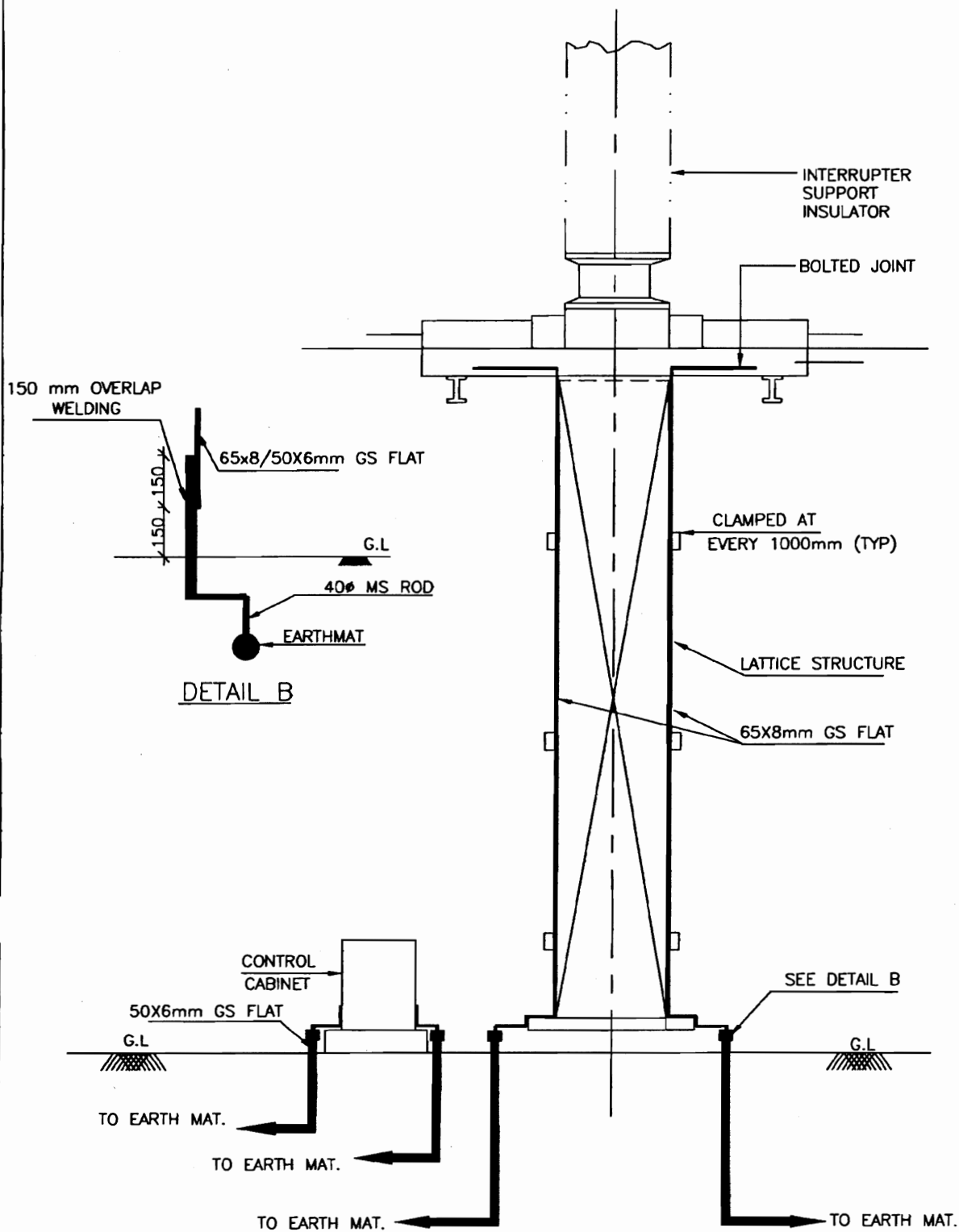
COMPUTERREF.NO.

DRG. No.

TB-4-352-316-008

REV. 00

SHEET No.
01



NOTE:

- 1) NO. OF RISERS PER CIRCUIT BREAKER = 2 NOS./PHASE
- 2) NO. OF RISERS FOR CONTROL CABINET = 2 NOS.
- 3) NO. OF RISERS FOR PLATFORM (IF APPLICABLE) = 2 NOS. PER PLATFORM.



EQUIPMENT EARTHING DETAILS

66kV SF6 CIRCUIT BREAKER

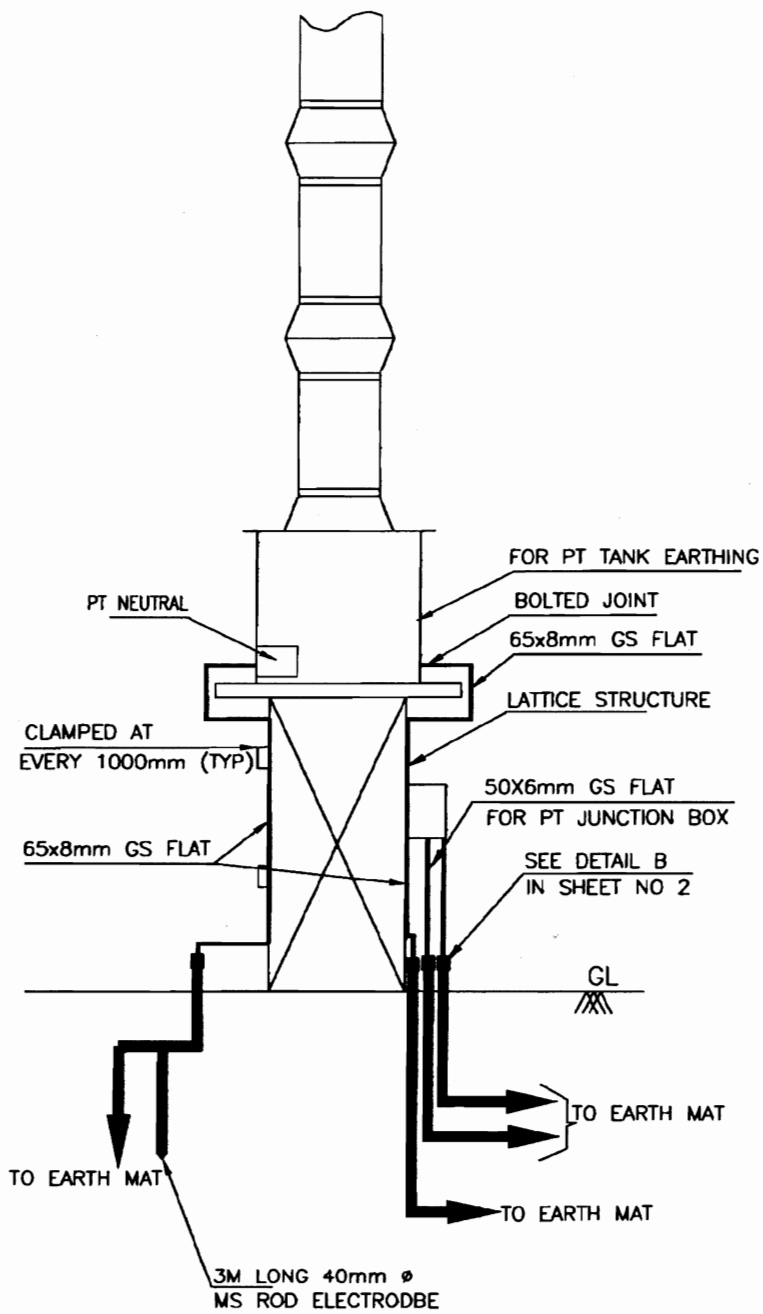
COMPUTERREF.NO.

DRG. No.

TB-4-352-316-008

REV. 00

SHEET No.
2



NOTE:

- (1) ROD ELECTRODE = 1 NOS./PHASE
- (2) NO. OF RISERS = 2 NOS PER PHASE FOR PT.
- (3) NO. OF RISERS FOR PT JUNCTION BOX = 2 NOS.



EQUIPMENT EARTHING DETAILS

66KV PT

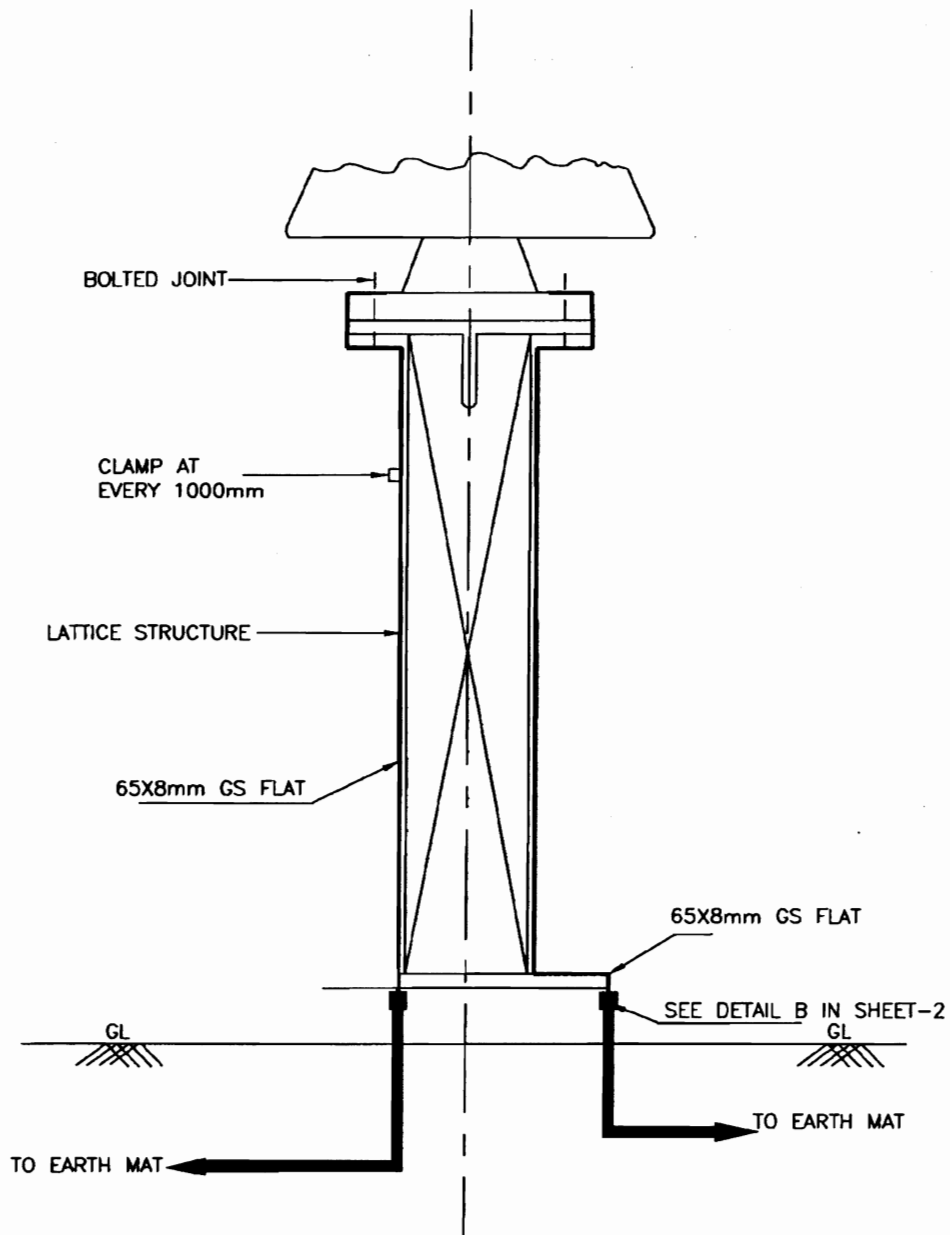
COMPUTERREF.NO.

DRG. No.

TB-4-352-316-008

REV. 00

SHEET No.
3



NOTE:

(1) NO. OF RISERS = 2 NOS./PHASE

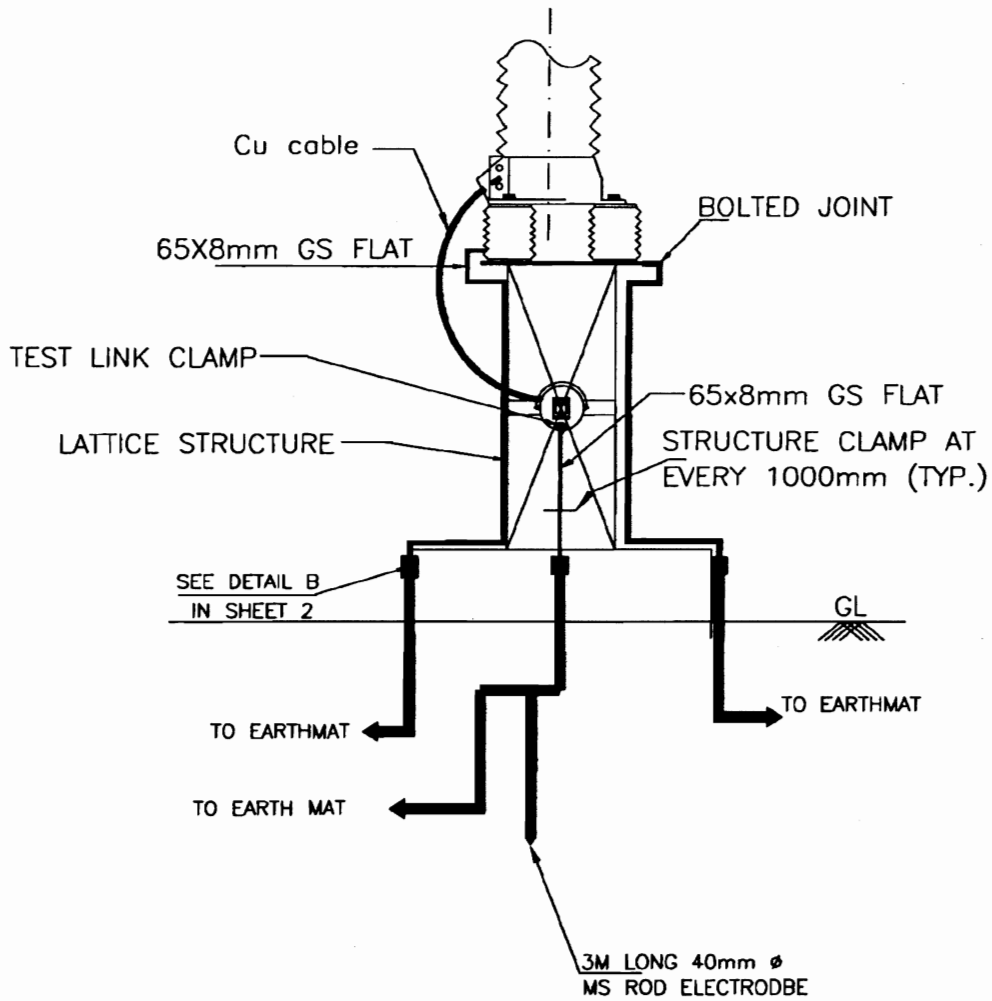


EQUIPMENT EARTHING DETAILS
66KV POST INSULATOR (SOLID CORE TYPE)

DRG. No. TB-4-352-316-008

REV. 00

SHEET No.
4



NOTES;

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



EQUIPMENT EARTHING DETAILS
LIGHTNING ARRESTER(60kV)

COMPU. DRG. REF.

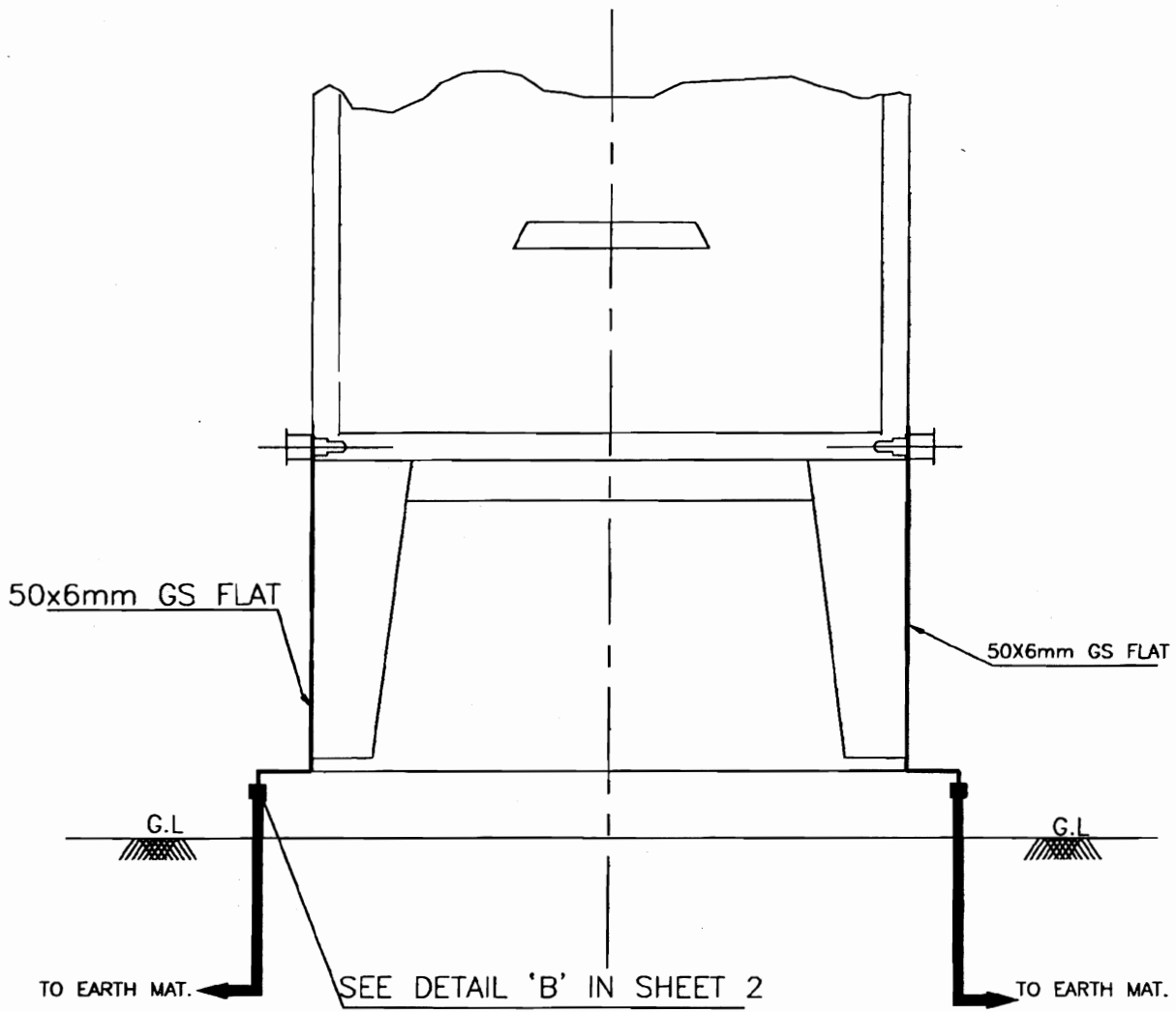
DRG.NO.

TB-4-352-316-008

REV. 00

SHEET No.

5



NOTES;

1. NO. OF RISERS= 2NOS.



EQUIPMENT EARTHING DETAILS
MARSHALLING KIOSK

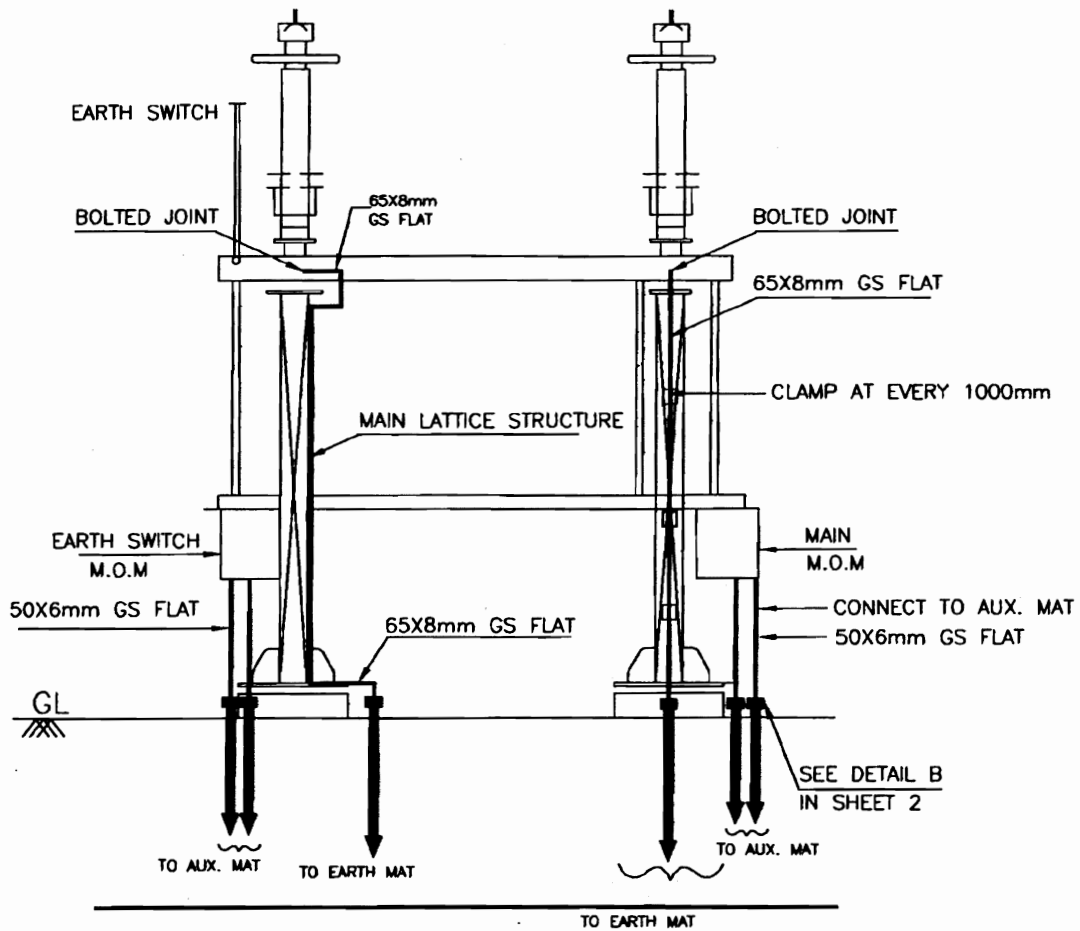
COMPUTERREF.NO.

DRG. No.

TB-4-352-316-008

REV. 00

SHEET No.
6



NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 11)
2. NO. OF RISERS FOR ISOLATOR = 2 NOS./PHASE
3. NO. OF RISERS FOR MAIN MECHANISM BOX = 2 NOS.
4. NO. OF RISERS FOR EARTH SWITCH MECHANISM BOX = 2 NOS.



EQUIPMENT EARTHING DETAILS

66KV HCB

ISOLATOR (TYPICAL) WITH ONE EARTH SWITCH

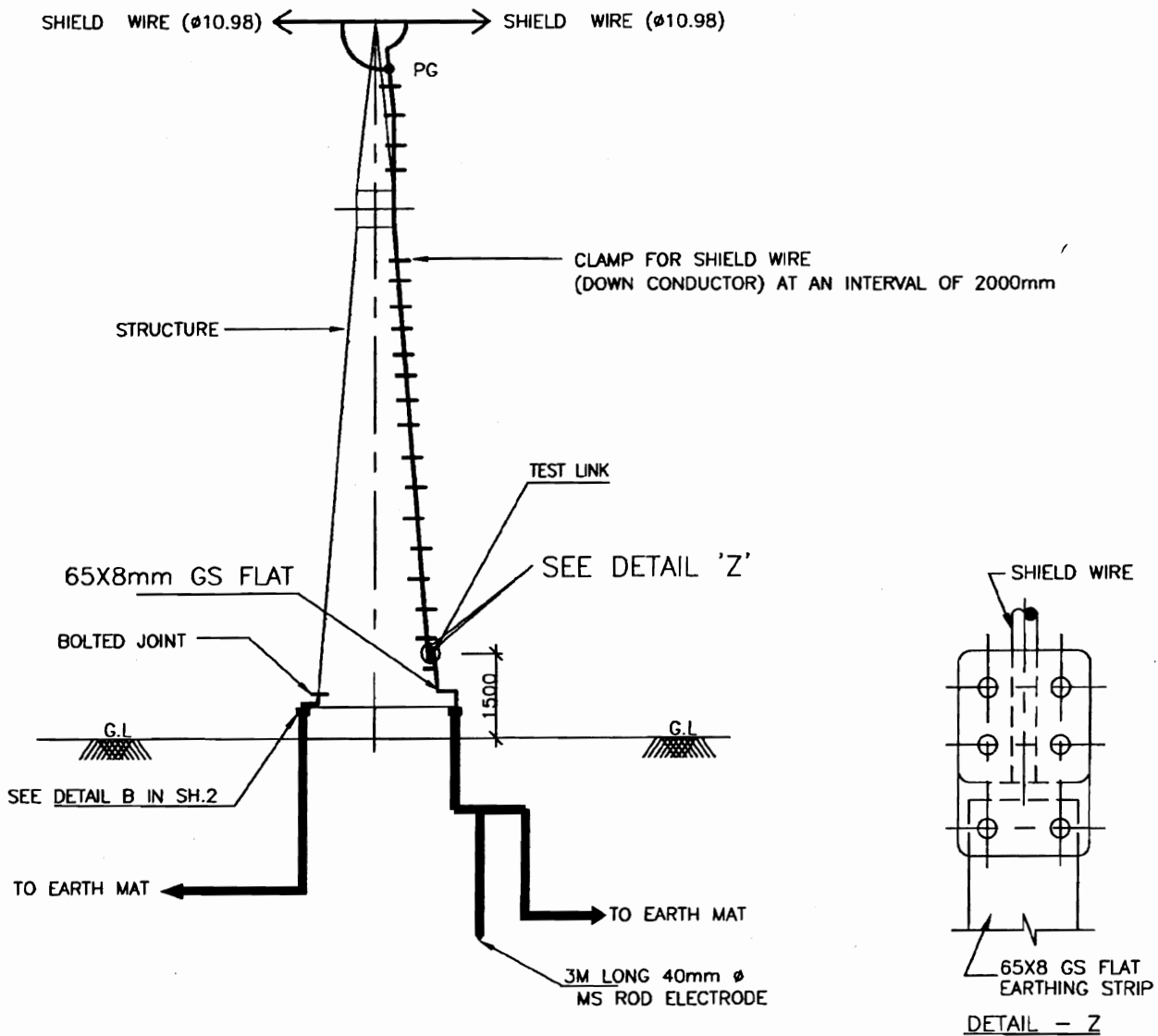
COMPUTERREF. NO.

DRG. No.

TB-4-352-316-008

REV. 00

SHEET No.
7



NOTE:

1. NO. OF ROD ELECTRODE : 1 NO. PER TOWER WITH DOWN CONDUCTOR.
2. NO. OF RISERS 2 NOS. / TOWER



EQUIPMENT EARTHING DETAILS
TOWER WITH SHIELD WIRE

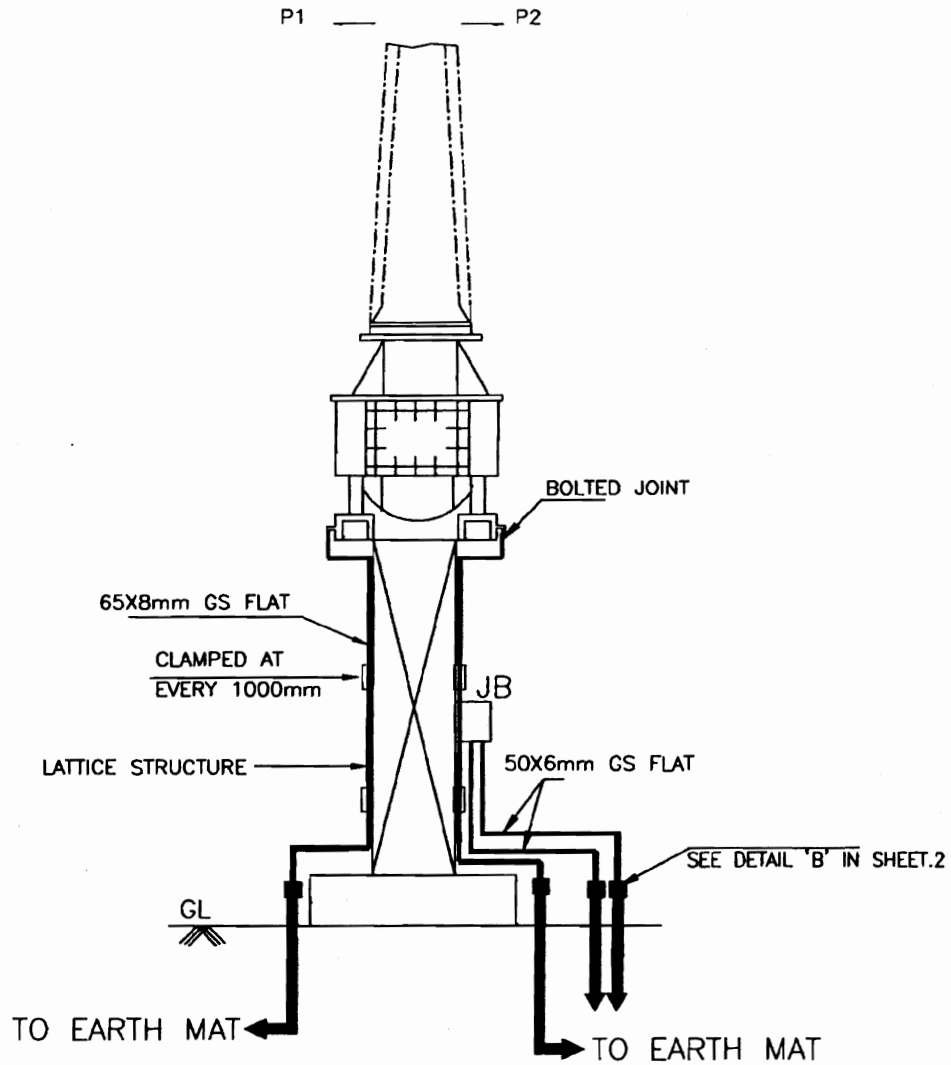
COMPUTERREF.NO.

DRG. No.

TB-4-352-316-008

REV. 00

SHEET No.
8



NOTE:

1. NO. OF RISERS=2 NOS./PHASE
2. NO. OF RISERS FOR JUNCTION BOX=2 NOS.



EQUIPMENT EARTHING DETAILS
66KV CURRENT TRANSFORMER

COMPU. DRG. REF.

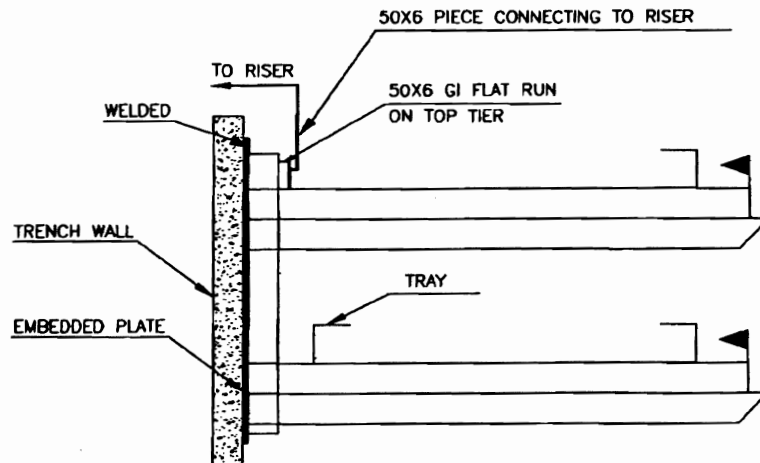
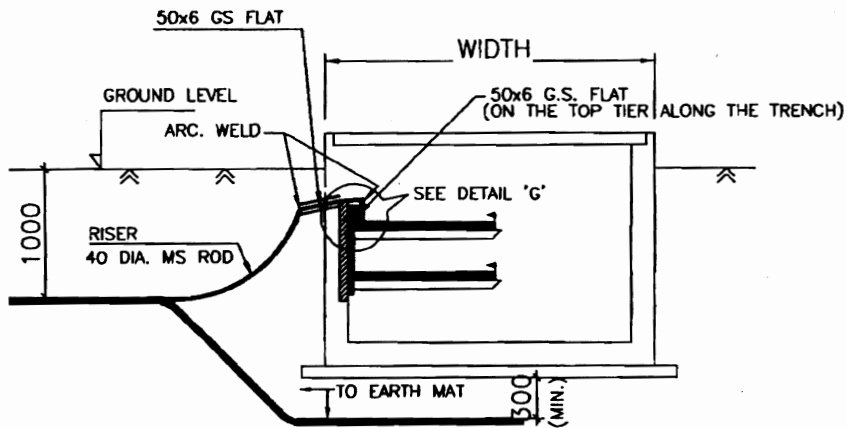
DRG.NO.

TB-4-352-316-008

REV. 00

SHEET No.

9



DETAIL 'G'

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

NOTE:

1. ALL TRENCHES SHALL BE EARTHED AT AN INTERVAL OF 30M ALONG THE LENGTH OF TRENCH.
2. THE EARTH STRIP (50x6 G.S. FLAT) SHALL RUN ON THE TOP TIER ALONG THE CABLE TRENCHES & WELDED TO EACH OF THE RACK AT EVERY 1.5M INTERVAL.



EQUIPMENT EARTHING DETAILS
CABLE TRENCH

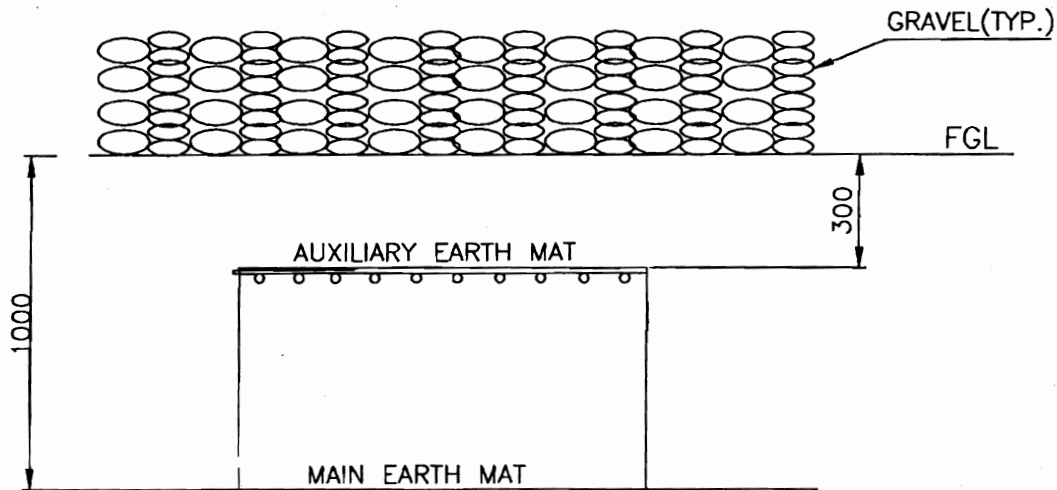
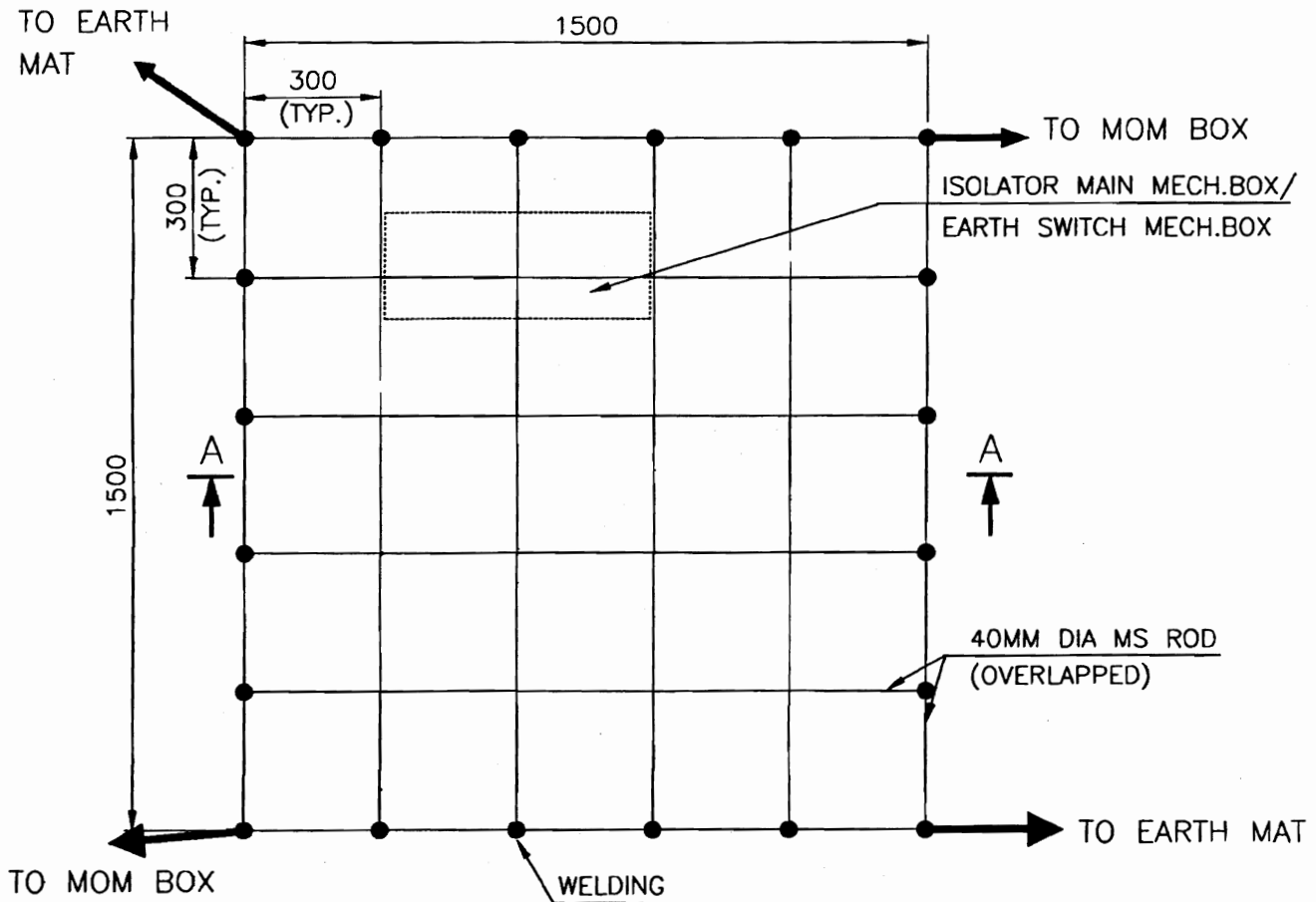
COMPU. DRG. REF.

DRG. NO.

TB-4-352-316-008

REV. 00

SHEET
10



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

COMPU. DRG. REF.

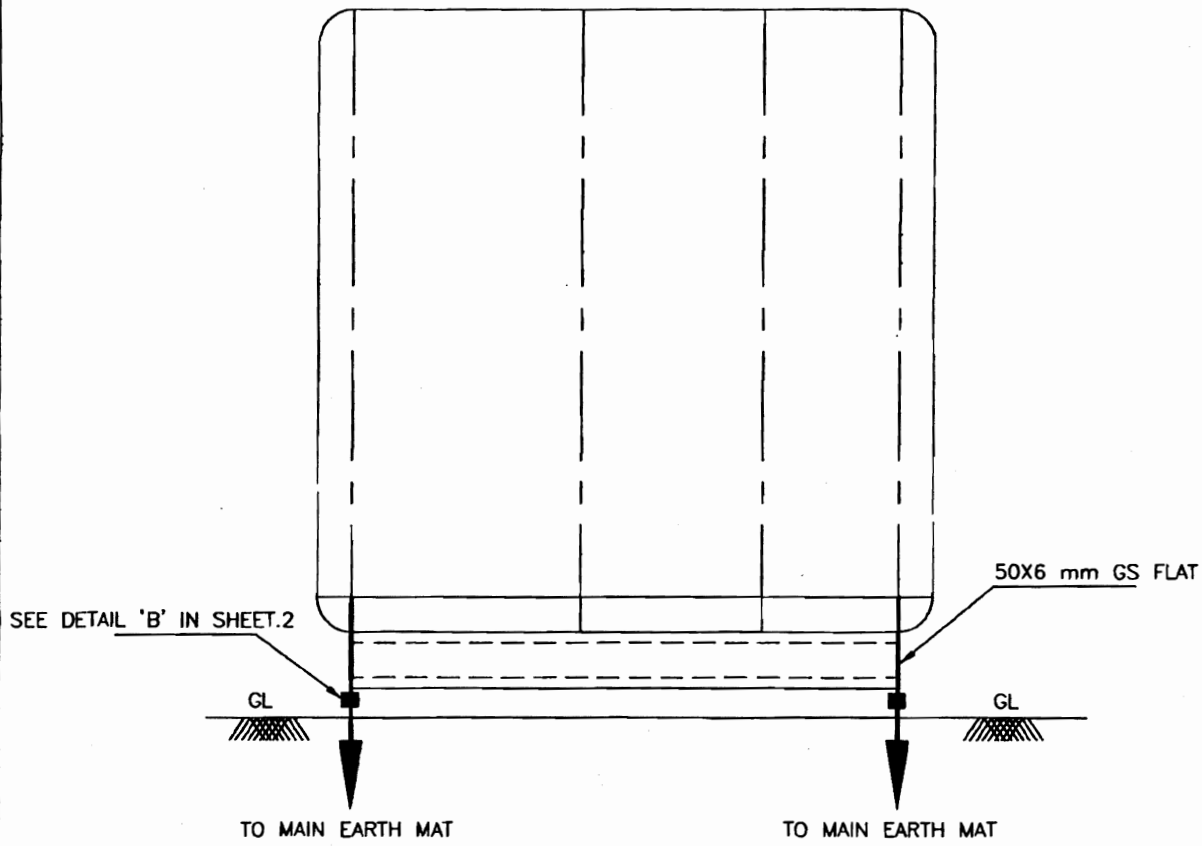
Report No.

TB-4-352-316-008

REV. 00

SHEET No.

11



EQUIPMENT

FLAT SIZE

PANELS

50X6 mm



EQUIPMENT EARTHING DETAILS
PANEL

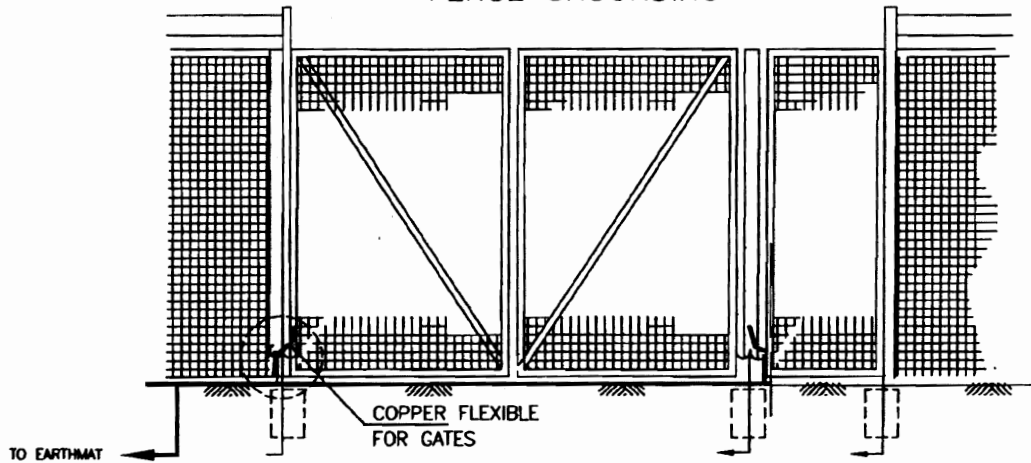
DRG. No.

TB-4-352-316-008

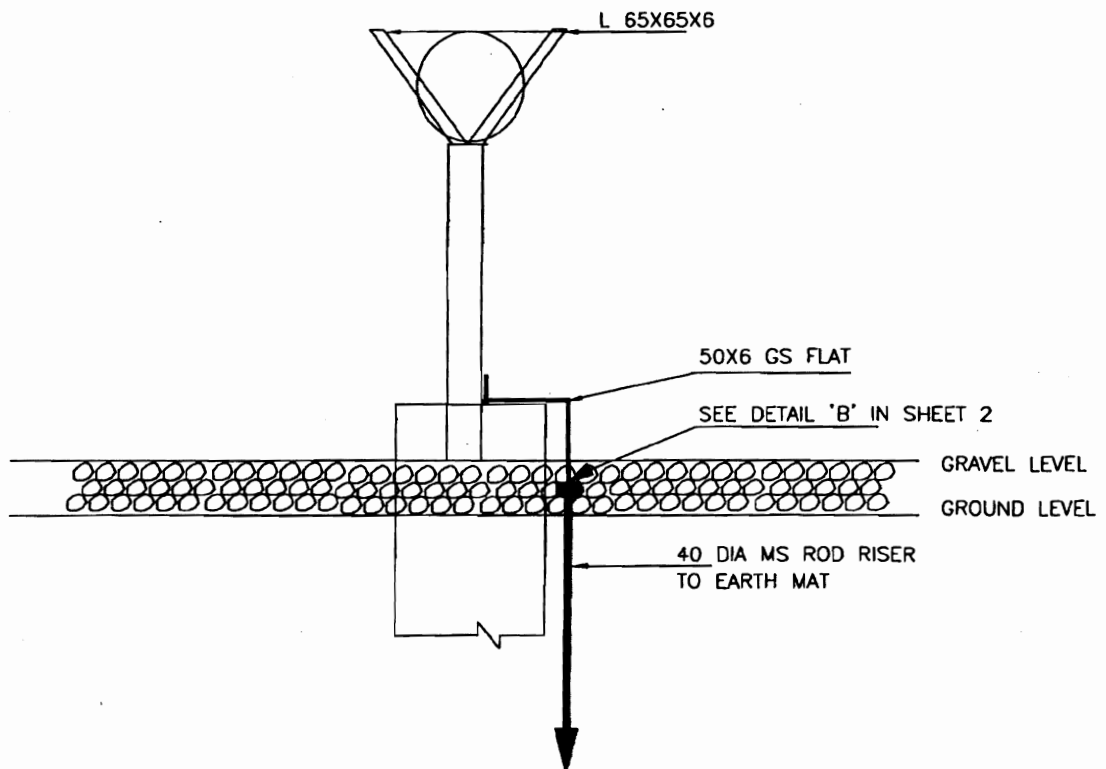
REV. 00

SHEET No.
12

FENCE GROUNDING



FENCE POSTS SHALL BE EARTHED BY 50X6 MM GS FLAT AT AN INTERVAL OF 10M.



FENCE EARTHING



EQUIPMENT EARTHING DETAILS

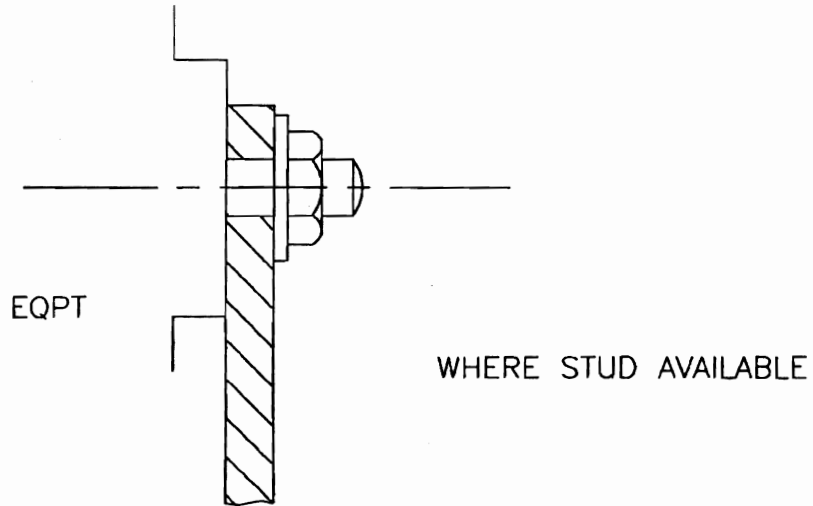
FENCE POST

DRG. No.

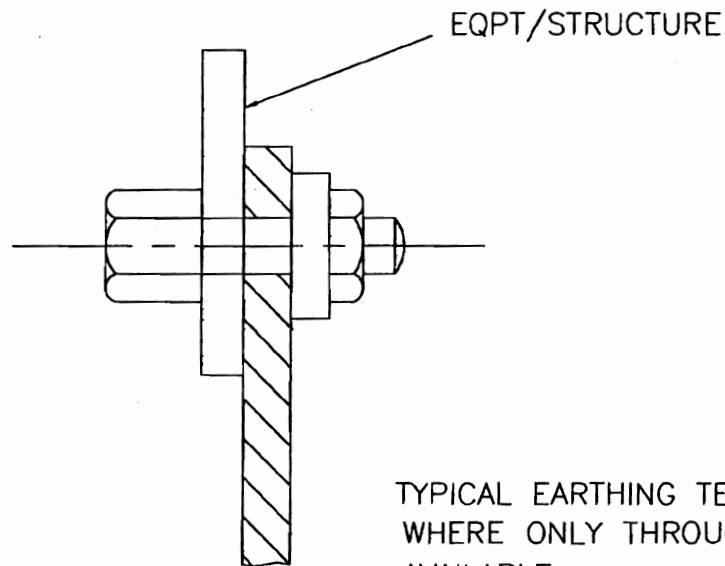
TB-4-352-316-008

REV. 00

SHEET No.
13



TYPICAL EARTHING TERMINAL JOINT



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.

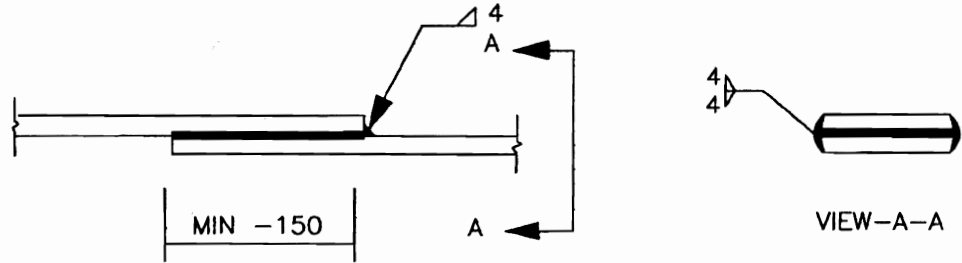
TB-4-352-316-008

REV. 00

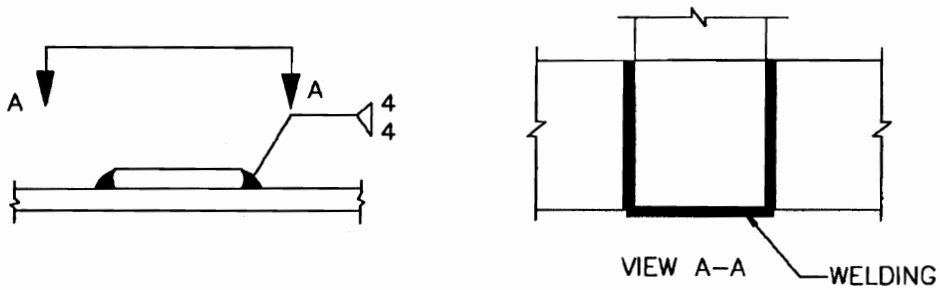
SHEET No.
14

STRIP TO STRIP

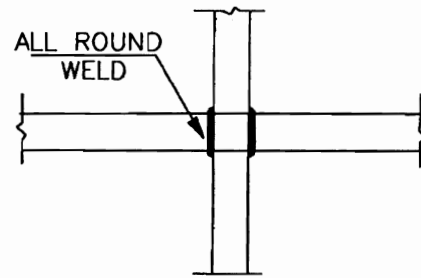
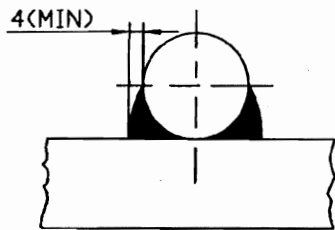
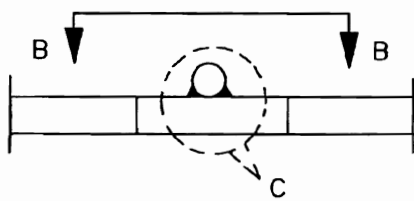
1. STRAIGHT LAP JOINT/RISER



2. CROSS LAP JOINT



RIGHT ANGLED JOINT (ROD TO ROD)



VIEW B-B



EQUIPMENT EARTHING DETAILS WELDING DETAIL

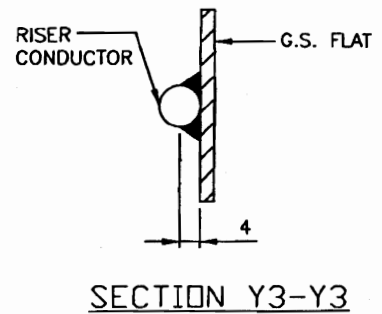
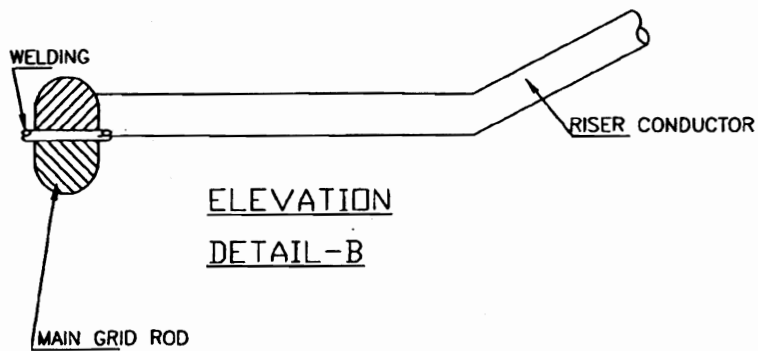
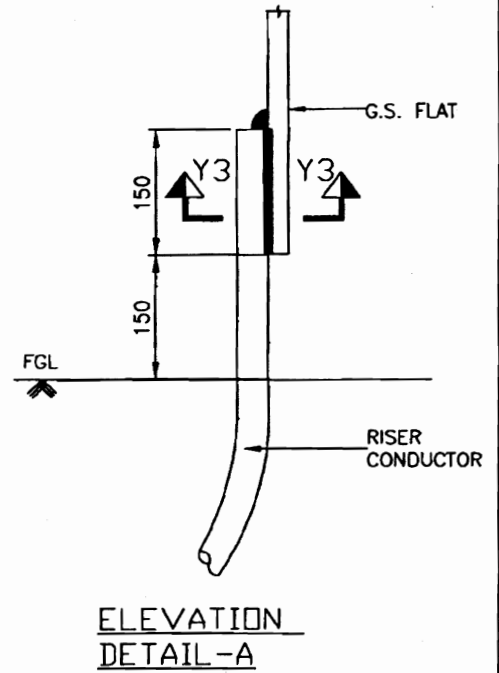
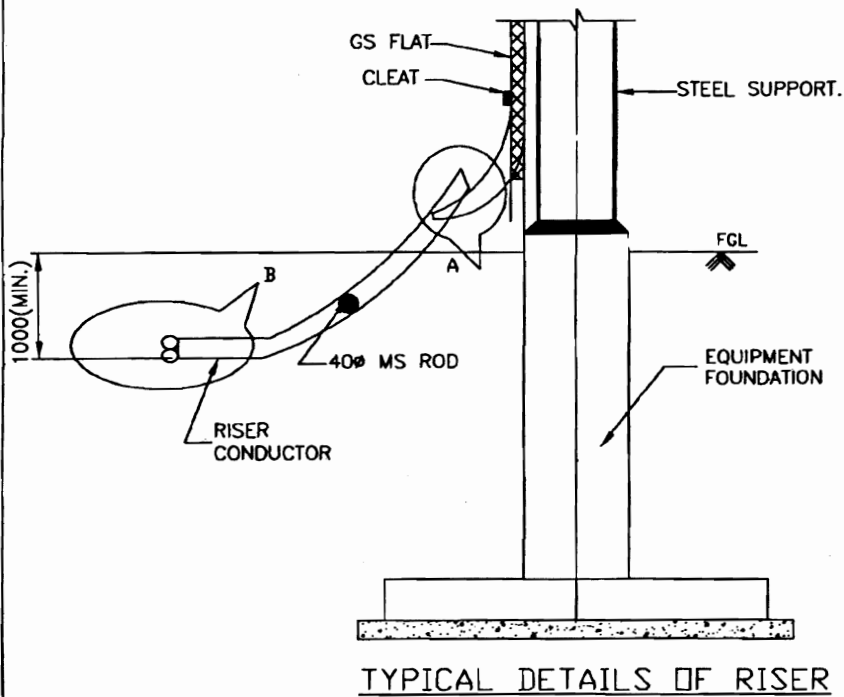
COMPUTERREF.NO.

DRG. No.

TB-4-352-316-008

REV. 00

SHEET No.
15



EQUIPMENT EARTHING DETAILS
WELDING DETAILS

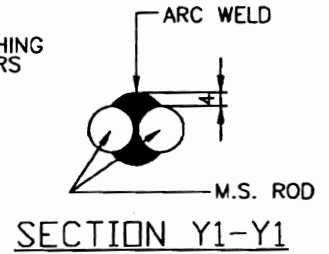
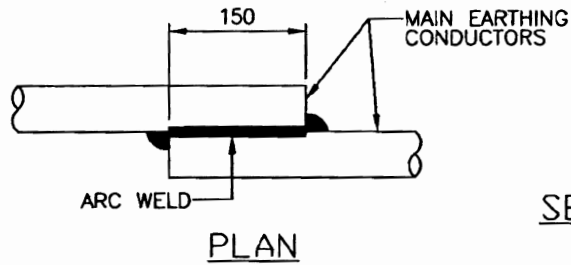
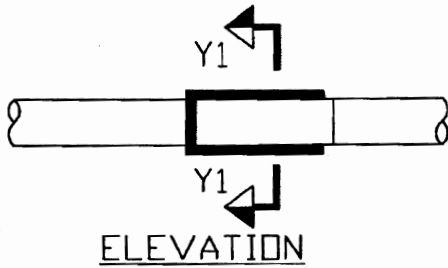
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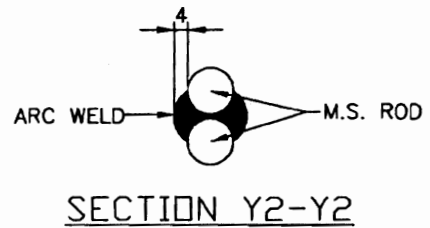
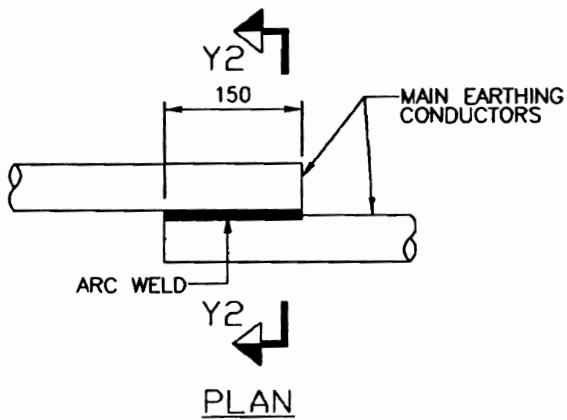
TB-4-352-316-008

REV. 00

SHEET No.
16



(CONDUCTOR IN HORIZONTAL PLANE)



(CONDUCTOR IN VERTICAL PLANE)



EQUIPMENT EARTHING DETAILS
WELDING DETAILS

COMPUTERREF.NO.

DRG. No.

TB-4-352-316-008

REV. 00

SHEET No.
17

BILL OF MATERIALS (MAIN EQUIPMENT)

S.L	ITEM DESCRIPTION	KV	QTY	SYMBOL	ITEM DESIGNATION
1.	1600A, 3-PH, 25kA FOR 1 SEC. SF6 CB SUITABLE FOR GANGED OPERATION	66	2		X06-52, X07-52
2.	1250A, 3-PH, HCB ISOLATOR (MECHANICALLY GANGED MOTOR & MANUAL OPERATED) WITH 1E/S (MECHANICALLY GANGED MANUAL OPERATED).	66	4		X06-89A, X06-89B, X07-89A, X07-89B
3.	1200A, 3 CORE CURRENT TRANSFORMER, 1 PH.	66	6		X01-CT, X02-CT
4.	800A, 1 CORE CURRENT TRANSFORMER, 1 PH.	66	6		X01-CT, X02-CT
5.	1200A, 5 CORE CURRENT TRANSFORMER, 1 PH.	66	6		X06-CT, X07-CT
6.	POTENTIAL TRANSFORMER 1 WINDING, 1PH.	66	6		X06-PT, X07-PT
7.	POTENTIAL TRANSFORMER 2 WINDING, 1PH.	66	9		B-PT, X07-PT1, X07-PT2
8.	SURGE ARRESTER (METAL OXIDE CAPLESS TYPE) 1-PH, 10kA CLASS-3	60	9		X06-LA, X07-LA
9.	CABLE SEALING END, 1PH.	66	12		X06-CSE, X07-CSE

LEGEND:-

NO	DESCRIPTION
21	DISTANCE PROTECTION SCHEME RELAYS (EXISTING)
87C	NUMERICAL CABLE DIFFERENTIAL PROTECTION WITH INBUILT 50.51, 50N AND 51N
87T	NUMERICAL TRANSFORMER DIFFERENTIAL PROTECTION
87O	NUMERICAL OVERALL DIFFERENTIAL PROTECTION
64RT	RESTRICTED EARTH FAULT PROTECTION
50Z	LOCAL BREAKER BACKUP PROTECTION
67	DIRECTIONAL OVERCURRENT RELAY (EXISTING)
67N	DIRECTIONAL E/F RELAY (EXISTING)
64	NEUTRAL DISPLACEMENT RELAY (EXISTING)
EMP	ENERGY METERING PANEL
TYM	TRIECTOR METER (IMPORT - EXPORT)
SRP	SWITCHYARD RELAY PANEL
SCR	SWITCHYARD CONTROL PANEL
TLK	TEST LINK
50	INSTANTANEOUS OVER CURRENT RELAY
51	INVERSE DEFINITE MINIMUM TIME OVER CURRENT RELAY
50N	INSTANTANEOUS EARTH FAULT RELAY
51N	INVERSE DEFINITE MINIMUM TIME EARTH FAULT RELAY
	PRESENT BHEL SCOPE
	FUTURE/EXISTING SCOPE
	CABLE SEALING END

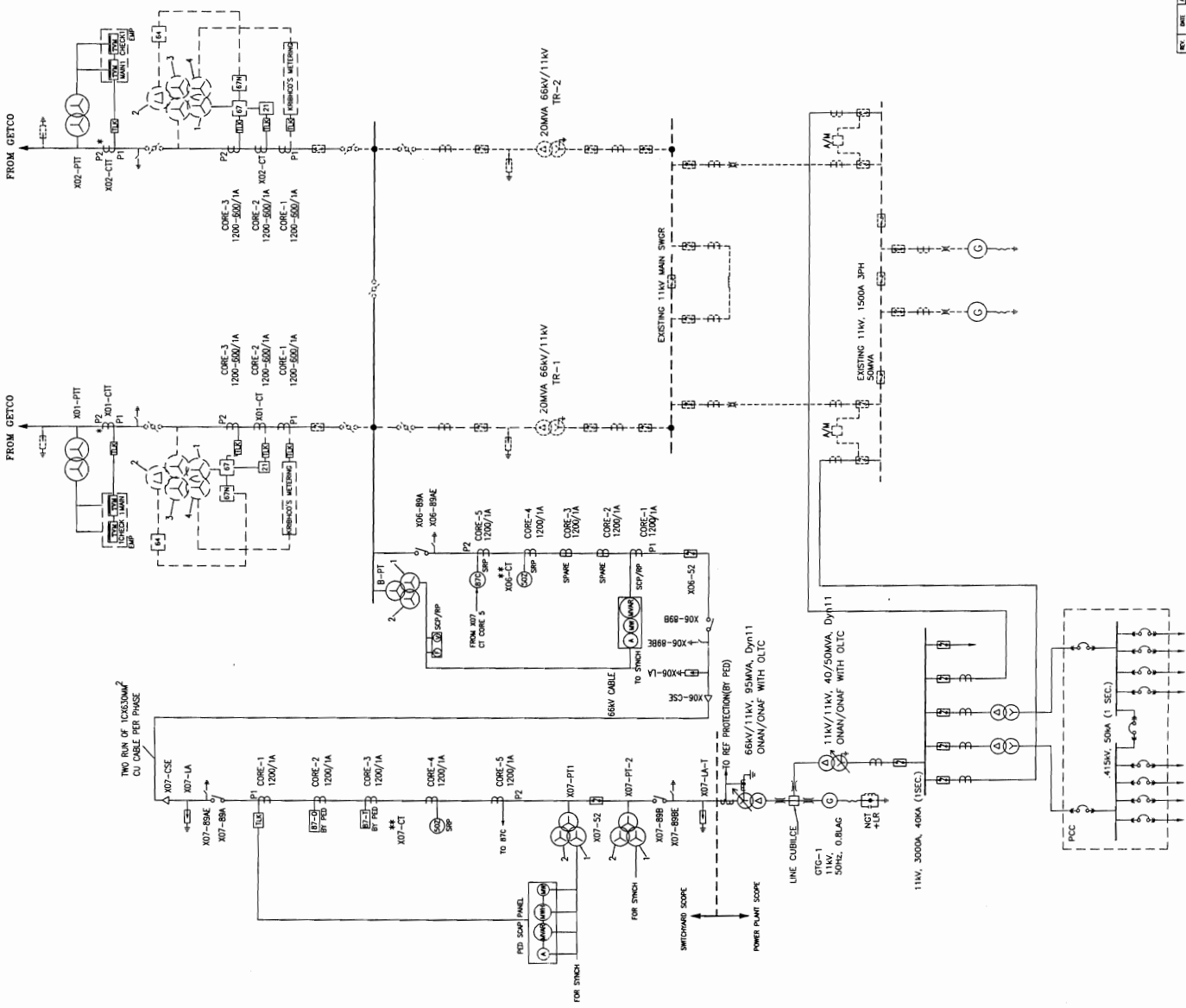
SYSTEM DETAILS:-

- 01) SYSTEM: 66KV 25KA FOR 1 SEC. SOLIDLY GROUNDED.
- 02) GREYPAGE: 3mm/kv.

- NOTE:-
- WAVE TRAP AND COUPLING CAPACITOR EXISTING IN INCOMER LINE-1 AND LINE-2 SHALL BE DISMANTLED BY BHEL.
 - CB X06-52 TO BE CLOSED IN DEAD BUS CLOSING MODE ALWAYS.
 - CB X07-52 TO BE AUTO SYNCHRONISED FROM SCAP (POWER PLANT).
 - IN CASE OF FAILURE IN GENERATOR OR GENERATOR TRANSFORMER, UAT OR 66KV CABLE, BOTH X06-52 & X07-52 CBS SHALL TRIP SIMULTANEOUSLY.
 - LOCAL BREAKER BACKUP (50Z) FOR X06-52 SHALL TRIP LINE CB AND X07-52.
 - LOCAL BREAKER BACKUP (50Z) FOR X07-52 SHALL TRIP X06-52 AND LV SIDE BREAKER OF GENERATOR TRANSFORMER.
 - BUSHING CT OF GT TRANSFORMER WILL BE USED FOR REF (RESTRICTED EARTH FAULT) PROTECTION.

REFERENCE

- KEY SINGLE LINE DIAGRAM DRG. 1001 REV. C.
- 66KV SUBSTATION LAYOUT DRG. E-4B
- PED DRG. NO.



KRISHNA BHARATI COOPERATIVE LTD.
 NAME OF CUSTOMER/PROJECT
 EXTENSION OF 66KV SWITCHYARD FOR 1X25MVA GTC BASED
 REVAMP PROJECT OF CFP AT KRIBHCO, HAZIRA

ADDITIONAL INFORMATION
 S.O. NO. 81005
 STATUS OF DRAWING
 DISTRIBUTION OF PRINTS

DATE 15/07/2011
BY [Signature]
CHKD [Signature]
DATE 15/07/2011
BY [Signature]
CHKD [Signature]

SCALE 1:1
DATE 15/07/2011
BY [Signature]
CHKD [Signature]

PROJECT NO. 1001
DATE 15/07/2011
BY [Signature]
CHKD [Signature]

PROJECT NO. 1001
DATE 15/07/2011
BY [Signature]
CHKD [Signature]

KEY [Symbol] [Description]
NO [Symbol] [Description]
DATE [Symbol] [Description]
BY [Symbol] [Description]
CHKD [Symbol] [Description]

PROJECT NO. 1001
DATE 15/07/2011
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CHKD [Signature]

