

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED			CHECKED
		APPD			APPD			APPD
						JOB No. 341/342		

**LEGEND**

CONNECTION TO GROUND MAT THROUGH RISER.  
 PE CONNECTION TO PIPE ELECTRODE.  
 RISER

**GENERAL NOTES:**

- EARTH STRIP SHALL BE CLEATED TO LATTICE /PIPE TYPE STRUCTURE AT AN INTERVAL OF 1.0M.
- FOR WELDING DETAILS REFER SHEET # 17, 18, 19
- E/WIRE DOWN CONDUCTOR SHALL BE CLEATED AT AN INTERVAL OF 2.0 M ALONG THE STRUCTURE. NO HOLES IN STRUCTURE ARE ALLOWED FOR THIS PURPOSE.
- NOT MORE THAN 2 RISERS ARE PERMISSIBLE PER PIG TAIL ( 40mm DIA. ROD.).
- SUBSTRUCTURE/STOOL SHALL NOT BE USED FOR EARTHING PURPOSE
- EARTHING LEAD FROM EQUIPMENT /STRUCTURE SHALL BE CONNECTED TO DIFFERENT EARTHING GRID.
- EQUIPMENT SHOWN IN DRAWING IS ONLY SYMBOLIC REPRESENTATION.

SHEET NO.	DESCRIPTION
02.	400kV SF6 CIRCUIT BREAKER
03.	400kV POST INSULATOR (SOLID CORE TYPE)
04.	390kV LIGHTNING ARRESTER
05.	MARSHALLING KIOSK
6A.	400kV HORIZONTAL DOUBLE BREAK ISOLATOR WITH ONE EARTH SWITCH
6B.	400kV HORIZONTAL DOUBLE BREAK ISOLATOR WITH TWO EARTH SWITCH
6C.	400kV HORIZONTAL CENTER BREAK ISOLATOR WITH ONE EARTH SWITCH
6D.	400kV HORIZONTAL CENTER BREAK ISOLATOR WITH TWO EARTH SWITCH
6E.	400kV PANTOGRAPH ISOLATOR WITHOUT EARTH SWITCH
6F.	400kV PANTOGRAPH ISOLATOR WITH ONE EARTH SWITCH
07.	SHIELD WIRE TOWER
7A.	TOWER WITHOUT PEAK
08.	LIGHTNING MAST
09.	400kV CURRENT TRANSFORMER
10.	CABLE TRENCH
11.	DETAIL OF PIPE EARTH ELECTRODE IN TREATED EARTH PIT (ET)

SHEET NO.	DESCRIPTION
12.	RAIL BONDING
13.	AUXILIARY EARTH MAT FOR ISOLATOR MAIN MECH.E/S MECH. BOX.
14.	400kV SHUNT REACTOR.
15.	FENCE POST
16.	TYPICAL ARRANGEMENT OF EQUIPMENT EARTHING WITH MAIN GRID
17.	WELDING DETAILS
18.	WELDING DETAILS
19.	WELDING DETAILS

ENCLOSURE:  
GUIDELINES FOR EARTH CONNECTIONS

W.O.NO. 80008/80009	CUSTOMER KARNATAKA POWER TRANSMISSION CORPORATION LIMITED
STATUS	PROJECT (INSTALLATION OF 1X63MVAR BUS REACTOR) NELAMANGLA & HOODY, TALAGUPPA & GUTTUR

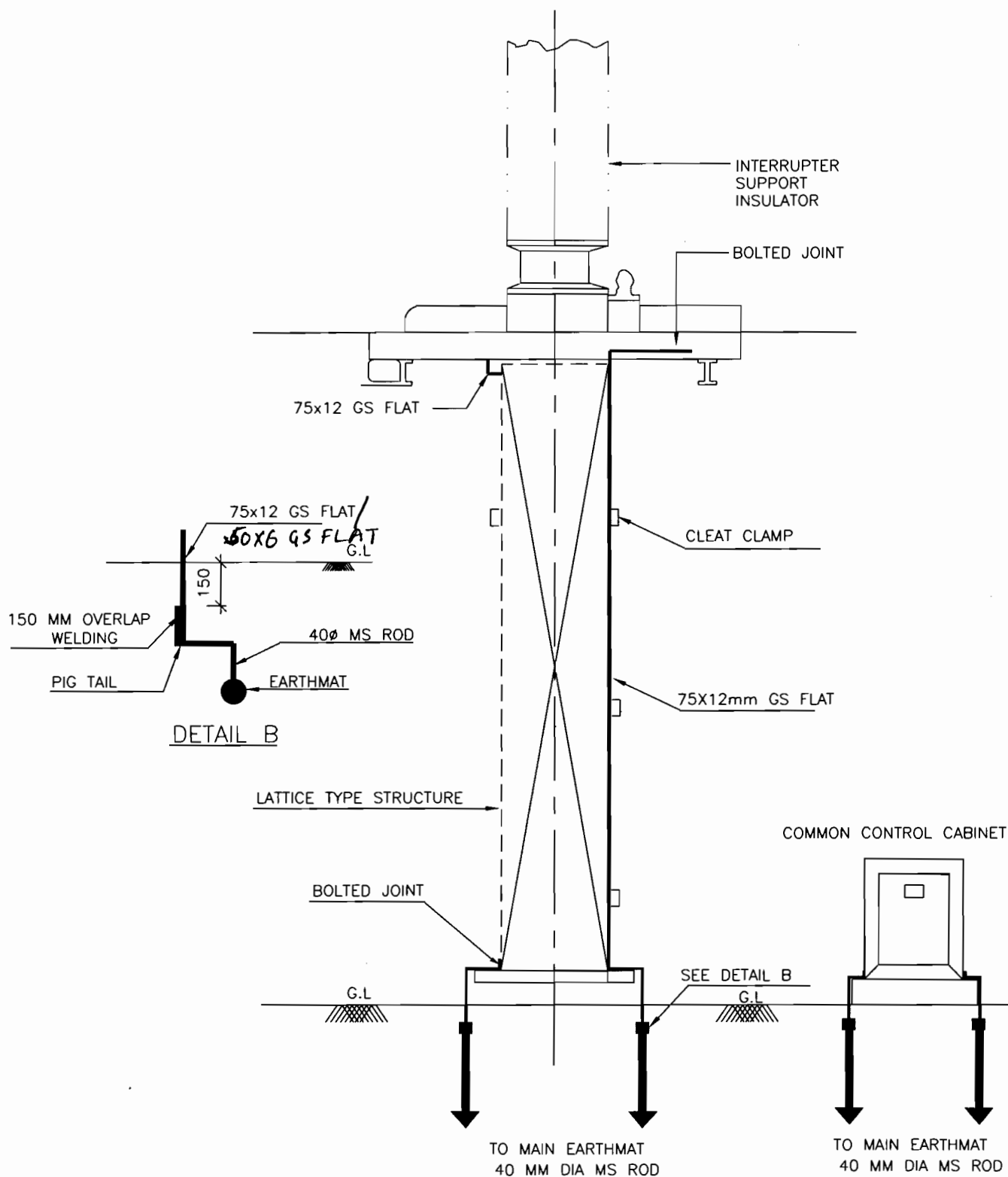
 <b>BHEL</b> भारत हेवी इलेक्ट्रिकल्स लिमिटेड ट्रांसमिशन परियोजना विभाग BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">DEPT CODE</th> <th style="width: 40%;">NAME</th> <th style="width: 10%;">SIGN.</th> <th style="width: 40%;">DATE</th> </tr> <tr> <td>DRN</td> <td>MANOJ</td> <td></td> <td>21.07.12</td> </tr> <tr> <td>DESN</td> <td>MM</td> <td></td> <td>14.08.12</td> </tr> <tr> <td>CHD</td> <td>DKM</td> <td></td> <td>14/8/12</td> </tr> <tr> <td>APPD</td> <td>RS</td> <td></td> <td>14/8/12</td> </tr> </table>	DEPT CODE	NAME	SIGN.	DATE	DRN	MANOJ		21.07.12	DESN	MM		14.08.12	CHD	DKM		14/8/12	APPD	RS		14/8/12
DEPT CODE	NAME	SIGN.	DATE																		
DRN	MANOJ		21.07.12																		
DESN	MM		14.08.12																		
CHD	DKM		14/8/12																		
APPD	RS		14/8/12																		

REV.	DATE	ALTD	CHD	APPD	

TITLE EQUIPMENT & STRUCTURE EARTHING DETAILS	REV 00.						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">DEPT.</td> <td style="width: 10%;">SCALE</td> <td style="width: 80%;">DRAWING NO.</td> </tr> <tr> <td></td> <td></td> <td>TB-4-341-316-005</td> </tr> </table>	DEPT.	SCALE	DRAWING NO.			TB-4-341-316-005	
DEPT.	SCALE	DRAWING NO.					
		TB-4-341-316-005					



NOTE:

- 1) \* BOLT SIZE AND HOLE SIZE SHALL BE TO SUIT RESPECTIVE EQPT./STRUCTURE.
- 2) NO. OF RISERS  
CIRCUIT BREAKER - 2NOS./PHASE  
M. BOX - 2NOS.



## EQUIPMENT EARTHING DETAILS

### 400kV SF6 CIRCUIT BREAKER

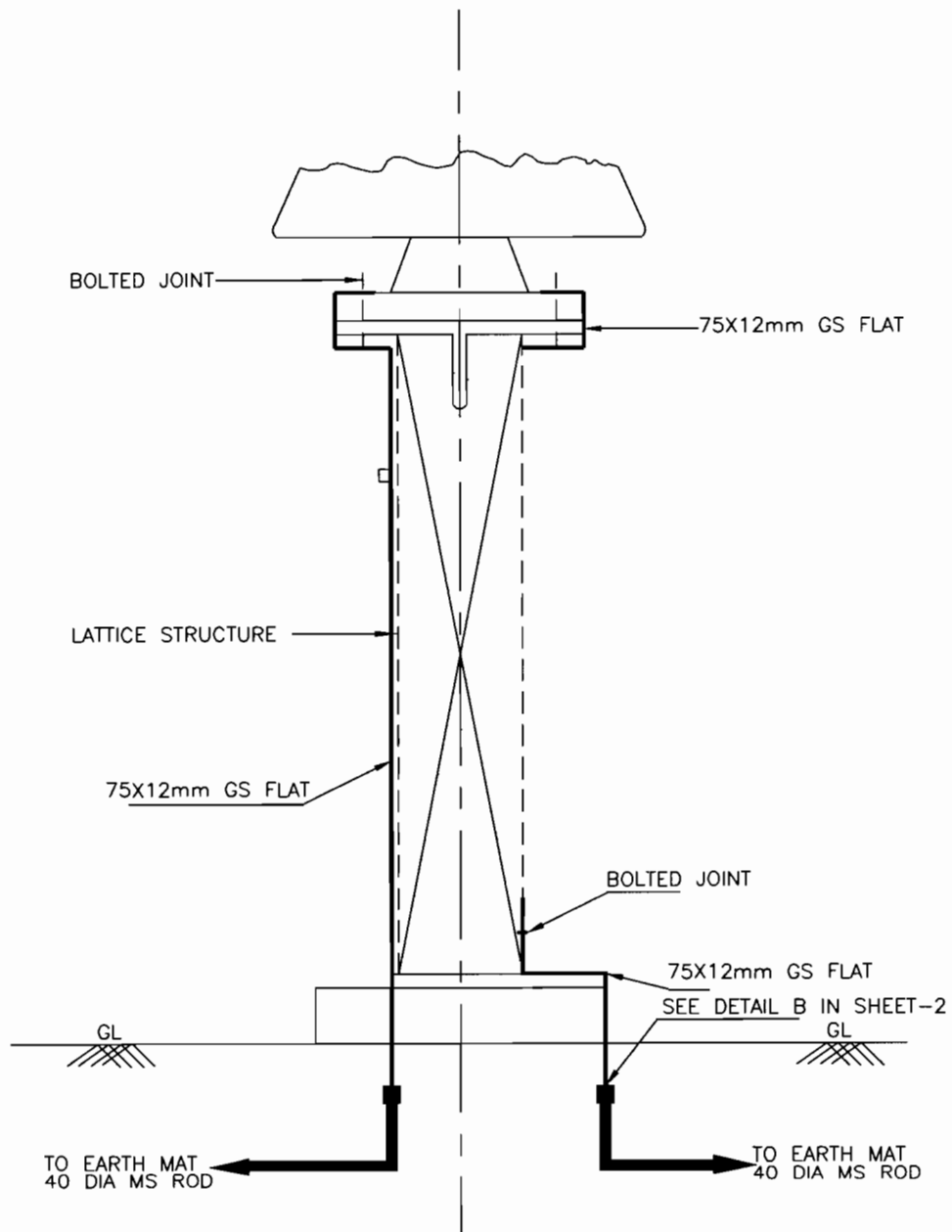
COMPUTERREF.NO.

DRG. No.

TB-4-341-316-005

REV. 00

SHEET No.  
2



1) NO. OF RISERS - 2NOS.

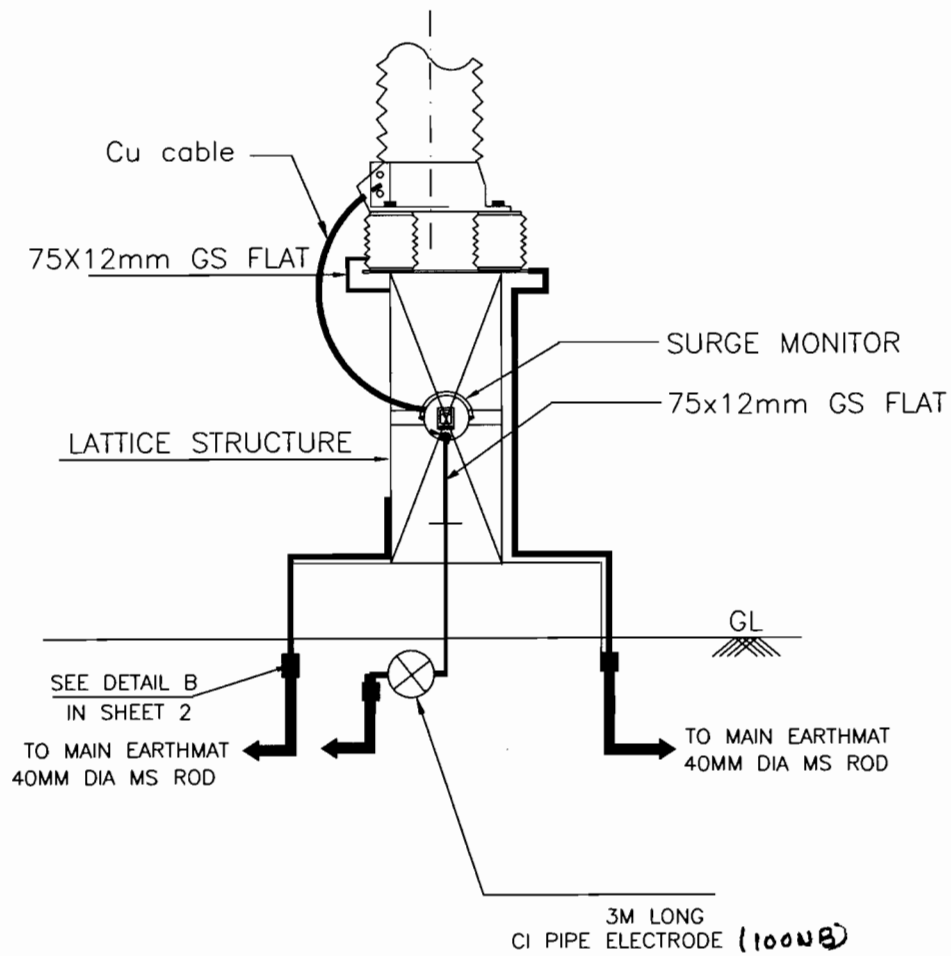


# EQUIPMENT EARTHING DETAILS 400kV POST INSULATOR (SOLID CORE TYPE)

DRG. No. TB-4-341-316-005

REV. 00

SHEET No.  
3



NOTES;

1. LA SHALL BE EARTHED THROUGH EARTH  
TERMINAL OF SURGE COUNTER
2. NO. OF PIPE ELECTRODE 1 NO. PER PHASE,
3. NO. OF RISERS
 

EQUIPMENT	- 1 NO
STRUCTURE	- 1 NO.
SURGE MONITOR	- 1 NO.



EQUIPMENT EARTHING DETAILS  
LIGHTNING ARRESTER(390kV)

COMPU. DRG. REF.

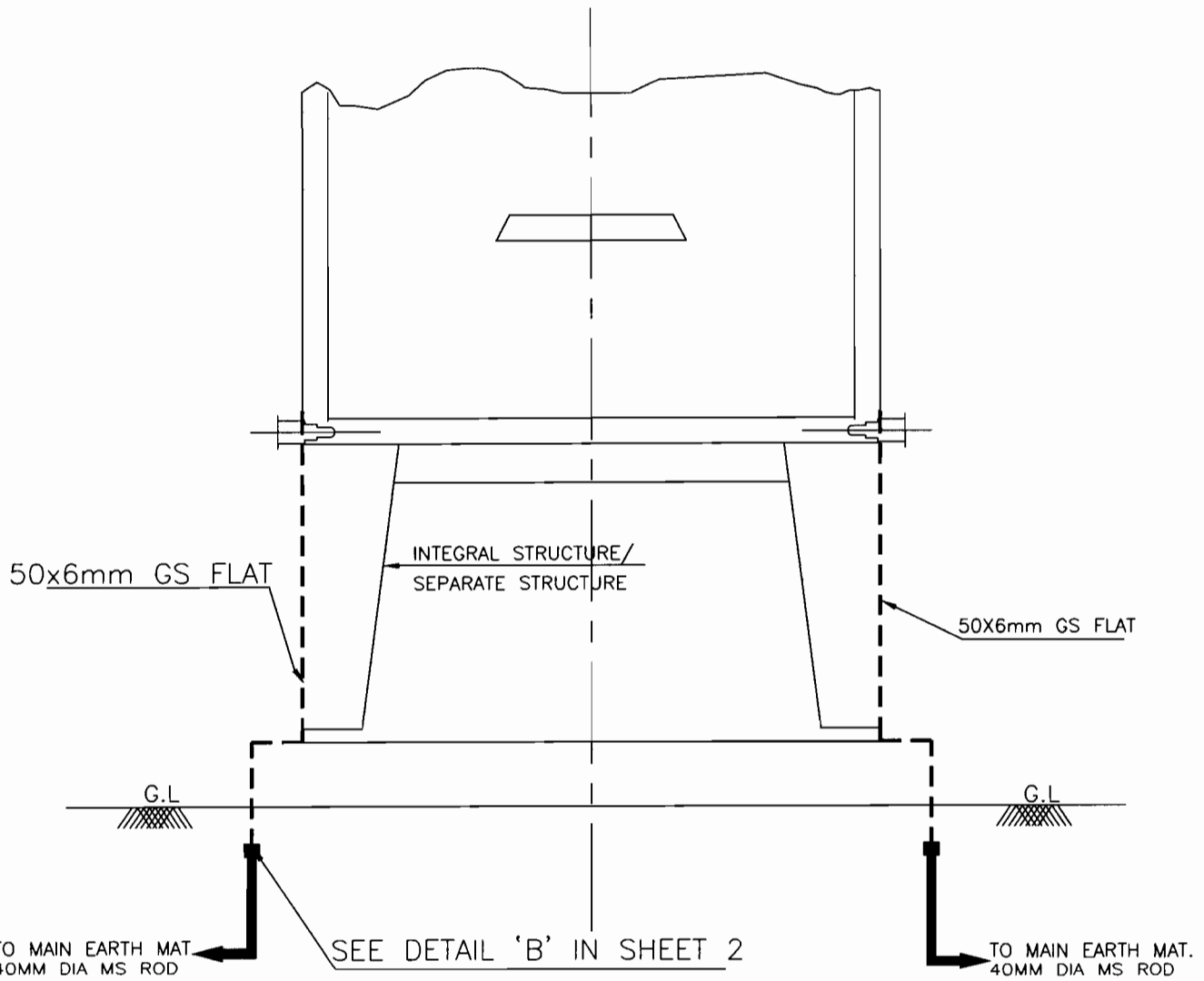
DRG.NO.

TB-4-341-316-005

REV. 00

SHEET No.

4



1) NO. OF RISERS - 2NOS.



# EQUIPMENT EARTHING DETAILS MARSHALLING KIOSK

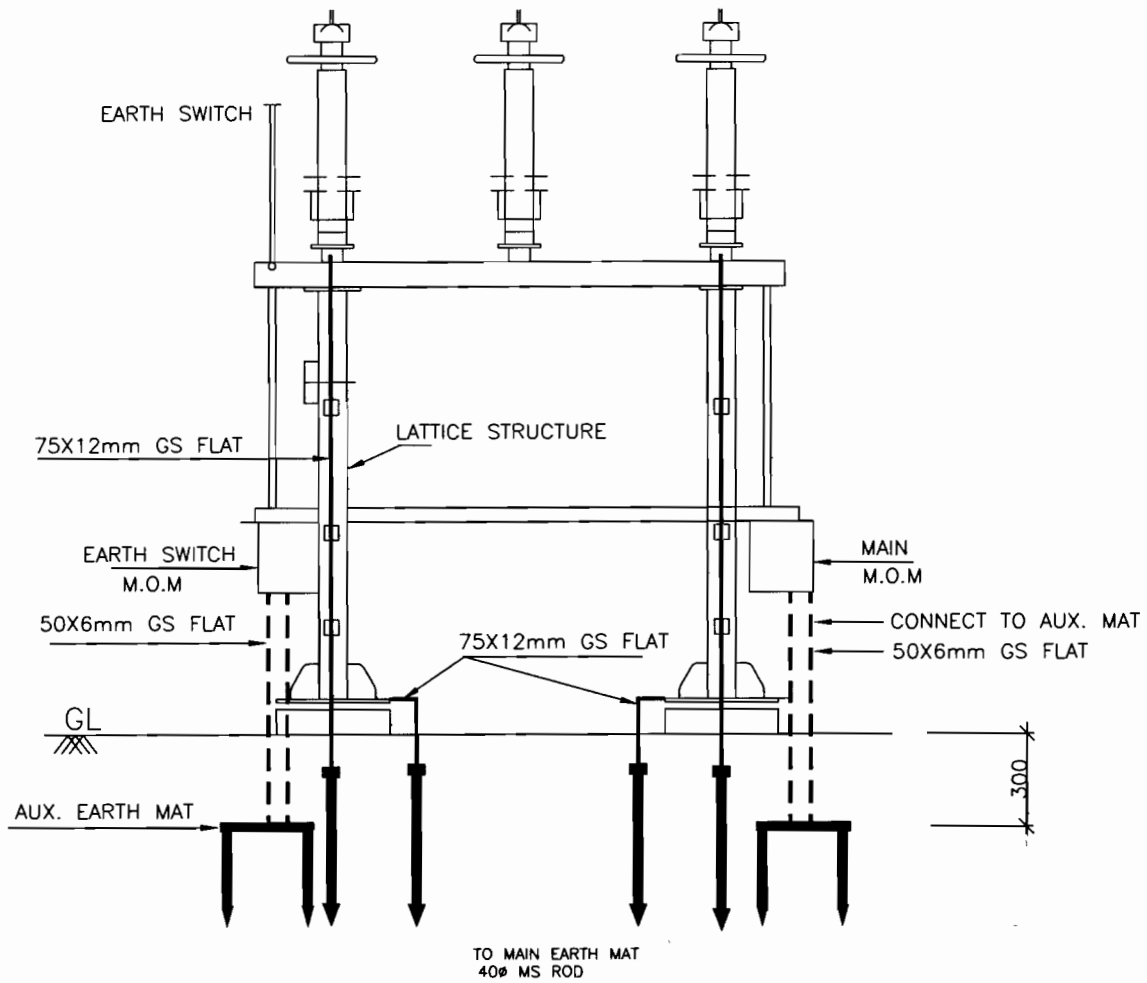
COMPUTERREF.NO.

DRG. No.

TB-4-341-316-005

REV. 00

SHEET No.  
5



#### NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 14)
2. NO. OF RISERS
  - ISOLATOR - 2NOS./PHASE
  - STRUCTURE - 2NOS./PHASE
  - M. BOX (ISO.) - 2NOS.
  - M. BOX (ES) - 2NOS.
  - AUX. EARTH MAT - 1NO/MB (SH-14)



## EQUIPMENT EARTHING DETAILS

400kV DOUBLE BREAK  
ISOLATOR (TYPICAL) WITH ONE EARTHSWITCH

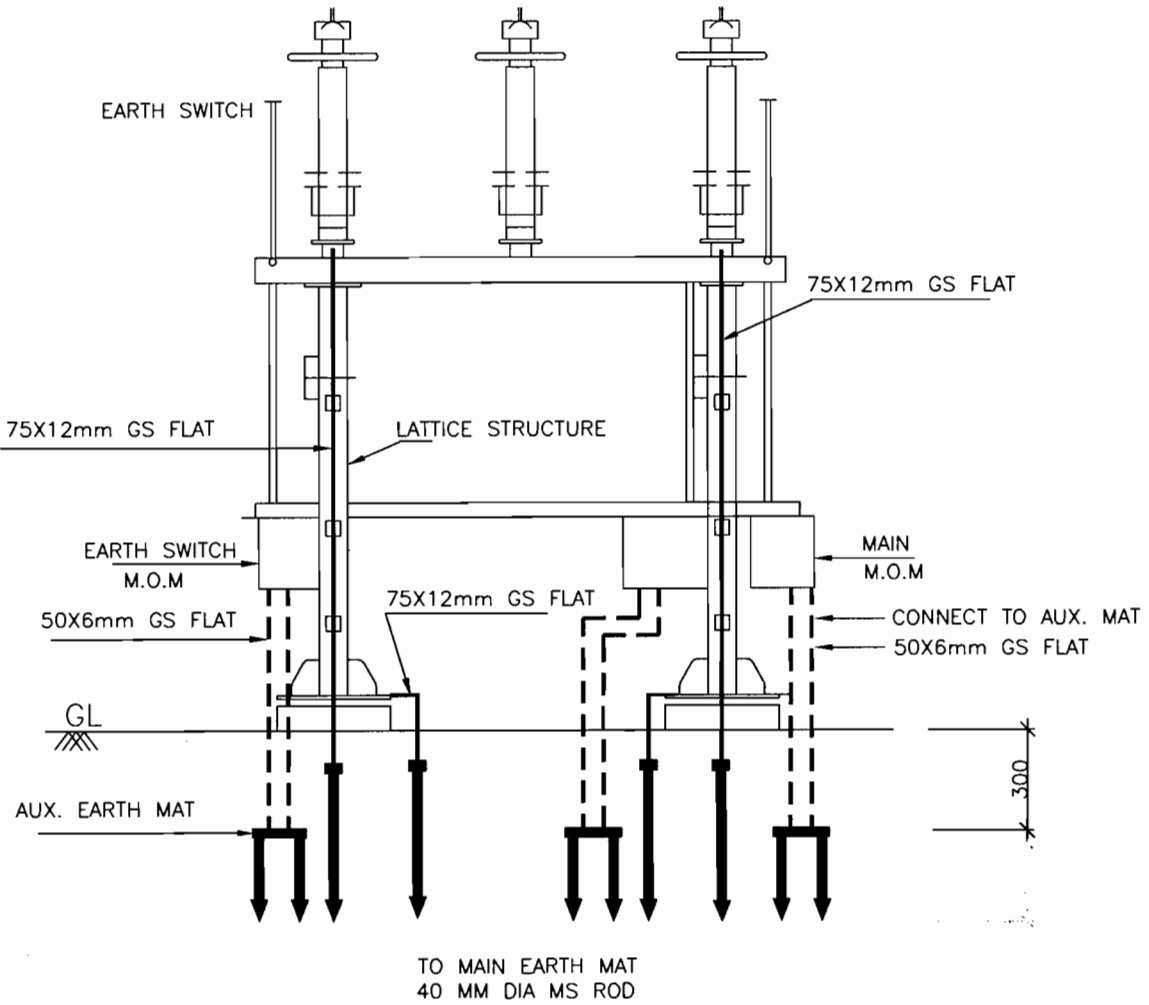
COMPUTERREF.NO.

DRG. No.

TB-4-341-316-005

REV. 00

SHEET No.  
6A



#### NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 14)
2. NO. OF RISERS
  - ISOLATOR - 2NOS./PHASE
  - STRUCTURE - 2NOS./PHASE
  - M. BOX (ISO.) - 2NOS.
  - M. BOX (ES) - 2NOS.
  - AUX. EARTH MAT - 1NO/MB (SH-14)



## EQUIPMENT EARTHING DETAILS

400kV DOUBLE BREAK  
ISOLATOR (TYPICAL) WITH TWO EARTHSWITCH

COMPUTERREF.NO.

DRG. No.

TB-4-341-316-005

REV. 00

SHEET No.  
6B

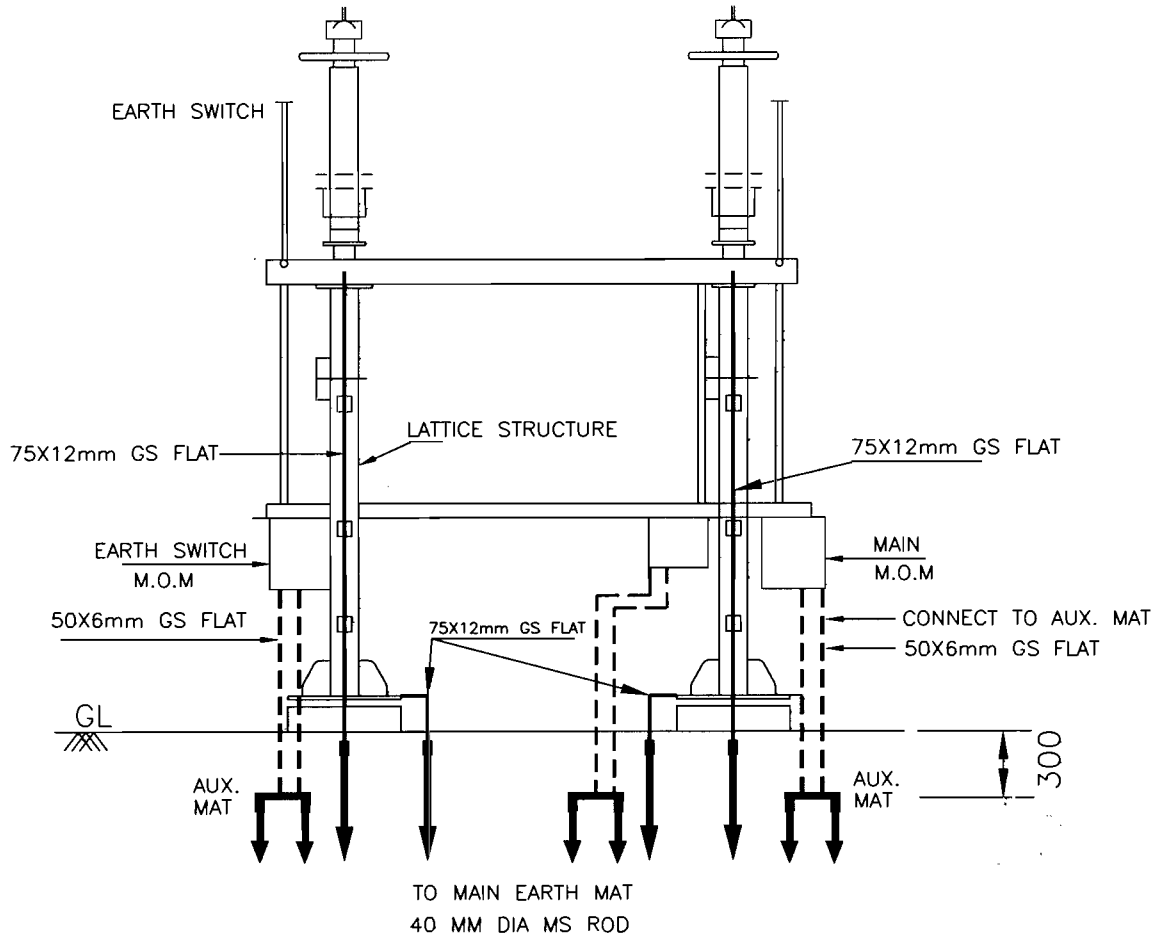


- 

400kV HORIZONTAL CENTER BREAK ISOLATOR WITH 1 E/S

SHEET No.  
6C





#### NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 14)
2. NO. OF RISERS
  - ISOLATOR - 2 NOS./PHASE
  - STRUCTURE - 2 NOS./PHASE
  - M. BOX (ISO.) - 2 NOS.
  - M. BOX (ES) - 2 NOS.
  - AUX. EARTH MAT - 1 NO/MB (SH-14)



## EQUIPMENT EARTHING DETAILS

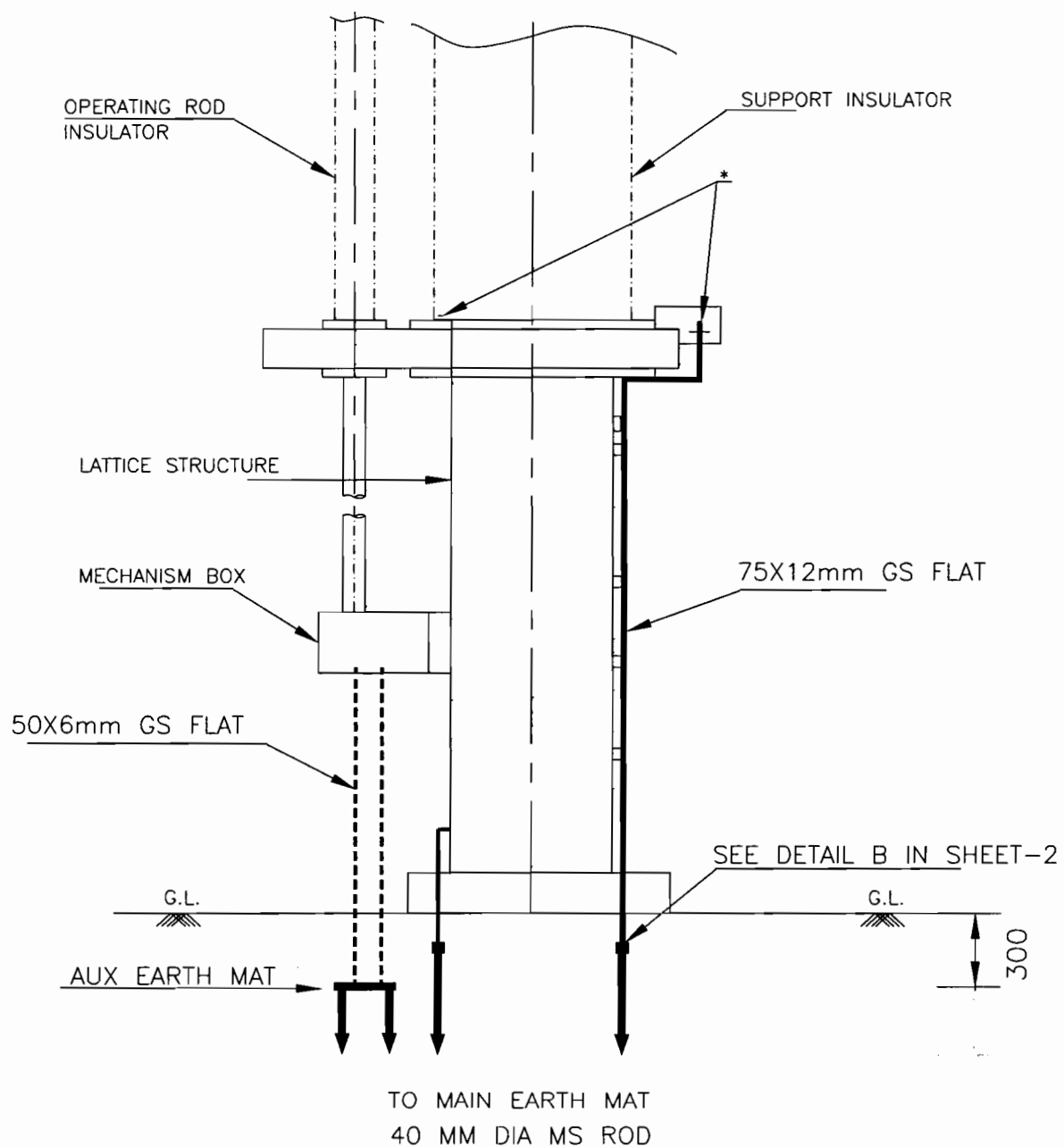
400kV HORIZONTAL CENTER BREAK ISOLATOR WITH 2 E/S

COMPUTER REF. NO.

DRG. No. TB-4-341-316-005

REV. 00

SHEET No.  
6D



#### NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 14).
2. NO. OF RISERS
 

ISOLATOR	- 1NO
STRUCTURE	- 1NO
M. BOX (ISO.)	- 2NOS.
M. BOX (ES)	- 2NOS.



## EQUIPMENT EARTHING DETAILS

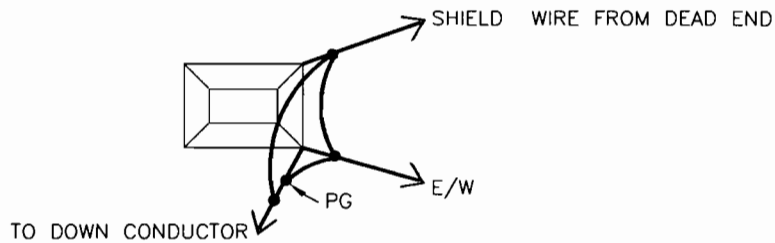
### 400kV PANTOGRAPH ISOLATOR WITH ONE E/S

COMPUTER REF. NO.

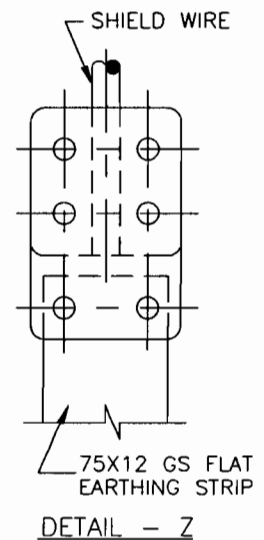
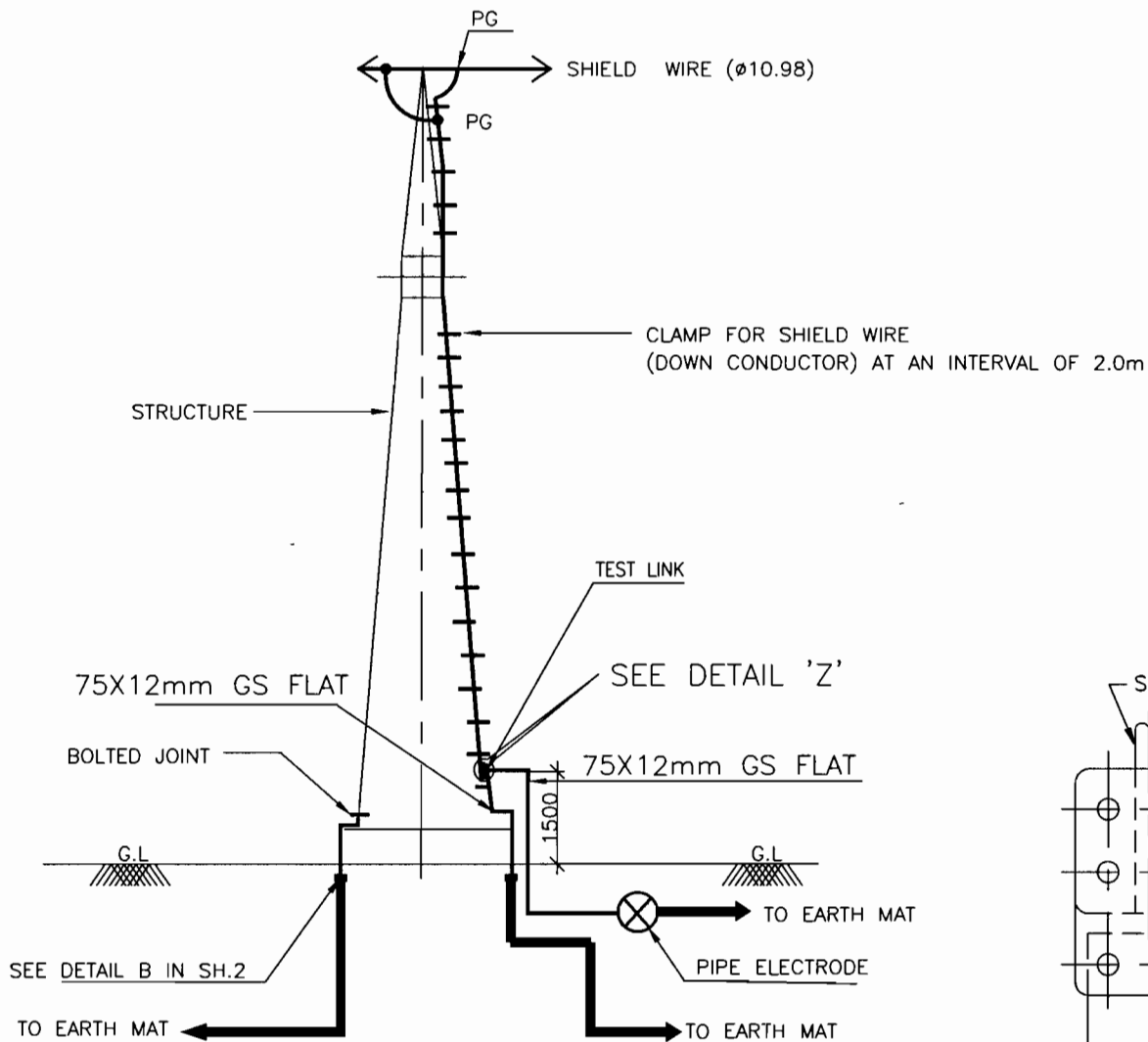
DRG. No. TB-4-341-316-005

REV. 00

SHEET No.  
6E



DETAIL WHEN 2 & E/WIRE TERMINATES A TOWER



NOTE:

1. NO. OF PIPE ELECTRODE : 1 NO. PER TOWER WITH DOWN CONDUCTOR.
2. NO. OF RISERS  
STR - 2NOS.  
DOWN CONDUCTOR- 1NO



EQUIPMENT EARTHING DETAILS  
SHIELD WIRE TOWER

COMPUTERREF.NO.

DRG. No.

TB-4-341-316-005

REV. 00

SHEET No.  
7



- 
- BHEL**

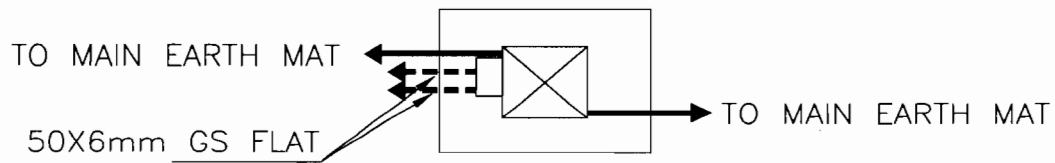
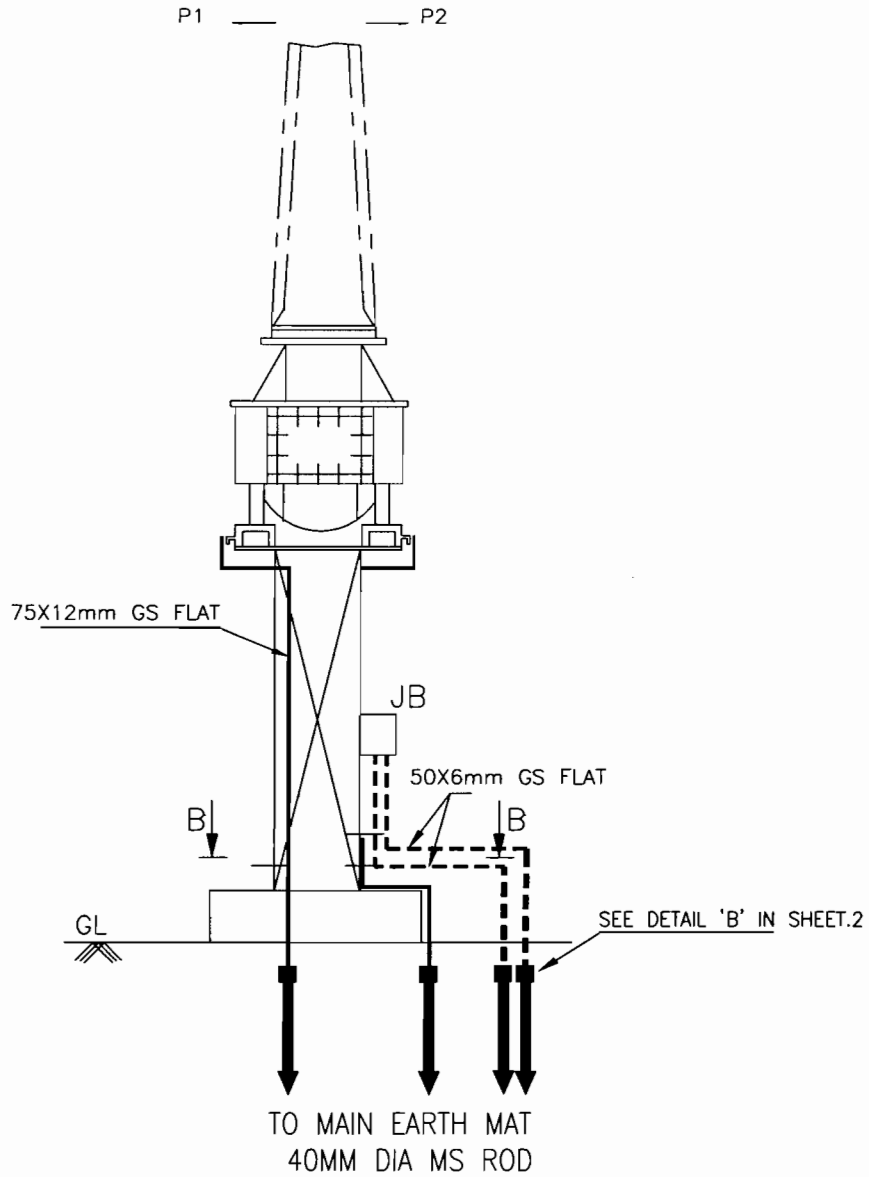
COMPUTERREF.NO.

DRG. No.

TB-4-341-316-005

REV. 00

SHEET No.  
8



View B-B

1. NO. OF RISERS

STRUCTURE — 1NO  
EQUIPMENT — 1NO  
JB(COMMON)— 2NOS.



# EQUIPMENT EARTHING DETAILS 400kV Current Transformer

COMPU. DRG. REF.

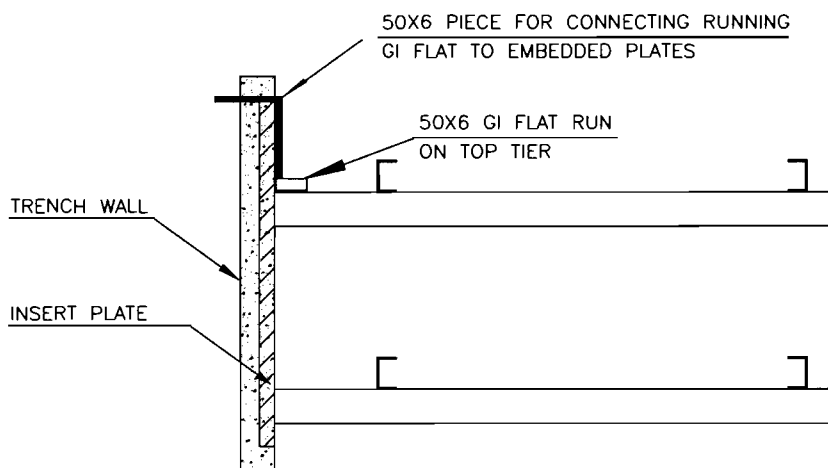
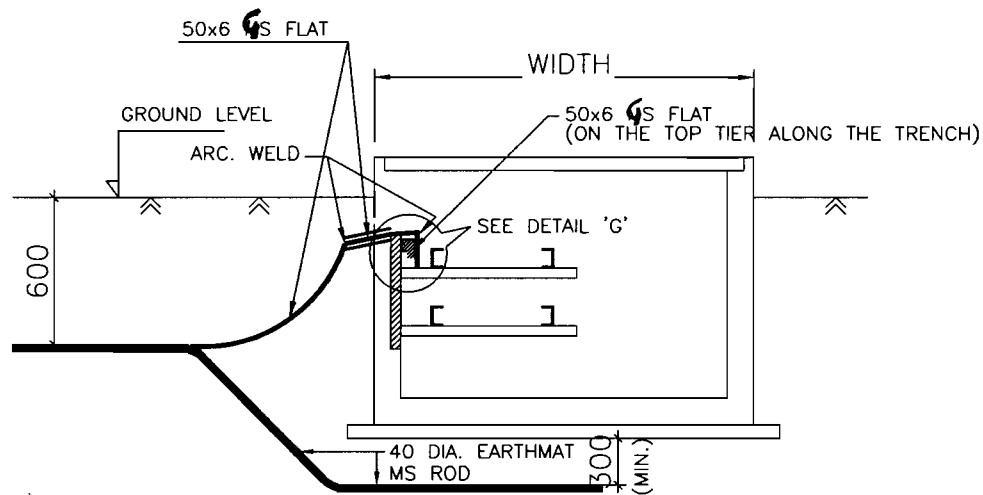
DRG.NO.

TB-4-341-316-005

REV. 00

SHEET No.

9



DETAIL 'G'

DETAIL FOR CONNECTING GI FLAT RUNNING HORIZONTAL  
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. 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

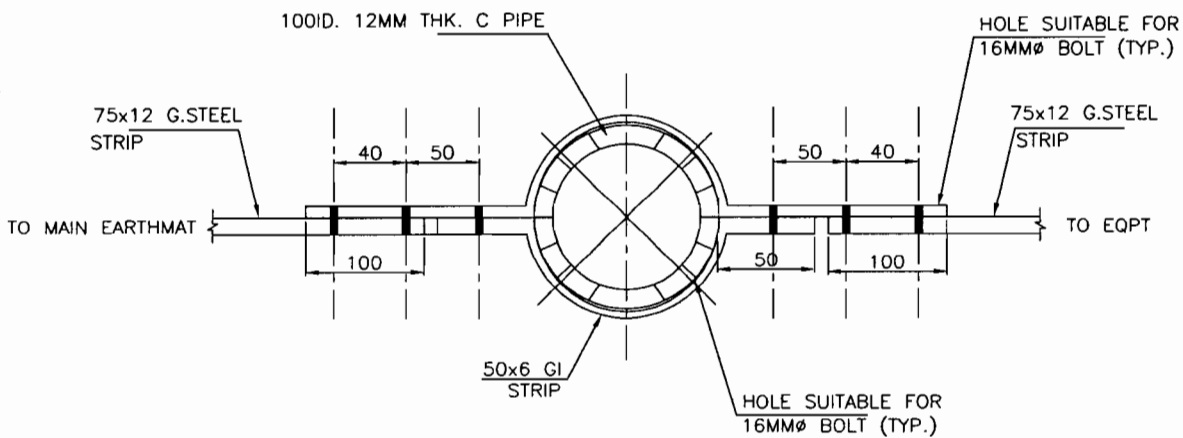
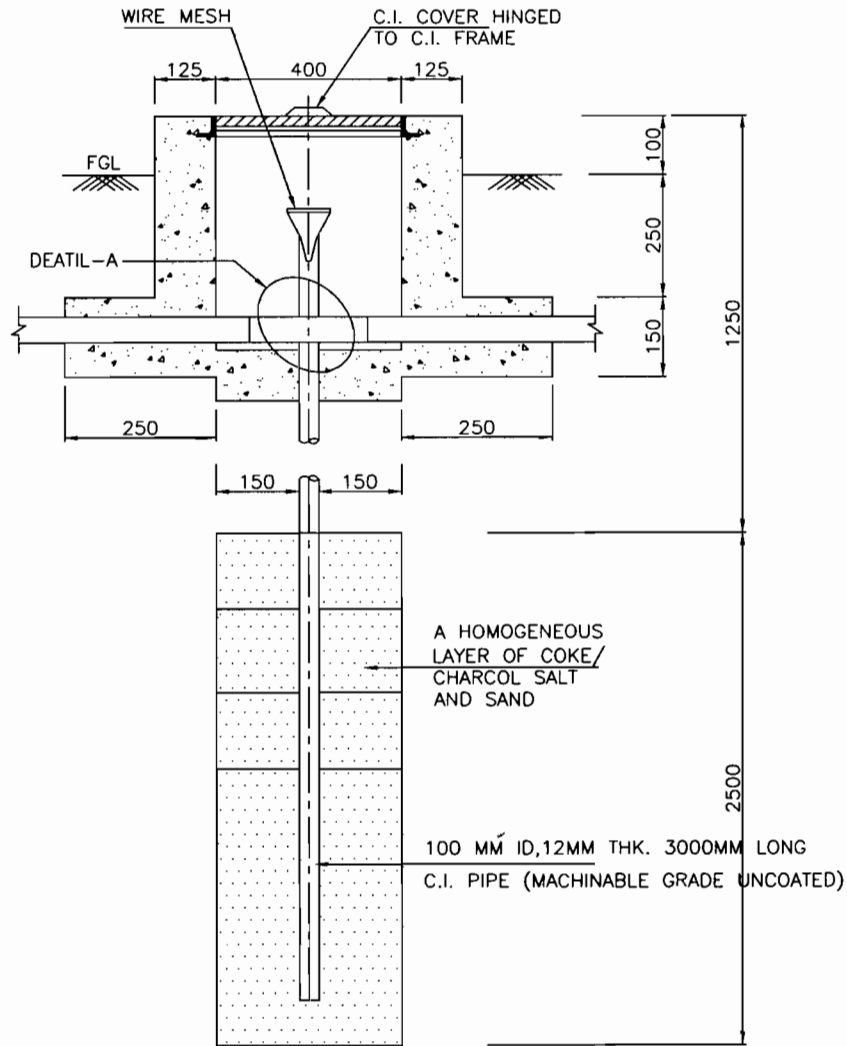
COMPU. DRG. REF.

DRG. NO.

TB-4-341-316-005

REV. 00

SHEET  
10



NOTE:

1. ALL DIMENSION ARE IN MM
2. REFERENCE IS: 3043



EQUIPMENT EARTHING DETAILS  
DETAILS OF PIPE EARTH ELECTRODE  
IN TREATED EARTH PIT (ET)

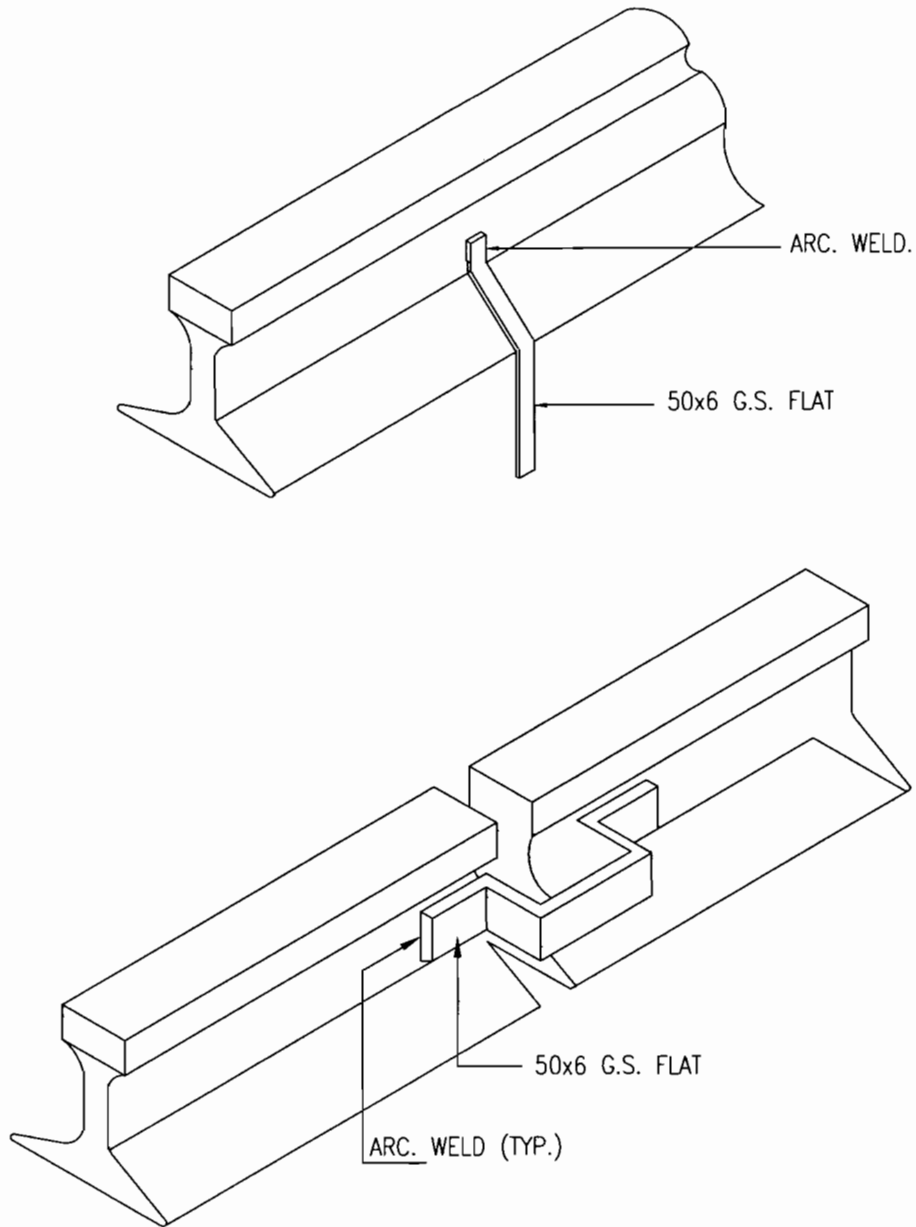
COMPUTER REF. NO.

DRG. No.

TB-4-341-316-005

REV. 00

SHEET No.  
11



NOTE:—

1. RAILWAY TRACKS WITHIN SWITCHYARD AREA SHALL BE EARTHED AT BOTH ENDS & AT 30M. SPACING.



## EQUIPMENT EARTHING DETAILS RAIL BONDING

COMPU. DRG. REF.

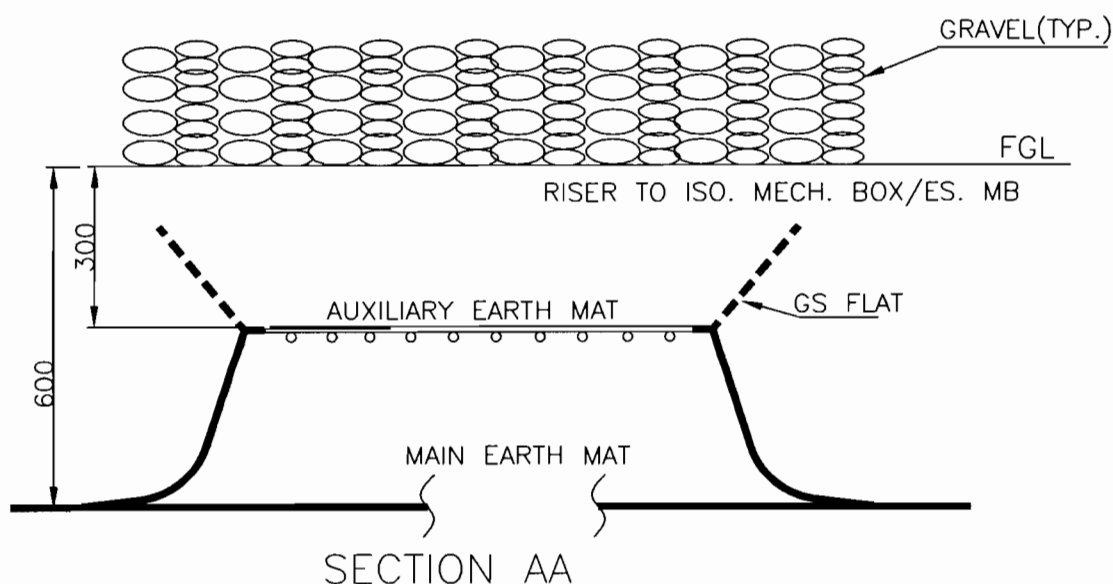
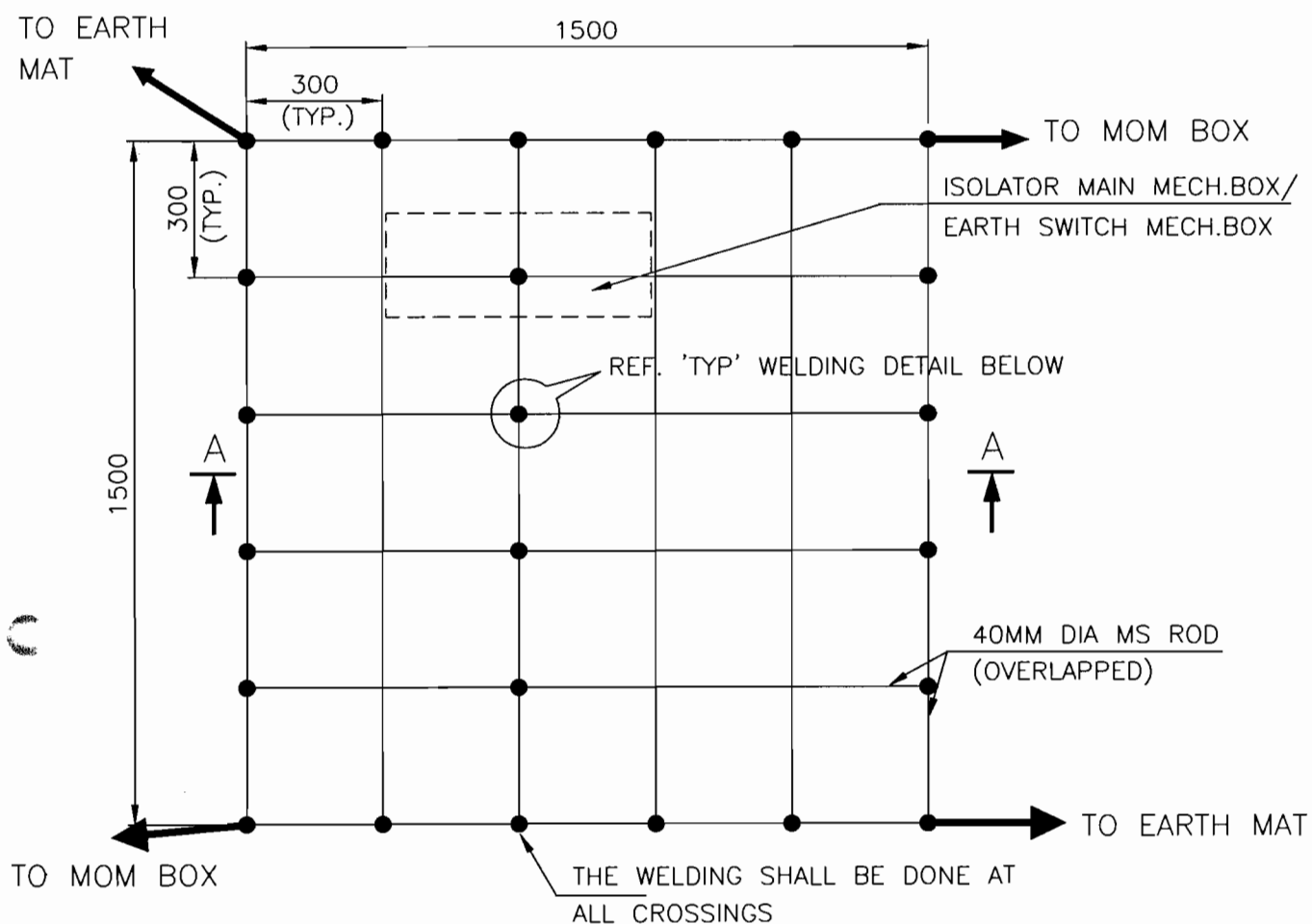
DRG. NO.

TB-4-341-316-005

REV. 00

SHEET No.  
12





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.

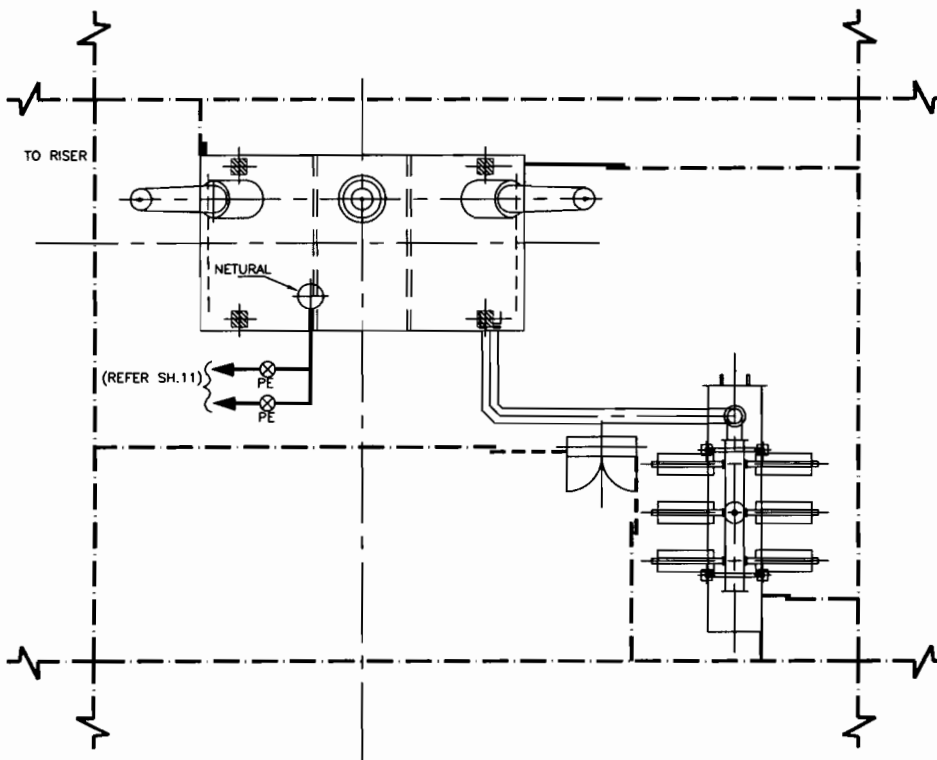
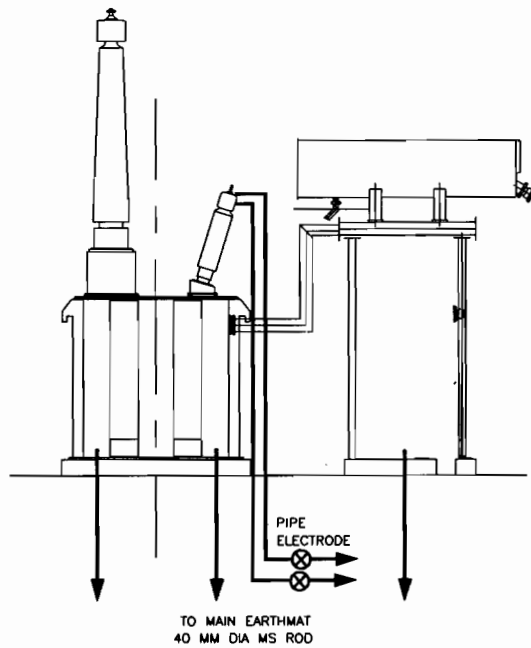
Report No.

TB-4-341-316-005

REV. 00

SHEET No.

13



LEGEND:-

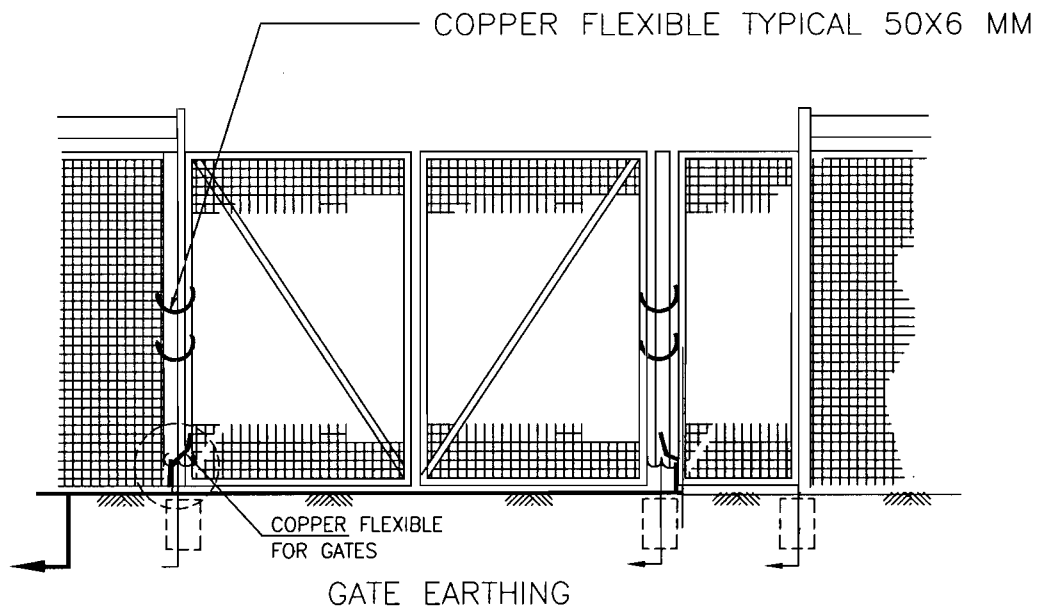
- 40MM $\phi$  MS ROD
- 75x12MM GS FLAT
- - - 50x6MM GS FLAT

NOTE:-

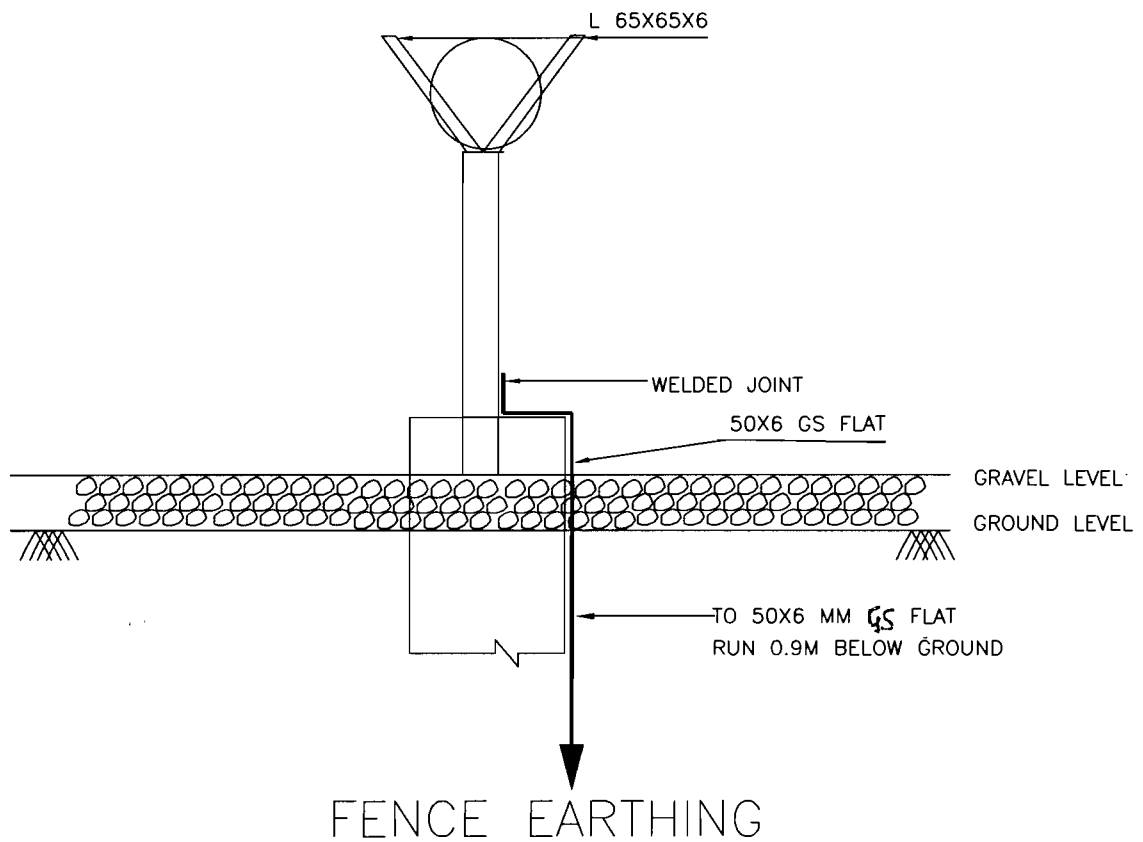
1. NO. OF RISERS
  - MAIN TANK - 2NOS.
  - RADIATOR TANK - 2NOS.
  - M. BOX - 2NOS.
  - NETURAL EARTH - 2NOS.
  - ELECTRODE
2. PYLON SUPPORTS SHALL BE EARTHED TO THE MAIN EARTHING CONDUCTOR BY GS. FLAT
3. PIPE ELECTRODE - 2 NOS.



EQUIPMENT EARTHING DETAILS  
400kV SHUNT REACTOR



EVERY ALTERNATE FENCE POST SHALL BE EARTHED,  
FOR FENCE EARTHING DETAILS, PLEASE REFER ENCLOSED GUIDELINES



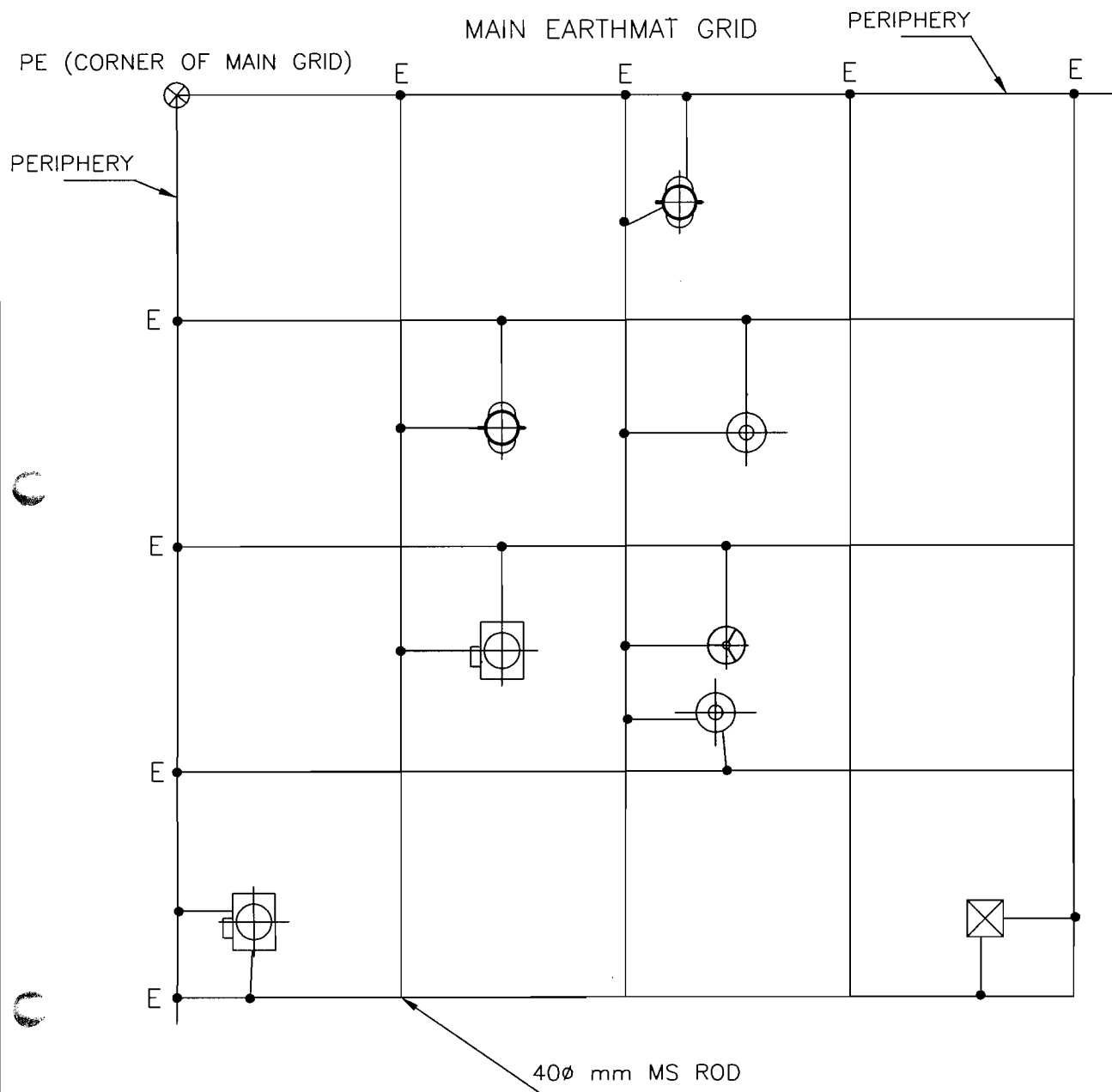
# EQUIPMENT EARTHING DETAILS FENCE & GATE EARTHING

DRG. No.

TB-4-341-316-005

REV. 00

SHEET No.  
15



- - RISER
- ⊗ - PIPE ELECTRODE
- E - 40mm DIA MS ROD 1.05M LONG AT PERIPHERY



## EQUIPMENT EARTHING DETAILS

TYPICAL ARRANGEMENT OF EQUIPMENT EARTHING WITH MAIN GRID

COMPU. DRG. REF.

DRG. NO.

TB-4-341-316-005

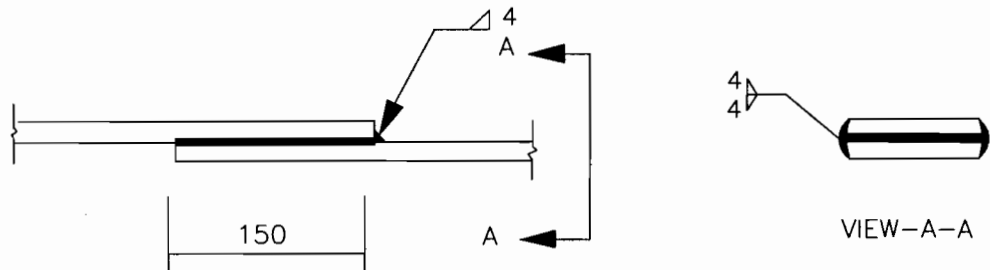
REV. 00

SHEET No.

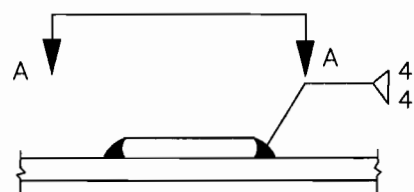
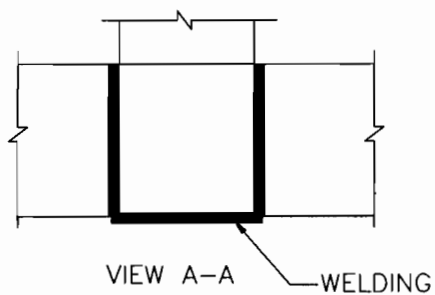
16

## STRIP TO STRIP

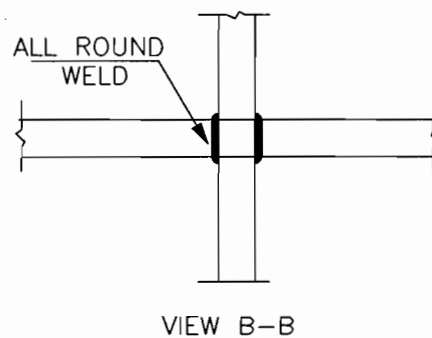
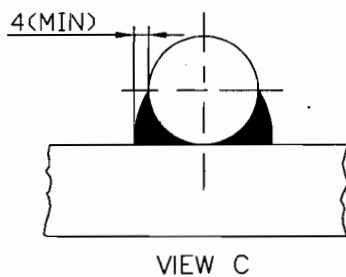
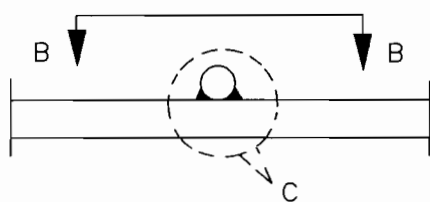
### 1. STRAIGHT LAP JOINT/RISER



### 2. CROSS LAP JOINT



### RIGHT ANGLED JOINT (ROD TO ROD)



## EQUIPMENT EARTHING DETAILS WELDING DETAIL

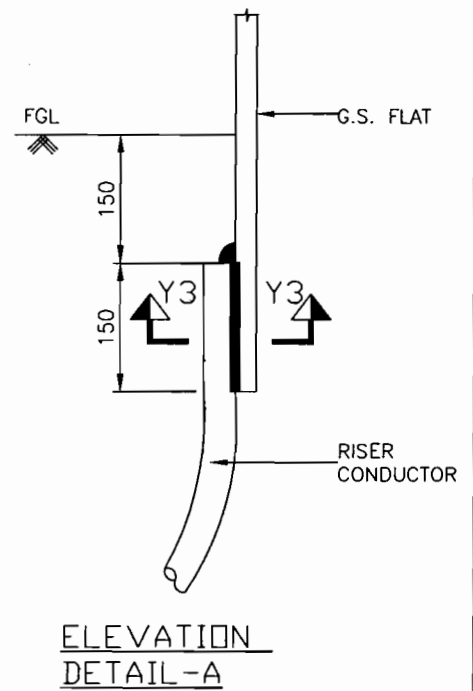
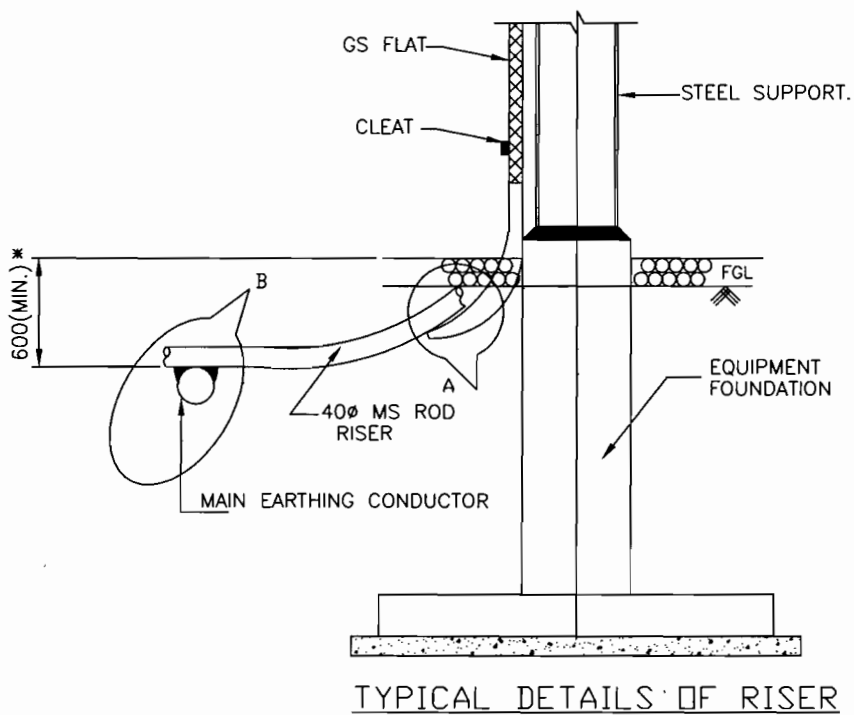
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DRG. No.

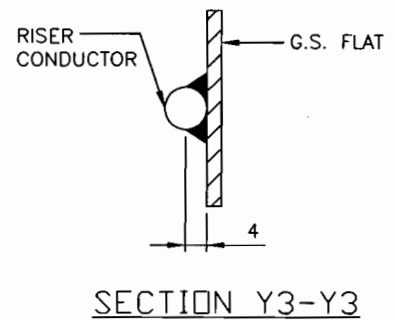
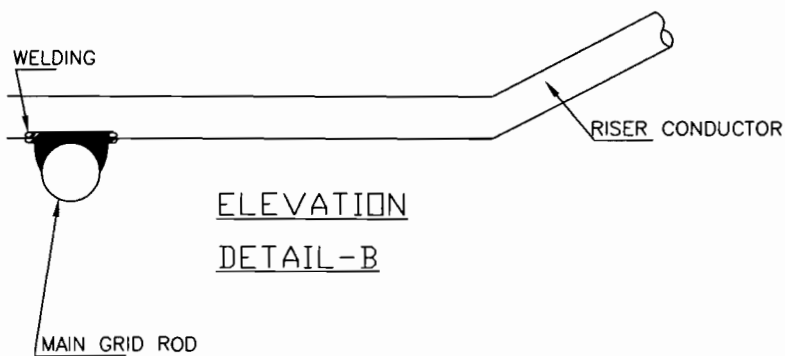
TB-4-341-316-005

REV. 00

SHEET No.  
17



\* MATCH WITH EXISTING EARTHMAT



# EQUIPMENT EARTHING DETAILS WELDING DETAILS

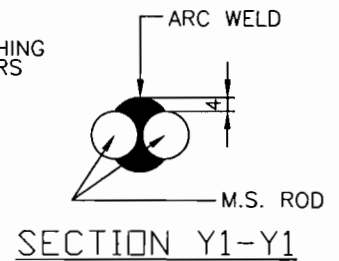
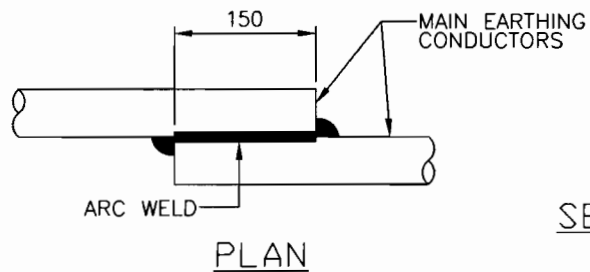
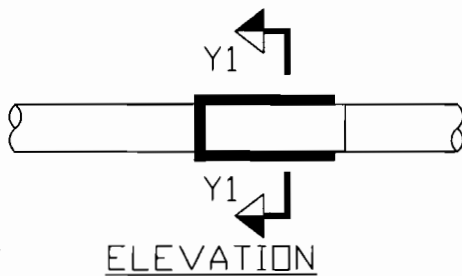
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DRG. No.

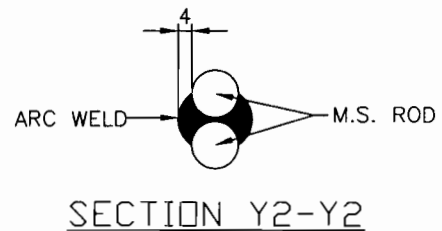
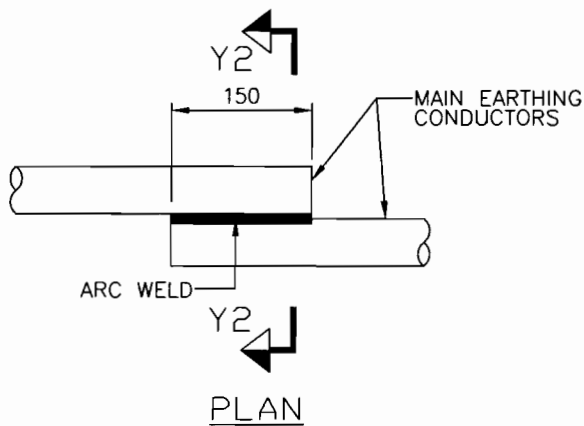
TB-4-341-316-005

REV. 00

SHEET No.  
18



(CONDUCTOR IN HORIZONTAL PLANE)



(CONDUCTOR IN VERTICAL PLANE)



# EQUIPMENT EARTHING DETAILS WELDING DETAILS

COMPUTER REF. NO.

DRG. No.

TB-4-341-316-005

REV. 00

SHEET No.  
19