

ANNEXURE -1 (DRAWING LIST)

Sl. No.	Description of drg./doc.	Drg./doc. No.	Rev no.
1.	Single line diagram for Ext. of 765kV Chittorgarh Substation(Three sheets)	TB-3-386-510-001C	01
2.	Layout plan for Ext. of 765kV Chittorgarh Substation	TB-0-386-510-002C	01
3.	Section elevation for Ext. of 765kV Chittorgarh Substation	TB-1-386-510-003C	01
4.	PGCIL standard equipment earthing drawing	C/ENG/STD/EARTHINGS	00

DRAWING No. TB-3-386-510-001C

COMPUTER DRG. PATH NAME :













SIGN. & DATE	REF. DRG. No.
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INVENTORY No.



REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED	S/SK/AAS/RSS/V	TBEM DEPT. CHIS CODE		JNU PAT / SCALE NTS	GDS GFS CARD CODE		
ZONE			ZONE		REVISD AS PER CUSTOMER LETTER DATED 04.11.15				श्रीषक/TITLE SINGLE LINE DIAGRAM FOR EXT. OF 765KV CHITTORGARH SUBSTATION		इंजि. क./DRAWING NO. TB-3-386-510-001C	पृष्ठ नं./NEXT SHEET No. 2

LEGENDS:-

SL.NO.	DESCRIPTION	RATING	QTY (NO.)	SYMBOL	SCOPE OF SUPPLY	LEGEND	LOCATION
1	80MVAR LINE REACTOR (1-PH) WITH NGR.		13		PGCIL	R/NGR	704RR, 704RY, 704RB 710NR, 710RY, 710RB 707RR, 707RY, 707RB 713RR, 713RY, 713RJL, 713S/104NGR, 107NGR, 110NGR, 113NGR
2	SP6 CIRCUIT BREAKER WITH CR, WITH CSD (3-PH)	3150A	1		PGCIL	52	71452
3	SP6 CIRCUIT BREAKER WITH CR, WITHOUT CSD (3-PH)	3150A	4		PGCIL	52	70452, 70752, 71052, 71352
4	SP6 CIRCUIT BREAKER WITHOUT CR, WITH CSD (1-PH)	3150A	13		PGCIL	52	70452R, 70452Y, 70452B, 70752R, 70752Y, 70752B, 71052R, 71052Y, 71052B, 71352R, 71352Y, 71352B, 752S
5	ISOLATOR WITH ONE E/SW (3 PH) VERTICAL KNEE TYPE	3150A	10		BHEL	89/89E	70489B, 70789B, 71089B, 71389B, 71389A, 71089A, 70489L, 70789L, 71089L, 71389L
6	ISOLATOR WITH TWO E/SW (3 PH) VERTICAL KNEE TYPE	3150A	2		BHEL	89/89E1/89E2	71489A, 71489B
7	ISOLATOR WITH ONE E/SW (1 PH) VERTICAL KNEE TYPE	2000A	13		BHEL	89/89E1	70489ER, 70489EY, 70489EB, 70789ER, 70789EY, 70789EB, 71089ER, 71089EY, 71089EB, 71389ER, 71389EY, 71389EB, 70489CB
8	ISOLATOR WITHOUT E/SW (1 PH) VERTICAL KNEE TYPE	2000A	23		BHEL	89	70489OR, 70489OY, 70489OB, 70489OC, 70489CY, 70789OR, 70789OY, 70789OB, 70789OC, 70789CY, 70789CB, 71089OR, 71089OY, 71089OB, 71089OC, 71089CY, 71089CB, 71389OR, 71389OY, 71389OB, 71389OC, 71389CY, 71389CB
9	CURRENT TRANSFORMER (1 PH) WITH 120% EXTENDED CURRENT RATING	3000A	15		BHEL	CT	704CT, 707CT, 710CT, 713CT, 714CT
10	CVT (1 PH)	8800pF	12		BHEL	CVT	704CVT, 707CVT, 710CVT, 713CVT
11	SURGE ARRESTER (1 PH)	624 kV, 20 KA 13 KJ/KV	25		BHEL	LA	704LA, 707LA, 710LA, 713LA, 704LAR, 704LAY, 704LAB, 707LAR, 707LAY, 707LAB, 710LAR, 710LAY, 710LAB, 713LAR, 713LAY, 713LAB, 714S
12	WAVE TRAP (1 PH.) PEDESTAL TYPE	1mH, 3150A	08		BHEL	WT	704WT, 707WT, 710WT, 713WT

— PRESENT SCOPE
- - - FUTURE/EXISTING SCOPE

1) SINGLE LINE DIGRAM (TENDER DRAWING)
DRG. NO :- C/ENG/NR-1/765KV/CHITTORGARH/SLD/01.R-0

1) SUPPLY, ERECTION, TESTING AND COMMISSIONING OF AUX. BUS FOR REACTOR BAY SHALL BE IN PGCIL SCOPE.


2) WAVE TRAP SHALL BE PROVIDED IN TWO PHASE ONLY

REQUIREMENTS FOR 800KV CURRENT TRANSFORMERS RATED FOR 3000A

REQUIREMENTS FOR 800KV CURRENT TRANSFORMERS RATED FOR 3000A								
NO OF CORES	CORE NO	APPLICATION	CURRENT RATIO	OUTPUT BURDEN (VA)	ACCURACY CLASS	Min. KNEE Pt. VOLTAGE (kV)	Max. CT SEC. WDG. RESISTANCE (In Ohm.)	Max. EXCITATION CURRENT AT V _k (IN mA)
6	1	BUS DIFF. CHECK	3000/2000/500/1	-	TPS*	3000/2000/500	15/10/2.5	20 ON 2000/1 TAP; 30 ON 2000/1; 120 ON 500/1 TAP
	2	BUS DIFF. MAIN	3000/2000/500/1	-	TPS*	3000/2000/500	15/10/2.5	20 ON 3000/1 TAP; 30 ON 2000/1; 120 ON 500/1 TAP
	3	METERING	3000/	20	0.2S	-	-	-
			2000/	20	0.2S	-	-	-
			500/1	20	0.2S	-	-	-
	4	METERING	3000/	20	0.2S	-	-	-
			2000/	20	0.2S	-	-	-
			500/1	20	0.2S	-	-	-
	5	TRANS DIFF /LINE PROT.N.	3000/	-	TPS*	3000/	15/10/2.5	20 ON 3000/1 TAP; 30 ON 2000/1; 120 ON 500/1 TAP
			2000/	-	TPS*	2000/	-	-
			500/1	-	TPS*	500/	-	-
	6	LINE PROTECTION PROT.N.	3000/	-	TPS*	3000/	15/10/2.5	20 ON 3000/1 TAP; 30 ON 2000/1; 120 ON 500/1 TAP
2000/			-	TPS*	2000/	-	-	
500/1			-	TPS*	500/	-	-	

NOTE: 1) * ALL PROTECTION CORES SHALL BE OF ACCURACY CLASS TPS AS PER IEC : 60044-6
2) METERING CORE SHALL BE OF ACCURACY CLASS 0.2S AS PER IEC : 60044-1

Ratio	$\frac{795\text{KV}}{\sqrt{3}} / \frac{110\text{V}}{\sqrt{3}} / \frac{110\text{V}}{\sqrt{3}} / \frac{110\text{V}}{\sqrt{3}}$
Sec - I	Class- 0.5/3P, 50VA
Sec - II	Class- 0.5/3P, 50VA
Sec - III	Class- 0.2, 50VA
	Capacitance: 8800 pF ($\pm 10\%$, 5%)

SL NO	DESCRIPTION	RATING	QTY (NO)	SYMBOL	SCOPE OF SUPPLY	LEGEND	LOCATION
13	SFS CIRCUIT BREAKER FOR NGR BYPASS (1 PH)	132KV, 1250A	4		BHEL	52	10402, 10752 11042, 11352
14	SURGE ARRESTER (1 PH)	120 KV, 10 KA 8 K/1KV	04		PG&L	1A	1041A, 1071A 1101A, 1131A
15	NEUTRAL CT. (1 PH) WITH 120% EXTENDED CURRENT RATINGS	33KV	04		PG&L	01	10401, 10701 11001, 11301

NOA NO. : CC-CS/483-NRI/SS-2802/11/GB/NOA-1&2/5478 & 5479 DT. 31.07.15

ADDITIONAL INFORMATION

W.O.No. 85004

STATUS OF DRAWING	CONTRACT
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DISTRIBUTION OF PRINTS

ग्राहक/परियोजना का नाम POWER GRID CORPORATION OF INDIA LIMITED

NAME OF CUSTOMER: **GUJ** SUBSTATION PACKAGE-SS01 FOR EXT OF 765KV LIMER S/S &

SUBSTATION PACKAGE-SSOI FOR EXT. OF 785KV ASMER S/S & 765KV CHITTORGARH S/S UNDER GREEN ENERGY CORRIDOR

ISTS(PART-B)


आचार्य हेदी प्रलेखनकालस निमिडेस	वक्त्र /NAME	हस्ता /SIGN.	दि./DATE
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DW	-SD-	24.09.1
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	भारत हेवी इलेक्ट्रिकल्स लिमिटेड BHARAT HEAVY ELECTRICALS LTD	SK/AA	-SO-	
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AS/RS	-SD-
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	अनुयायक / SCALE	CARD CODE
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Q15	422	NTS			
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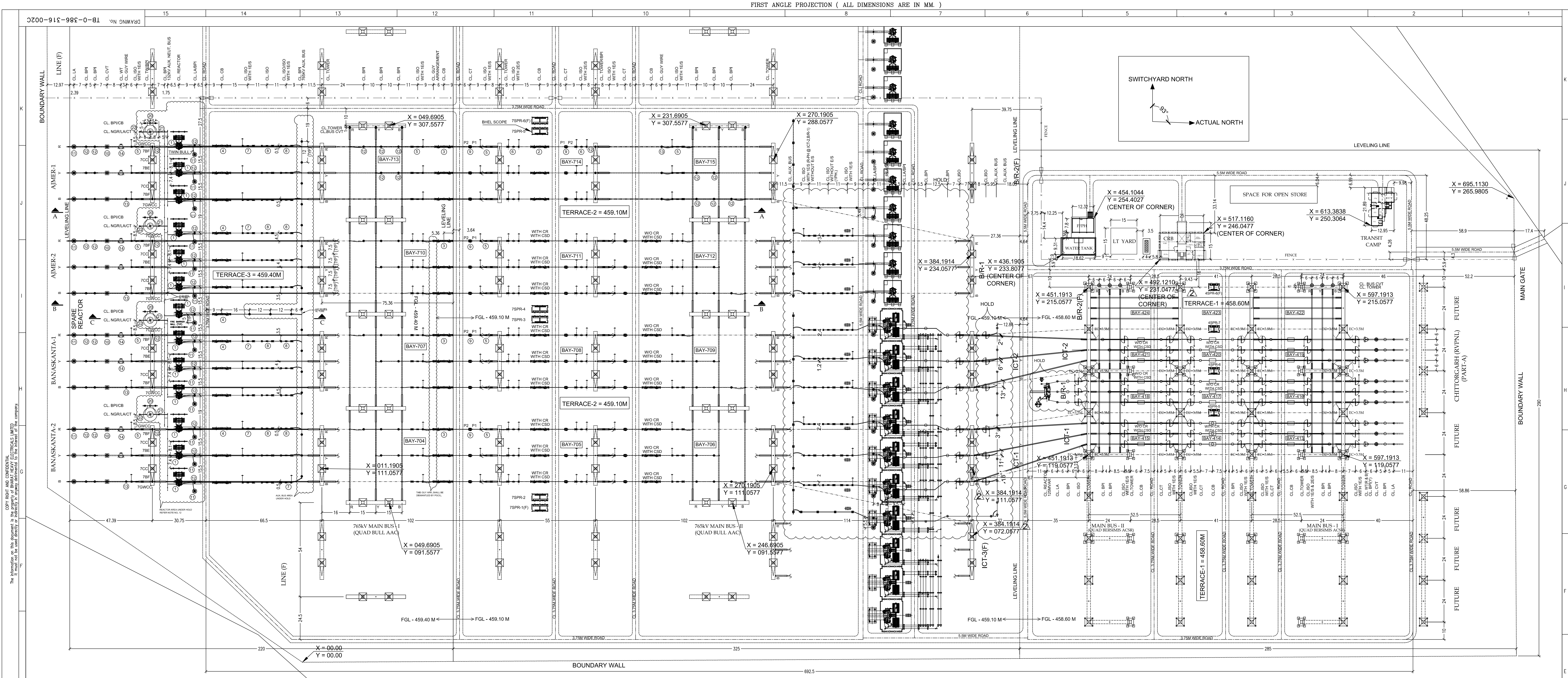
परीक्षक/AMF	डाईंग नं./DRAWING NO.	पुनः/RE
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SINGLE LINE DIAGRAM

FOR EXT. OF 765KV CHITTORGARH SUBSTATION	18-3-388-510-0010
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पृष्ठ सं./SHEET No. 3

3		2	
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BILL OF QUANTITY - 765KV

ITEM CODE	DESCRIPTION	SYMBOL	QTY.	SCOPE
1	765KV, 40 MVAR SWITCHABLE LINE REACTOR WITH NGR, 1-PH		13 Nos.	PGCIL
2	SF6 CIRCUIT BREAKER WITH CLOSING RESISTOR, WITH CSD 765KV, 3150A, 40 KA for 1 SEC. (3-PH)		1 No.	PGCIL
3	SF6 CIRCUIT BREAKER WITH CLOSING RESISTOR, WITHOUT CSD 765KV, 3150A, 40 KA for 1 SEC. (3-PH)		4 Nos.	PGCIL
4	SF6 CIRCUIT BREAKER WITHOUT CLOSING RESISTOR, WITH CSD 765KV, 3150A, 40 KA for 1 SEC. (1-PH)		13 Nos.	PGCIL
5	ISOLATOR VERTICAL KNEE TYPE WITH ONE EARTH SWITCH 765KV, 3150 A, 40 KA for 1 SEC. (3-PH)		10 Nos.	BHEL
6	ISOLATOR VERTICAL KNEE TYPE WITH TWO EARTH SWITCH 765KV, 3150 A, 40 KA for 1 SEC. (3-PH)		2 Nos.	BHEL
7	ISOLATOR VERTICAL KNEE TYPE WITH ONE EARTH SWITCH 765KV, 2000 A, 40KA for 1 sec. (1-PH)		13 Nos.	BHEL
8	ISOLATOR VERTICAL KNEE TYPE WITHOUT EARTH SWITCH 765KV, 2000 A, 40KA for 1 sec. (1-PH)		23 Nos.	BHEL
9	3000A, 40KA for 1 SEC CURRENT TRANSFORMER (6 CORE), 1-PH, 120% Extended Current Rating(765KV)		15 Nos.	BHEL
10	CAPACITIVE VOLTAGE TRANSFORMER 765KV, 40A, 1-PH, 8000 pF, VOLTAGE RATIO - 765/11		12 Nos.	BHEL
11	SURGE ARRESTER 120KV, 1-PH, 20KA, 13KJ/KV		25 Nos.	BHEL
12	765KV BUS POST INSULATOR (EXCEPT FOR WAVE TRAP AND ISOLATOR)		62 Nos.	BHEL
13	765KV GUY WIRE (FOR SWITCHYARD)		7 Nos.	BHEL
14	WAVE TRAP, 3150A, 1 mH, 40 KA for 1Sec., 1-PH (PEDESTAL MOUNTED)		8 Nos.	BHEL

BILL OF QUANTITY - 132/33KV

ITEM CODE	DESCRIPTION	SYMBOL	QTY.	SCOPE
20	SF6 CIRCUIT BREAKER FOR NGR BY PASS 132KV, 1250A (1-PH)		4 Nos.	BHEL
21	SURGE ARRESTER 120KV, 10 KA, 5 KJ/KV (1-PH)		4 Nos.	PGCIL
22	NEUTRAL CT, 33KV (1 PH) WITH 120% EXTENDED CURRENT RATING		4 Nos.	PGCIL

CONDUCTOR & STRINGING DETAILS - 765KV.

Sl.No.	DESCRIPTION	LEVEL FROM PLINTH	CONDUCTOR DETAILS	TENSION INSULATOR STRINGING PHASE
1	MAIN BUS-I & II	(AT 27M HEIGHT)	QUAD AAC BULL CONDUCTOR WITH 40MM SUB-CONDUCTOR SPACING	765KV 210KV Double Tension Disc Insulator(2X44 Nos.)
2	JACK BUS	(AT 39M HEIGHT)	QUAD AAC BULL CONDUCTOR WITH 40MM SUB-CONDUCTOR SPACING	765KV 210KV Double Tension Disc Insulator(2X44 Nos.)
3	DROPPERS/JUMPING	-	QUAD AAC BULL CONDUCTOR WITH 40MM SUB-CONDUCTOR SPACING	765KV 210KV Single Suspension Disc Insulator(1X44 Nos.)
4	EQUIPMENT INTERCONNECTION	(AT 14M HEIGHT)	4.5" IPS AL TUBESQUAD AAC BULL CONDUCTOR WITH 40 SPACING	-
5	EARTH WIRE	(AT 3M HEIGHT)	75.66mm GI WIRE (10.98mm DIA)	-

LEGEND:-

SYMBOL	PRESENT SCOPE
	FUTURE / EXISTING / NOT IN BHEL SCOPE
	FENCE
	BOUNDARY WALL
	765KV TOWER W/O PEAK
	765KV TOWER WITH PEAK
	400KV TOWER WITH PEAK
	400KV TOWER W/O PEAK
	SHIELD WIRE (765KV & 400KV)

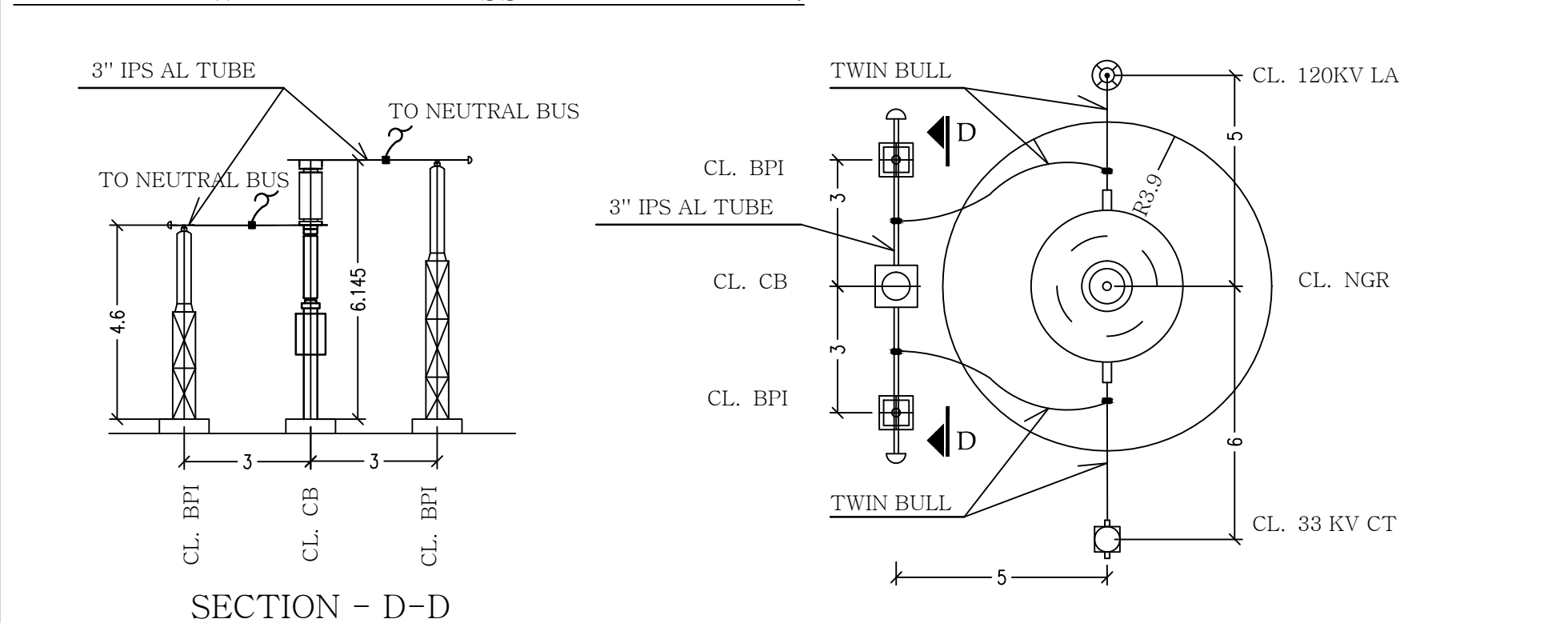
SYSTEM PARAMETERS (765KV):-

Sl.No.	DESCRIPTION OF PARAMETER	765KV SYSTEM
1	HIGHEST SYSTEM VOLTAGE	800KV
2	SYSTEM OPERATING VOLTAGE	765KV
3	RATED FREQUENCY	50Hz
4	NO. OF PHASES	3
5	RATED INSULATION LEVELS I) FULL WAVE LIGHTNING WITNESS VOLTAGE (1.25 Impulse) II) SWITCHING SURGES WITNESS VOLTAGE (250/2000µsec) DRY & WET III) ONE MINUTE POWER FREQUENCY SW WITNESS VOLTAGE (rms)	±1050KV ±1050KV 800KV
6	CORONA EXTENSION VOLTAGE	508KVrms
7	MAX. RADIO INTERFERENCE VOLTAGE LEVEL AT 300KV (rms) FOR 200 KVA AT 33KV (rms) FOR 400KV	2500 micro v/m
8	RATED SHORT CIRCUIT CURRENT FOR 1 SEC. DURATION	40KA (P&R 1 sec.) EFFECT
9	SYSTEM NEUTRAL EARTHING	EARTHED

NOTES:

- ALL DIMENSIONS ARE IN MTR. UNLESS OTHERWISE SPECIFIED.
- DEAD END TOWER SECTION AND OUTGOING OF LINE CONDUCTOR & SHIELD WIRE ARE NOT IN BHEL SCOPE BUT CONNECTION OF EQUIPMENT TOWARDS LINE SIDE SHALL BE DONE BY BHEL. SUPPLY OF TENSION INSULATOR STRING ON LINE SIDE OF TAKE OFF GANTRY IS IN BHEL SCOPE OF WORK.
- SUPPLY ERECTION, TESTING & COMMISSIONING OF REACTOR, NGR, 120KV LA, 33KV NCT, FORMATION OF NEUTRAL & AUXILIARY BUSES ALONG WITH BPH & ITS STRUCTURE AND ASSOCIATED CIVIL WORKS IS NOT COVERED IN BHEL SCOPE OF WORK AS PER TS SECTION PROJECT (EXCEPT FIRE PROTECTION SYSTEM, CABLING FROM CROPPERS & NGR MBS & CONNECTOR OF HV BUSHING OF 765 KV REACTOR).
- INTER EQUIPMENT DIMENSION ARE PLANNED SO AS TO ACHIEVE REQUIRED PHYSICAL AND ELECTRICAL CLEARANCE. HOWEVER IF ELECTRICAL CLEARANCE ARE NOT AVAILABLE SITE AND MODIFICATIONS ARE REQUIRED TO ACHIEVE IT. THE REQUIRED MODIFICATION WILL BE DONE BY BHEL WITHOUT ANY EXTRA COST IMPLICATION TO OWNER.
- BOUNDARY WALL ALONG WITH SUBSTATION PROPERTY LINE. OWNER SIDE OFFICE, STORES, CONTOURING AND SUBSTATION LEVELLING, MAIN BELOW GROUND EARTH MAT ARE NOT IN BHEL SCOPE.
- FIRE RESISTANT WALL BETWEEN 765KV REACTORS UNITS ARE NOT IN BHEL'S SCOPE.
- SOIL INVESTIGATION OF SUBSTATION ARE NOT IN BHEL'S SCOPE.
- LOCATION OF WT SHOWN IS INDICATIVE ONLY. EXACT LOCATION SHALL BE FINALIZED DURING COMMISSIONING BASED ON PLCC REQUIREMENT HOWEVER FOUNDATION FOR WAVE TRAP SHALL BE CONSIDERED FOR ALL THREE PHASES.
- DETAILS OF BPH & SWITCHYARD PANEL ROOM (SPR) LOCATION (WITH CO-ORDINATES) SHALL BE SHOWN IN CABLE TRENCH LAYOUT DRAWING.
- SUPPLY OF 765KV CB IS NOT IN SCOPE OF BHEL AS PER TS SECTION PROJECT. CL. NO. 2.1.4 OF SECTION PROJECT SHALL BE APPLICABLE FOR 765KV CB RELATED WORK UNDER PRESENT SCOPE.
- PLINTH HEIGHT OF FOUNDATION WILL BE +300MM FROM FINISHED GROUND LEVEL (F.G.L.). GRAVEL TOP LEVEL WILL BE +175MM FROM F.G.L. (GRAVEL THICKNESS 100MM & PCC THICKNESS 75MM) HOWEVER TO MEET BEAM / SUPPORT STRUCTURE OF EQUIPMENT AT SAME HEIGHT, PLINTH HEIGHT OF FOUNDATION WILL BE RAISED AS REQUIRED.
- LINE REACTOR, 132/765KV AUX. BUS, 132KV CB, 132KV LA, 765KV BPH 765KV LA CORRESPONDING TO REACTOR AND NGR ARE UNDER HOLD.
- 765KV BPH OF SPARE REACTOR BAY BETWEEN 765KV CB AND 765KV AUX. BUS ARE IN PGCIL SCOPE.
- FOUNDATION OF GUY WIRE COMING BETWEEN WAVE TRAP AND ISOLATOR SHALL BE CONSTRUCTED IN ALL THREE PHASE.

DETAIL VIEW OF NGR BYPASS ARRANGEMENT.



NOTE:- 3.92M MINIMUM MAGNETIC CLEARANCE TO METALLIC PART NOT FORMING CLOSE LOOP.

765KV COLUMNS							
TYPE	DESIGNATION	PEAK	TOTAL HEIGHT (MTR.)	COLUMN HEIGHT (MTR.)	BEAM ATTACHMENTS	BEAM LEVEL (MTR.)	SUPPORTING BEAMS
1	70C	WITH PEAK	45.0	39.0	2	39.0	7BE & 7BF

765KV BEAM							
TYPE	DESIGNATION	CENTER TO CENTER SPAN OF BEAM	CLEAR SPAN OF BEAM	CROSS SECTION OF BEAM	TENSION (UNDER NORMAL CONDITION)	TENSION (UNDER SHORT CIRCUIT CONDITION)	QUANTITY (NOS.)
1	7BE	15 MTR.	13.00 MTR.	2.2 X 2.0 MTR.	97/CONDUCTOR	12.7/CONDUCTOR	04
2	7BF	9.0 MTR.	8.0 MTR.	2.2 X 2.0 MTR.	97/CONDUCTOR	12.7/CONDUCTOR	08

765KV X-ARM FOR EARTH WIRE					
TYPE	DESIGNATION	SPAN OF BEAM	SPAN OF BEAM	CROSS SECTION OF BEAM	TENSION (UNDER NORMAL CONDITION)
1	70WC	7.50 MTR. (C/C)	6.50 MTR. (CLEAR)	2.2 X 1.6 MTR. (NEAR SUPPORT)	0.81/EARTHWIRE & 1.27/EARTHWIRE

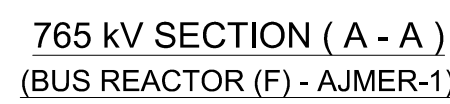
TENDER REF DRAWING OF PGCIL:

765KV LAYOUT PLAN FOR CHITTORGARH(XTN) S/S-UNDER STAGE : DRG. NO. CI/ENGR4/765KV/CHITTORGARH(XTN).PLA/01,REV-0. 765KV LAYOUT SECTION CHITTORGARH S/S EXTN. :DRG. NO. CI/ENGR4/765KV/CHITTORGARH(XTN).SEC/01,REV-0

BHEL REF DRAWING:

SINGLE LINE DIAGRAM : DRG NO.TB-3386-510-001C

NOA NO. : CC-CS/483-NRI/SS-2802/11/G8/NOA-1&2/5478 & 8479 DT. 31.07.15	NAME OF CUSTOMER POWER GRID CORPORATION OF INDIA LIMITED
ADDITIONAL INFORMATION W.D.No. 85004	STATUS OF DRAWING CONTRACT
STATUS OF DRAWING CONTRACT	NAME OF PROJECT: SUBSTATION PACKAGE-SS01 FOR EXT. OF 765KV AJMER S/S & 765KV CHITTORGARH S/S UNDER GREEN ENERGY CORRIDOR 131(PART-B)
DISTRIBUTION OF PRINTS	REVISIONS
REV. DATE ALTERED CHECKED APPROVED	REV. DATE ALTERED CHECKED APPROVED
01 11.08.16 APPROVED	01 11.08.16 APPROVED
AS PER PGCIL LETTER DATED 30.12.15	AS PER PGCIL LETTER DATED 30.12.15
LAYOUT PLAN FOR EXT. OF 765KV CHITTORGARH SUBSTATION	FOR EXT. OF 765KV CHITTORGARH SUBSTATION
DATE: 11.08.16	DATE: 11.08.16
BY: 422	BY: 422
SCALE: 1:1000	SCALE: 1:1000
DRG. NO. TB-0-386-316-002C	DRG. NO. TB-0-386-316-002C
1	1





Sl.No.	DESCRIPTION	765KV SYSTEM
1	PHASE TO PHASE FOR CONDUCTOR-CONDUCTOR CONFIGURATION FOR ROD-CONDUCTOR CONFIGURATION	7600mm 9400mm
2	PHASE TO EARTH FOR CONDUCTOR-CONDUCTOR STRUCTURE FOR ROD-CONDUCTOR CONFIGURATION	4900mm 6400mm
3	SECTIONAL CLEARANCE	10300mm
4	MIN HEIGHT OF EQPMT BUS CENTRE LINE ABOVE PLINTH LEVEL	+14000mm
5	MIN CLEARANCE IN AIR FOR TRANSFORMER & REACTOR A) PHASE TO PHASE B) PHASE TO EARTH	6700mm (FOR BILL-1950 kVp & SIL- 1550kVp 5800mm (FOR BILL-1950 kVp & SIL- 1550kVp
6	VERTICAL DISTANCE BETWEEN LOWEST PART OF INSULATOR TO PLINTH	2550mm



_____ PRESENT SCOPE
 - - - - - FUTURE / EXISTING SCOPE

NOTES :

1. ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE SPECIFIED.
2. PC = PHASE CLEARANCE, EC = EARTH CLEARANCE
SC = SECTION/SAFETY CLEARANCE.

NOA NO. : CC-CS/483-NRI/SS-2802/11/G8/NOA-1&2/5478 & 5479 DT. 31.07.15																		
ADDITIONAL INFORMATION W.O. No. 85004			आद्य/परिचयिका का नाम NAME OF CUSTOMER  POWER GRID CORPORATION OF INDIA LIMITED															
STATUS OF DRAWING		CONTRACT		NAME OF PROJECT SUBSTATION PACKAGE-SS01 FOR EXT. OF 765KV AJMER S/S & 765KV CHITTORGAR S/S UNDER GREEN ENERGY CORRIDOR ISTI(PART-B)														
DISTRIBUTION OF PRINTS				<div><div><div>भारत बिजली निगम लिमिटेड भारतीय बिजली निगम BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION</div></div><div><table><tr><th>क्रमांक/Serial No.</th><th>नाम /NAME</th><th>हस्ताक्षर/SIGN.</th></tr><tr><td>25020</td><td>SK</td><td>-SB-</td></tr><tr><td>25021</td><td>AS/RS</td><td>-SB-</td></tr></table></div></div>						क्रमांक/Serial No.	नाम /NAME	हस्ताक्षर/SIGN.	25020	SK	-SB-	25021	AS/RS	-SB-
क्रमांक/Serial No.	नाम /NAME	हस्ताक्षर/SIGN.																
25020	SK	-SB-																
25021	AS/RS	-SB-																
REV.	DATE	ALTERED	SK	AS	DEFINITION	THBM	उपवाक्य / SCALE	हार्ड कोड										
01	11.05.15	APPROVED	RS	AS	हार्ड कोड	422	1:1000	CARD CODE										
ZONE				AS PER POCIL LETTER DATED 30.12.15 शीट/सं./TITLE SECTION ELEVATION FOR EXT. OF 765KV CHITTORGAR SUBSTATION														
				डाटा./सं./DRAWING NO. TB-1-386-316-003C														
				पृष्ठ क्र./शे.सं. 1 पृष्ठों/पृष्ठों में से														

GENERAL INSTRUCTIONS FOR EARTHING:

1. Location of earthing conductors / risers shown in the earthing drawing may change to suit the site condition.
2. Two different risers of one structure/equipment shall be connected to different conductors of main earthmat.
3. Earthing conductor around the building shall be buried at a minimum distance of 1500 mm from the outer boundary of the building.
4. Minimum distance of 6000 mm shall be maintained between two treated (pipe) electrodes.
5. For surge arrester, earthing lead from surge counter to main earthmat shall be shortest in length as practically as possible. Earthing lead from surge arrester shall not be passed through any pipe.
6. No welding is allowed in the over ground earthing leads/risers.

RELEASED FOR CONSTRUCTION

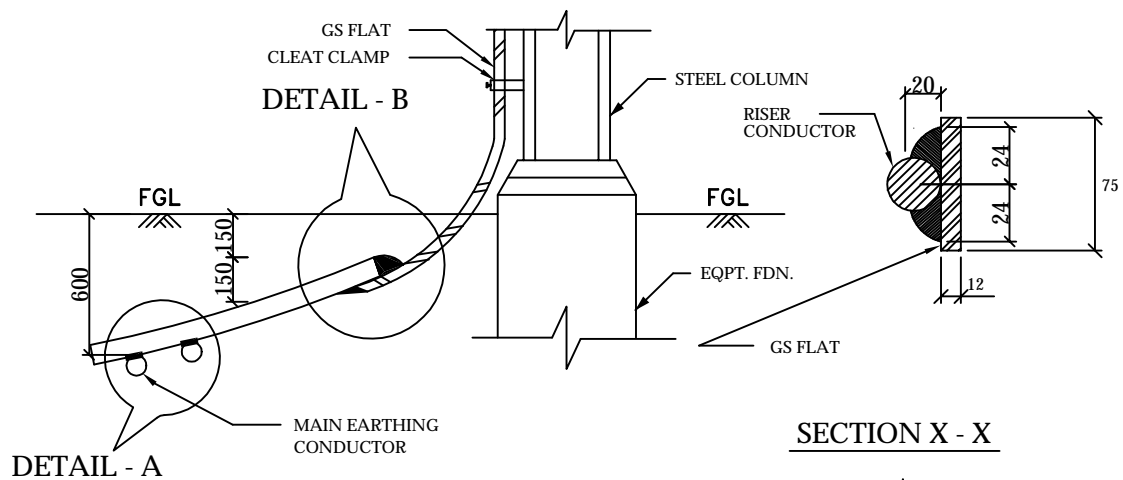
**POWER GRID CORPORATION
OF INDIA LIMITED**
(A Government of India Enterprise)



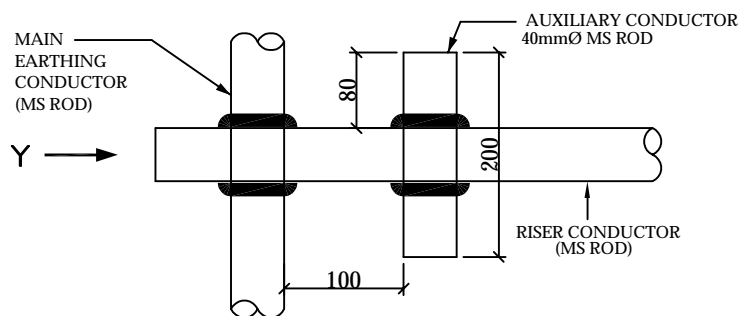
PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

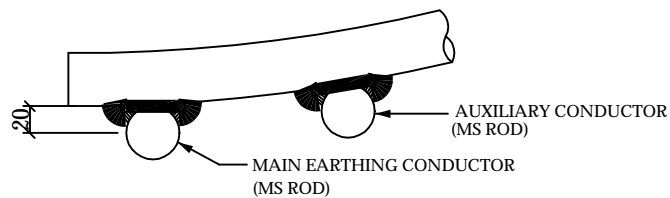
<i>JH Parkar</i>	<i>JH Parkar</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS	Rev.
CKD BY	PRPD BY	Date	SHEET # 1	00



TYPICAL DETAILS OF RISER

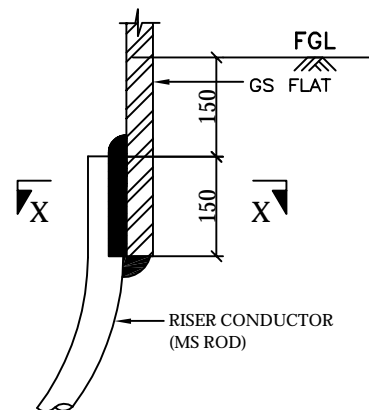


PLAN



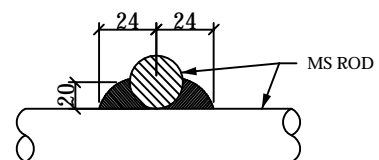
**ELEVATION
DETAIL - A**

SECTION X - X



ELEVATION

DETAIL - B



VIEW - Y

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PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

CKD BY

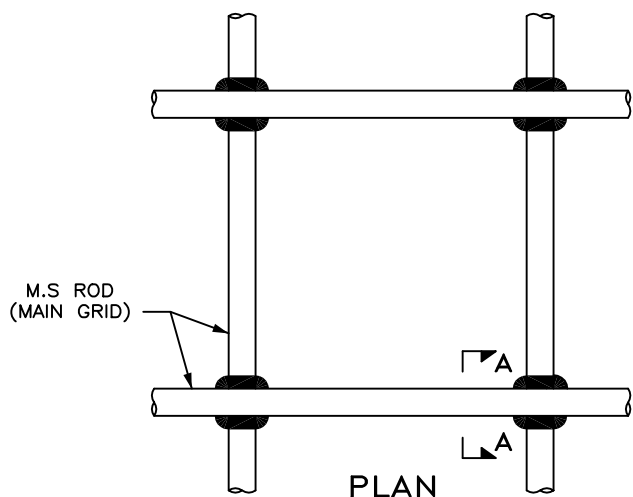
PRPD BY

27/3/2008

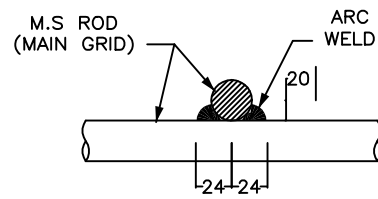
Date

Drawing No.:
C/ENG/STD/EARTHINGS
SHEET # 2

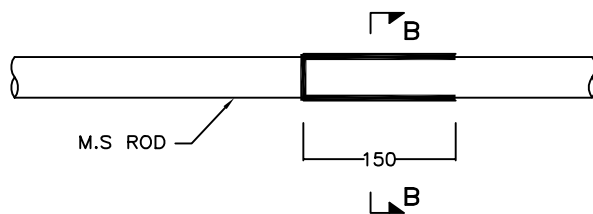
Rev.
00



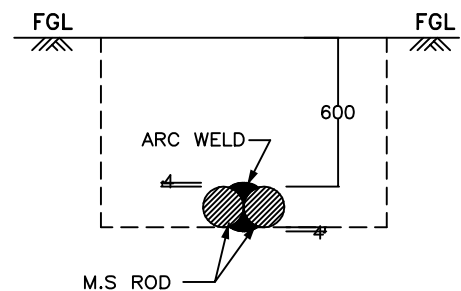
DETAIL OF CROSS JOINT



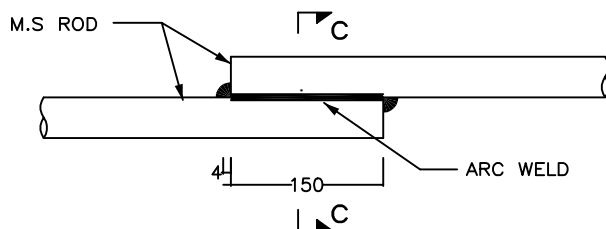
SECTION A - A



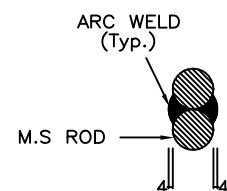
(CONDUCTORS KEPT ON SIDES)



SECTION B - B



(CONDUCTORS ONE ABOVE THE OTHER)



SECTION C - C

DETAIL OF LAP JOINT

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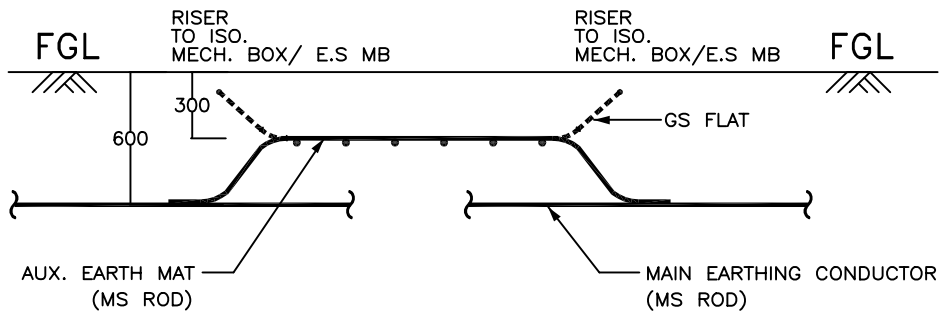
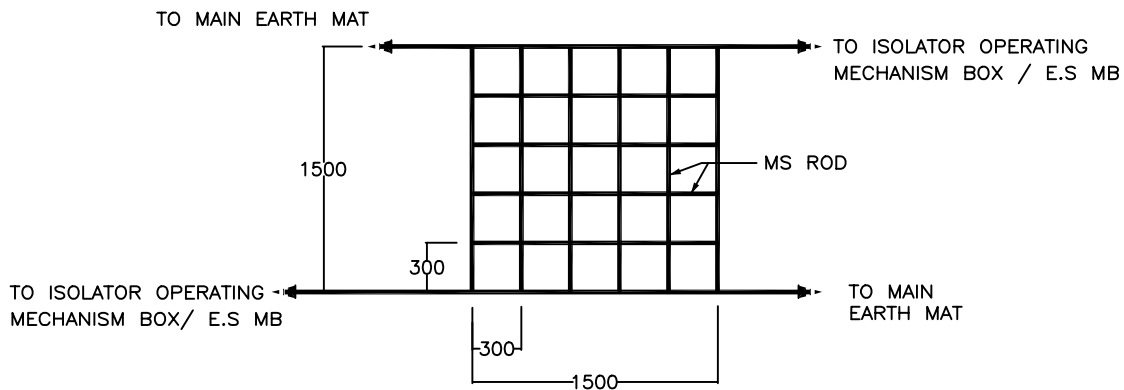


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>KK Parkar</i>	<i>KK Parkar</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS	Rev.
CKD BY	PRPD BY	Date	SHEET # 3	00

AUXILIARY EARTH MAT

ELEVATION

PLAN

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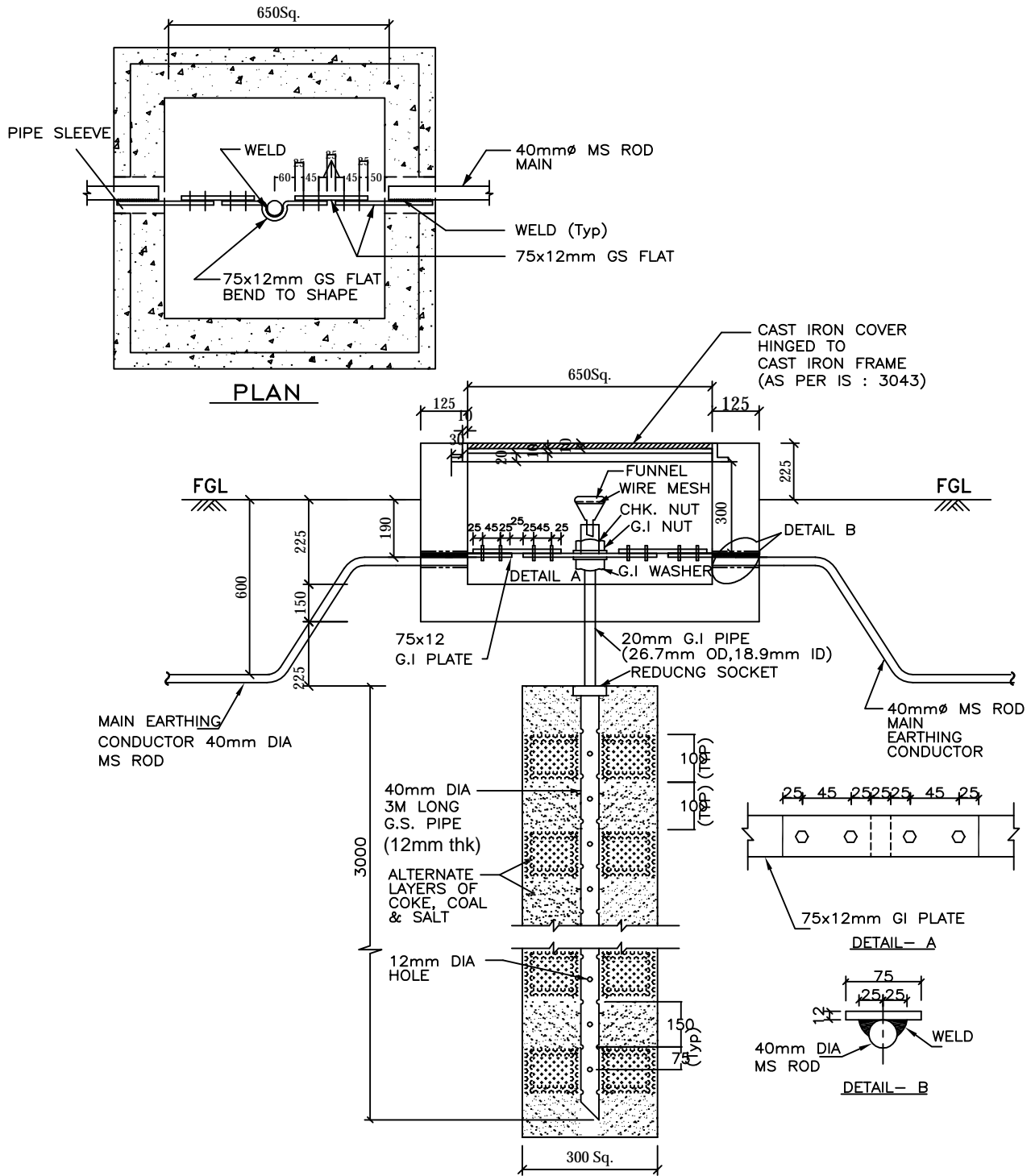


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>KK Panwar</i>	<i>KK Panwar</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS SHEET # 4	Rev. 00
CKD BY	PRPD BY	Date		

PIPE ELECTRODE



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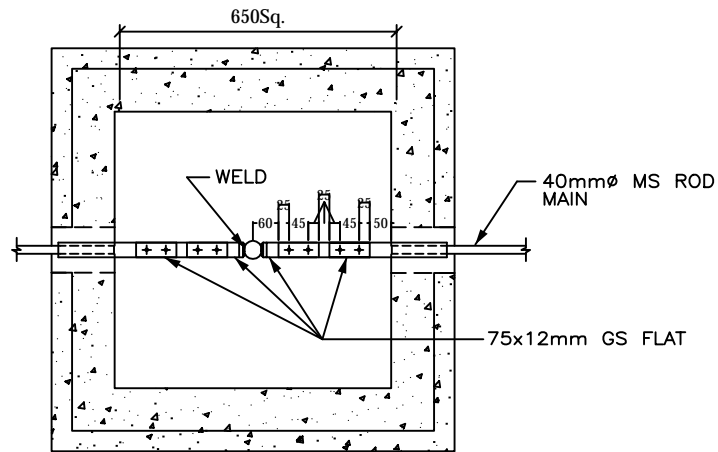


PROJECT :- STANDARD

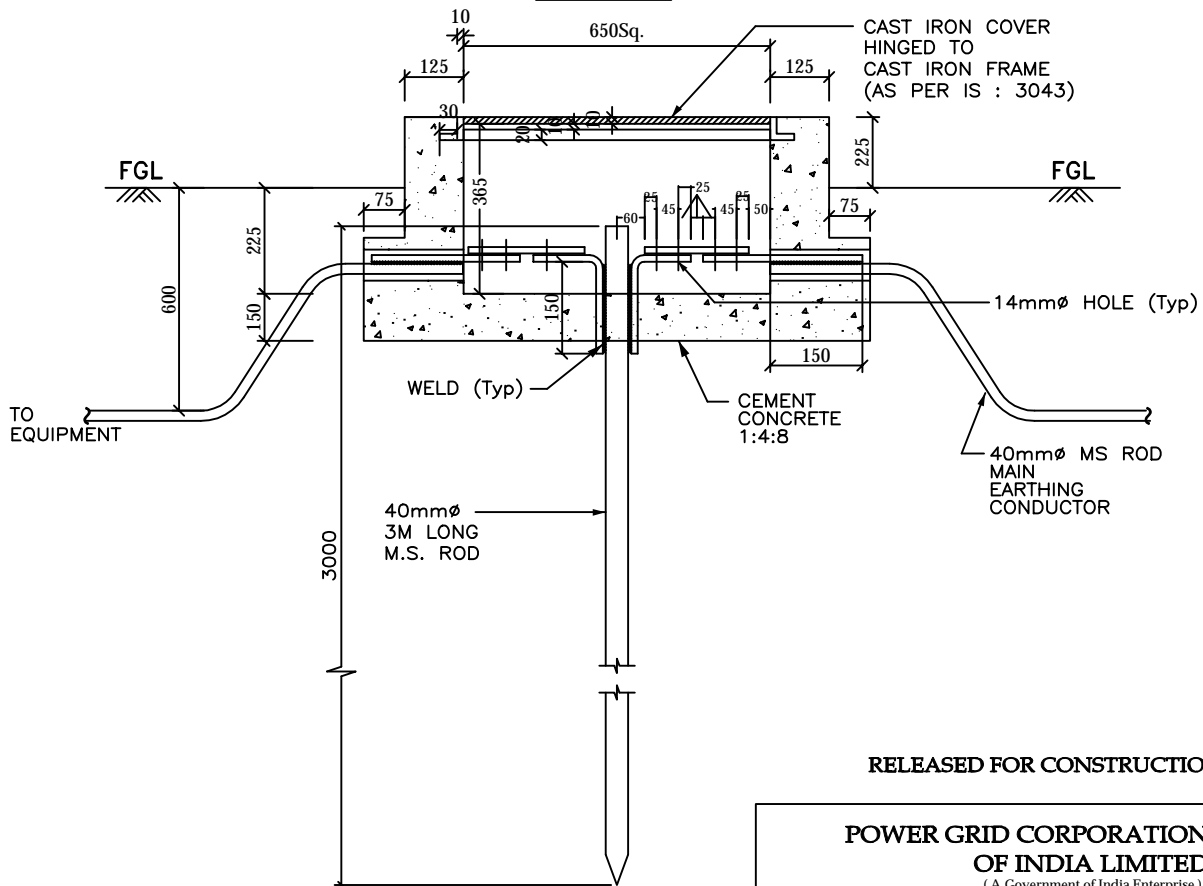
TITLE:- STANDARD EARTHING DETAILS

CKD BY	PRPD BY	28/3/2008	Drawing No.: C/ENG/STD/EARTHING SHEET # 5	Rev. 00
		Date		

ROD ELECTRODE WITH TEST LINK FOR LM, TOWER WITH PEAK, CVT, LA



PLAN



ELEVATION

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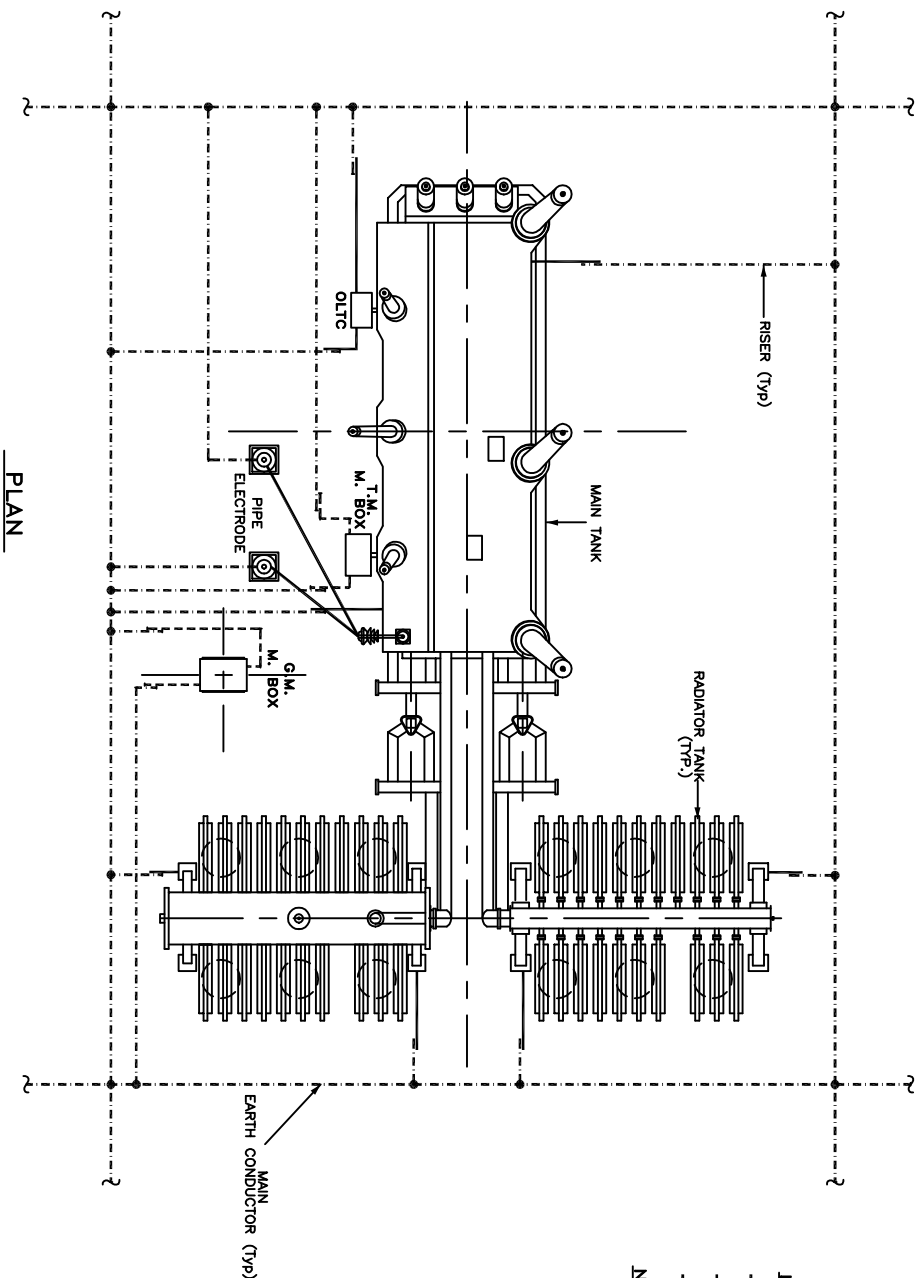


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

CKD BY	PRPD BY	Date	Drawing No.: C/ENG/STD/EARTHINGS SHEET # 6	Rev. 00
		27/3/2008		

EARTHING OF TRANSFORMER / REACTOR



LEGEND	
	40mm ϕ MS ROD
	75 x 12 mm GS FLAT
	50 x 6 mm GS FLAT

NOTES :-

1. No. OF RISERS :-
MAIN TANK - 2 Nos.
RADIATOR TANK - 4 Nos. (ICT only)
OLT/C - 2 Nos./M. BOX
M. BOX - 2 Nos.
NEUTRAL EARTH ELECTRODE - 2 Nos.
2. No. OF PIPE ELECTRODE REQUIRED = 2 Nos.
3. Pylon SUPPORTS SHALL BE EARTHED TO THE MAIN EARTHING CONDUCTOR BY GS FLAT.

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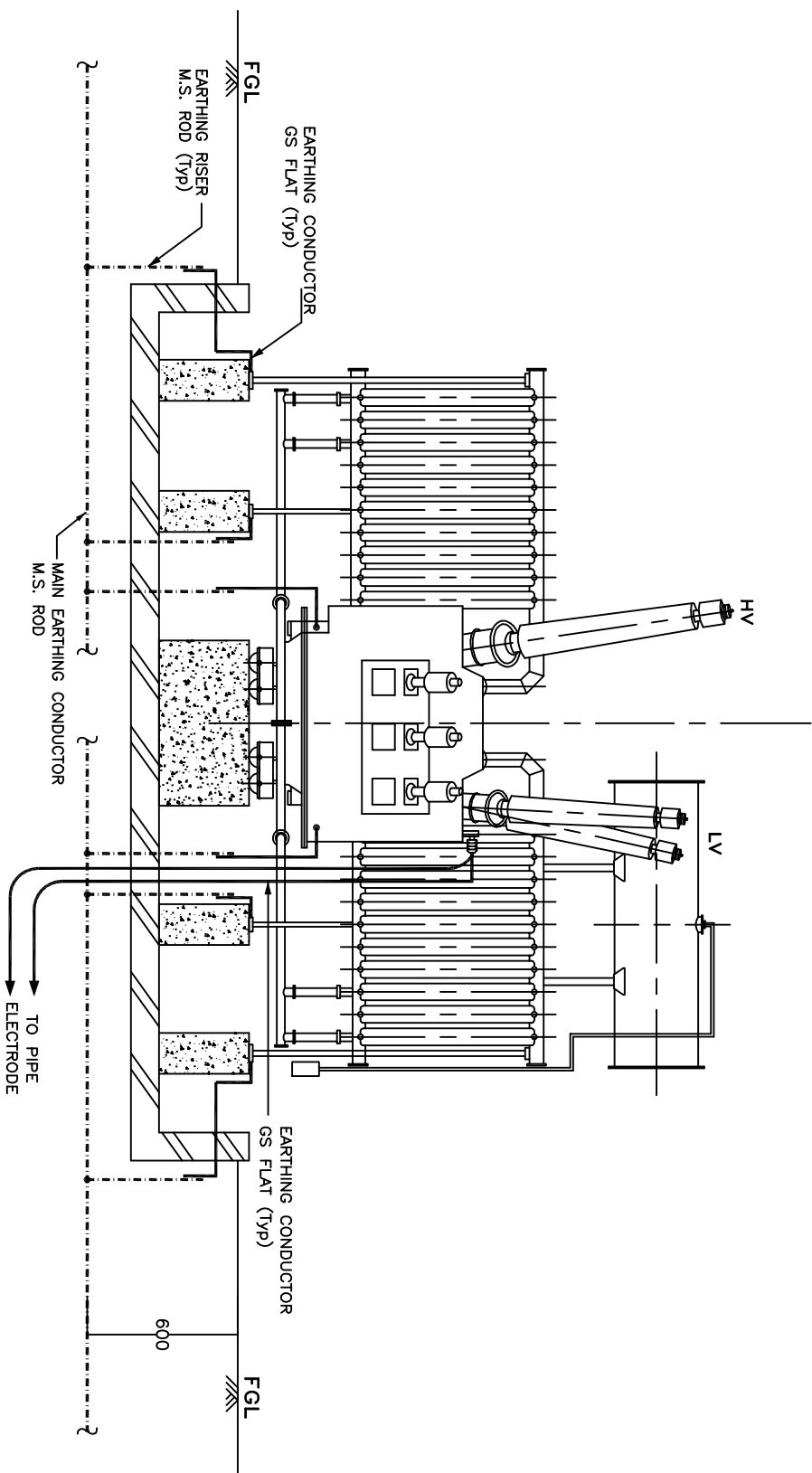


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

2008/2009	2008/2009	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS	Rev. 00
CKD BY	PRPD BY	Date	SHEET # 7	

EARTHING OF TRANSFORMER / REACTOR




LEGEND

- 40mm ϕ MS ROD
- 75 x 12 mm GS FLAT
- 50 x 6 mm GS FLAT

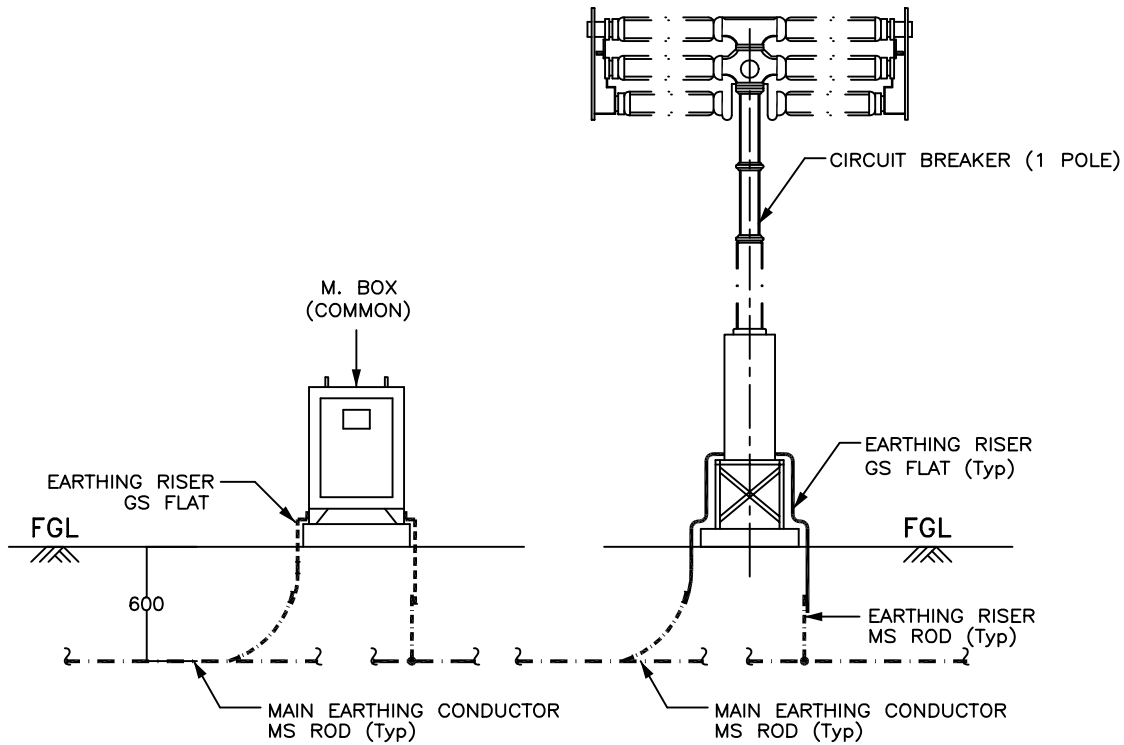
END VIEW

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PROJECT :- STANDARD	

TITLE:- STANDARD EARTHING DETAILS			
CKD BY	PRPD BY	Date	Drawing No.: C/ENG/STD/EARTHINGS SHEET # 8
20/08/2008	26/08/2008	27/3/2008	Rev. 00

EARTHING OF CIRCUIT BREAKER



ELEVATION

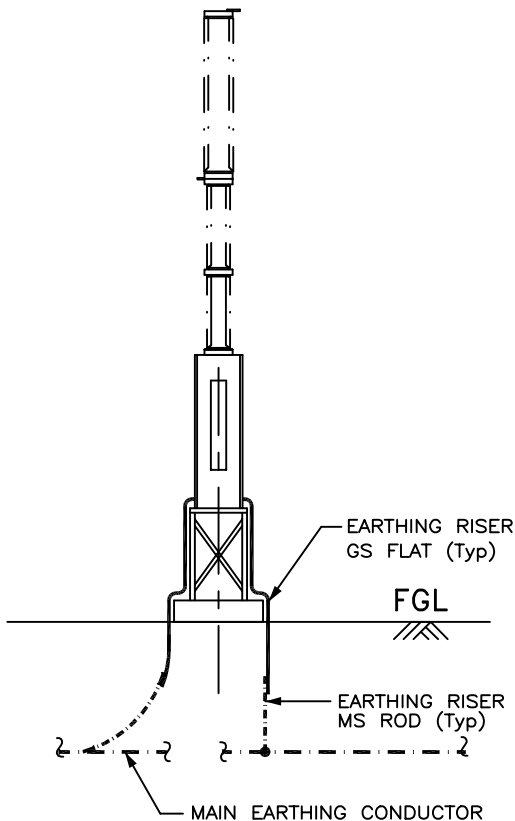
NOTES :-

1. No. OF RISERS FOR CIRCUIT BREAKER = 2 Nos. / PHASE
1. No. OF RISERS FOR LADDER (IF Applicable) = 2 Nos.
2. No. OF RISERS FOR MAR. BOX = 2 Nos.
3. CLEAT CLAMP SHALL BE PROVIDED AT 1000mm INTERVAL.

LEGEND

	40mm ϕ MS ROD
	75 x 12 mm GS FLAT
	50 x 6 mm GS FLAT

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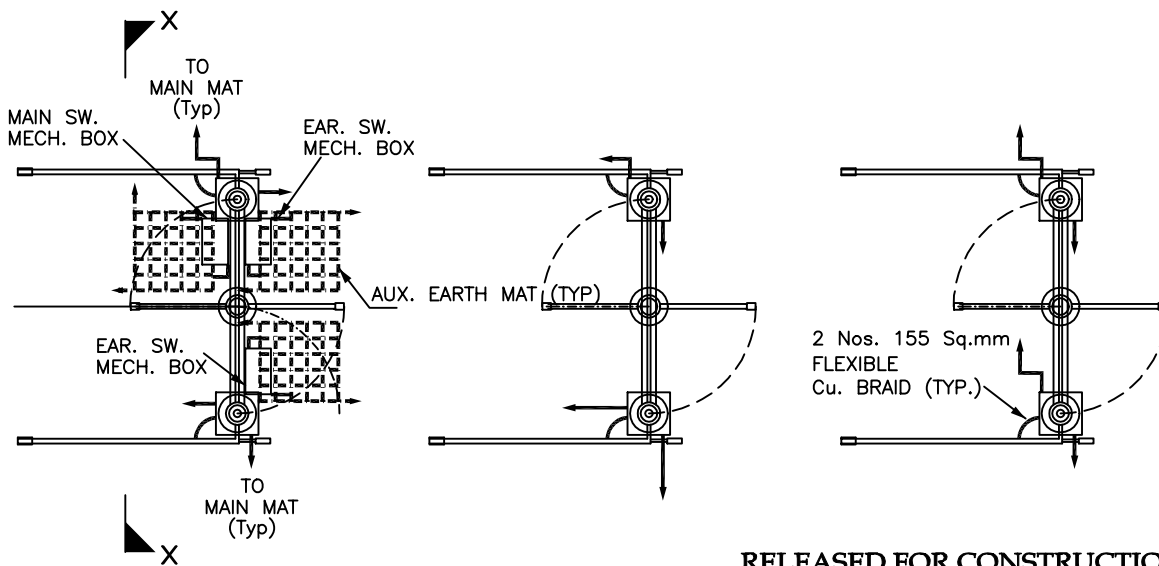
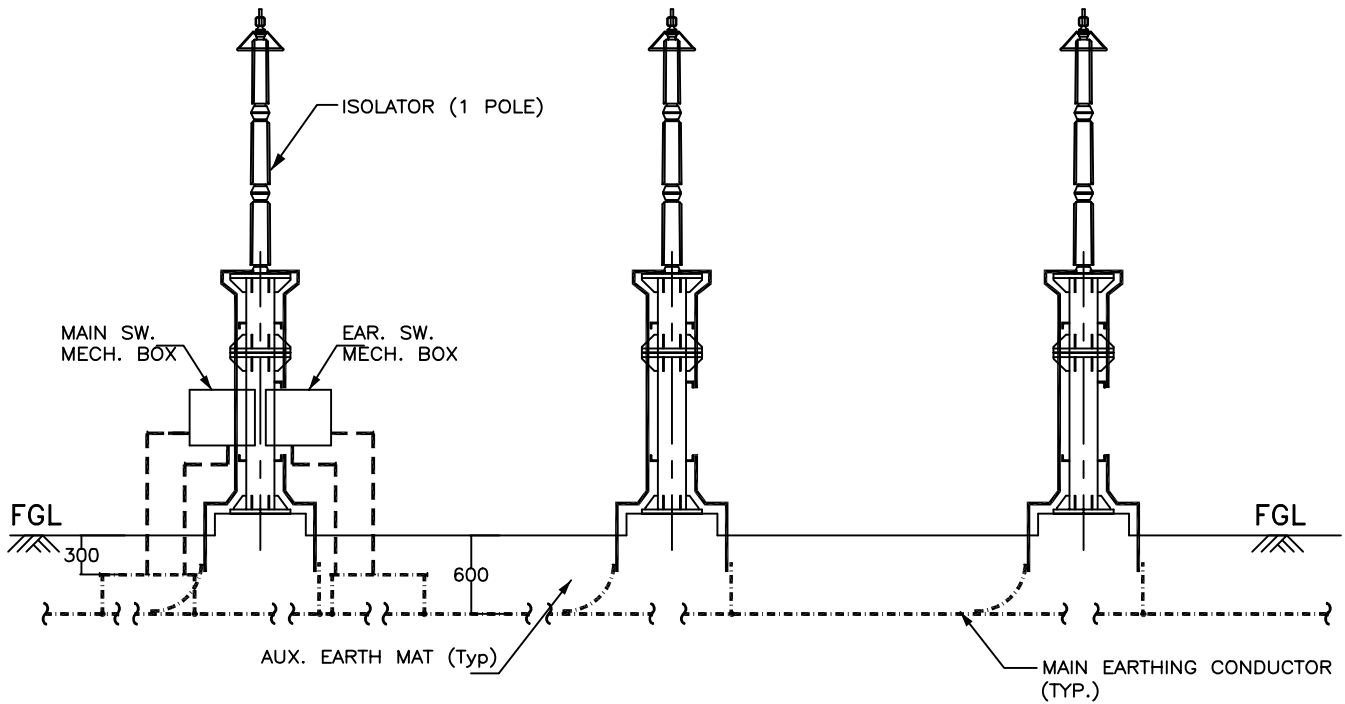


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>KKP</i>	<i>KKP</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS	Rev.
CKD BY	PRPD BY	Date	SHEET # 9	00

EARTHING OF ISOLATOR



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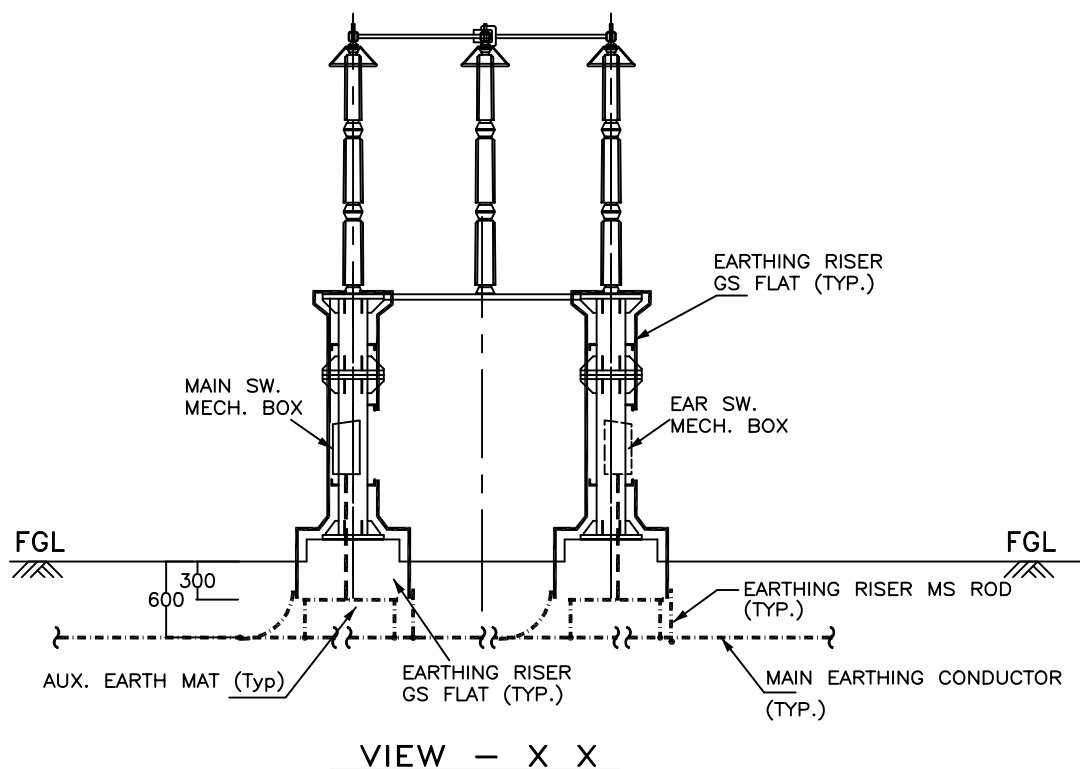


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>HKPankar</i>	<i>HKPankar</i>	27/3/2008	Drawing No.:	Rev.
CKD BY	PRPD BY	Date	C/ENG/STD/EARTHINGS SHEET # 10	00

EARTHING OF ISOLATOR (1 PH)



LEGEND

	40mm \varnothing MS ROD
	75 x 12 mm GS FLAT
	50 x 6 mm GS FLAT

NOTES :-

1. No. OF RISERS FOR ISOLATOR = 4 Nos. / PHASE.
2. No. OF RISERS FOR MAIN MECH. BOX = 2 Nos.
3. No. OF RISERS FOR EARTH SW. MECH. BOX = 2 Nos. / BOX.
4. No. OF AUXILIARY EARTH MAT = 1 Nos. FOR EACH MB
5. CLEAT CLAMP SHALL BE PROVIDED AT 1000mm INTERVAL.
6. NO. OF AUX. EARTHMAT IS INDICATIVE ONLY. IT SHALL BE EXECUTED AS PER ACTUAL NUMBER/POSITION OF EARTH SWITCHES.

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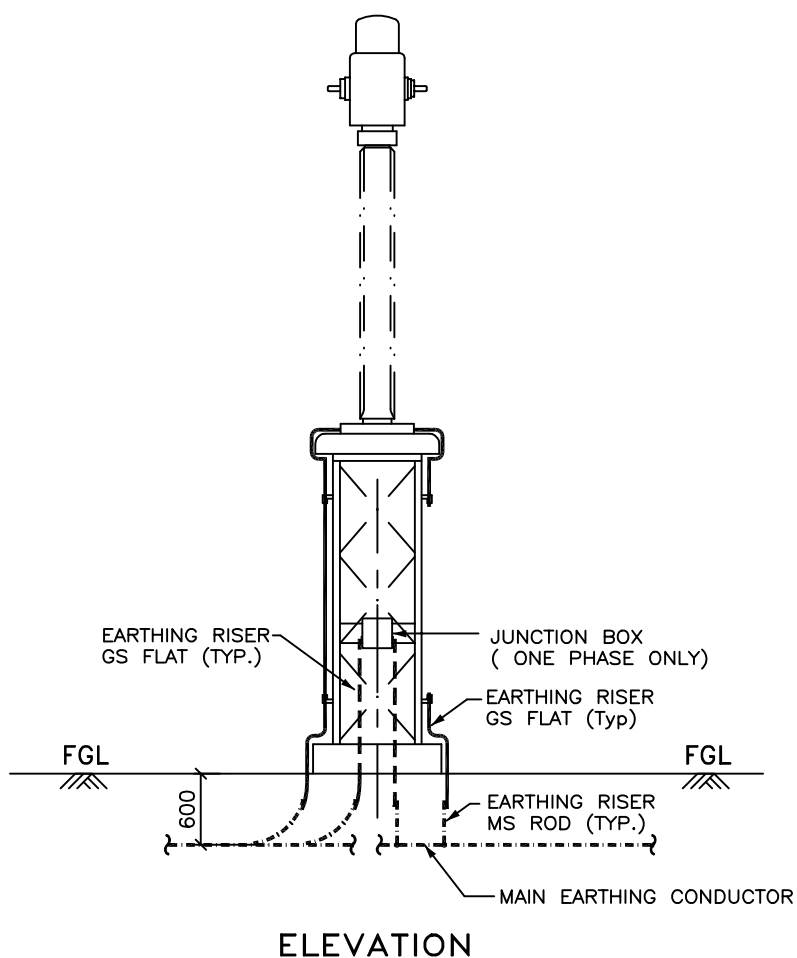


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>HNK Panhar</i>	<i>HNK Panhar</i>	27/3/2008	Drawing No.:	Rev.
CKD BY	PRPD BY	Date	C/ENG/STD/EARTHINGS SHEET # 11	00

EARTHING OF CURRENT TRANSFORMER (1 PH)




LEGEND

— · — · —	40mm ϕ MS ROD
————	75 x 12 mm GS FLAT
-----	50 x 6 mm GS FLAT

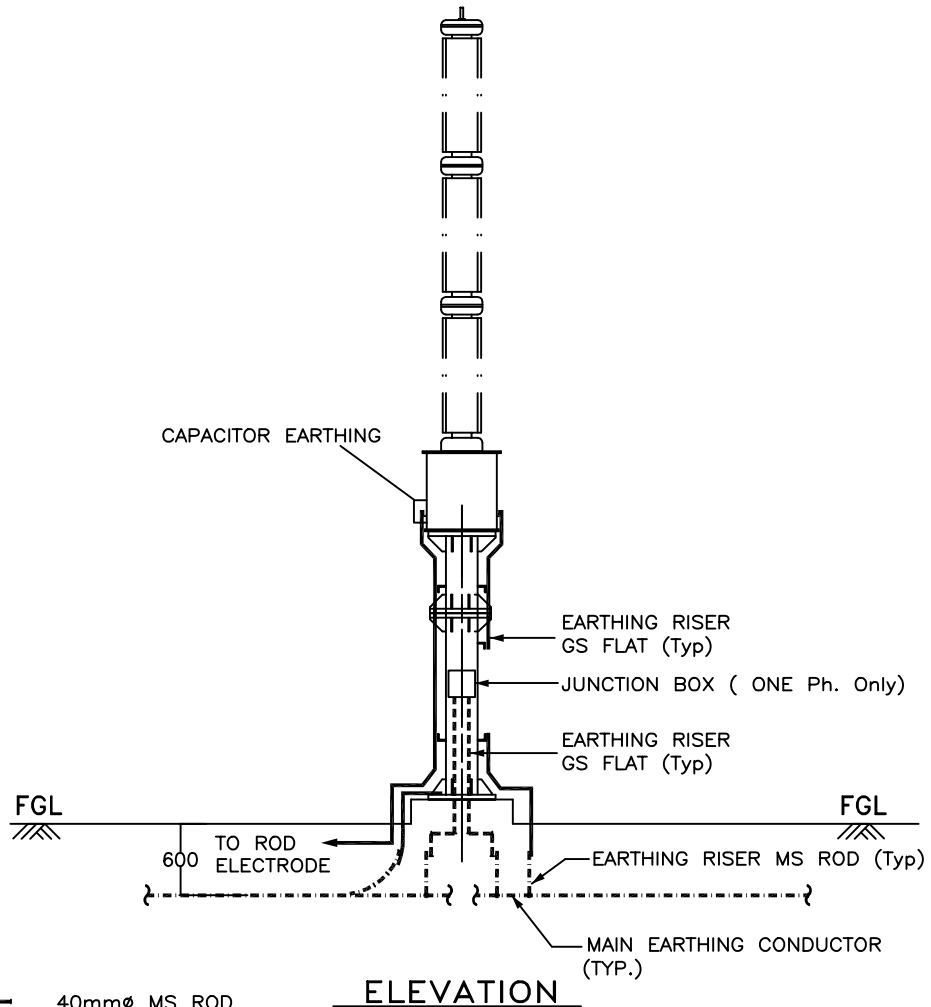
NOTES :-

1. No. OF RISERS = 2 Nos. / PHASE.
2. No. OF RISERS FOR JUN. BOX = 2 Nos.
3. CLEAT CLAMP SHALL BE PROVIDED AT 1000mm INTERVAL.

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<div>POWER GRID CORPORATION OF INDIA LIMITED (A Government of India Enterprise)</div>			<div> पावरग्रिड</div>	
PROJECT :- STANDARD				
TITLE:- STANDARD EARTHING DETAILS				
<i>SKP</i> Parthar	<i>SKP</i> Parthar	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS SHEET # 12	Rev. 00
CKD BY	PRPD BY	Date		

EARTHING OF CAPACITIVE VOLTAGE TRANSFORMER (1 PH)



LEGEND

- · — · — · — 40mm ϕ MS ROD
- 75 x 12 mm GS FLAT
- 50 x 6 mm GS FLAT

NOTES :-

1. No. OF RISERS = 3 Nos. / PHASE.
2. No. OF RISERS FOR J. BOX = 2 Nos.
3. No. OF ROD ELECTRODE REQUIRED = 1 No. / PHASE.
4. CLEAT CLAMP SHALL BE PROVIDED AT 1000mm INTERVAL.

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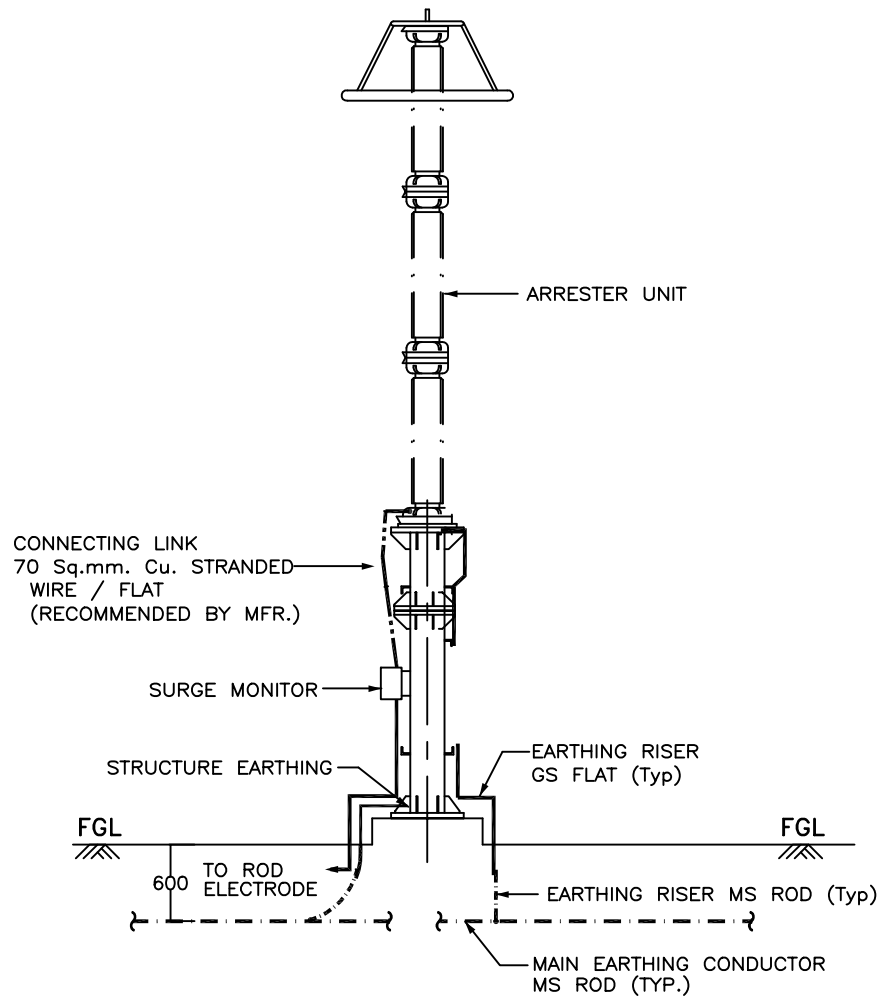


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>KKPankar</i>	<i>KKPankar</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS SHEET # 13	Rev. 00
CKD BY	PRPD BY	Date		

EARTHING OF SURGE ARRESTER (1PH)



ELEVATION

LEGEND

— · — · — 40mm ϕ MS ROD

———— 75 x 12 mm GS FLAT

NOTES :-

- 1 . No. OF RISERS = 3 Nos. / PHASE.
- 2 . No. OF ROD ELECTRODE REQUIRED = 1 No. / PHASE.
- 3 . CLEAT CLAMP SHALL BE PROVIDED AT 1000mm INTERVAL.

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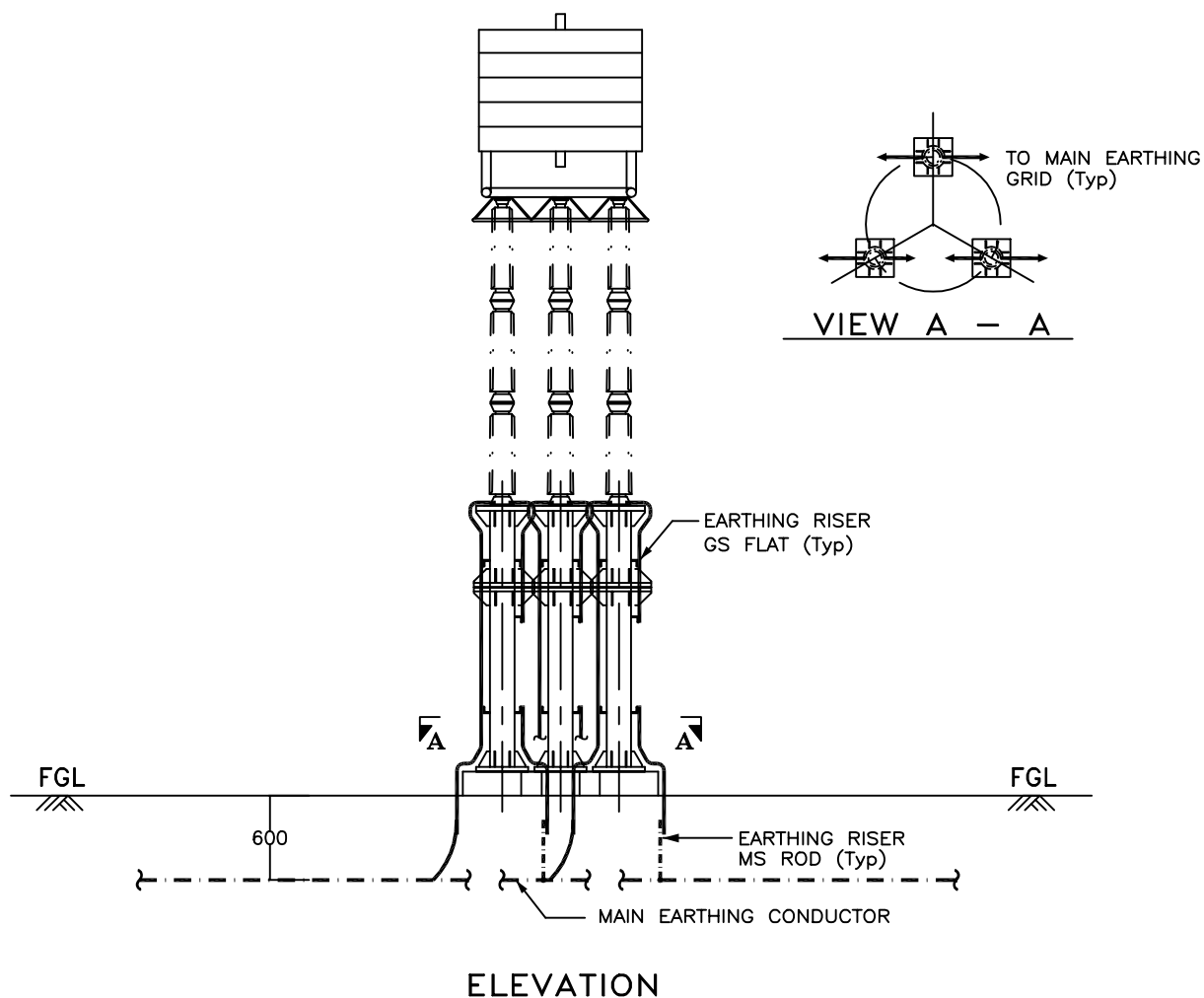


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>CKD</i>	<i>PRPD</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS SHEET # 14	Rev. 00
CKD BY	PRPD BY	Date		

EARTHING OF WAVE TRAP (1PH)



LEGEND

- · — · — · — 40mm ϕ MS ROD
————— 75 x 12 mm GS FLAT

NOTE :-

1. No. OF RISERS = 6 Nos. / PHASE.
2. CLEAT CLAMP SHALL BE PROVIDED AT 1000mm INTERVAL.

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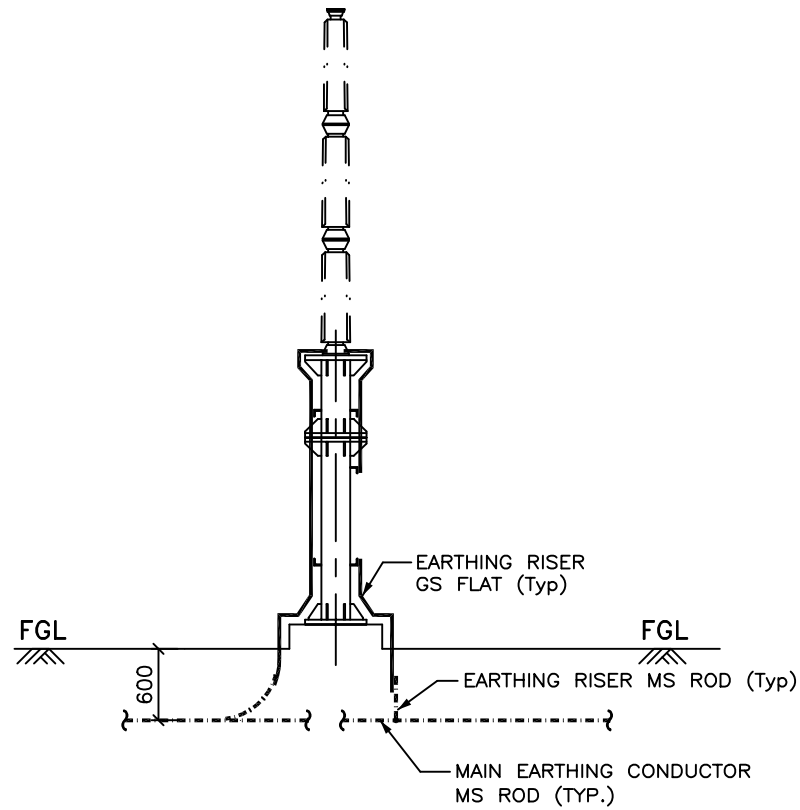


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>JN Parkar</i>	<i>JN Parkar</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS SHEET # 15	Rev. 00
CKD BY	PRPD BY	Date		

EARTHING OF POST INSULATOR (1PH)



ELEVATION

LEGEND

	40mm ϕ MS ROD
	75 x 12 mm GS FLAT

NOTES :-

1. No. OF RISERS = 2 Nos. / PHASE.
2. CLEAT CLAMP SHALL BE PROVIDED AT 1000mm INTERVAL.

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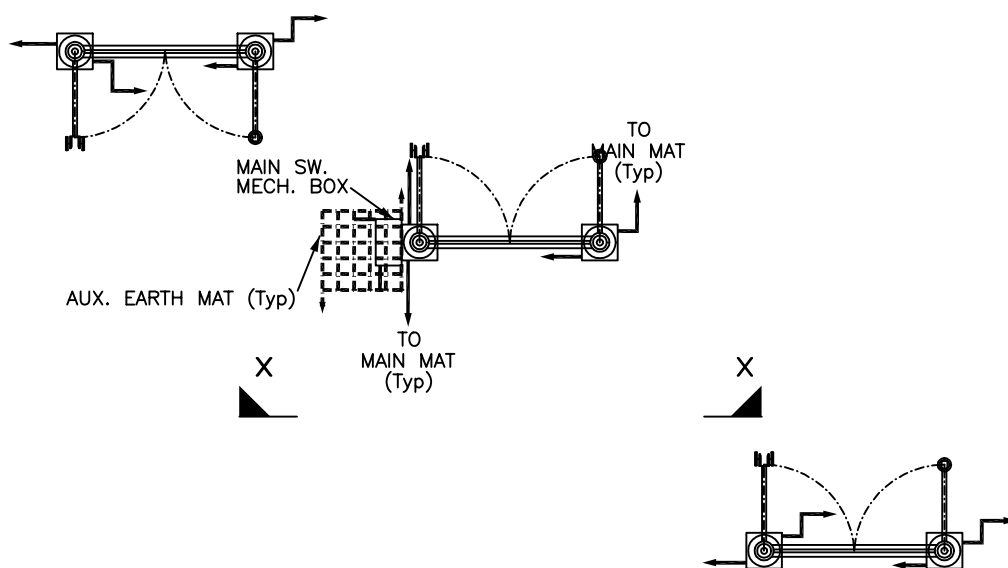
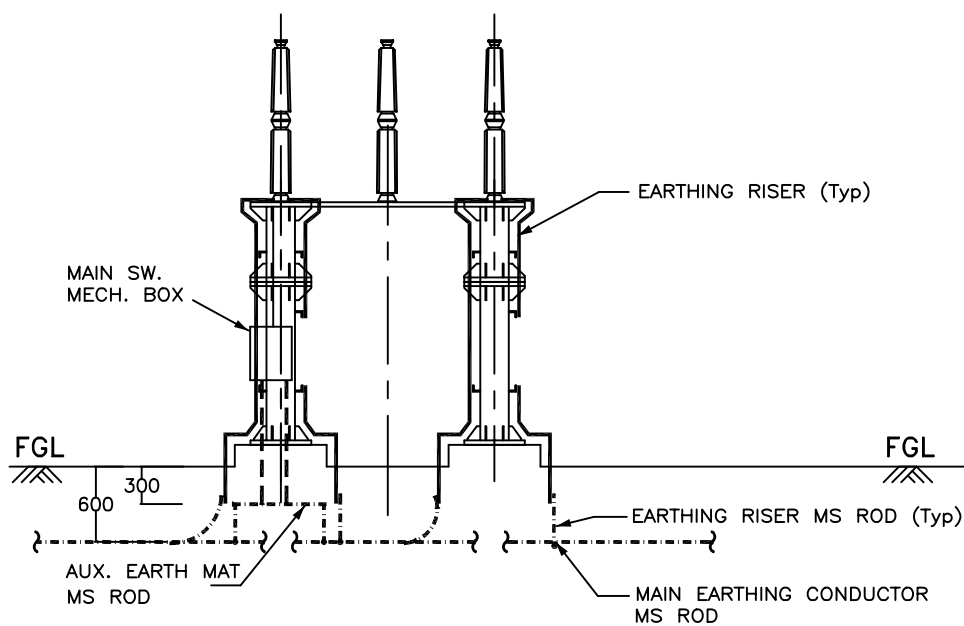


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>SK Parthar</i>	<i>SK Parthar</i>	27/3/2008	Drawing No.:	Rev.
CKD BY	PRPD BY	Date	C/ENG/STD/EARTHINGS SHEET # 16	00

TANDEM ISOLATOR



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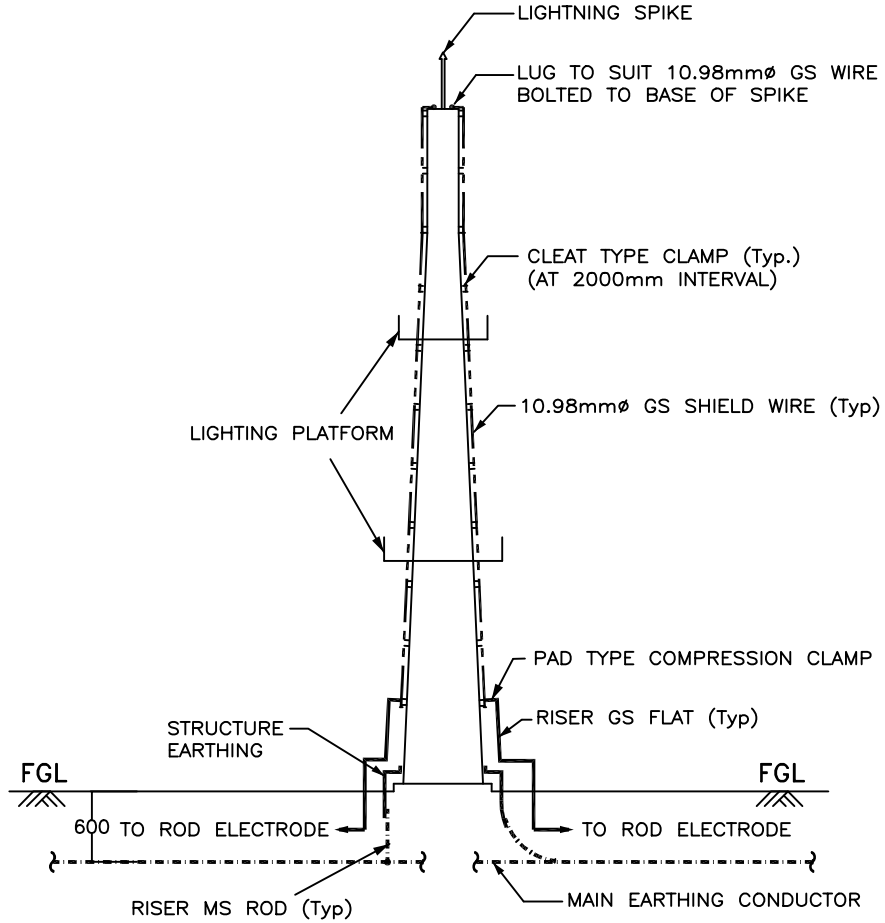


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>JKP/Perkar</i>	<i>JKP/Perkar</i>	27/3/2008	Drawing No.:	Rev. 00
CKD BY	PRPD BY	Date	C/ENG/STD/EARTHING SHEET # 17	

EARTHING OF LIGHTNING MAST



NOTES :-

1. No. OF RISERS = 4 Nos.
2. No. OF ROD ELECTRODE REQUIRED = 2 Nos.
3. No. OF PAD TYPE CLAMP = 2 Nos.

LEGEND

- · — · — · — 40mm ϕ MS ROD
- 75 x 12 mm GS FLAT

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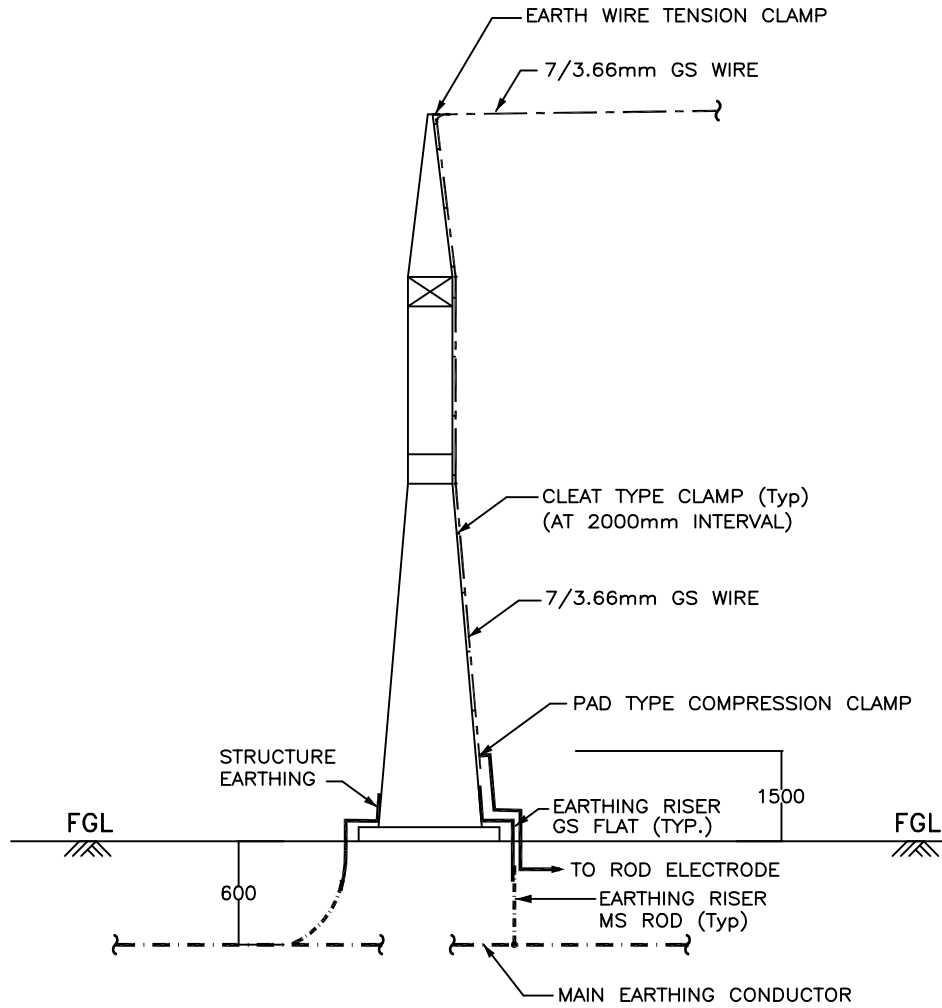


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>HN Parkar</i>	<i>HN Parkar</i>	27/3/2008	Drawing No.:	Rev.
CKD BY	PRPD BY	Date	C/ENG/STD/EARTHINGS	00
			SHEET # 18	

EARTHING OF TOWER WITH PEAK



ELEVATION

NOTES :-

1. No. OF RISERS = 3 Nos.
2. No. OF ROD ELECTRODE REQUIRED = 1 No.
3. No. OF PAD TYPE CLAMP = 1 No.

LEGEND

- 40mm ϕ MS ROD
 75 x 12 mm GS FLAT

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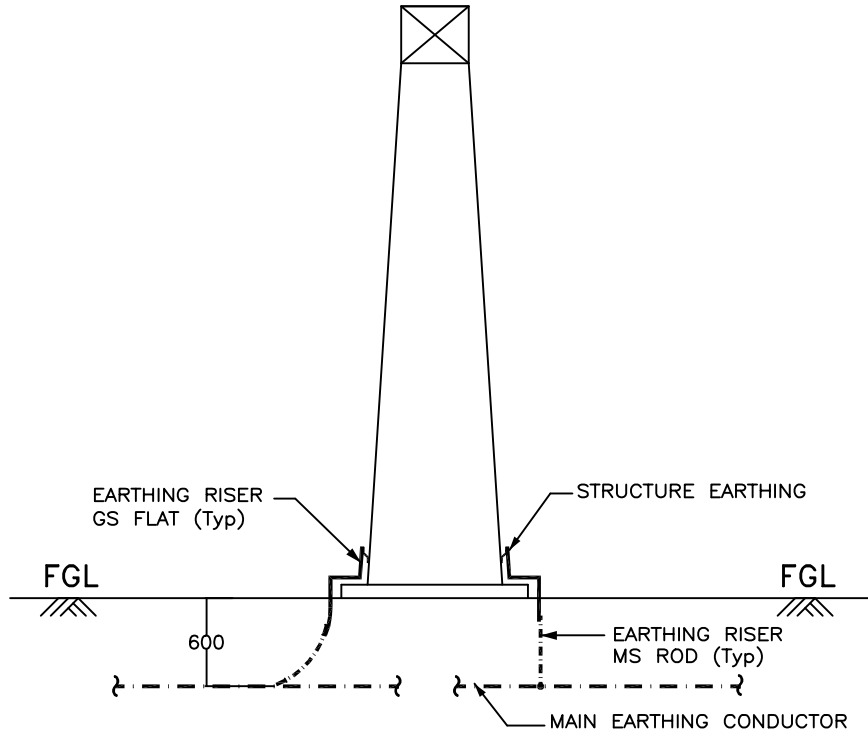


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>CKD</i>	<i>PRPD</i>	27/3/2008	Drawing No.:	Rev.
CKD BY	PRPD BY	Date	C/ENG/STD/EARTHINGS SHEET # 19	00

EARTHING OF TOWER WITHOUT PEAK



ELEVATION

LEGEND

- · — · — 40mm ϕ MS ROD
—— 75 x 12 mm GS FLAT

NOTES :-

1. No. OF RISERS = 2 Nos.

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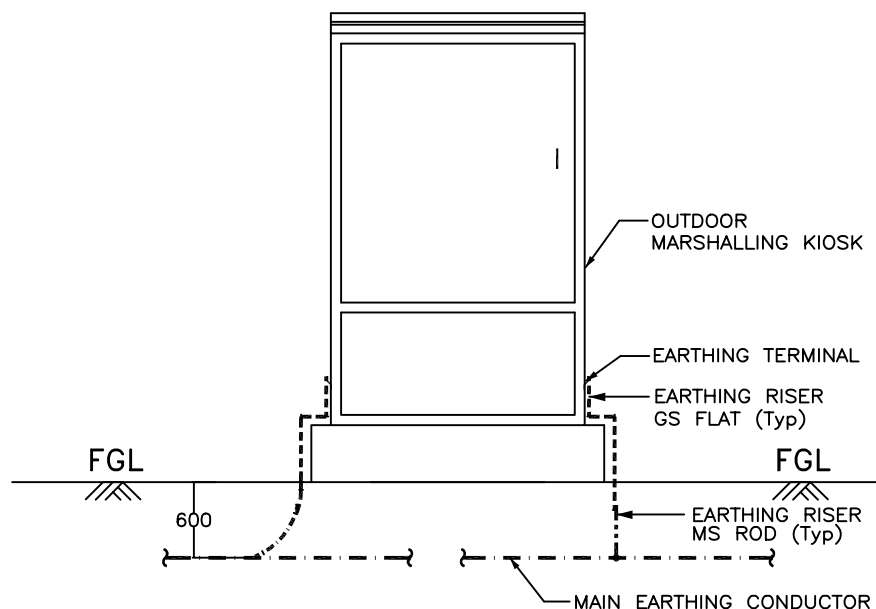


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>KKPurkar</i>	<i>KKPurkar</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS SHEET # 20	Rev. 00
CKD BY	PRPD BY	Date		

EARTHING OF BAY MARSHALLING BOX



ELEVATION

LEGEND

— · — · — · —	40mm \varnothing MS ROD
—————	75 x 12 mm GS FLAT
-----	50 x 6 mm GS FLAT

NOTE :-

1. No. OF RISERS = 2 Nos.

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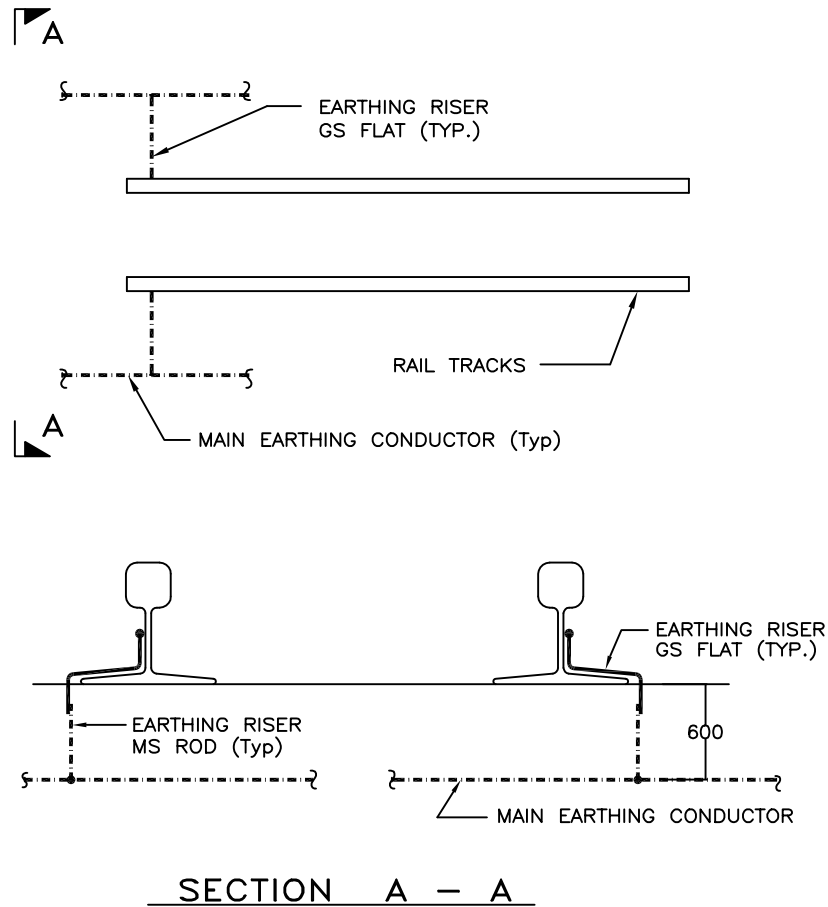


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>SKP</i>	<i>SKP</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS	Rev.
CKD BY	PRPD BY	Date	SHEET # 21	00

EARTHING OF RAIL TRACK



LEGEND

	40mm ϕ MS ROD
	75 x 12 mm GS FLAT

NOTES :-

1. EACH RAIL SHALL BE EARTHED AT 30M INTERVAL AND ALSO AT BOTH ENDS.

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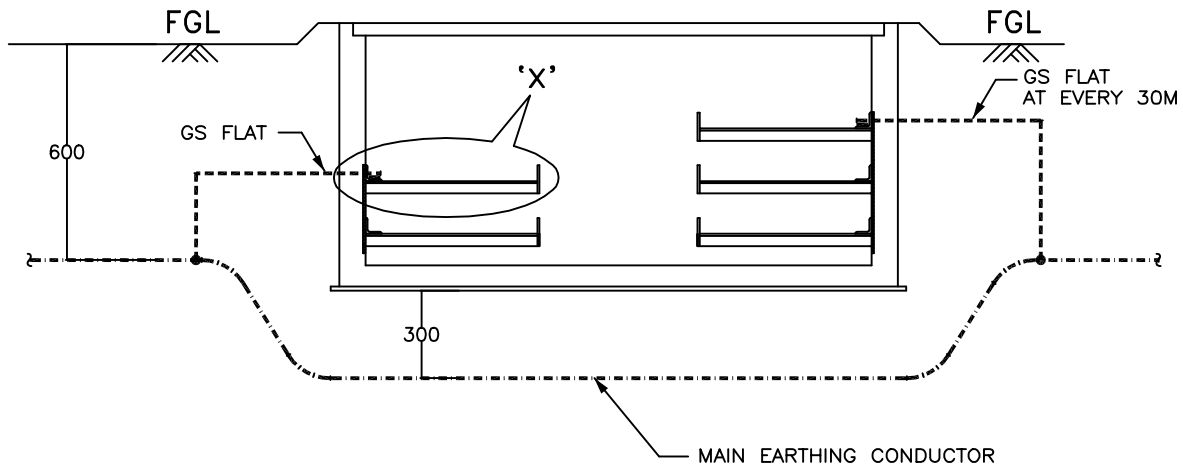


PROJECT :- STANDARD

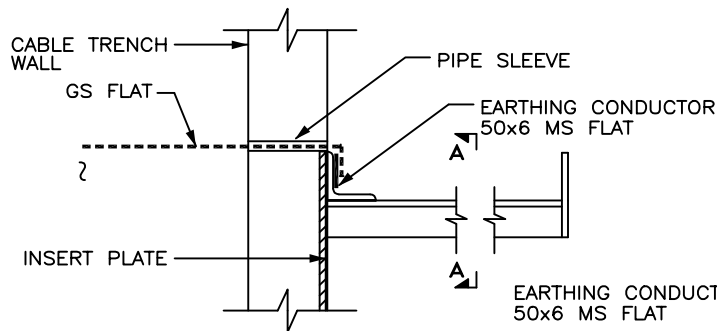
TITLE:- STANDARD EARTHING DETAILS

<i>HN Parkar</i>	<i>HN Parkar</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS	Rev.
CKD BY	PRPD BY	Date	SHEET # 22	00

EARTHING OF CABLE TRENCH



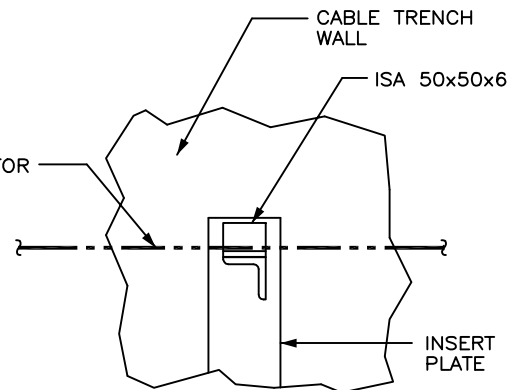
TYPICAL CROSS SECTION OF CABLE TRENCH



DETAIL - X

NOTES :-

1. MS FLAT SHALL RUN ON TOP TIER ALL ALONG THE CABLE TRENCHES & WELDED TO EACH OF THE RACKS.
2. MS FLAT SHALL BE EARTHED AT 30M INTERVAL AND ALSO AT BOTH ENDS.



SECTION A - A

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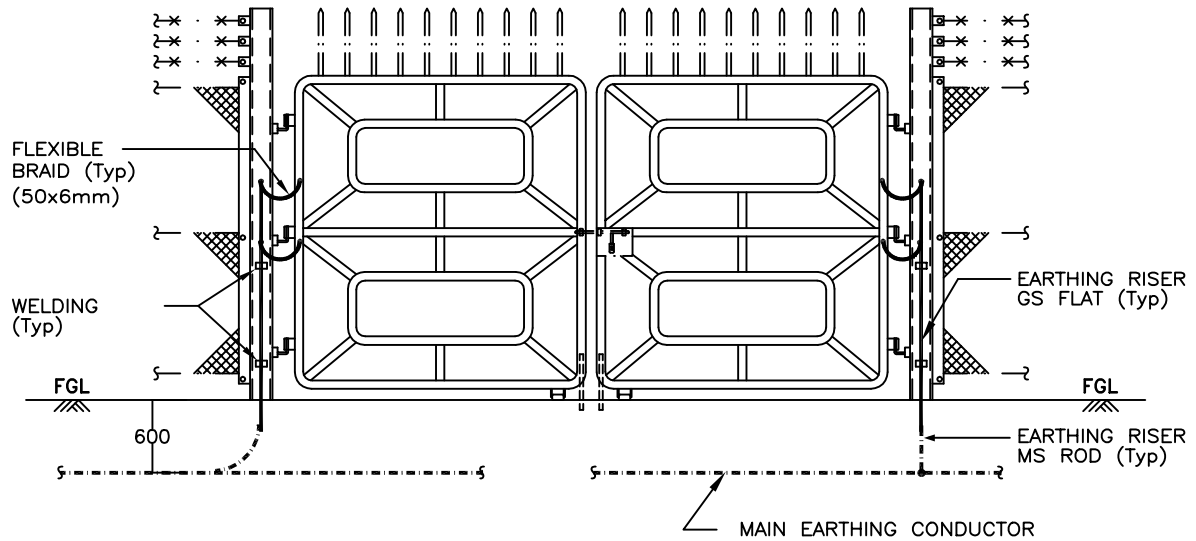


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>KKPankar</i>	<i>KKPankar</i>	27/3/2008	Drawing No.:	Rev.
CKD BY	PRPD BY	Date	C/ENG/STD/EARTHINGS	00
			SHEET # 23	

EARTHING OF GATES & FENCE



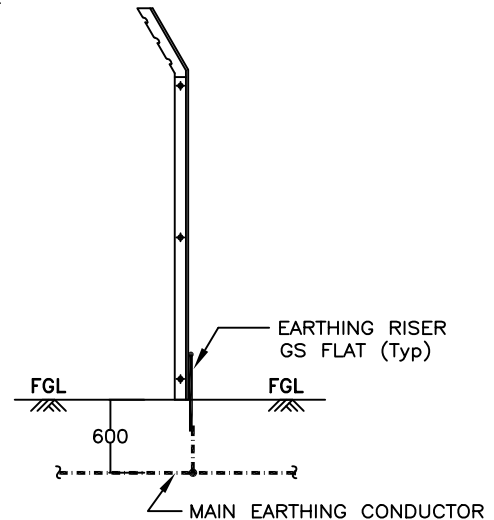
MAIN GATE

LEGEND

	40mm \varnothing MS ROD
	75 x 12 mm GS FLAT
	50 x 6 mm MS FLAT

NOTES :-

	FENCE POST	MAIN GATE
1 . No. OF RISERS REQUIRED	1	2
2 . No. OF FLEXIBLE BRAID	—	4
3. ALL GATES SHALL BE CONNECTED TO EARTHING GRID.		
4. EVERY ALTERNATE FENCE SHALL BE CONNECTED TO EARTHING GRID.		



FENCE POST (ALTERNATE FENCE POST)

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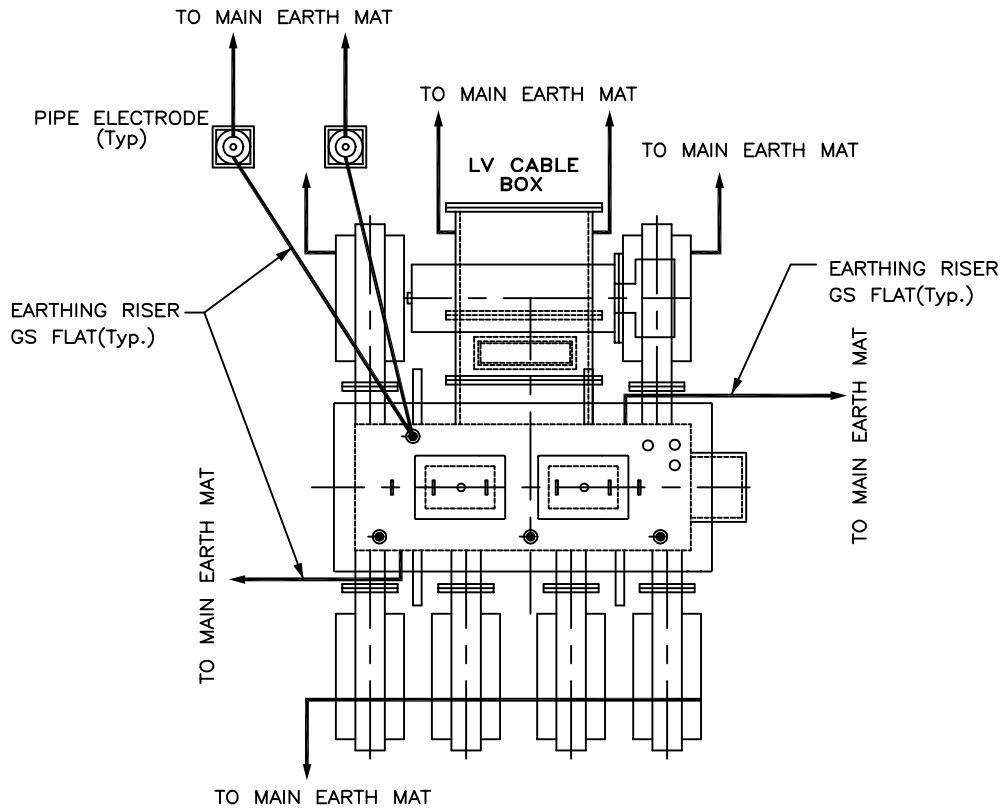


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>CKD</i>	<i>PRPD</i>	27/3/2008	Drawing No.:	Rev.
CKD BY	PRPD BY	Date	C/ENG/STD/EARTHINGS	00
			SHEET # 24	

EARTHING OF LT TRANSFORMER



PLAN

LEGEND

— · — · — · —	40mm ϕ MS ROD
—————	75 x 12 mm GS FLAT
-----	50 x 6 mm GS FLAT

NOTES :-

1. No. OF RISERS FOR MAIN TANK & T.M. MAR. BOX = 4 Nos.
2. No. OF RISERS FOR LV CABLE BOX & RADIATOR = 4 Nos.
3. No. OF RISERS FOR PIPE ELECTRODE = 2 Nos.
4. No. OF PIPE ELECTRODES REQUIRED = 2 Nos.

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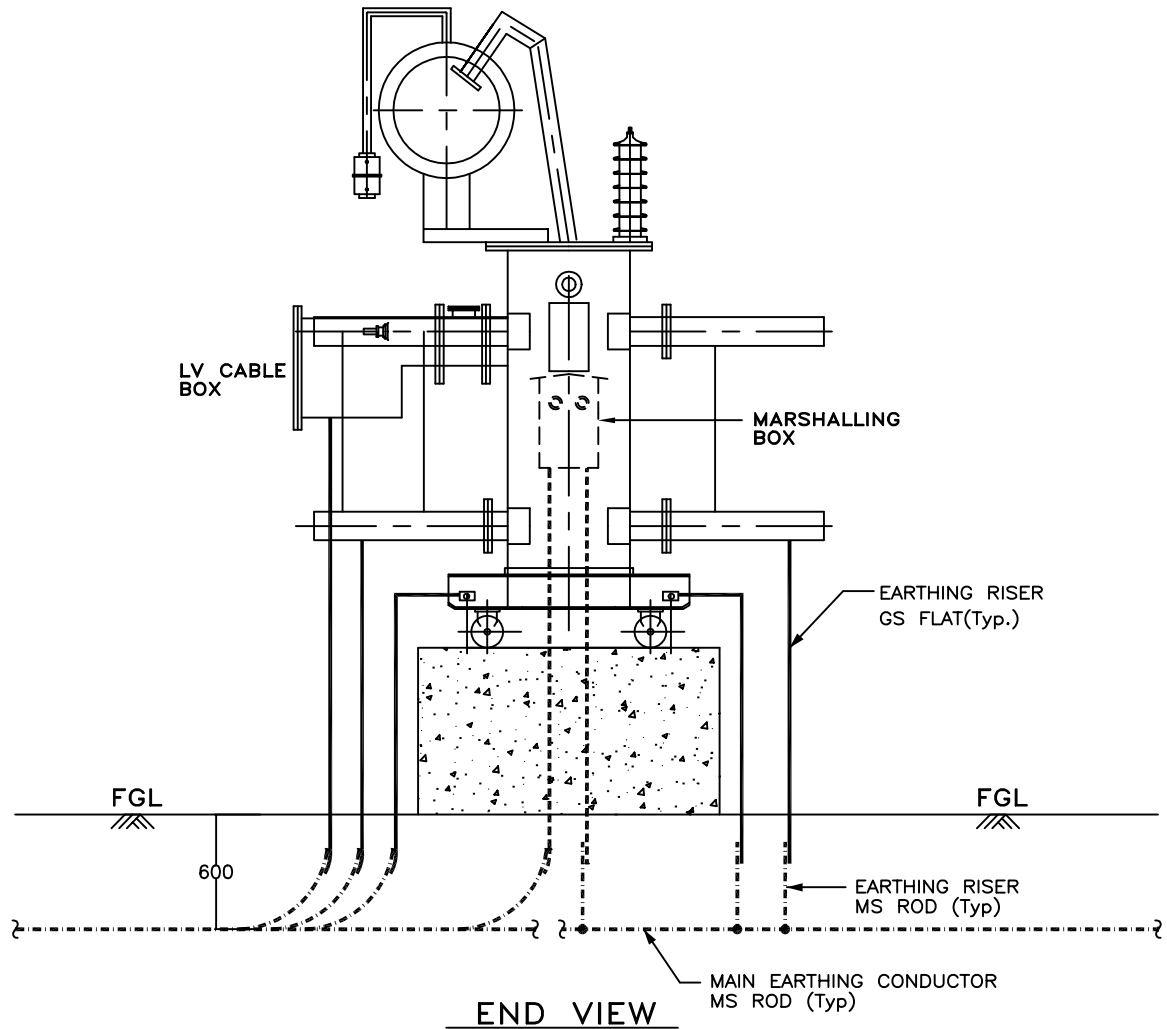


PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>SK Parhar</i>	<i>SK Parhar</i>	27/3/2008	Drawing No.:	Rev.
CKD BY	PRPD BY	Date	C/ENG/STD/EARTHINGS	00
			SHEET # 25	

EARTHING OF LT TRANSFORMER



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PROJECT :- STANDARD

TITLE:- STANDARD EARTHING DETAILS

<i>CKD</i>	<i>PRPD</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS	Rev.
CKD BY	PRPD BY	Date	SHEET # 26	00

EARTHING OF PYLON SUPPORTS

Pylon supports shall be grounded through 50x6mm GI flat to the ring around the Pylon supports of 75x12mm GI flat which in turn is connected to the main grid (40 mm dia MS rod) at 2 to 3 points as available.

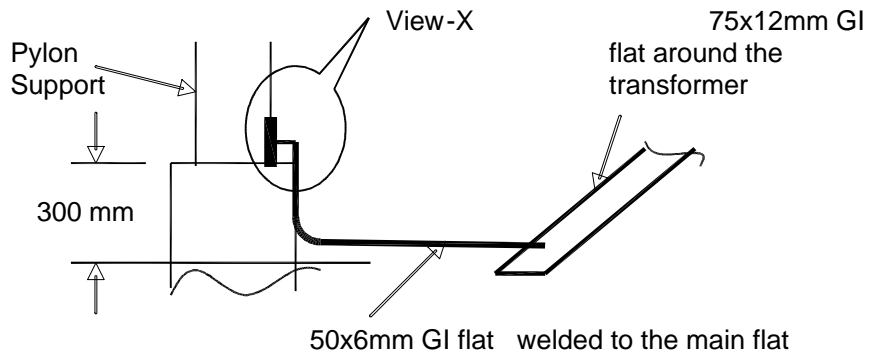


Fig.- Elevation (Earthing of Pylon Supports)

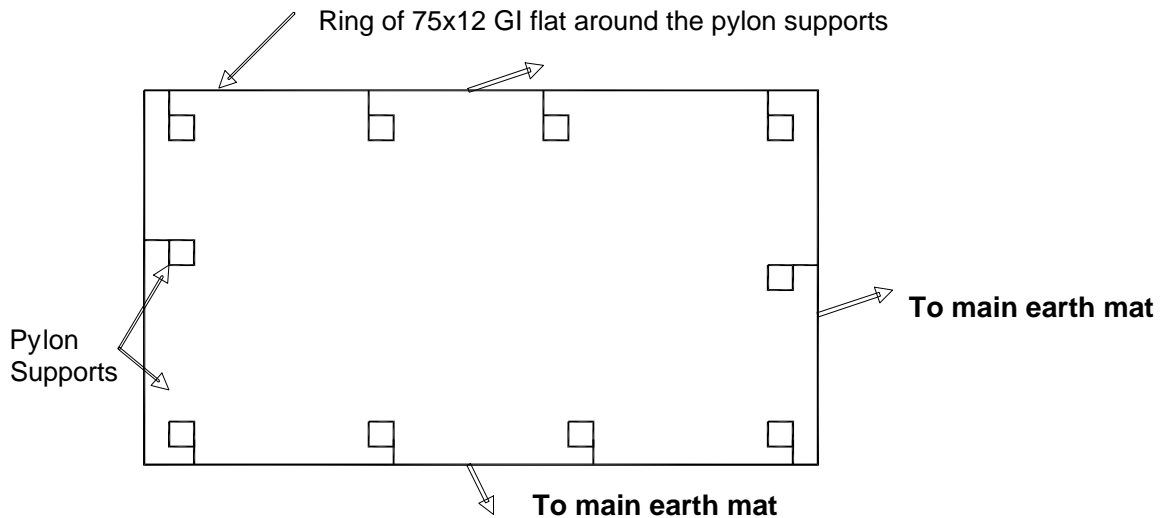



Fig.- Layout (Earthing of Pylon Supports)

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PROJECT :- STANDARD				
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<i>KK Parkar</i>	<i>KK Parkar</i>	27/3/2008	Drawing No.: C/ENG/STD/EARTHINGS SHEET # 27	Rev. 00
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EARTHING OF HYDRANT/ HVW SPRAY PIPING

These pipes shall be grounded at pump house through 50x6mm GI flat connected to the main flat, 75x12mm running around the room.

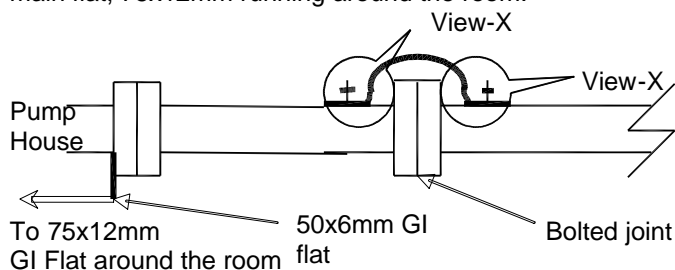


Fig.-Earthing of Hydrant / HVW Spray Piping

EARTHING OF HYDRANT POST/ HOSE BOX

A bolt shall be welded to these structures at the time of installation which can be used to connect them to the nearest riser or main 75x12mm GI flat through 50x6mm GI flat.

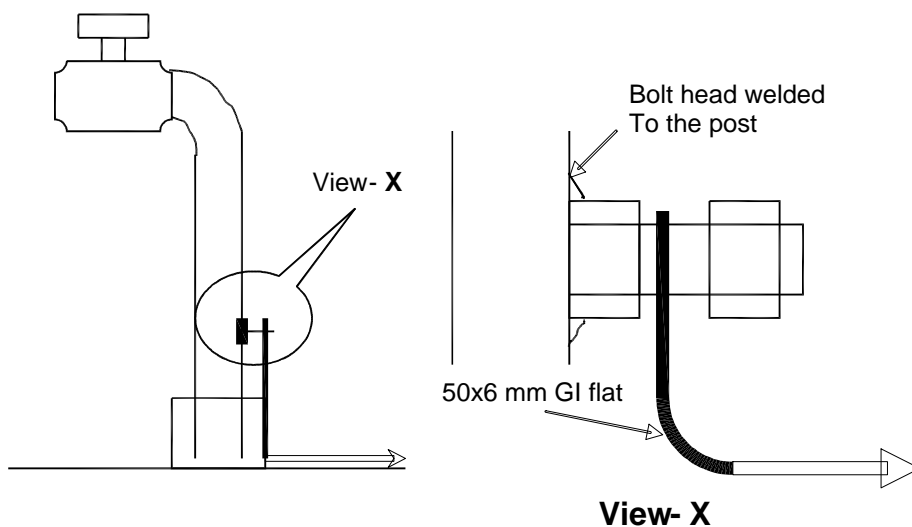


Fig.- Earthing of hydrant box / hose box

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