

GENERAL INSTRUCTION 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) electrode.
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 if the length is less than 6m .
7. All ground connections shall be made by electric arc welding. All welded joints shall be allowed to cool down gradually to atmospheric temperature before putting any load on it. Artificial cooling shall not be allowed.
8. All arc welding with MS ROD shall be done with low hydrogen content electrodes. the welds should be treated with red oxide primer and afterwards coated with two layers bitumen compound to prevent corrosion.
9. Wherever earthing conductor crosses cable trenches, underground service ducts, pipes, tunnels, railway tracks etc., it shall be laid minimum 300 mm below them and shall be circumvented in case it fouls with equipment/structure foundations.
10. Earthing conductor around the building shall be buried in earth at a minimum distance of 1500 mm from the outer boundary of the building.
11. Earthing conductors crossing the road shall be laid 300mm below road or at greater depth to suit the site conditions.
12. Earthing conductors embedded in the concrete shall have approximately 50mm concrete cover

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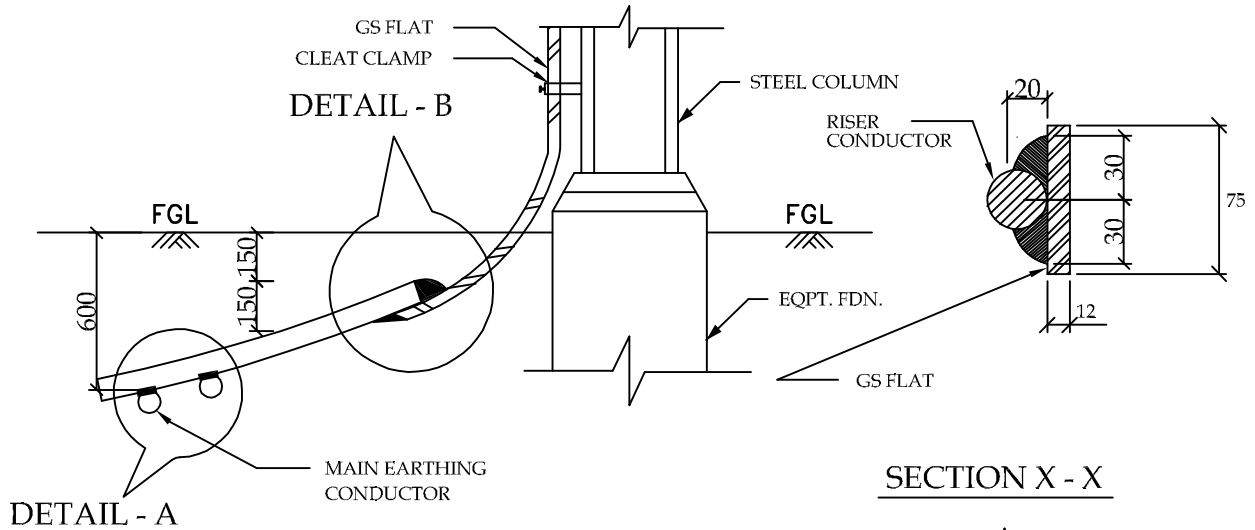
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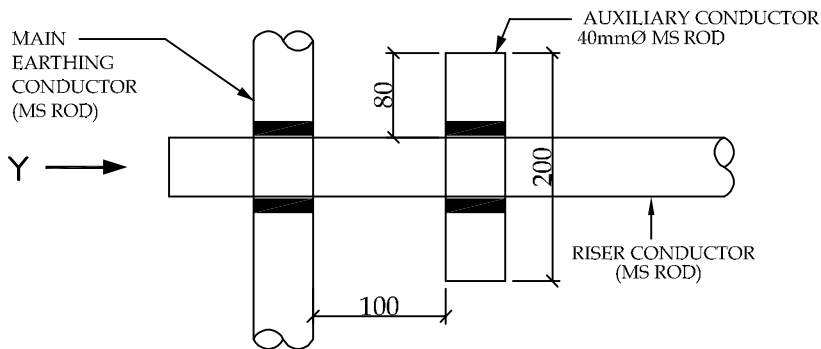
PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

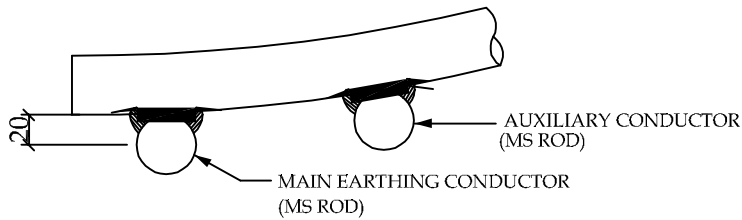
<i>KKParhar</i>	<i>KKParhar</i>	Dec-2013	Drawing No.: C/ENG/STD/EARTHINGS/09 SHEET # 1
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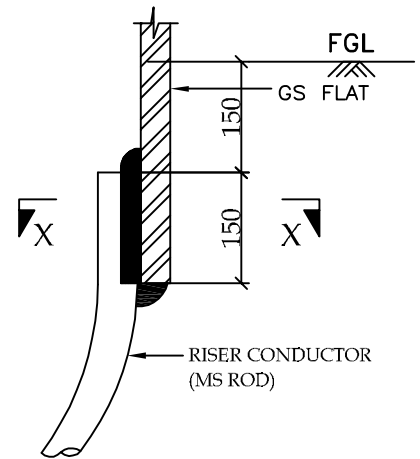
TYPICAL DETAILS OF RISER



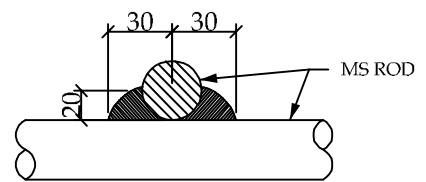
PLAN



ELEVATION
DETAIL - A



ELEVATION
DETAIL - B



VIEW - Y

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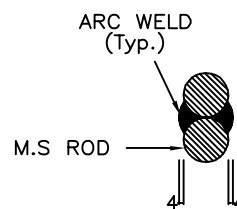
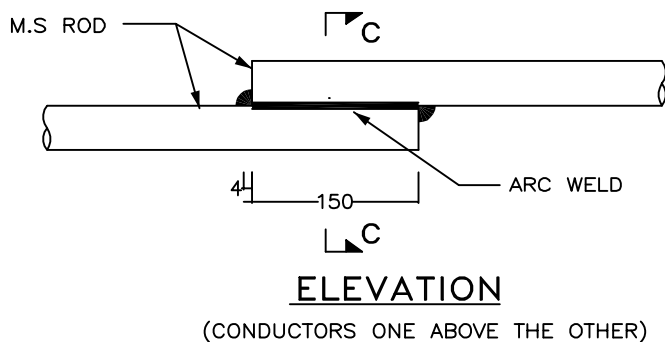
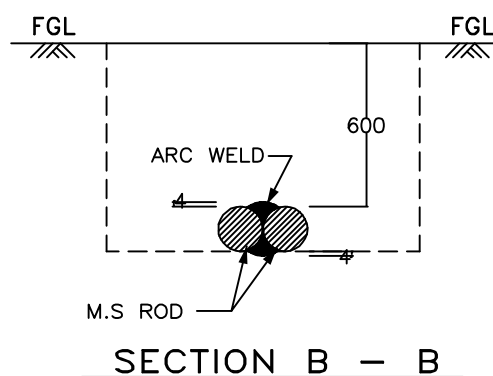
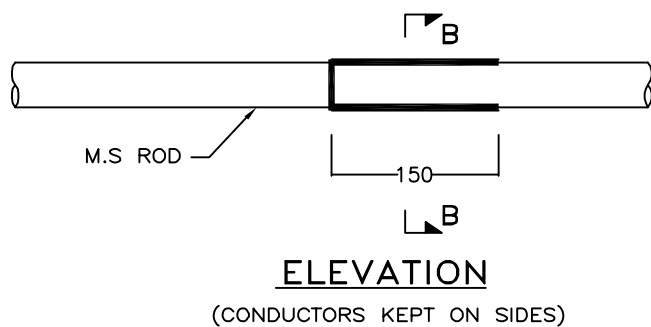
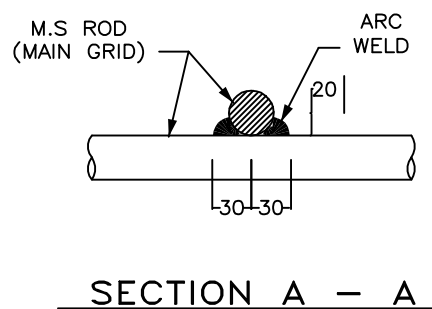
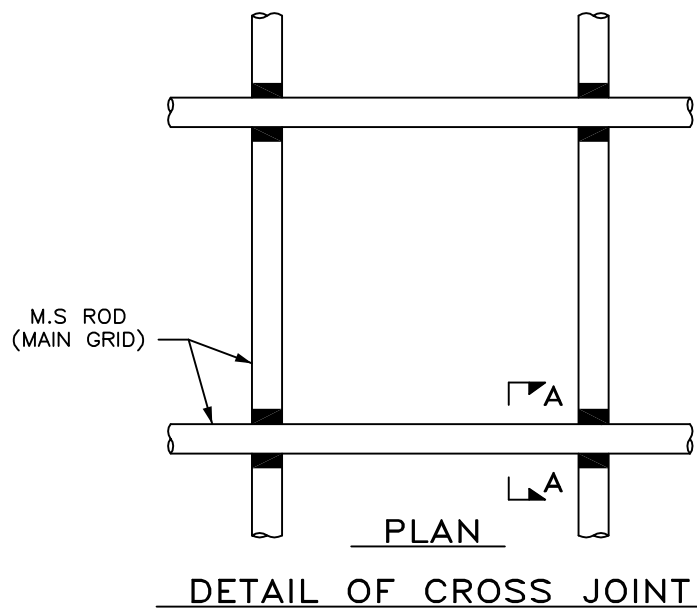
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SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

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DETAIL OF LAP JOINT

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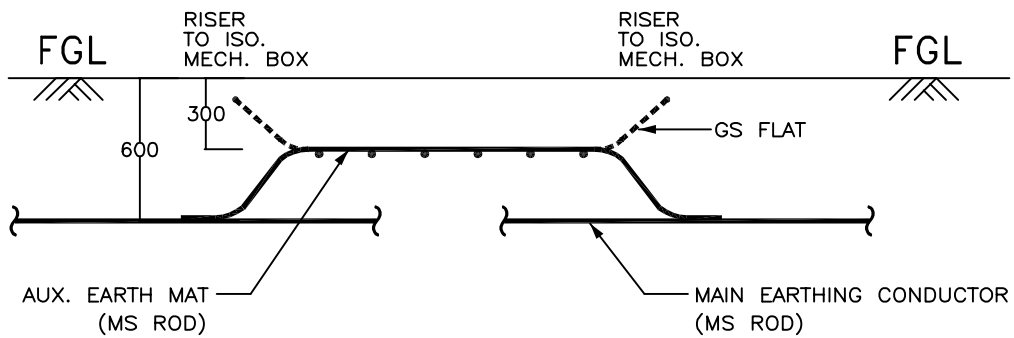
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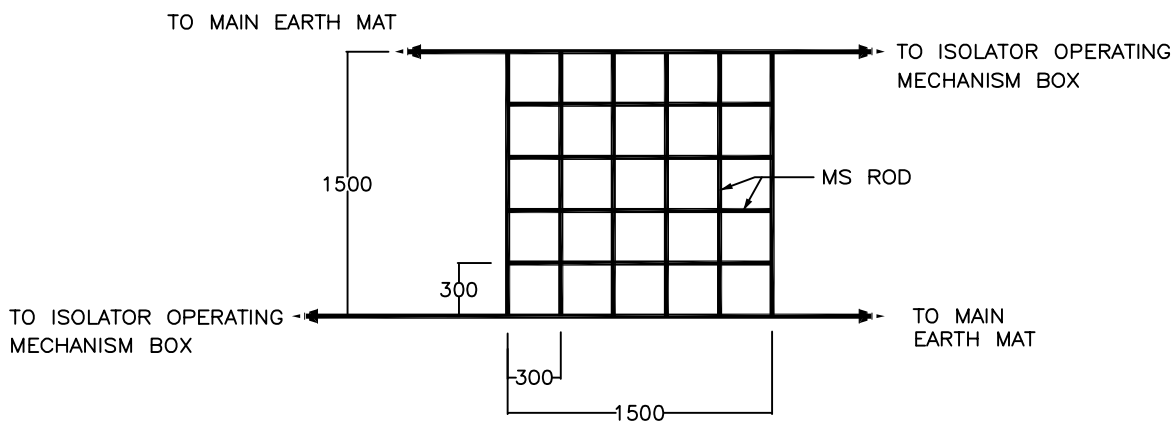
PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

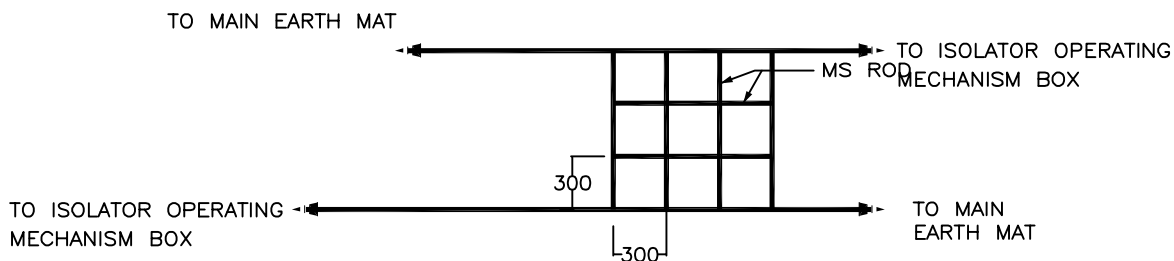
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ELEVATION



PLAN (For 220kV & above class isolators)



PLAN (For 132kV & below class isolators)

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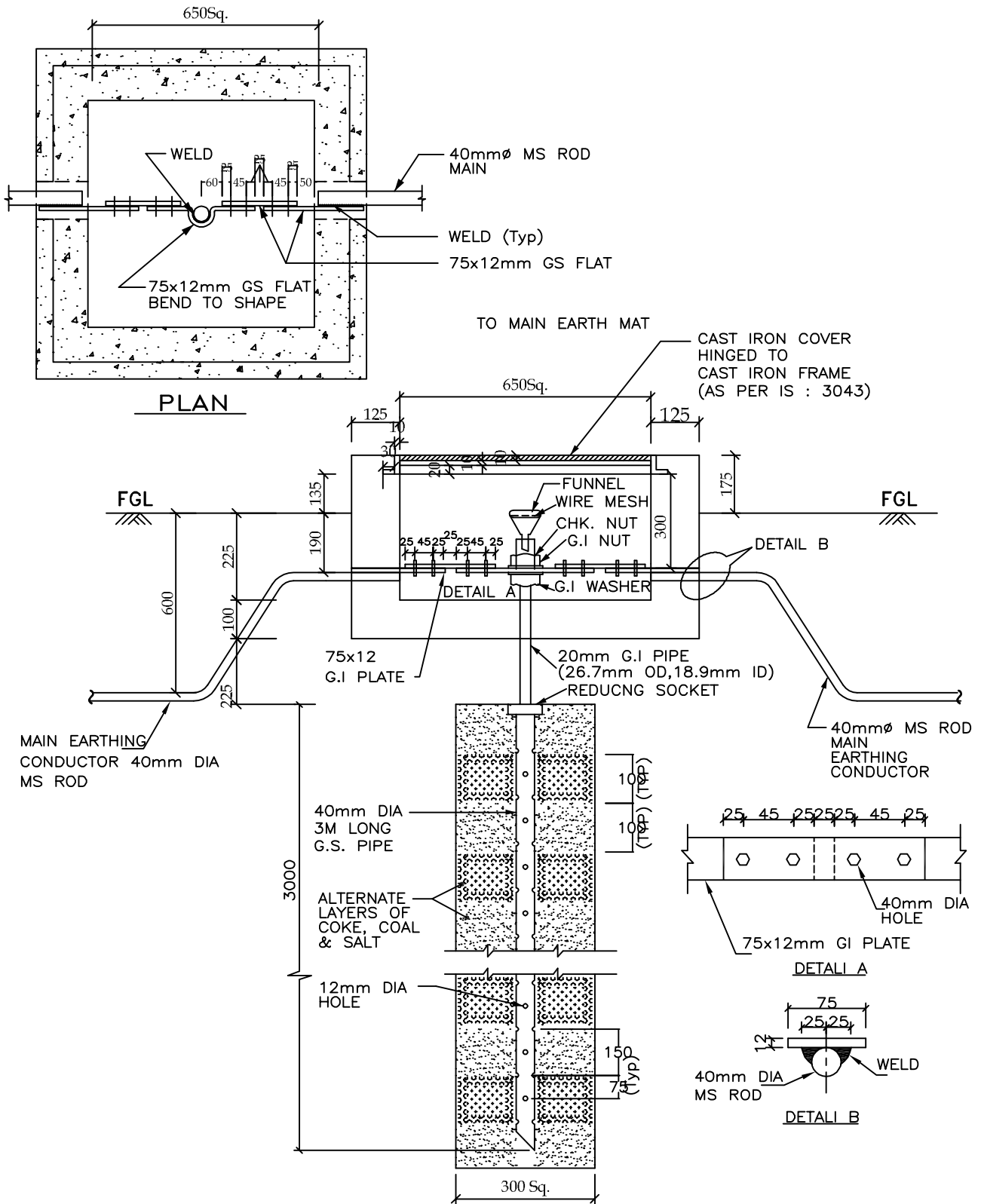
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SWITCHYARD ERECTION

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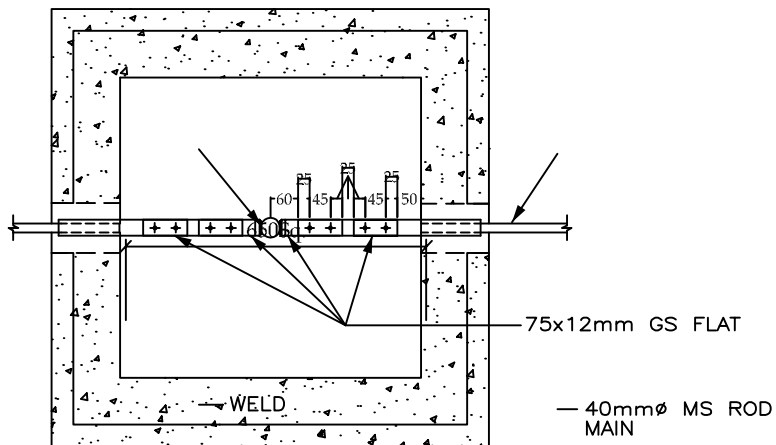


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

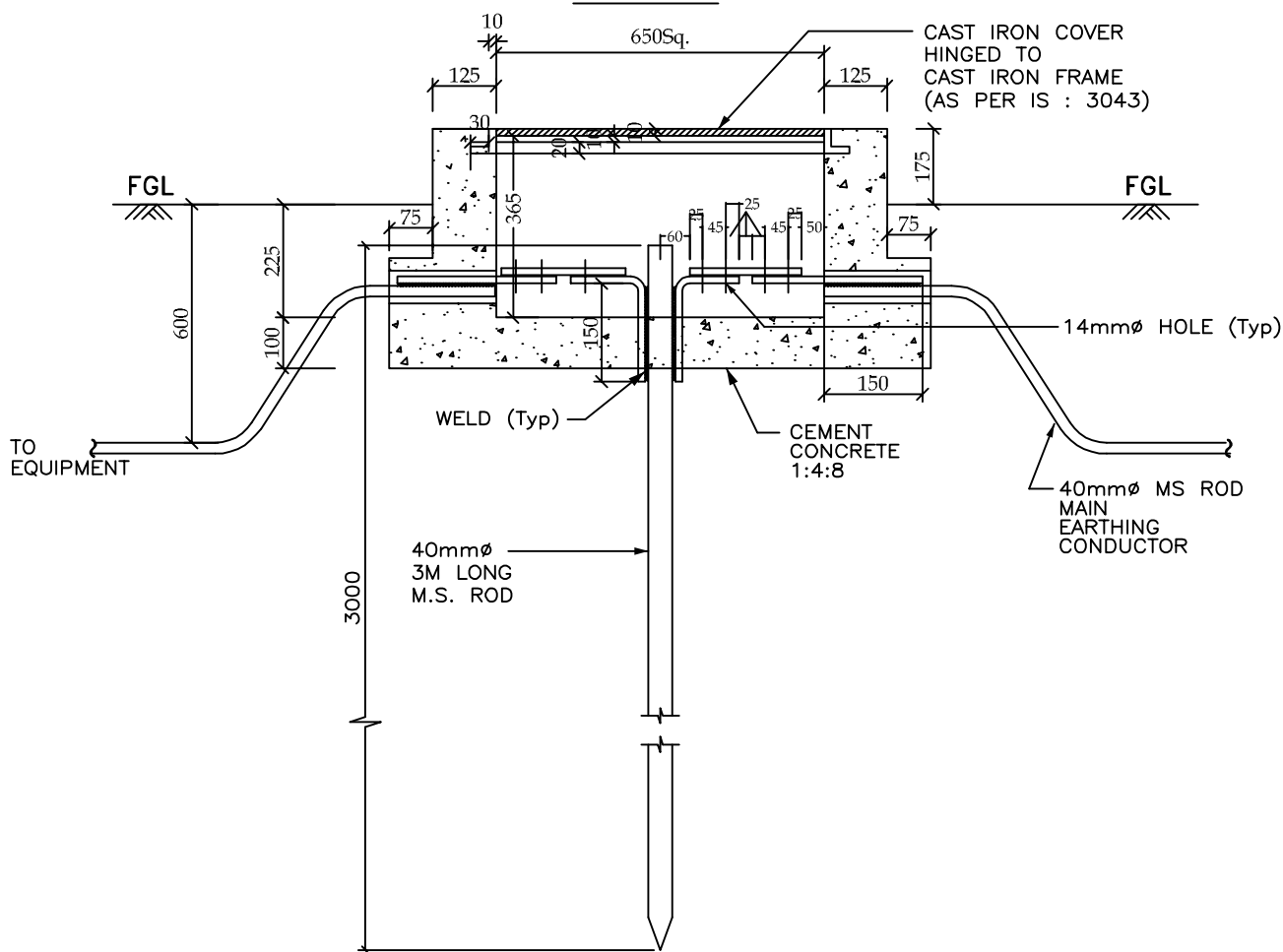
TITLE:- STANDARD EARTHING DETAILS

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



PLAN



ELEVATION

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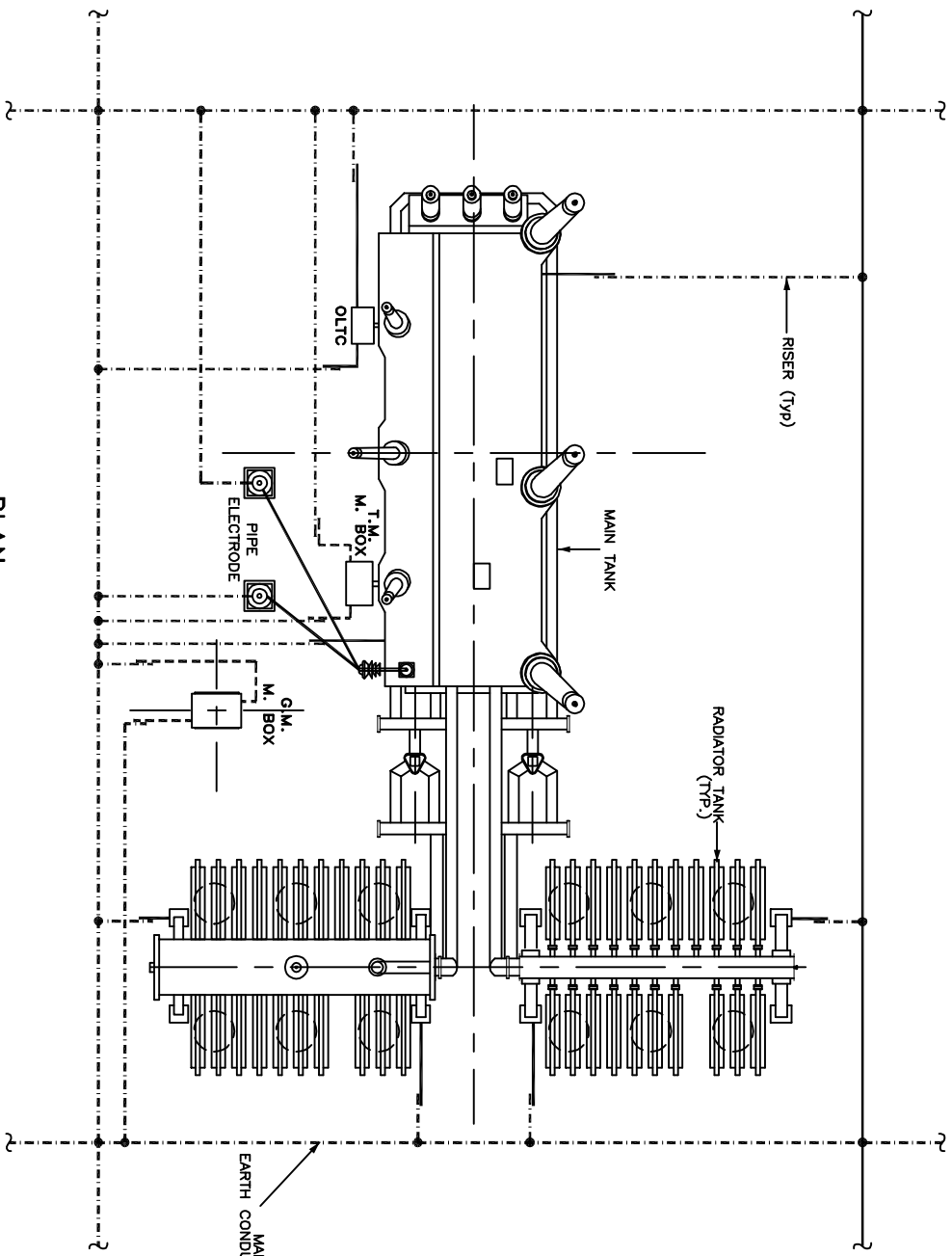


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

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EARTHING OF TRANSFORMER / REACTOR



PLAN

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.
 O.L.T.C - 2 Nos. (CT only)
 M. BOX - 2 Nos./M. BOX
 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.

RELEASED FOR CONTRUCTION

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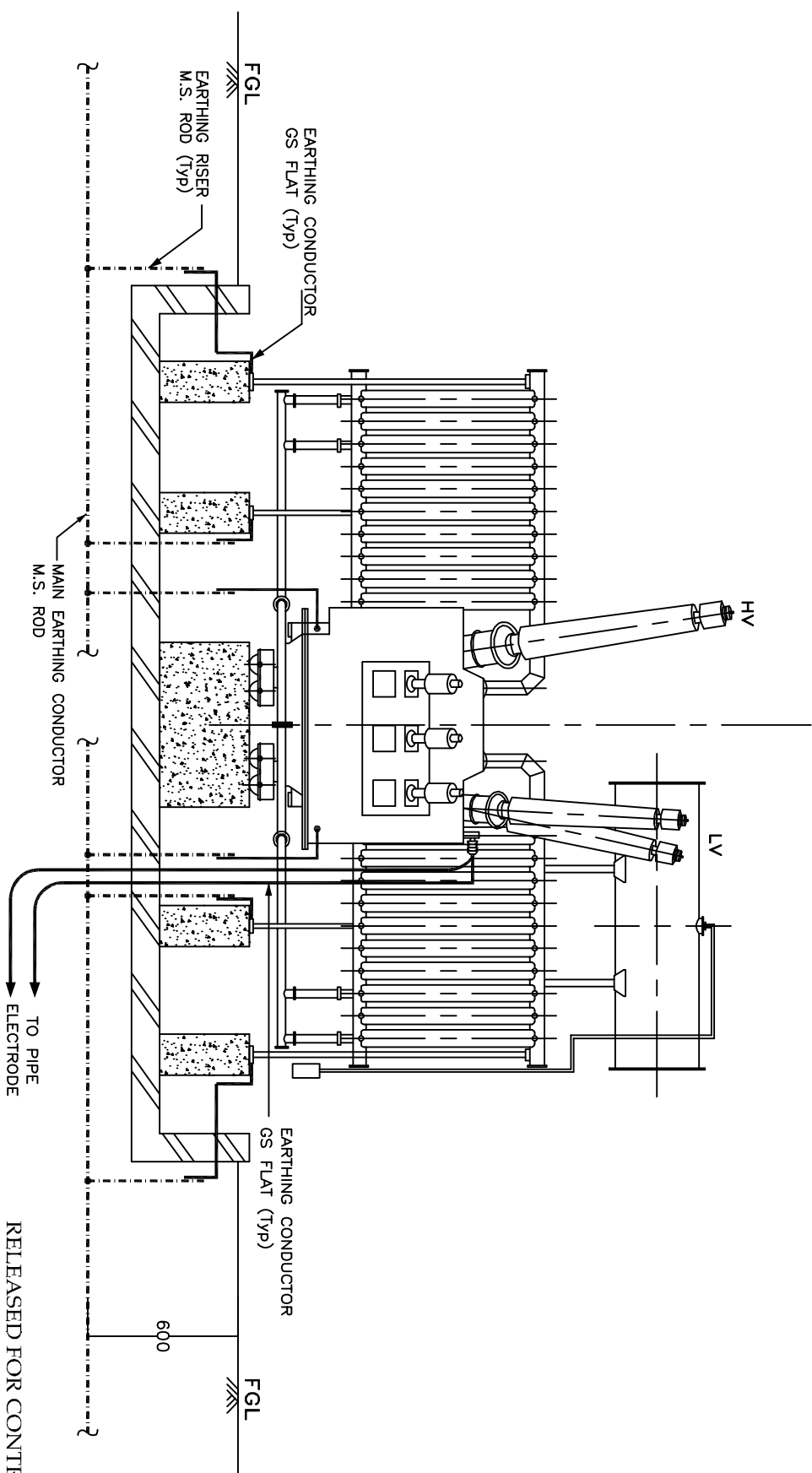


**PROJECT :- TECHNICAL SPECIFICATION-
 SWITCHYARD ERECTION**

TITLE:- STANDARD EARTHING DETAILS

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		Drawing No.: C/ENG/STD/EARTHINGS/09 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

RELEASED FOR CONTRUCTION

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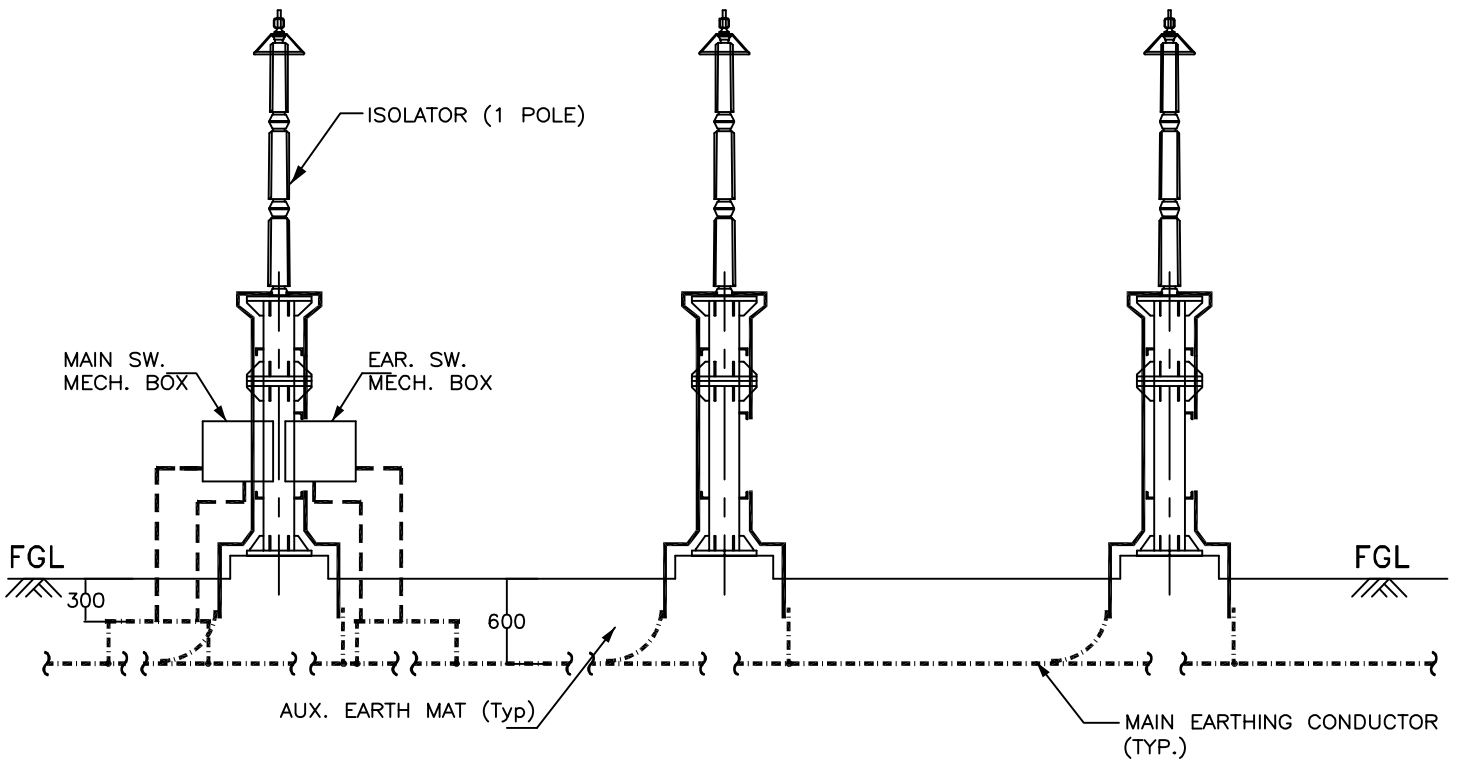


**PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION**

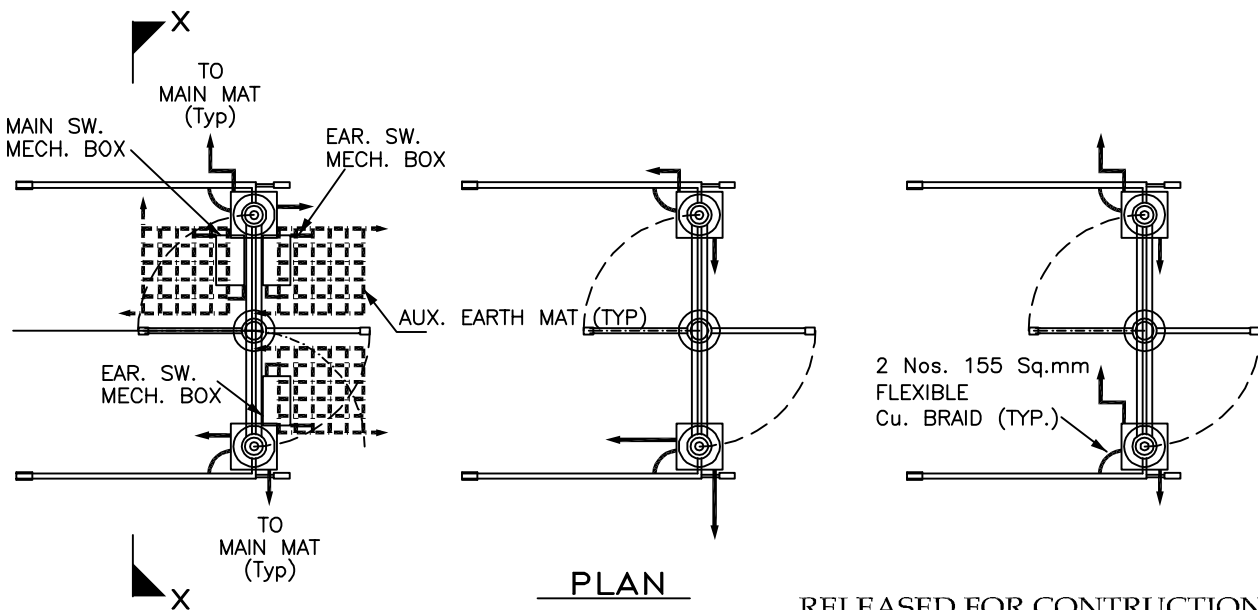
TITLE:- STANDARD EARTHING DETAILS

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			SHEET # 8

EARTHING OF ISOLATOR



ELEVATION



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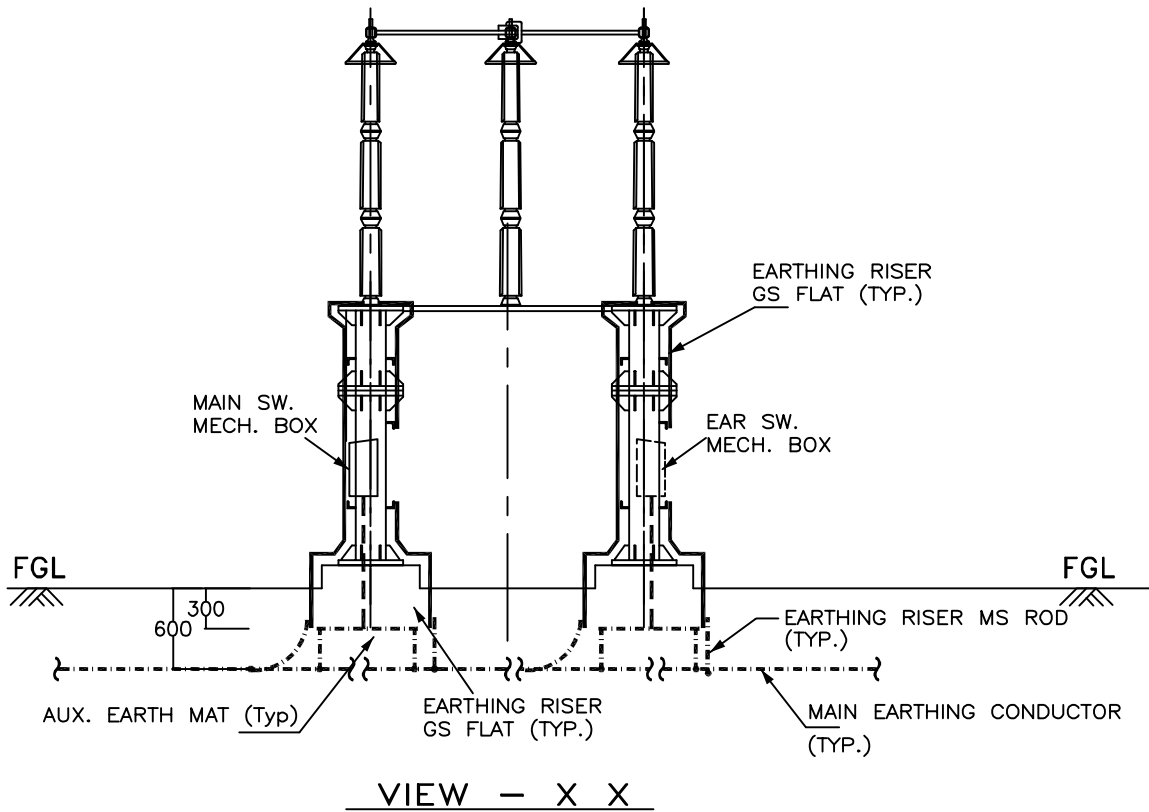


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

<i>KKParhar</i>	<i>KKParhar</i>	Dec-2013	Drawing No.:
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EARTHING OF ISOLATOR (1 PH)



LEGEND

— · — · — · —	40mm ϕ 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. EARTH MAT IS INDICATIVE ONLY. IT SHALL BE EXECUTED AS PER ACTUAL NUMBER/POSITION OF EARTH SWITCHES.

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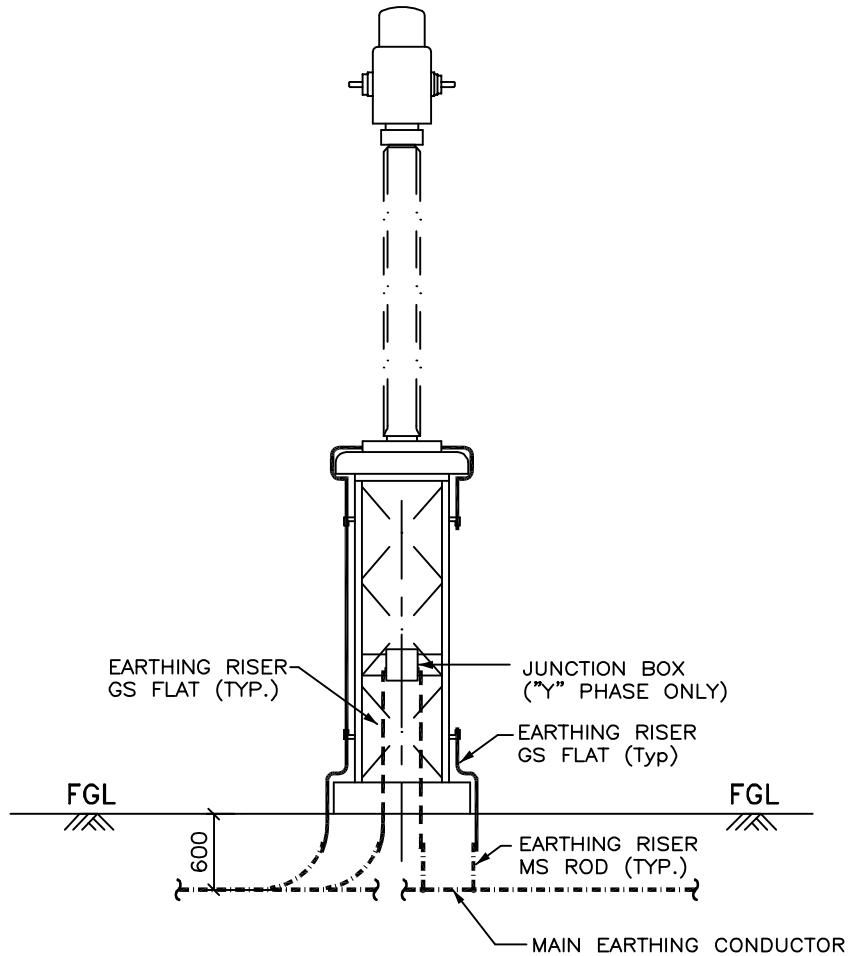


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

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EARTHING OF CURRENT TRANSFORMER (1 PH)



ELEVATION

LEGEND

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

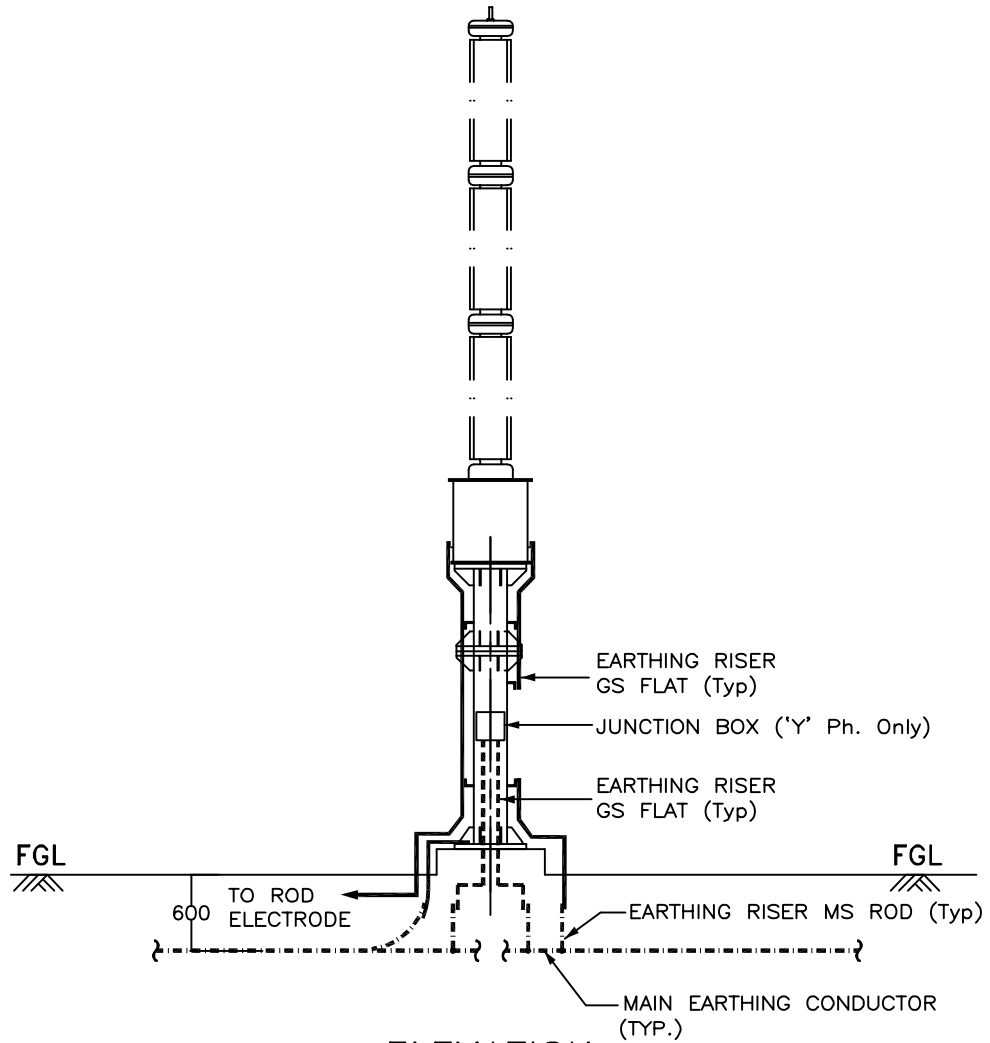
NOTES :-

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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TITLE:- STANDARD EARTHING DETAILS			
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EARTHING OF CAPACITIVE VOLTAGE TRANSFORMER (1 PH)



ELEVATION


LEGEND

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

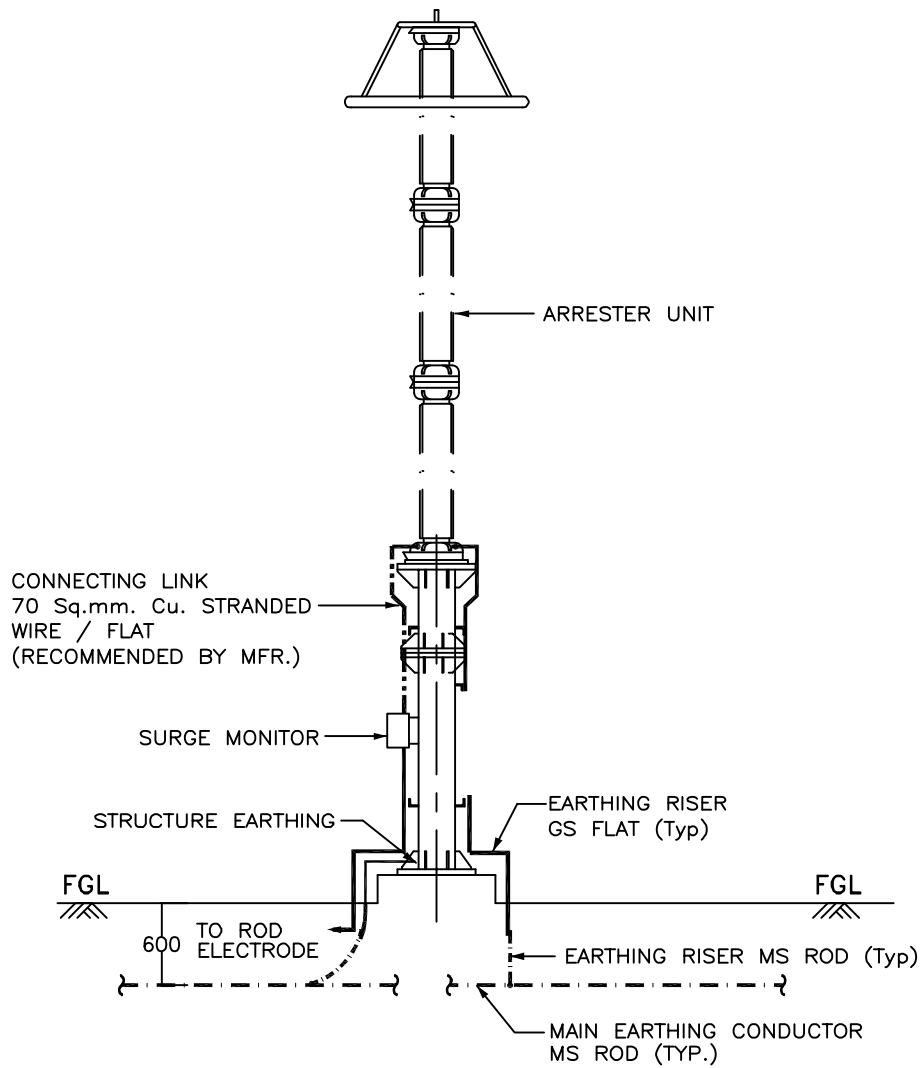
NOTES :-

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.

RELEASED FOR CONTRUCTION

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<p>PROJECT :- TECHNICAL SPECIFICATION- SWITCHYARD ERECTION</p>			
<p>TITLE:- STANDARD EARTHING DETAILS</p>			
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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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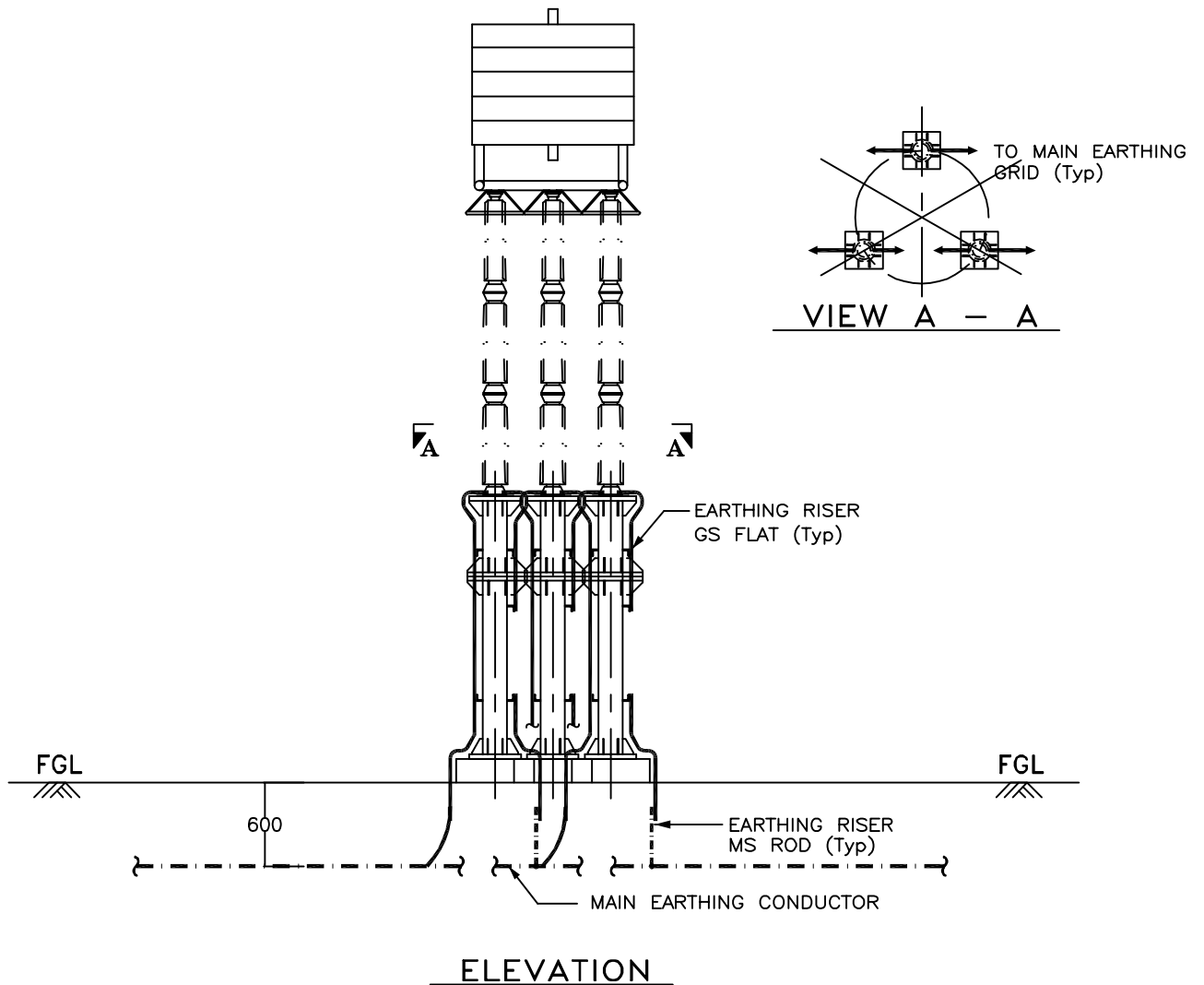


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

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EARTHING OF WAVE TRAP (1PH)




LEGEND

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

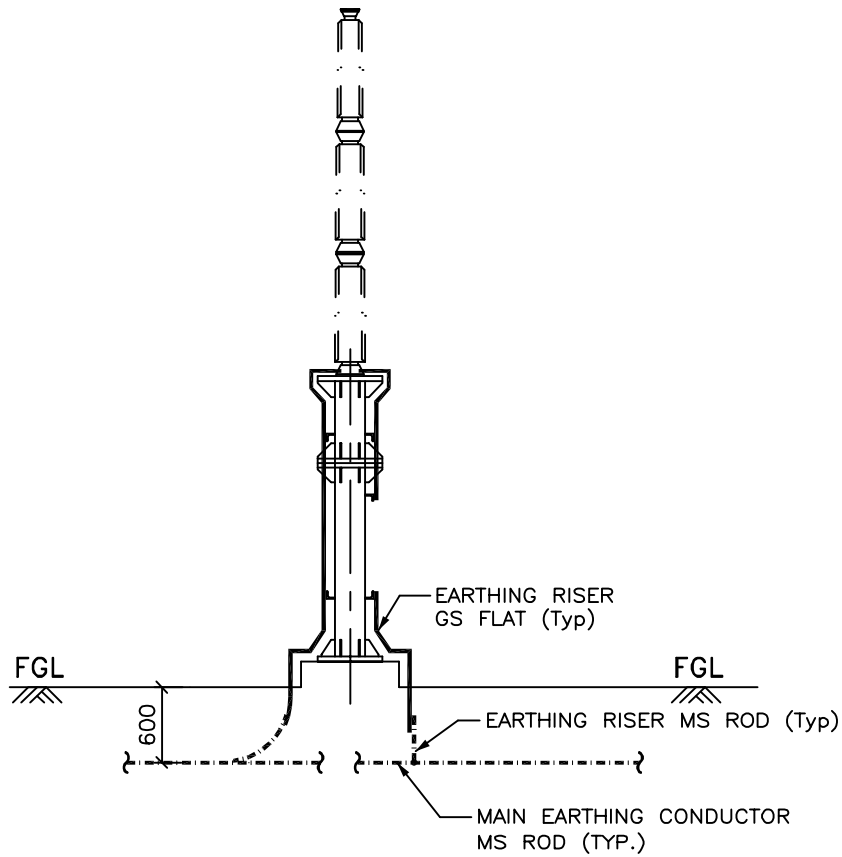
NOTE :-

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

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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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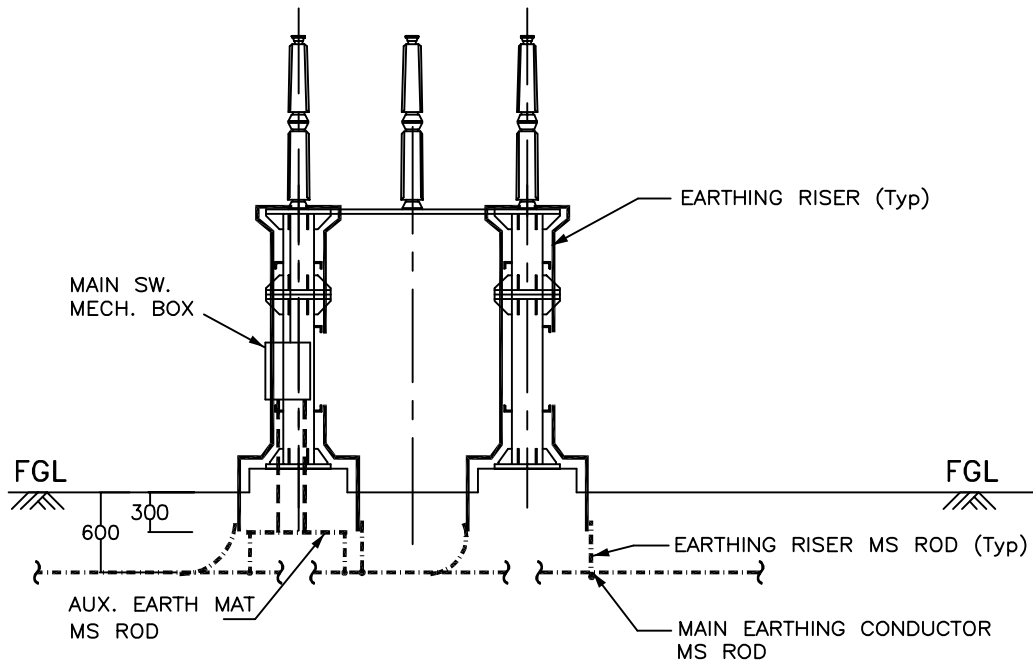


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

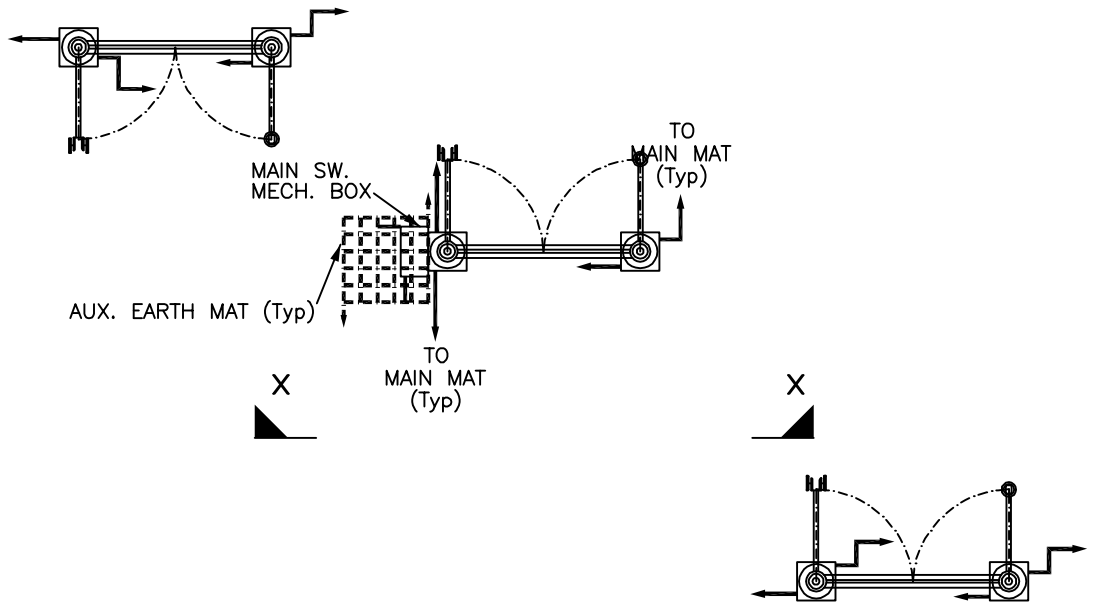
TITLE:- STANDARD EARTHING DETAILS

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TANDEM ISOLATOR



VIEW - X X



PLAN

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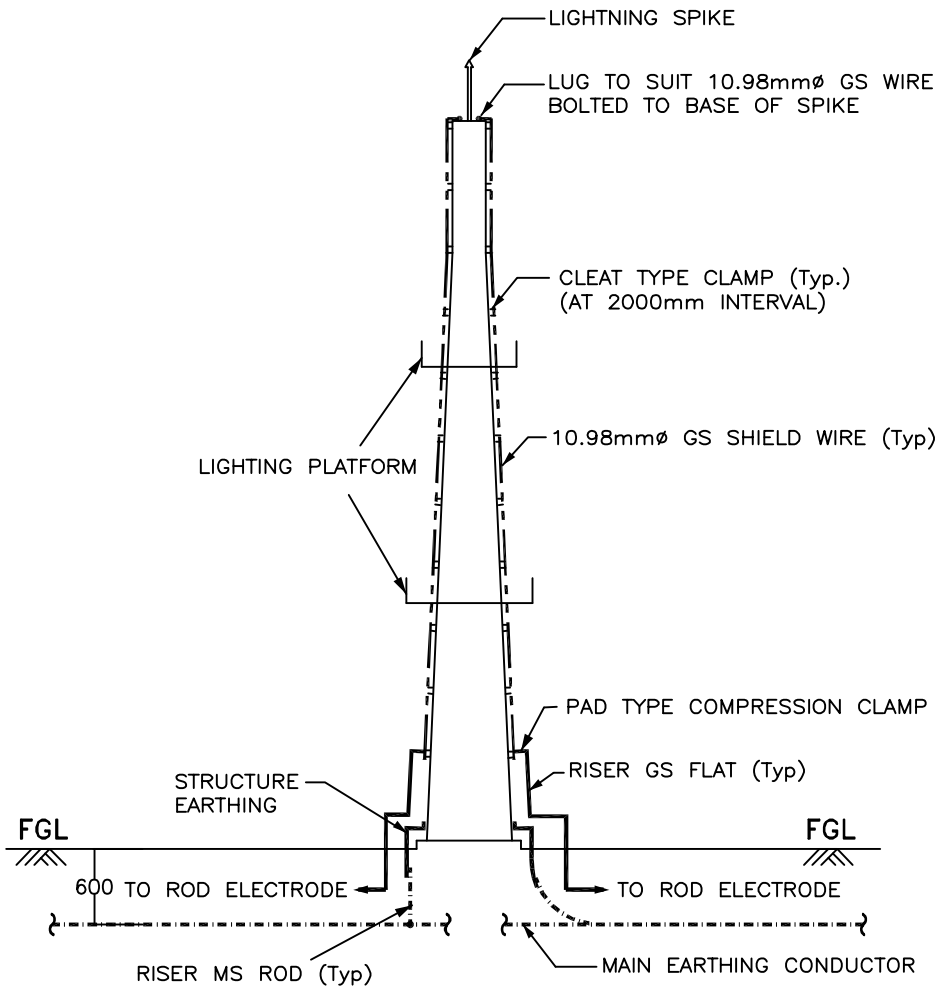


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

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EARTHING OF LIGHTNING MAST



ELEVATION

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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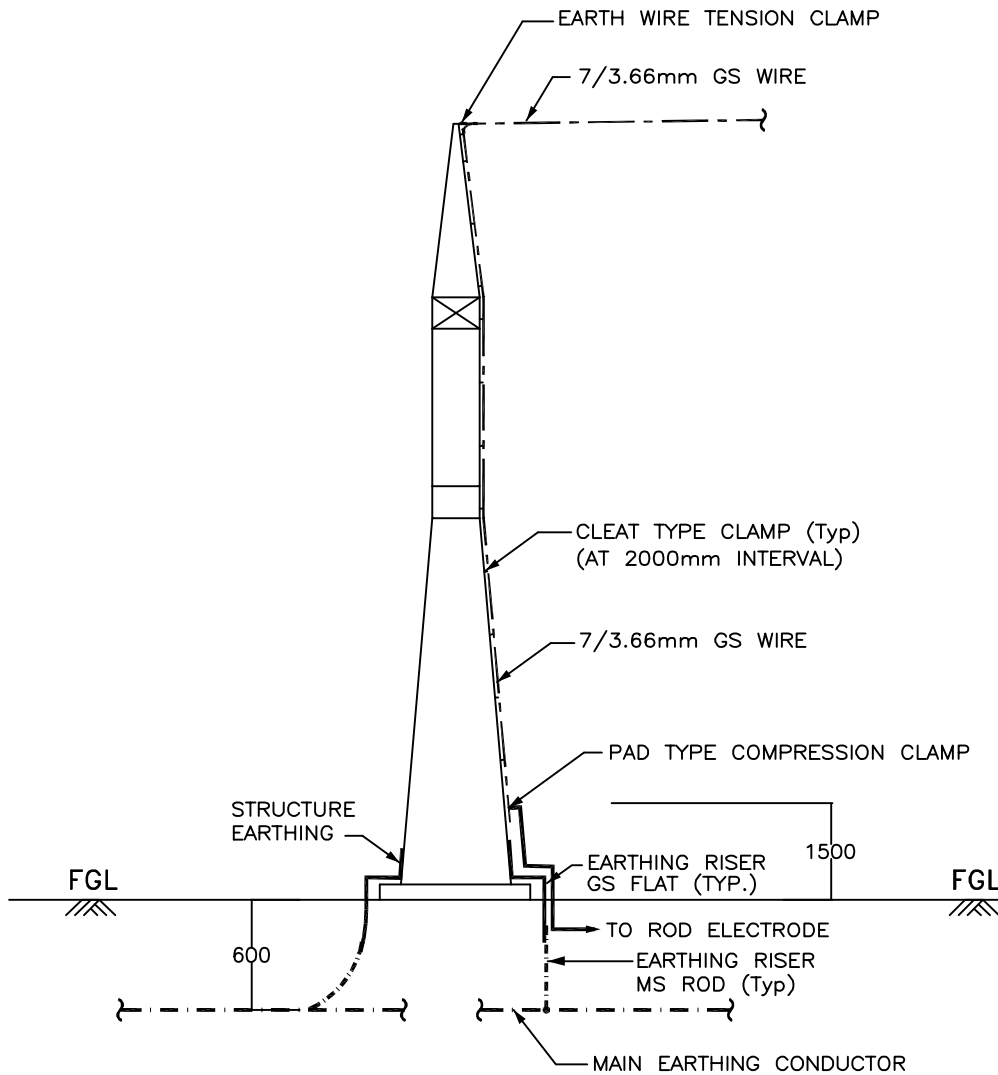


**PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION**

TITLE:- STANDARD EARTHING DETAILS

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EARTHING OF TOWER WITH PEAK



ELEVATION

LEGEND

- 40mm ϕ MS ROD
- 75 x 12 mm GS FLAT

NOTES :-

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

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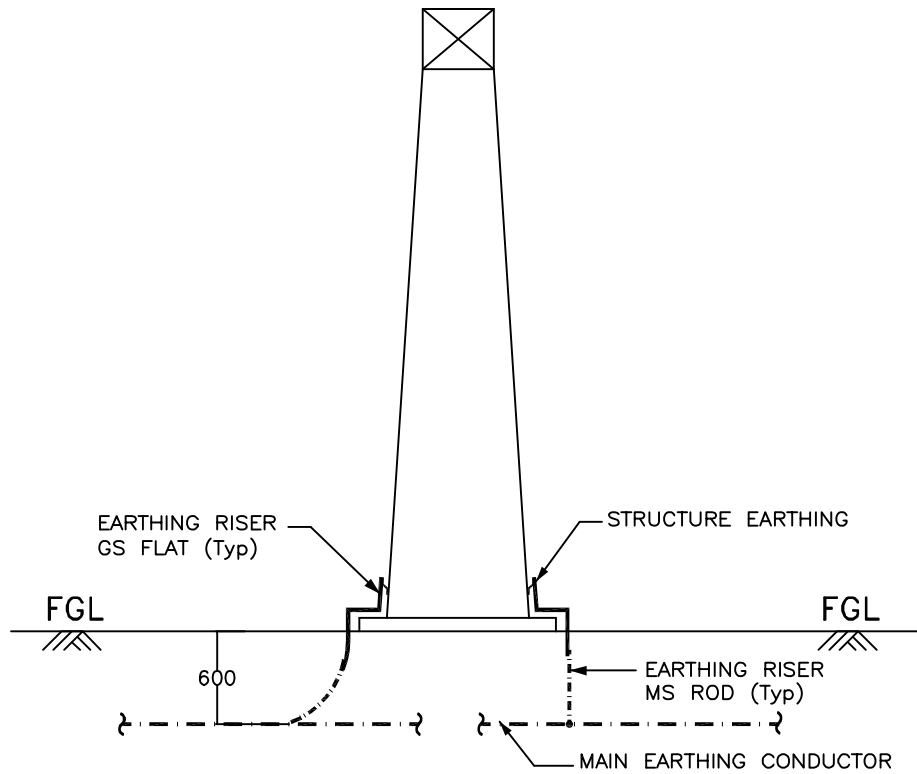


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

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EARTHING OF TOWER WITHOUT PEAK



ELEVATION

LEGEND

- 40mm ϕ MS ROD
- 75 x 12 mm GS FLAT

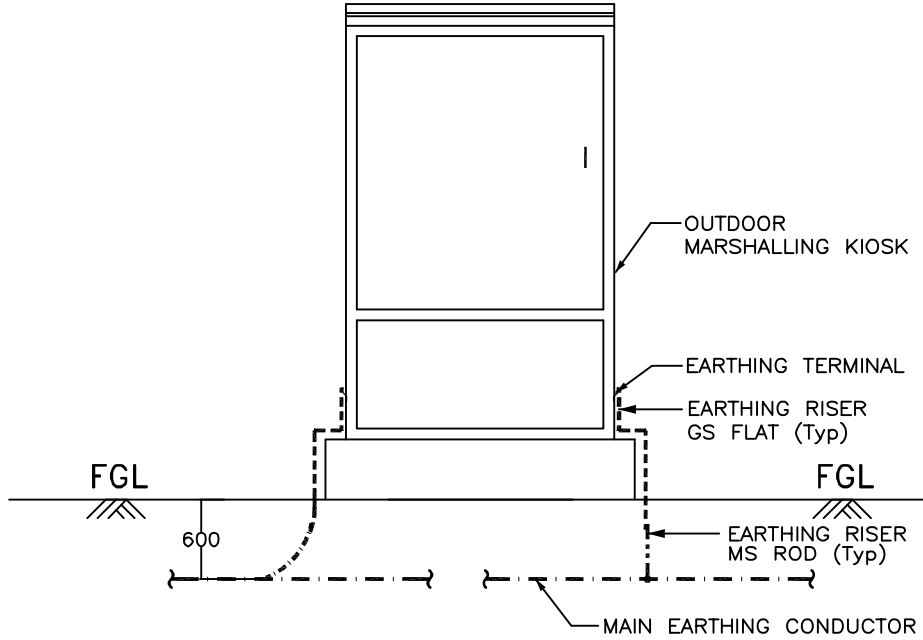
NOTES :-

1. No. OF RISERS = 2 Nos.

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EARTHING OF BAY MARSHALLING BOX



ELEVATION

LEGEND

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

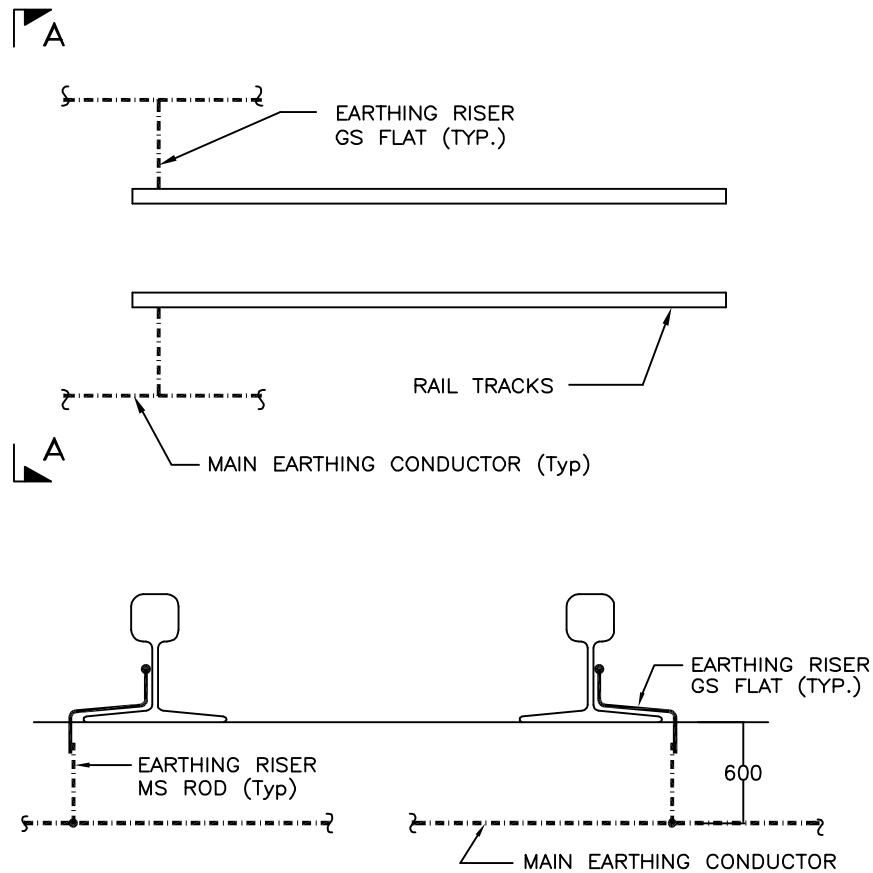
NOTE :-

1. No. OF RISERS = 2 Nos.

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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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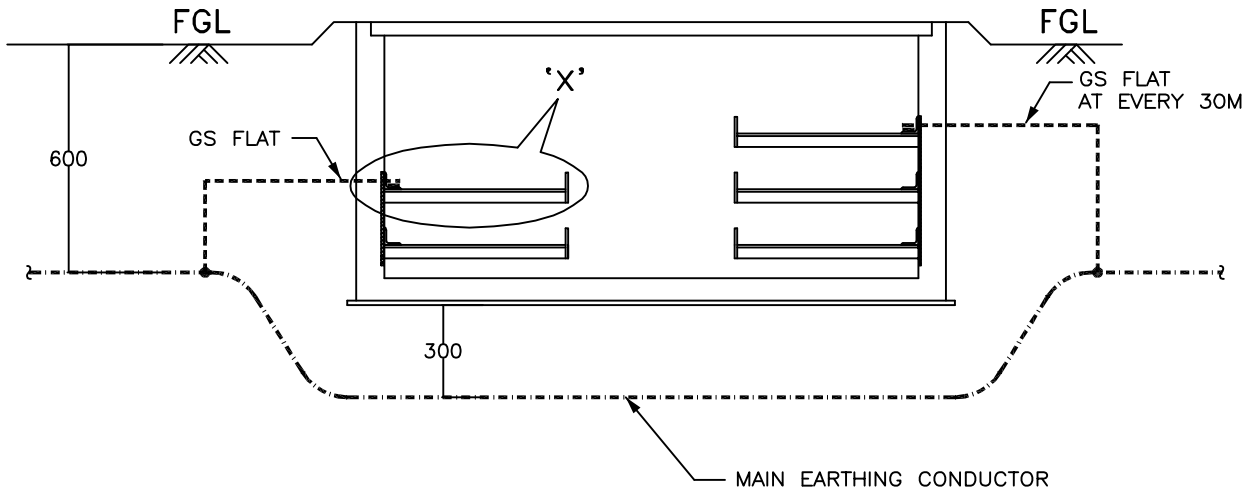


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

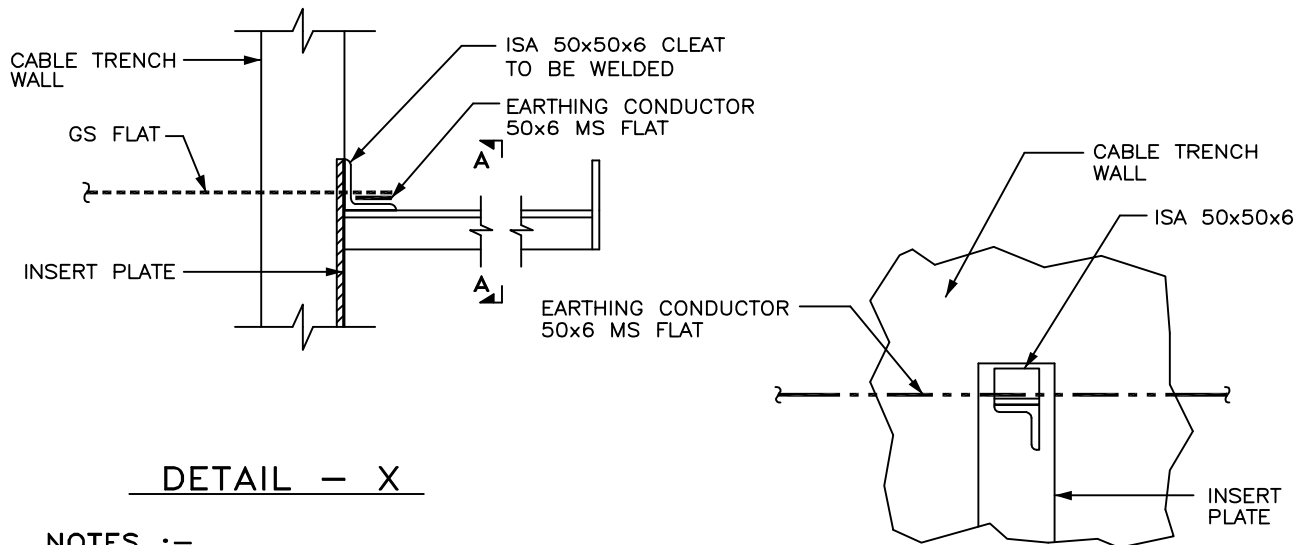
TITLE:- STANDARD EARTHING DETAILS

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EARTHING OF CABLE TRENCH



TYPICAL CROSS SECTION OF CABLE TRENCH



DETAIL - X

SECTION A - A

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.

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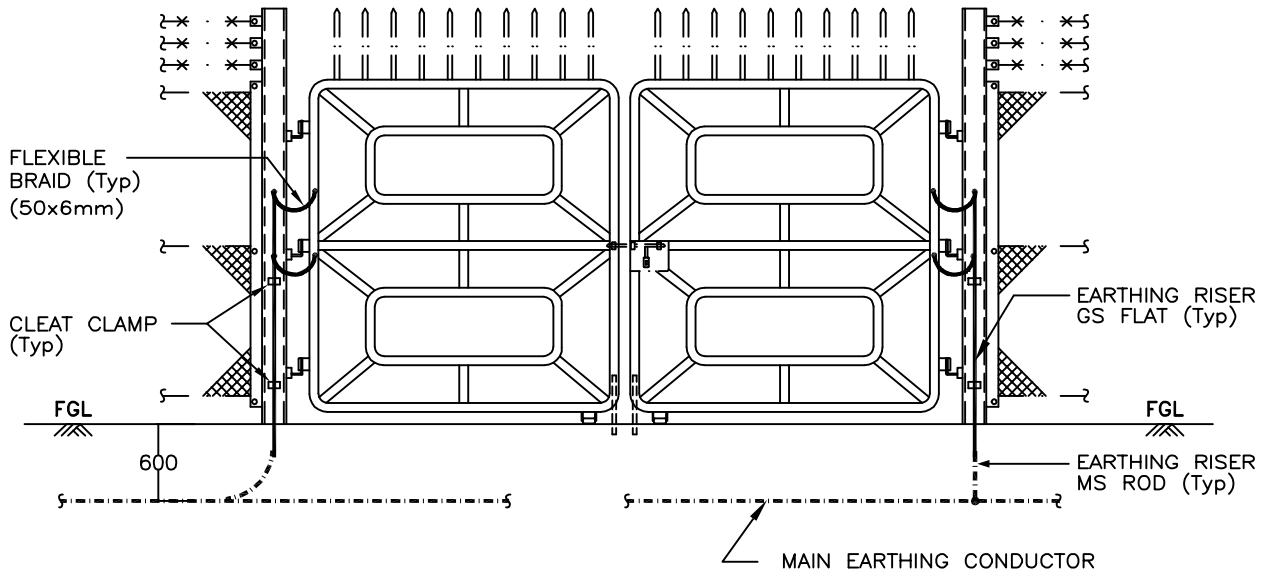


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

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CKD BY	PRPD BY	Date	

EARTHING OF GATES



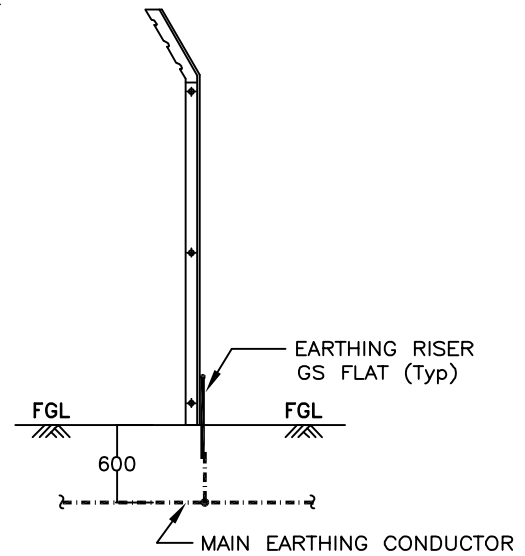
MAIN GATE

LEGEND

- 40mm ϕ 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 & EVERY ALTERNATE FENCE SHALL BE CONNECTED TO EARTHING GRID.		



FENCE POST (ALTERNATE FENCE POST)

RELEASED FOR CONTRUCTION

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

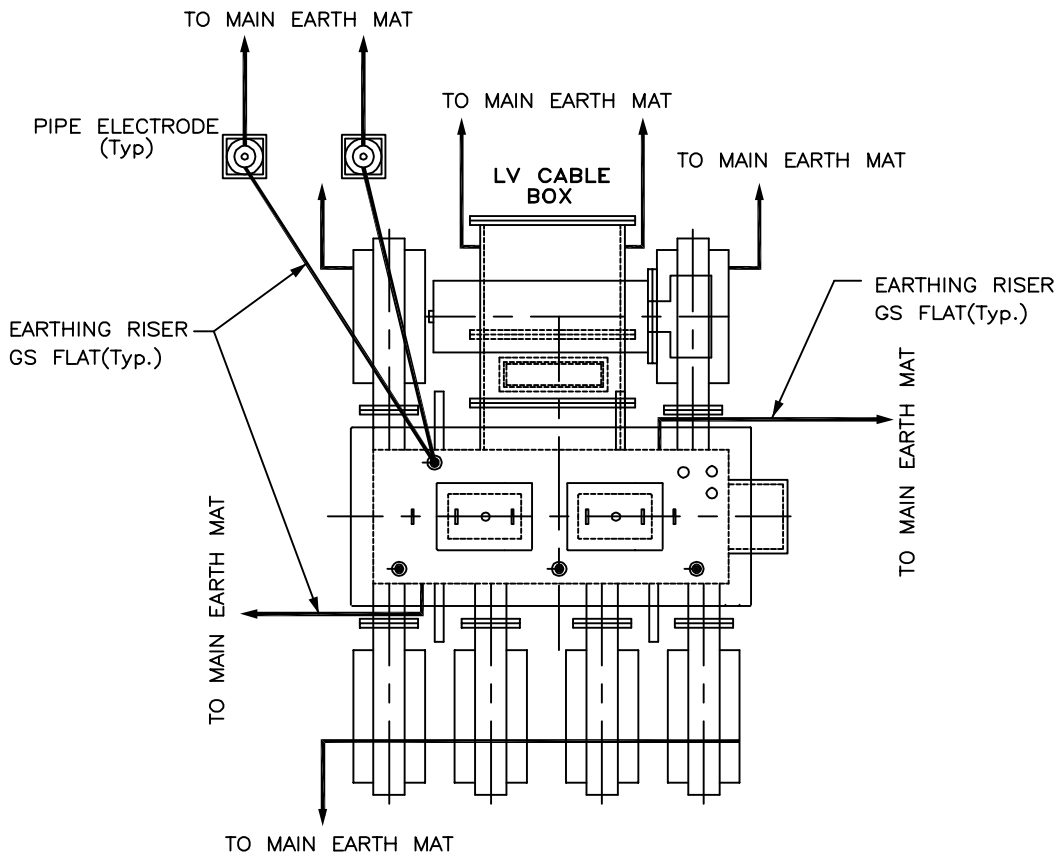


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

<i>KK Parhar</i>	<i>KK Parhar</i>	Dec-2013	Drawing No.: C/ENG/STD/EARTHINGS/09 SHEET # 24
CKD BY	PRPD BY	Date	

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.

RELEASED FOR CONTRUCTION

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

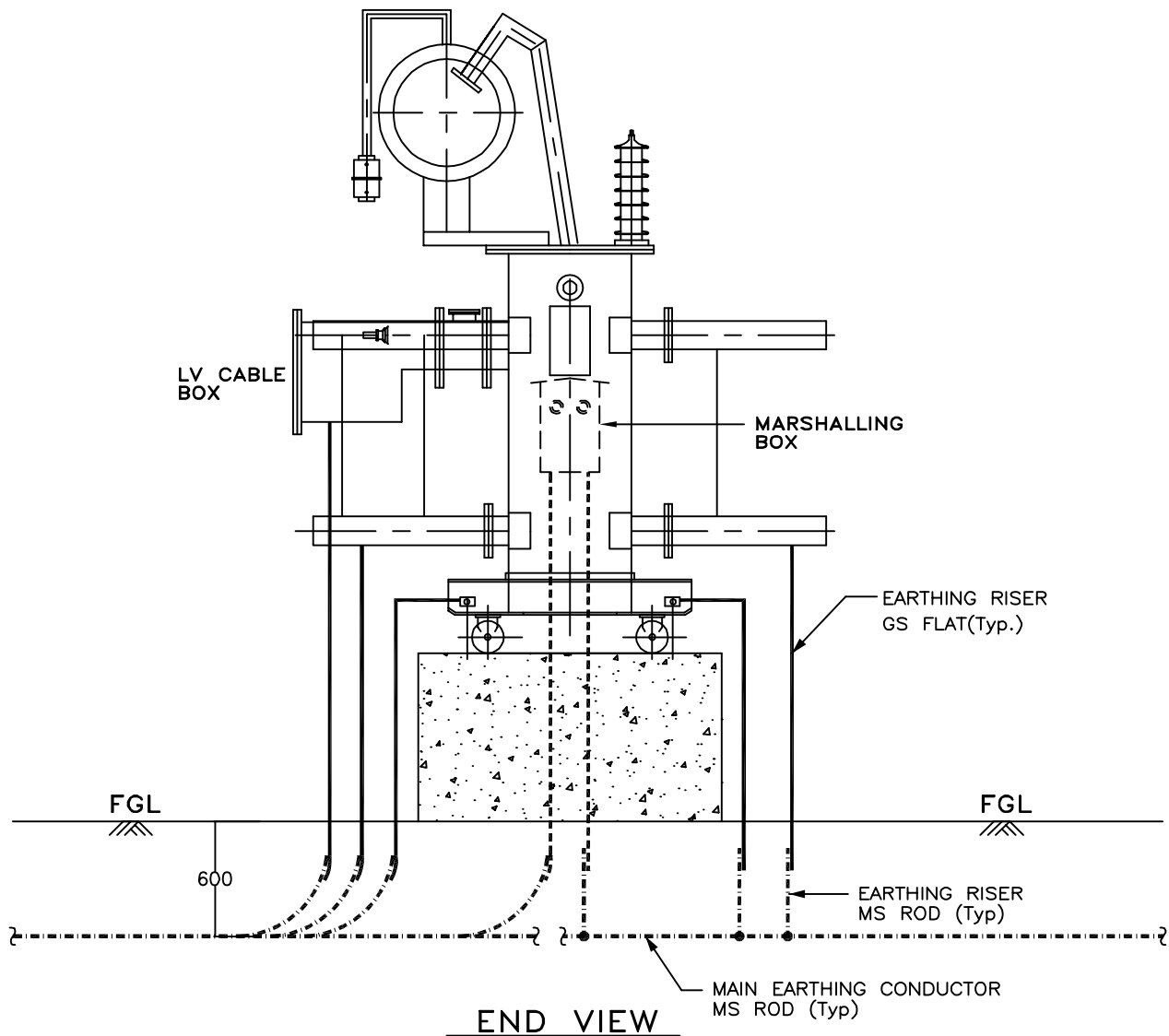


PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

<i>KKParshar</i>	<i>KKParshar</i>	Dec-2013	Drawing No.: C/ENG/STD/EARTHINGS/09 SHEET # 25
CKD BY	PRPD BY	Date	

EARTHING OF LT TRANSFORMER



RELEASED FOR CONTRUCTION

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



PROJECT :- TECHNICAL SPECIFICATION-
SWITCHYARD ERECTION

TITLE:- STANDARD EARTHING DETAILS

<i>KK Parshar</i>	<i>KK Parshar</i>	Dec-2013	Drawing No.: C/ENG/STD/EARTHINGS/09 SHEET # 26
CKD BY	PRPD BY	Date	

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.

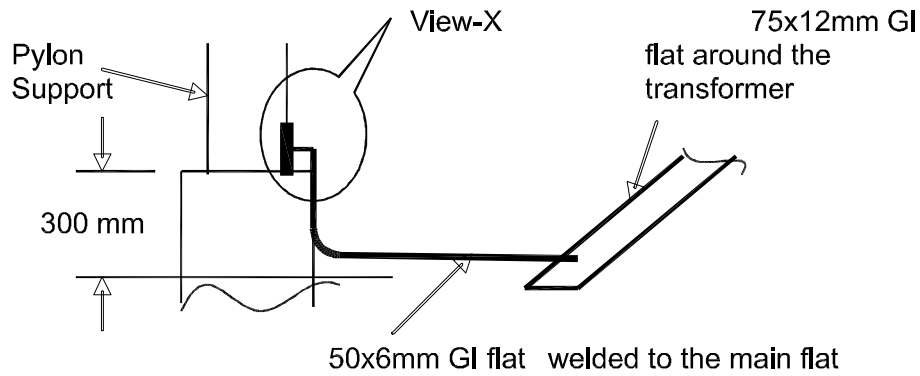


Fig.- Elevation (Earthing of Pylon Supports)

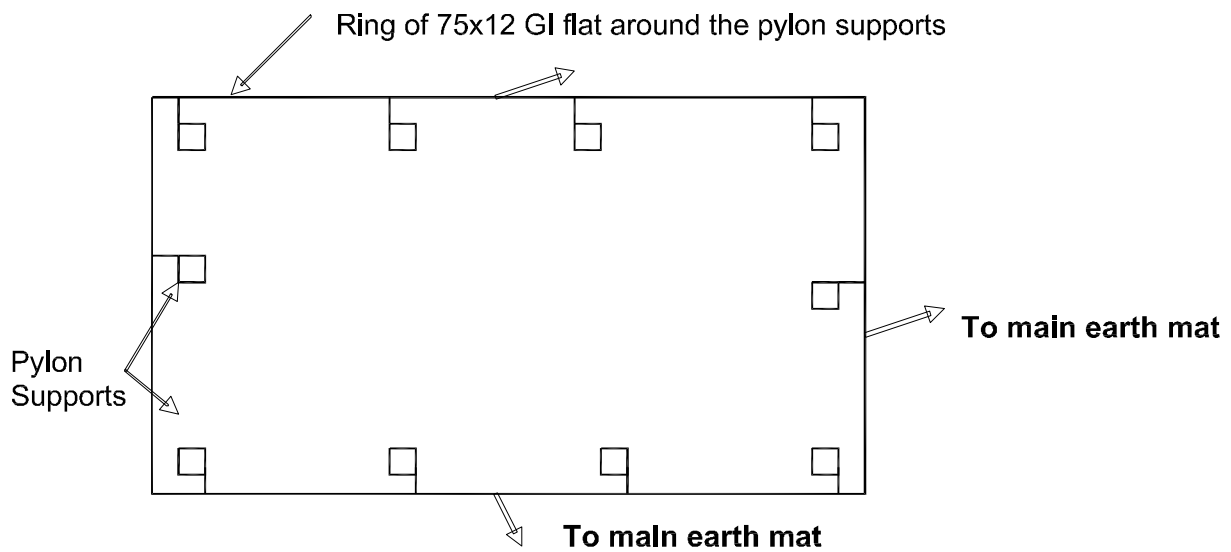



Fig.- Layout (Earthing of Pylon Supports)

RELEASED FOR CONTRUCTION

POWER GRID CORPORATION OF INDIA LIMITED (A Government of India Enterprise)			 पावरग्रिड
PROJECT :- TECHNICAL SPECIFICATION- SWITCHYARD ERECTION			
TITLE:- STANDARD EARTHING DETAILS			
<i>SKPashkar</i>	<i>SKPashkar</i>	Dec-2013	Drawing No.: C/ENG/STD/EARTHINGS/09 SHEET # 27
CKD BY	PRPD BY	Date	

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.

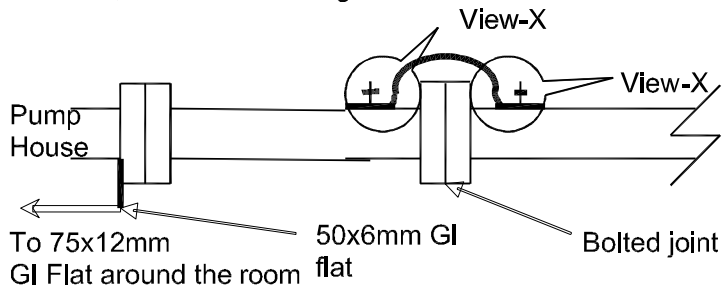


Fig.-Earthing of Hydrant / HVW Spray Piping

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.

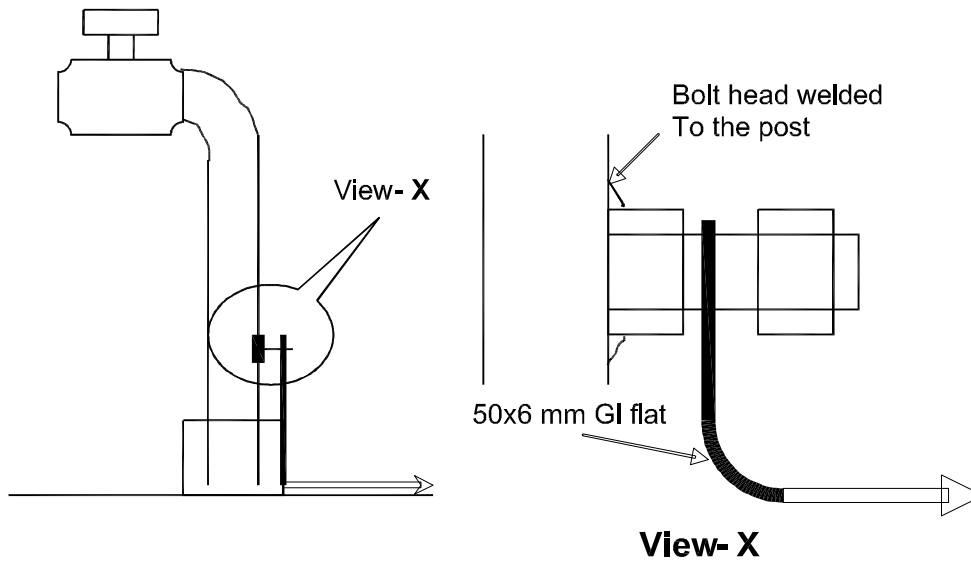



Fig.- Earthing of hydrant box / hose box

RELEASED FOR CONTRUCTION

POWER GRID CORPORATION OF INDIA LIMITED (A Government of India Enterprise)			 पावरग्रिड
PROJECT :- TECHNICAL SPECIFICATION- SWITCHYARD ERECTION			
TITLE:- STANDARD EARTHING DETAILS			
<i>HKPashkar</i>	<i>HKPashkar</i>	Dec-2013	Drawing No.: C/ENG/STD/EARTHINGS/09 SHEET # 28
CKD BY	PRPD BY	Date	

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

100-385-510-001

DRWING No.

TO 765KV
ICT-3 (F) ICT-4 (F)
765/400/33KV
42000VA AT
33000VA AT

TO 765KV
ICT-1
765/400/33KV
42000VA AT
33000VA AT

125 MVAR
B/R

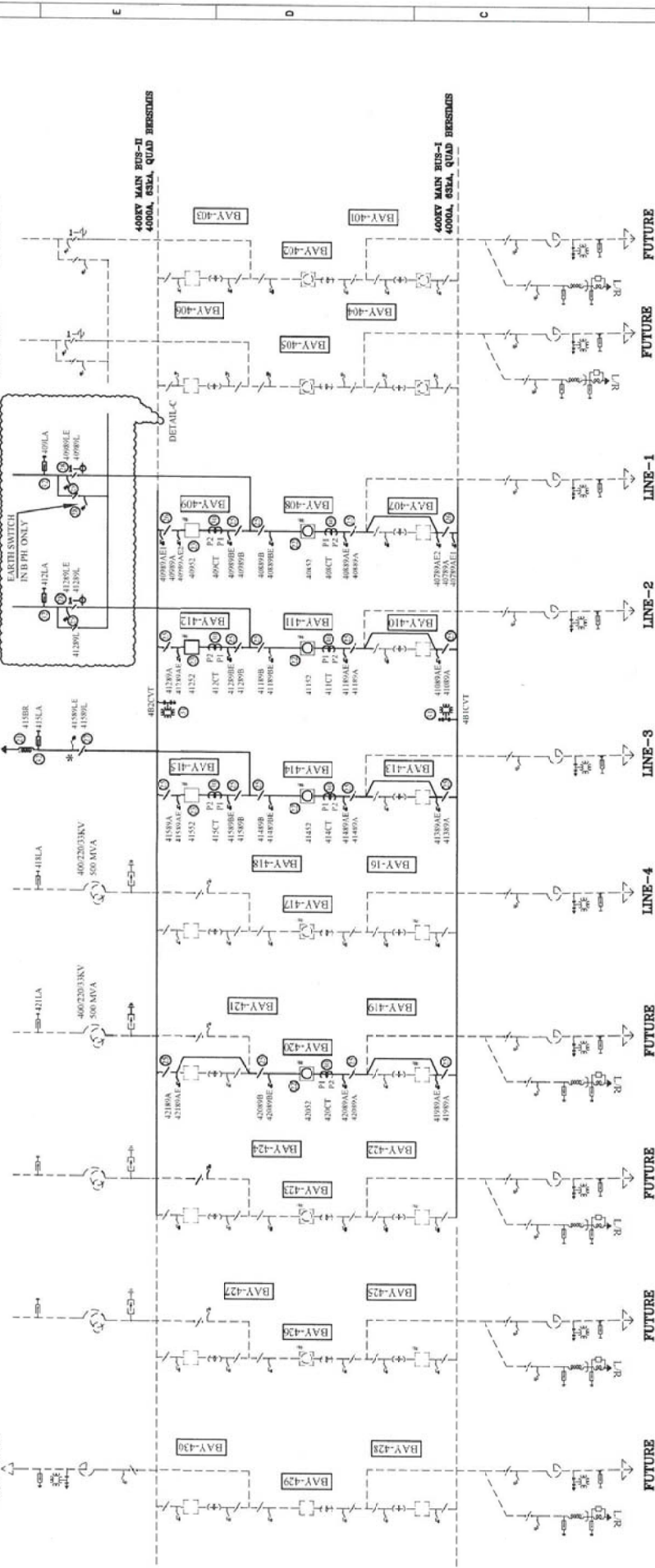
TO 220KV S/Y

220KV

FUTURE

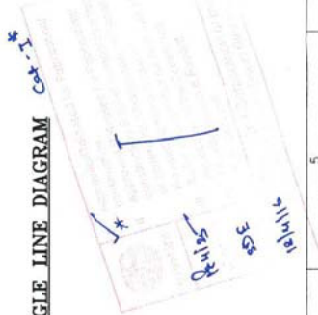
400KV MAIN BUS-II
4000A, 635A, QUAD BUSES

400KV MAIN BUS-I
4000A, 635A, QUAD BUSES



NOA NO. : CC-CS/484-WR2-SS-2853/11/G8/NOA-1&2/5727 & 5728 DT. 31.03.16		POWER GRID CORPORATION OF INDIA LIMITED	
SUBSTATION PACKAGE-SS01 FOR CONSTRUCTION OF 765/400/220KV BHUJ S/S & EXT. OF 765KV BAMASKANTHA S/S UNDER GREEN ENERGY CORRIDOR ISTS PART-C (PART-1)		BHUJ S/S & EXT. OF 765KV BAMASKANTHA S/S UNDER GREEN ENERGY CORRIDOR ISTS PART-C (PART-1)	
DATE	SCALE	REV	DATE
16.04.16	AS/PS	0	16.04.16
SINGLE LINE DIAGRAM		DRAWING NO.	
FOR 765/400/220KV BHUJ S/S.		TB-385-510-001	
SHEET No. 02		SHEET No. 02	

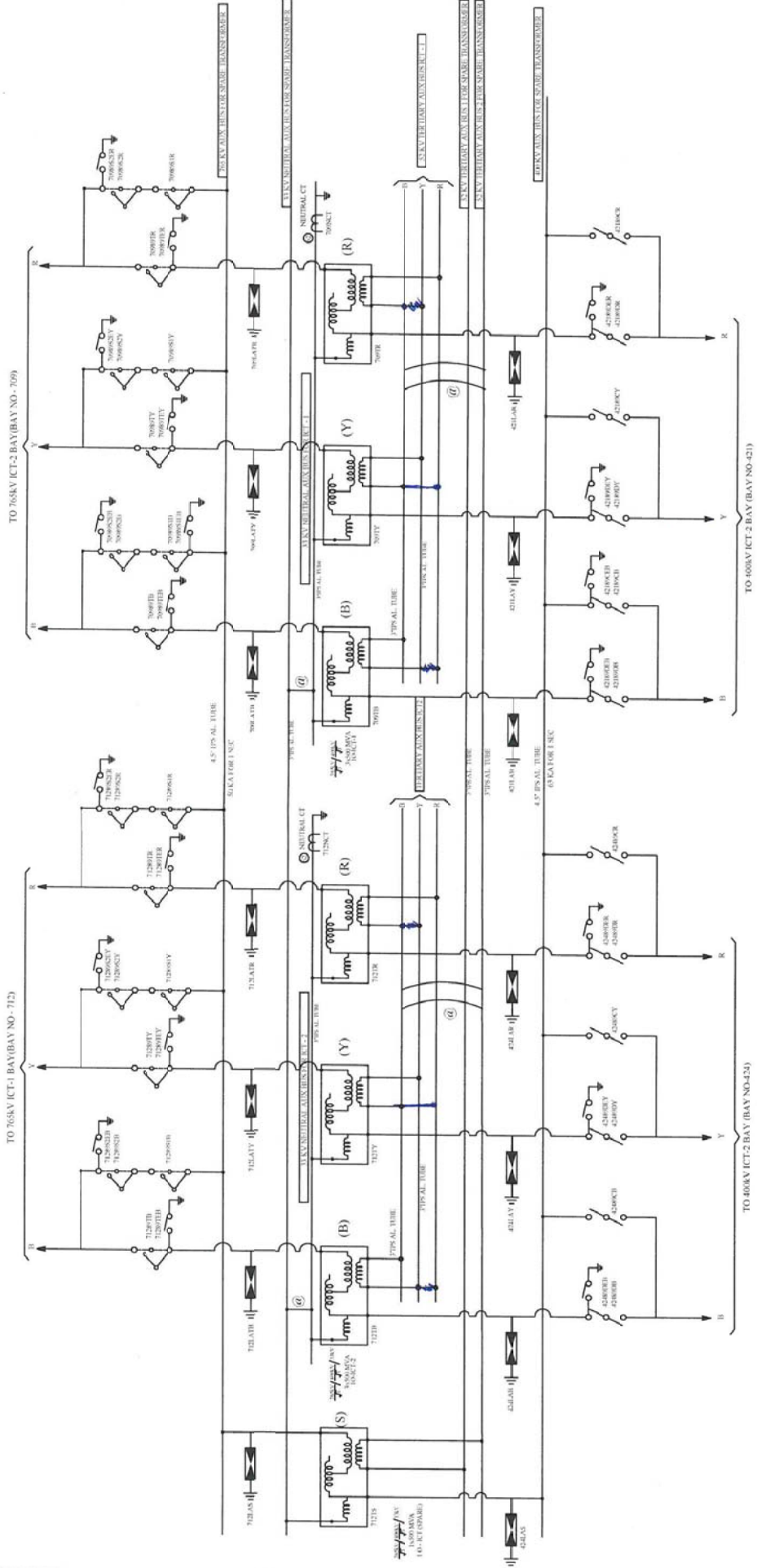
ADDITIONAL INFORMATION W.O.No. 85603		STATUS OF DRAWING CONTRACT	
DISTRIBUTION OF PRINTS		REV. DATE	
REV.	DATE	ALTERED	CHECKED
		APPROVED	APPROVED
SCALE		SCALE	
NTS		NTS	
SHEET TITLE		SHEET TITLE	
SINGLE LINE DIAGRAM		SINGLE LINE DIAGRAM	
FOR 765/400/220KV BHUJ S/S.		FOR 765/400/220KV BHUJ S/S.	



COMPILED BY: _____ DATE: _____
 CHECKED BY: _____ DATE: _____
 APPROVED BY: _____ DATE: _____
 INVENTORY No. _____ SIGN. & DATE _____
 REF. DRG. No. _____
 DRAWING No. _____

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-385-510-001



DETAIL-C
(ARRANGEMENT OF 765/400KV ICT AND AUX. BUS)

NOA NO. : CC-CS/484-WR2/SS-2953/11/G8/NOA-1&2/5727 & 5728 DT. 31.03.16

ADDITIONAL INFORMATION W.O.No. 85003		POWER GRID CORPORATION OF INDIA LIMITED	
STATUS OF DRAWING CONTRACT		SUBSTATION PACKAGE-SS01 FOR CONSTRUCTION OF 765/400/220KV BHUJ S/S & EXT. OF 765KV BANASKANTHA S/S UNDER GREEN ENERGY CORRIDOR ISTS PART - C (PART-1)	
DISTRIBUTION OF PRINTS		भारत भारती इलेक्ट्रिकल्स लिमिटेड भारत भारती इलेक्ट्रिकल्स लिमिटेड BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION	
REV.	DATE	ALTERED BY	SCALE
		CHECKED BY	NTS
		APPROVED BY	422
ZONE		SHEET / TOTAL SHEETS	
		0 / 0	
INVENTORY No.		SIGN. & DATE	
TB-385-510-001			
REF. DRG. No.		COMPILED DRG. PATH NAME :	

Handwritten notes and signatures in blue ink, including a date '14/11/16' and initials 'S.S.' and 'A.S.'.

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FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING NO. ON DRAWING

BILL OF QTY. FOR 765KV MAIN EQUIPMENTS: (20KA for 1sec)

SL.NO	DESCRIPTION	RATING	QTY (NO. PART-1)	SYMBOL	SCOPE OF SUPPLY	LEGEND
1	500MVA (1-PH) AUTOTRANSFORMER	765-400/33KV	7		PGCIL	T
2	110MVAR LINE REACTOR (1-PH) WITH NGR(250 Ohm)	765KV	7		PGCIL	LNOR
3	110MVAR BUS REACTOR (1-PH)	765KV	4		PGCIL	BR
4	SF6 CIRCUIT BREAKER WITH CR, WITH CSD (1-PH)	3150A	3		PGCIL	52
5	SF6 CIRCUIT BREAKER WITH CR, WITHOUT CSD (1-PH)	3150A	2		PGCIL	52
6	SF6 CIRCUIT BREAKER WITHOUT CR, WITH CSD (3-PH)	3150A	5		PGCIL	52
7	SF6 CIRCUIT BREAKER WITHOUT CR, WITH CSD (1-PH)	3150A	1		PGCIL	52
8	ISOLATOR WITH ONE ESW (3 PH) VERTICAL KNEE TYPE	3150A	17		BHEL	89/89E
9	ISOLATOR WITH TWO ESW (1 PH) VERTICAL KNEE TYPE	3150A	2		BHEL	89/89E1/89E2
10	ISOLATOR WITH ONE ESW (1 PH) VERTICAL KNEE TYPE	2000A	23		BHEL	89/89E1
11	ISOLATOR WITHOUT ESW (1 PH) VERTICAL KNEE TYPE	2000A	12		BHEL	89
12	CURRENT TRANSFORMER CURRENT RATING	3000A	24		BHEL	CT
13	CVT (1 PH)	58099F	12		BHEL	CVT
14	SURGE ARRESTER (1 PH)	624KV	24		BHEL	LA
15	WAVE TRAP (1 PH) PEDESTAL TYPE	1mH, 3150A	04		BHEL	WT

BILL OF QTY. FOR 400KV MAIN EQUIPMENTS: (63KA for 1sec)

SL.NO	DESCRIPTION	RATING	QTY (PART-1) (NO.)	QTY (PART-2) (NO.)	SYMBOL	SCOPE OF SUPPLY	LEGEND
20	500MVA (1-PH) AUTOTRANSFORMER	400/220/33KV	0	0		BHEL	T
21	125MVAR BUS REACTOR (1-PH)	420 KV	1	0		BHEL	BR
22	SF6 CIRCUIT BREAKER WITH CR, WITH CSD (1-PH)	3150A	4	0		BHEL	52
23	SF6 CIRCUIT BREAKER WITHOUT CR, WITH CSD (3-PH)	3150A	3	0		BHEL	52
24	SF6 CIRCUIT BREAKER WITHOUT CR, WITHOUT CSD (3-PH)	3150A	0	0		BHEL	52
25	ISOLATOR WITH ONE ESW (3 PH) DOUBLE BREAK TYPE	3150A	17	0		BHEL	89/89E1/89E2
26	ISOLATOR WITH TWO ESW (1 PH) DOUBLE BREAK TYPE	3150A	2	0		BHEL	89/89E1
27	ISOLATOR WITH ONE ESW (1 PH) DOUBLE BREAK TYPE	2000A	1	0		BHEL	89/89E1
28	ISOLATOR WITH ONE ESW (1 PH) DOUBLE BREAK TYPE	3150A	7	0		BHEL	89/89E1
29	ISOLATOR WITHOUT ESW (1 PH) DOUBLE BREAK TYPE	3150A	5	0		BHEL	89
30	CURRENT TRANSFORMER (1 PH) WITH 120% EXTENDED CURRENT RATING	3000A	21	0		BHEL	CT
31	CVT (1 PH)	44099F	6	0		BHEL	CVT
32	SURGE ARRESTER (1 PH)	336KV	0	0		BHEL	LA
33	WAVE TRAP (1 PH) PEDESTAL TYPE	0.1mH, 3000A	0	0		BHEL	WT

BILL OF QTY. FOR 12KV & 33KV MAIN EQUIPMENTS:

SL.NO	DESCRIPTION	RATING	QTY (NO.)	SYMBOL	SCOPE OF SUPPLY	LEGEND
60	SF6 CIRCUIT BREAKER FOR NGR BYPASS (1-PH)	12KV, 1250A	2		BHEL	52
61	SURGE ARRESTER (1 PH)	120KV, 10KA 5 KJ/KV	2		PGCIL	LA
62	NEUTRAL CT (1 PH) WITH 120% EXTENDED CURRENT RATING	33KV	5		PGCIL	CT

Handwritten notes and signatures in blue ink, including 'Revised', 'SOE', and '16/11/16'. There is also a stamp from 'POWER GRID CORPORATION OF INDIA LIMITED'.

NOA NO. : CC-CS/484-WR2/SS-29553/11/C8/NOA-1&2/5727 & 5728 DT. 31.03.16

POWER GRID CORPORATION OF INDIA LIMITED
 SUBSTATION PACKAGE-SS01 FOR CONSTRUCTION OF 765/400/220KV
 BHUJ S/S & EXT. OF 765KV BANASKANTHA S/S
 UNDER GREEN ENERGY CORRIDOR ISTS PART-C (PART-1)

ADDITIONAL INFORMATION
 W.O.No. 85003
 STATUS OF DRAWING
 DISTRIBUTION OF PRINTS

REV. DATE ALTERED CHECKED APPROVED

SCALE 4:22

ZONE

PROJECT / SCALE
 NTS

SINGLE LINE DIAGRAM
 FOR 765/400/220KV BHUJ S/S.

TB-385-510-001
 SHEET No.06

POWER GRID CORPORATION OF INDIA LIMITED
 BHARAT HEAVY ELECTRICALS LTD.
 TRANSMISSION PROJECTS DIVISION

DATE / DATE 23.11.15

SK/AA AS/PS

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COMPUTER DWG. PATH NAME :

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

100-010-585-B1 ON 01MAY20

20kV, 1600A, CT
 up to 120% Extended Rating applicable for ICTM #2 and Transfer Bus Bays
 up to 150% Extended Rating applicable for Bus Coupler Bay

Core No.	Current Ratio	Accuracy Class	Output Burden VA	Min kPV (V)	Max RCT in Ohms	Max Im at kPV (mA)	Purpose
1	1600-800/1	PS	-	1600-800	8-4	25mA on 1600/1 Tap 50mA on 800/1 Tap	BUS DIFF CHECK
2	1600-800/1	PS	-	1600-800	8-4	25mA on 1600/1 Tap 50mA on 800/1 Tap	BUS DIFF MAIN
3	1600-800/1	0.2S	20	-	-	-	METERING
4	1600-800/1	PS	-	1600-800	8-4	25mA on 1600/1 Tap 50mA on 800/1 Tap	TRANS BACKUP/LINE BACKUP PROTIN
5	1600-800/1	PS	-	1600-800	8-4	25mA on 1600/1 Tap 50mA on 800/1 Tap	TRANS. DIFF. LINE PROTIN

Accuracy class PS as per IS:2705

220kV CVT:

Ratio	220KV / √3	110KV / √3	110KV / √3 / √3
Sec-I	Class - 3P, 50VA		
Sec-II	Class - 3P, 50VA		
Sec-III	Class - 0.2, 50VA		
Capacitance - 4000 pF (+10%, -5%)			

Rated Voltage Factor: 1.2 Continuous
 1.5 for 30 Seconds

72.5kV, 50A, CT

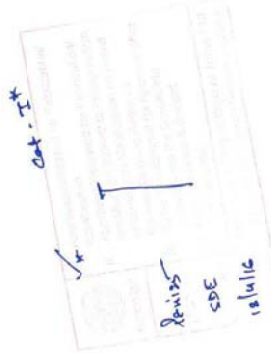
Core No.	Current Ratio	Accuracy Class	Output Burden VA	Min kPV (V)	Max RCT in Ohms	Max Im at kPV (mA)	Purpose
1	50/1	SPI0	10	-	-	-	OC & F/F
2	50/1	0.5	10	-	-	-	Metering

72.5kV VT:

Ratio	33KV / √3	110V / √3	110V / √3 / √3
Sec-I	Class - 3P, 10VA		
Sec-II	Class - 0.5, 10VA		

LEGENDS:-

- PRESENT SCOPE
- FUTURE/EXISTING SCOPE



NOTES:

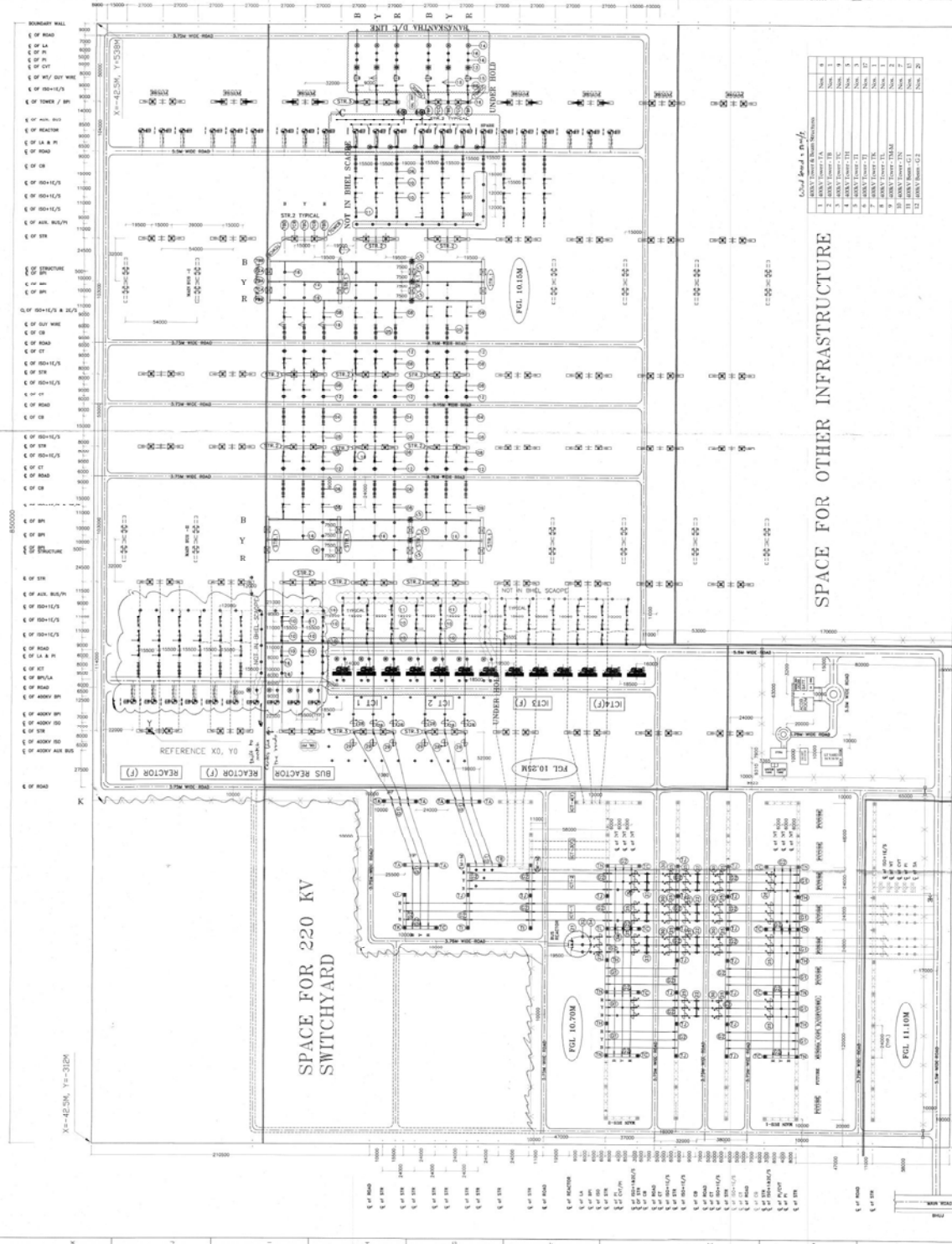
- (a) ELECTRICAL CONNECTION SHALL BE MADE MANUALLY DEPENDING UPON 765KV SIDE SWITCHING OF DIFFERENT FEEDERS OF AUTO TRANSFORMER/REACTOR.
- SUPPLY, ERECTION, TESTING & COMMISSIONING INCLUDING FORMATION OF HV, LV, NEUTRAL, TERTIARY & AUXILIARY BUSES OF 3-500MVA, (765KV / √3) / (400KV / √3), 33KV, 10 AUTO TRANSFORMERS AND LINE BUS REACTOR ARE NOT IN BHEL SCOPE.
- 765KV WAVE TRAP SHALL BE PROVIDED IN TWO PHASE ONLY.
- WAVE TRAP SHALL BE PROVIDED IN ONE PHASE ONLY.
- WAVE TRAP SHALL BE PROVIDED IN ONE PHASE ONLY.

NOA NO. : CC-CS/484-WR2/SS-2953/11/G8/NOA-1&2/5727 & 5728 DT. 31.03.16

ADDITIONAL INFORMATION W.O.No. 85003 STATUS OF DRAWING CONTRACT DISTRIBUTION OF PRINTS		NAME OF CUSTOMER/PROJECT POWER GRID CORPORATION OF INDIA LIMITED SUBSTATION PACKAGE-SS01 FOR CONSTRUCTION OF 765/400/220KV BHUJ S/S & EXT. OF 765KV BANASKANTHA S/S UNDER GREEN ENERGY CORRIDOR ISTS PART-C (PART-1)	
REV.	DATE	ALTERED BY	APPROVED BY
ZONE			
BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION		BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION	
SCALE NTS		CARD CODE 422	
SINGLE LINE DIAGRAM FOR 765/400/220KV BHUJ S/S.		DRAWING NO. TB-385-510-001	

200-010-090-011 - ALL DIMENSIONS ARE IN MM

X=42.5M, Y=312K



BILL OF MATERIALS FOR 765KV MAIN EQUIPMENTS (SMA FOR 1. SEC)

ITEM CODE	DESCRIPTION	QTY	UNIT	TYPE OF SUPPLY
1	NOV 1000/20KV	7	NOV	NOV
2	NOV 1000/20KV	7	NOV	NOV
3	NOV 1000/20KV	4	NOV	NOV
4	NOV 1000/20KV	3	NOV	NOV
5	NOV 1000/20KV	3	NOV	NOV
6	NOV 1000/20KV	3	NOV	NOV
7	NOV 1000/20KV	1	NOV	NOV
8	NOV 1000/20KV	17	NOV	NOV
9	NOV 1000/20KV	2	NOV	NOV
10	NOV 1000/20KV	13	NOV	NOV
11	NOV 1000/20KV	2	NOV	NOV
12	NOV 1000/20KV	14	NOV	NOV
13	NOV 1000/20KV	12	NOV	NOV
14	NOV 1000/20KV	14	NOV	NOV
15	NOV 1000/20KV	14	NOV	NOV
16	NOV 1000/20KV	18	NOV	NOV
17	NOV 1000/20KV	12	NOV	NOV
18	NOV 1000/20KV	19	NOV	NOV

BILL OF MATERIALS FOR 400KV MAIN EQUIPMENTS (SMA FOR 1. SEC)

ITEM CODE	DESCRIPTION	QTY	UNIT	TYPE OF SUPPLY
1	NOV 1000/20KV	9	NOV	NOV
2	NOV 1000/20KV	4	NOV	NOV
3	NOV 1000/20KV	3	NOV	NOV
4	NOV 1000/20KV	3	NOV	NOV
5	NOV 1000/20KV	17	NOV	NOV
6	NOV 1000/20KV	2	NOV	NOV
7	NOV 1000/20KV	13	NOV	NOV
8	NOV 1000/20KV	2	NOV	NOV
9	NOV 1000/20KV	14	NOV	NOV
10	NOV 1000/20KV	12	NOV	NOV
11	NOV 1000/20KV	14	NOV	NOV
12	NOV 1000/20KV	14	NOV	NOV
13	NOV 1000/20KV	18	NOV	NOV
14	NOV 1000/20KV	12	NOV	NOV
15	NOV 1000/20KV	19	NOV	NOV

DETAILS

ITEM CODE	DESCRIPTION	QTY	UNIT	TYPE OF SUPPLY
1	NOV 1000/20KV	9	NOV	NOV
2	NOV 1000/20KV	4	NOV	NOV
3	NOV 1000/20KV	3	NOV	NOV
4	NOV 1000/20KV	3	NOV	NOV
5	NOV 1000/20KV	17	NOV	NOV
6	NOV 1000/20KV	2	NOV	NOV
7	NOV 1000/20KV	13	NOV	NOV
8	NOV 1000/20KV	2	NOV	NOV
9	NOV 1000/20KV	14	NOV	NOV
10	NOV 1000/20KV	12	NOV	NOV
11	NOV 1000/20KV	14	NOV	NOV
12	NOV 1000/20KV	14	NOV	NOV
13	NOV 1000/20KV	18	NOV	NOV
14	NOV 1000/20KV	12	NOV	NOV
15	NOV 1000/20KV	19	NOV	NOV

GENERAL INFORMATION
 STATUS OF DRAWING
 REVISIONS
 APPROVALS

REVISIONS

NO.	DATE	DESCRIPTION
1		
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GENERAL INFORMATION

PROJECT NAME	765 KV/400 KV 230 KV SUBSTATION
CLIENT	STATE GRID CORPORATION OF INDIA LTD
DESIGNER	STATE GRID CORPORATION OF INDIA LTD
DATE	15/03/2011
SCALE	1:1

REVISIONS

NO.	DATE	DESCRIPTION
1		
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REVISIONS

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REVISIONS

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REVISIONS

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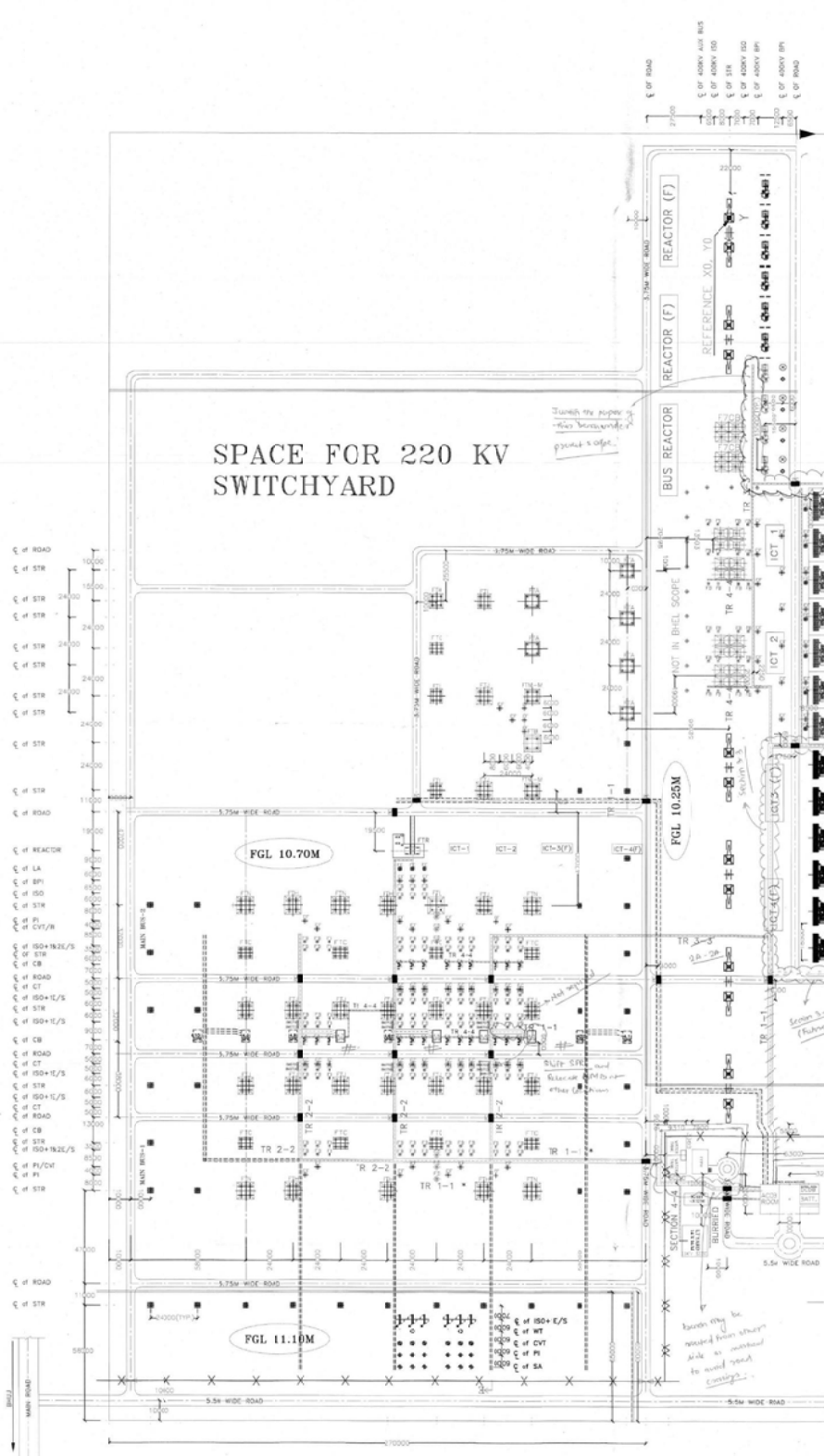
NOTES

1. ALL DIMENSIONS ARE IN M.
2. THE LOCATION OF CABLE TRENCHES MARKED IN THIS DRAWING MAY BE SLIGHTLY MODIFIED TO SUIT SITE CONDITIONS.
3. OPENINGS FOR TANGING OUT PVC PIPES TO EQUIPMENTS SHALL BE PROVIDED IN CABLE TRENCHES OPENING OF SIZE SUABLE TO DIA. AND PIPES SHALL BE PROVIDED SLOPE OF ONE PER CENT.
4. SWR - INDICATES SWR MARKING BOX.
5. SWR SHALL BE PLACED IN THE LOCATION SHOWN EXACT COORDINATES TO BE SURVEY CHECKED AT SITE.
6. CABLES SHALL BE LAY IN MULTILAYER OR CABLE SUPPORT UNLESS SPECIFIED OTHERWISE.
7. CABLE SUPPORT SHALL BE PROVIDED AT EVERY 0.5M INTERVAL.
8. HEIGHTS MUST BE CHECKED AT EVERY 1.5M INTERVAL FOR TRENCH CABLE SUPPORT.
9. ALUMINUM POWER CABLES SHALL BE LAY IN TOP TRENCH AND CONTROL CABLES IN BOTTOM TRENCH, AS PER TECHNICAL SPECIFICATION.
10. BURIED CABLES SHALL BE DONE AS PER SPECIFICATION (INSTALLATION) OF CABLES.
11. BURIED CABLES FOR LIGHTING PURPOSES SHALL BE PER SEPARATE LAYOUT.
12. LOCATION OF CABLE TRENCHES EXACT COORDINATES, REFER TO DRAWING, BE SHOWN SEPARATELY.
13. EARTH CONDUCTOR SOAS NO FLAT TO BE WELDED IN THE CABLE SUPPORT BEFORE INSTALLATION OF CABLES.
14. CABLES CROSSING ROADLINE TRENCH SHALL BE LAY IN SIDE DELIVERY.
15. FOR POWER & CONTROL, SEPARATE PIPES SHALL BE USED CONSIDERING 100 FOR EACH PIPE (I.E. 400mm TRENCH CRITERIA).
16. PLACEMENT OF AC OR DC CABLES AND ITS CABLE TRENCH IS TENTATIVE. EXACT COORDINATES TO BE SURVEY CHECKED AT SITE.
17. UNBURNED CABLES LAY IN PVC PIPES OF 80mm DIA. COVER SHAL AT DEPTH OF 300mm (MIN).
18. CABLE FROM EQUIPMENT TO CABLE TRENCH SHALL RUN IN PVC PIPES.
19. MARKED THIS (X) INDICATES CABLE ENTRY POINT FROM EQUIPMENT.
20. ALL OTHER DETAILS PERTAINING TO CIVIL WORKS SHALL BE REFLECTED IN THE RESPECTIVE CIVIL DRAWINGS.
21. PVC PIPES SHALL BE SECURELY FIRED AT BOTH ENDS, EITHER EMBEDDED IN CONCRETE OR PROPERLY CLAMPED.
22. AFTER LAYING THE CABLES, THE TRENCH OF PIPES SHALL BE FULLY GRADED TO PREVENT ACCUMULATION OF WATER INSIDE THE PIPES.
23. CONTROL CABLES & POWER CABLES MUST BE LAY IN SEPARATE PVC PIPES.
24. CABLE TRENCH SHALL BE PROVIDED ON MARKING BOX SIDE OF EQUIPMENT.
25. THE PURPOSE OF TRENCH LAYOUT DRAWING IS FOR USE AS FOLLOWS:
 - TO BE USED AS DATA INPUT FOR CABLE TRENCHING.
 - FOR ESTIMATION OF CABLE TRENCH AT SITE.
 - FOR CABLE LAYING AND ROUTING AT SITE.
26. BURIED CABLES AND SUPPORTS SHALL BE PROTECTED AFTER INSTALLATION WITH 2 LAYERS OF METAL PLATE (COMPOSITION OF RED OXIDE & ZINC CHROMATE IN A SYNTHETIC MEDIUM) FOLLOWED BY NO FINISH COAT OF ALUMINUM PAINT.
27. BURIED CABLES SHALL BE PROVIDED IN TRENCH WHERE FUTURE TRENCH EQUIPMENT PVC TERMINATED IN PRESENT SCOPE OF TRENCH.
28. SUPPORTS SHALL NOT BE PROVIDED IF REQUIRED WHERE CABLE SHALL BE LAY IN PVC PIPE.
29. LONGITUDINAL SLOPE IN CABLE TRENCH SHALL BE TYPICALLY 1:500.
30. INDICATE PIPE DIA/TYPE.
31. WORK REQUIREMENTS FOR CABLE TRENCHES SHALL BE PROVIDED ON THE FACE OF TRENCH SHALL BE DRAWN SEPARATELY.
32. FOR CABLE TRENCHING, POWER CABLE APPROVED/RELEASED SHALL BE FOLLOWED.
33. UNDERGROUND LAYING OF FIBER OPTIC CABLE SHALL BE DONE IN GI PIPE.
34. FOR CABLE TRENCHING AND CONSTRUCTION DETAILS PLEASE REFER TO THE STANDING CABLE TRENCH SECTION DRAWING FOR CONSTRUCTION OF BURIED CABLES.
35. TYPICAL DETAILS FOR PVC AND CABLE TRENCH APPROVED FOR EQUIPMENTS USE OF D.O.T. OR A SOLARSHALL SHALL BE DRAWN SEPARATELY.
36. FOR CABLE TRENCHING, WORK TO BE PROVIDED IN THIS TRENCH, CABLE SHALL BE LAY AND BOTH THE SECTION SHALL BE PROVISIONALLY FILLED FIRST.
37. BURIED CABLE TRENCH TO BE USED FOR CABLES FOR SET, THE PROTECTION POINT SHALL BE AS FOLLOWS.

REMARKS

1. TO BE USED AS DATA INPUT FOR CABLE TRENCHING AT SITE.

SPACE FOR 220 KV SWITCHYARD



REFERENCE DWG --

NO.	TITLE
TR-305-510-001	SINGLE LINE DIAGRAM 765/400V BPHU 5/5
TR-305-510-002	ELLIPSOIDAL LAYOUT PLAN FOR 765/400V BPHU 5/5
TR-305-607-601	765KV FOUNDATION LAYOUT FOR BPHU
TR-305-607-602	400KV FOUNDATION LAYOUT FOR BPHU

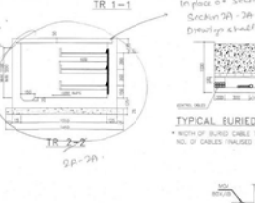


TABLE - 1

PVC PIPES CLASS 'Y' LAY FOR 0.5M DIA

NO.	DESCRIPTION	QTY	UNIT
1
2
3
4
5
6
7
8
9
10

APPROVAL INFORMATION

NO.	DATE	APPROVED	DESIGNED	CHECKED	DATE	APPROVED	DESIGNED	CHECKED	DATE	APPROVED	DESIGNED	CHECKED	DATE	APPROVED	DESIGNED	CHECKED	DATE	
1

PROJECT INFORMATION

PROJECT NAME: POWER GRID CORPORATION OF INDIA LTD

PROJECT NO: 305-510-008

DATE: 14/07/18

SCALE: AS SHOWN