

संदर्भ/Ref : CC-ENGG-TR202308-1002103-SS1907-EARTHING LAYOUT SWRD

Date : 12/03/2025

From : Somiran Das
Senior GM**To :** M S HARTEK POWER PRIVATE LIMITED
BOOTH NO 195 SECTOR 37 C CHANDI
CHANDIGARH 160036
160036**Cc :** CGM(Project)/Sr.GM(ENGG),NRTS,Faridabad**Subject :** AIS Substation Extn. Package - SS116 for i) Augmentation of transformation capacity at 400/220 kV Nalagarh S/s by 400/220 kV, 1x500 MVA ICT (4th) ii)Augmentation of transformation capacity at 400/220 kV Bikaner - II PS by 400/220 kV, 1x500 MVA ICT.**LOA Ref :** CC/NT/W-AIS/DOM/A02/23/07106/NOA-1/24-101261/01 Dated 25/01/2024

Please find enclosed following drawings/ documents for necessary action at your end.

Vendor Drg. No. : TR202308-1002103-SS1907-EARTHING LAYOUT SWRD
Orgn. Drg. No. : TR202308-1002103-SS1907-EARTHING LAYOUT SWRD
Revision No. : 03
Drg. Title : NALAGARH- OUTDOOR EARTHING LAYOUT SWITCHYARD
App. Category : CAT-I
Release Date : 12/03/2025



Scan to verify

Comments : Approved with comments**अनुमोदित श्रेणी/App. Category:**

- I. फेब्रिकेशन/निर्माण/टाइप टेस्टिंग हेतु जारी।
Approved/released for fabrication/construction.
- II. फेब्रिकेशन/निर्माण/टाइप टेस्टिंग हेतु अनुमोदित/जारी बशर्ते दिए गए टिप्पणियाँ एवं आशोधनों की सम्मिलित किया जाये। कृपया रिवाइज्ड दस्तावेज अनुमोदनार्थ प्रस्तुत करें।
Approved/released for fabrication/ construction subject to incorporation of comments and modification as noted. Revised drawing required for approval.
- III. टिप्पणियाँ सम्मिलित करने के उपरांत दस्तावेज को अनुमोदनार्थ प्रस्तुत करें।
To be resubmitted for approval after incorporating the comments.
- IV. सूचनार्थ एवं रिकार्ड हेतु।
For information and record.
- CATREL/ निर्माण हेतु जारी।
REL-CON **Released for construction.**

नोट/Note:

1. Approval/Comments conveyed herein neither relieve the contractor of his contractual obligations and his responsibilities, weights, quantities, design details assemble fits, performance particulars and conformity of the supplies with the Indian Statutory Laws as may be applicable, nor does it limits the purchaser's right under the contract.
2. The approval conveyed vide this letter does not cover the approval of make for sub-vendor items.

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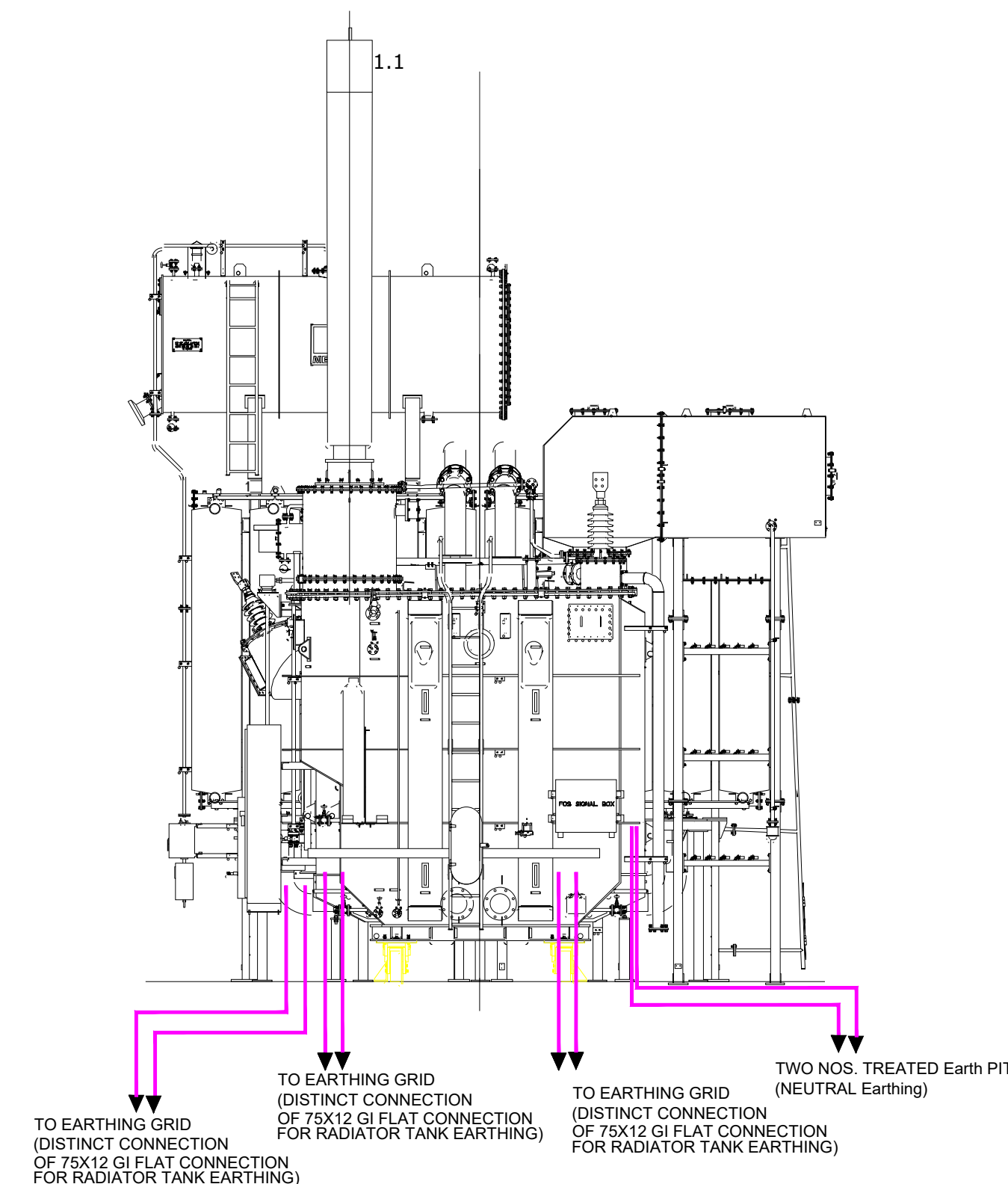
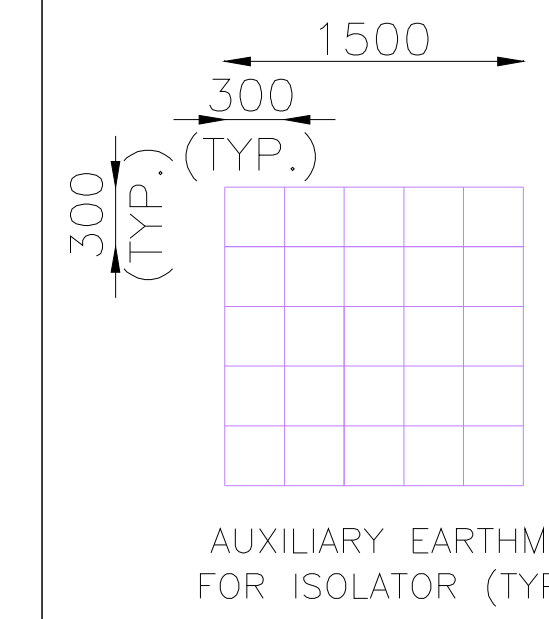
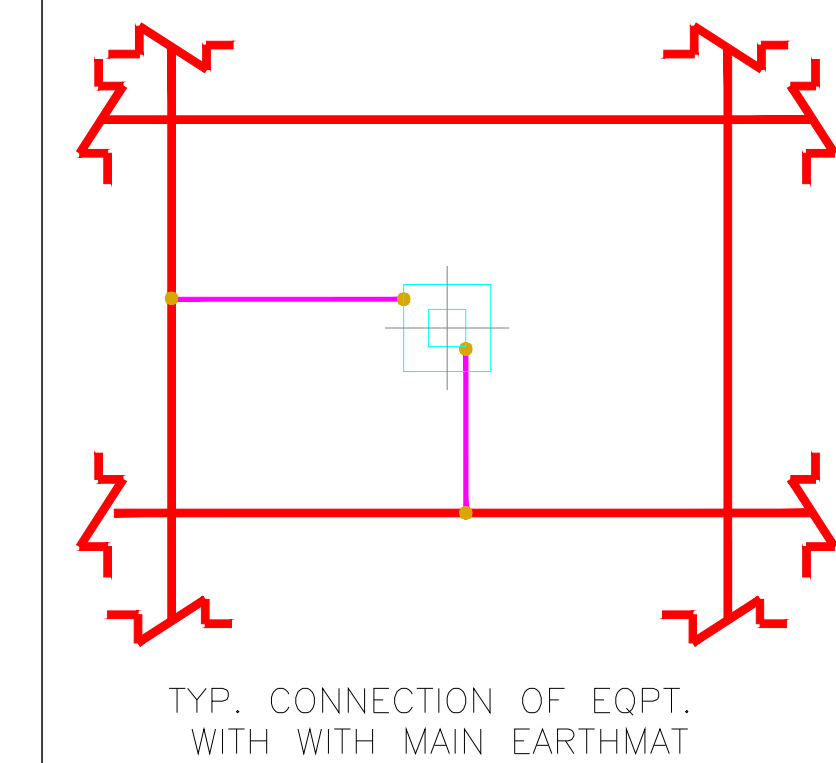
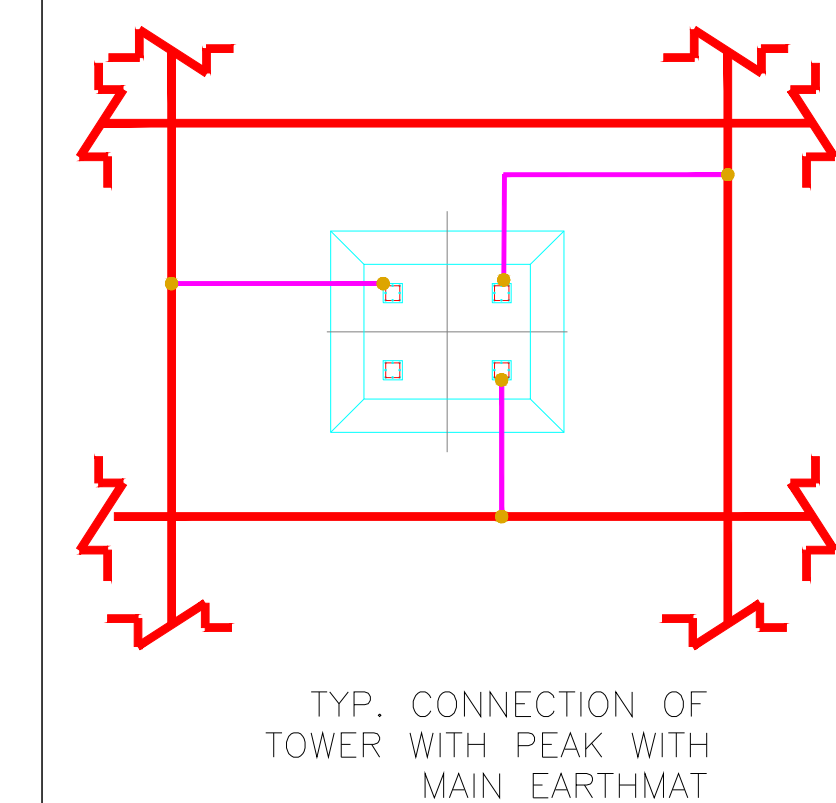
WITHOUT PRIOR CONSENT OF THE COMPANY.

HARTEK[®]**HARTEK POWER PVT. LTD.****DOCUMENT NO.****NALAGARH- OUTDOOR EARTHING LAYOUT
SWITCHYARD****TR202308-1002103-
SS1907-EARTHING
LAYOUT SWRD**
**पावरग्रिड
POWERGRID**
POWER GRID CORPORATION OF INDIA LTD.

**Project :-Substation Package SS-116 for augmentation of transformation capacity at 400/220 kV
Nalagarh S/s by 400/220 kV, 1x500 MVA ICT (4th) and augmentation of transformation capacity
at 400/220kV Bikaner-II PS by 400/220kV, 1x500MVA ICT**

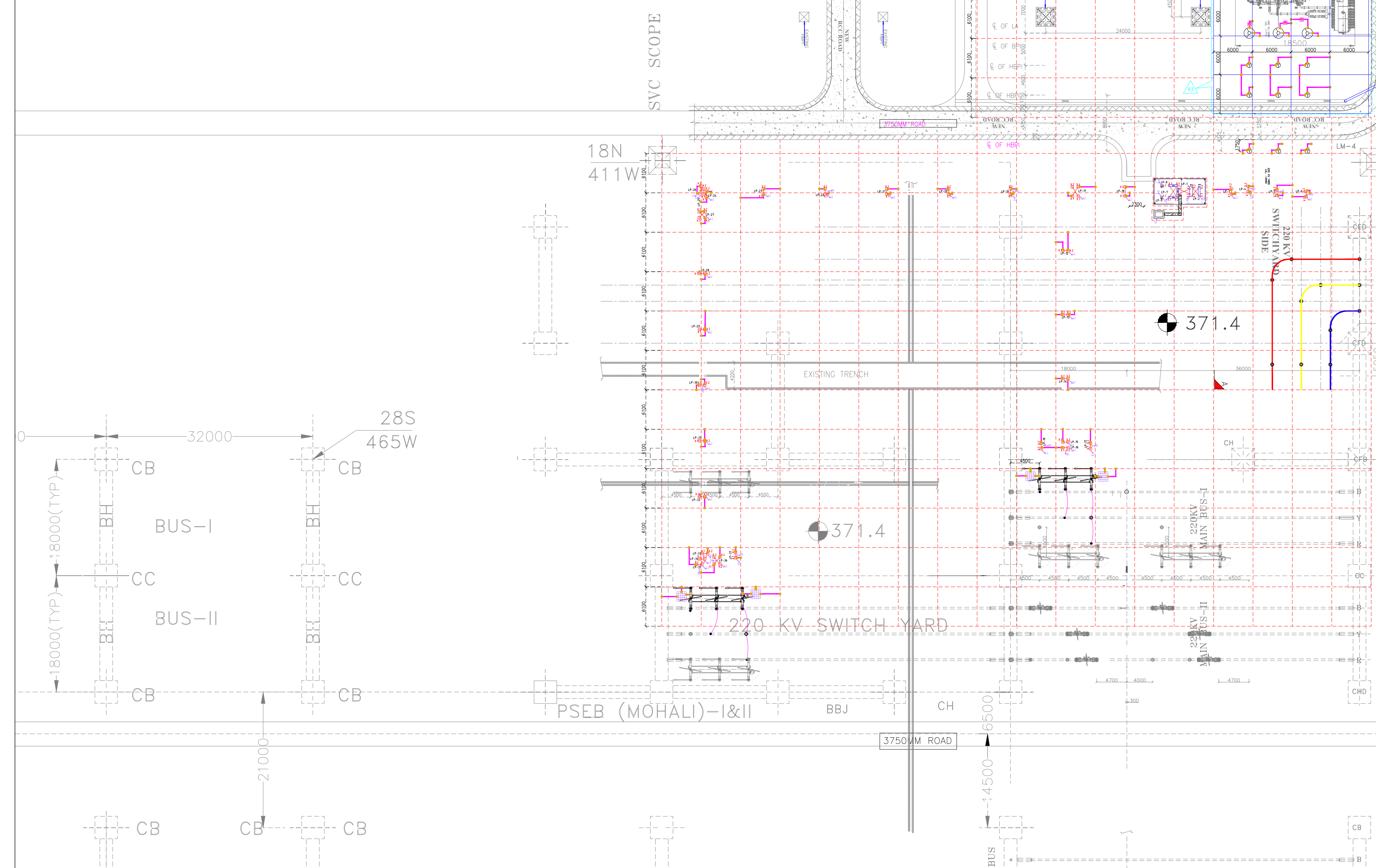
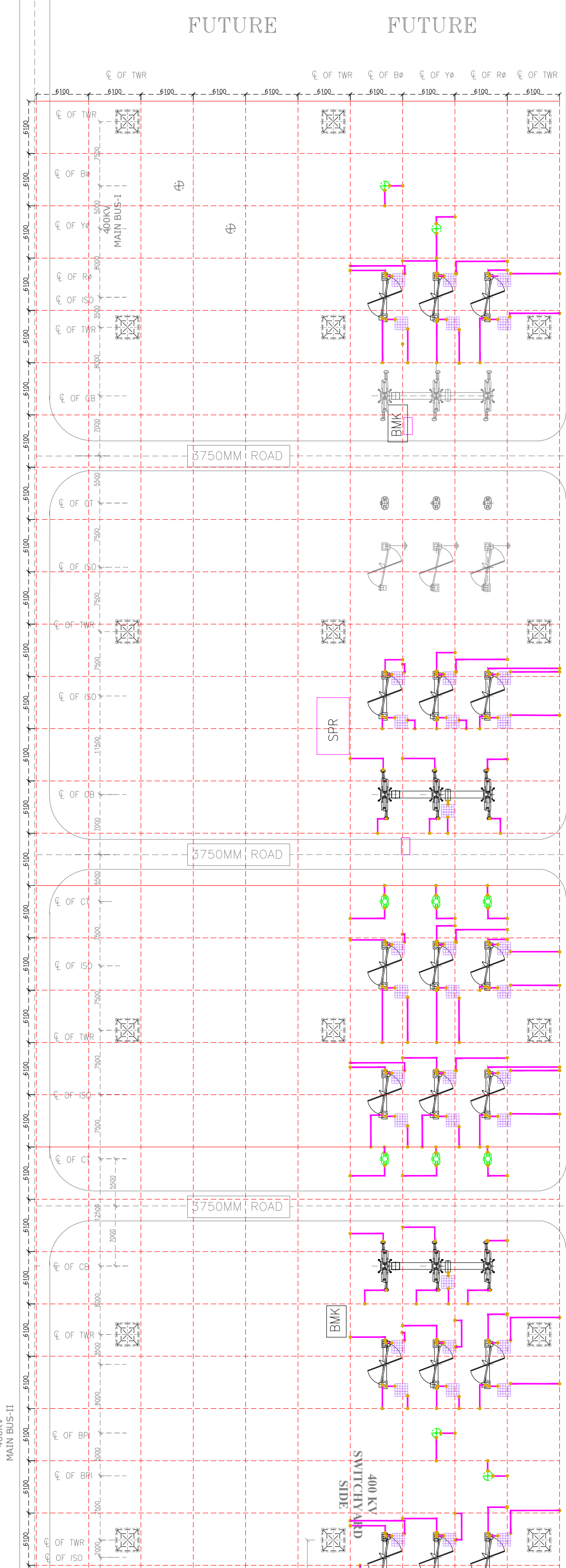
Equipment:- NALAGARH- OUTDOOR EARTHING LAYOUT SWITCHYARD**HARTEK[®]****HARTEK POWER PVT. LTD.****EPC CONTRACTOR**

REV. NO.	1		2		3		4		ISSUE
	INITIALS	SIGN.	INITIALS	SIGN.	INITIALS	SIGN.	INITIALS	SIGN.	
PPD. BY	AS		MS		NS				Rev R3
CHD. BY	RK		RK		RK				
APD. BY	KA		KA		KA				
DATE	23-01-2025		07-02-2025		28-02-2025				



LEGEND - EARTHING MATERIAL ONLY / ONLY SUPPLY OF RISERS IN SCOPE OF SIEMENS GDS			
LEGEND	DESCRIPTION	RECOMMENDED MINIMUM CONDUCTOR SIZE AND MATERIAL	SUPPLY SCOPE
	Earthing Grid around GDS (Looped / Embedded in Floor)	Flat Copper - 500 sq mm Conductor for outdoor earthing system to be designed by Substation designer for full length of 500kV or 115kV	EPC Contractor
	Earthing connection to Circuit Breaker	Copper Cable - 2x120 sq mm	SIEMENS
	Earthing connection to Pinned Steel Structure	Copper Cable - 2x120 sq mm	SIEMENS
	Earthing connection to Outdoor Steel Structure	Copper Cable - 2x120 sq mm / FLAT GDS 175x2 sq mm (Refer Note-A)	EPC Contractor
	Earthing connection to LCC	Copper Cable - 1x120 sq mm	SIEMENS
	Connection between Main Earthing and Foundation earthing	Flat Copper - 500 sq mm / FLAT GDS 175x2 sq mm (Refer Note-A)	EPC Contractor
	Connection between Main Earthing and Foundation and Outdoor grid	Flat Copper - 500 sq mm / FLAT GDS 175x2 sq mm (Refer Note-A)	EPC Contractor
	Earthing connection to Bonding Plating	Flat Copper - 500 sq mm / FLAT GDS 175x2 sq mm (Refer Note-A)	SIEMENS

NOTE:
A:-Bimetallic strip/washer shall be used at junction of dissimilar material of earthing conductor and shall be procured by EPF.



LEGEND:-

- : EXISTING MAIN EARTHMAT /GRID(40 DIA M.S RO
- : 75X12 G.S FLAT-EARTHING CONDUCTOR
- : PRESENT MAIN EARTHMAT /GRID(40 DIA M.S RO

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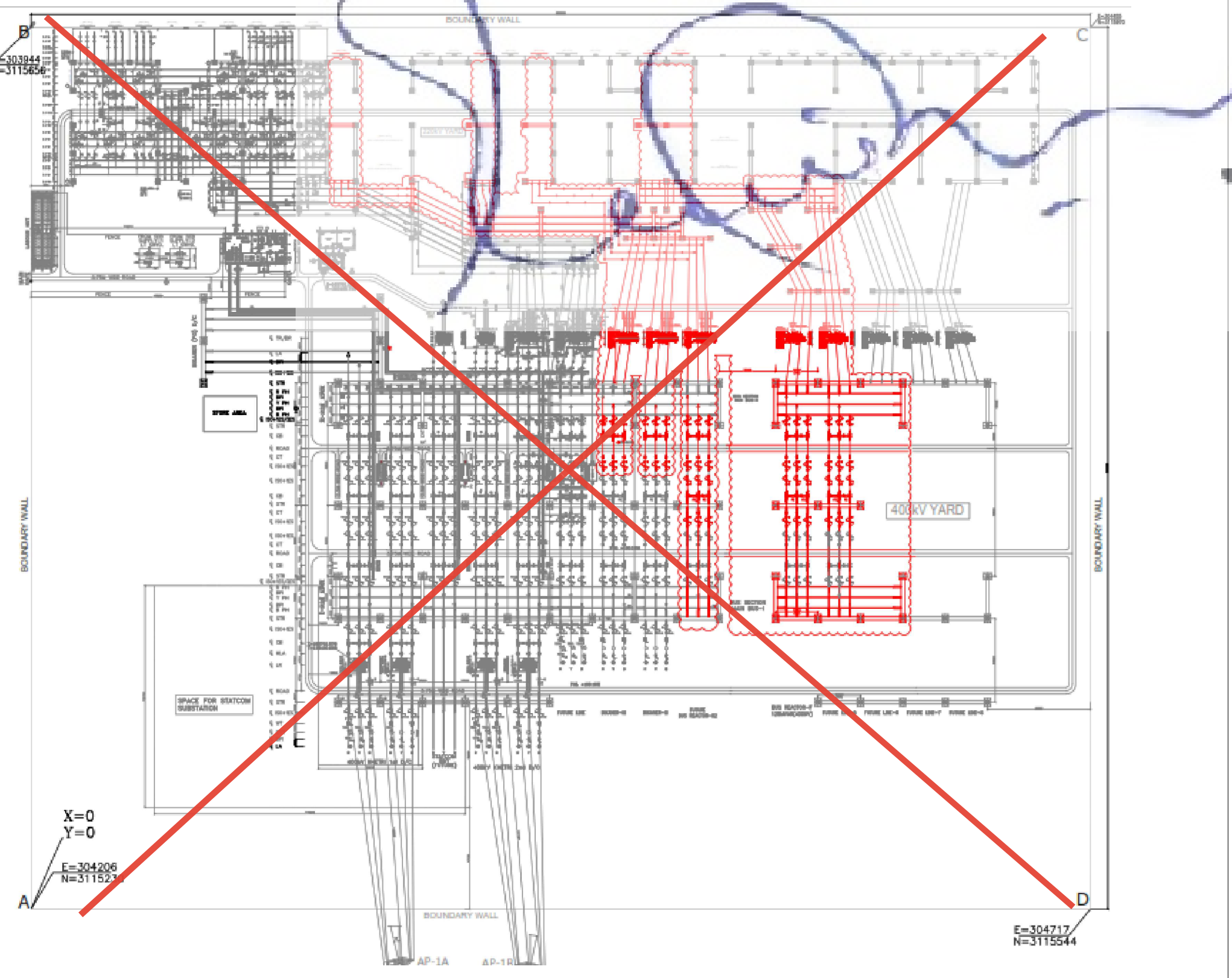
EARTHING BILL OF QUANTITIES						
S.No.	EQPT.	DESCRIPTION	UNITS	QTY.	REMARKS	
1.		75X12 G.I FLAT-EARTHING CONDUCTOR (ABOVE GROUND RISER)	MTR.	700	(*)	
2.		40 MM MS ROD FOR MAIN EARTHMAT	MTR.	00	(NA)EXISTING	
3.		40 MM MS ROD (RISEER FROM MAIN EARTHMAT (40 MM DIA MS ROD)	MTR.	1300	(*)	
4.		40 MM MS ROD (AUXILIARY MAT FOR ISOLATOR)	MTR.	700	(*)	
5.		40 MM MS ROD (MAIN EARTHMAT FOR ICT-4 (40 MM DIA MS ROD)	MTR.	300	RE-INSTALLATION AS EXISTING EARTHMAT GRID DAMAGED DURING EXCAVATION	
6.		40 MM DIA 3MTR LONG MS ROD ELECTRODE WITH UNTREATED PIT	NOS.	08	(*)	
7.		40 MM DIA 3MTR LONG GI PIPE ELECTRODE WITH TREATED PIT	NOS.	02	(*)	
8.		50X6 MM GI FLAT (MOM.BMK,J.B.PANEL)	MTR.	350	(*)	
9.		50X6 MM MS FLAT (CABLE TRENCH EARTHING)	MTR.	150	(*)	

*EARTHING CONDUCTOR PROVIDED BY M/S HARTEK UNDER "ERECTION HARDWARE" LINE ITEM OF BPS

REFERENCE DRAWINGS:

1. ELECTRICAL LAYOUT PLAN DRAWING NUMBER: TR202308-1002103-SS1907-ELECT-LAY REV-00

CLIENT :	POWER GRID CORPORATION OF INDIA LIMITED				
PROJECT :	SUBSTATION PACKAGE FOR SS-116 FOR AUGMENTATION OF TRANSFORMATION CAPACITY AT 400 / 220 KV NALAGARH S/s BY 400 / 200 KV, 1X500 MVA ICT (4th) AND AUGMENTATION OF TRANSFORMATION CAPACITY AT 400/220KV BIKANER-II PS BY 400/220KV, 1X500MVA ICT				
EPC CONTRACTOR:	HARTEK POWER PRIVATE LIMITED				
	DATE	NAME	DRG TITLE. NALAGARH- OUTDOOR EARTHING LAYOUT SWITCHYARD		
DRAWN	27-02-2025	AS			
CHECKED	27-02-2025	RK			
APPROVED	27-02-2025	KA			
PROJECT SITE COORDINATES					
SCALE : NTS					
DRG. NO.: TR202308-1002103-SS1907-EARTHING LAYOUT SWRD			SHT: 01 OF 02		REV. 3



(KEY PLAN)

LEGEND:-
: EXISTING MAIN EARTHMAT /GRI40 DIA M.S ROD
: 75X12 G.S FLAT-EARTHING CONDUCTOR
: PRESENT MAIN EARTHMAT /GRI40 DIA M.S ROD

- NOTES:-
01. ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE SPECIFIED.
 02. THE EARTHING SYSTEM INSTALLATION WORK SHALL CONFORM TO THE REQUIREMENTS OF THE EDITIONS OF THE FOLLOWING STANDARDS/CODES:
(A) IS 3043
(B) IEEE STD. 98
 03. THE DRAWING IS ONLY DIAGRAMMATIC REPRESENTATION OF EARTHING CONDUCTOR LAYOUT AT ACTUAL POSITION. CONDUCTOR SHALL BE ROUTED IN SUCH MANNER SO THAT IT DOES NOT HINDER WITH ANY FOUNDATION BUILDING ETC.
 04. GROUNDING MAT LAY MAY BE BURIED GENERALLY AT A DEPTH OF 300mm BELOW FINISHED GROUND LEVEL. A MINIMUM GROUND COVERAGE OF 200mm SHALL BE PROVIDED BETWEEN THE GROUND MAT CONDUCTOR AND THE BOTTOM OF TRENCHES. UNDERGROUND PIPES ETC. THE GROUND MAT CONDUCTOR SHALL BE ROUTED IN CASE IT COULD WITH EQUIPMENT FOUNDATIONS.
 05. AN ADDITIONAL AUXILIARY GRID OF 1500X1500mm COMPRISING OF CLOSELY SPACED (300mmX300mm) 400 MAIN CONDUCTORS AT A DEPTH OF 300mm FROM FINISHED GRADE LEVEL SHALL BE PROVIDED BELOW THE OPERATING HANDLE OF EACH ISOLATOR MAIN OPERATING BOX AND EARTH SWITCH OPERATING BOX. THIS GRID SHALL ALSO BE CONNECTED TO THE MAIN GROUND GRID.
 06. ONE NUMBER 40mm DIA 3000mm LONG MS EARTH ELECTRODE WITH TEST LINK CI FRAME AND COVER SHALL BE PROVIDED TO CONNECT EACH DOWN CONDUCTOR OR SURGE ARRESTERS CAPACITIVE VOLTAGE TRANSFORMER LIGHTNING MASTS AND TOWERS WITH FEAR ALSO FOR SURGE CAPACITORS & POTENTIAL TRANSFORMER.
 07. 200mm X60mm MS FLAT SHALL RUN ON THE TOP TIE AND ALL ALONG THE CABLE TRENCHES AND THE SAME WELDED TO EACH OF THE BACKS. FURTHER THIS FLAT SHALL BE EARTHED AT BOTH ENDS AND AT AN INTERVAL OF 30M. THE MS FLAT SHALL BE FINALLY EARTHED WITH TWO COATS OF RED OXIDE PRIMER AND TWO COATS OF POST OFFICE RED OXIDE PRIMER AND TWO COATS OF POST OFFICE RED EXAMINE PAINT.
 08. THE 75mmX12mm G.I. FLAT SHALL BE CLAMPED WITH THE EQUIPMENT SUPPORT STRUCTURE AT 1000mm INTERVAL.
 09. ALL GROUND MAT CONNECTION BELOW GROUND LEVEL SHALL BE DONE BY WELDING. THE CONTACT SURFACES SHALL BE THOROUGHLY CLEANED TO PROVIDE GOOD ELECTRICAL CONTACT.
 10. ALL TOWERS AND SUPPORT ELECTRICAL EQUIPMENT AND ASSOCIATED NON ALIBENT CARRYING METAL WORKS SUPPORTING STRUCTURE SHALL BE EARTHED TO EARTHING GRID. THE EARTHING SHALL BE DONE BY WELDING. THE CONTACT SURFACES SHALL BE THOROUGHLY CLEANED TO PROVIDE GOOD ELECTRICAL CONTACT.
 11. EARTHING CONDUCTOR FOR FENCE ALONG BOUNDARY WALL SHALL BE LAID AS CLOSE AS POSSIBLE TO THE BOUNDARY WALL. ALL GATES & EVERY ALTERNATE FENCE POST BE CONNECTED TO EARTH GRID. EARTHING CONDUCTOR SHALL BE BURIED 200mm OUTSIDE THE SWITCHYARD FENCE.
 12. EARTHING CONDUCTOR CROSSING ROAD SHALL BE LAID 300mm BELOW ROAD OR GREATER DEPTH.
 13. EARTHING CONDUCTOR EMBEDDED IN THE CONCRETE SHALL HAVE APPROX. 50mm CONCRETE COVER.
 14. ALL THE EQUIPMENT AND GANTRY STRUCTURES ARE TO BE CONNECTED TO THE MAIN GROUNDING CONDUCTOR 400 ROD AT TWO POINTS DIAGONALLY OPPOSITE WHETHER THEY ARE SHOWN OR NOT.
 15. EARTHING CONDUCTOR SHALL BE BURIED 200mm OUTSIDE THE SWITCHYARD FENCE. ALL THE GATE AND EVERY ALTERNATE POST OF THE FENCE SHALL BE CONNECTED TO EARTHING GRID. THE STONE SPREADING SHALL ALSO BE DONE 200mm OUTSIDE SWITCHYARD FENCE. THE CRITERION FOR STONE SPREADING SHALL BE FOLLOWED IN LINE WITH REQUIREMENT IN THE SPECIFICATION.
 16. WHETHER SPECIFICALLY SHOWN IN DRAWINGS OR NOT STEEL/ROD COLUMNS METALLIC STAIRS ETC. SHALL BE CONNECTED TO THE NEARBY EARTHING GRID CONDUCTOR BY TWO EARTHING LEAD ELECTRICAL CONTINUITY SHALL BE ENSURED BY BONDING.
 17. FOR DETAIL EARTHING PLEASE REFER DRG. STANDARD EARTHING DETAILS. C/ENG/STD/EARTHING IN SECTION SWITCHYARD ERECTION REV NO.10.
 18. FOR EARTHING DETAILS OF INDIVIDUAL EQUIPMENT TO MAIN GRID AND WELDING/RISER DETAILS PLEASE REFER TO TECHNICAL SPECIFICATION SECTION SWITCHYARD ERECTION (C/ENG/SPEC/SE REV NO.10).
 19. THE EARTH MAT OF 200X6 G.S IS EXISTING.

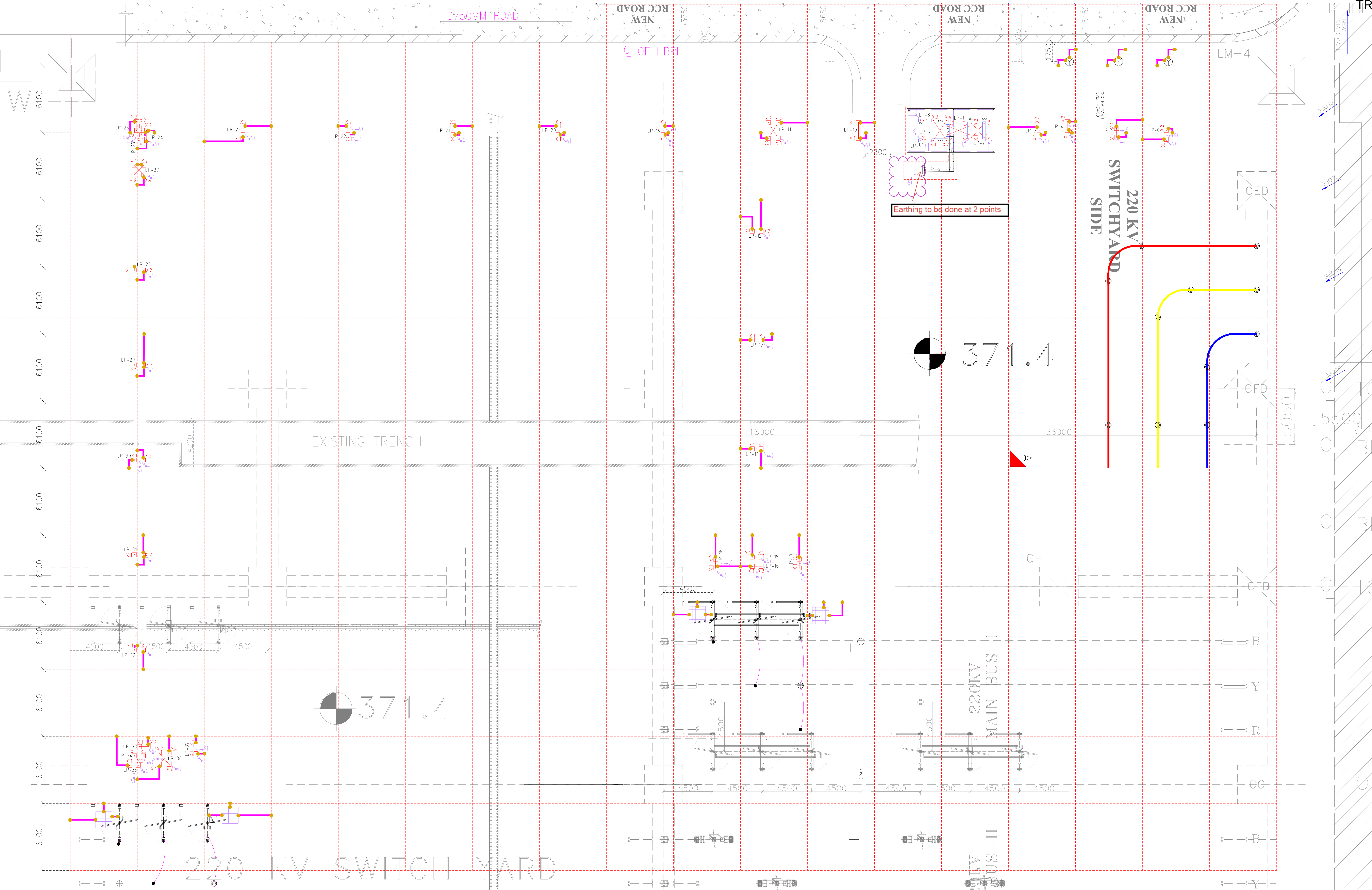
EARTHING BILL OF QUANTITIES

S.No.	Eqpt.	DESCRIPTION	UNITS	QTY.	REMARKS
1.		75X12 G.I. FLAT-EARTHING CONDUCTOR (ABOVE GROUND RISER)	MTR	700	(*)
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3.		40 MM MS ROD (RISER FROM MAIN EARTHMAT (40 MM DIA MS ROD)	MTR.	1300	(*)
4.		40 MM MS ROD (AUXILIARY MAT FOR ISOLATOR)	MTR.	700	(*)
5.		40 MM MS ROD (MAIN EARTHMAT FOR ICT-4 (40 MM DIA MS ROD)	MTR.	300	RE-INSTALLATION AS EXISTING EARTHMAT GRID DAMAGED DURING EXCAVATION
6.		40 MM DIA 3MTR LONG MS ROD ELECTRODE WITH UNTREATED PIT	NOS.	08	(*)
7.		40 MM DIA 3MTR LONG GI PIPE ELECTRODE WITH TREATED PIT	NOS.	02	(*)
8.		50X6 MM GI FLAT (MOM,BMK,J.B.PANEL)	MTR.	350	(*)
9.		50X6 MM MS FLAT (CABLE TRENCH EARTHING)	MTR.	150	(*)

*EARTHING CONDUCTOR PROVIDED BY M/S HARTEK UNDER "ERECTION HARDWARE" LINE ITEM OF BPS

REFERENCE DRAWINGS:

1. ELECTRICAL LAYOUT PLAN DRAWING NUMBER: TR202308-1002103-SS1907-ELECT-LAY REV-06



LEGEND - EARTHING MATERIAL (ONLY SUPPLY OF RISERS IN SCOPE OF SIEMENS GIS)

LEGEND	DESCRIPTION	RECOMMENDED MINIMUM CONDUCTOR SIZE AND MATERIAL	SUPPLY SCOPE
— — —	Earthing Grid around GIS (exposed / embedded in floor)	Flat Copper - 50x6 mm ² Connection to outdoor earthing system to be designed by Substation designer for fault level of 50kA for 1 Sec	EPC Contractor
● ↗	(1) Earthing connection to Circuit Breaker	Copper Cable - 2x120 sq.mm	SIEMENS
● ↗	(2) Earthing connection to Plinth Steel Structure	Copper Cable - 2x120 sq.mm	SIEMENS
● ↗	(3) Earthing connection to Outdoor Steel Structure	Copper Cable - 2x120 sq.mm/ FLAT GI 75x12 sq.mm (Refer Note-A)	EPC Contractor
● ↗	(4) Earthing connection to LCC	Copper Cable - 1x120 sq.mm x 2	SIEMENS
● ↗	(5) Connection between main Earthing and Foundation earthing	Flat Copper - 50x6 sq.mm/ FLAT GI 75x12 sq.mm (Refer Note-A)	EPC Contractor
● ↗	(6) Connection between Main grid, Foundation grid & Outdoor grid	Flat Copper - 50x6 sq.mm/ FLAT GI 75x12 sq.mm (Refer Note-A)	EPC Contractor
● ↗	(7) Earthing connection to Bonding Plate	Flat Copper - 50x6 sq.mm/ FLAT GI 75x12 sq.mm (Refer Note-A)	SIEMENS

NOTE:

A:-Bimetallic strip/washer shall be used at junction of dissimilar material of earthing conductor and shall be procured by EPF.

CLIENT :	POWER GRID CORPORATION OF INDIA LIMITED					
PROJECT :	SUBSTATION PACKAGE FOR SS-116 FOR AUGMENTATION OF TRANSFORMATION CAPACITY AT 400 / 220 KV NALAGARH S/s BY 400 / 200 KV, 1X500 MVA ICT (4th) AND AUGMENTATION OF TRANSFORMATION CAPACITY AT 400/220KV BIKANER-II PS BY 400/220KV, 1X500MVA ICT					
EPC CONTRACTOR:	HARTEK POWER PRIVATE LIMITED					
	DATE	NAME	DRG TITLE. NALAGARH- OUTDOOR EARTHING LAYOUT SWITCHYARD			
DRAWN	27-02-2025	AS				
CHECKED	27-02-2025	RK				
APPROVED	27-02-2025	KA				
PROJECT SITE CORDINATES						
SCALE : NTS						
DRG. NO.:			TR202308-1002103-SS1907-EARTHING LAYOUT SWRD		SHT: 02 OF 02	REV. 3