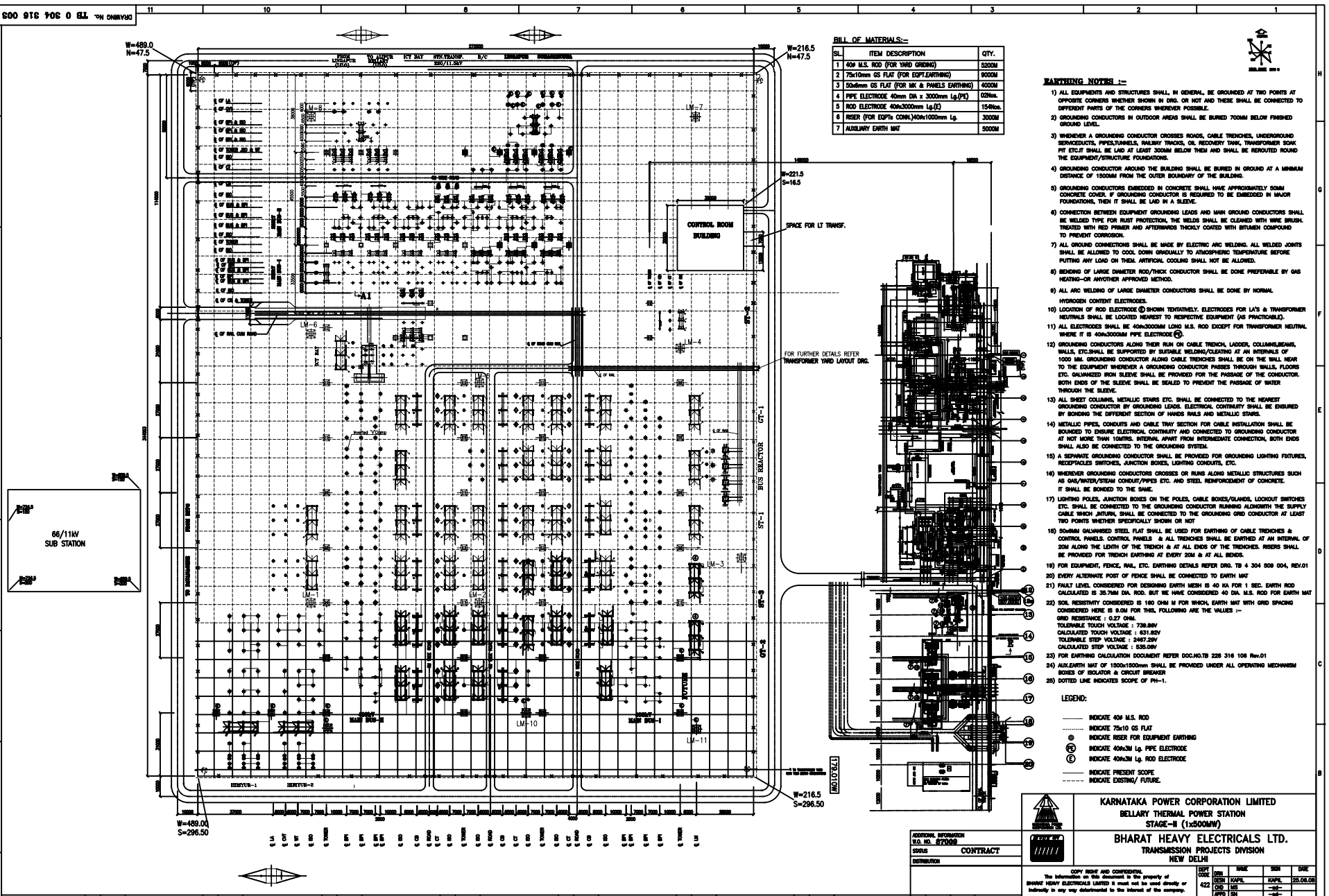
FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB 0 304 316 003



BILL OF MATERIALS:-

SL.	ITEM DESCRIPTION	QTY.
1	40ϕ M.S. ROD (FOR YARD GRIDING)	5200M
2	75x10mm GS FLAT (FOR EQPT.EARTHING)	9000M
3	50x6mm GS FLAT (FOR MK & PANELS EARTHING)	4000M
4	PIPE ELECTRODE 40mm DIA x 3000mm Lg.(PE)	02Nos.
5	ROD ELECTRODE 40ϕx3000mm Lg.(E)	154Nos.
6	RISER (FOR EQPTs CONN.)40ϕx1000mm Lg.	3000M
7	AUXILIARY EARTH MAT	5000M

EARTHING NOTES :-

1) ALL EQUIPMENTS AND STRUCTURES SHALL, IN GENERAL, BE GROUNDED AT TWO POINTS AT OPPOSITE CORNERS WHETHER SHOWN IN DRG. OR NOT AND THESE SHALL BE CONNECTED TO DIFFERENT PARTS OF THE CORNERS WHEREVER POSSIBLE.
2) GROUNDING CONDUCTORS IN OUTDOOR AREAS SHALL BE BURIED 700MM BELOW FINISHED GROUND LEVEL.
3) WHENEVER A GROUNDING CONDUCTOR CROSSES ROADS, CABLE TRENCHES, UNDERGROUND SERVICEDUCTS, PIPES,TUNNELS, RAILWAY TRACKS, OIL RECOVERY TANK, TRANSFORMER SOAK PIT ETC.IT SHALL BE LAID AT LEAST 300MM BELOW THEM AND SHALL BE REROUTED ROUND THE EQUIPMENT/STRUCTURE FOUNDATIONS.
4) GROUNDING CONDUCTOR AROUND THE BUILDING SHALL BE BURIED IN GROUND AT A MINIMUM DISTANCE OF 1500MM FROM THE OUTER BOUNDARY OF THE BUILDING.
5) GROUNDING CONDUCTORS EMBEDDED IN CONCRETE SHALL HAVE APPROXIMATELY 50MM CONCRETE COVER. IF GROUNDING CONDUCTOR IS REQUIRED TO BE EMBEDDED IN MAJOR FOUNDATIONS, THEN IT SHALL BE LAID IN A SLEEVE.
6) CONNECTION BETWEEN EQUIPMENT GROUNDING LEADS AND MAIN GROUND CONDUCTORS SHALL BE WELDED TYPE FOR RUST PROTECTION, THE WELDS SHALL BE CLEANED WITH WIRE BRUSH. TREATED WITH RED PRIMER AND AFTERWARDS THICKLY COATED WITH BITUMEN COMPOUND TO PREVENT CORROSION.
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 THEM. ARTIFICIAL COOLING SHALL NOT BE ALLOWED.
8) BENDING OF LARGE DIAMETER ROD/THICK CONDUCTOR SHALL BE DONE PREFERABLE BY GAS HEATING--OR ANYOTHER APPROVED METHOD.
9) ALL ARC WELDING OF LARGE DIAMETER CONDUCTORS SHALL BE DONE BY NORMAL HYDROGEN CONTENT ELECTRODES.
10) LOCATION OF ROD ELECTRODE (E) SHOWN TENTATIVELY. ELECTRODES FOR LA'S & TRANSFORMER NEUTRALS SHALL BE LOCATED NEAREST TO RESPECTIVE EQUIPMENT (AS PRACTICABLE).
11) ALL ELECTRODES SHALL BE 40ϕx3000MM LONG M.S. ROD EXCEPT FOR TRANSFORMER NEUTRAL WHERE IT IS 40ϕx3000MM PIPE ELECTRODE (PE).
12) GROUNDING CONDUCTORS ALONG THEIR RUN ON CABLE TRENCH, LADDER, COLUMNS,BEAMS, WALLS, ETC.SHALL BE SUPPORTED BY SUITABLE WELDING/CLEATING AT AN INTERVALS OF 1000 MM. GROUNDING CONDUCTOR ALONG CABLE TRENCHES SHALL BE ON THE WALL NEAR TO THE EQUIPMENT WHEREVER A GROUNDING CONDUCTOR PASSES THROUGH WALLS, FLOORS ETC. GALVANIZED IRON SLEEVE SHALL BE PROVIDED FOR THE PASSAGE OF THE CONDUCTOR. BOTH ENDS OF THE SLEEVE SHALL BE SEALED TO PREVENT THE PASSAGE OF WATER THROUGH THE SLEEVE.
13) ALL SHEET COLUMNS, METALLIC STAIRS ETC. SHALL BE CONNECTED TO THE NEAREST GROUNDING CONDUCTOR BY GROUNDING LEADS. ELECTRICAL CONTINUITY SHALL BE ENSURED BY BONDING THE DIFFERENT SECTION OF HANDS RAILS AND METALLIC STAIRS.
14) METALLIC PIPES, CONDUITS AND CABLE TRAY SECTION FOR CABLE INSTALLATION SHALL BE BOUNDED TO ENSURE ELECTRICAL CONTINUITY AND CONNECTED TO GROUNDING CONDUCTOR AT NOT MORE THAN 10MTRS. INTERVAL APART FROM INTERMEDIATE CONNECTION, BOTH ENDS SHALL ALSO BE CONNECTED TO THE GROUNDING SYSTEM.
15) A SEPARATE GROUNDING CONDUCTOR SHALL BE PROVIDED FOR GROUNDING LIGHTING FIXTURES, RECEPTACLES SWITCHES, JUNCTION BOXES, LIGHTING CONDUITS, ETC.
16) WHEREVER GROUNDING CONDUCTORS CROSSES OR RUNS ALONG METALLIC STRUCTURES SUCH AS GAS/WATER/STEAM CONDUIT/PIPES ETC. AND STEEL REINFORCEMENT OF CONCRETE. IT SHALL BE BONDED TO THE SAME.
17) LIGHTING POLES, JUNCTION BOXES ON THE POLES, CABLE BOXES/GLANDS, LOCKOUT SWITCHES ETC. SHALL BE CONNECTED TO THE GROUNDING CONDUCTOR RUNNING ALONGWITH THE SUPPLY CABLE WHICH „NTURN, SHALL BE CONNECTED TO THE GROUNDING GRID CONDUCTOR AT LEAST TWO POINTS WHETHER SPECIFICALLY SHOWN OR NOT
18) 50x6MM GALVANISED STEEL FLAT SHALL BE USED FOR EARTHING OF CABLE TRENCHES & CONTROL PANELS. CONTROL PANELS & ALL TRENCHES SHALL BE EARTHED AT AN INTERVAL OF 20M ALONG THE LENTH OF THE TRENCH & AT ALL ENDS OF THE TRENCHES. RISERS SHALL BE PROVIDED FOR TRENCH EARTHING AT EVERY 20M & AT ALL BENDS.
19) FOR EQUIPMENT, FENCE, RAIL, ETC. EARTHING DETAILS REFER DRG. TB 4 304 509 004, REV.01
20) EVERY ALTERNATE POST OF FENCE SHALL BE CONNECTED TO EARTH MAT
21) FAULT LEVEL CONSIDERED FOR DESIGNING EARTH MESH IS 40 KA FOR 1 SEC. EARTH ROD CALCULATED IS 35.7MM DIA. ROD. BUT WE HAVE CONSIDERED 40 DIA. M.S. ROD FOR EARTH MAT
22) SOIL RESISTIVITY CONSIDERED IS 160 OHM M FOR WHICH, EARTH MAT WITH GRID SPACING CONSIDERED HERE IS 9.0M FOR THIS, FOLLOWING ARE THE VALUES :-
GRID RESISTANCE : 0.27 OHM.
TOLERABLE TOUCH VOLTAGE : 739.86V
CALCULATED TOUCH VOLTAGE : 631.92V
TOLERABLE STEP VOLTAGE : 2467.29V
CALCULATED STEP VOLTAGE : 535.08V
23) FOR EARTHING CALCULATION DOCUMENT REFER DOC.NO.TB 225 316 108 Rev.01
24) AUX.EARTH MAT OF 1500x1500mm SHALL BE PROVIDED UNDER ALL OPERATING MECHANISM BOXES OF ISOLATOR & CIRCUIT BREAKER
25) DOTTED LINE INDICATES SCOPE OF PH-1.

LEGEND:

——— INDICATE 40ϕ M.S. ROD
..... INDICATE 75x10 GS FLAT
● INDICATE RISER FOR EQUIPMENT EARTHING
(PE) INDICATE 40ϕx3M Lg. PIPE ELECTRODE
(E) INDICATE 40ϕx3M Lg. ROD ELECTRODE
——— INDICATE PRESENT SCOPE
- - - - - INDICATE EXISTING/ FUTURE.

KARNATAKA POWER CORPORATION LIMITED
BELLARY THERMAL POWER STATION
STAGE-II (1x500MW)

BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION PROJECTS DIVISION
NEW DELHI

ADDITIONAL INFORMATION
W.O. NO. 87099
STATUS CONTRACT
DISTRIBUTION

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DEPT CODE	DRN	NAME	SIGN	DATE
422	DSGN	KAPIL	KAPIL	25.06.08
	CHD	MS		
	APPD	SM		

TITLE
EARTHING LAYOUT PLAN OF 400/220kV SWITCHYARD EXT.

DEPT. SCALE 1:825
SIGN
DATE
DRAWING NO. TB 0 304 316 003
SHEET 01 OF 01 REV. 01

REV.	DATE	ALTERED / CHECKED / APPROVED	ZONE
01	13.10.08	CHECKED MS/MK	

PAPER SIZE-A0

PLOT ON W/P PAN	THICK.
ALL	0.20
8,9	0.09
181	0.35
114	0.25