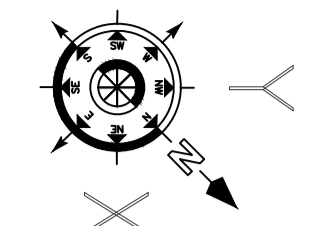
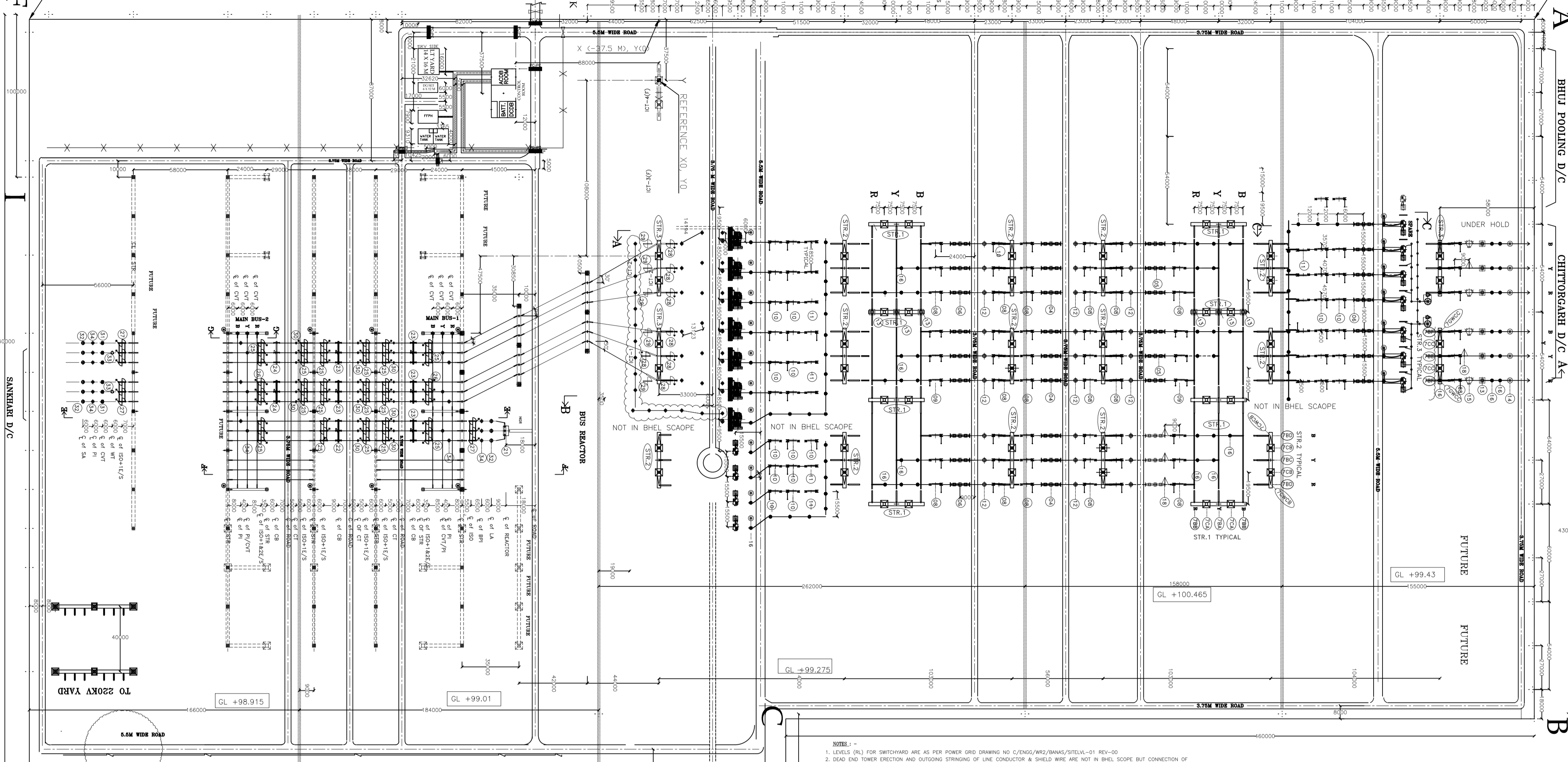


FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)



X=-37.5M, Y=-387M

X=-37.5M, Y=538M



BILL OF QTY. FOR 765kV MAIN EQUIPMENTS (50KA FOR 1 SEC)

ITEM Code	DESCRIPTION	RATING	QTY. (NET)	QTY. (PART-1)	SYMBOL	SCOPE OF SUPPLY
1	500 MVA, 3-Phase AUTOTRANSFORMER	765/400/33kV	7	7		PGCIL
2	100MVAR LINE REACTOR (1-Phase)	765kV	7	7		PGCIL
3	100MVAR BUS REACTOR (1-Phase)	765kV	4	4		PGCIL
4	SF6 CIRCUIT BREAKER WITH CR, WITH CSS (3-Phase)	3150A	3	3		PGCIL
5	SF6 CIRCUIT BREAKER WITH CR, WITHOUT CSS (3-Phase)	3150A	2	2		PGCIL
6	SF6 CIRCUIT BREAKER WITHOUT CR, WITH CSS (3-Phase)	3150A	5	5		PGCIL
7	SF6 CIRCUIT BREAKER WITHOUT CR, WITHOUT CSS (1-Phase)	3150A	1	1		PGCIL
8	ISOLATOR WITH ONE E/SW (3 Phase) VERTICAL KNEE TYPE	3150A	17	17		BHEL
9	ISOLATOR WITH TWO E/SW (3 Phase) VERTICAL KNEE TYPE	3150A	2	2		BHEL
10	ISOLATOR WITH ONE E/SW (1 Phase) VERTICAL KNEE TYPE	2000A	33	33		BHEL
11	ISOLATOR WITHOUT E/SW (1 Phase) VERTICAL KNEE TYPE	2000A	12	12		BHEL
12	CURRENT TRANSFORMER (1 Phase) WITH LOG EXTENDED CURRENT RATING	3000A	24	24		BHEL
13	CVT (1 Phase)	8800pF	12	12		BHEL
14	SURGE ARRESTER (1 Phase)	624 kV	24	24		BHEL
15	WAVE TRAP (1 Phase) PEDESTAL TYPE	1M, 3150A	04	04		BHEL
16	765kV POST INSULATOR (FOR SWITCHYARD)	624 kV	66	66		BHEL
17	765kV POST INSULATOR (FOR WAVE TRAP)	624 kV	12	12		BHEL
18	765kV GUY WIRE (FOR SWITCHYARD)		05	05		BHEL

BILL OF QTY. FOR 400kV MAIN EQUIPMENTS (6.3KA FOR 1 SEC)

ITEM Code	DESCRIPTION	RATING	QTY. (NET)	QTY. (PART-1)	SYMBOL	SCOPE OF SUPPLY
20	500MVA, 3-Phase AUTOTRANSFORMER	400/220/33kV	0	0		BHEL
21	125MVAR BUS REACTOR (3-Phase)	400 kV	1	1		BHEL
22	SF6 CIRCUIT BREAKER WITH CR, WITH CSS (3-Phase)	3150A	1	1		BHEL
23	SF6 CIRCUIT BREAKER WITH CR, WITHOUT CSS (3-Phase)	3150A	5	5		BHEL
24	SF6 CIRCUIT BREAKER WITHOUT CR, WITH CSS (3-Phase)	3150A	2	2		BHEL
25	ISOLATOR WITH ONE E/SW (3 Phase) DOUBLE BREAK TYPE	3150A	15	15		BHEL
26	ISOLATOR WITH TWO E/SW (3 Phase) DOUBLE BREAK TYPE	3150A	2	2		BHEL
27	ISOLATOR WITH ONE E/SW (1 Phase) DOUBLE BREAK TYPE	2000A	3	3		BHEL
28	ISOLATOR WITH ONE E/SW (1 Phase) DOUBLE BREAK TYPE	3150A	7	7		BHEL
29	ISOLATOR WITHOUT E/SW (1 Phase) DOUBLE BREAK TYPE	3150A	5	5		BHEL
30	CURRENT TRANSFORMER (1 Phase) WITH LOG EXTENDED CURRENT RATING	3000A	24	24		BHEL
31	CVT (1 Phase)	4400pF	12	12		BHEL
32	SURGE ARRESTER (1 Phase)	336 kV	16	16		BHEL
33	WAVE TRAP (1 Phase) PEDESTAL TYPE	0.5M, 2000A	2	2		BHEL
34	400kV BPI (FOR SWITCHYARD)	400kV	40	40		BHEL
35	400kV BPI (FOR WT)	400kV	6	6		BHEL

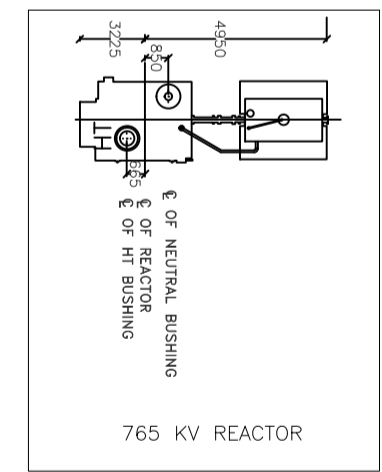
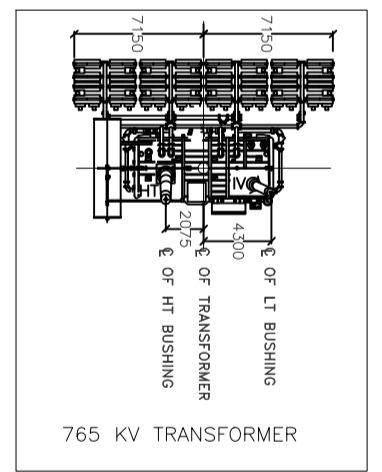
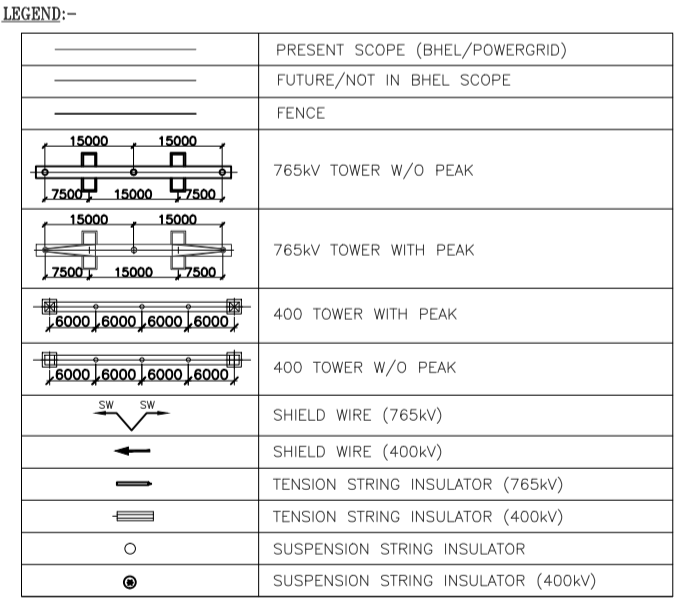
- NOTE:-**
- LEVELS (RL) FOR SWITCHYARD ARE AS PER POWER GRID DRAWING NO. C/ENGL/WR2/BANAS/STEL/01 REV-03
 - DEAD END TOWER ERECTION AND OUTGOING STRINGING OF LINE CONDUCTOR & SHIELD WIRE ARE NOT IN BHEL SCOPE BUT CONNECTION OF EQUIPMENT TOWARDS LINE SIDE SHALL BE DONE BY BHEL. SUPPLY OF TENSION INSULATOR STRING ON LINE SIDE OF TAKE OFF GANTY IS IN BHEL SCOPE OF WORK INCLUDING TENSION CLAMP FOR EARTHING.
 - SUPPLY ERECTION, TESTING, COMMISSIONING AND EARTHING OF 765kV TRAP & REACTOR INCLUDING (OLTC & TERMINAL CONNECTOR OF TRAP) & (FOR 125MVA, 125MVA NOT & TRAP) CONNECTOR OF REACTOR, FORMATION OF HV, LV, TERTIARY, NEUTRAL & AUXILIARY BUSES ALONG WITH BIL & ITS STRUCTURE AND ASSOCIATED CIVIL WORKS IS NOT COVERED IN SCOPE OF WORK AS PER IS SECTION PROJECT.
 - INTER EQUIPMENT DIMENSION IS 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.
 - FIRE RESISTANT WALL BETWEEN 765kV TRANSFORMER UNITS AND 765kV REACTOR UNITS ARE NOT IN BHEL SCOPE.
 - ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
 - LOCATION OF WT SHOWN IS INDICATIVE ONLY. EXACT LOCATION SHALL BE FINALIZED DURING ERECTION COMMISSIONING STAGE BASED ON LINE PARAMETERS FOUNDATION FOR WAVE TRAP SHALL BE CONDUCTED FOR ALL THREE PHASES IN 765kV AREA.
 - REACTOR HV CT AREA SHALL BE FINALIZED AFTER RECEIVING PROJECT SPECIFIC CT AREA LAYOUT FROM POWERGRID. HENCE THE SAME SHALL BE ISSUED BY POWERGRID AND UPDATED ON SWITCHYARD LAYOUT DRAWING ACCORDINGLY & ICT INTERSECTIONS SHOWN ON THIS LAYOUT ARE TENTATIVE.
 - 765kV REACTOR AREA SHALL BE FINALIZED AFTER RECEIVING PROJECT SPECIFIC REACTOR AREA LAYOUT FROM POWERGRID. HENCE THE SAME SHALL BE UPDATED ON SWITCHYARD LAYOUT DRAWING ACCORDINGLY & REACTOR INTERSECTIONS SHOWN ON THIS LAYOUT ARE TENTATIVE.
 - DETAILS OF BMK, CTUB, CVT JUNCTION BOX & SWITCHYARD PANEL ROOM (SPR) LOCATION SHALL BE SHOWN IN CABLE TRENCH LAYOUT DRAWING.
 - FENCE SCHEME IS INDICATIVE & IT SHALL BE VIEWED AT SITE DURING EXECUTION, ALONG WITH TRANSFORMER LINE.
 - PLINTH HEIGHT OF FOUNDATION WILL BE MIN.300MM FROM FINISHED GROUND LEVEL (F.G.L.).
 - MARKED GANTRIES SHALL BE DOUBLE TIER BASS.
 - CONSTRUCTION OF 765kV AUX. BUS UP TO 765kV TRANSFORMER AND 765kV REACTOR ARE NOT IN BHEL SCOPE.
 - PLINTH LEVEL WILL BE F.G.L. +300MM. HOWEVER TO MEET BEAM AT SAME HEIGHT, RESPECTIVE PLINTH LEVEL WILL BE RAISED AS REQUIRED.

CONDUCTOR & STRINGING DETAILS -765kV

SL.NO.	DESCRIPTION	LEVEL FROM PLINTH	SUB-CONDUCTOR	TENSION INSULATOR STRING/PHASE
1.	MAIN BUS-I & II	(AT 27M HEIGHT)	QUAD AAC BULL CONDUCTOR WITH 450MM SUB-CONDUCTOR SPACING	DOUBLE TENSION 210 kN DISC INSULATOR (2444 Nos.)
2.	JACKBUS	(AT 39M HEIGHT)	QUAD AAC BULL CONDUCTOR WITH 450MM SUB-CONDUCTOR SPACING	DOUBLE TENSION 210 kN DISC INSULATOR (2444 Nos.)
3.	DROPPERS/AMPERING	-	QUAD AAC BULL CONDUCTOR WITH 450MM SUB-CONDUCTOR SPACING	SINGLE STRING-210kN DISC INSULATOR (1444 Nos.)
4.	EQUIPMENT INTERCONNECTION	(AT 14M HEIGHT)	4.5" IPS AL TUBE (120mm OD)/QUAD AAC BULL CONDUCTOR WITH 450MM SPACING	-
5.	EARTHWIRE	(AT 45M HEIGHT)	7/3.66mm GI WIRE (10.98mm DIA)	-
6.	INTERCONNECTION BETWEEN 765/400kV TRAP TO 400kV SUB-STATION	-	QUAD BULL/BERSMSIS ACSR CONDUCTOR WITH 450MM SUB-CONDUCTOR SPACING/4.5" IPS AL TUBE	-
7.	EQUIPMENT INTERCONNECTION NEAR 765/400kV ICT AREA FOR HIGH BREAK/HIGH LA	(AT 12M HEIGHT)	QUAD BULL/BERSMSIS ACSR CONDUCTOR WITH 450MM SUB-CONDUCTOR SPACING/4.5" IPS AL TUBE	-

CONDUCTOR & STRINGING DETAILS -400kV

SL.NO.	DESCRIPTION	LEVEL FROM PLINTH	SUB-CONDUCTOR	TENSION INSULATOR STRING/PHASE
1.	MAIN BUS-I & II	(AT 15M HEIGHT)	QUAD AAC BULL CONDUCTOR WITH 450MM SUB-CONDUCTOR SPACING	DOUBLE TENSION 120 kN DISC INSULATOR (2425 Nos.)
2.	JACKBUS	(AT 22M HEIGHT)	QUAD BERSMSIS ACSR CONDUCTOR WITH 450MM SUB-CONDUCTOR SPACING	DOUBLE TENSION 120 kN DISC INSULATOR (2425 Nos.)
3.	DROPPERS/AMPERING	-	QUAD BERSMSIS ACSR CONDUCTOR WITH 450MM SUB-CONDUCTOR SPACING	SINGLE STRING-120kN DISC INSULATOR (1425 Nos.)
4.	EQUIPMENT INTERCONNECTION	(AT 8M HEIGHT)	4.5" IPS AL TUBE /QUAD ACSR BERSMSIS CONDUCTOR WITH 450MM SPACING	-
5.	EARTHWIRE	(AT 29.5M HEIGHT)	7/3.66mm GI WIRE (10.98mm DIA)	-
6.	BUS CVT, CVT & LA IN LINE BAYS	-	7MM BERSMSIS ACSR CONDUCTOR WITH 450MM SUB-CONDUCTOR SPACING	-



SYSTEM PARAMETERS (765kV)-

S/NO	DESCRIPTION OF PARAMETER	765kV SYSTEM	400kV SYSTEM	220kV SYSTEM	36kV SYSTEM
1	HIGHEST SYSTEM VOLTAGE	800kV	420kV	245kV	36kV
2	NORMAL SYSTEM VOLTAGE	765kV	400kV	220kV	33kV
3	RATED FREQUENCY	50Hz	50Hz	50 Hz	50Hz
4	NO. OF PHASES	3	3	3	3
RATED INSULATION LEVELS					
	(i) FULL WAVE LIGHTNING IMPULSE WITHSTAND VOLTAGE (1.2/50microsec.)	±2100kV	±1550kV	±1050kV	±170kV
	(ii) SWITCHING IMPULSE WITHSTAND VOLTAGE (250/250microsec.) DRY & WET	±1550kV	±1050kV	---	---
	(iii) ONE MINUTE POWER FREQUENCY DRY WITHSTAND VOLTAGE (rms)	830kV	630kV	460kV	70kV
6	OSFORM EXTINCTION VOLTAGE	508kV	320kV	156 kV	---
7	MAX. MAINT. INTERFERENCE VOLTAGE LEVEL AT 508kV (rms) FOR 765 kV & AT 120 Hz (10ms) FOR 400kV	2500 micro volts	1500 micro volts	1000 micro volts	---
8	RATED SHORT CIRCUIT CURRENT FOR 1 SEC. DURATION	50kA	63kA	40kA	25kA
9	SYSTEM NEUTRAL EARTHING	EFFECT. EARTHED.	EFFECT. EARTHED.	EFFECT. EARTHED.	EFFECT. EARTHED.

Lattice Structure for Towers & Beams Standard Structures for 765kV

Letter	Column	Nos.
a	P/C A column	Nos. 16
b	P/C B column	Nos. 16
c	P/C C column	Nos. 8
d	P/C D column	Nos. 26
e	P/C E column	Nos. 13
f	P/C F column	Nos. 26
g	P/C G column	Nos. 26
h	P/C H column	Nos. 8
i	P/C I column	Nos. 4
j	P/C J column	Nos. 8
k	P/C K column	Nos. 8

REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED
ZONE			ZONE			ZONE			ZONE			ZONE		

ADDITIONAL INFORMATION
W.D.No. AA 11035 , PROJECT CODE - 384

STATUS OF DRAWING
NAME OF CUSTOMER: POWER GRID CORPORATION OF INDIA LTD

DISTRIBUTION OF PRINTS

Sl. No.	NAME	DESIGN	CHECKED	DATE
1	DR. J. K. JAIN	DR.	JK	21.03.16
2	DR. S. K. SINGH	DR.	SK	
3	DR. R. S. SINGH	DR.	RS	

SCALE
NTS

DATE
21.03.16

PROJECT TITLE
LAYOUT PLAN FOR BANASKANTHA 765 kV/ 400 kV/ 220 kV SUBSTATION

DRAWING NO.
TB-384-510-002

SHEET NO.
02