

400-916-626-3-BL ON DRG.

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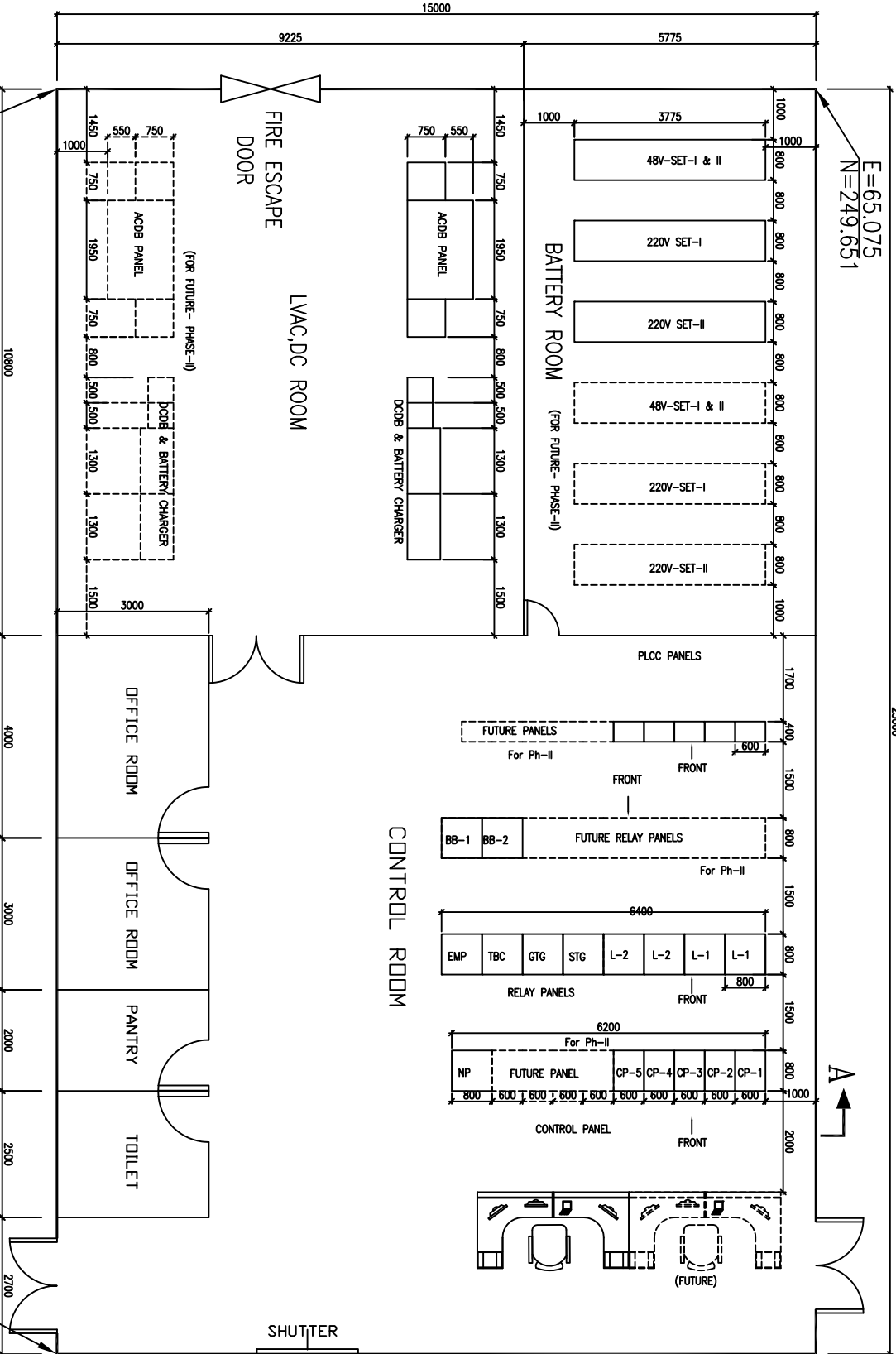
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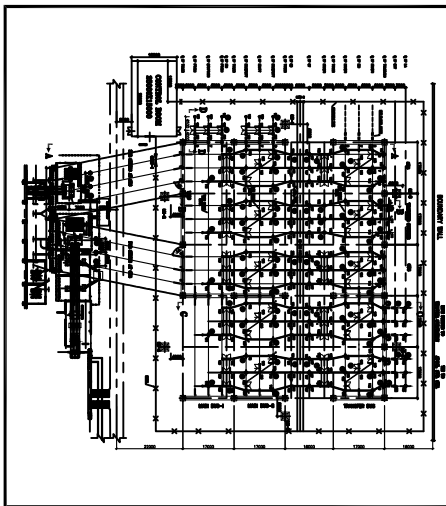
PROJECT :

E=50.075
N=249.651



E=65.075
N=249.651

E=65.075
N=224.651



- NOTE:-**
- NUMBER & DIMENSION OF SAS PANELS ARE TENTATIVE AND ARE SUBJECTED TO CHANGE AS PER ACTUAL PANEL DRAWINGS APPROVED DURING DETAILED ENGINEERING.
 - ALL DIMENSIONS ARE FROM THE INSIDE FACE OF THE WALLS
 - BATTERY ROOM SHALL BE PROVIDED WITH ACID PROOF TILES FOR FLOOR & WALLS, EXHAUST FANS, EYE WASH BASIN, CORROSION PROOF ILLUMINATION SYSTEM ETC.
 - CONTROL & OFFICE ROOM SHALL BE PROVIDED WITH FALSE CEILING

TB 1 323 316 009	EARTHING & LIGHTING PROTECTION DRAWING FOR 220KV SWITCHYARD (NRPP PH-1)
TB 2 323 316 040	ILLUMINATION DRAWING FOR 220KV SWITCHYARD (NRPP PH-1)
TB 1 323 607 626/1	ARCH. DRAWING FOR 220KV SWITCHYARD (NRPP PH-1)
TB 1 323 607 626/2/3/4	CIVIL DRAWING FOR 220KV SWITCHYARD (NRPP PH-1)
TB 1 323 607 628	CIVIL DRAWING FOR 220KV SWITCHYARD (NRPP PH-1)
TB 3 323 316 016	PANEL LAYOUT DRAWING FOR 220KV SWITCHYARD (NRPP PH-1)
TB 1 323 316 001	LAYOUT PLAN FOR 220KV SWITCHYARD (NRPP PH-1)
REFERENCE DRAWING NO.	DESCRIPTION

1x100MW NAMRUP REPLACEMENT POWER
PROJECT (PHASE-I) AT NAMRUP, ASSAM

CUSTOMER :

ASSAM POWER GENERATION CORPORATION LTD.

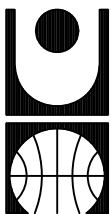
GUWAHATI, ASSAM

CONSULTANT :

DEVELOPMENT CONSULTANTS (P) LTD.

CONSULTING ENGINEERS

KOLKATA CHENNAI MUMBAI NEW DELHI



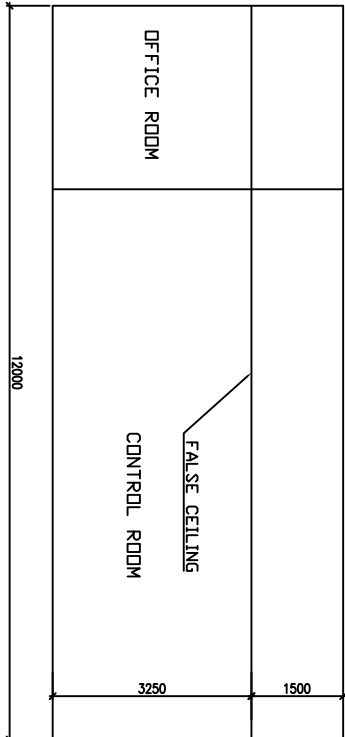
ASSAM POWER GENERATION CORPORATION LTD. GUWAHATI, ASSAM.
1*100MW NAMRUP REPLACEMENT POWER PROJECT(PHASE-I)

NAME OF
CUSTOMER

ASSAM POWER GENERATION CORPORATION LTD. GUWAHATI, ASSAM.

1*100MW NAMRUP REPLACEMENT POWER PROJECT(PHASE-I)

SECTION A-A



COMPUTER DRG. PATH NAME :

SIGN & DATE

REV.	DATE	ALTD.	CHD.	APPD.	REV.	DATE	ALTD.	CHD.	APPD.
02	22.02.10	JUGENDRA	SSR/DKM	SN	01	14.12.09	JUGENDRA -SD-	SSR/DKM -SD-	SN -SD-

1. DRAWING REVISED AS PER CUSTOMER COMMENTS
DATED 08.12.09

1. DRAWING REVISED AS PER CUSTOMER COMMENTS
DATED 15.09.09

NAME	SIGN.	DATE
JUGENDRA	Sd/	28.08.09
VGR/DKM/VK	Sd/	
SN	Sd/	

DISTRIBUTION OF PRINTS



BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS GROUP

TITLE:-

CONTROL & RELAY BUILDING LAYOUT FOR
220KV SWITCHYARD (NRPP PH-1)

CARD CODE

NEXT SHEET

-

SHEET No.

01

INVENTORY NO.

SCALE 1:100

W.O. No.

DRG. No. TB-3-323-316-007

REV. 02

100-918-828-1-BL ON 2RD

FO JHS

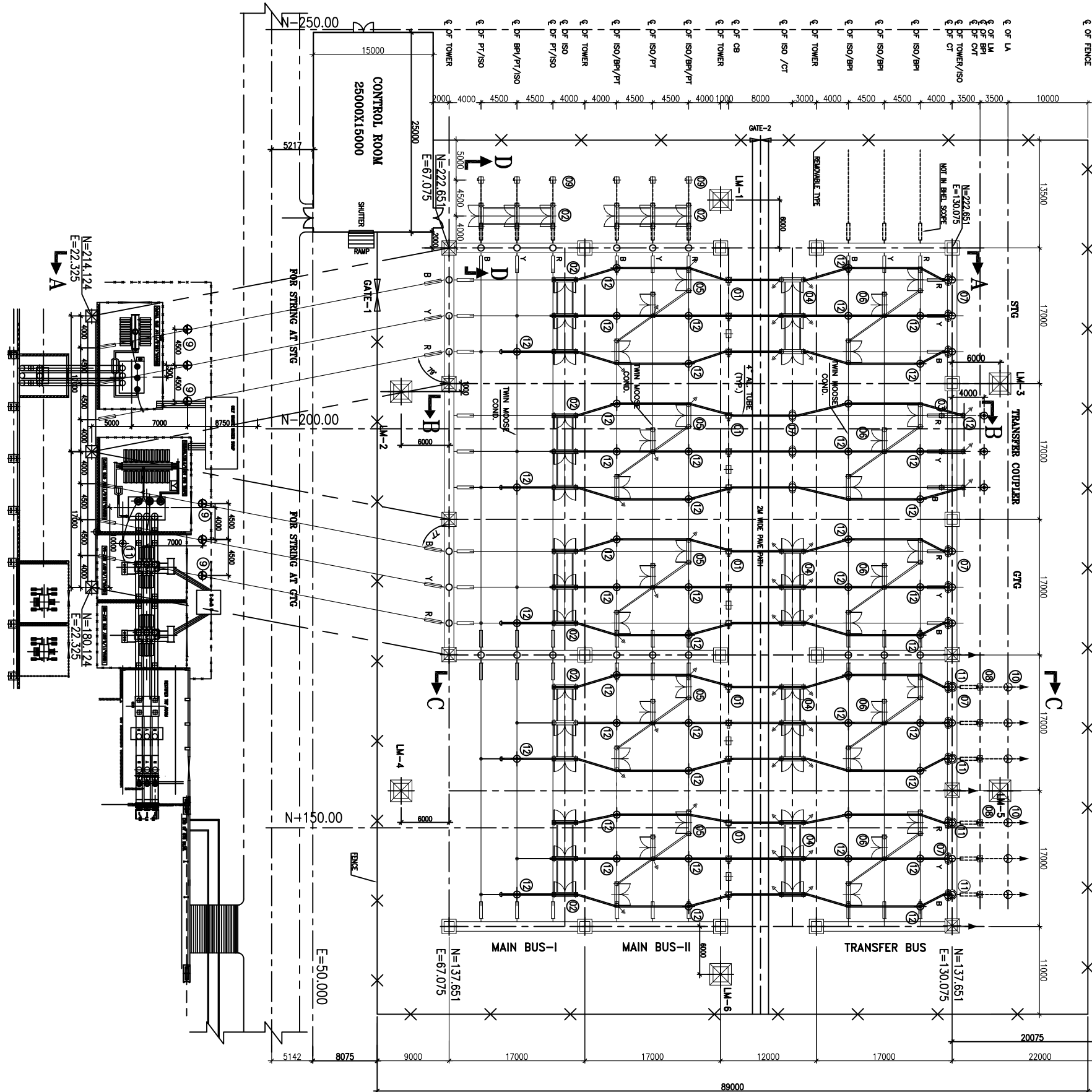
BOUNDARY WALL

LINE FEEDER TO
TINSUDA SUBSTATION
APRCL SUB. STN.

TIE TO



GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261



S.NO.	DESCRIPTION	SYMBOL	QTY.
1.	245KV, 1600A, 40KA FOR 1 SEC. SF6 CIRCUIT BREAKER		05
2.	245KV, 1600A, 40KA FOR 1 SEC. 3 POLE HCB, MOTORIZED ISOLATOR WITHOUT EARTH SWITCH MECHANICALLY GANGED		07
3.	245KV, 1600A, 40KA FOR 1 SEC. 3 POLE HCB, MOTORIZED ISOLATOR WITH SINGLE EARTH SWITCH (MECHANICALLY GANGED)		01
4.	245KV, 1600A, 40KA FOR 1 SEC. 3 POLE HCB, MOTORIZED ISOLATOR WITH TWO EARTH SWITCH (MECHANICALLY GANGED)		04
5.	245KV, 1600A, 40KA FOR 1 SEC. 3 POLE TANDEM MOTORIZED ISOLATOR WITH SINGLE EARTH SWITCH (MECHANICALLY GANGED)		05
6.	245KV, 1600A, 40KA FOR 1 SEC. 3 POLE TANDEM MOTORIZED ISOLATOR WITHOUT EARTH SWITCH (MECHANICALLY GANGED)		05
7.	245KV, 1000A, SINGLE PHASE CT 40KA FOR 1 SEC. (600-300/1-1-1-1-1A)		15
8.	245KV, 8800PF, 220KV/110V/110V/110V SINGLE PHASE CVT		06
9.	245KV, 220KV/110V/110V, SINGLE PHASE ELECTRO MAGNETIC VT		06
10.	198KV, 100A CLASS-III, CAPLESS LIGHTNING ARRESTER (SINGLE PHASE)		12
11.	245KV, 0.5mth, 1600A, WAVE TRAP		04+04(LOOSE)
12.	245KV, BUS POST INSULATOR		49
13.	MARSHALLING KIOSK		05

MINIMUM CLEARANCE TABLE	
PHASE TO PHASE (PP) (mm)	220kV
PHASE TO EARTH (PE) (mm)	2100
SECTION CLEARANCE (SC) (mm)	2100
HEIGHT OF TUBE CENTRE LINE OF FIRST LEVEL (MIN.) MM. (FROM PLINTH LEVEL)	5000
HEIGHT OF TUBE CENTRE LINE OF FIRST LEVEL (MIN.) MM. (FROM PLINTH LEVEL)	5500
CREEPAGE DISTANCE	25MM/KV

- NOTES:
1. ALL CONNECTIONS MARKED WITH ACSR CONDUCTOR ARE WITH "MOOSE" (OVERALL DIA = 31.77mm) UNLESS OTHERWISE SPECIFIED. ALL CONNECTIONS MARKED WITH AL TUBE ARE WITH 4" IPS (DIA = 114.3mm)
 2. TERMINATION OF LINE CONDUCTORS ON THE SWITCHYARD GANTRY INCLUDING INSULATOR STRINGS FOR SAME IS NOT IN SCOPE OF CONTRACT AND THEREFOR SHOWN IN DOTTED.
 3. SWITCHYARD SHALL BE PROVIDED WITH GRAVELS. THE THICKNESS OF GRAVEL SHALL BE 150MM.
 4. AREA OF SWITCHYARD (FENCE TO FENCE DISTANCE 90M x 110.5M)

0-381-21-00612	KEY SINGLE LINE DIAGRAM
0-381-01-01018	OVERALL PLOT PLAN
TB 1 323 316 001 SH.2	SECTIONAL ELEVATION FOR 220KV SWITCHYARD (NRPP PH-1)
TB 1 323 510 001	SINGLE LINE DIAGRAM FOR 220KV SWITCHYARD (NRPP PH-1)
DRAWING REF. NO.	TITLE

PROJECT : 1x100MW NAMRUP REPLACEMENT POWER PROJECT (PHASE-1) AT NAMRUP, ASSAM

CUSTOMER : ASSAM POWER GENERATION CORPORATION LTD. GUWAHATI, ASSAM

CONSULTANT : DEVELOPMENT CONSULTANTS (P) LTD. CONSULTING ENGINEERS KOLKATA CHENNAI MUMBAI NEW DELHI

PROJECT : 1x100MW NAMRUP REPLACEMENT POWER PROJECT (PHASE-1) AT NAMRUP, ASSAM

CUSTOMER : ASSAM POWER GENERATION CORPORATION LTD. GUWAHATI, ASSAM

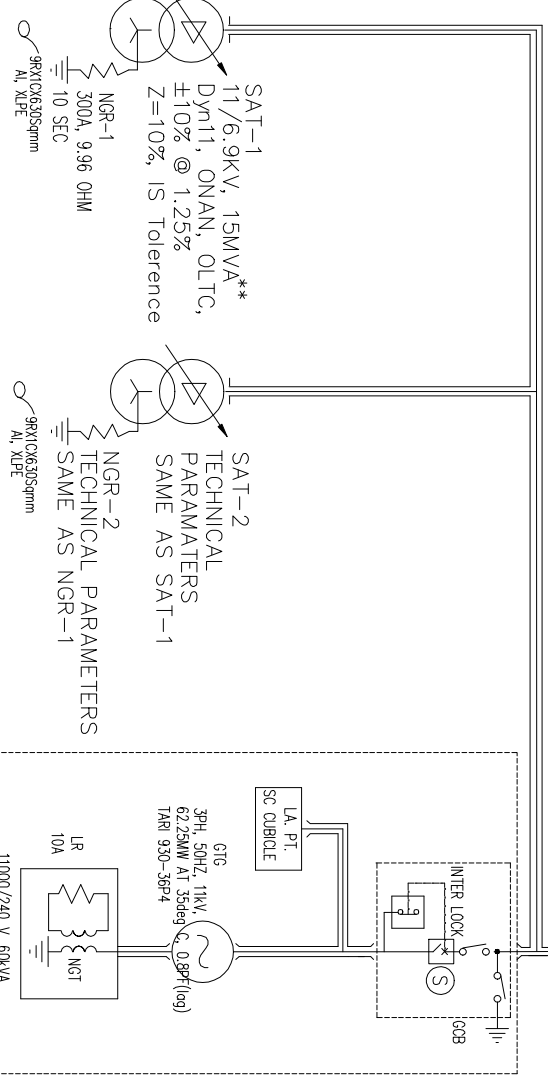
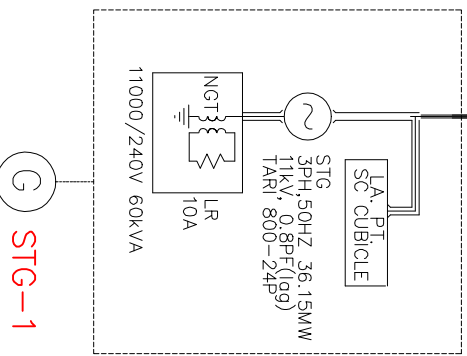
CONSULTANT : DEVELOPMENT CONSULTANTS (P) LTD. CONSULTING ENGINEERS KOLKATA CHENNAI MUMBAI NEW DELHI

PROJECT : 1x100MW NAMRUP REPLACEMENT POWER PROJECT (PHASE-1) AT NAMRUP, ASSAM

CUSTOMER : ASSAM POWER GENERATION CORPORATION LTD. GUWAHATI, ASSAM

CONSULTANT : DEVELOPMENT CONSULTANTS (P) LTD. CONSULTING ENGINEERS KOLKATA CHENNAI MUMBAI NEW DELHI

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHD/APPD															



220KV CT DETAILS(FOR BUS TIE CUM TRANSFER BUS COUPLER)

220KV CT DETAILS(FOR GT,ST & LINE BAYS)

ITEM NO.	DESCRIPTION	CODE	HIGHEST SYSTEM VOLTAGE	QTY.
01	ENV CIRCUIT BREAKER (SFB TYPE) WITHOUT PIR THREE PHASE, 1600 A, 40 KA FOR 1SEC	52	245	5
02	HCB ISOLATOR WITHOUT E/S THREE PHASE, 1600 A, 40 KA FOR 1SEC	89	245	7
03	HCB ISOLATOR WITH ONE E/S THREE PHASE, MOTOR OPERATED ES, 1600 A, 40 KA FOR 1SEC	89	245	1
04	HCB ISOLATOR WITH TWO E/S THREE PHASE, MOTOR OPERATED ES, 1600 A, 40 KA FOR 1SEC	89	245	4
05	TANDAM ISOLATOR (HCB) WITH ONE E/S	89	245	1

ITEM NO.	DESCRIPTION	CODE	HIGHEST SYSTEM VOLTAGE	QTY.
01	ENV CIRCUIT BREAKER (SFB TRFD) WITHOUT PIR THREE PHASE, 1600 A, 40 KA FOR 1SEC	52	245	5
02	HCB ISOLATOR WITHOUT E/S THREE PHASE, 1600 A, 40 KA FOR 1SEC	89	245	7
03	HCB ISOLATOR WITH ONE E/S THREE PHASE, MOTOR OPERATED ES, 1600 A, 40 KA FOR 1SEC	89	245	1
04	HCB ISOLATOR WITH TWO E/S THREE PHASE, MOTOR OPERATED ES, 1600 A, 40 KA FOR 1SEC	89	245	4
05	TANDM ISOLATOR (HCB) WITH ONE E/S THREE PHASE, MOTOR OPERATED ES, 1600 A, 40 KA FOR 1SEC	89	245	5
06	TANDM ISOLATOR (HCB) WITHOUT E/S THREE PHASE, 1600 A, 40 KA FOR 1SEC	89	245	5
07	CURRENT TRANSFORMER SINGLE PHASE	CT	245	15
08	CAPACITIVE VOLTAGE TRANSFORMER SINGLE PHASE	CVT	245	6
09	ELECTROMAGNETIC VOLTAGE TRANSFORMER SINGLE PHASE	EMVT	245	6
10	SURGE ARRESTOR SINGLE PHASE, 198 KV, 10KA, CLASS-III DISCHARGE CLASS	SA	245	12
11	LINE TRAP SINGLE PHASE, 1600 A, 40 KA FOR 1SEC, 0.5MH, SUSPENSIONMOUNTING	WT	245	4+4+10 BE 100KV

SYSTEM: 245KV, 1600A, 40KA FOR 1 SEC, SOLIDLY EARTHED

NOTES:-

1. NOMINAL VOLTAGE : 220KV
2. HIGHEST SYSTEM VOLTAGE : 245KV
3. POWER FREQUENCY WITHSTAND VOLTAGE FOR 1 SEC. : 460kV (rms)
4. LIGHTNING IMPULSE VOLTAGE : 1050kVp
5. CREEPAGE : 6125mm
6. SHORT CIRCUIT CAPABILITY : 40KA FOR 1 SEC.
7. AC AUX. SUPPLY : 415V \pm 10%, 3-PH, 4-W, 50HZ \pm 5%
8. DC AUX. VOLTAGE : 220V \pm 10%, 2-W, UNGROUNDED.
9. ALL EQUIPMENT SHALL BE RATED FOR 40 DEG C AMBIENT AND OUTDOOR INSTALLATION.
10. ALL EQUIPMENT SHALL BE PROVIDED IN LINE WITH TECHNICAL SPECIFICATION OF NIT CONSIDERING INDICATED RATING AS MINIMUM FOR SITE AMBIENT.
11. POWER LINE CARRIER COMMUNICATION (PLCC) SYSTEM FOR TWO (2) NO. LINE FEEDER. BTEL SHALL ALSO PROVIDE PLCC EQUIPMENT ON OTHER END TO MATCH WITH NRPP END WHICH WILL BE SUPPLIED AS LOOSE ITEMS.
12. PROVISION FOR INTERCONNECTION IS KEPT WITH PHASE-2 (FUTURE) TO FORM ONE COMPOSITE SWITCHYARD. THE SAME SHALL BE MARKED IN LAYOUT DRAWING.










REFERENCE DRAWING/ DOCUMENTS.

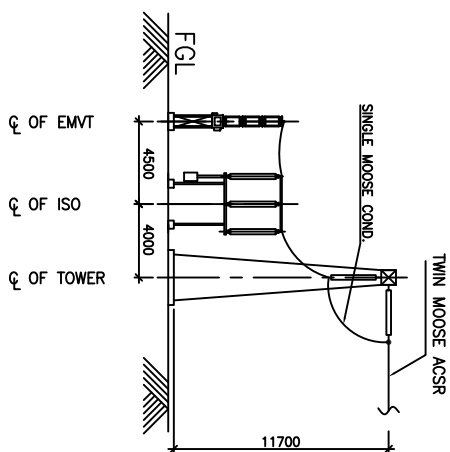
1. CUSTOMER KEY SINGLE LINE DIAGRAM GTO, STG & BOP : K7205-DWG-E-0001
2. 220kV SWITCHYARD PLAN LAYOUT : TB-0-323-316-002
3. PREVIOUSLY KEY SINGLE LINE DIAGRAM FOR 220kV SWITCHYARD : TB-3-322-510-015.

REV-00 SUPERSEDES THIS DRAWING.

KEY SINGLE LINE DIAGRAM No. 0-581-21-00612 (PREPARED BY BHEL-PED)

LEGENDS AND SYMBOLS:-

	EHV CIRCUIT BREAKER(SF6 TYPE)
	HCB ISOLATOR WITHOUT EARTH SWITCH (MOTOR OPERATED)
	HCB ISOLATOR WITH ONE EARTH SWITCH (MOTOR OPERATED)
	HCB ISOLATOR WITH TWO EARTH SWITCH (MOTOR OPERATED)
	CURRENT TRANSFORMER
	TANDEM ISOLATOR(HCB) WITHOUT EARTH SWITCH (MOTOR OPERATED)
	TANDEM ISOLATOR(HCB) WITH ONE EARTH SWITCH (MOTOR OPERATED)
	CVT WITH 3 NOS. OF SECONDARY WINDINGS
	EMVT WITH 3 NOS. OF SECONDARY WINDINGS
	LIGHTNING ARRESTER / SURGE ARRESTER
	WAVE TRAP
	MOTOR
	BREAKER WITH SYNCH FACILITY
	GENERATOR

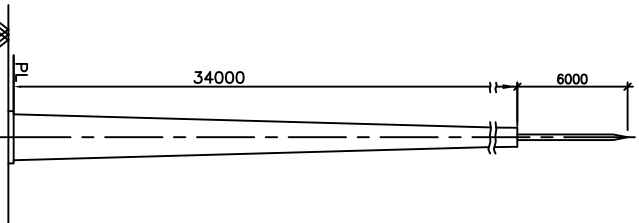


(BUS PT)

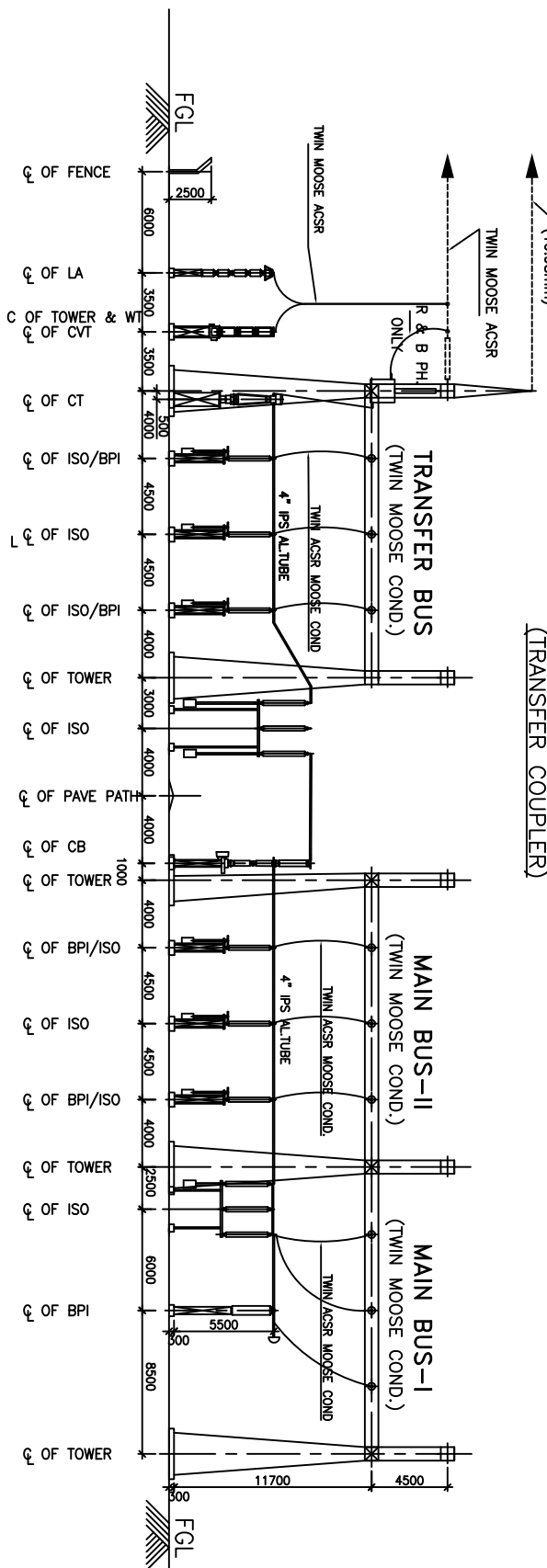
MINIMUM CLEARANCE TABLE	220kV
PHASE TO PHASE (PP) (mm)	2100
PHASE TO EARTH (PE) (mm)	2100
SECTION CLEARANCE (SC) (mm)	5000
CREEPAGE DISTANCE (MM.)	25mm/kV
HEIGHT OF TUBE CENTRE LINE OF FIRST LEVEL (mm) (mm) (FROM PLINTH LEVEL)	5500
TO NEAREST PART AT EARTH POTENTIAL OF AN INSULATOR SUPPORTING LIVE CONDUCTOR	2440
CREEPAGE DISTANCE	25MM/KV

NOTES:

1. ALL CONNECTIONS MARKED WITH ASR CONDUCTOR ARE WITH "MOOSE" (OVERALL DIA = 31.77mm) UNLESS OTHERWISE SPECIFIED. ALL CONNECTIONS MARKED WITH AL. TUBE ARE WITH 4" IPS (DIA= 114.3mm).
2. TERMINATION OF LINE CONDUCTORS ON THE SWITCHYARD GANTRY INCLUDING INSULATOR STRINGS FOR SAME IS NOT IN SCOPE OF CONTRACT AND THEREFORE SHOWN IN DOTTED.
3. SWITCHYARD SHALL BE PROVIDED WITH GRAVELS. THE THICKNESS OF GRAVEL SHALL BE 150MM.
4. AREA OF SWITCHYARD (FENCE TO FENCE DISTANCE 90M x 110.5M)
5. SHIELD WIRE CONDUCTOR OVERALL SIZE 10.96mm






SECTION B-B
(TRANSFER COUPLER)



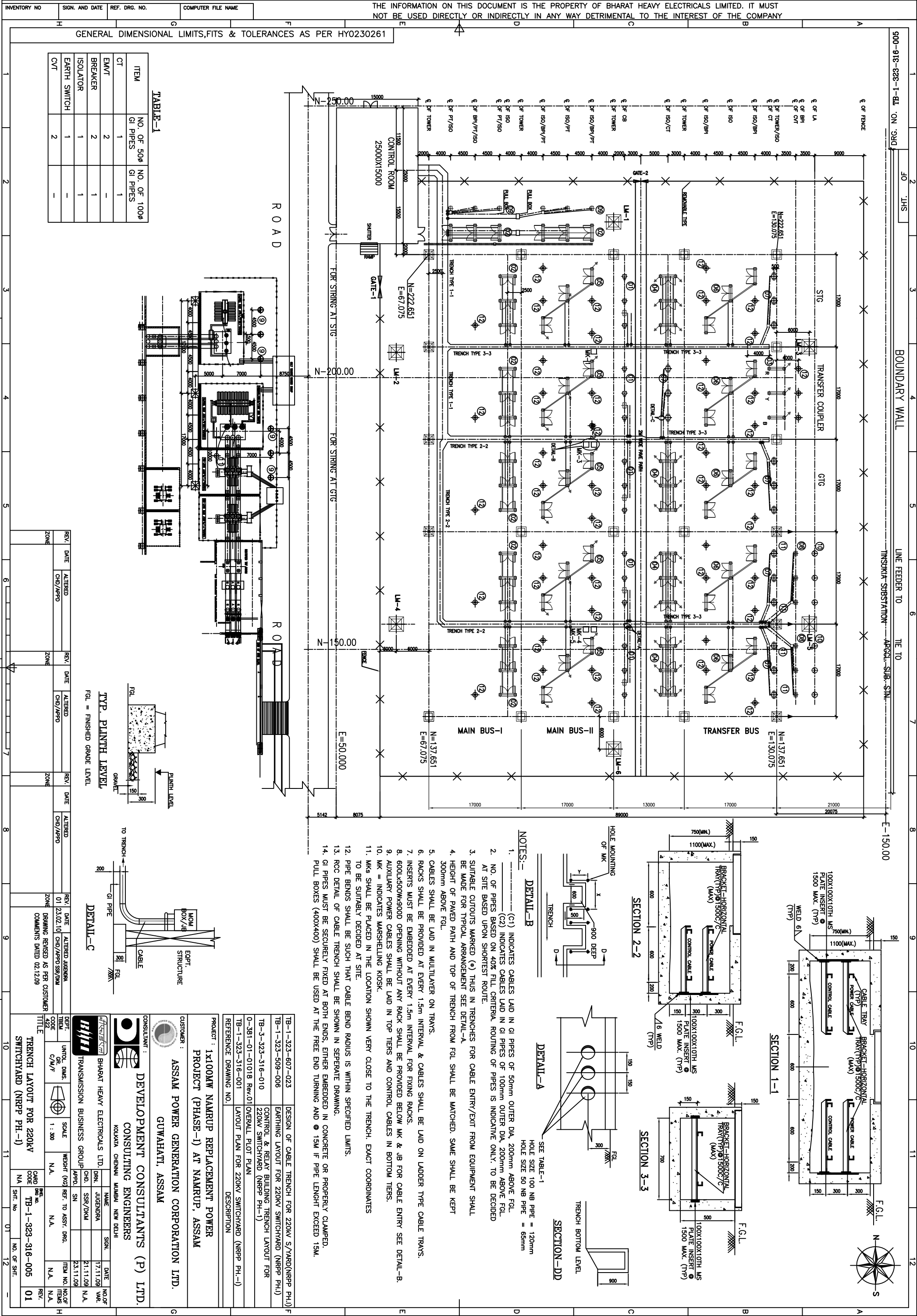
SECTION C-C
(LINE BAY)

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHD/APRD			CHD/APRD			JUGENDORA			Sd/
ZONE			ZONE			DRAWING REVISED AS PER OWNER COMMENTS DATED 07/10/09	01	02/09/08	CHD/APRD	Sd/	DRAWING REVISED AS PER OWNER COMMENTS DATED 26/08/09
			477								

PROJECT : 1x100MW NAMRUP REPLACEMENT POWER PROJECT (PHASE-1) AT NAMRUP, ASSAM									
CUSTOMER : ASSAM POWER GENERATION CORPORATION LTD.									
CONSULTANT : GUWAHATI, ASSAM									
									
DEVELOPMENT CONSULTANTS (P) LTD. CONSULTING ENGINEERS KOLAKATA CHENNAI MUMBAI NEW DELHI									
									
BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP									
DEPT. CODE	UNITL OR C/M/F	DIMS.	SCALE	WEIGHT (KG)	N.A.	NAME	SIGN.	DATE	NO.OF
TBDA						DRL	KAPIL	17.04.09	VAR.
CODE						CHD	VG/DKM	Sd/	N.A.
TITLE						APPO	SN	Sd/	
						REF.	TO ASSY.	DRG.	ITEM NO
						N.A.			N.A.
									NO.OF
									ITEMS
									N.A.
									REV.
SECTION ELEVATION FOR 220KV SWITCHYARD (NRP-1)									
CARD	NO	TB-1-323-316-001							
CODE									
NA									
SHT.	No	02	NO. OF SHT.						
			-						
			02						

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN MM)



GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

ITEM	NO. OF 500 CI PIPES	NO. OF 1000 CI PIPES
CT	1	1
EMVT	2	-
BREAKER	2	1
ISOLATOR	1	1
EARTH SWITCH	1	-
CVT	2	-

TABLE-1

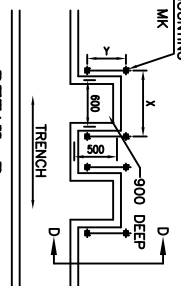
TYP. PLINTH LEVEL
FGL = FINISHED GRADE LEVEL

DETAIL-C

NOTES:-

1. (C) INDICATES CABLES LAID IN CI PIPES OF 50mm OUTER DIA, 200mm ABOVE FGL.
2. NO. OF PIPES BASED ON 40% FILL CRITERIA. ROUTING OF PIPES IS INDICATIVE ONLY. TO BE DECIDED AT SITE BASED UPON SHORTEST ROUTE.
3. SUITABLE CUTOUTS MARKED (o) THUS IN TRENCHES FOR CABLE ENTRY/EXIT FROM EQUIPMENT SHALL BE MADE FOR TYPICAL ARRANGEMENT SEE DETAIL-A.
4. HEIGHT OF PAVED PATH AND TOP OF TRENCH FROM FGL SHALL BE MATCHED. SAME SHALL BE KEPT 300mm ABOVE FGL.
5. CABLES SHALL BE LAID IN MULTILAYER ON TRAYS.
6. RACKS SHALL BE PROVIDED AT EVERY 1.5m INTERVAL & CABLES SHALL BE LAID ON LADDER TYPE CABLE TRAYS.
7. INSERTS MUST BE EMBEDDED AT EVERY 1.5m INTERVAL FOR FIXING RACKS.
8. 600x500x9000 OPENING WITHOUT ANY RACK SHALL BE PROVIDED BELOW MK & JB FOR CABLE ENTRY SEE DETAIL-B.
9. AUXILIARY POWER CABLES SHALL BE LAID IN TOP TIERS AND CONTROL CABLES IN BOTTOM TIERS.
10. MK = INDICATES MARSHALLING KIOSK.
11. MKs SHALL BE PLACED IN THE LOCATION SHOWN VERY CLOSE TO THE TRENCH. EXACT COORDINATES TO BE SUITABLY DECIDED AT SITE.
12. PIPE BENDS SHALL BE SUCH THAT CABLE BEND RADIUS IS WITHIN SPECIFIED LIMITS.
13. RCC DETAIL OF CABLE TRENCH SHALL BE SHOWN IN SEPARATE DRAWING.
14. CI PIPES MUST BE SECURELY FIXED AT BOTH ENDS, EITHER EMBEDDED IN CONCRETE OR PROPERLY CLAMPED. PULL BOXES (400x400) SHALL BE USED AT THE FREE END TURNING AND @ 15M IF PIPE LENGTH EXCEED 15M.

DETAIL-B



DETAIL-A

SECTION-1

SECTION-2

SECTION-3

SECTION-DD

SEE TABLE-1
HOLE SIZE 100 NB PIPE = 120mm
HOLE SIZE 50 NB PIPE = 65mm

SECTION-BOTTOM LEVEL

SECTION-1-1

SECTION-2-2

SECTION-3-3

SECTION-DD

SECTION-1-1

SECTION-2-2

SECTION-3-3

SECTION-DD

SECTION-1-1

SECTION-2-2

SECTION-3-3

SECTION-DD

SECTION-1-1

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