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LINE FEEDER -1,2, TIE FEEDER -1,2

403-CTA, 405-CTA, 406-CTA, 408-CTA							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min Kpv	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
CTA-1	2000-1000-500/1	0.2S ISF<5	20 VA	-	-	-	Metering
CTA-2	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	87BB/87BBCH (IN BUILT)
CTA-3	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	SPARE
403-CTB, 405-CTB, 406-CTB, 408-CTB							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
CTB-1	2000-1000-500/1	0.2S ISF<5	20 VA	-	-	-	Tariff Metering
CTB-2	2000-1000-500/1	PS	-	4000-2000-1000 V	10-5-2.5 Ohms	30-60-120 mA	21M2, 67, 67N, 50BF/87
CTB-3	2000-1000-500/1	PS	-	4000-2000-1000 V	10-5-2.5 Ohms	30-60-120 mA	21M1/87

GT #8, ST #8 BAY

402-CTA, 404-CTA							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
CTA-1	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	87BB/87BBCH (IN BUILT)
CTA-2	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	SPARE
CTA-3	2000-1000-500/1	0.2S ISF<5	20 VA	-	-	-	SPARE
402-CTB, 404-CTB							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
CTB-1	2000-1000-500/1	0.2S ISF<5	20 VA	-	-	-	Metering
CTB-2	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	51GT & 51NGT / 51 & 51N
CTB-3	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	87OA /87ST

BUS COUPLER BAY

407-CTA							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
CTA-1	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	87BB/87BBCH (IN BUILT)
CTA-2	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	50BF, 51, 51N
CTA-3	2000-1000-500/1	0.2S ISF<5	20 VA	-	-	-	SPARE
407-CTB							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
CTB-1	2000-1000-500/1	0.2S ISF<5	20 VA	-	-	-	Metering
CTB-2	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	SPARE
CTB-3	2000-1000-500/1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	87BB/87BBCH (IN BUILT)

Bus-I VT, Bus-II VT, GT BAY VT

Winding No.	Voltage Ratio	Accuracy Class	Min. Burden	Purpose
1	400kV/√3 / 110V/√3	3P	200 VA	Protn/Voltage selection
2	400kV/√3 / 110V/√3	3P	200VA	Protn/Voltage selection
3	400kV/√3 / 110V/√3	0.2	100VA	Metering/Synch

Total simultaneous Burden for Winding -3 shall be 100VA

LINE FEEDER-1&2, TIE FEEDER 1&2

Winding No.	Voltage Ratio	Accuracy Class	Min. Burden	Purpose
1	400kV/√3 / 110V/√3	3P	200VA	21M1
2	400kV/√3 / 110V/√3	3P	200 VA	21M2
3	400kV/√3 / 110V/√3	0.2	100VA	Metering/Synch

HF Capacitance: 4400pF +10% -5%

Total simultaneous Burden for Winding -3 shall be 100VA

CT/CVT DETAILS OF 400KV GIS

			TOTAL SHEETS	04
W.O. No.	DEPT.	CODE	NEXT SHEET	03
	TBEM	422	SHEET No.	02

REVISED	AS	MM/AA	REVISION	RELEASED FOR APPROVAL	REV.	DATE
	AS	MM/AA	REVISD AS PER COMMENTS DTD. 18.03.16	RELEASED FOR APPROVAL	05	11.07.16
	AS	MM/AA	CT/CVT PARAMETRS REVISED	RELEASED FOR APPROVAL	04	03.03.16
	AS	MM/AA	CB WILL BE PROVIDED WITHOUT PIR	RELEASED FOR APPROVAL	03	02.01.16
	AS	MM/AA	REVISD AS PER COMMENTS DT. 11.09.15	RELEASED FOR APPROVAL	02	30.09.15
	VK	MM/AA	REVISD AS PER COMMENTS DT. 04.05.15	RELEASED FOR APPROVAL	01	27.05.15
	APPROVED	REVIEWED	CHECKED	DRAWN	DESCRIPTION	RELEASE STATUS

	GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8		BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP NOIDA	NAME: SK SD/- DATE: 21/10/14
		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA MUMBAI CHENNAI NEW DELHI	APPD: AS SD/- DATE: 21/10/14	TITLE: SINGLE LINE DIAGRAM OF 400KV GIS UNIT: XXXXX SCALE: NIL BHEL DWG. NO.: TB-3-375-510-001 REV. 05

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SCOPE OF SUPPLY FOR 400KV GAS INSULATED SWITCHGEAR

ONE (1) SET GAS INSULATED SWITCHGEAR ASSEMBLY
CONSISTING OF FOLLOWING BAYS AND TERMINATION

DETAILS	400KV GIS
BUSBAR RATING AS PER IEC	420 KV, 40 KA / 3 SEC, 2000 A
BUS CONFIGURATION	DOUBLE BUSBAR
BAYS TO BE PROVIDED:	SEVEN BAYS (1GT+ 1ST + 2 LINE FDR. + 2 TIE FDR. + BUS COUPLER) + 2 NOS. BUS PT.
OVER HEAD LINE FEEDERS	TWO NOS, 2000A
R4 135/67.5/67.5MVA 400.KV/11.5KV STATION TRANSFORMER FEEDERS	ONE NO, 2000A
966MVA 420KV/27KV GENERATOR TRANSFORMER FEEDERS	ONE NO, 2000A
BUS COUPLER	ONE NO, 2000A
GIS TO EXISTING AIS INTERCONNECTION	TWO NOS, 2000A
FUTURE SPACE PROVISION	ONE BAY EACH ON BOTH SIDES

GIS BOQ:

S.N.	EQUIPMENT	SYMBOL	ABBR.	QTY. (NOS.)
1.	420 KV, 2000 A, 3X1-PH , GROUP OPERATED MOTORISED DISCONNECTOR		89	23
2.	420 KV MOTORISED 3X1-PH, GROUP OPERATED MAINTENANCE EARTHING SWITCH		89E	19
3.	420 KV 3X1-PH, GROUP OPERATED FAST ACTING EARTHING SWITCH		89E	06
4.	420 KV, 1-PH, 3-CORE,2000A, CURRENT TRANSFORMER		CT	42
5.	420 KV, 2000A, 3X1-PH, METAL ENCLOSED CIRCUIT BREAKER WITH ELECTRICALLY SPRING CHARGED OPERATING MECH., WITHOUT PIR *		52	07
6.	420 KV, 1-PH VOLTAGE TRANSFORMER		PT	09
7.	420 KV, 1-PH SF6/AIR BUSHING			18
8.	420 KV, SF6 BUS DUCT			

R4* HOWEVER , IF THE LINE LENGTH EXCEED AS PER STATUTORY REQUIRMENT DURING EXECUTION STAGE, BHEL SHALL PROVIDE PIR/CSD (CONTROL SWITCHING DEVICE) FOR TWO LINES WITHOUT FINANCIAL IMPLICATIONS TO GSECL.

POTHEADYARD BOQ

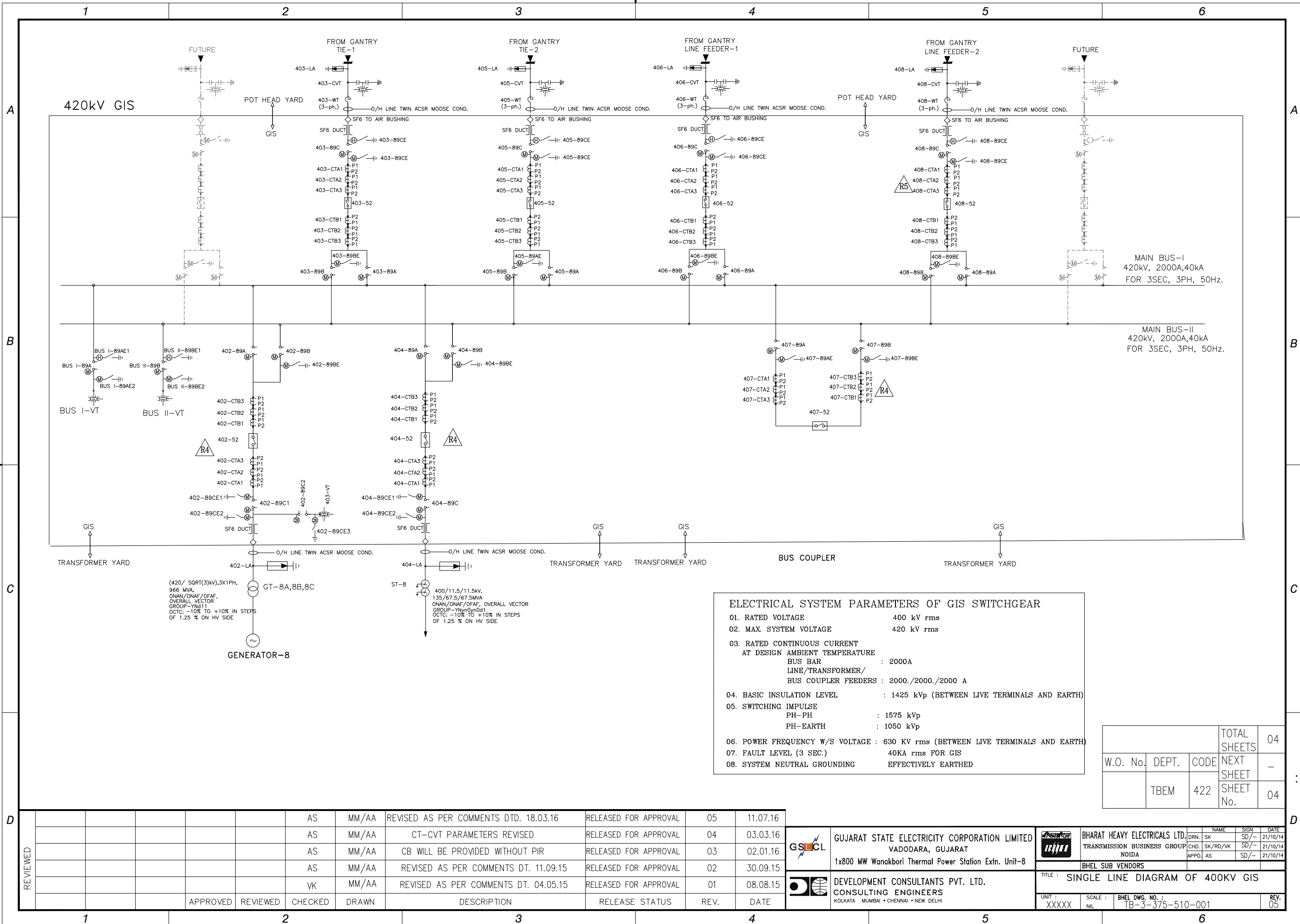
S.NO.	DESCRIPTION	SYMBOL	ABR.	MAIN QTY. (IN NOS.)
1	360KV, 10KA CLASS-3 SURGE ARRESTER (1-PH)		SA	18
2	420KV CAPACITIVE VOLTAGE TRANSFORMER (1-PH) 4400pF		CVT	12
3	420KV CAPACITIVE VOLTAGE TRANSFORMER (1-PH) 4400pF FOR REMOTE END FOR LINE FEEDER 1&2, SUPPLY ONLY		CVT	06
4	420KV WAVE TRAP (1-PH), , 2000A, 1.0 mH		WT	12
5	420KV WAVE TRAP (1-PH), , 2000A, 1.0 mH FOR REMOTE END FOR LINE FEEDER 1&2, SUPPLY ONLY		WT	06

	TOTAL SHEETS	04
W.O. No.	DEPT.	CODE
	TBEM	422
	NEXT SHEET	04
	SHEET No.	03

REVISED	AS	MM/AA	REVISION	RELEASED FOR APPROVAL	REV.	DATE
	AS	MM/AA	REVISED AS PER COMMENTS DTD. 18.03.16	RELEASED FOR APPROVAL	05	11.07.16
	AS	MM/AA	CT-CVT PARAMETERS REVISED	RELEASED FOR APPROVAL	04	03.03.16
	AS	MM/AA	CB WILL BE PROVIDED WITHOUT PIR	RELEASED FOR APPROVAL	03	02.01.16
	AS	MM/AA	REVISED AS PER COMMENTS DT. 11.09.15	RELEASED FOR APPROVAL	02	30.09.15
	VK	MM/AA	REVISED AS PER COMMENTS DT. 04.05.15	RELEASED FOR APPROVAL	01	08.08.15
	APPROVED	REVIEWED	CHECKED	DRAWN	DESCRIPTION	RELEASE STATUS

	GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8		BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP NOIDA	DRN: SK APPD: AS	NAME SD/-	SIGN SD/-	DATE 21/10/14
	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA MUMBAI CHENNAI NEW DELHI		BHEL SUB VENDORS		TITLE : SINGLE LINE DIAGRAM OF 400KV GIS		
UNIT : XXXXX		SCALE : NIL		BHEL DWG. NO. : TB-3-375-510-001		REV. 05	

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ELECTRICAL SYSTEM PARAMETERS OF GIS SWITCHGEAR	
01. RATED VOLTAGE	400 kV rms
02. MAX. SYSTEM VOLTAGE	420 kV rms
03. RATED CONTINUOUS CURRENT AT DESIGN AMBIENT TEMPERATURE	
BUS BAR	: 2000A
LINE/TRANSFORMER/	
BUS COUPLER FEEDERS	: 2000./2000./2000 A
04. BASIC INSULATION LEVEL	: 1425 kVp (BETWEEN LIVE TERMINALS AND EARTH)
05. SWITCHING IMPULSE	
PH-PH	: 1575 kVp
PH-EARTH	: 1050 kVp
06. POWER FREQUENCY W/S VOLTAGE	: 630 KV rms (BETWEEN LIVE TERMINALS AND EARTH)
07. FAULT LEVEL (3 SEC.)	40KA rms FOR GIS
08. SYSTEM NEUTRAL GROUNDING	EFFECTIVELY EARTHED

			TOTAL SHEETS	04
W.O. No.	DEPT.	CODE	NEXT SHEET	-
	TBEM	422	SHEET No.	04

REVIEWED	APPROVED	REVIEWED	CHECKED	DRAWN	DESCRIPTION	RELEASE STATUS	REV.	DATE	
				AS	MM/AA	REVISED AS PER COMMENTS DTD. 18.03.16	RELEASED FOR APPROVAL	05	11.07.16
				AS	MM/AA	CT-CVT PARAMETERS REVISED	RELEASED FOR APPROVAL	04	03.03.16
				AS	MM/AA	CB WILL BE PROVIDED WITHOUT PIR	RELEASED FOR APPROVAL	03	02.01.16
				AS	MM/AA	REVISED AS PER COMMENTS DT. 11.09.15	RELEASED FOR APPROVAL	02	30.09.15
				VK	MM/AA	REVISED AS PER COMMENTS DT. 04.05.15	RELEASED FOR APPROVAL	01	08.08.15

	GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8		BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP NOIDA	NAME: SK SIGN: SD/- DATE: 21/10/14
	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA • MUMBAI • CHENNAI • NEW DELHI		CHD: SK/RD/VK SD/- DATE: 21/10/14	APPD: AS SD/- DATE: 21/10/14
TITLE: SINGLE LINE DIAGRAM OF 400KV GIS			UNIT: XXXXX SCALE: NIL BHEL DWG. NO.: TB-3-375-510-001 REV. 05	

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SCHEDULE OF EQUIPMENT(400KV)

S.NO.	DESCRIPTION	SYMBOL	ABR.	MAIN QTY. (IN NOS.)
1	420kV CIRCUIT BREAKER (SF6 TYPE), 2000A WITHOUT PIR, 40 KA. FOR 3 SEC, WITH SPRING-SPRING OPERATING MECH., SINGLE AND THREE PHASE HIGH SPEED AUTO RECLOSING.		52	06
2	420kV, 2000A, 40 KA. FOR 3 SEC, HCB ISOLATOR, MOTOR & MANUAL OPERATED SUITABLE FOR MECHANICALLY GANGED OPERATION, WITH ONE EARTH SWITCH MOTOR AND MANUAL OPERATED, MECHANICALLY GANGED		89	14
3	420KV,2000A, 1-PH 5-CORE CURRENT TRANSFORMER, 40KA FOR 3SEC. (WITH 120 % EXTENDED RATING)		CT	24
4	360KV, 10KA CLASS-3 SURGE ARRESTER (1-PH), 40KA FOR 3SEC.		SA	06
5	420kV, 4400 PF CAPACITIVE VOLTAGE TRANSFORMER (1-PH)		CVT	06
6	420kV, 2000A, 1.0mH WAVE TRAP (1-PH), 40ka-1 SEC		WT	06

NOTES:-

400KV SWITCHYARD (EXTN.)

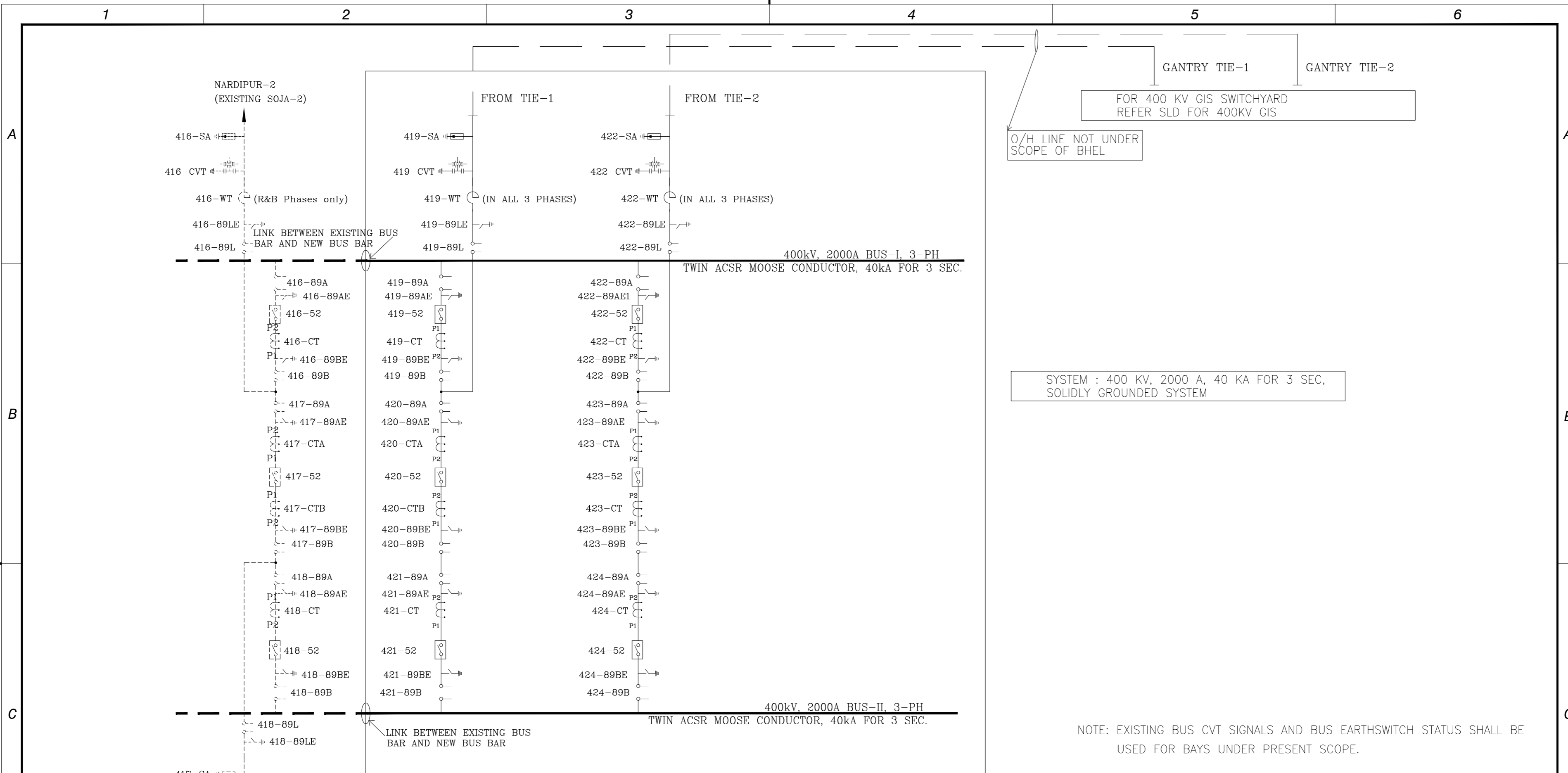
- NOMINAL VOLTAGE : 400kV
- HIGHEST SYSTEM VOLTAGE : 420kV
- SYSTEM VOLTAGE VARIATION : -5% to +5%
- RATED FREQUENCY : 50 Hz, +3% to -5%
- INSULATION LEVELS FOR 400KV
CIRCUIT BREAKERS AND DISCONNECTING SWITCHES
- RATED ONE MINUTE POWER FREQUENCY : 630 KV RMS BETWEEN LIVE TERMINALS AND EARTH WITHSTAND VOLTAGE
- RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE : A) ± 1425 KVP BETWEEN LIVE TERMINALS AND EARTH.
B) ± 1665 KVP IMPULSE ON ONE TERMINAL AND OTHER TERMINAL EARTHED (ACROSS ISOLATING DISTANCE).
- RATED SWITCHING IMPULSE WITHSTAND VOLTAGE : 1050 KVP (PHASE TO EARTH)
1575 KVP (PHASE TO PHASE)
- CREEPAGE DISTANCE : 31 MM / KV
- RATED SHORT TIME WITHSTAND CURRENT CAPACITY : 40 KA RMS FOR THREE (3) SECOND
- SYSTEM NEUTRAL EARTHING : EFFECTIVELY EARTHED
- AC AUX. SUPPLY : 415V, 3PH, 4 WIRE (+10% TO -10%)
: 240V, 1PH, 2 WIRE (+10% TO -10%)
- CONTROL VOLTAGE : 220V DC, 2 WIRE, +10% TO -15%
- DC SYSTEM FOR PLCC : 48V DC, 2 WIRE
- ALL EQUIPMENT SHALL BE RATED FOR 50 DEG CENTIGRADE AMBIENT AND OUTDOOR INSTALLATION.
- MAX. RADIO INTERFERENCE VOLTAGE AT 320KVRMS SHALL BE1000 MICRO VOLTS FOR FREQUENCY BETWEEN 0.5 MHZ AND 2.0 MHZ FOR ALL EQUIPMENT.
- CORONA EXTINCTION VOLTAGE SHALL BE 320 KV.
- THE AUXILIARY CONTACTS SHALL HAVE CONTINUOUS RATING OF 10A AND BREAKING CAPACITY OF 2A WITH CIRCUIT TIME CONSTANT OF MINIMUM 20 MILLISECOND AT 220V DC.

			TOTAL SHEETS	04
W.O. No.	DEPT.	CODE	NEXT SHEET	03
	TBEM	422	SHEET No.	02

REVISED	DATE	BY	REASON	STATUS	REV.	DATE
		VK/AS	MM/AA	REVISED AS PER COMMENTS DT. 08.03.16	04	12.07.16
		VK/AS	MM/AA	REVISED AS PER COMMENTS DT. 02.11.15	03	03.03.16
		VK/AS	MM/AA	REVISED AS PER COMMENTS DT. 01.09.15	02	08.10.15
		VK	MM/AA	REVISED AS PER COMMENTS DT. 04.05.15	01	08.08.15
		APPROVED	REVIEWED	CHECKED	DRAWN	DESCRIPTION
						RELEASE STATUS

	GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8		BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP NOIDA	NAME	SIGN	DATE
				DRN. SK	SD/-	21/10/14
	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA MUMBAI CHENNAI NEW DELHI	SCHEDULE OF EQUIPMENT AND SYSTEM DETAILS OF 400KV SWITCHYARD EXTENSION		CHD. SK/RD/VK	SD/-	21/10/14
			APPD. AS	SD/-	21/10/14	
	UNIT : XXXXX	SCALE : NIL	BHEL DWG. NO. : TB-3-375-510-001A	REV.	04	

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GANTRY TIE-1
GANTRY TIE-2
FOR 400 KV GIS SWITCHYARD
REFER SLD FOR 400KV GIS

O/H LINE NOT UNDER
SCOPE OF BHEL

SYSTEM : 400 KV, 2000 A, 40 KA FOR 3 SEC,
SOLIDLY GROUNDED SYSTEM

NOTE: EXISTING BUS CVT SIGNALS AND BUS EARTH SWITCH STATUS SHALL BE
USED FOR BAYS UNDER PRESENT SCOPE.

21/(420/) SQRT(3)kV,3X240MVA,YNd11
IMPEDANCE:13.5+/-5%
AT PRINCIPAL TAP, IN THE RANGE OF
12-15% WITHOUT TOLERANCE ON ALL
OTHER TAPS OFF CIRCUIT TAP CHANGE
-5% TO +5% IN IN STEPS OF 2.5 %

GT-7
GENERATOR-7

NOTES:-

PRESENT
EXISTING/
NOT IN BHEL SCOPE

BHEL SCOPE: EXTENSION WITHIN
EXISTING 400KV SWITCHYARD

			TOTAL SHEETS	04
W.O. No.	DEPT.	CODE	NEXT SHEET	04
	TBEM	422	SHEET No.	03

REVISED	APPROVED	REVIEWED	CHECKED	DRAWN	DESCRIPTION	RELEASE STATUS	REV.	DATE	
				VK/AS	MM/AA	REVISED AS PER COMMENTS DT. 08.03.16	RELEASED FOR APPROVAL	04	12.07.16
				VK/AS	MM/AA	REVISED AS PER COMMENTS DT. 02.11.15	RELEASED FOR APPROVAL	03	03.03.16
				VK/AS	MM/AA	REVISED AS PER COMMENTS DT. 01.09.15	RELEASED FOR APPROVAL	02	08.10.15
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<p>GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wanakkbori Thermal Power Station Extn. Unit-8</p>	<p>BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP NOIDA</p>	NAME	SIGN	DATE	
		DRN.	SK	SD/-	21/10/14
<p>DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA MUMBAI CHENNAI NEW DELHI</p>		CHD.	SK/RD/VK	SD/-	21/10/14
<p>TITLE : SLD OF 400KV SWITCHYARD FOR 400KV SWITCHYARD EXTENSION</p>		APPD.	AS	SD/-	21/10/14
UNIT :	SCALE :	BHEL DWG. NO. :		REV.	
XXXXX	NIL	TB-3-375-510-001A		04	

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420KV,2000A, 1-PH, 5-CORE CURRENT TRANSFORMER, WITH 120% EXTENDED RATING

Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
1	2000 -1000-500/ 1	PS	-	4000-2000-1000 V	10-5-2.5Ohms	30-60-120 mA	87/21M1
2	2000 -1000-500/ 1	PS	-	4000-2000-1000 V	10-5-2.5Ohms	30-60-120 mA	87/21M2, 67,67N,50BF
3	2000 -1000-500/ 1	0.2S , ISF<5	20 VA	-	-	-	Metering
4	2000 -1000-500/ 1	0.2S , ISF<5	20 VA	-	-	-	Metering (tariff)
5	2000 -1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5Ohms	30-60-120 mA	87BB/87BBCH (INBUILT)



420KV,4400PF , CAPACITIVE VOLTAGE TRANSFORMER (1-PH)

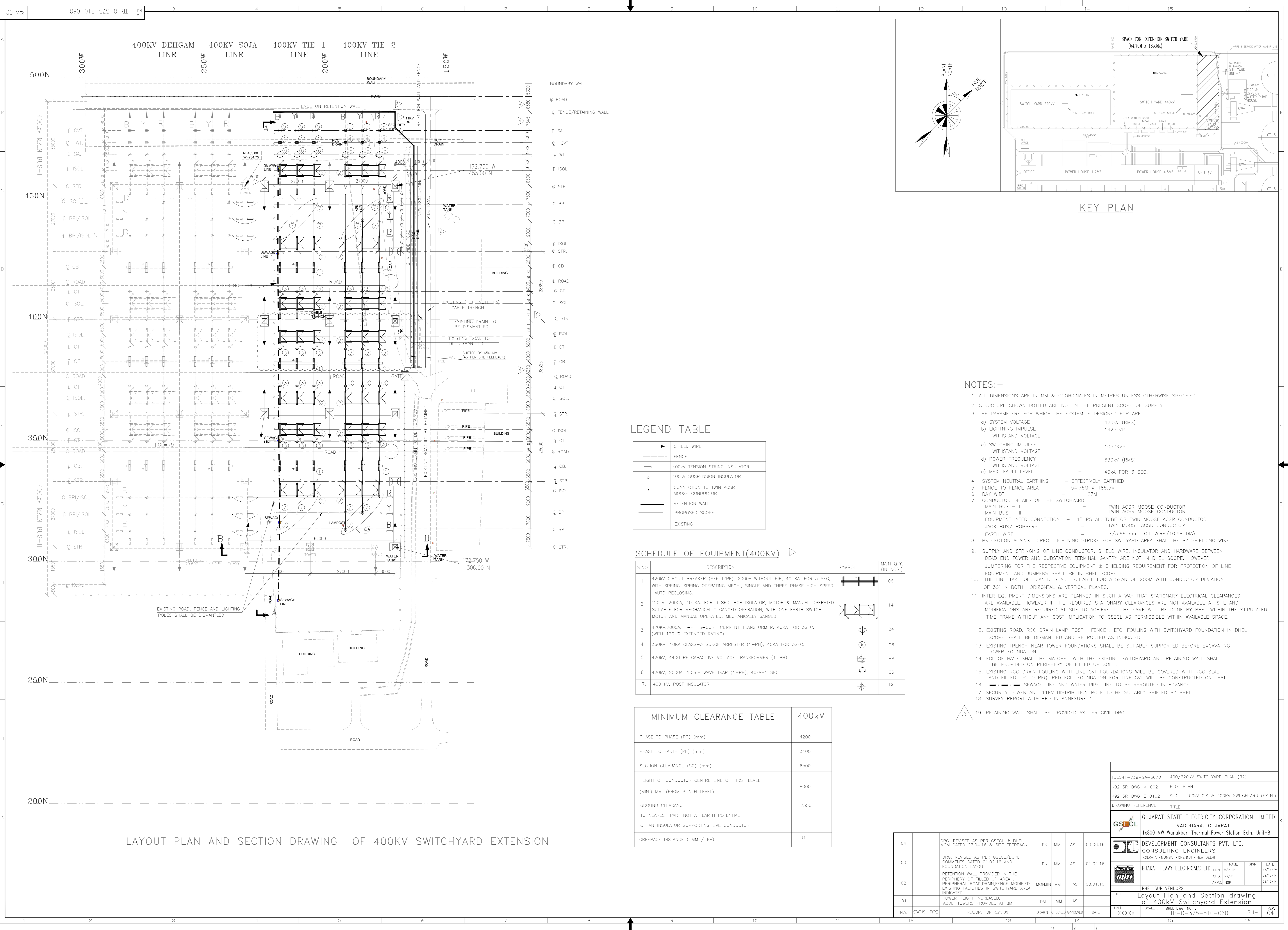
Winding No.	Voltage Ratio	Accuracy Class	Min. Burden	Purpose
1	400kV/√3 / 110V/√3	3P	200 VA	21M1
2	400kV/√3 / 110V/√3	3P	200 VA	21M2
3	400kV/√3 / 110V/√3	0.2	100VA	Metering/Synch
HF Capacitance : 4400pF +10%,-5%				



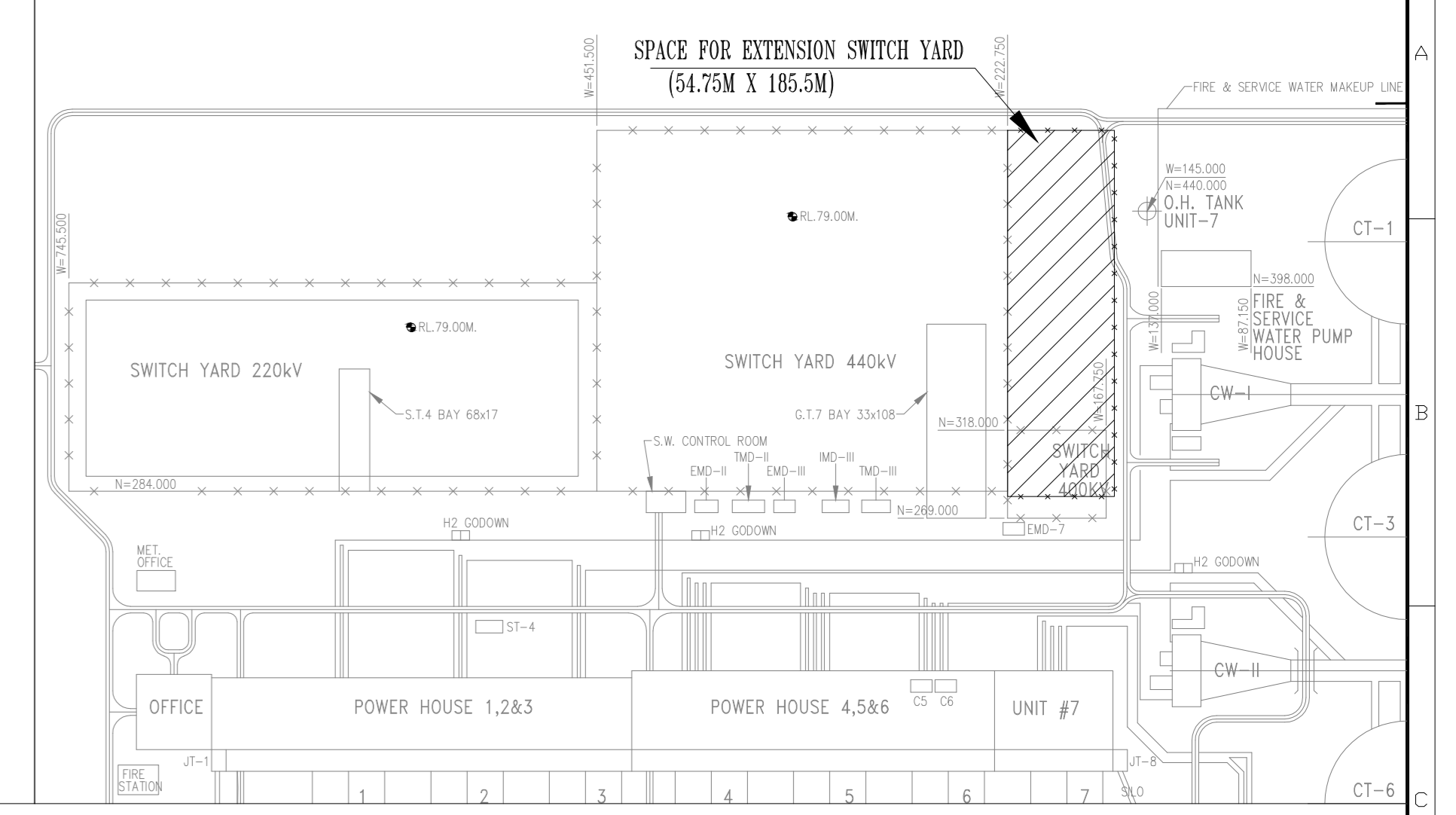
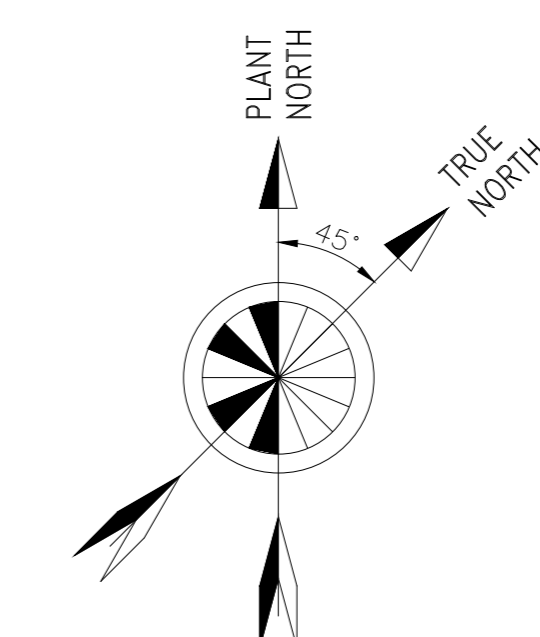
TOTAL SIMULTANEOUS BURDEN FOR WINDING -3 FOR CVT SHALL BE 100VA

			TOTAL SHEETS	04
W.O. No.	DEPT.	CODE	NEXT SHEET	-
	TBEM	422	SHEET No.	04

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				VK/AS	MM/AA	REVISED AS PER COMMENTS DT. 02.11.15	RELEASED FOR APPROVAL	03	03.03.16			CHD.	SK/RD/VK	SD/	21/10/14
				VK/AS	MM/AA	REVISED AS PER COMMENTS DT. 01.09.15	RELEASED FOR APPROVAL	02	08.10.15			APPD.	AS	SD/	21/10/14
				VK	MM/AA	REVISED AS PER COMMENTS DT. 04.05.15	RELEASED FOR APPROVAL	01	08.08.15	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA MUMBAI CHENNAI NEW DELHI	TITLE : CT/CVT DETAILS FOR 400KV SWITCHYARD EXTENSION				
										UNIT :	SCALE :	BHEL DWG. NO. :	REV.		
										XXXXX	NIL	TB-3-375-510-001A	04		



LAYOUT PLAN AND SECTION DRAWING OF 400KV SWITCHYARD EXTENSION



KEY PLAN

NOTES:-

- ALL DIMENSIONS ARE IN MM & COORDINATES IN METRES UNLESS OTHERWISE SPECIFIED
- STRUCTURE SHOWN DOTTED ARE NOT IN THE PRESENT SCOPE OF SUPPLY
- THE PARAMETERS FOR WHICH THE SYSTEM IS DESIGNED FOR ARE:
 - a) SYSTEM VOLTAGE - 420KV (RMS)
 - b) LIGHTNING IMPULSE - 1425KV. WITHSTAND VOLTAGE
 - c) SWITCHING IMPULSE - 1050KV. WITHSTAND VOLTAGE
 - d) POWER FREQUENCY - 630KV (RMS) WITHSTAND VOLTAGE
 - e) MAX. FAULT LEVEL - 40KA FOR 3 SEC.
- SYSTEM NEUTRAL EARTHING - EFFECTIVELY EARTHED
- FENCE TO FENCE AREA - 54.75M X 185.5M
- BAY WIDTH - 27M
- CONDUCTOR DETAILS OF THE SWITCHYARD
 - MAIN BUS - I - TWIN ACSR MOOSE CONDUCTOR
 - MAIN BUS - II - TWIN ACSR MOOSE CONDUCTOR
 - EQUIPMENT INTER CONNECTION - 4" IPS AL. TUBE OR TWIN MOOSE ACSR CONDUCTOR
 - JACK BUS/DROPPERS - TWIN MOOSE ACSR CONDUCTOR
 - EARTH WIRE - 7/3.66 mm G.I. WIRE,(10.98 DIA)
- PROTECTION AGAINST DIRECT LIGHTNING STROKE FOR SW. YARD AREA SHALL BE BY SHIELDING WIRE.
- SUPPLY AND STRINGING OF LINE CONDUCTOR, SHIELD WIRE, INSULATOR AND HARDWARE BETWEEN DEAD END TOWER AND SUBSTATION TERMINAL GANTRY ARE NOT IN BHEL SCOPE. HOWEVER JUMPING FOR THE RESPECTIVE EQUIPMENT & SHIELDING REQUIREMENT FOR PROTECTION OF LINE EQUIPMENT AND JUMPERS SHALL BE IN BHEL SCOPE.
- THE LINE TAKE OFF GANTRIES ARE SUITABLE FOR A SPAN OF 200M WITH CONDUCTOR DEVIATION OF 30° IN BOTH HORIZONTAL & VERTICAL PLANES.
- INTER EQUIPMENT DIMENSIONS ARE PLANNED IN SUCH A WAY THAT STATIONARY ELECTRICAL CLEARANCES ARE AVAILABLE. HOWEVER IF THE REQUIRED STATIONARY CLEARANCES ARE NOT AVAILABLE AT SITE AND MODIFICATIONS ARE REQUIRED AT SITE TO ACHIEVE IT, THE SAME WILL BE DONE BY BHEL WITHIN THE STIPULATED TIME FRAME WITHOUT ANY COST IMPLICATION TO GSECL AS PERMISSIBLE WITHIN AVAILABLE SPACE.
- EXISTING ROAD, RCC DRAIN LAMP POST, FENCE, ETC. FOULING WITH SWITCHYARD FOUNDATION IN BHEL SCOPE SHALL BE DISMANTLED AND RE ROUTED AS INDICATED.
- EXISTING TRENCH NEAR TOWER FOUNDATIONS SHALL BE SUITABLY SUPPORTED BEFORE EXCAVATING TOWER FOUNDATION.
- FGL OF BAYS SHALL BE MATCHED WITH THE EXISTING SWITCHYARD AND RETAINING WALL SHALL BE PROVIDED ON PERIPHERY OF FILLED UP SOIL.
- EXISTING RCC DRAIN FOULING WITH LINE CVT FOUNDATIONS WILL BE COVERED WITH RCC SLAB AND FILLED UP TO REQUIRED FGL. FOUNDATION FOR LINE CVT WILL BE CONSTRUCTED ON THAT.
- SEWAGE LINE AND WATER PIPE LINE TO BE REROUTED IN ADVANCE.
- SECURITY TOWER AND 11KV DISTRIBUTION POLE TO BE SUITABLY SHIFTED BY BHEL.
- SURVEY REPORT ATTACHED IN ANNEXURE 1
- RETAINING WALL SHALL BE PROVIDED AS PER CIVIL DRG.

LEGEND TABLE

	SHIELD WIRE
	FENCE
	400KV TENSION STRING INSULATOR
	400KV SUSPENSION INSULATOR
	CONNECTION TO TWIN ACSR MOOSE CONDUCTOR
	RETENTION WALL
	PROPOSED SCOPE
	EXISTING

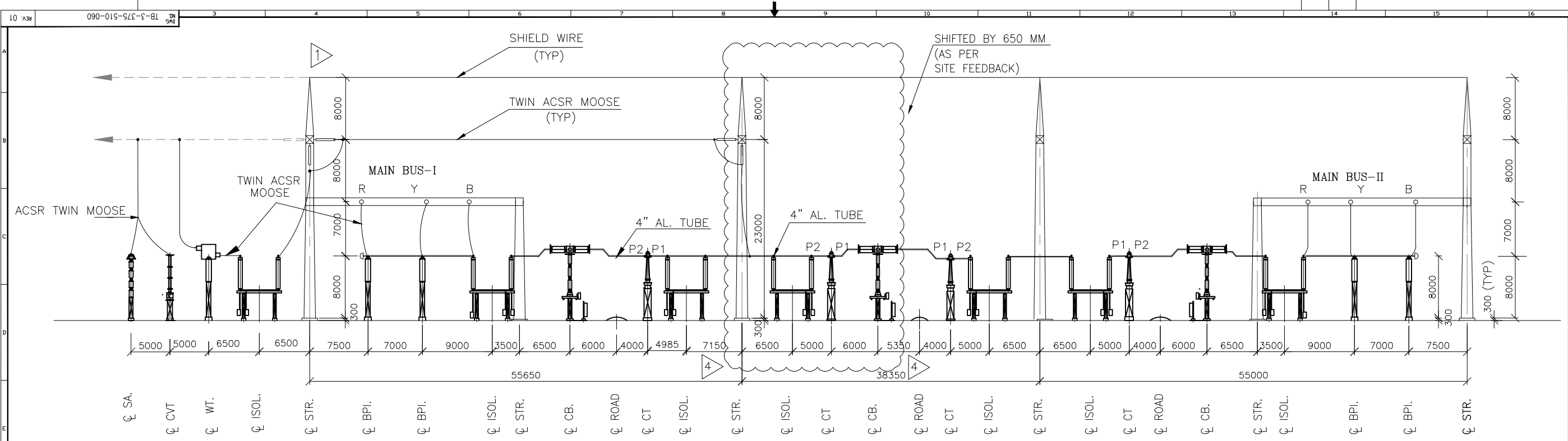
SCHEDULE OF EQUIPMENT(400KV)

S.NO.	DESCRIPTION	SYMBOL	MAIN QTY. (IN NOS.)
1	420kv CIRCUIT BREAKER (SF6 TYPE), 2000A WITHOUT PIR, 40 KA. FOR 3 SEC. WITH SPRING-SPRING OPERATING MECH., SINGLE AND THREE PHASE HIGH SPEED AUTO RECLOSING.		06
2	420kv, 2000A, 40 KA. FOR 3 SEC. HCB ISOLATOR, MOTOR & MANUAL OPERATED SUITABLE FOR MECHANICALLY GANGED OPERATION, WITH ONE EARTH SWITCH MOTOR AND MANUAL OPERATED, MECHANICALLY GANGED		14
3	420KV,2000A, 1-PH 5-CORE CURRENT TRANSFORMER, 40KA FOR 3SEC. (WITH 120 % EXTENDED RATING)		24
4	360KV, 10KA CLASS-3 SURGE ARRESTER (1-PH), 40KA FOR 3SEC.		06
5	420kv, 4400 PF CAPACITIVE VOLTAGE TRANSFORMER (1-PH)		06
6	420kv, 2000A, 1.0mH WAVE TRAP (1-PH), 40ka-1 SEC		06
7.	400 kv, POST INSULATOR		12

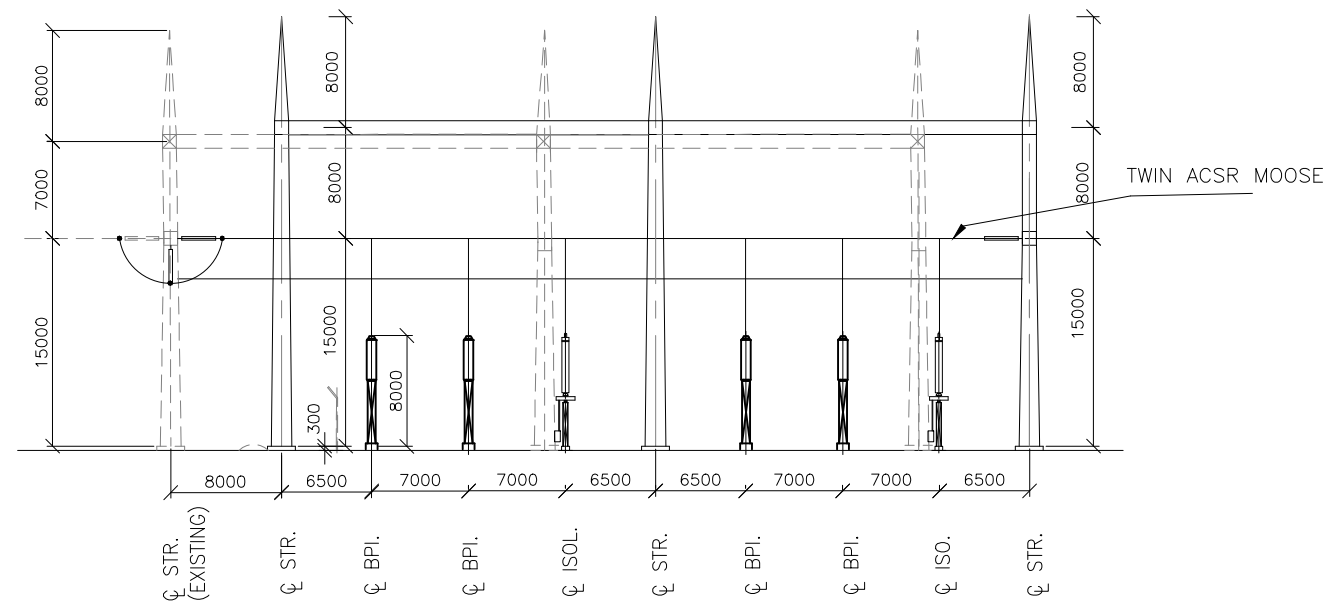
MINIMUM CLEARANCE TABLE		400KV
PHASE TO PHASE (PP) (mm)		4200
PHASE TO EARTH (PE) (mm)		3400
SECTION CLEARANCE (SC) (mm)		6500
HEIGHT OF CONDUCTOR CENTRE LINE OF FIRST LEVEL (MIN.) MM. (FROM PLINTH LEVEL)		8000
GROUND CLEARANCE TO NEAREST PART NOT AT EARTH POTENTIAL OF AN INSULATOR SUPPORTING LIVE CONDUCTOR		2550
CREEPAGE DISTANCE (MM / KV)		31

04	DRG. REVISED AS PER GSECL & BHEL MOM DATED 27.04.16 & SITE FEEDBACK	PK	MM	AS	03.06.16
03	DRG. REVISED AS PER GSECL/DCPL COMMENTS DATED 01.02.16 AND FOUNDATION LAYOUT	PK	MM	AS	01.04.16
02	RETENTION WALL PROVIDED IN THE PERIPHERY OF FILLED UP AREA. PERIPHERAL ROAD, DRAIN, FENCE, MODIFIED EXISTING FACILITIES IN SWITCHYARD AREA INDICATED.	MON/JN	MM	AS	08.01.16
01	TOWER HEIGHT INCREASED. ADDL. TOWERS PROVIDED AT 8M	DM	MM	AS	

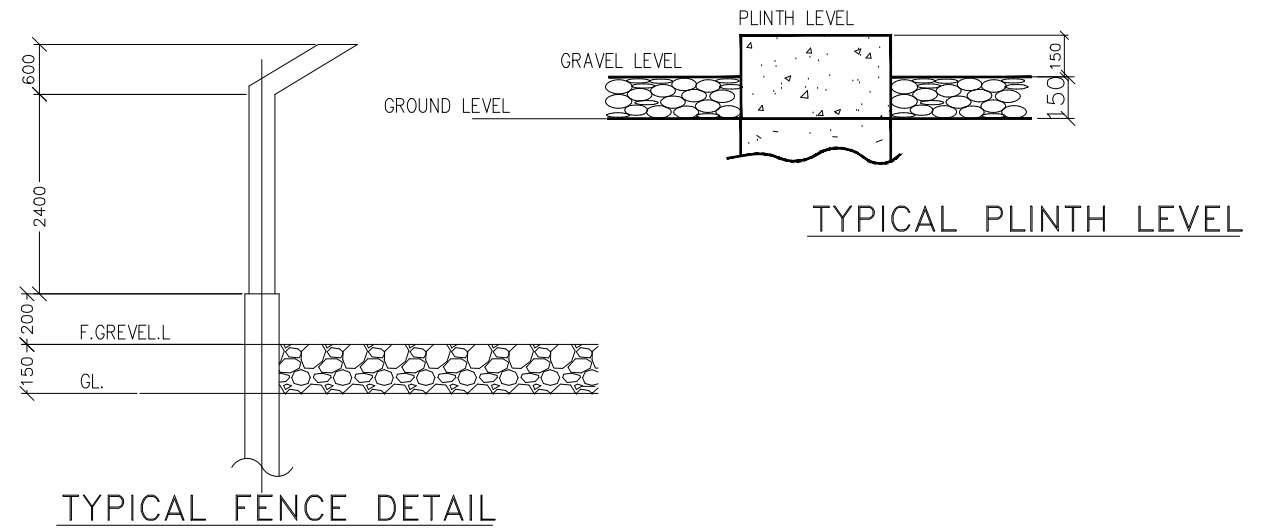
TCE541-739-GA-3070	400/220KV SWITCHYARD PLAN (R2)
K9213R-DWG-M-002	PLOT PLAN
K9213R-DWG-E-0102	SLD - 400KV GIS & 400KV SWITCHYARD (EXTRN.)
	DRAWING REFERENCE
	TITLE
GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wankanori Thermal Power Station Extn. Unit-8	
DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA • MUMBAI • CHENNAI • NEW DELHI	
BHARAT HEAVY ELECTRICALS LTD. BHARAT HEAVY ELECTRICALS LTD. BHARAT HEAVY ELECTRICALS LTD. BHARAT HEAVY ELECTRICALS LTD.	
BHEL SUB VENDORS TITLE: Layout Plan and Section drawing of 400kV Switchyard Extension UNIT: XXXXX SCALE: BHEL DWG. NO.: 1B-0-375-510-060 SH-1 REV. 04	



SECTION A-A
(400kV BAY)



SECTION B-B



04		DRG. REVISED AS PER GSECL & BHEL MOM DATED 27.04.16 & SITE FEEDBACK	PK	MM	AS	03.06.16	
03		DRG. REVISED AS PER GSECL/DCPL COMMENTS DATED 01.02.16 AND FOUNDATION LAYOUT	PK	MM	AS	01.04.16	
02		RETENTION WALL PROVIDED IN THE PERIPHERY OF FILLED UP AREA, PERIPHERAL ROAD, DRAIN, FENCE, MODIFIED EXISTING FACILITIES IN SWITCHYARD AREA INDICATED.	MONJIN	MM	AS	08.01.16	
01		TOWER HEIGHT INCREASED, ADDL. TOWERS PROVIDED AT 8M	DM	MM	AS		
REV.	STATUS	TYPE	REASONS FOR REVISION	DRAWN	CHECKED	APPROVED	DATE

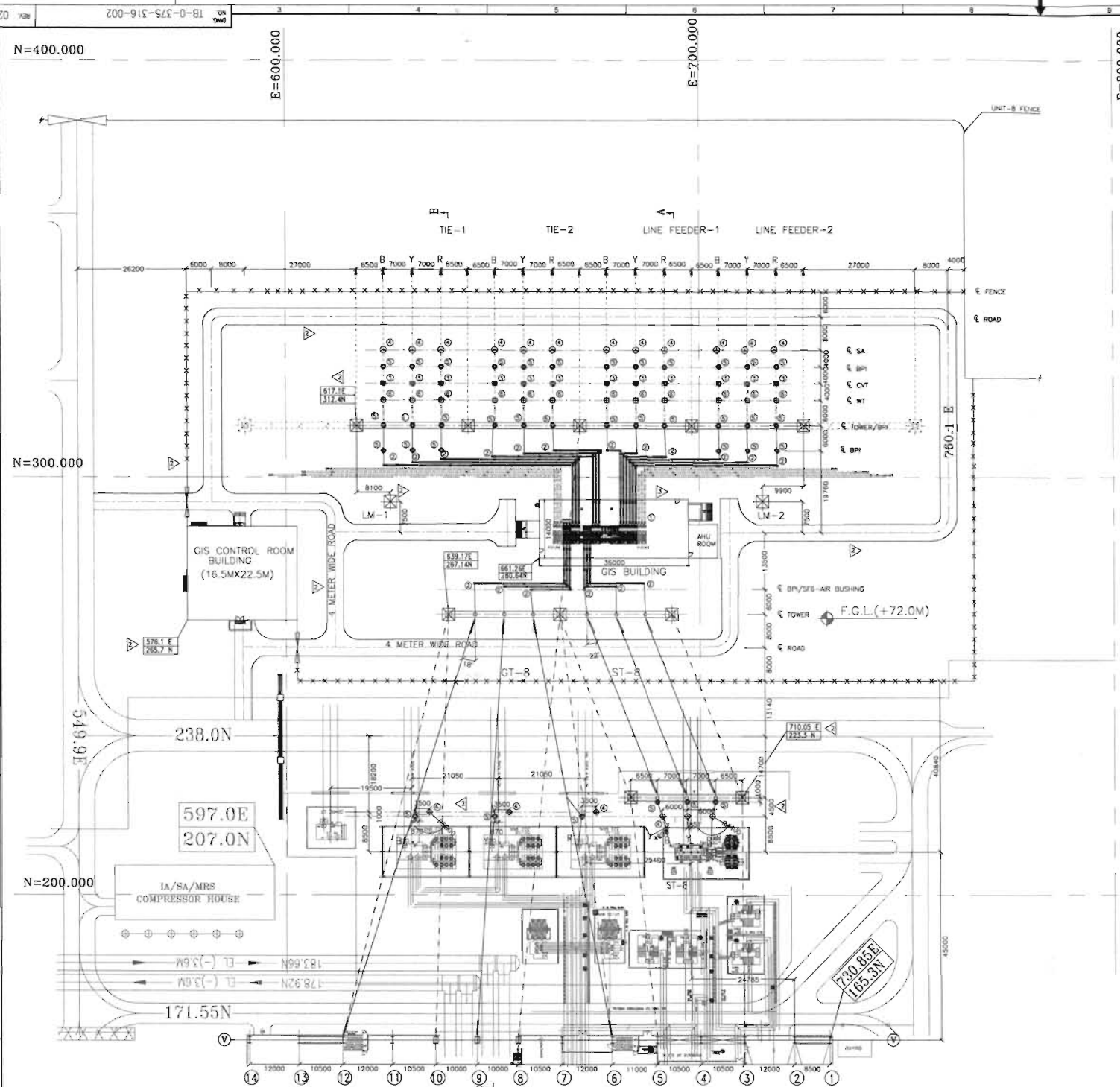
GUJARAT STATE ELECTRICITY CORPORATION LIMITED
VADODARA, GUJARAT
1x800 MW Wanakbori Thermal Power Station Extn. Unit-8

DEVELOPMENT CONSULTANTS PVT. LTD.
CONSULTING ENGINEERS
KOLKATA • MUMBAI • CHENNAI • NEW DELHI

NAME	SIGN	DATE
DRG. MANJIN		22/12/14
CHK. BK/AS		22/12/14
APPD. NSR		22/12/14

BHEL SUB VENDORS

TITLE: Layout Plan and Section drawing of 400kV Switchyard Extension
SCALE: 1:1000
UNIT: XXXXX
BHEL DRG. NO.: TB-0-375-510-060
SH-2 03



BILL OF QUANTITY:-

S.NO.	DESCRIPTION	SYMBOL	QUANTITY (NOS.)
1	420 KV INDOOR GIS		01
2	420 KV, 1-ph SF6 TO AIR BUSHING		18
3	420KV, 1-ph CVT		12
4	360KV, 1-ph SURGE ARRESTER		18
5	420KV, 8 KN, 1-ph BUS POST INSULATOR		56
6	420KV, 2000A, 1-ph, 1.1MH WAVE TRAP		12

CONDUCTOR SIZE DETAILS

EQUIPMENT INTERCONNECTION	400 KV	TWIN 'MOOSE' CONDUCTOR
JACK BUS & JUMPERS	400 KV	TWIN 'MOOSE' CONDUCTOR

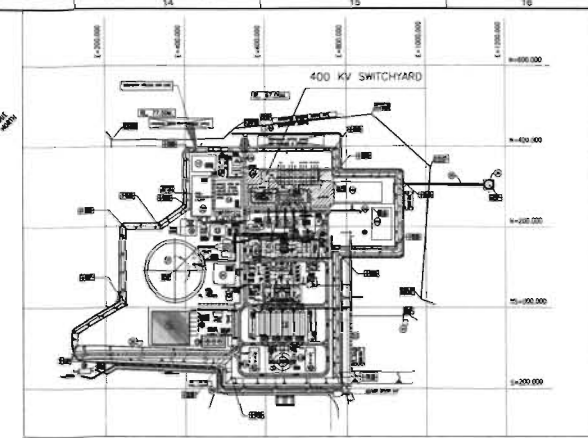
MINIMUM CLEARANCE TABLE - 400KV

PHASE TO PHASE (PP) (mm)	4200
PHASE TO EARTH (PE) (mm)	3400
SECTION CLEARANCE (SC) (mm)	6500
HEIGHT OF CONDUCTOR CENTRE LINE OF FIRST LEVEL (MIN) MM. (FROM PLINTH LEVEL)	8000
GROUND CLEARANCE TO NEAREST PART NOT AT EARTH-POTENTIAL OF AN INSULATOR SUPPORTING LIVE CONDUCTOR	2550
CREEPAE DISTANCE (mm/kV)	31

SYSTEM PARAMETERS OF GIS SWITCHGEAR

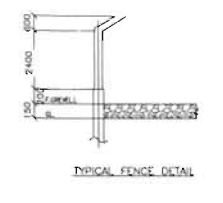
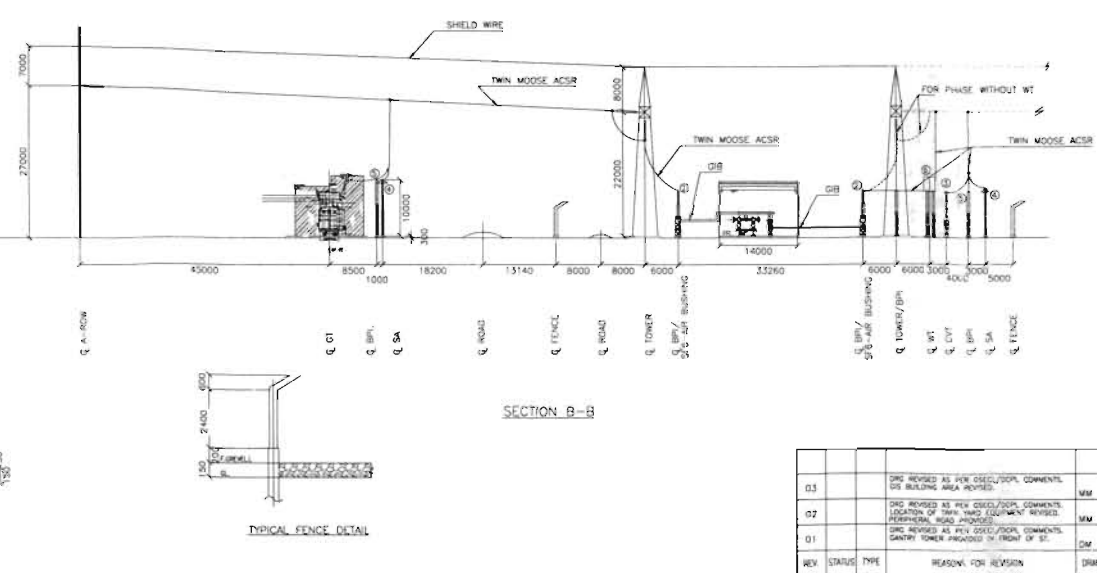
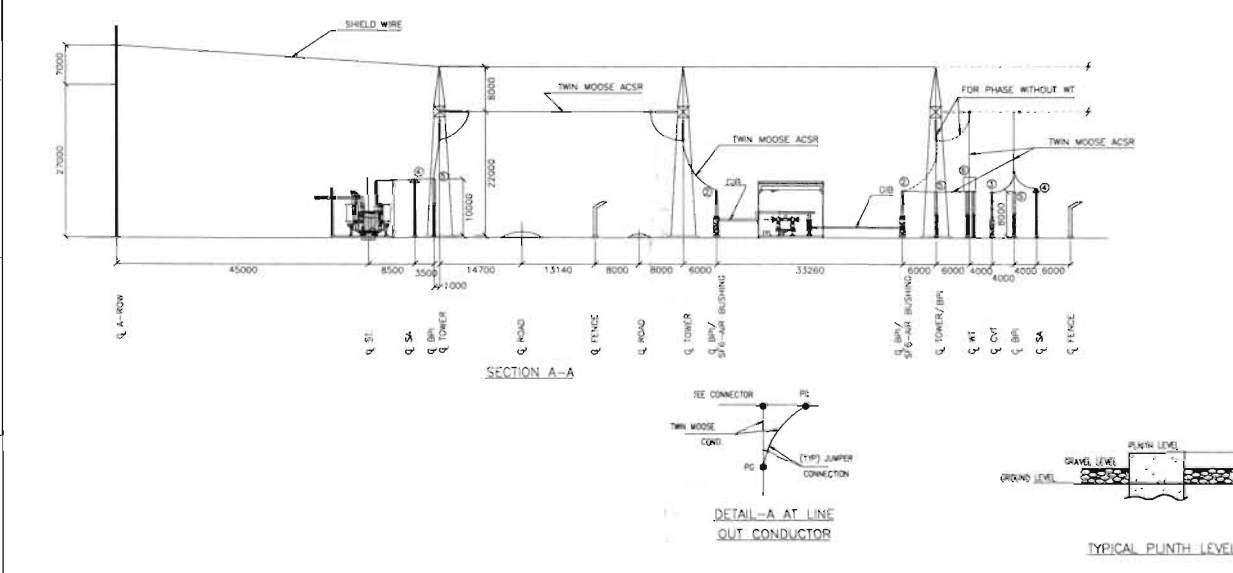
NOTES:-

	400KV SWITCHYARD (FOR GIS)
1. NOMINAL VOLTAGE	: 400KV
2. HIGHEST SYSTEM VOLTAGE	: 420KV
3. SYSTEM VOLTAGE VARIATION	: -5% to +5%
4. RATED FREQUENCY	: 50 Hz, +3% to -5%
5. INSULATION LEVELS FOR 400KV CIRCUIT BREAKERS AND DISCONNECTING SWITCHES	
5A. RATED ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE	: 630 KV RMS BETWEEN LIVE TERMINALS AND EARTH.
5B. RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE	: A) ± 1425 KVP BETWEEN LIVE TERMINALS AND EARTH. B) ± 1865 KVP IMPULSE ON ONE TERMINAL AND OTHER TERMINAL EARTHED (ACROSS ISOLATING DISTANCE).
5C. RATED SWITCHING IMPULSE WITHSTAND VOLTAGE	: 1050 KVP (PHASE TO EARTH) 1575 KVP (PHASE TO PHASE)
6. RATED SHORT TIME WITHSTAND CURRENT CAPACITY	: 40 KA RMS FOR THREE (3) SECONDS
7. SYSTEM NEUTRAL EARTHING	: EFFECTIVELY EARTHED
8. AC AUX. SUPPLY	: 415V, 3PH, 4 WIRE (+10% TO -10%) 240V, 1PH, 2 WIRE (+10% TO -10%)
9. CONTROL VOLTAGE	: 220V DC, 2 WIRE, +10% TO -15%
10. DC SYSTEM FOR FLOC	: 48V DC, 2 WIRE
11. GIS BUS CONFIGURATION	: DOUBLE BUSBAR, 420 KV, 2000A, 40A FOR 3 S
11. ALL EQUIPMENT SHALL BE RATED FOR 50 DEG CENTIGRADE AMBIENT AND OUTDOOR INSTALLATION.	



LEGEND TABLE:-

—	400KV TENSION INSULATOR
—	TWIN 'MOOSE' ACSR CONDUCTOR
—	SHIELD WIRE
—	FENCE
○	400KV SUSPENSION INSULATOR
○	CONNECTION TO TWIN ACSR MOOSE CONDUCTOR
—	PROPOSED SCOPE
---	EXISTING/FUTURE SCOPE
—	GB (GAS INSULATED BUS DUCT)
—	TOWER WITH PEAK
—	LM (LIGHTNING MAST)



- NOTES:**
- ALL DIMENSIONS ARE IN MM.
 - ALL STRUCTURE/CONDUCTOR HEIGHTS ARE ABOVE PLINTH LEVEL. PLINTH LEVEL - 300 MM ABOVE G.L. (GROUND LEVEL).
 - ALL FLEXIBLE CONNECTIONS ARE WITH TWIN MOOSE ACSR CONDUCTOR WITH 450 MM SPACING.
 - LOCATION OF WTS ARE INDICATIVE ONLY AND THE EXACT LOCATION WILL BE BASED ON PLOC REQUIREMENT THEREFORE THE PLOC SHALL BE PROVIDED IN ALL THREE PHASE.
 - 30KV LA NEAR GENERATOR TRANSFORMERS AND STATION TRANSFORMERS MUST HAVE REMOVABLE TYPE STEEL STRUCTURE SO THAT IT CAN BE REMOVED WHEN TRANSFORMER HAS TO BE TAKEN OUT FOR REPAIR/ REPLACEMENT.
 - LA PRESSURE RELIEF VALVE SHALL NOT BE TOWARDS TRANSFORMER SIDE/ANY EQUIPMENT KEPT NEAR LIGHTNING ARRESTER.
 - HEIGHT OF FENCE SHALL BE 1800MM FROM TOP OF THE WALL. TOP OF THE WALL SHALL BE MIN. 200MM ABOVE FORMATION LEVEL(TOP OF DRIVEL).
 - GIS/BUS DUCT LAYOUT IS TENTATIVE AND SHALL BE FINALIZED AFTER VENDOR FINALIZATION OF GIS.
 - CONTROL ROOM BUILDING AND GIS BUILDING LAYOUT SHALL BE SUBMITTED SEPARATELY.
 - EQUIPMENTS IN TRANSFORMER YARD SHALL BE FINALISED AS PER TRANSFORMER YARD LAYOUT.

PL-00-NR-100-0001	PILOT PLAN
PL-00-NR-100-0001	TRANSFORMER YARD LAYOUT
43273M-0MG-W-002	PILOT PLAN (TENDER)
43273M-0MG-C-0102	SLD - 400KV GIS & 400KV SWITCHYARD (EXTN.)
	TITLE

GSECL
GUJARAT STATE ELECTRICITY CORPORATION LIMITED
 VADODARA, GUJARAT
 1x800 MW Wankaroli Thermal Power Station Extn. Unit-8

DEVELOPMENT CONSULTANTS PVT. LTD.
 CONSULTING ENGINEERS
 KOLKATA - HYDRABAD - CHENNAI - NEW DELHI

GHARAT HEAVY ELECTRICALS LTD.
 BHIL SUB VENDORS

NO.	DATE	REVISION	BY	CHECKED	DATE
03		DRG REVISED AS PER OBSERVATION COMMENTS ON BUILDING AREA REVISED	MM	AS	11.07.16
02		DRG REVISED AS PER OBSERVATION COMMENTS ON LOCATION OF TOWER AND EQUIPMENT REVISED	MM	SK	02.02.16
01		DRG REVISED AS PER OBSERVATION COMMENTS ON TOWER POSITION REVISED FROM 8 TO 9	DM	MM	21.09.15

Scale: XXXXX
 Date: 18-0-375-316-002
 Rev: 03

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REV.	DATE	ALTERED	REV.	DATE	ALTERED	MM	REV.	DATE	ALTERED	PK
		CHECKED	02	23.08.2016	CHECKED	MM	01	05.07.2016	CHECKED	MM/SK
		APPD			APPD	AS			APPD	AS
			DRG REVISED AS PER GSECL/DCPL COMMENTS DATED: -28.07.2016				DRG REVISED AS PER GSECL/DCPL COMMENTS. DATED: -08.04.2016			
			JOB No. 81004							

LEGEND



CONNECTION TO GROUND MAT THROUGH RISER.

SHEET NO. DESCRIPTION

- 01. TITLE
- 1A. NOTES
- 02. 400kV SF6 CIRCUIT BREAKER
- 03. 400kV CVT
- 04. 400kV, POST INSULATOR (SOLID CORE TYPE)
- 05. LIGHTNING ARRESTER (360kV)
- 06. MARSHALLING KIOSK
- 07. 400kV HORIZONTAL CENTER BREAK ISOLATOR (TYPICAL) WITH ONE EARTH SWITCH
- 08. TOWER WITH PEAK
- 8A. TOWER WITHOUT PEAK
- 8B. LIGHTNING MAST
- 09. 400kV CURRENT TRANSFORMER
- 10. CABLE TRENCH
- 11. ROD EARTH ELECTRODE WITHOUT TEST PIT
- 12. ROD EARTH ELECTRODE WITH TEST PIT

SHEET NO. DESCRIPTION

- 13. RAIL BONDING
- 14. LT TRANSFORMER
- 15. AUXILIARY EARTH MAT FOR ISOLATOR MAIN MECH.,E/S MECH. BOX
- 16. CONTROL AND RELAY PANELS
- 17. GATE/FENCE POST
- 18. TYPICAL ARRANGEMENT OF BOLTED JOINTS
- 19. WELDING DETAILS
- 20. WELDING DETAILS
- 21. WELDING DETAILS
- 22. WELDING DETAILS
- 23. 400 kV WAVE TRAP

TRANSLATE DWG:-

K9213R-DWG-E-0600: NOTES & DETAILS; GROUNDING SYSTEM

	GUJARAT STATE ELECTRICITY CORPORATION LIMITED			
	VADODARA, GUJARAT 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8			
	DEVELOPMENT CONSULTANTS PVT. LTD.			
	CONSULTING ENGINEERS KOLKATA MUMBAI GHENNAI NEW DELHI			
	BHARAT HEAVY ELECTRICALS LTD.	NAME	SIGN	DATE
		DRN. PK		
		CHD. MM/SK		
		APPD. AS		
TITLE : EQUIPMENT EARTHING DETAILS FOR 400kV SWITCHYARD				
UNIT : TBG	SCALE :	BHEL DWG. NO. : TB-4-375-509-019		REV. 02

GENERAL NOTES:

1. EARTH STRIP CLEATED TO LATTICE TYPE STRUCTURE AT AN INTERVAL OF 750mm.
2. ALL ELECTRICAL EQUIPMENTS SHALL BE EARTHED BY TWO SEPARATE AND DISTINCT EARTH CONNECTIONS AND SHALL BE CONNECTED TO DIFFERENT CONDUCTORS OF EARTHING GRID.
3. THE MAIN GROUND GRID SHALL BE BURIED IN EARTH AT A MINIMUM DEPTH OF 1000MM BELOW GROUND LEVEL.
4. THE GROUND GRID CONDUCTOR BELOW GROUND LEVEL SHALL BE OF BARE 40MM ϕ MILD STEEL ROD. GROUND ELECTRODE SHALL BE 40MM ϕ X 3000 MM LONG MILD STEEL ROD, DRIVEN INTO THE GROUND AND CONNECTED TO THE GROUND GRID CONDUCTOR.
5. RISER/PIGTAIL FROM THE GROUND GRID SHALL BE 40MM ϕ MILD STEEL ROD AND SHALL PROJECT 300 MM ABOVE FINISHED GROUND/CONCRETE FLOOR LEVEL.
6. ALL GROUND CONNECTIONS BELOW GROUND SHALL BE MADE BY ELECTRIC ARC WELDING WITH LOW HYDROGEN CONTENT ELECTRODE. BENDING OF THE CONDUCTOR WHERE NECESSARY SHALL BE DONE BY GAS HEATING.
7. GROUND CONDUCTOR CONNECTIONS ABOVE GROUND SHALL BE GENERALLY MADE BY ELECTRIC ARC WELDING. THE CONNECTION SHALL BE COATED WITH COLD GALVANISING/WEATHER RESISTANT PAINTS.
8. BOLTED CONNECTION SHALL BE MADE ONLY FOR GROUNDING OF EQUIPMENT/ DEVICES AND SOME REMOVABLE STRUCTURES. THE CONTACT SURFACES SHALL BE THOROUGHLY CLEANED BEFORE CONNECTION TO ENSURE GOOD ELECTRICAL CONTACT.
9. 40MM ϕ X3000MM LONG MILD STEEL GROUND ROD ELECTRODES SHALL BE PROVIDED AT CONNECTIONS WITH DRY TYPE TRANSFORMER NEUTRALS, LIGHTNING ARRESTERS, CVT NEUTRALS AND SHIELD WIRE TOWER.
10. THE GROUNDING INSTALLATION WORK SHALL CONFORM TO THE REQUIREMENTS OF THE INDIAN ELECTRICITY RULES AND CODE OF PRACTICE FOR EARTHING (IS:3043) AS AMENDED UP-TO-DATE IN INDIA.
11. 40 DIA MS ROD RISERS SHOULD BE BROUGHT CLOSE TO EQUIPMENTS FOUNDATION.
12. EARTH WIRE DOWN CONDUCTOR SHALL BE CLEATED AT AN INTERVAL OF 1500MM ALONG WITH STRUCTURE.
13. FOR WELDING DETAILS REFER SHHET NO. 19,20,21 AND 22.

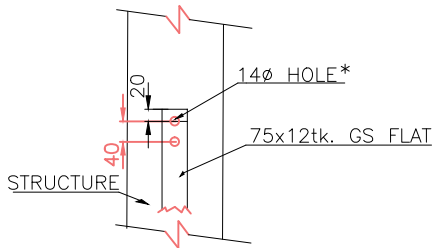


**EQUIPMENT EARTHING DETAILS
NOTES**

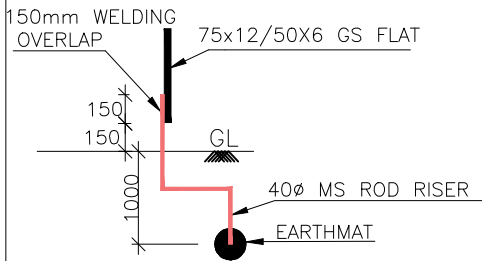
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TB-4-375-509-019

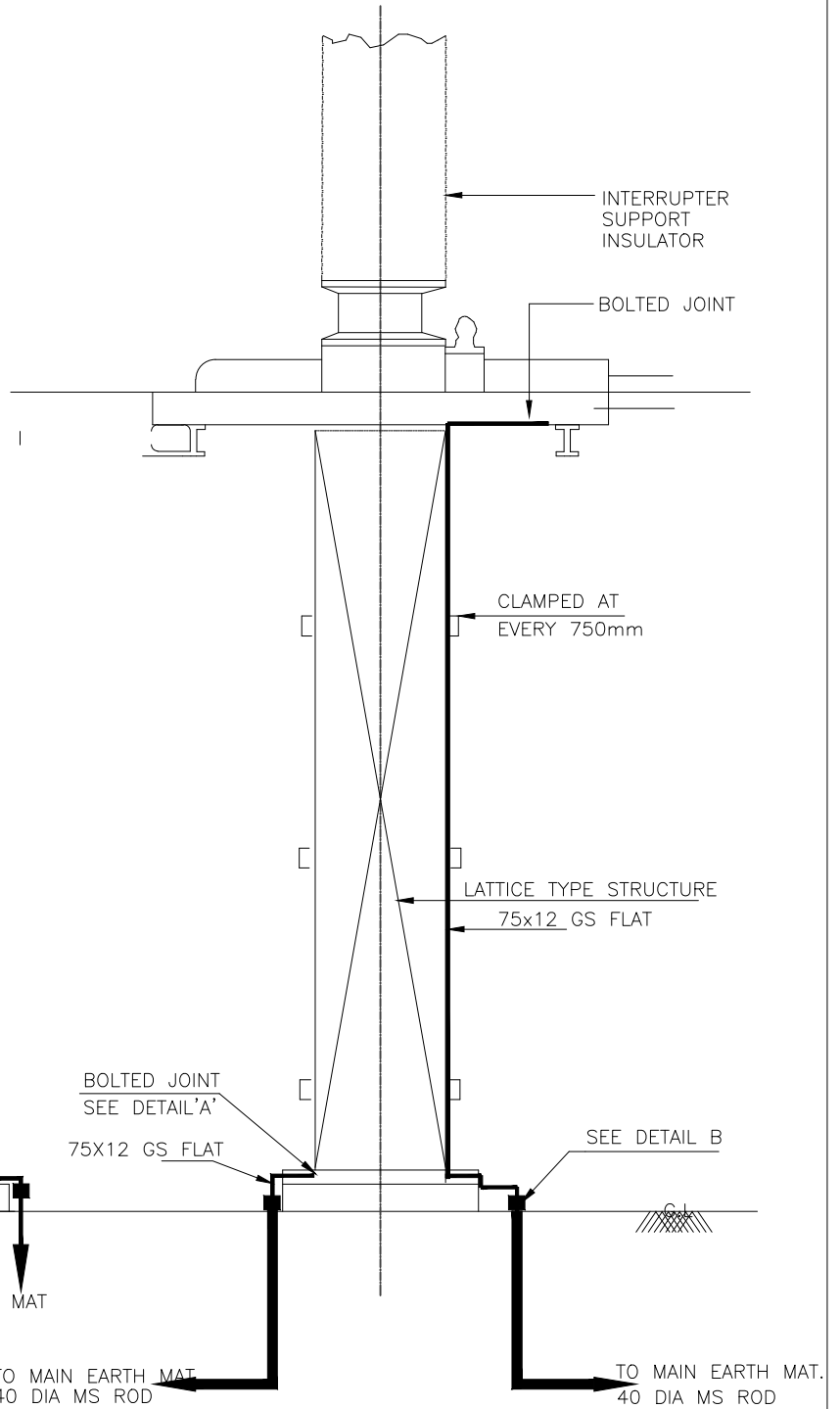
SHEET No.
1A



DETAIL-A



DETAIL B



NOTE:

- 1) * BOLT SIZE AND HOLE SIZE SHALL BE TO SUIT RESPECTIVE EQPT./STRUCTURE.
- 2) NO. OF RISERS PER CIRCUIT BREAKER = 2 NOS./PHASE
- 3) NO. OF RISERS FOR CONTROL CABINET = 2 NOS.
- 4) NO. OF RISERS FOR PLATFORM = 2 NOS. PER PLATFORM (IF APPLICABLE).
- 5) AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW CONTROL CABINET OF CB
- 6) "SEPARATE RISERS SHALL BE PROVIDED FOR MB"



EQUIPMENT EARTHING DETAILS
400kV SF6 CIRCUIT BREAKER

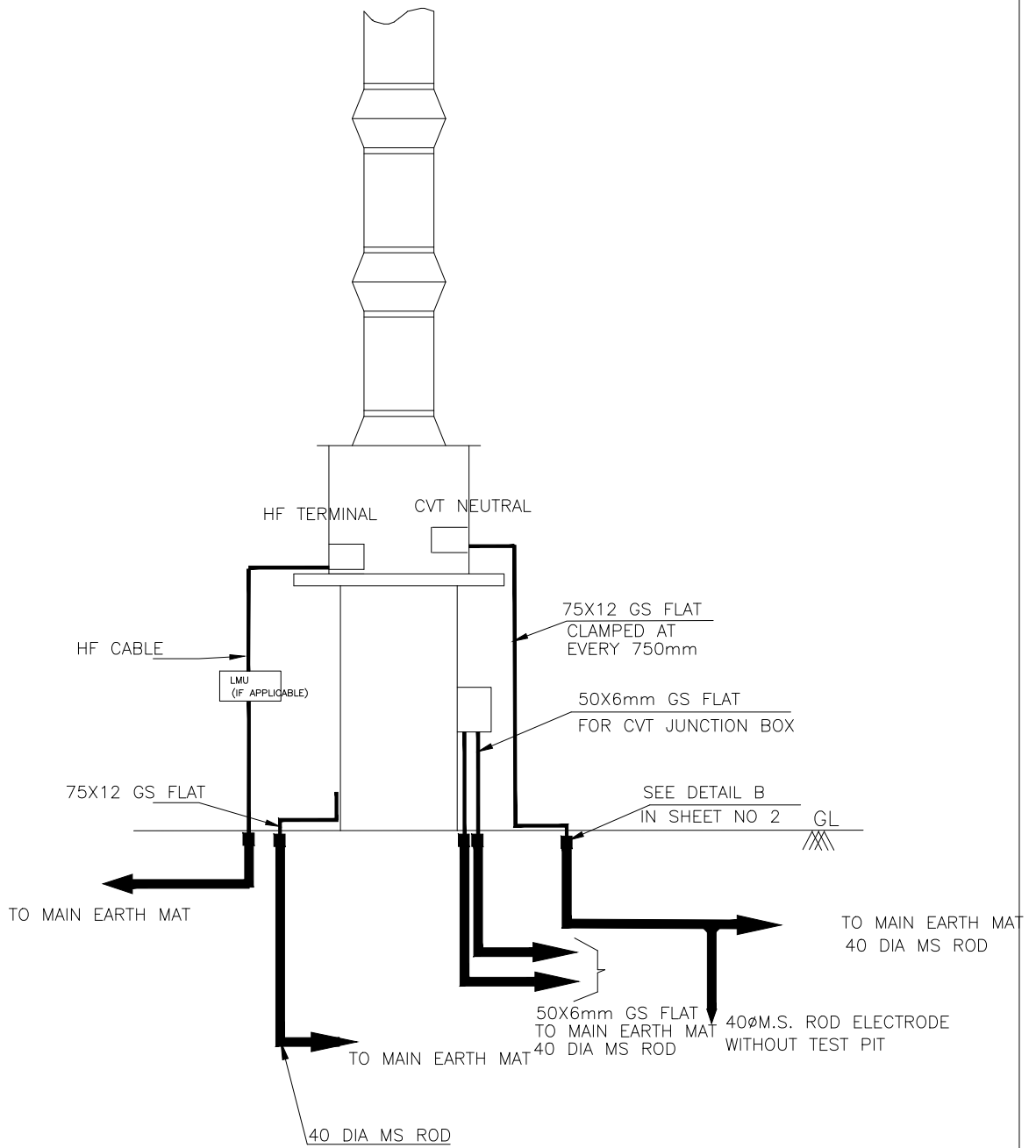
COMPUTERREF.NO.

DRG. No.

TB-4-375-509-019

SHEET No.

2



NOS.OF RISERS
 = 3 NOS. PER PHASE
 + 2 NOS. FOR CVT JUNCTION BOX
 ROD ELECTRODE = 1 NO. PER CVT FOR NEUTRAL



EQUIPMENT EARTHING DETAILS
 400kV CVT (LINE SIDE)

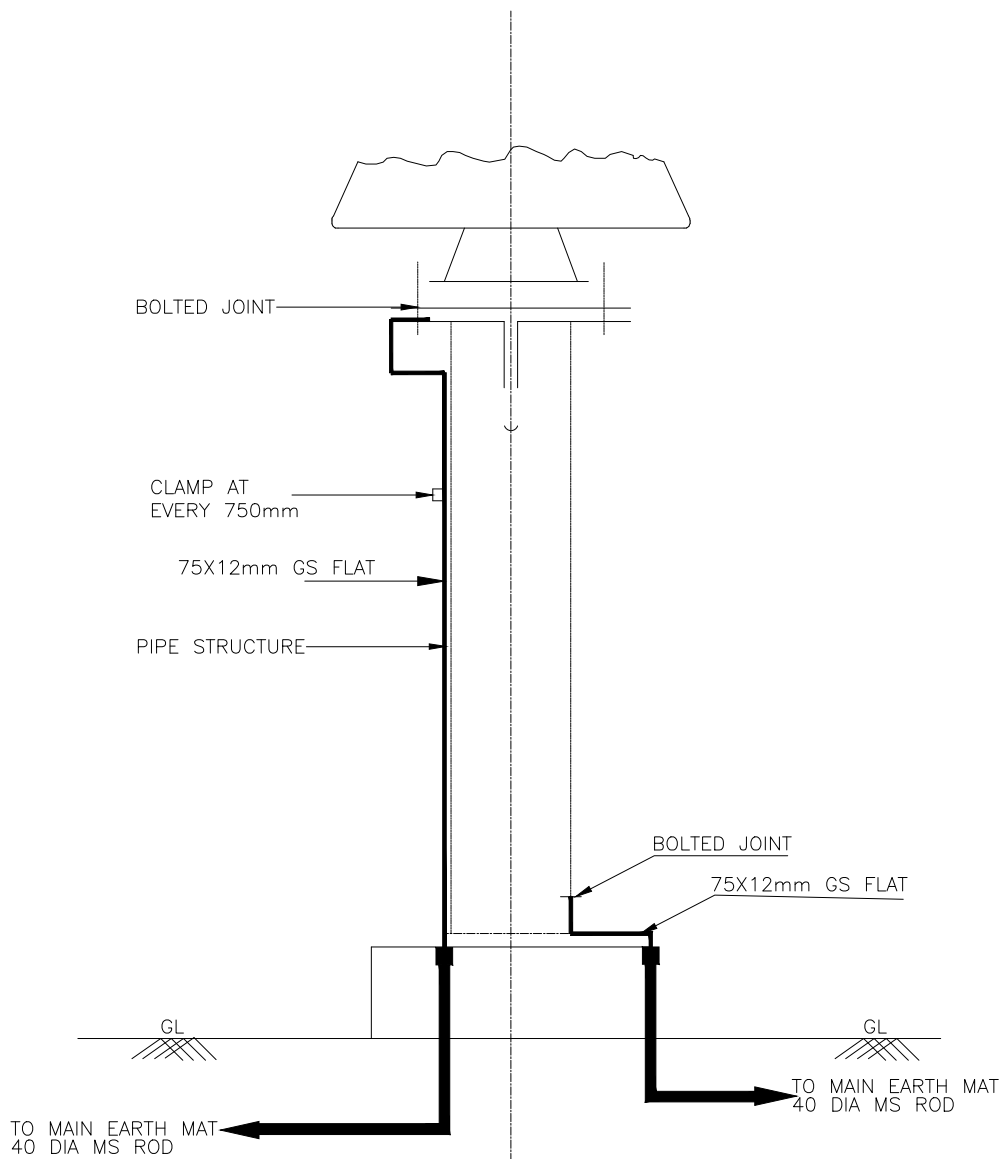
COMPUTERREF.NO.

DRG. No.

TB-4-375-509-019

SHEET No.

3



NOS.OF RISERS = 2 NOS.

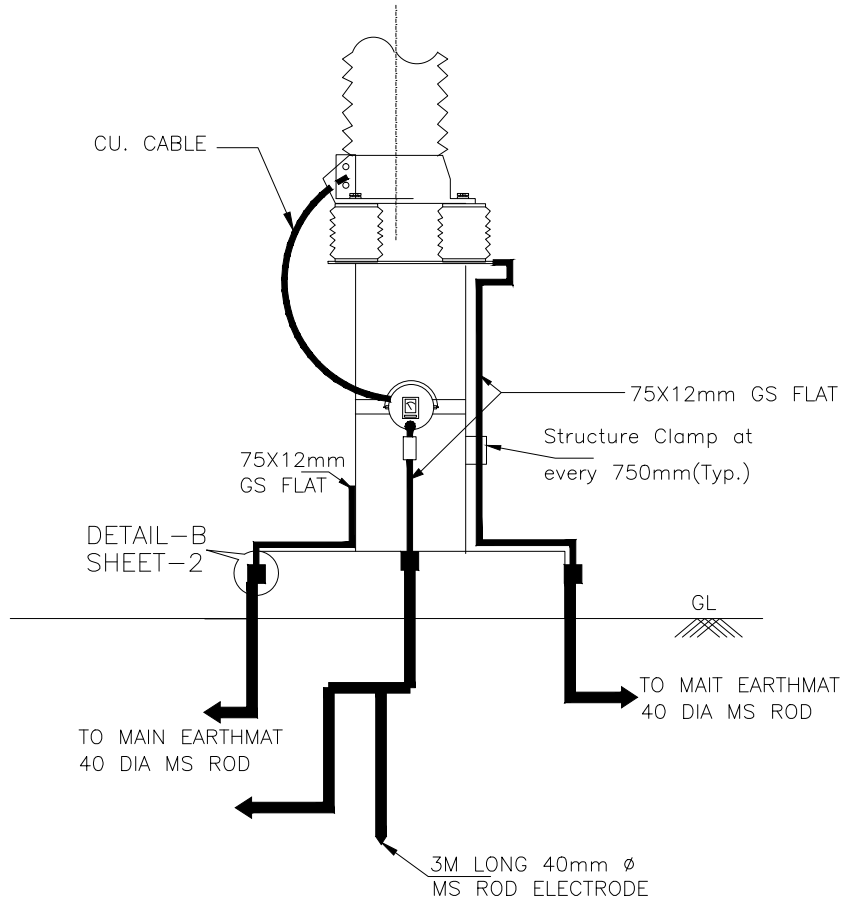


EQUIPMENT EARTHING DETAILS

400kV, POST INSULATOR (SOLID CORE TYPE)

DRG. No.

SHEET No.
4



NOTES;

1. LA SHALL BE EARTHED THROUGH EARTH TERMINAL OF SURGE COUNTER
2. NO. OF ROD ELECTRODE : 1 NO. PER PHASE, NO OF RISERS = 3 NOS. PER PHASE.
3. TEST LINK SHALL HAVE PROVISION TO BOLT TEST LEAD BEFORE ISOLATING MAIN EARTH CONNECTION=1 NO.



EQUIPMENT EARTHING DETAILS
LIGHTNING ARRESTER (360KV)

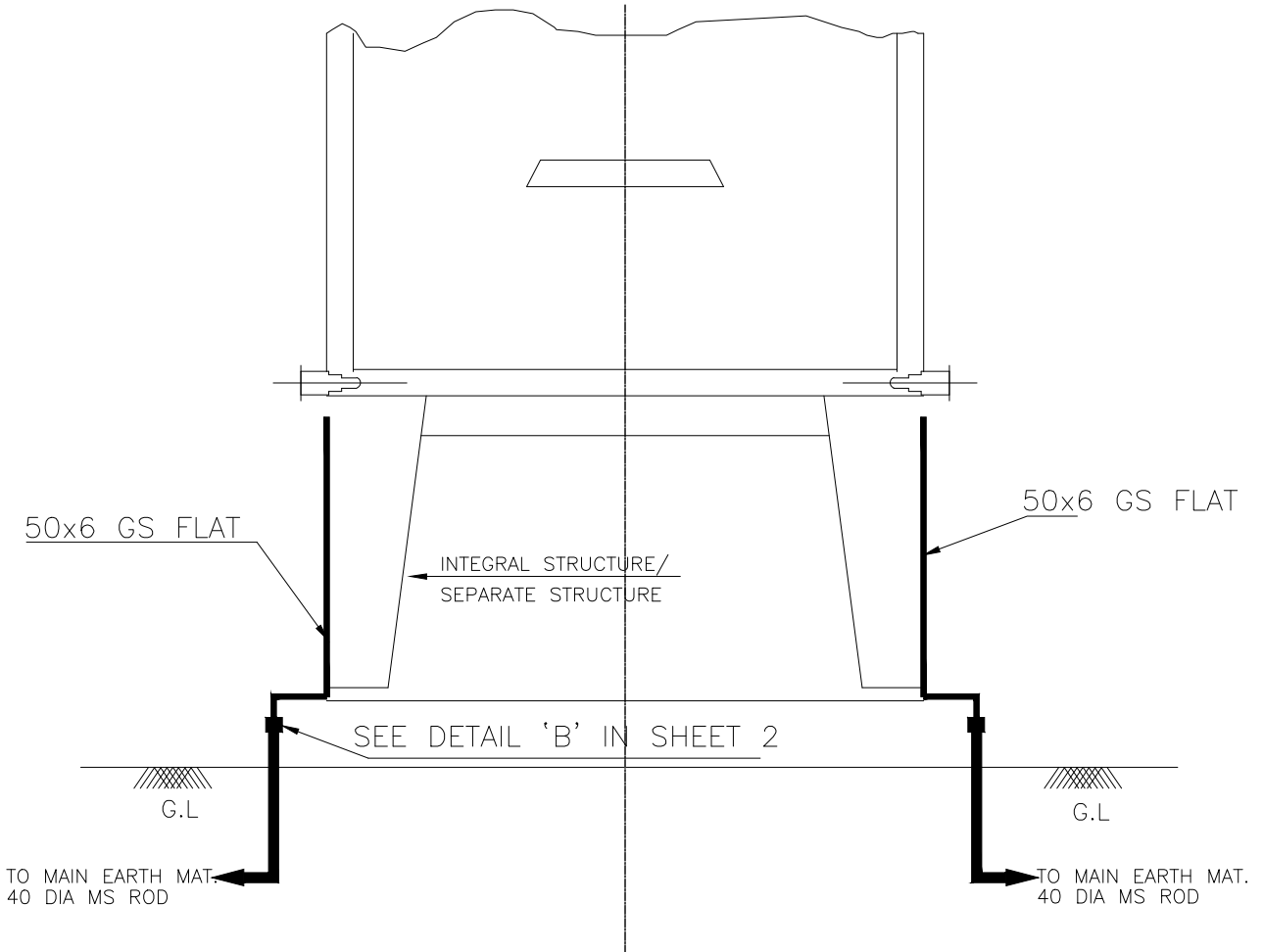
COMPU. DRG. REF.

DRG.NO.

TB-4-375-509-019

SHEET No.

5



NOS.OF RISERS = 2 NOS.



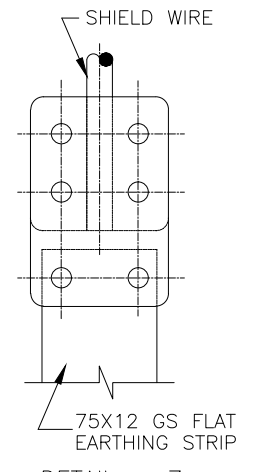
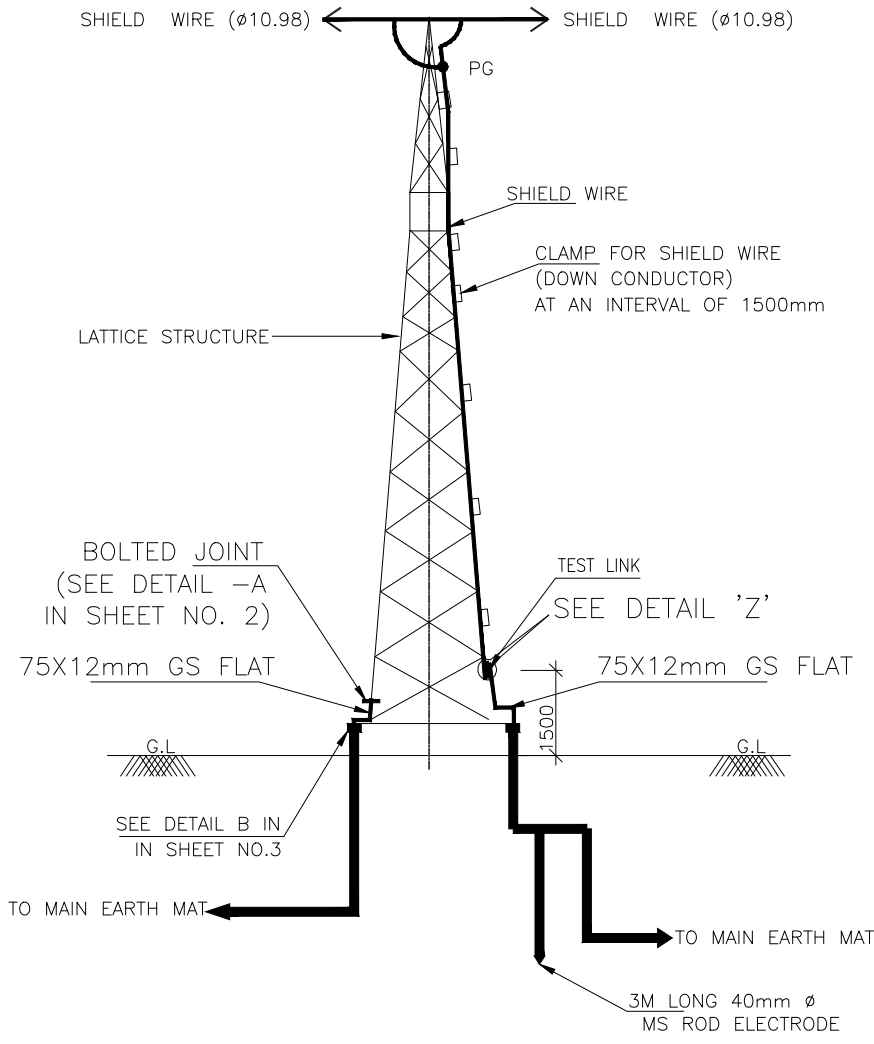
EQUIPMENT EARTHING DETAILS
MARSHALLING KIOSK

COMPUTERREF.NO.

DRG. No.

TB-4-375-509-019

SHEET No.
6



DETAIL - Z
PAD TYPE CLAMP

NOTE:

1. NO. OF ROD ELECTRODE : 1 NO. PER TOWER WITH DOWN CONDUCTOR.
2. NO. OF RISERS 2 NOS. / TOWER
3. CLAMP BETWEEN SHIELD WIRE & 75X12MM GS FLAT WILL WORK AS A TEST LINK.



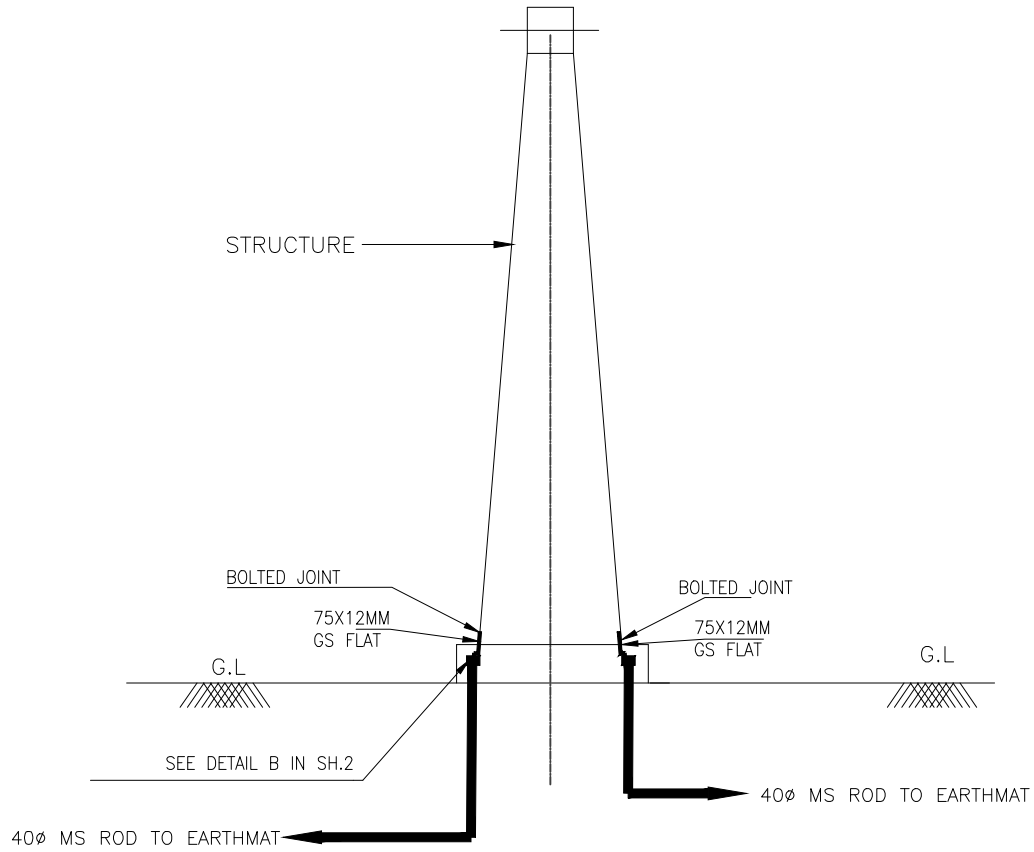
EQUIPMENT EARTHING DETAILS
TOWER WITH PEAK

COMPUTERREF.NO.

DRG. No.

TB-4-375-509-019

SHEET No.
8



NOS.OF RISERS = 2 NOS. PER TOWER



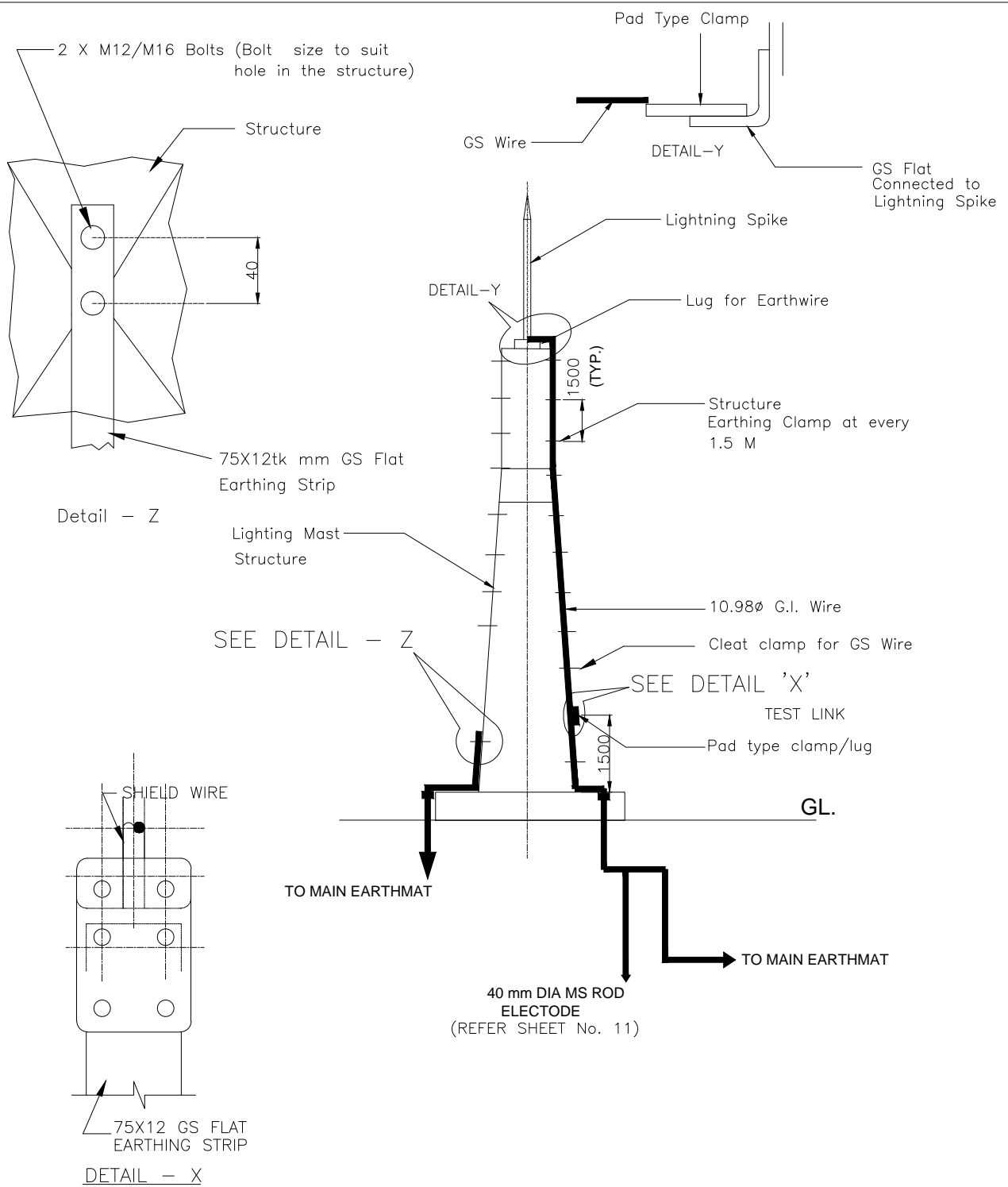
EQUIPMENT EARTHING DETAILS
TOWER WITHOUT PEAK

COMPUTERREF.NO.

DRG. No.

TB-4-375-509-019

SHEET No.
8A



NOTE:

1. NO. OF ROD ELECTRODE : 1 NO.
2. PAD TYPE CLAMP 2 NOS.
3. THE DOWN CONDUCTORS (E/WIRE) SHALL BE CONNECTED TO EARTH ELECTRODE.



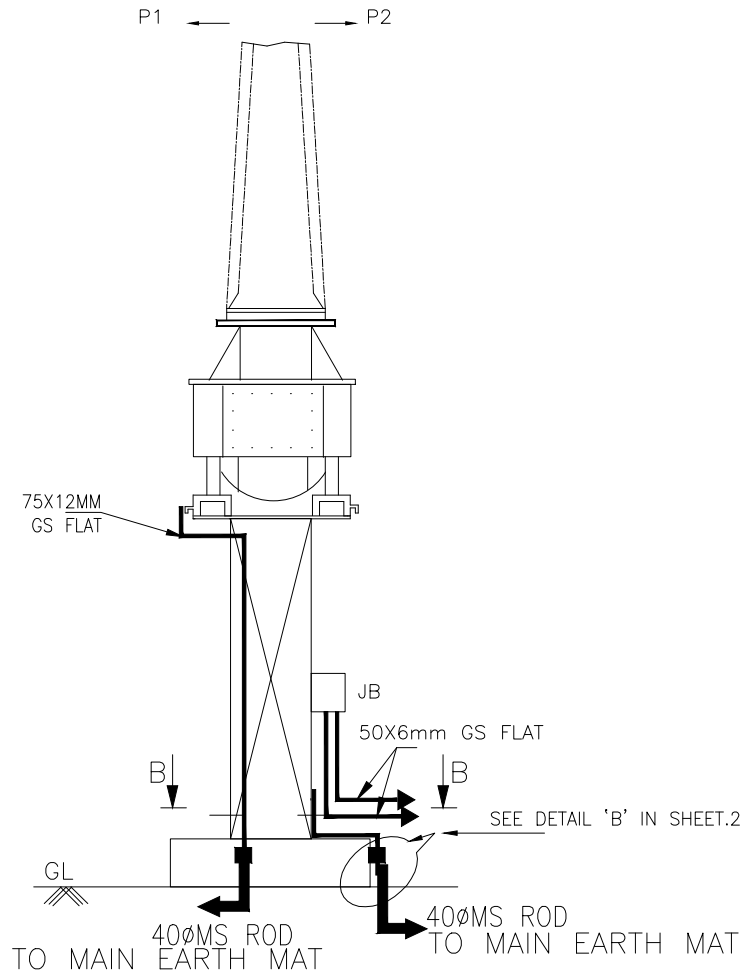
EQUIPMENT EARTHING DETAILS
LIGHTNING MAST

COMPU. DRG. REF.

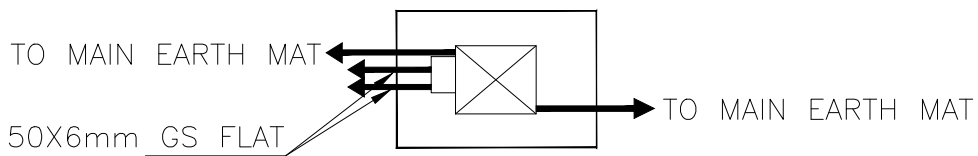
DRG.NO.

TB-4-375-509-019

SHEET No.
8B



VIEW A-A



VIEW B-B

NOS.OF RISERS
 = 2 NOS. PER PHASE
 + 2 NOS. FOR CT JB



EQUIPMENT EARTHING DETAILS
 400KV CURRENT TRANSFORMER

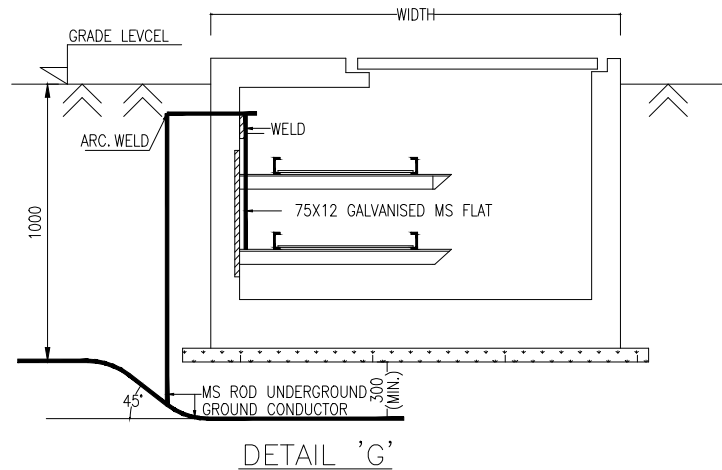
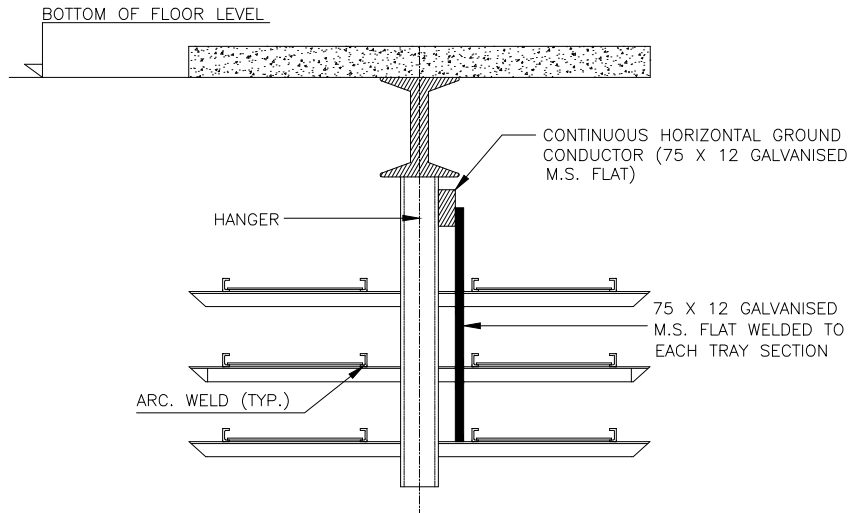
COMPU. DRG. REF.

DRG.NO.

TB-4-375-509-019

SHEET No.

9



DETAIL FOR CONNECTING GS FLAT RUNNING ON TOP TIER TRENCH TO EMBEDDED PLATE.

NOTE:

1. ALL TRENCHES SHALL BE EARTHED AT AN INTERVAL OF 20M ALONG THE LENGTH OF TRENCH & FREE ENDS.
2. THE EARTH STRIP (75X12 G.S. FLAT) SHALL BE WELDED/CLEATED TO TOP RACK ALONG THE TRENCH RUN & CONTROL ROOM AT EVERY 1.5 M.
3. WHERE THE CABLE RACKS ARE PROVIDED ON BOTH SIDES OF THE TRENCH, BOTH SIDES SHALL BE EARTHED AS PER ABOVE.
4. CABLE & CABLE TRAY EARTHING SHALL BE DONE AS PER SPECIFICATION.
5. THE EARTHING CONDUCTOR RUNNING UNDER THE TRENCHES SHALL BE LAID 300MM BELOW THE TRENCHES.



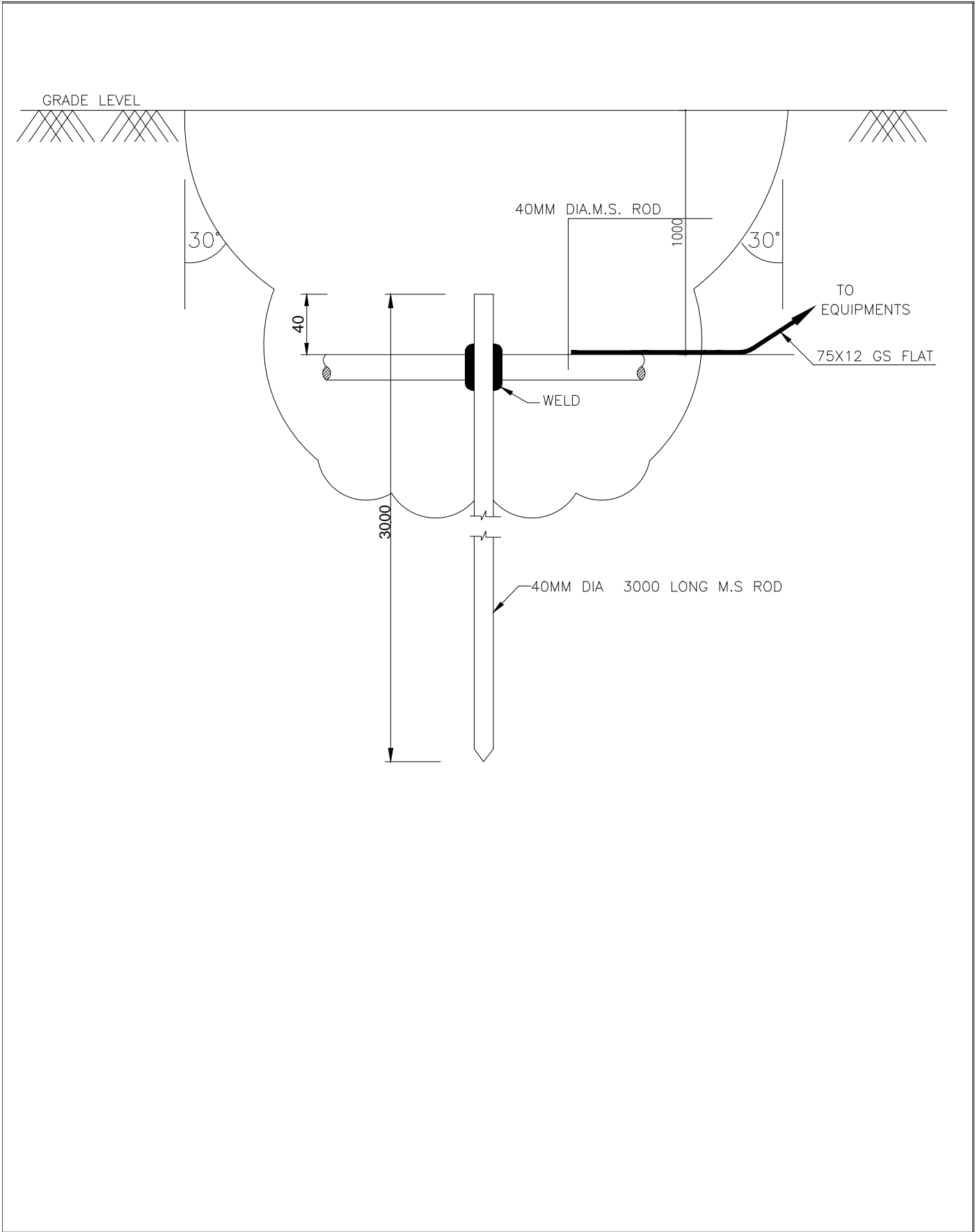
EQUIPMENT EARTHING DETAILS
CABLE TRENCH

COMPU. DRG. REF.

DRG. NO.

TB-4-375-509-019

SHEET
10



EQUIPMENT EARTHING DETAILS
 ROD EARTH ELECTRODE WITHOUT TEST PIT

COMPU. DRG. REF.

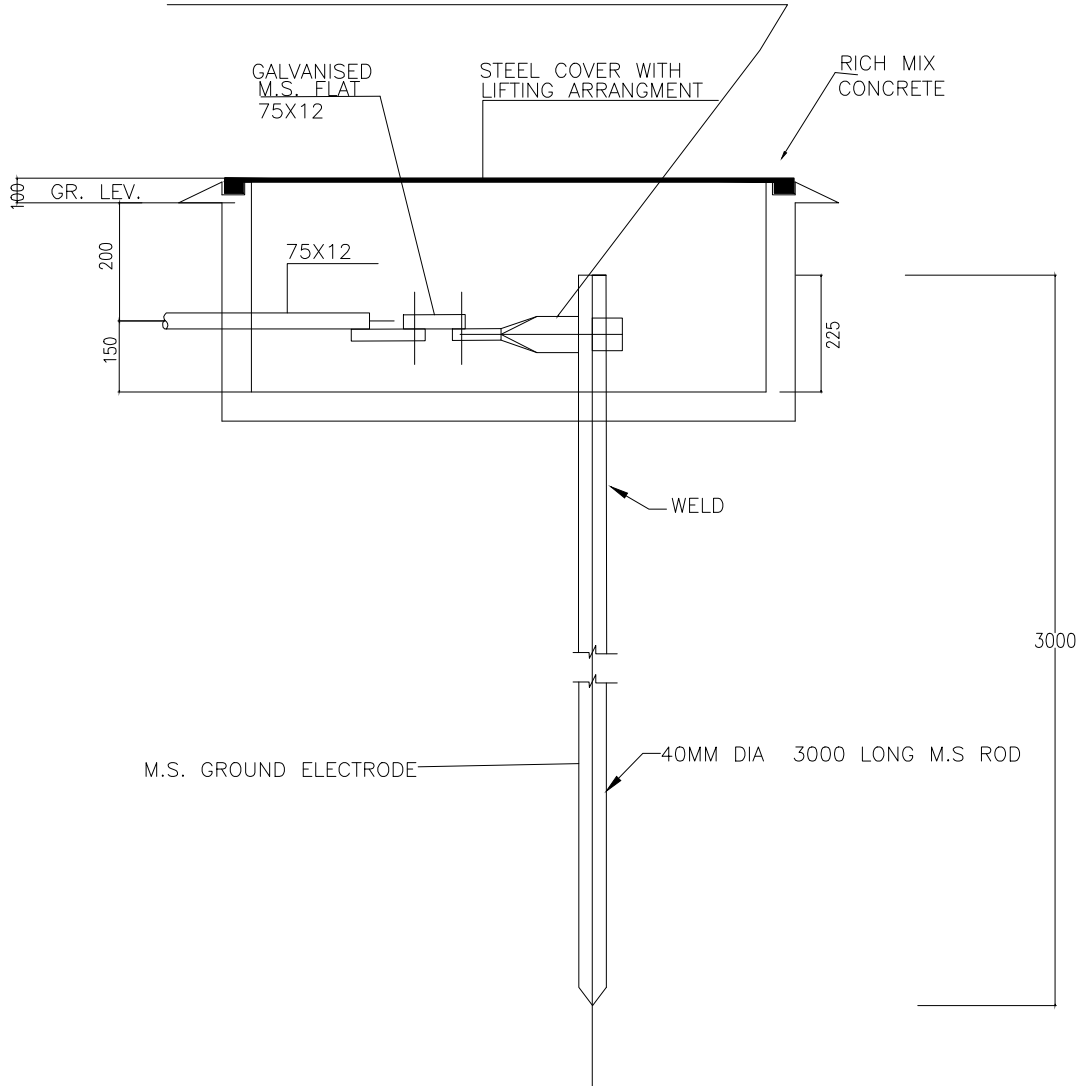
DRG. No.

TB-4-375-509-019

SHEET No.

11

GALVANISED M.S. FLAT TWISTED AT 90° BY GAS HEATING AND WELDED TO ELECTRODE ON AND BOTTOM ALL AROUND BEFORE ELECTRODE IS DRIVEN INTO THE EARTH



NOTES:-

1. SUPPLY OF FIXING BOLTS NUTS & WASHERS FOR GS FLAT EARTHING CONDUCTOR IS ALSO FORMS PART OF THE SCOPE.
2. WILL BE PROVIDED FOR CONNECTION TO EXISTING EARTHMAT OR CONNECTION TO TRANSFORMER YARD EARTHMAT



EQUIPMENT EARTHING DETAILS
ROD EARTH ELECTRODE WITH TEST PIT

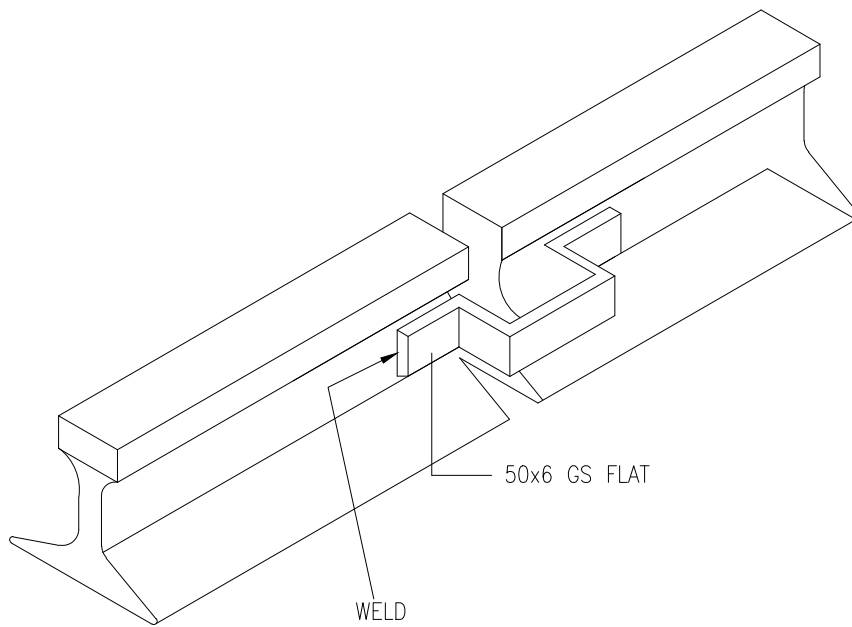
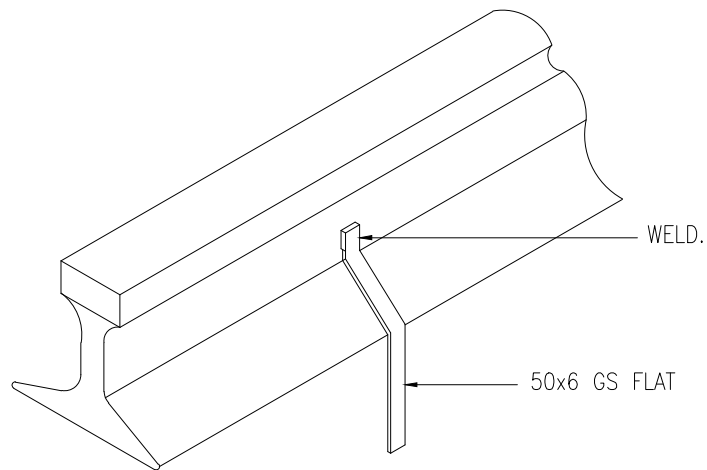
COMPU. DRG. REF.

DRG. No.

TB-4-375-509-019

SHEET No.

12



NOTE:—

1. RAILWAY TRACKS WITHIN SWITCHYARD AREA SHALL BE EARTHED AT A SPACING OF 30 m AND ALSO AT BOTH ENDS.



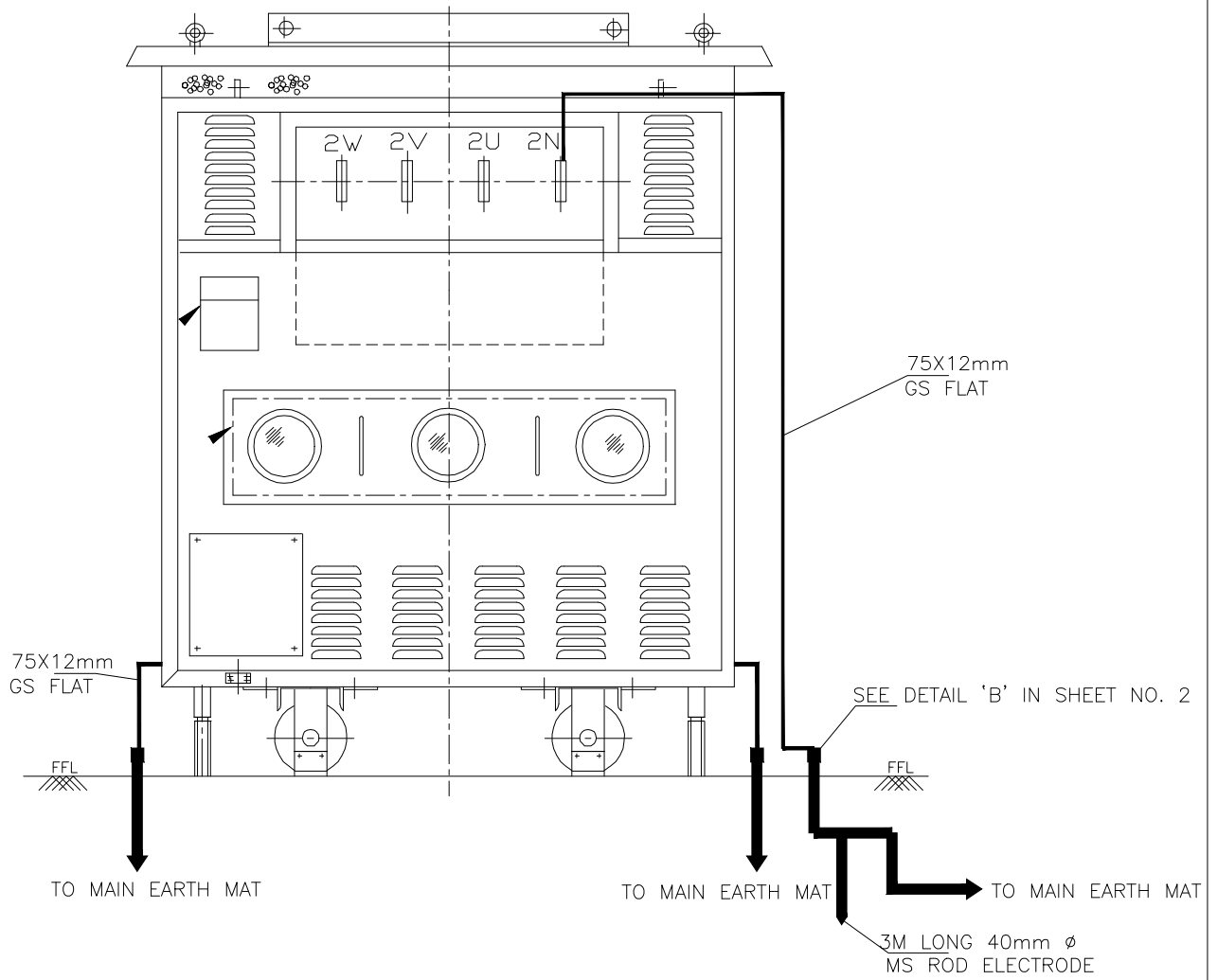
EQUIPMENT EARTHING DETAILS RAIL BONDING

COMPU. DRG. REF.

DRG. NO.

TB-4-375-509-019

SHEET No.
13



NOTE:

1. NO. OF RISERS FOR = 3 NOS.
2. NO. OF ROD ELECTRODE FOR NEUTRAL = 1 NO.

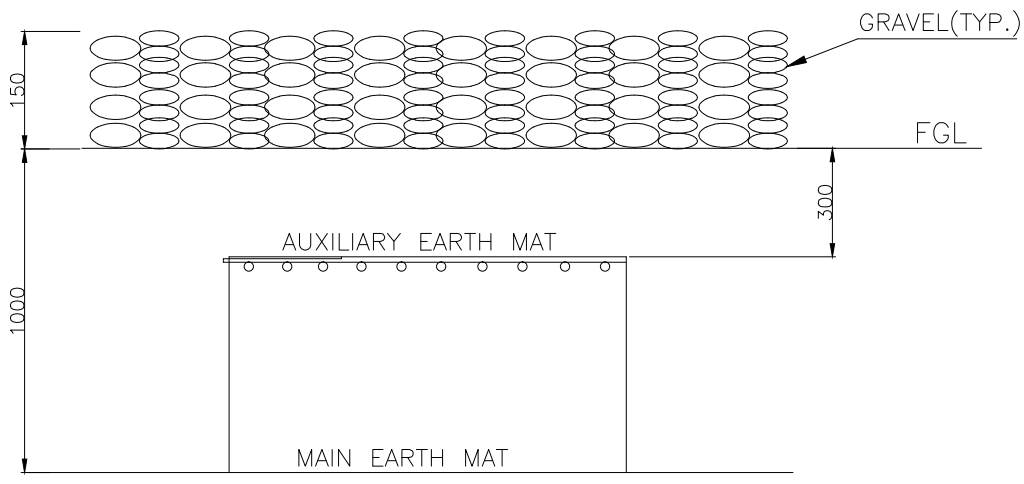
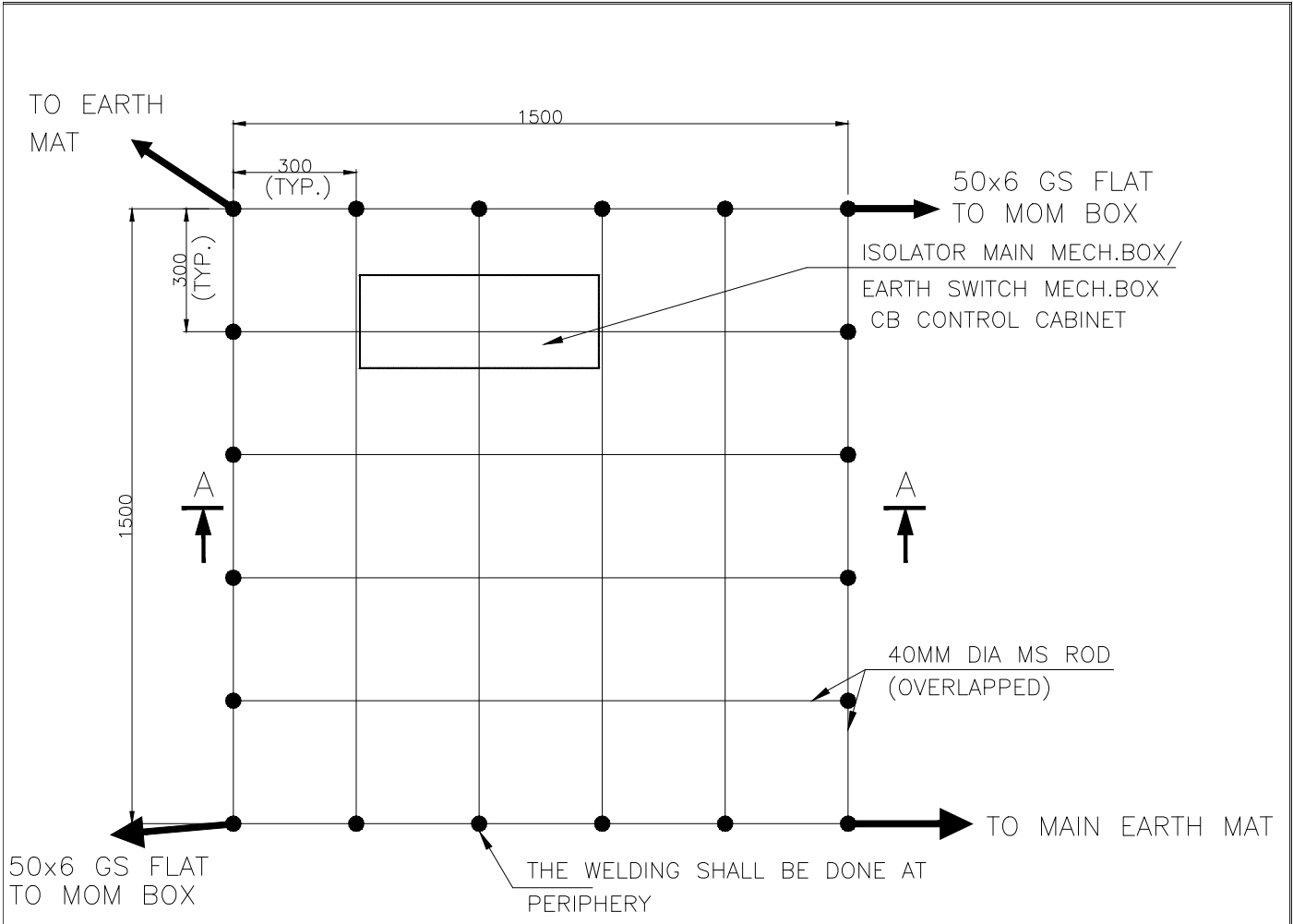


EQUIPMENT EARTHING DETAILS LT TRANSFORMER

DRG. No.

TB-4-375-509-019

SHEET No.
14



SECTION AA

NOTE:

AUX. EARTH MAT SHALL BE SO POSITIONED THAT THE FOOT OF THE OPERATOR ALWAYS LIE OVER THE AUX. EARTH MAT AREA WHILE ATTENDING / OPERATING THE MECH. BOX THE CABLE TRENCH ROUTING SHALL BE PLANNED ACCORDINGLY.

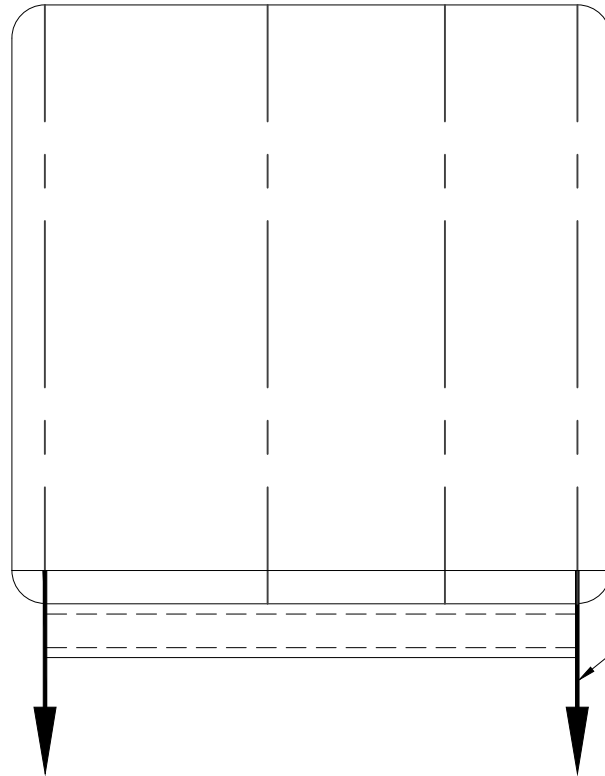


EQUIPMENT EARTHING DETAILS
 AUXILIARY EARTH MAT FOR ISOLATOR MAIN MECH., E/S MECH. BOX,
 CB CONTROL CABINET

COMPU. DRG. REF.

Report No. TB-4-375-509-019

SHEET No. 15



TO EARTH FLAT IN THE TRENCH BELOW

TO EARTH FLAT IN THE TRENCH BELOW

50X6 GS FLAT

EQUIPMENT
CONTROL & RELAY PANELS

NOTE:

THIS EARTHING ARRANGEMENT IS ALSO APPLICABLE FOR SWITCHGEAR; MCC; AC/DC DISTRIBUTION BOARDS.



EQUIPMENT EARTHING DETAILS
CONTROL AND RELAY PANELS

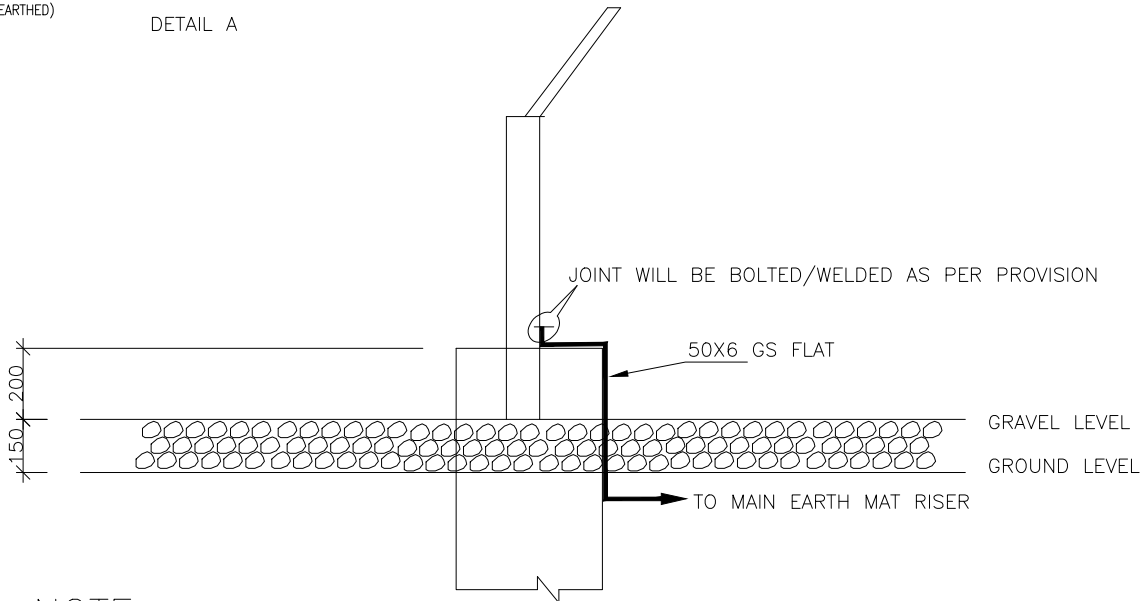
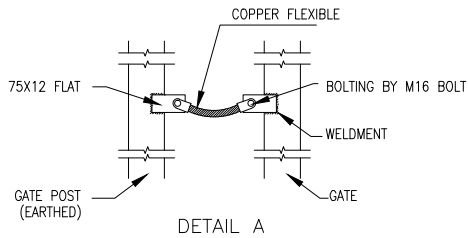
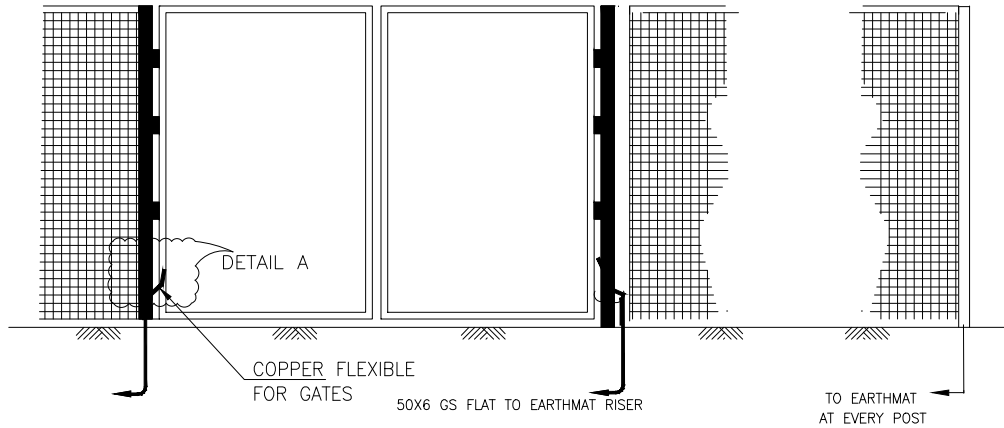
DRG. No.

TB-4-375-509-019

SHEET No.
16

FENCE GATE

FENCE GROUNDING



NOTE

01. AT AVERY 10M OF FENCE & GATES SHALL BE CONNECTED TO EARTHING LOOP BY 50X6 MM GS FLAT. EARTHING CONDUCTOR SHALL BE BURIED 1000mm OUTSIDE THE SWITCHYARD FENCE.
02. FOR CONCRETE POST THE EARTH CONDUCTOR SHALL BE TAKEN UPTO TOP OF POST FOR CONNECTION WITH METALLIC PART. PL. SHOW CONNECTION ARRANGEMENT ACCORDINGLY.

FENCE EARTHING



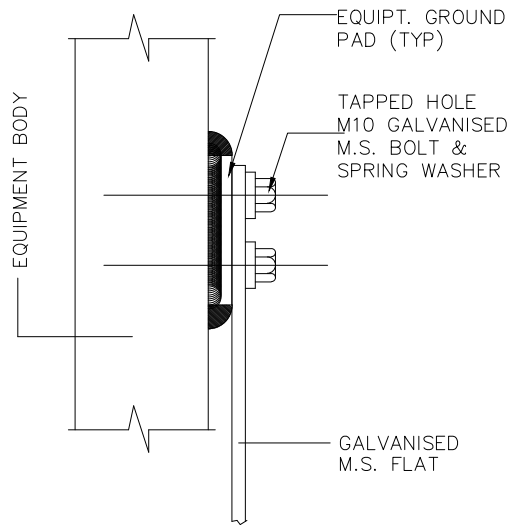
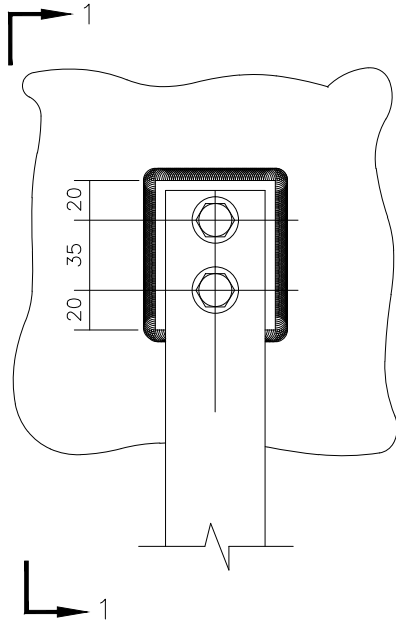
EQUIPMENT EARTHING DETAILS GATE/FENCE POST

DRG. No.

TB-4-375-509-019

SHEET No.

17



SECTION - 1 - 1

EQUIPMENT GROUNDING

NOTE

1. THIS IS GENERAL TYPICAL BOLTING ARRANGEMENT APPLICABLE TO ALL PANELS, EQUIPMENT ETC. WHERE BOLTING ARRANGEMENT IS PROVIDED.

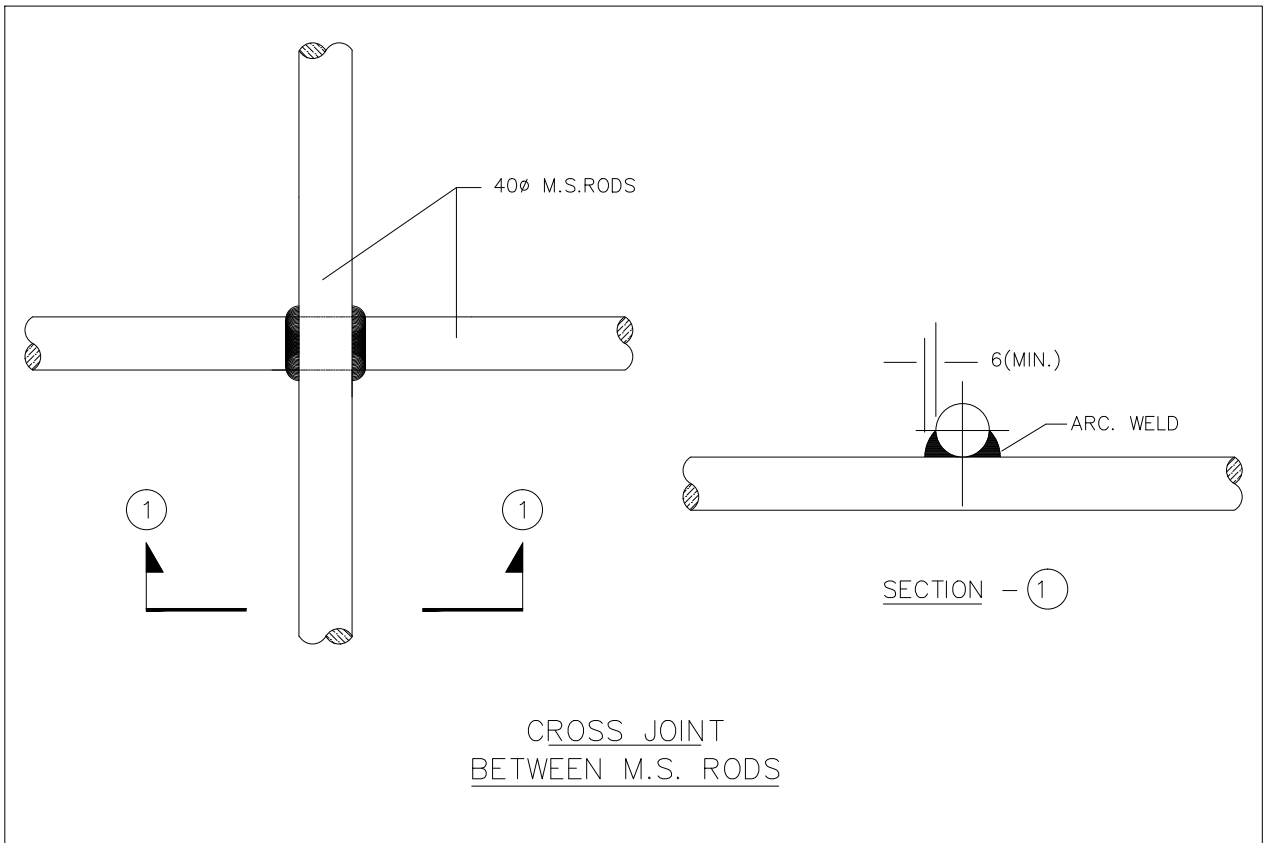
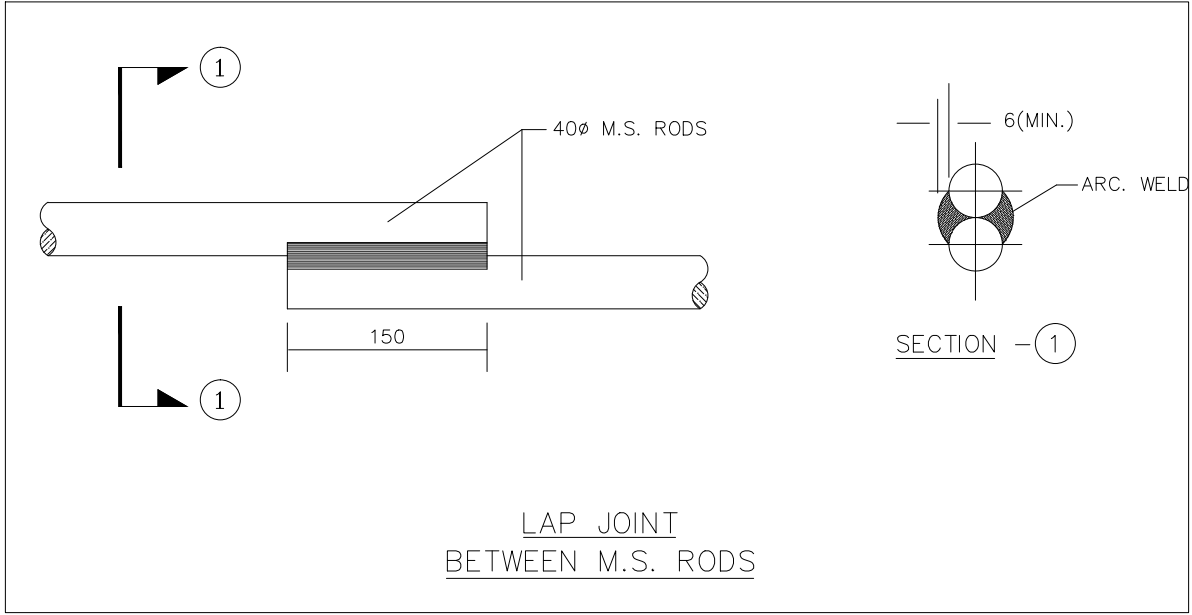


EQUIPMENT & STRUCTURE EARTHING DETAILS
TYPICAL ARRANGEMENT OF BOLTED JOINTS

DRG. No.

TB-4-375-509-019

SHEET No.
18



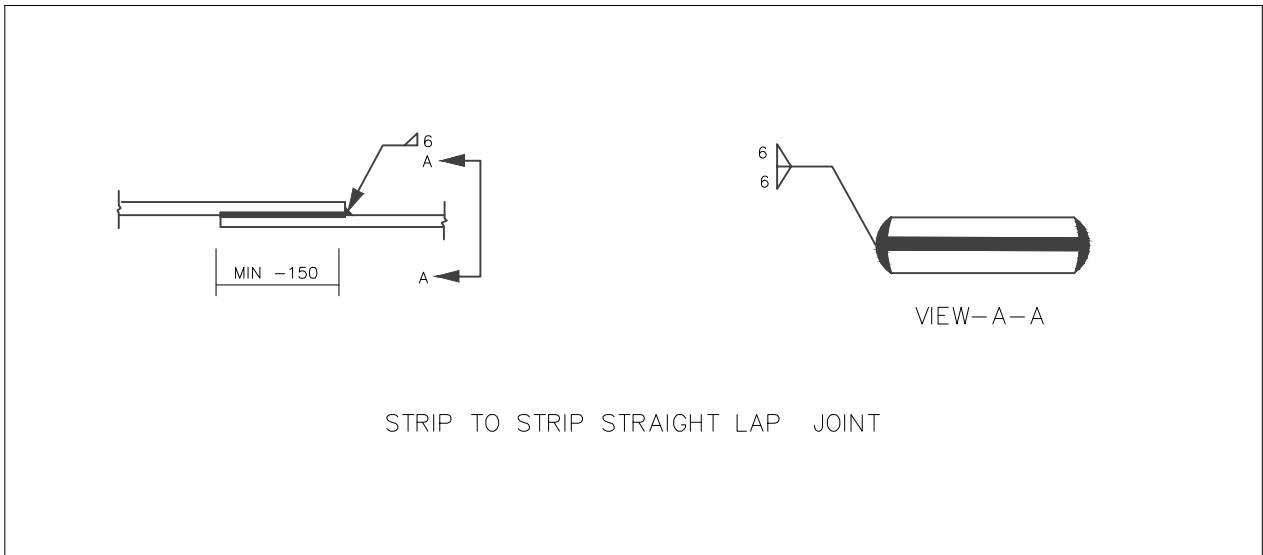
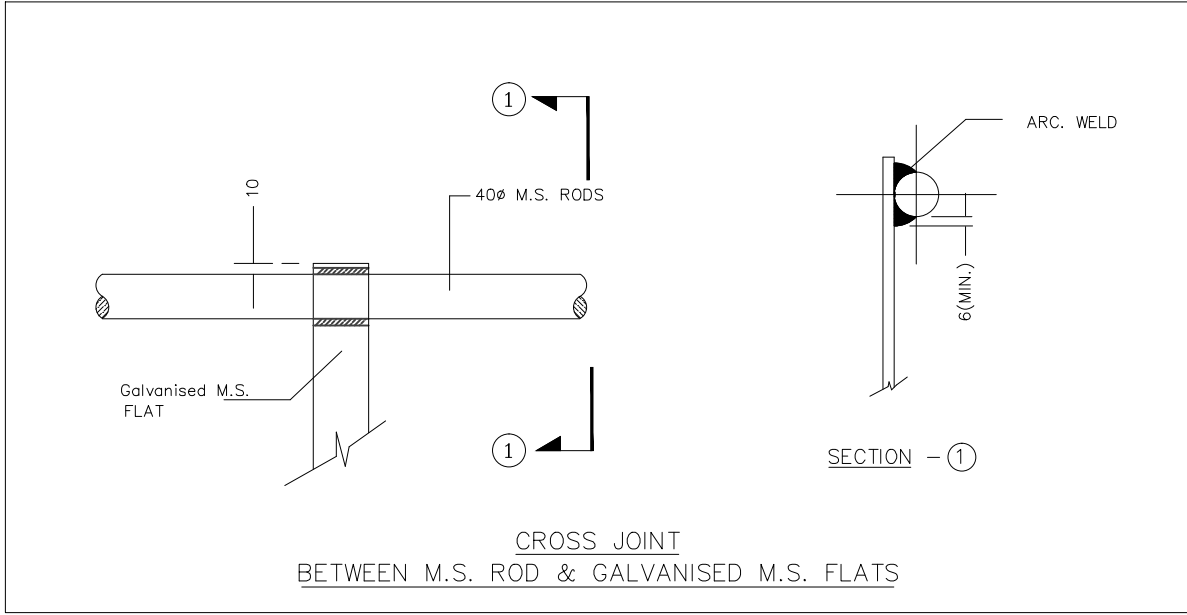
EQUIPMENT & STRUCTURE EARTHING DETAILS
WELDING DETAILS

COMPUTERREF.NO.

DRG. No.

TB-4-375-509-019

SHEET No.
20



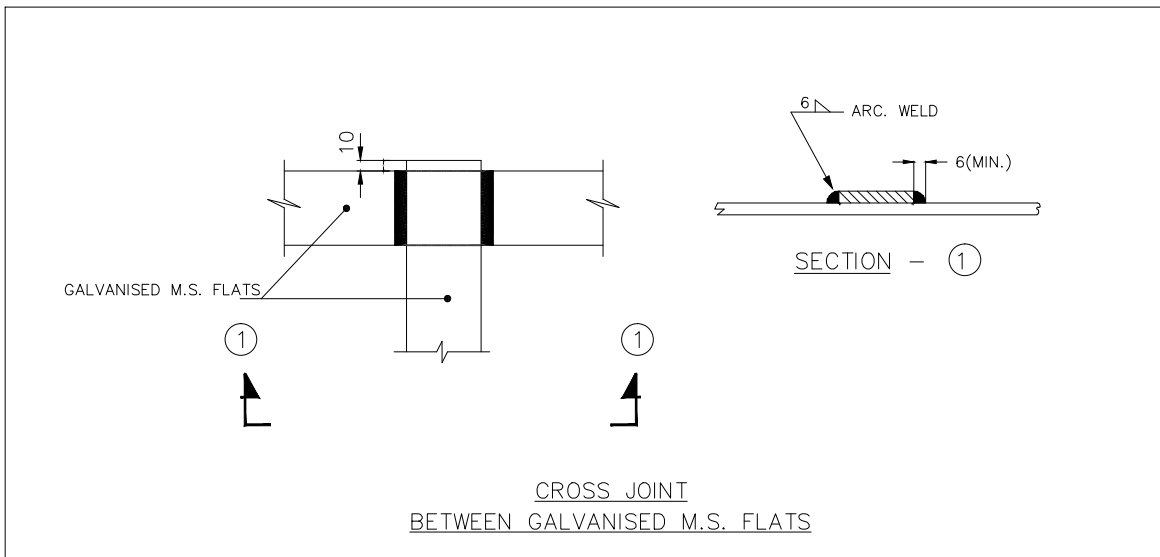
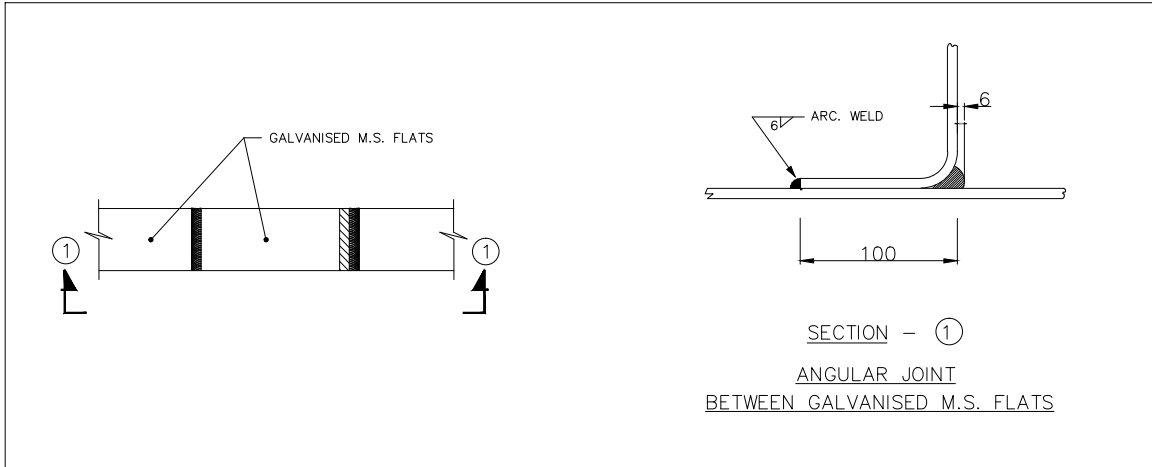
EQUIPMENT & STRUCTURE EARTHING DETAILS
WELDING DETAILS

COMPUTERREF.NO.

DRG. No.

TB-4-375-509-019

SHEET No.
21



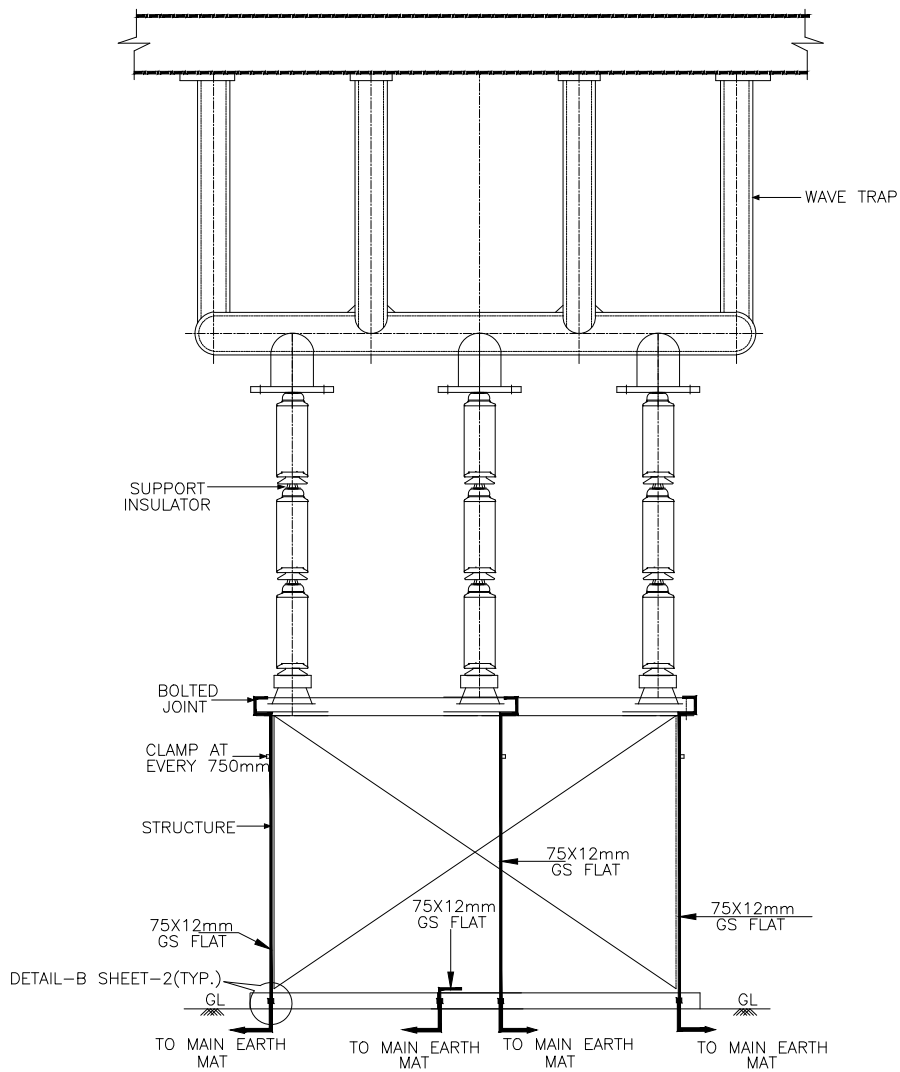
EQUIPMENT & STRUCTURE EARTHING DETAILS
WELDING DETAILS

COMPUTERREF.NO.

DRG. No.

TB-4-375-509-019

SHEET No.
22



NOS.OF RISERS= 4 NOS.



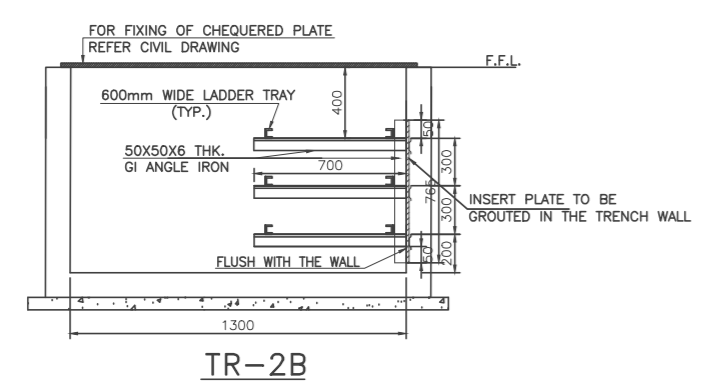
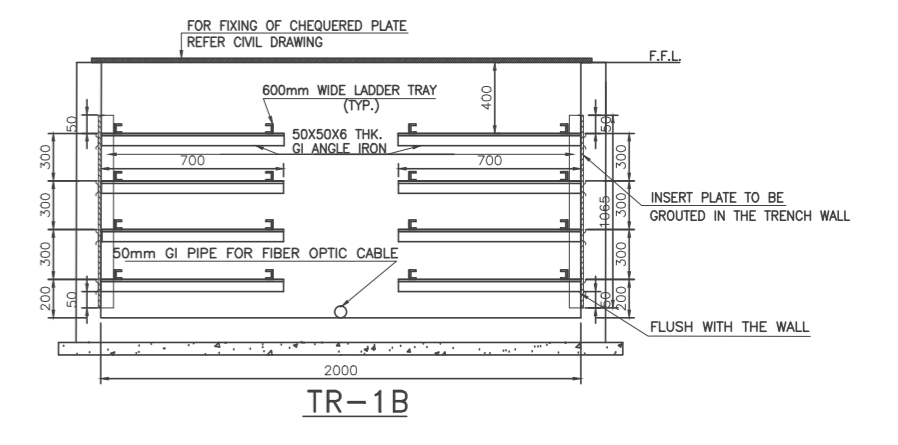
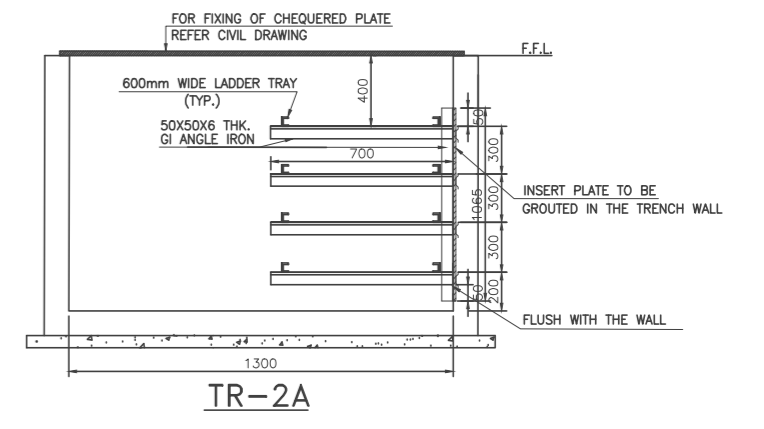
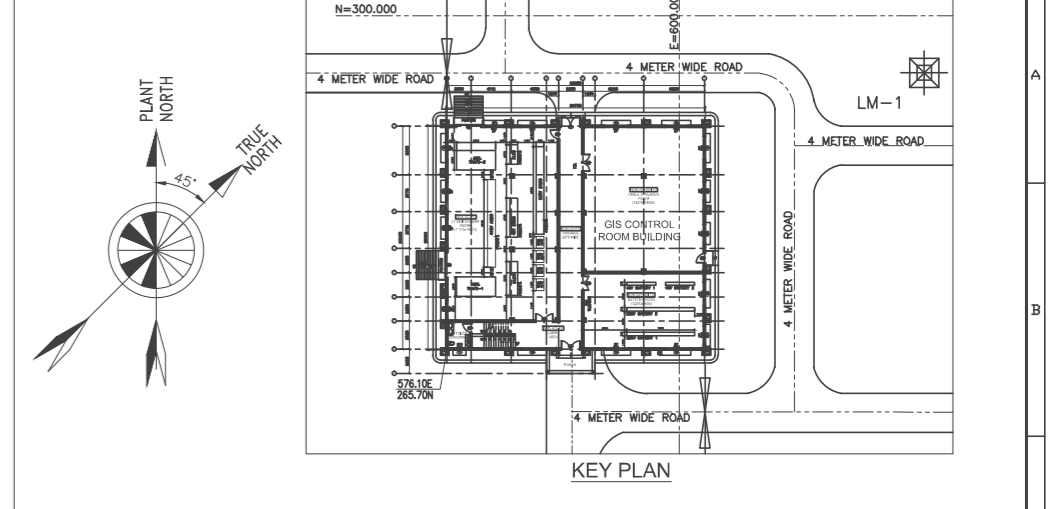
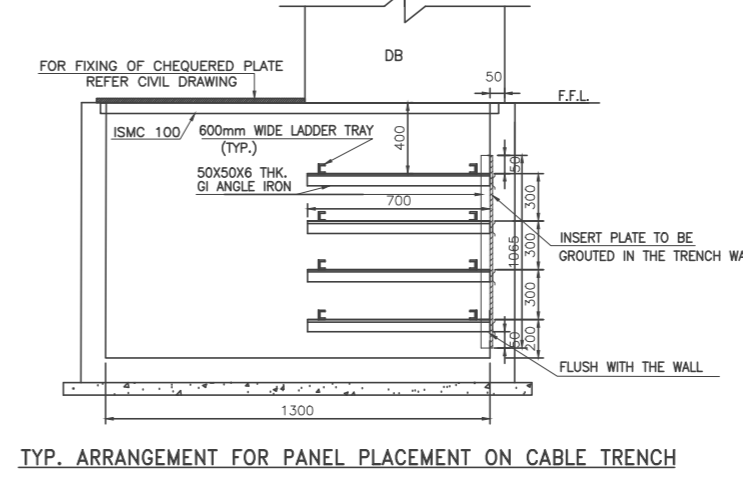
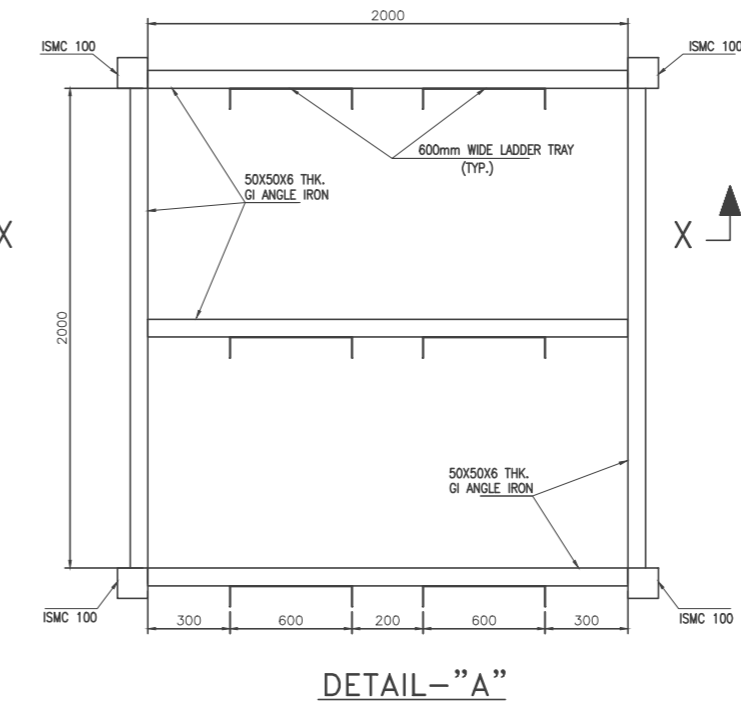
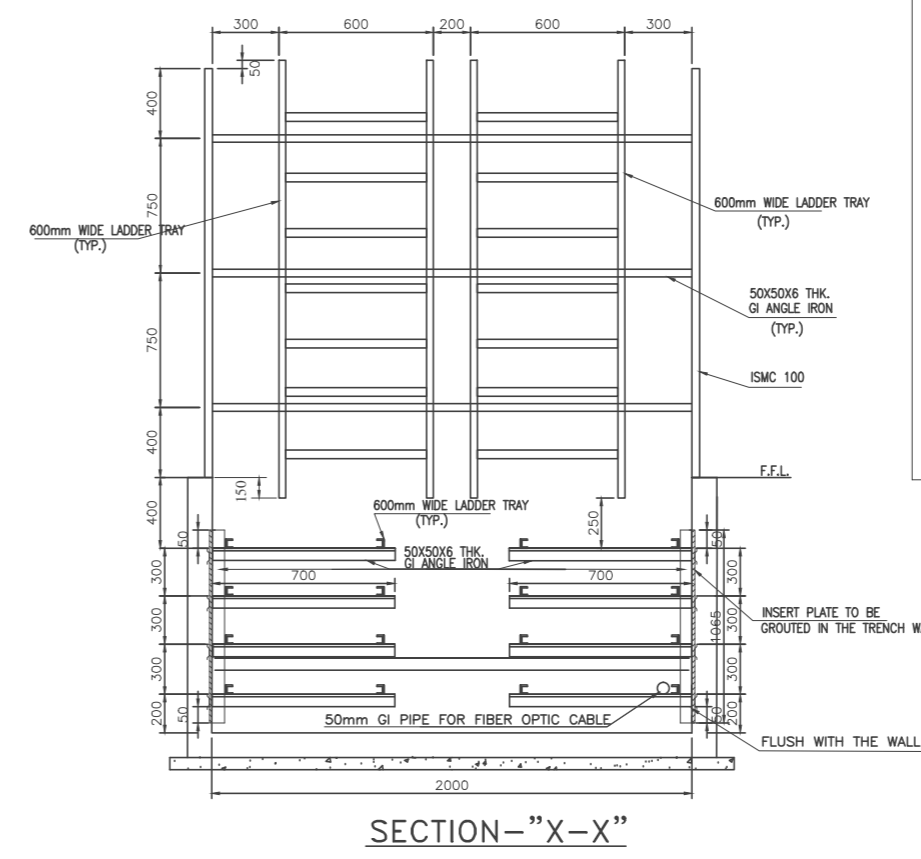
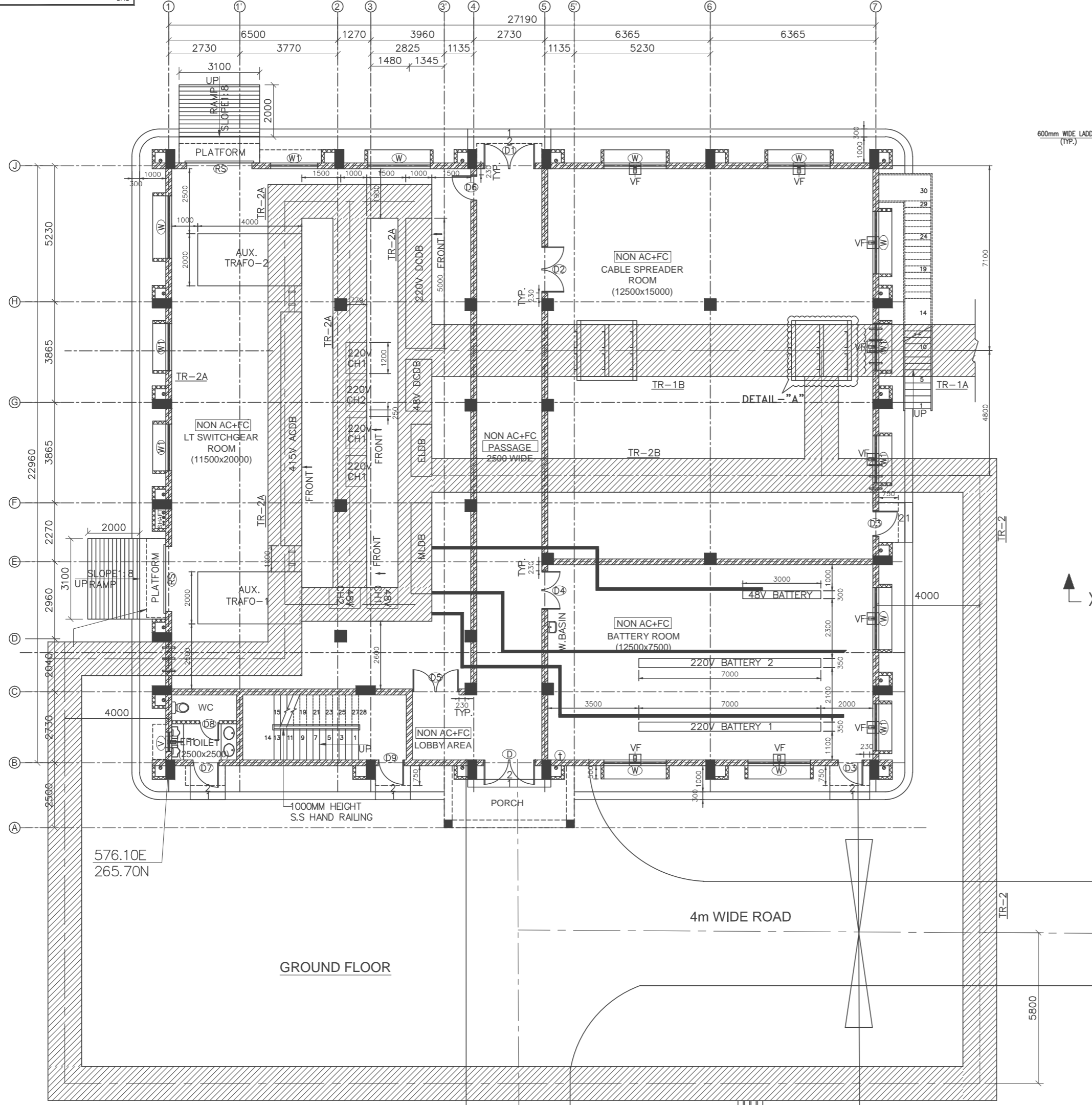
EQUIPMENT EARTHING DETAILS 400kV WAVE TRAP

COMPUTERREF.NO.

DRG. No.

TB-4-375-509-019

SHEET No.
23



REFERENCE DWG. :-
 OUTDOOR TRENCH LAYOUT DWG. NO. TB-3-375-316-065A
 ARCHITECTURAL DWG. NO. TB-1-360-607-651,652
 CONCEPTUAL CONTROL ROOM BUILDING LAYOUT DWG. NO. TB-3-360-316-009

GSECL GUJARAT STATE ELECTRICITY CORPORATION LIMITED
 VADODARA, GUJARAT
 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8

DEVELOPMENT CONSULTANTS PVT. LTD.
 CONSULTING ENGINEERS
 KOLKATA • MUMBAI • CHENNAI • NEW DELHI

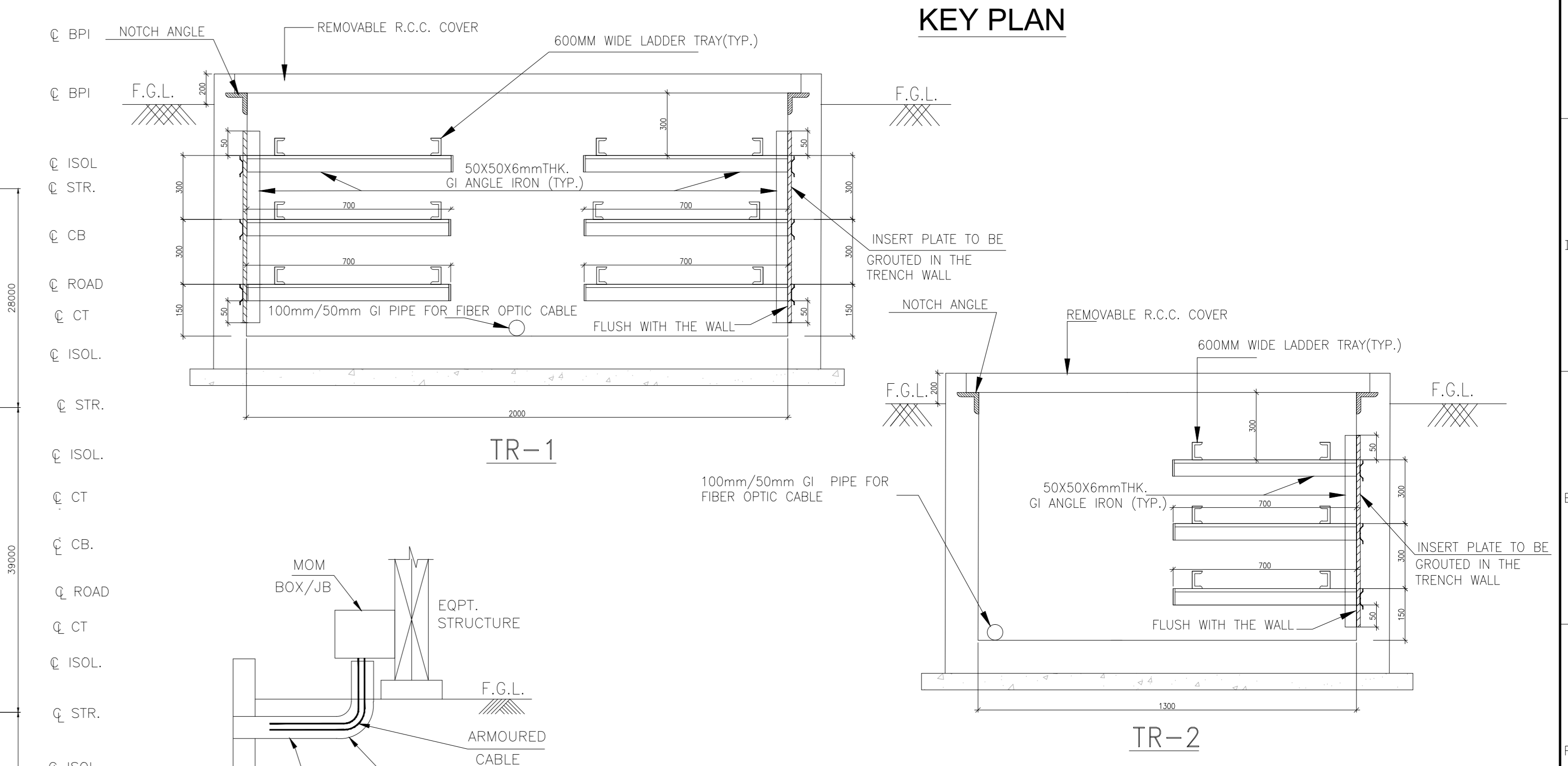
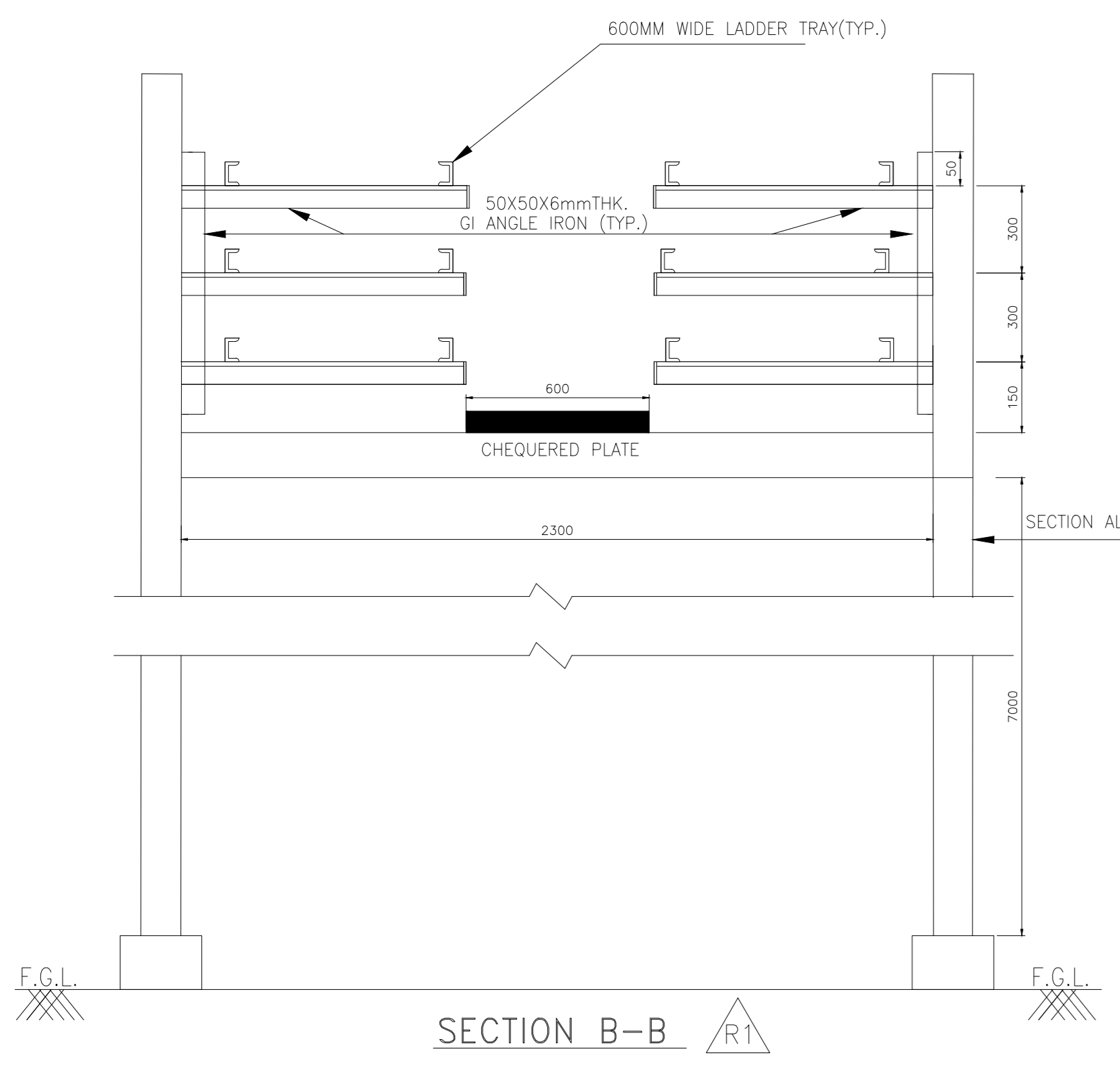
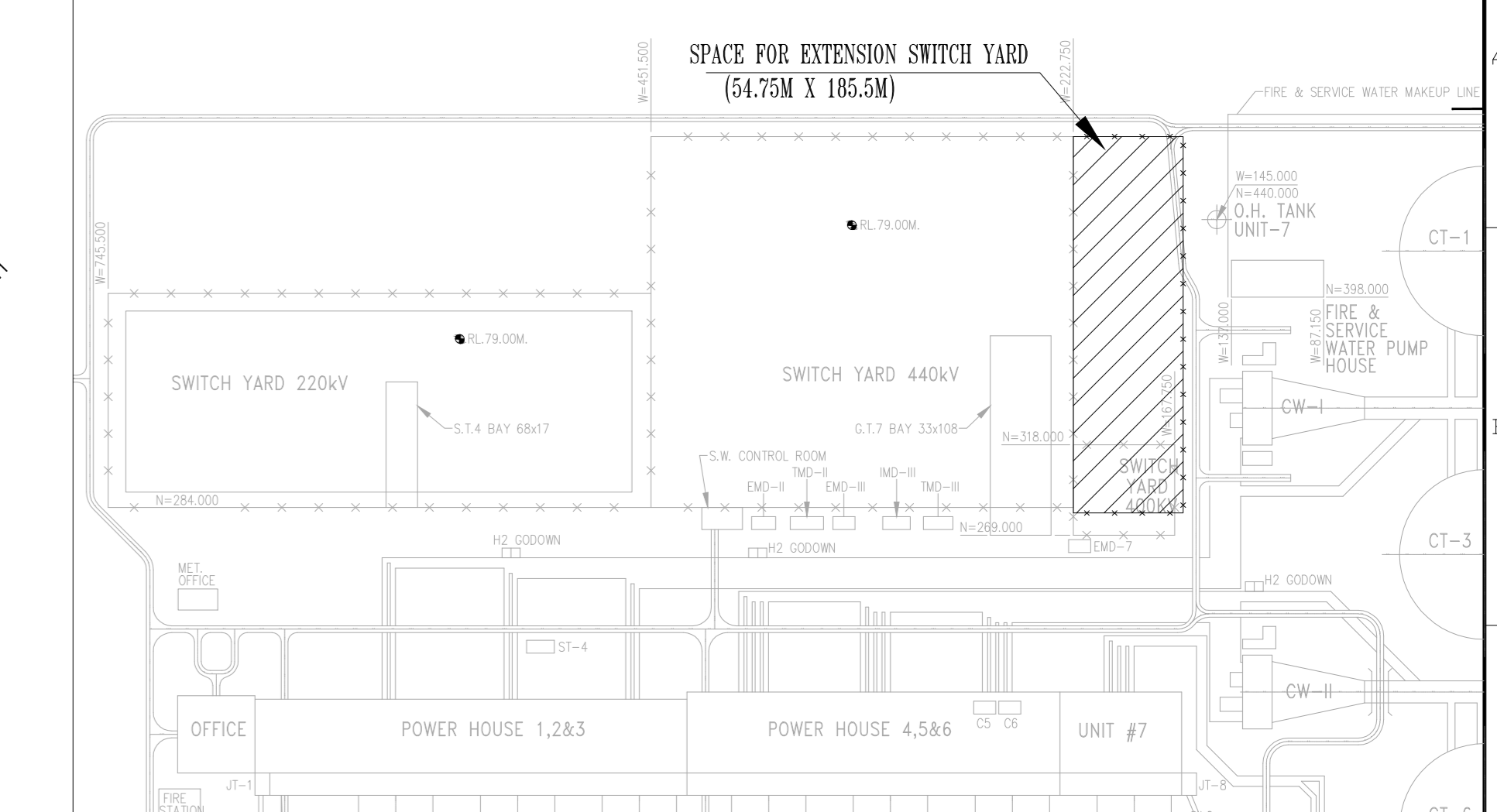
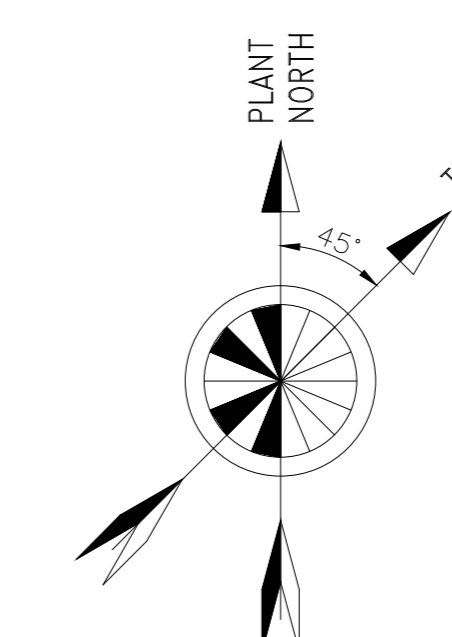
BHEL	BHARAT HEAVY ELECTRICALS LTD.		
	DRN. SP	NAME	SIGN
	CHD. SK	DATE	11.08.16
APPD. AM			

TITLE : CABLE TRENCH LAYOUT OF CONTROL BUILDING OF 400KV SWITCHYARD FOR GIS

UNIT : SCALE : 1:100 BHEL DWG. NO. : TB-2-375-316-005 REV 0

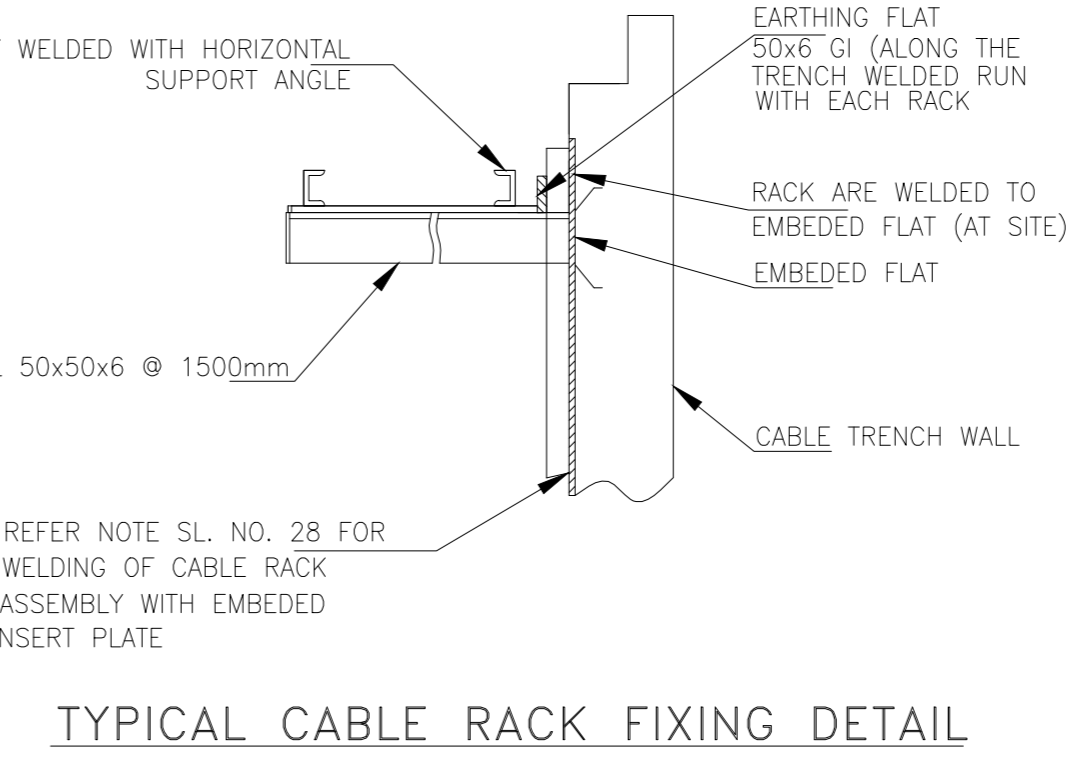
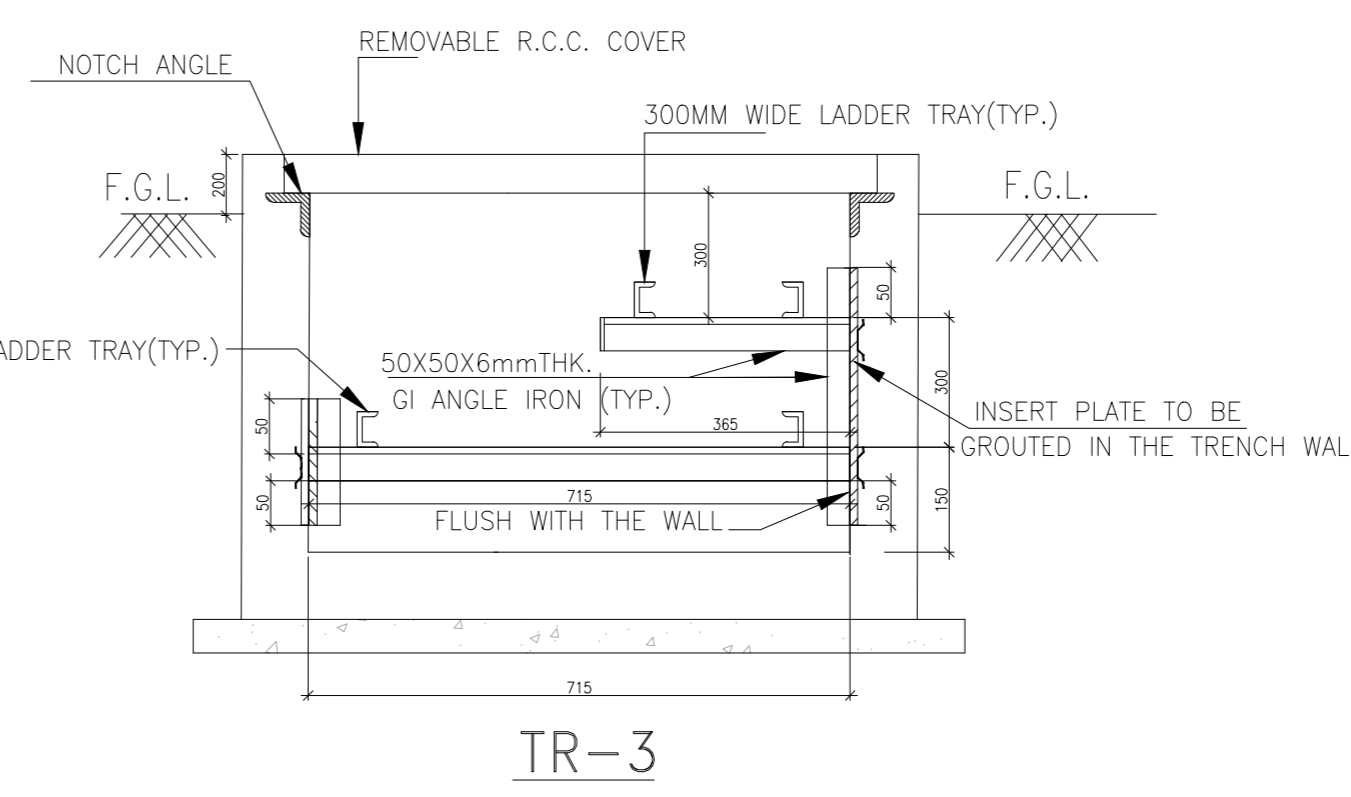
REV.	STATUS	TYPE	REASONS FOR REVISION	DRAWN	CHECKED	APPROVED	DATE

400KV DEHGAM LINE
400KV SOJA LINE
400KV TIE-1 LINE
400KV TIE-2 LINE

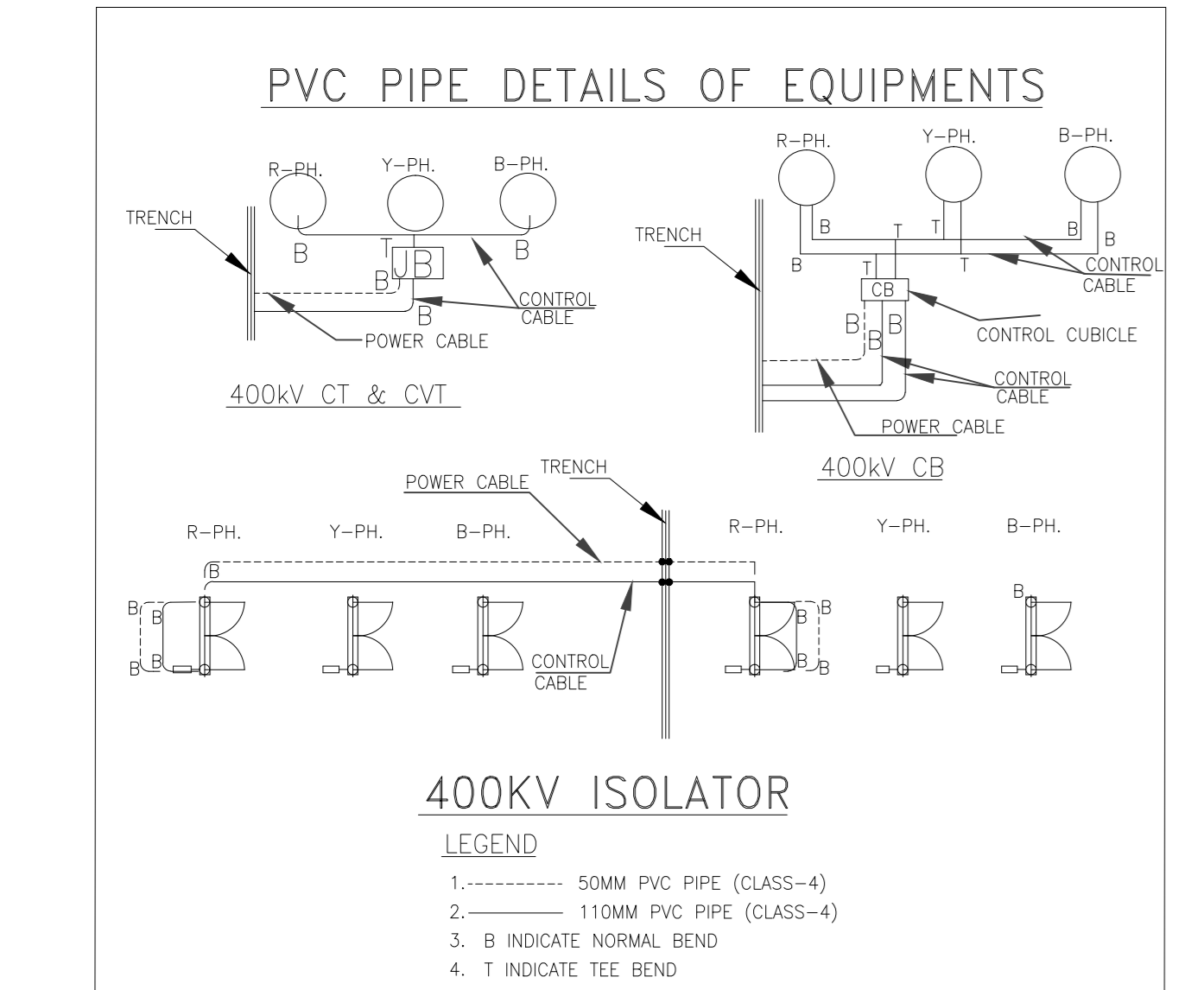
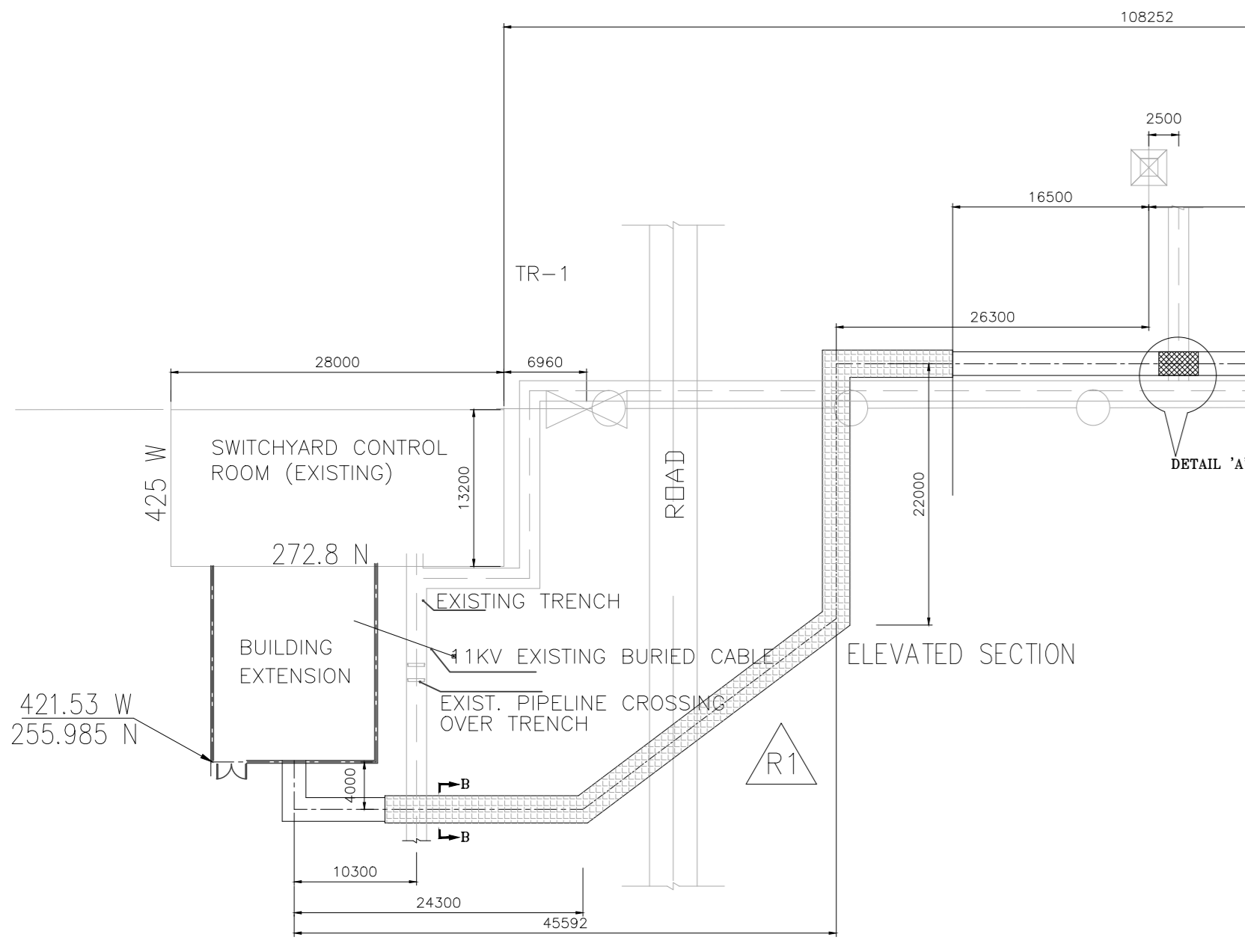


DETAIL SHOWING ROUTING OF CABLE INSIDE PVC PIPE CABLE TRENCH TO EQUIPMENT

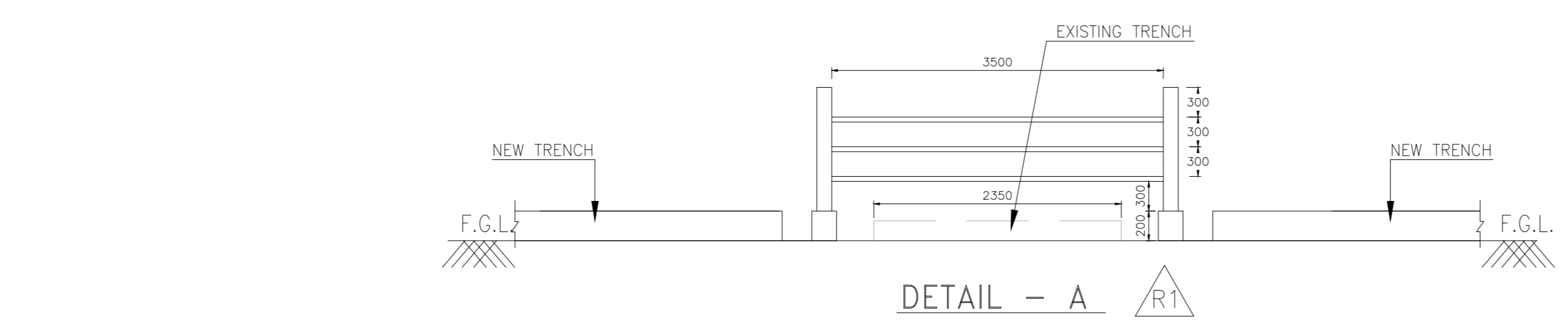
- NOTES :-**
- ALL DIMENSIONS ARE IN MM.
 - THE LOCATION OF CABLE TRENCHES MARKED IN THIS DWG MAY BE SLIGHTLY MODIFIED TO SUIT SITE CONDITIONS.
 - OPENINGS FOR TAKING OUT GI PIPES TO EQUIPMENTS SHALL BE PROVIDED IN CABLE TRENCHES. OPENING OF SIZE SUITABLE TO DIA. 50/100 PIPE SHALL BE PROVIDED BELOW TOP CABLE SUPPORT.
 - MK = INDICATES MARSHALLING KIOSK.
 - MK SHALL BE PLACED IN THE LOCATION SHOWN, EXACT COORDINATES TO BE SUITABLY DECIDED AT SITE.
 - 1.1KV CABLE SHALL BE PLACED ON 2.5M LONG GI TRAY SUPPORTED ON RACK (GI ANGLE).
 - CABLE SUPPORT SHALL BE PROVIDED AT EVERY 1500MM INTERVAL.
 - INSULTERS MUST BE EMBEDDED AT EVERY 1500MM INTERVAL FOR TIEING CABLE SUPPORT.
 - AUXILIARY POWER CABLES SHALL BE LAID IN TOP TIERS AND CONTROL CABLES IN BOTTOM TIERS.
 - FIBER OPTIC CABLE BETWEEN BAY CONTROL ROOM(BCR) AND EXISTING CONTROL ROOM SHALL BE LAID IN 100mm DIA GI PIPE AND SAME SHALL BE ROUTED THROUGH BOTTOM OF CABLE TRENCH. 100mm DIA GI PIPE USED FOR FIBER OPTICS CABLES SHALL BE SUITABLY CLAMPED TO AVOID MOVEMENT.
 - CABLES FOR LIGHTING PURPOSE SHALL BE LAID IN PVC PIPE/ TRENCH. SEPARATE DRAWING SHALL BE SUBMITTED FOR LIGHTING SYSTEM.
 - LOCATION OF CABLE TRENCHES INSIDE LT SWITCHGEAR ROOM SHALL BE SHOWN IN SEPARATE DRAWINGS.
 - EARTH CONDUCTOR 50x6 GI FLAT TO BE WELDED IN VERTICAL ON THE CABLE SUPPORT BEFORE INSTALLATION OF CABLES.
 - CABLES CROSSING ROAD SHALL BE LAID IN PIPE CULVERT.
 - FOR POWER & CONTROL CABLES, SEPARATE PIPES SHALL BE USED CONSIDERING 60% VOID FOR EACH PIPE I.E., 40% FILLING CRITERIA.
 - 300mm (MAX.) CABLE FROM EQUIPMENT TO CABLE TRENCH SHALL RUN IN GI PIPES.
 - MARKED THIN CIRCLES INDICATES CABLE ENTRY/EXIT FROM EQUIPMENT.
 - ALL OTHER DETAILS PERTAINING TO CIVIL WORKS SHALL BE REFLECTED IN THE RESPECTIVE CIVIL DRAWINGS.
 - PVC PIPES SHALL BE SECURELY FIXED AT BOTH ENDS.
 - AFTER LAYING THE CABLES THE ENDS OF PVC PIPES SHALL BE FULLY SEALED TO PREVENT INGRESS OF WATER INSIDE THE PIPE.
 - CONTROL CABLES & POWER CABLES MUST BE LAID IN SEPARATE PVC PIPES.
 - THE PURPOSE OF TRENCH LAYOUT DRAWING IS FOR USE AS FOLLOWS:
 - TO BE USED AS CIVIL INPUT FOR CABLE TRENCHES.
 - FOR ERECTION OF CABLE RACKS AT SITE.
 - FOR CABLE LAYING AND ROUTING AT SITE.
 - CONTROL CABLE CAN BE LAID UP TO A TWO LAYERS IN EACH TRAY.
 - LONGITUDINAL SLOPE IN CABLE TRENCH SHALL BE TYPICALLY 1:500
 - THE CABLE OF CT /CVT BETWEEN SECONDARY TERMINAL BOX AND JUNCTION BOX SHALL BE LAID IN 100MM GI PIPE.
 - INDICATE PIPE CULVERT.
 - CABLE TRAYS SHALL BE WELDED WITH HORIZONTAL CABLE SUPPORT RACK ANGLE.
 - THE CABLE RACK ASSEMBLY SHALL BE WELDED TO EMBEDDED INSERT PLATE AS MENTIONED BELOW. EVERY INTERMEDIATE HORIZONTAL CABLE SUPPORT ANGLE, IT MEANT THAT IF CABLE RACK ASSEMBLY HAS THREE TIERS THEN IT SHALL BE WELDED TO FIVE LOCATION AT BOTH SIDE.
 - CABLES SHALL BE ROUTED THROUGH SHORTEST ROUTE AS POSSIBLE.
 - POWER CABLE SHALL BE LAID IN SINGLE LAYER IN TRAYS.
 - SUMP AND DRAINAGE SHALL BE SHOWN IN SEPARATE CIVIL DRAWING.
 - THE PORTION OF GALVANISED STEEL, WHICH IF REQUIRED UNDERGOES ANY WELDING AT SITE SHALL BE COATED WITH TWO COATS OF COLD GALVANISING ANTI-CORROSION PAINT AFTER WELDING.
 - REFER DRAWING NO. TB-2-348-607-610 FOR DETAILS OF PIPE CULVERT FOR ROAD CROSSING.
 - INDICATE TRENCH/PIPE CROSSING.
 - INDICATE ELEVATED SECTION.
 - EXISTING CABLE TRENCH SHALL BE USED FOR CABLES FROM EXISTING BAYS TO SAS.



TYPICAL CABLE RACK FIXING DETAIL

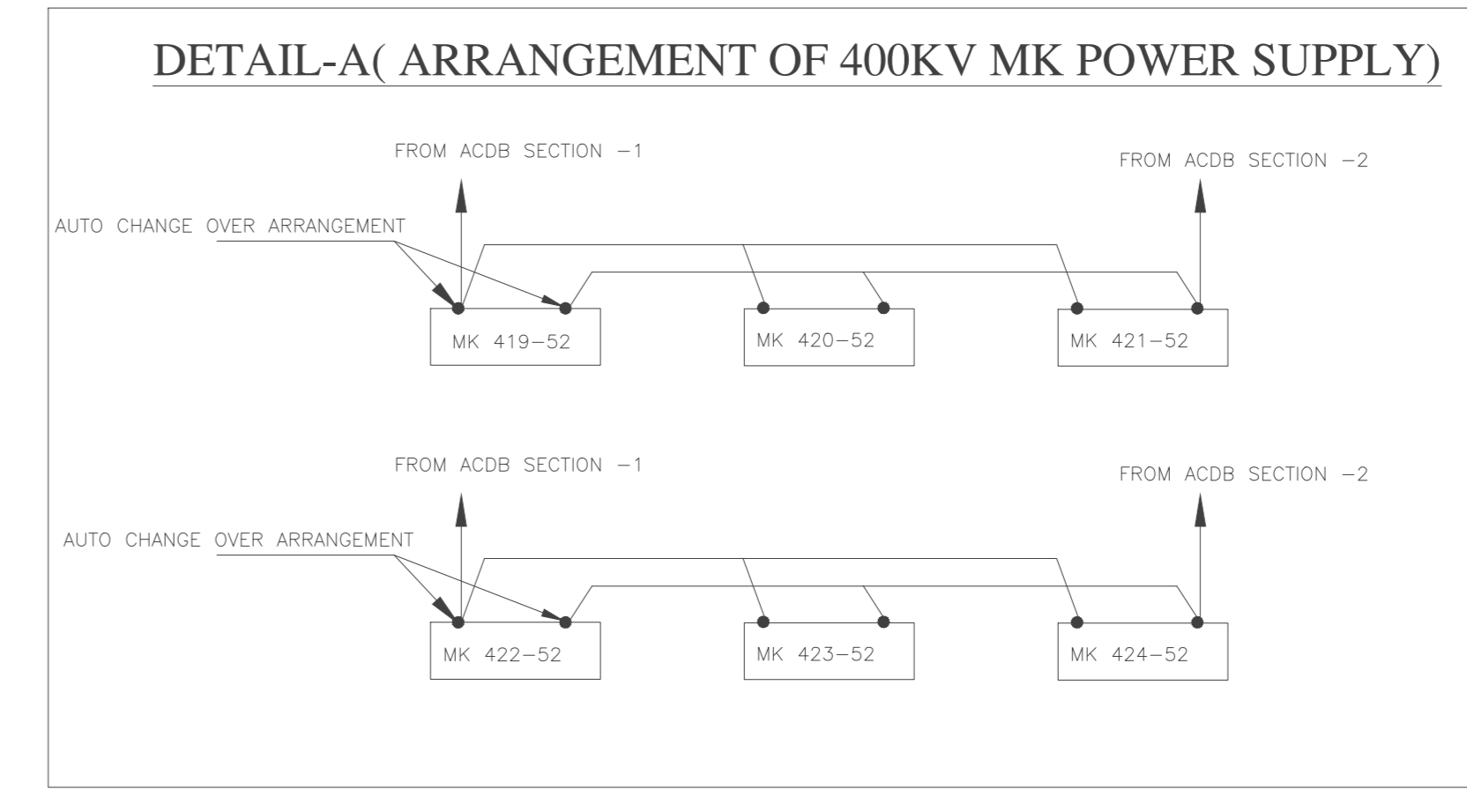
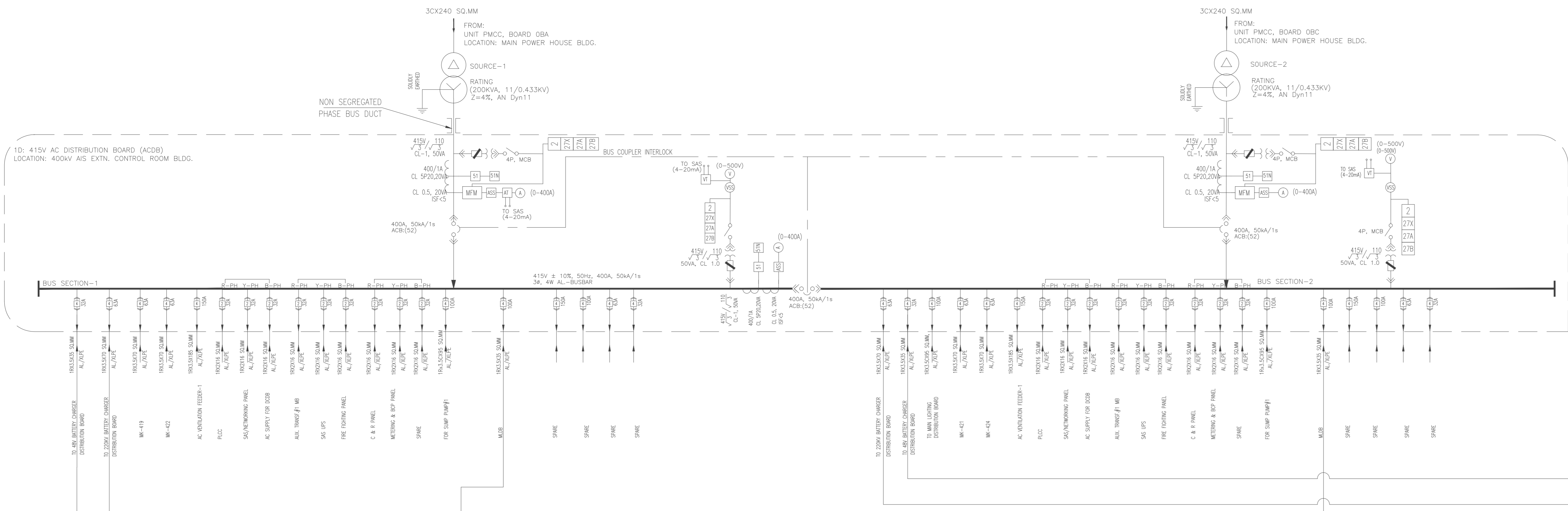


400KV ISOLATOR
LEGEND
1. 50MM PVC PIPE (CLASS-4)
2. 110MM PVC PIPE (CLASS-4)
3. B INDICATE NORMAL BEND
4. T INDICATE TEE BEND



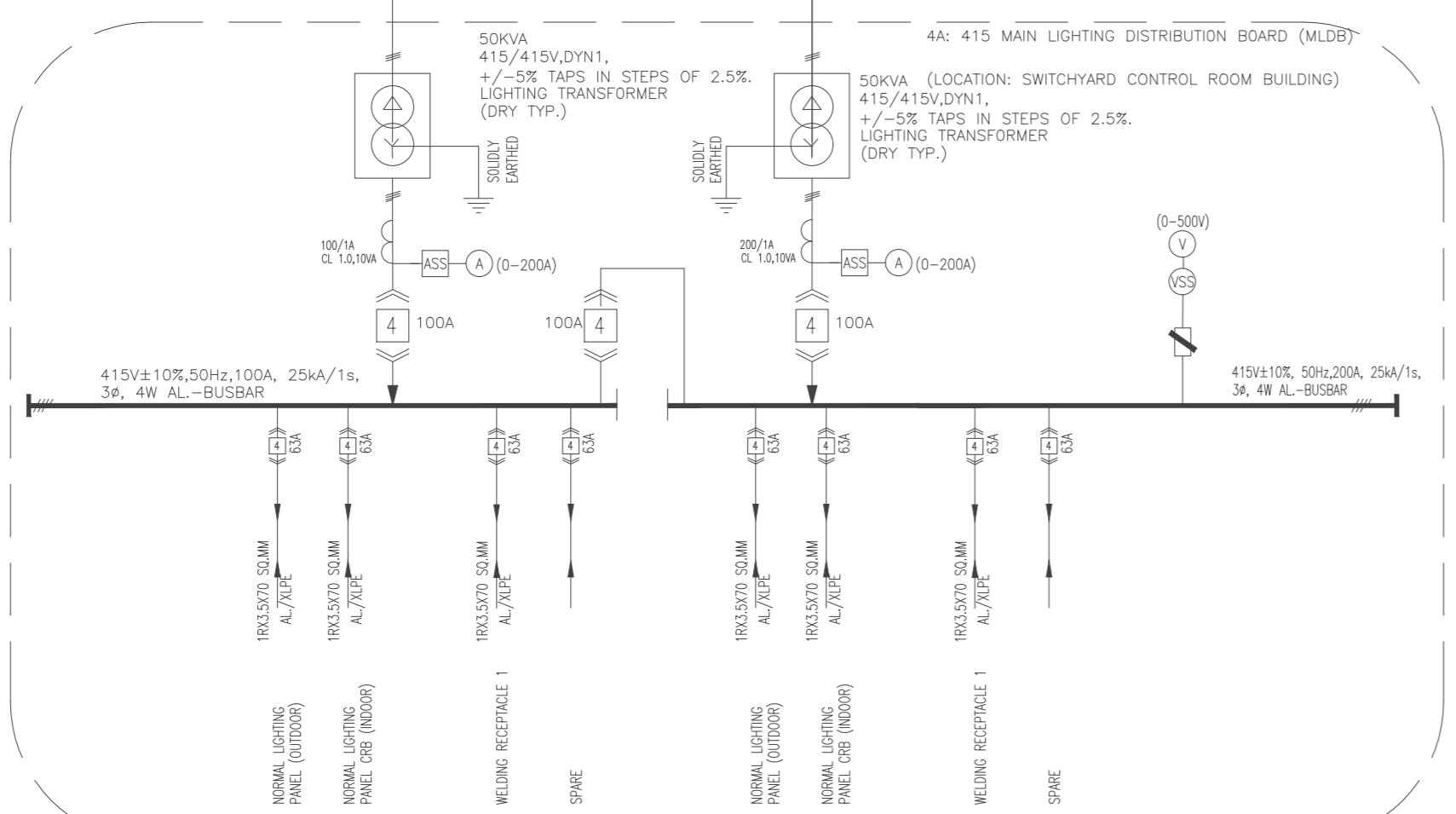
DETAIL - A

TB-0-375-510-060	LAYOUT PLAN AND SECTION DRAWING OF 400KV SWITCHYARD EXTENSION						
K9213R-DWG-M-002	PLOT PLAN						
TCE-541-739-CT-3073	400/220KV SWITCHYARD CABLE TRANCE AND AIR PIPING LAYOUT						
	DRAWING REFERENCE						
	TITLE						
GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wankaroli Thermal Power Station Extn. Unit-8							
DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA • MUMBAI • CHENNAI • NEW DELHI							
BHARAT HEAVY ELECTRICALS LTD.							
BHEL SUB VENDORS							
01	DRAWING REVISION AS PER SITE/CUSTOMER FEEDBACK. SECTION B, DETAIL A INCLUDED.						
REV.	STATUS	TYPE	REASONS FOR REVISION	DRAWN	CHECKED	APPROVED	DATE
							19.07.16
TITLE: TRENCH LAYOUT OUTDOOR DRAWING OF 400KV SWITCHYARD EXTENSION SCALE: 1:100 SHEET NO.: TB-3-375-316-065 SH-1							



Signal List	D/DO/SAS interface
415V ACDB Main incomer-1 Open	DO
415V ACDB Main incomer-1 Close	DO
415V ACDB Main incomer-2 Open	DO
415V ACDB Main incomer-2 Close	DO
415V ACDB Main Bus coupler Open	DO
415V ACDB Main Bus coupler Close	DO
415V ACDB Main incomer-1 ON	DI
415V ACDB Main incomer-1 OFF	DI
415V ACDB Main incomer-2 ON	DI
415V ACDB Main incomer-2 OFF	DI
415V ACDB Main Bus coupler ON	DI
415V ACDB Main Bus coupler OFF	DI
415V ACDB Main Incomer-1 5I/5IN operated	DI
415V ACDB Main Incomer-2 5I/5IN operated	DI
220V DCDB-1 U/V operated	DI
220V DCDB-1 E/F operated	DI
220V DCDB-2 U/V operated	DI
220V DCDB-2 E/F operated	DI
48V DCDB-1 U/V operated	DI
48V DCDB-1 O/V operated	DI
220V DCDB-1 I/C Current	AI
220V DCDB-1 Bus Voltage	AI
220V DCDB-2 I/C Current	AI
220V DCDB-2 Bus Voltage	AI
48V DCDB-1 I/C Current	AI
48V DCDB-1 Bus Voltage	AI

- GENERAL NOTES:
- BOARD SHALL BE DUST AND VERMIN PROOF WITH IP-54.
 - DISTRIBUTION BOARD'S SHALL HAVE TWO INCOMERS AND ONE BUS-COUPLER. IN ADDITION TO ELECTRICAL INTERLOCKS, MECHANICAL CASTLE KEY INTERLOCK SHALL BE PROVIDED BETWEEN THE TWO INCOMERS AND THE BUS-COUPLER SO THAT ANY TWO OF THE THREE MAY BE CLOSED AT A TIME.
 - INCOMERS & BUS SECTION BREAKERS OF DISTRIBUTION BOARDS SHALL HAVE PROVISIONS FOR REMOTE OPERATION & INDICATION FROM CONTROL ROOM/SAS.
 - NO TWO AC SOURCES SHALL BE PARALLELED AT ANY STAGE. INTERLOCK (ELECTRICAL) TO BE PROVIDED BETWEEN INCOMERS. REFER INTERLOCK SCHEME FOR DETAIL WHICH SHALL BE FURNISHED SEPARATELY.
 - WELDING RECEPTACLE SHALL BE LOOPED-IN LOOPED-OUT.
 - METERING AND PROTECTION REQUIREMENT AS PER TECHNICAL SPECIFICATION.
 - FOR CABLE INTERCONNECTION REFER CABLE SCHEDULE DRAWING.
 - CABLE DETAIL INDICATED ARE TENTATIVE ONLY. (INFORMATION PURPOSE)
 - FOR AUTO-CHANGEOVER SCHEME REFER VENDOR SCHEME DETAIL DRAWINGS(S).
 - FOR OUTGOING FEEDER DETAILS REFER OGA OF RESPECTIVE BOARDS.
 - EACH BAY MK SHALL BE FED BY ATLEAST ONE SOURCE FROM ACDB. SECOND SOURCE SHALL BE LOOPED FROM NEAREST BAY WHICH SHALL BE FED FROM ANOTHER SOURCE FROM 415V ACDB (SEE DETAIL-A FOR MK AC SUPPLY).
 - THE SOLATOR, CIRCUIT BREAKER & CT/CTV JB WILL BE FED FROM RESPECTIVE NEAREST BAY MK.
 - IN NORMAL CONDITION WHEN TWO INCOMERS OF 415V MAIN LIGHTING DISTRIBUTION IS ON THEN BUS COUPLER MCCB SHALL BE OFF CONDITION. IN THE CASE OF OUTAGE OF ONE INCOMER OF 415V MAIN, BUS COUPLER MCCB SHALL BE IN ON CONDITION.
 - THE INTERFACE OF ACDB BOARDS WITH SAS SHALL BE THROUGH HANDEDOWN SIGNALS.
 - AIR CIRCUIT BREAKER SHALL BE PROVIDED WITH ANTI PUMPING (94), TRIP ANNUNCIATION (95), LOCKOUT (96) AND TRIP CIRCUIT SUPERVISION (74) RELAYS. LOCKOUT RELAY SHALL BE HAND RESET TYPE.
 - ALL RELAY SHALL BE NUMERICAL RELAY WITH NECESSARY FEEDBACK SHALL BE PROVIDED TO SAS.
 - ALL INCOMER, BUS COUPLER & OUTGOING FEEDERS SHALL BE DRAW OUT TYPE.
 - MULTI-FUNCTION METER CONSIST OF FOLLOWING ELECTRICAL MEASURING PARAMETERS V, A, PF, W, WH & F.
 - ALL AC & DC MCCB OF PMCC, M.LDB, E.LDB DCDB & MK SHALL HAVE TRIP INDICATION & PROVISION OF GROUP ALARM.



EQUIPMENT NOMENCLATURES:

SYMBOL	NOMENCLATURE	DESCRIPTION
	AUX. TRANSFORMER	
	VT	VOLTAGE TRANSFORMER, 415/13/110/13 50VA, G-1
	ACB	3 POLE AIR CIRCUIT BREAKER
	MCCB	MOLDED CASE CIRCUIT BREAKER (DRAWOUT TYPE)
	MCCB	MOLDED CASE CIRCUIT BREAKER (NON DRAWOUT TYPE)
	MCB	MINIATURE CIRCUIT BREAKER
	CT	CURRENT TRANSFORMER
	F	FUSE
	CABLE	CABLE
		ELECTRICAL INTERLOCKING
		DRAW-OUT TYPE
		SWITCH

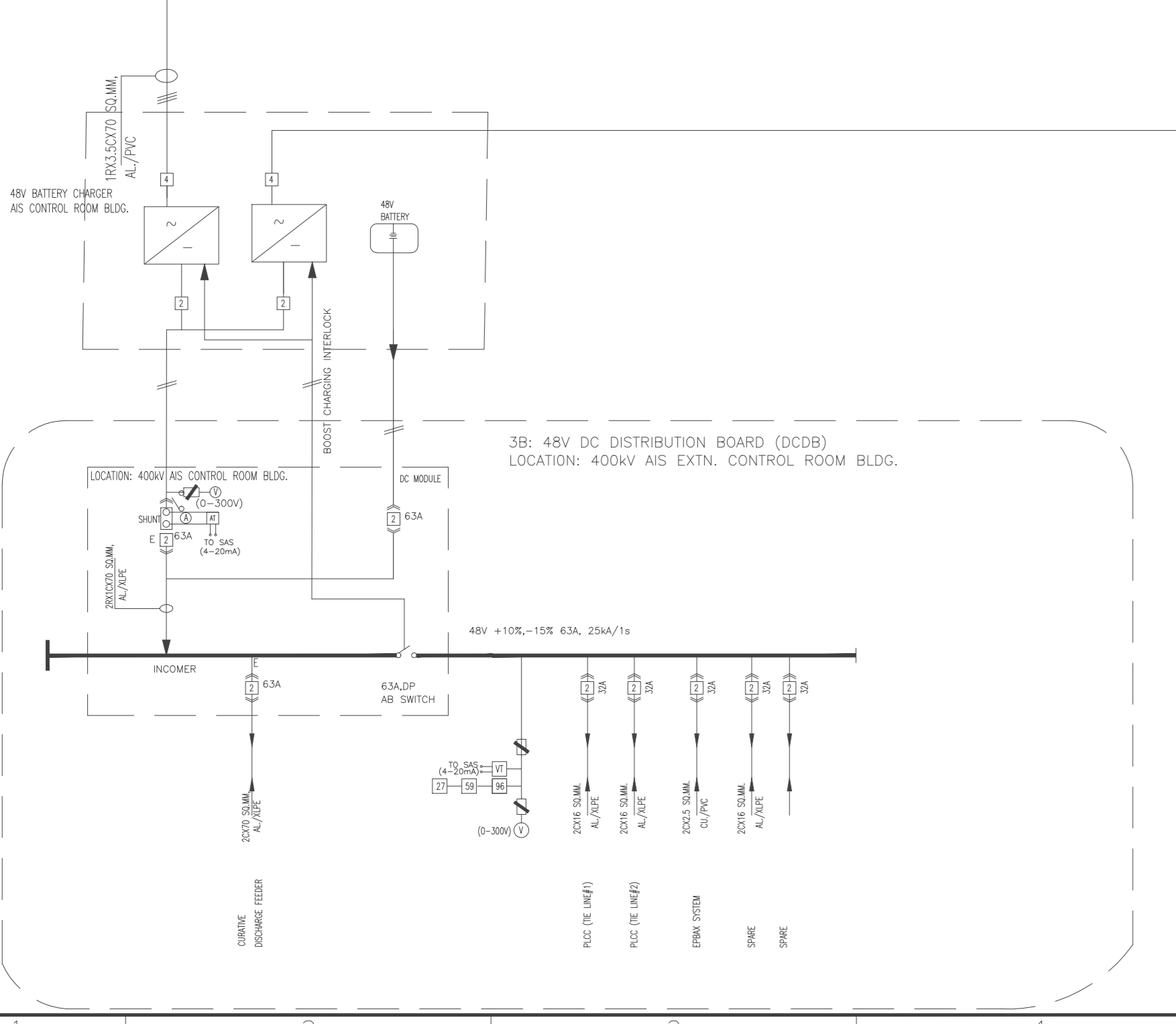
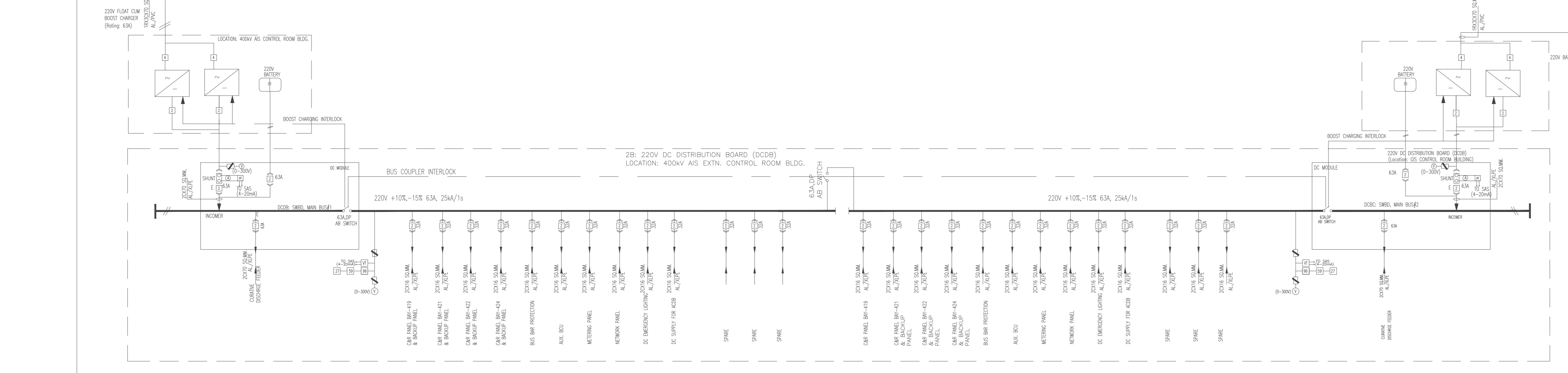
S.NO	MIN. CLEARANCE (EXCEPT AT TERMINATION)	DESCRIPTION
1	PHASE TO PHASE	25 MM
2	PHASE TO NEUTRAL	25 MM
3	PHASE TO EARTH	25 MM
4	NEUTRAL TO EARTH	25 MM

- LEGEND:-
- 51 : INVERSE TIME O/C RELAY FOR PHASE FAULT
 - 51N : INVERSE TIME O/C RELAY FOR EARTH FAULT
 - 2 : TIME DELAY PICKUP RELAY
 - 27A : AC DOUBLE POLE INSTANTANEOUS UNDER VOLTAGE RELAY
 - 27 : DC INSTANTANEOUS UNDER VOLTAGE RELAY
 - 59 : DC INSTANTANEOUS OVER VOLTAGE RELAY
 - 98 : EARTH LEAKAGE RELAY
 - REF : RESTRICTED E/F RELAY
 - SAS : SUBSTATION AUTOMATION SYSTEM
 - V : VOLTMETER
 - A : AMMETER
 - VT : VOLTAGE TRANSFORMER
 - AT : CURRENT TRANSFORMER
 - VSS : VOLTAGE SELECTOR SWITCH
 - ASS : AMMETER SELECTOR SWITCH
 - MFM : MULTI-FUNCTION METER

S.NO	MIN. CLEARANCE (EXCEPT AT TERMINATION)	DESCRIPTION
1	PHASE TO PHASE	25 MM
2	PHASE TO NEUTRAL	25 MM
3	PHASE TO EARTH	25 MM
4	NEUTRAL TO EARTH	25 MM

- DESIGN PARTICULARS:
- AMBIENT TEMPERATURE : 50°C
 - ONE MIN. POWER FREQ. WITHSTANDING VOLTAGE : 2.5 kv(rms)
 - POWER SUPPLY DETAIL :
 - a. AC SYSTEM : 3-PHASE, 4-WIRE, SOLIDLY EARTHED, 415V/125/50HZ
 - b. DC SYSTEM : 2WIRE, UNEARTHED, 220V (-15% to +10%)
 - WIRING : 1100V GRADE PVC INSULATED WIRE OF 2.5 SQ MM Cu FOR CONTROL AND 1.5 SQMM. Cu. FOR VT CIRCUIT
 - POWER SUPPLY DETAIL :
 - a. TRIP AND CLOSING COILS : 220 DC UNEARTHED
 - b. SPRING CHARGING : 220 DC UNEARTHED

S.NO	MIN. CLEARANCE (EXCEPT AT TERMINATION)	DESCRIPTION
1	PHASE TO PHASE	25 MM
2	PHASE TO NEUTRAL	25 MM
3	PHASE TO EARTH	25 MM
4	NEUTRAL TO EARTH	25 MM



REV.	STATUS	TYPE	REASONS FOR REVISION	DRAWN	CHECKED	APPROVED	DATE
01			DRG REVISED AS PER GSECL/DCPL COMMENTS DTD 10.08.2016	PK	MM	AS	02.09.16

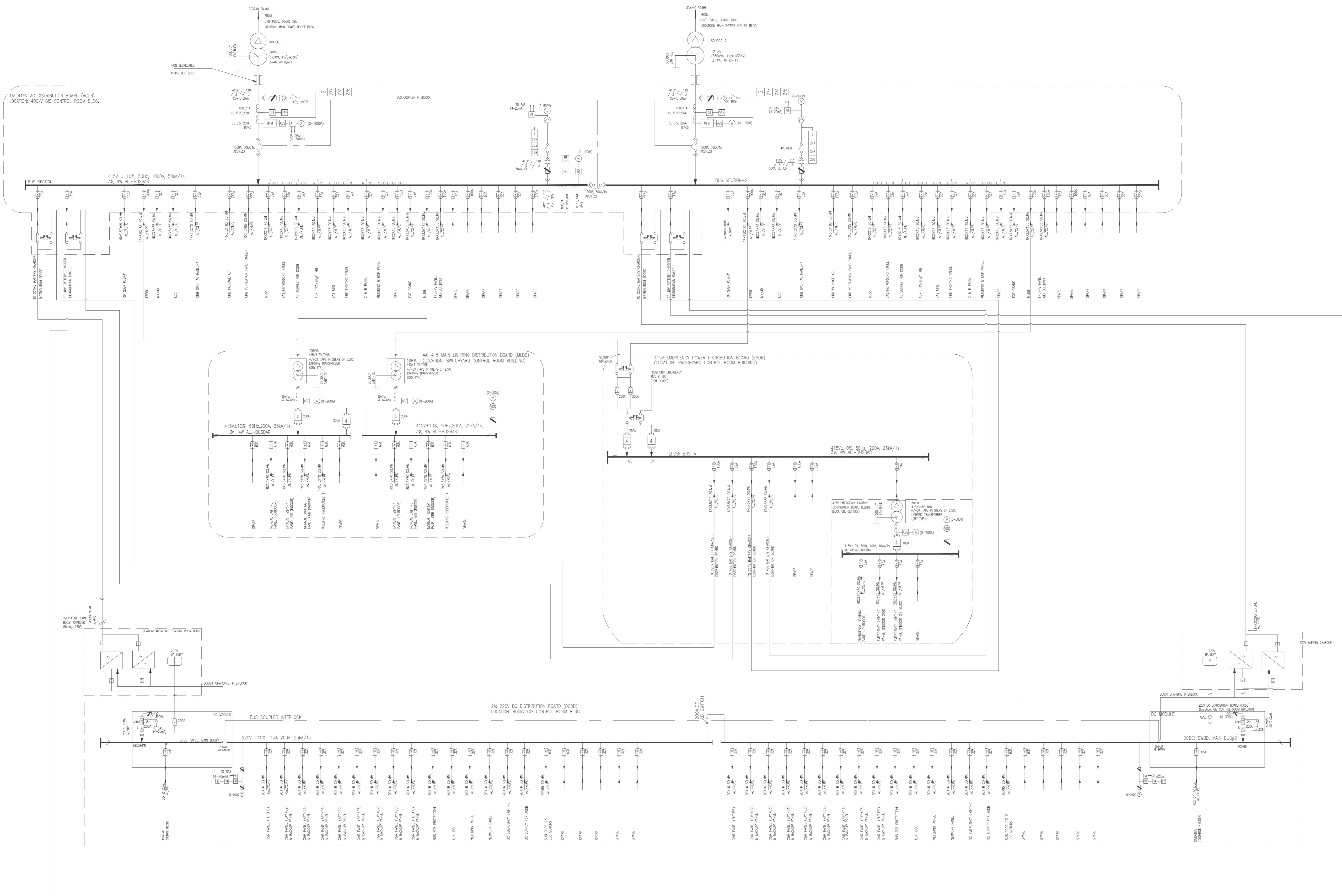
GUJARAT STATE ELECTRICITY CORPORATION LIMITED
 VADODARA, GUJARAT
 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8

DEVELOPMENT CONSULTANTS PVT. LTD.
 CONSULTING ENGINEERS
 KOLKATA • MUMBAI • CHENNAI • NEW DELHI

BHARAT HEAVY ELECTRICALS LTD. DRN NAME SIGN DATE
 (DNL)
 (APPL)

BHCL SUB VENDORS

TITLE : SINGLE LINE DIAGRAM OF LT. AC/DC. DB OF 400KV AIS EXTN.
 SCALE : BHCL DWG. NO. : TB-2-375-316-064
 REV. 01



Signal List	D/DO SAS interface
415V ACDB Main Incomer-1 Open	DO
415V ACDB Main Incomer-1 Close	DO
415V ACDB Main Incomer-2 Open	DO
415V ACDB Main Incomer-2 Close	DO
415V ACDB Main Bus coupler Open	DO
415V ACDB Main Bus coupler Close	DO
415V ACDB Main Incomer-1 ON	DI
415V ACDB Main Incomer-1 OFF	DI
415V ACDB Main Incomer-2 ON	DI
415V ACDB Main Incomer-2 OFF	DI
415V ACDB Main Bus coupler ON	DI
415V ACDB Main Bus coupler OFF	DI
415V ACDB Main Incomer-1 S1/S1N operated	DI
415V ACDB Main Incomer-2 S1/S1N operated	DI
220V DCDB-1 U/V operated	DI
220V DCDB-1 O/V operated	DI
220V DCDB-1 E/F operated	DI
220V DCDB-2 U/V operated	DI
220V DCDB-2 O/V operated	DI
220V DCDB-2 E/F operated	DI
48V DCDB-1 U/V operated	DI
48V DCDB-1 O/V operated	DI
220V DCDB-1 I/C Current	AI
220V DCDB-1 Bus Voltage	AI
220V DCDB-2 I/C Current	AI
220V DCDB-2 Bus Voltage	AI
48V DCDB-1 I/C Current	AI
48V DCDB-1 Bus Voltage	AI

- GENERAL NOTES:
1. BOARD SHALL BE DUST AND VERMIN PROOF WITH IP-54.
 2. DISTRIBUTION BOARD SHALL HAVE TWO INCOMERS AND ONE BUS-COUPLER.
 3. IN ADDITION TO ELECTRICAL INTERLOCKS, MECHANICAL CASTLE KEY INTERLOCK SHALL BE PROVIDED BETWEEN THE TWO INCOMERS AND THE BUS-COUPLER SO THAT ANY TWO OF THE THREE MAY BE CLOSED AT A TIME.
 4. NO TWO AC SOURCES SHALL BE PARALLELED BY ANY SINGLE INTERLOCK (ELECTRICAL) TO BE PROVIDED BETWEEN INCOMERS. REFER INTERLOCK SCHEME FOR DETAIL WHICH SHALL BE FORWARDED SEPARATELY.
 5. WELDING RECEPTACLE SHALL BE LOCKED-IN LOCKED-OUT.
 6. WELDING AND PROTECTION REQUIREMENTS AS PER TECHNICAL SPECIFICATION.
 7. FOR CABLE INTERCONNECTION REFER CABLE SCHEDULE DRAWING.
 8. CABLE DETAIL INDICATED ARE REFER TO ONLY (FOR INFORMATION PURPOSES).
 9. FOR AUTO-CHANGEOVER SCHEME REFER VENDOR SCHEME DETAIL DRAWINGS.
 10. FOR OUTSTANDING FEEDBACKS REFER IS&A OF RESPECTIVE BOARDS.
 11. IN NORMAL CONDITION WHEN TWO INCOMERS OF 415V MAIN LIGHTING DISTRIBUTION ON THEN BUS COUPLER MCB SHALL BE OFF CONDITION. IN THE CASE OF OUTAGE OF ONE INCOMER OF 415V MAIN BUS COUPLER MCB SHALL BE IN ON CONDITION.
 12. THE INTERFACE OF ACDB BOARDS WITH SAS SHALL BE THROUGH HARDWIRED SIGNALS.
 13. AIR CIRCUIT BREAKER SHALL BE PROVIDED WITH ANTI PUMPING (DAS, TRIP ANNUNCIATION (CO), LOCKOUT (S) AND TRIP CIRCUIT SUPERVISION (T) RELAYS. LOCKOUT RELAY SHALL BE HARD RESET TYPE.
 14. ALL RELAY SHALL BE NUMERICAL RELAY WITH NECESSARY FEEDBACK SHALL BE PROVIDED TO SAS.
 15. ALL INCOMER, BUS COUPLER & OUTSTANDING FEEDERS SHALL BE DRAW OUT TYPE.
 16. MULTI-FUNCTION METER CONSIST OF FOLLOWING ELECTRICAL MEASURING PARAMETERS V, A, P, R, MW & F.
 17. ALL AC & DC MCB OF PANEL, MCB, ELCB OCB & MK SHALL HAVE TRIP INDICATION & PROVISION OF GROUP ALARM.
 18. REF PROTECTION IS NOT ENVIAGED FOR 480V AUXILIARY TRANSFORMER.

EQUIPMENT NOMENCLATURES:

SYMBOL	NOMENCLATURE	DESCRIPTION
	VT	VOLTAGE TRANSFORMER, 415/5/110/1/5 50VA, CI-1
	ACB	3 POLE AIR CIRCUIT BREAKER
	MCCB	MOULDED CASE CIRCUIT BREAKER (DRAWOUT TYPE)
	MCB	MOULDED CASE CIRCUIT BREAKER (NON DRAWOUT TYPE)
	MCB	MINIATURE CIRCUIT BREAKER
	CT	CURRENT TRANSFORMER
	F	FUSE
	C	CABLE
		ELECTRICAL INTERLOCKING
		DRAW-OUT TYPE
	S	SWITCH

S.NO	MIN. CLEARANCE (EXCEPT AT TERMINATION)	25 MM
1	PHASE TO PHASE	25 MM
2	PHASE TO NEUTRAL	25 MM
3	PHASE TO EARTH	25 MM
4	NEUTRAL TO EARTH	25 MM

- DESIGN PARTICULARS:
1. AMBIENT TEMPERATURE : 50°C
 2. ONE MIN. POWER FREQ. WITHSTAND VOLTAGE : 2.5 (W/MVA)
 3. POWER SUPPLY DETAIL : 3-PHASE, 4-WIRE, GDBLY EARTHED, 415/110V, 50HZ
 4. AC SYSTEM : 2-WIRE, UN-EARTHED, 220V (-15% to +10%)
 5. DC SYSTEM : 110V GRADE PVC INSULATED WIRE OF 2.5 SQ.MM. Cu. FOR CONTROL AND 1.5 SQ.MM. Cu. FOR VT CIRCUIT
 6. TRIP AND CLOSING COILS : 220 DC UN-EARTHED
 7. POWER SUPPLY DETAIL : 220 DC UN-EARTHED
 8. SPRING CHARGING : 220 DC UN-EARTHED

- LEGEND:
- S1 : INVERSE TIME O/C RELAY FOR PHASE FAULT
 - S1N : INVERSE TIME O/C RELAY FOR EARTH FAULT
 - 2 : TIME DELAY PICKUP RELAY
 - 27F : AC DOUBLE POLE INSTANTANEOUS UNDER VOLTAGE RELAY
 - 27 : DC INSTANTANEOUS UNDER VOLTAGE RELAY
 - 28 : DC INSTANTANEOUS OVER VOLTAGE RELAY
 - RE : EARTH LEAKAGE RELAY
 - SAS : SUBSTATION AUTOMATION SYSTEM
 - V : VOLTMETER
 - A : AMMETER
 - VT : VOLTAGE TRANSFORMER
 - AT : CURRENT TRANSFORMER
 - VSS : VOLTAGE SELECTOR SWITCH
 - ASD : AMMETER SELECTOR SWITCH
 - MFM : MULTI-FUNCTION METER

S.NO	MIN. CLEARANCE (EXCEPT AT TERMINATION)	25 MM
1	PHASE TO PHASE	25 MM
2	PHASE TO NEUTRAL	25 MM
3	PHASE TO EARTH	25 MM
4	NEUTRAL TO EARTH	25 MM

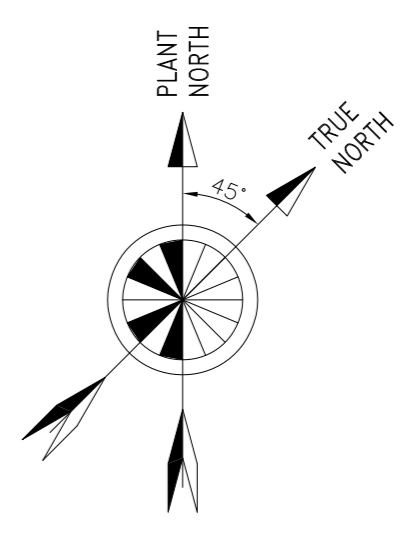
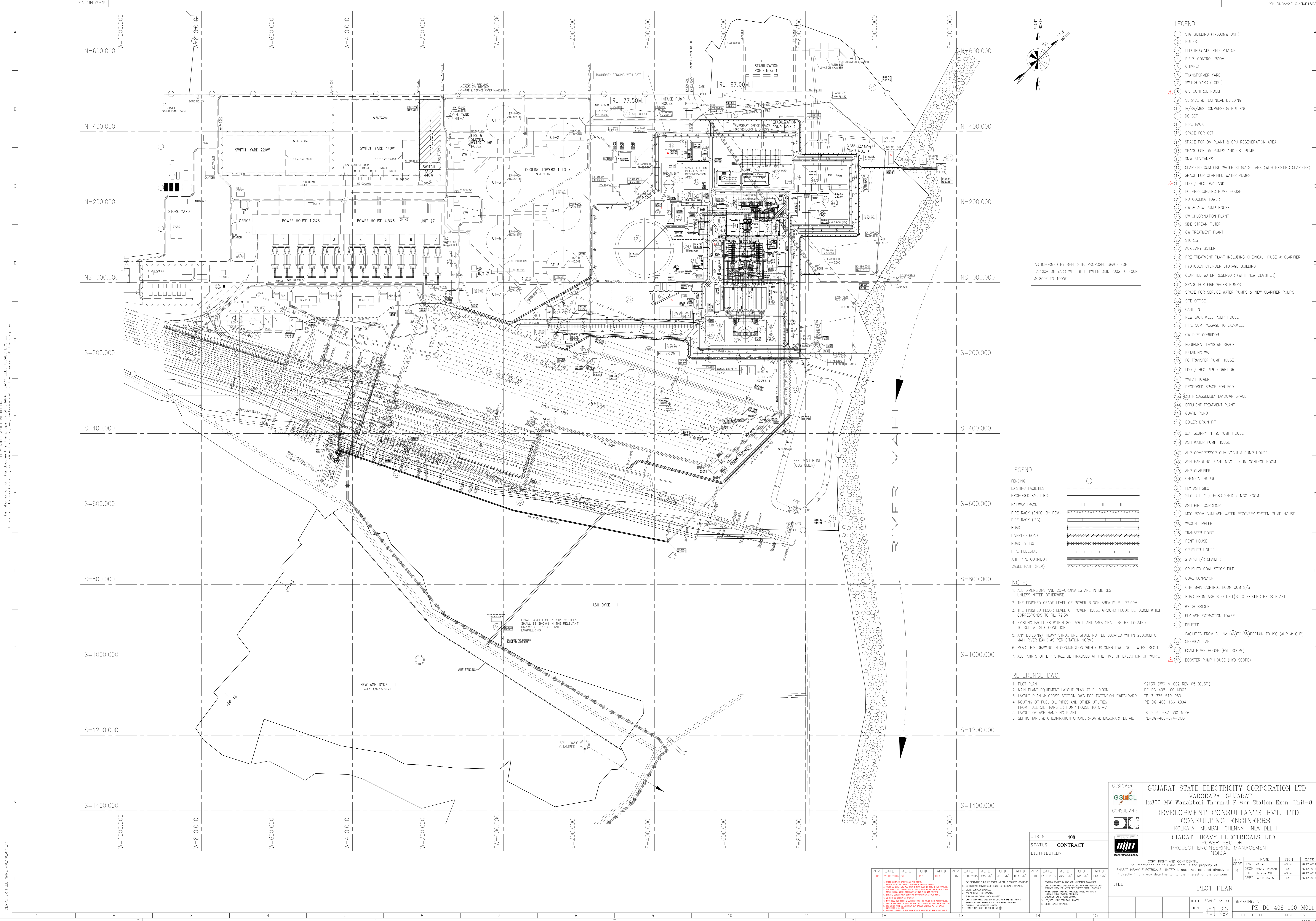
TB-4-375-316-031 LT POWER CABLE SIZING FOR 400V GIS
 TB-375-553-033 DESIGN PHILOSOPHY FOR AIR CONDITIONING & VENTILATION SYSTEM (S&HV) FOR
 TB-3-375-010-044 KEY PROTECTION AND METERING SINGLE LINE DIAGRAM FOR 400V GIS & SAS
 TB-4-375-558-035 BATTERY AND BATTERY CHARGER SIZING CALCULATION
 TB-375-551-036 TYPICAL SINGLE LINE DIAGRAM 415V INCOMER/DCDB
 TB-3-375-510-051 SLD OF 400V GIS

DRAWING REFERENCE: TITLE: GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA • MUMBAI • CHENNAI • NEW DELHI

REV.	STATUS	TYPE	REASONS FOR REVISION	DRAWN	CHECKED	APPROVED	DATE
01			ISSUED AS PER GSECL/DCPL COMMENTS DTD 10.08.2016	PK	UM	AS	02.09.16

REV.	STATUS	TYPE	REASONS FOR REVISION	DRAWN	CHECKED	APPROVED	DATE
01							

TITLE: SINGLE LINE DIAGRAM OF LT, AC/DC, DB OF 400KV GIS
 SCALE: 1:1
 SHEET NO.: TB-0-375-316-006
 REV. 01



- LEGEND**
- ① STG BUILDING (1x800MW UNIT)
 - ② BOILER
 - ③ ELECTROSTATIC PRECIPITATOR
 - ④ E.S.P. CONTROL ROOM
 - ⑤ CHIMNEY
 - ⑥ TRANSFORMER YARD
 - ⑦ SWITCH YARD (6S)
 - ⑧ GIS CONTROL ROOM
 - ⑨ SERVICE & TECHNICAL BUILDING
 - ⑩ IA/SA/MS COMPRESSOR BUILDING
 - ⑪ DG SET
 - ⑫ PIPE RACK
 - ⑬ SPACE FOR CST
 - ⑭ SPACE FOR DM PLANT & CPU REGENERATION AREA
 - ⑮ SPACE FOR DM PUMPS AND CST PUMP
 - ⑯ DMW STG. TANKS
 - ⑰ CLARIFIED CUM FIRE WATER STORAGE TANK (WITH EXISTING CLARIFIER)
 - ⑱ SPACE FOR CLARIFIED WATER PUMPS
 - ⑲ LDO / HFO DAY TANK
 - ⑳ FO PRESSURIZING PUMP HOUSE
 - ㉑ ND COOLING TOWER
 - ㉒ CW & ADW PUMP HOUSE
 - ㉓ CW CHLORINATION PLANT
 - ㉔ SIDE STREAM FILTER
 - ㉕ CW TREATMENT PLANT
 - ㉖ STORES
 - ㉗ AUXILIARY BOILER
 - ㉘ PRE TREATMENT PLANT INCLUDING CHEMICAL HOUSE & CLARIFIER
 - ㉙ HYDROGEN CYLINDER STORAGE BUILDING
 - ㉚ CLARIFIED WATER RESERVOIR (WITH NEW CLARIFIER)
 - ㉛ SPACE FOR FIRE WATER PUMPS
 - ㉜ SPACE FOR SERVICE WATER PUMPS & NEW CLARIFIER PUMPS
 - ㉝ SITE OFFICE
 - ㉞ CANTEN
 - ㉟ NEW JACK WELL PUMP HOUSE
 - ⓫ PIPE CUM PASSAGE TO JACKWELL
 - ⓬ CW PIPE CORRIDOR
 - ⓭ EQUIPMENT LAYDOWN SPACE
 - ⓮ RETAINING WALL
 - ⓯ FO TRANSFER PUMP HOUSE
 - ⓰ LDO / HFO PIPE CORRIDOR
 - ⓱ WATCH TOWER
 - ⓲ PROPOSED SPACE FOR FGD
 - ⓳ PREASSEMBLY LAYDOWN SPACE
 - ⓴ EFFLUENT TREATMENT PLANT
 - ⓵ GUARD POND
 - ⓶ BOILER DRAIN PIT
 - ⓷ B.A. SLURRY PIT & PUMP HOUSE
 - ⓸ ASH WATER PUMP HOUSE
 - ⓹ AHP COMPRESSOR CUM VACUUM PUMP HOUSE
 - ⓺ ASH HANDLING PLANT MCC-1 CUM CONTROL ROOM
 - ⓻ AHP CLARIFIER
 - ⓼ CHEMICAL HOUSE
 - ⓽ FLY ASH SILO
 - ⓾ SILO UTILITY / HCSHED / MCC ROOM
 - ⓿ ASH PIPE CORRIDOR
 - ⓿ MCC ROOM CUM ASH WATER RECOVERY SYSTEM PUMP HOUSE
 - ⓿ WAGON TIPPLER
 - ⓿ TRANSFER POINT
 - ⓿ PENT HOUSE
 - ⓿ CRUSHER HOUSE
 - ⓿ STACKER/RECLAIMER
 - ⓿ CRUSHED COAL STOCK PILE
 - ⓿ COAL CONVEYOR
 - ⓿ CHP MAIN CONTROL ROOM CUM S/S
 - ⓿ ROAD FROM ASH SILO UNIT#8 TO EXISTING BRICK PLANT
 - ⓿ WEIGH BRIDGE
 - ⓿ FLY ASH EXTRACTION TOWER
 - ⓿ DELETED
 - ⓿ FACILITIES FROM SL. No. 46) TO 65) PERTAIN TO ISG (AHP & CHP).
 - ⓿ CHEMICAL LAB
 - ⓿ FOAM PUMP HOUSE (HYD SCOPE)
 - ⓿ BOOSTER PUMP HOUSE (HYD SCOPE)

AS INFORMED BY BHEL SITE, PROPOSED SPACE FOR FABRICATION YARD WILL BE BETWEEN GRID 200S TO 400N & 800E TO 1000E.

- LEGEND**
- FENCING
 - EXISTING FACILITIES
 - PROPOSED FACILITIES
 - RAILWAY TRACK
 - PIPE RACK (ENGG. BY PEM)
 - PIPE RACK (ISG)
 - ROAD
 - DIVERTED ROAD
 - ROAD BY ISG
 - PIPE PEDESTAL
 - AHP PIPE CORRIDOR
 - CABLE PATH (PEM)

- NOTE:-**
- ALL DIMENSIONS AND CO-ORDINATES ARE IN METRES UNLESS NOTED OTHERWISE.
 - THE FINISHED GRADE LEVEL OF POWER BLOCK AREA IS RL. 72.00M.
 - THE FINISHED FLOOR LEVEL OF POWER HOUSE GROUND FLOOR EL. 0.00M WHICH CORRESPONDS TO RL. 72.3M.
 - EXISTING FACILITIES WITHIN 800 MM PLANT AREA SHALL BE RE-LOCATED TO SUIT AT SITE CONDITION.
 - ANY BUILDING/ HEAVY STRUCTURE SHALL NOT BE LOCATED WITHIN 200.00M OF MAHI RIVER BANK AS PER CITATION NORMS.
 - READ THIS DRAWING IN CONJUNCTION WITH CUSTOMER DWG. NO. - WTPS: SEC.19.
 - ALL POINTS OF ETP SHALL BE FINALED AT THE TIME OF EXECUTION OF WORK.

- REFERENCE DWG.**
1. PLOT PLAN
 2. MAIN PLANT EQUIPMENT LAYOUT PLAN AT EL. 0.00M
 3. LAYOUT PLAN & CROSS SECTION DWG FOR EXTENSION SWITCHYARD
 4. ROUTING OF FUEL OIL PIPES AND OTHER UTILITIES FROM FUEL OIL TRANSFER PUMP HOUSE TO CT-7
 5. LAYOUT OF ASH HANDLING PLANT
 6. SEPTIC TANK & CHLORINATION CHAMBER-GA & MASONARY DETAIL

9213R-DWG-M-002 REV-05 (CUST.)
 PE-DG-408-100-M002
 TB-3-375-510-660
 PE-DG-408-166-A004
 IS-0-PL-687-300-M004
 PE-DG-408-674-C001

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COMPUTER FILE NAME: K9L001001.L3

REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD
NO.				BY	NO.				BY	NO.				BY
1	20.12.2014	MS	RP	BNA	1	18.03.2015	MS	RP	BNA	1	18.03.2015	MS	RP	BNA
2	20.12.2014	MS	RP	BNA	2	18.03.2015	MS	RP	BNA	2	18.03.2015	MS	RP	BNA
3	20.12.2014	MS	RP	BNA	3	18.03.2015	MS	RP	BNA	3	18.03.2015	MS	RP	BNA
4	20.12.2014	MS	RP	BNA	4	18.03.2015	MS	RP	BNA	4	18.03.2015	MS	RP	BNA
5	20.12.2014	MS	RP	BNA	5	18.03.2015	MS	RP	BNA	5	18.03.2015	MS	RP	BNA

CUSTOMER: GUJARAT STATE ELECTRICITY CORPORATION LTD
 VADODARA, GUJARAT
 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8

CONSULTANT: DEVELOPMENT CONSULTANTS PVT. LTD.
 CONSULTING ENGINEERS
 KOLKATA MUMBAI CHENNAI NEW DELHI

CLIENT: BHARAT HEAVY ELECTRICALS LTD
 POWER SECTOR
 PROJECT ENGINEERING MANAGEMENT
 NOIDA

JOB NO. 408
STATUS CONTRACT
DISTRIBUTION

TITLE PLOT PLAN
DEPT. SCALE 1:3000
DRAWING NO. PE-DG-408-100-M001
SHEET 1 OF 1
REV. 03