

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

40-00-100-015-053-3-BL ON 380	1	2	3	4	5	6	7
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BILL OF QUANTITY – 400kV

CVT PARAMETERS

400 KV LINE CVT

Ratio	400kV / 110V / 110V / 110V 33 33 33 33
Sec-I	Class - 3P, 75VA
Sec-II	Class - 3P, 75VA
Sec-III	Class - 0.2, 75VA
Capacitance	4400 pF

S.NO.	SYMBOL	LEGEND	DESCRIPTION	BAY NO	QTY.
1	⊖	52	400kV, 2000A, 50kA FOR 1s, 3-PH CIRCUIT BREAKER WITHOUT PIR	405-52,406-52,410-52	03
2	⊖	89	400kV, 2000A, 50kA FOR 1s, 3-PH HCB ISOLATORS, MOTOR OPERATED WITH 1 E/S	404-89A,405-89A,406-89B,406-89A, 406-89B, 406-89L,410-89B,410-89L	08
3	⊖	CT	400kV, 2000A, 50kA FOR 1s, 1-PH, 5-CORE CURRENT TRANSFORMER WITH 120% EXTENDED CURRENT RATING	405-CTA,406-CTA, 406-CTB,410-CTA,410-CTB,411-CTB	18
4	⊖	CVT	400kV, 4400 pF,4400 pF,4400 pF,4400 pF,4400 pF	406-CVT,410-CVT	06
5	⊖	SA	380 kV, 10kA, 1-PH SURGE ARRESTER	406-SA,410-SA	06

CT PARAMETERS

400 KV, 2000A CT (5 CORE)

Core No.	Current Ratio	Accuracy Class	Output Burden (VA)	Min kV (V _{alt})	Max Ret (Ohm)	Max Im at kV (mA)	Purpose
1	2000/1000/1	PS	-	2000/1000	16-5	30-60	BUS DIFF. MAIN-1
2	2000/1000/1	PS	-	2000/1000	16-5	30-60	BUS DIFF. MAIN-2
3	2000/1000/500/1	0.2s RS<= 5	20	-	-	-	METERING & SYNCH
4	2000/1000/500/1	PS	-	4000/3000/1000	16-5,2.5	30-60/1.20	LINE PROTIN
5	2000/1000/500/1	PS	-	4000/3000/1000	16-5,2.5	30-60/1.20	LINE PROTIN

MAIN SYSTEM PARAMETERS:

1. NOMINAL VOLTAGE -400kV
2. HIGHEST SYSTEM VOLTAGE -420kV
3. RATED FREQUENCY -60 Hz
4. RATED SHORT TIME CURRENT -50kA FOR 1 SEC
5. POWER FACT WITH STAND VOLTAGE -0.95 (lag)
6. POWER FACT WITH STAND VOLTAGE -0.95 (lag)
7. SWITCHING IMPULSE WITHSTAND VOLTAGE - 110kV /peak
8. CREEPAGE - 28mm/kV (10830 mm)

NOTES:

1. PRESENT
- EXISTING

NAME OF CUSTOMER: NABINAGAR POWER GENERATING CO. PVT. LIMITED (NPGC)
NAME OF PROJECT : 400/132 KV SWITCHYARD PACKAGE AT NABINAGAR SUPER THERMAL POWER PROJECT (3 X 660 MW)

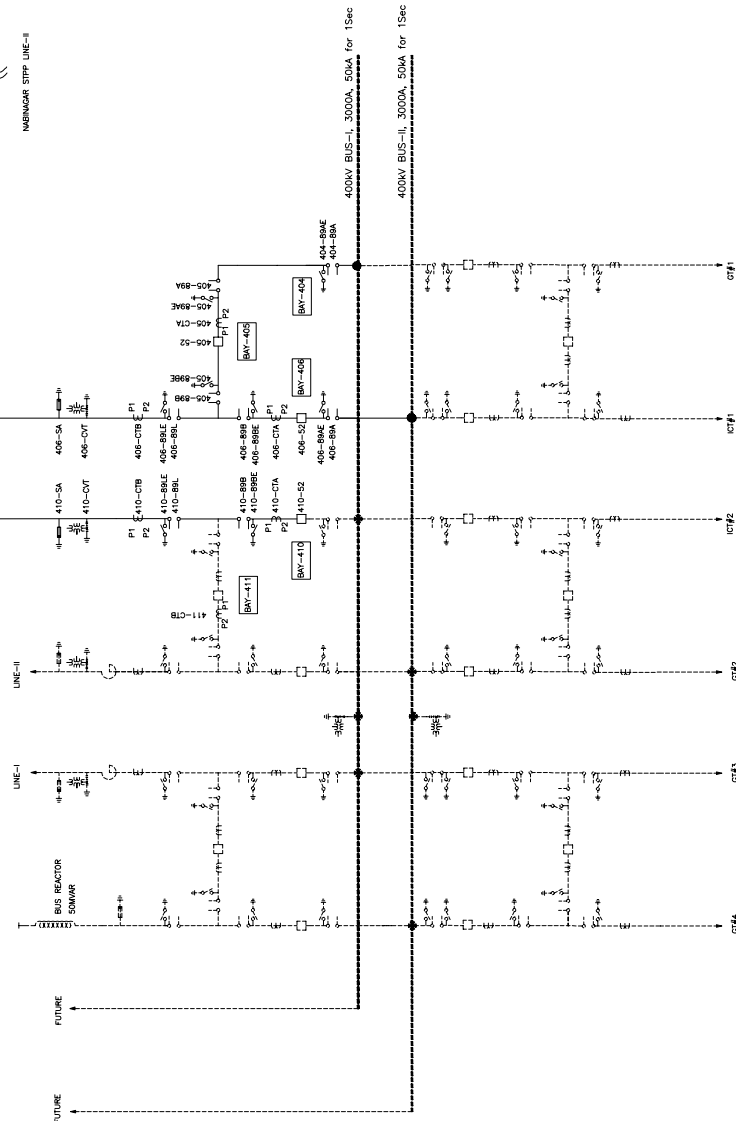
NTPC DRAWING NO. 0370-572-PVE-P-425

REF. DWG. 0270-572-PVE-P-002, REV-02

SIGN & DATE	REV. DATE	ALTD.	CHD.	APPD.	REV.	DATE	ALTD.	CHD.	APPD.		भारत भाराट BHEL			BHARAT HEAVY ELECTRICALS LIMITED TRANSMISSION BUSINESS GROUP			CARD CODE				
	02	01.04.14	MM	MM/WK/DKM	RS	01	01.09.13	MM	MM/WK/DKM										RS	NEXT SHEET No.	02
	CVT RATING FINALISED CORRECTION IN BAY NO FOR ISOLATORS IN BOQ TABLE.																		CHECKED		
INVENTORY NO.	DISTRIBUTION OF PRINTS									DEPT.			CODE			400KV NABINACAR TPP (BRBCL) EXTN – SINGLE LINE DIAGRAM	NEXT SHEET No.	01			
										TBEM			422								
																			SCALE	NTS	W.O. No.

NTPC DRAWING NO. 0370-572-PVE-P-425		Bharat Heavy Electricals Limited		CARD CODE	
NAME OF CUSTOMER: NABINAGAR POWER GENERATING CO. PVT. LIMITED (NPGC)		TRANSMISSION BUSINESS GROUP		NEXT SHEET	
NAME OF PROJECT : 400/132 KV SWITCHYARD PACKAGE AT NABINAGAR SUPER THERMAL POWER PROJECT (3 X 660 MW)		400KV NABINAGAR TPP (BRBCL) EXTN - SINGLE LINE DIAGRAM		SHEET No.	
				01	
				REV 02	

						DRI. NO.
7	9	6	4	3	2	B-3-350-510-100-02



NAME OF CUSTOMER: NABINAGAR POWER GENERATING CO. PVT. LIMITED (NPGC)
NAME OF PROJECT : 400/132 KV SWITCHYARD PACKAGE AT NABINAGAR SUPER
THERMAL POWER PROJECT (3 X 660 MW)

NTPC DRAWING NO. 0370-572-PVE-P-425

REF. DWG. 0270-572-PVE-P-002, REV-02

BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESS GROUP

400KV NABINAGAR TPP (BRBCL) EXTN - SINGLE LINE DIAGRAM

SCALE	W.O. No.	DRG. No.	REV 02
	81004	TB-1-350-510-100-04	



DEPT.	CODE
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TRFM	422
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	NAME	SIGN.	DATE
DRAWN	MM		31-07-
CHECKED	MM/VK/DKM		31-07-
APPROVED	RS		01-08-

DISTRIBUTION OF PRINTS

[illegible]

REV.	DATE	CHD.	APPD.	REV.	DATE	CHD.
02	01.04.14	MM		01	01.09.13	MM
		MM/YK/DK/M				MM/YK/DK/M

CVT RATING FINALISED
CORRECTION IN BAY NO FOR
ISOLATORS IN BOG TABLE

DRG. REVISED AS PER NTPC
COMMENTS DATED 21.08.13

• **RESEARCH** AND **DEVELOPMENT**

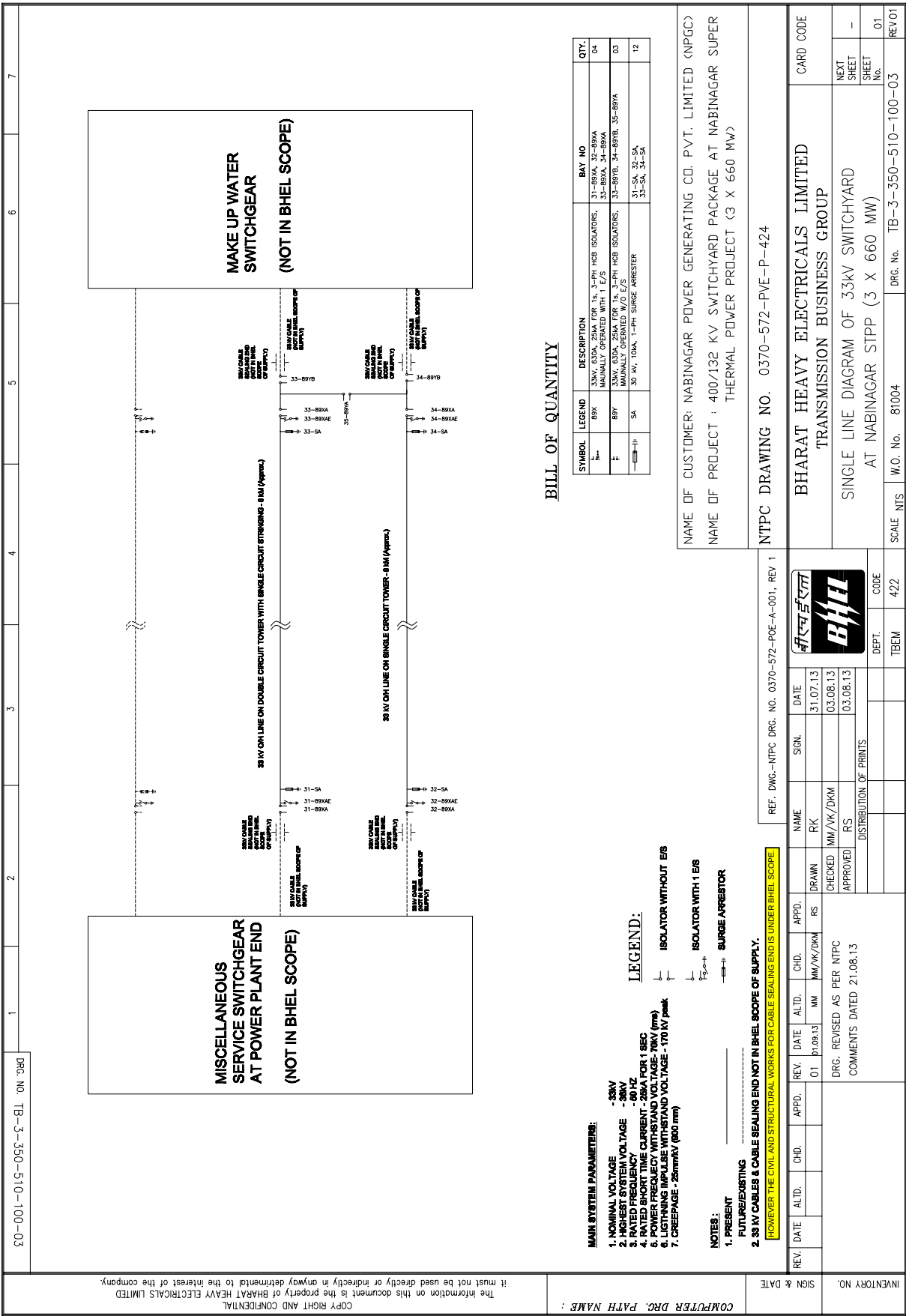
10

DATE _____

COMPUTER DRG. PATH NAME :

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SYMBOL	LEGEND	DESCRIPTION	BAY NO / LOCATION	QTY:
	52X	132kV, 1200A, 31.5kA FOR 1s, 3-PH CIRCUIT BREAKER WITHOUT PIR	103-52X,107-52X,108-52X,110-52X	4
	52Y	132kV, 1200A, 31.5kA FOR 1s, 3-PH CIRCUIT BREAKER WITHOUT PIR	101-52Y,102-52Y,104-52Y,106-52Y,109-52Y,114-52Y	7
	89V	132kV, 1250A, 31.5kA FOR 1s, 3-PH HCB TANDEM ISOLATOR MOTOR OPERATED, W/O E/S	101-89VA,102-89VA,104-89VA,106-89VA,109-89VA,112-89VA,114-89VA	7
	89W	132kV, 1200A, 31.5kA FOR 1s, 3-PH HCB ISOLATOR MOTOR OPERATED, WITH 1 E/S	107-89WA,107-89WB,108-89WA,108-89WB	4
	89X	132kV, 1200A, 31.5kA FOR 1s, 3-PH HCB ISOLATOR MOTOR OPERATED, WITH 1 E/S	107-89XA,102-89XB,104-89XA,106-89XB,109-89XB,112-89XB,114-89XB	7
	89Y	132kV, 2000A, 31.5kA FOR 1s, 3-PH HCB ISOLATOR MOTOR OPERATED, WITH 2 E/S	103-89YA,103-89YB,110-89YA,110-89YB	7
	89Z	132kV, 1250A, 31.5kA FOR 1s, 3-PH HCB ISOLATOR MOTOR OPERATED, WITH 2 E/S	101-89ZL,102-89ZL,104-89ZL,106-89ZL,109-89ZL,112-89ZL,114-89ZL	4
	CT1	132kV, 1200A, 31.5 kA FOR 1s, 1-PH, 5-CORE CURRENT TRANSFORMER WITH 150% EXTENDED CURRENT RATING	103-CT1,107-CT1,108-CT1,110-CT1	12
	CT2	132kV, 1200A, 31.5 kA FOR 1s, 1-PH, 5-CORE CURRENT TRANSFORMER WITH 120% EXTENDED CURRENT RATING	101-CT2,102-CT2,104-CT2,106-CT2,109-CT2,112-CT2,114-CT2	21
	CVT	132kV, 8800 picroFarad, 1-PH CAPACITOR VOLTAGE TRANSFORMER	BUS-1 CVT, BUS-II CVT, BUS-III CVT, BUS-IV-CVT	12
	SA	120kV, 10kA, 1-PH SURGE ARRESTERS	101-SVA-1,101-SVA-2,102-SVA,104-SVA-1,104-SVA-2,106-SVA,109-SVA,112-SVA,114-SVA-1,114-SVA-2	30

Ratio	$\frac{132kV}{\sqrt{3}}$ / $\frac{110kV}{\sqrt{3}}$ / $\frac{110kV}{\sqrt{3}}$
Sec-I	Class - 3P, 75VA
Sec-II	Class - 3P, 75VA
Sec-III	Class -0.2, 75VA
	Capacitance – 8800 pF

Core No.	Current Ratio	Accuracy Class	Output Burden (VA)	Min KVP (V _{AC})	Max I _{SP} (Ohm)	Max I _{in} at KVP (mA)	Purpose
1	1:2000-600/1	P5	-	1200-600-300	10-5-2.5	40-80-160	RUS DIFF MAIN-1
2	1:2000-600/1	P5	-	1200-600-300	10-5-2.5	40-80-160	RUS DIFF MAIN-2
3	1:2000-600/1	0.2	20	-	-	-	DIFFERING & SYNC
4	1:2000-600/1	ISF=5	-	1200-600-300	10-5-2.5	40-80-160	TEAMS BACKUP
5	1:2000-600/1	P5	-	1200-600-300	10-5-2.5	40-80-160	TEAMS DIFF BUS DIFF.

NOTES:
1. PRESENT
FUTURE

NAME OF CUSTOMER: NABINAGAR POWER GENERATING CO. PVT. LIMITED (NPGC)
NAME OF PROJECT : 400/132 KV SWITCHYARD PACKAGE AT NABINAGAR SUPER THERMAL POWER PROJECT (3 X 660 MW)
NTPC DRAWING NO. 0370-572-PVE-P-423

REV.	DATE	ALTD.	CHD.	APPD.	REV.	DATE	ALTD.	CHD.	APPD.	NAME	SIGN.	DATE
02	21.08.13	MM/RD		RS	01	01.08.13	MM	MM/KK/DKM	RS	DRAWN	RK	
DRG. REVISED AS PER NTPC COMMENTS DATED 17.09.13 AND COMMENTS DATED 21.08.13 DRG. REVISED AS PER NTPC COMMENTS DATED 17.09.13 AND COMMENTS DATED 21.08.13 HAS BEEN CHANGED TO 0.2. AS PER CONTRACT SPECIFICATION.												
 DEPT. CODE TBEM 422												
132KV NABINAGAR (STPP)–SINGLE LINE DIAGRAM TRANSMISSION BUSINESS GROUP BHARAT HEAVY ELECTRICALS LIMITED CARD CODE 01 02 NEXT SHEET SHEET No.												
SCALE NTS 81004 W.O. No. 81004 DRG. No. TB–3–350–510–100–02												

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COMPUTER DRG. PATH NAME :

SYMBOL	LEGEND	DESCRIPTION	BAY NO / LOCATION	QTY	Notes
	52X	400V, 3150A, 50kA FOR 1s, 3-PH CIRCUIT BREAKER WITHOUT RIR	401-52X, 402-52X, 403-52X, 404-52X, 405-52X, 410-52X, 411-52X	10	
	52Y	400V, 2000A, 50kA FOR 1s, 3-PH CIRCUIT BREAKER WITHOUT RIR	409-52Y, 413-52Y, 414-52Y, 415-52Y, 420-52Y, 421-52Y, 423-52Y, 428-52Y, 429-52Y	8	
	52Z	400V, 2000A, 50kA FOR 1s, 3-PH CIRCUIT BREAKER WITHOUT RIR, WITH CONTROLLED SWITCHING FUNCTION	407-52Z, 408-52Z	2	
	88X	400V, 3150A, 50kA FOR 1s, 3-PH HCB ISOLATORS, MOTOR OPERATED WITH 1 E/S	401-88X, 401-88Y, 406-88X, 406-88Y, 408-88X, 408-88Y, 410-88X, 410-88Y, 411-88X, 411-88Y, 415-88X, 415-88Y, 416-88X, 416-88Y, 417-88X, 417-88Y, 418-88X, 418-88Y, 419-88X, 419-88Y, 420-88X, 420-88Y, 421-88X, 421-88Y, 423-88X, 423-88Y, 428-88X, 428-88Y, 429-88X, 429-88Y, 430-88X, 430-88Y, 431-88X, 431-88Y, 432-88X, 432-88Y, 433-88X, 433-88Y, 434-88X, 434-88Y, 435-88X, 435-88Y, 436-88X, 436-88Y, 437-88X, 437-88Y, 438-88X, 438-88Y, 439-88X, 439-88Y, 440-88X, 440-88Y, 441-88X, 441-88Y, 442-88X, 442-88Y, 443-88X, 443-88Y, 444-88X, 444-88Y, 445-88X, 445-88Y, 446-88X, 446-88Y, 447-88X, 447-88Y, 448-88X, 448-88Y, 449-88X, 449-88Y, 450-88X, 450-88Y, 451-88X, 451-88Y, 452-88X, 452-88Y, 453-88X, 453-88Y, 454-88X, 454-88Y, 455-88X, 455-88Y, 456-88X, 456-88Y, 457-88X, 457-88Y, 458-88X, 458-88Y, 459-88X, 459-88Y, 460-88X, 460-88Y, 461-88X, 461-88Y, 462-88X, 462-88Y, 463-88X, 463-88Y, 464-88X, 464-88Y, 465-88X, 465-88Y, 466-88X, 466-88Y, 467-88X, 467-88Y, 468-88X, 468-88Y, 469-88X, 469-88Y, 470-88X, 470-88Y, 471-88X, 471-88Y, 472-88X, 472-88Y, 473-88X, 473-88Y, 474-88X, 474-88Y, 475-88X, 475-88Y, 476-88X, 476-88Y, 477-88X, 477-88Y, 478-88X, 478-88Y, 479-88X, 479-88Y, 480-88X, 480-88Y, 481-88X, 481-88Y, 482-88X, 482-88Y, 483-88X, 483-88Y, 484-88X, 484-88Y, 485-88X, 485-88Y, 486-88X, 486-88Y, 487-88X, 487-88Y, 488-88X, 488-88Y, 489-88X, 489-88Y, 490-88X, 490-88Y, 491-88X, 491-88Y, 492-88X, 492-88Y, 493-88X, 493-88Y, 494-88X, 494-88Y, 495-88X, 495-88Y, 496-88X, 496-88Y, 497-88X, 497-88Y, 498-88X, 498-88Y, 499-88X, 499-88Y, 500-88X, 500-88Y, 501-88X, 501-88Y, 502-88X, 502-88Y, 503-88X, 503-88Y, 504-88X, 504-88Y, 505-88X, 505-88Y, 506-88X, 506-88Y, 507-88X, 507-88Y, 508-88X, 508-88Y, 509-88X, 509-88Y, 510-88X, 510-88Y, 511-88X, 511-88Y, 512-88X, 512-88Y, 513-88X, 513-88Y, 514-88X, 514-88Y, 515-88X, 515-88Y, 516-88X, 516-88Y, 517-88X, 517-88Y, 518-88X, 518-88Y, 519-88X, 519-88Y, 520-88X, 520-88Y, 521-88X, 521-88Y, 522-88X, 522-88Y, 523-88X, 523-88Y, 524-88X, 524-88Y, 525-88X, 525-88Y, 526-88X, 526-88Y, 527-88X, 527-88Y, 528-88X, 528-88Y, 529-88X, 529-88Y, 530-88X, 530-88Y, 531-88X, 531-88Y, 532-88X, 532-88Y, 533-88X, 533-88Y, 534-88X, 534-88Y, 535-88X, 535-88Y, 536-88X, 536-88Y, 537-88X, 537-88Y, 538-88X, 538-88Y, 539-88X, 539-88Y, 540-88X, 540-88Y, 541-88X, 541-88Y, 542-88X, 542-88Y, 543-88X, 543-88Y, 544-88X, 544-88Y, 545-88X, 545-88Y, 546-88X, 546-88Y, 547-88X, 547-88Y, 548-88X, 548-88Y, 549-88X, 549-88Y, 550-88X, 550-88Y, 551-88X, 551-88Y, 552-88X, 552-88Y, 553-88X, 553-88Y, 554-88X, 554-88Y, 555-88X, 555-88Y, 556-88X, 556-88Y, 557-88X, 557-88Y, 558-88X, 558-88Y, 559-88X, 559-88Y, 560-88X, 560-88Y, 561-88X, 561-88Y, 562-88X, 562-88Y, 563-88X, 563-88Y, 564-88X, 564-88Y, 565-88X, 565-88Y, 566-88X, 566-88Y, 567-88X, 567-88Y, 568-88X, 568-88Y, 569-88X, 569-88Y, 570-88X, 570-88Y, 571-88X, 571-88Y, 572-88X, 572-88Y, 573-88X, 573-88Y, 574-88X, 574-88Y, 575-88X, 575-88Y, 576-88X, 576-88Y, 577-88X, 577-88Y, 578-88X, 578-88Y, 579-88X, 579-88Y, 580-88X, 580-88Y, 581-88X, 581-88Y, 582-88X, 582-88Y, 583-88X, 583-88Y, 584-88X, 584-88Y, 585-88X, 585-88Y, 586-88X, 586-88Y, 587-88X, 587-88Y, 588-88X, 588-88Y, 589-88X, 589-88Y, 590-88X, 590-88Y, 591-88X, 591-88Y, 592-88X, 592-88Y, 593-88X, 593-88Y, 594-88X, 594-88Y, 595-88X, 595-88Y, 596-88X, 596-88Y, 597-88X, 597-88Y, 598-88X, 598-88Y, 599-88X, 599-88Y, 600-88X, 600-88Y, 601-88X, 601-88Y, 602-88X, 602-88Y, 603-88X, 603-88Y, 604-88X, 604-88Y, 605-88X, 605-88Y, 606-88X, 606-88Y, 607-88X, 607-88Y, 608-88X, 608-88Y, 609-88X, 609-88Y, 610-88X, 610-88Y, 611-88X, 611-88Y, 612-88X, 612		

CVT PARAMETERS

400 kV CVT

Ratio	400KV/110V/110V/110V √3 √3 √3 √3
Sec-I	Class - 3P, 75VA
Sec-II	Class - 3P, 75VA
Sec-III	Class - 0.2, 75VA
	Capacitance - 4400 pF

400 kV LINE CVT

Ratio	400KV / 110V / 110V / 110V
Sec-I	Class - 3P - 75VA
Sec-II	Class - 3P - 75VA
Sec-III	Class - 0.2 - 75VA
	Capacitance - 8500 pF

1. NOMINAL VOLTAGE - 400kV
2. HIGHEST SYSTEM VOLTAGE - 420kV
3. RATED FREQUENCY - 60 HZ
4. RATED SHORT TIME CURRENT - 50KA FOR 1 SEC
5. POWER FREQUENCY WITHSTAND VOLTAGE - 600kV (rms)
6. LIGHTNING IMPULSE WITHSTAND VOLTAGE - ±1425 kV peak
7. SWITCHING IMPULSE WITHSTAND VOLTAGE - ±1050 kV peak
8. CREEPAGE - 25mm/kV (10500 mm)

1. WAVE TRAPS WOULD BE IN TWO PHASES OF LINES ONLY.

2. PRESENT _____

FUTURE -----

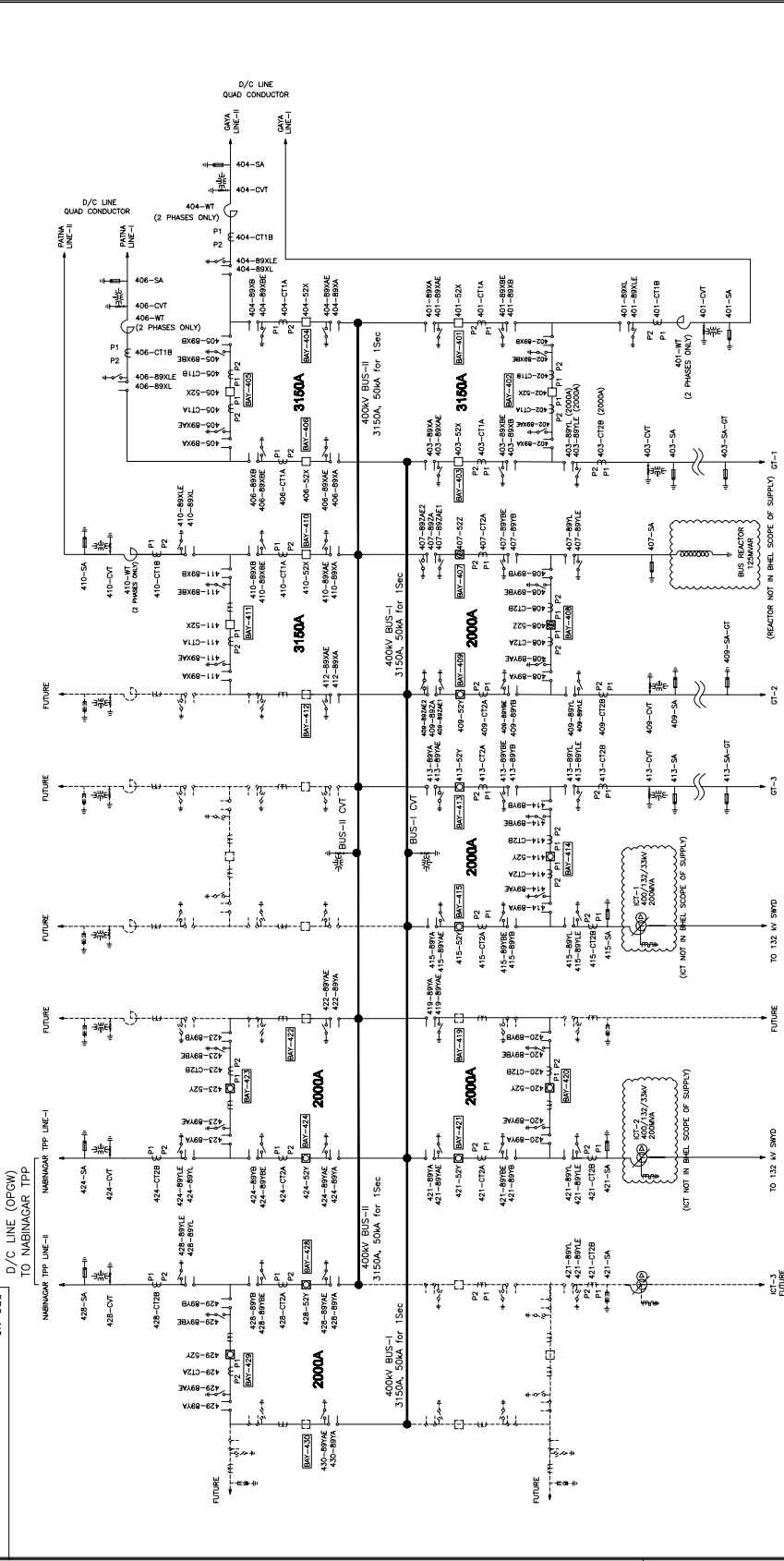
NAME OF CUSTOMER: NABINAGAR POWER GENERATING CO. PVT. LIMITED (NPGC)
NAME OF PROJECT : 400/132 KV SWITCHYARD PACKAGE AT NABINAGAR SUPER THERMAL POWER PROJECT (3 X 660 MW)
NTPC DRAWING NO. 0370-572-PVE-P-422

REV. DATE 02 24.09.13 MM/RD MM/WK/DKM RS ALTD. 24.09.13 MM/RD MM/WK/DKM MM/WK/DKM RS CHD. MM/WK/DKM MM/WK/DKM MM/WK/DKM RS APPD. RS												REV. DATE 01 09.09.13 MM MM/WK/DKM RS ALTD. MM MM/WK/DKM MM/WK/DKM RS CHD. MM/WK/DKM MM/WK/DKM MM/WK/DKM RS APPD. RS												NAME RK DRAWN CHECKED APPROVED												SIGN. DATE 31.07.13 DISTRIBUTION OF PRINTS												DEPT. CODE												TBEM 422 SCALE NTS W.O. No. 81004 DRG. No. TB-3-350-510-100-01												BHARAT HEAVY ELECTRICALS LIMITED TRANSMISSION BUSINESS GROUP 400KV NABINAGAR (STPP) – SINGLE LINE DIAGRAM												CARD CODE NEXT SHEET SHEET No. 01												REV03											
REV. DATE 02 24.09.13 MM/RD MM/WK/DKM RS ALTD. 24.09.13 MM/RD MM/WK/DKM MM/WK/DKM RS CHD. MM/RD MM/WK/DKM MM/WK/DKM RS APPD. RS												REV. DATE 01 09.09.13 MM MM/WK/DKM RS ALTD. MM MM/WK/DKM MM/WK/DKM RS CHD. MM/WK/DKM MM/WK/DKM MM/WK/DKM RS APPD. RS												NAME RK DRAWN CHECKED APPROVED												SIGN. DATE 31.07.13 DISTRIBUTION OF PRINTS												DEPT. CODE												TBEM 422 SCALE NTS W.O. No. 81004 DRG. No. TB-3-350-510-100-01												BHARAT HEAVY ELECTRICALS LIMITED TRANSMISSION BUSINESS GROUP 400KV NABINAGAR (STPP) – SINGLE LINE DIAGRAM												CARD CODE NEXT SHEET SHEET No. 01												REV03											

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DRG. NO. TB-3-350-510-100-01					
7	9	5	4	3	2
					1

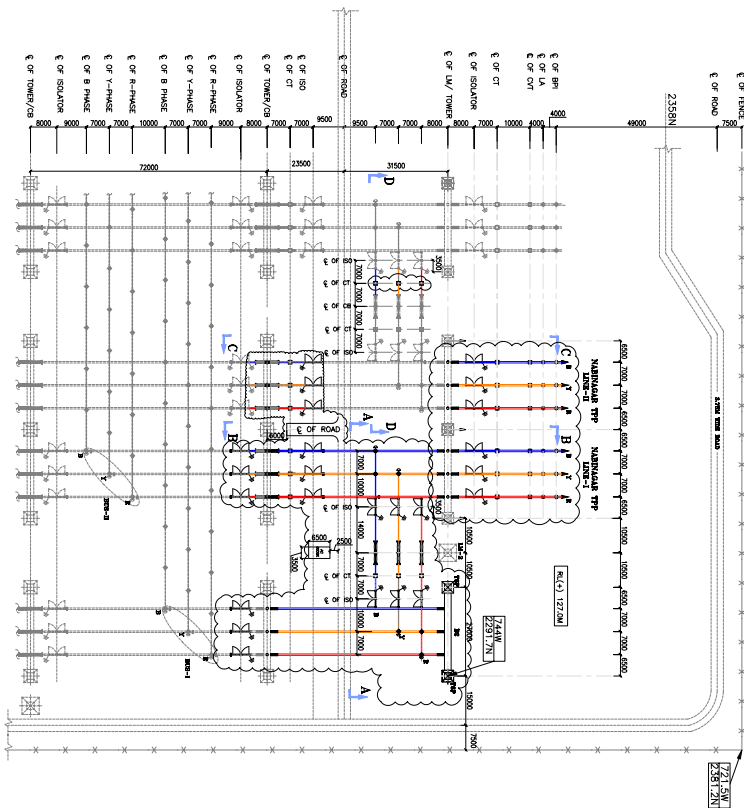


REV.	DATE	ALTD.	CHD.	APPD.
03	02.04.14	MM/RD	MM/VK/DQM	RS

REF. DWG.

CVI & WI RAILING FINALISED		(TB-350-510-100-02)
	NTPC DRG NO	0370-998-PDF-J-I-001

भारत हेवी इलेक्ट्रिकल्स लिमिटेड TRANSMISSION BUSINESS GROUP भारत हेवी इलेक्ट्रिकल्स लिमिटेड TRANSMISSION BUSINESS GROUP										CARD CODE	
400KV NABINAGAR (STPP) – SINGLE LINE DIAGRAM 400KV NABINAGAR (STPP) – SINGLE LINE DIAGRAM										NEXT SHEET	
										SHEET No.	
										02	
										REV03	



LEGEND : 400 kV EQUIPMENTS

SYMBOL	EQUIPMENT
	400V, 2000A, 50KA FOR 1s, 3-PH CIRCUIT BREAKER WITHOUT PIR
	400V, 2000A, 50KA FOR 1s, 3-PH HCB ISOLATORS,
	400V, 2000A, 50KA FOR 1 SEC, 5 CORE, 1 PHASE CURRENT TRANSFORMER WITH 120K EXTENDED CURRENT RATING
	400V, 4400V, 1 PHASE, CAPACITOR VOLTAGE TRANSFORMER
	390 kV, 10 kA, 1 PHASE, SURGE ARRESTER
	400 kV, 6kV, 1 PHASE, SOLID CORE BUS POST INSULATOR

LEGEND

	TOWER WITH PEAK
	TOWER WITHOUT PEAK
	SUSPENSION INSULATOR STRING (25 DISCS / TENSION INSULATOR STRING)
	DOUBLE TENSION INSULATOR STRING (25 DISCS / TENSION INSULATOR STRING)
	4 INCH IPS AL TUBE
	ACSR MOOSE CONDUCTOR
	END CAP/CORONA BELL FOR BUSBAR
	SHIELD WIRE (10.99mm)

SYSTEM PARAMETERS

S/N	DESCRIPTION OF PARAMETER	400V SYSTEM
1	SYSTEM OPERATING VOLTAGE	400V
2	MAX. OPERATING VOLTAGE OF THE SYSTEM (rms)	424V
3	RATED FREQUENCY	50Hz
4	N.O. OF PHASES	3
5	RATED INSULATION LEVELS	
5	i) FULL WAVE IMPULSE WITHSTAND VOLTAGE (1.2/50microsec)	±1425kV
5	ii) SWITCHING IMPULSE WITHSTAND VOLTAGE (250/250microsec) DRY & WET	±1050kV
6	ONE MINUTE POWER FREQUENCY OVERVOLTAGE (rms)	630kV (rms)
6	CORONA EXTINCTION VOLTAGE (kV)	320kV
7	MAX. RADIO INTERFERENCE VOLTAGE FOR FREQUENCY BETWEEN 0.5MHz & 2MHz AT 250V rms	1000 microV
8	MIN. CREEPAGE DISTANCE	220MM/kV (10500 mm)
9	MIN. CLEARANCE	
9	i) PHASE TO PHASE	4000MM
9	ii) PHASE TO EARTH	3500MM
10	RATED SHORT CIRCUIT CURRENT FOR 1SEC DURATION	6500MM
11	SYSTEM NEUTRAL EARTHING	50kA EFFECTIVELY EARTHED
12	SUB CONDUCTOR SPACING	450MM
13	CONDUCTOR STATIC TENSION	4T/PHASE
14	MAIN BUS 1 & 2	4" AL TUBE
14	JACK BUS	7MM ACSR MOOSE
14	EQUIPMENT INTER CONNECTION	4" AL TUBE/7MM ACSR MOOSE
15	MAIN BUS & EQUIPMENT CONNECTION LEVEL (FROM PLINTH)	800MM

LEGENDS:-

PRESENT SCOPE
NOT IN BRHL SCOPE

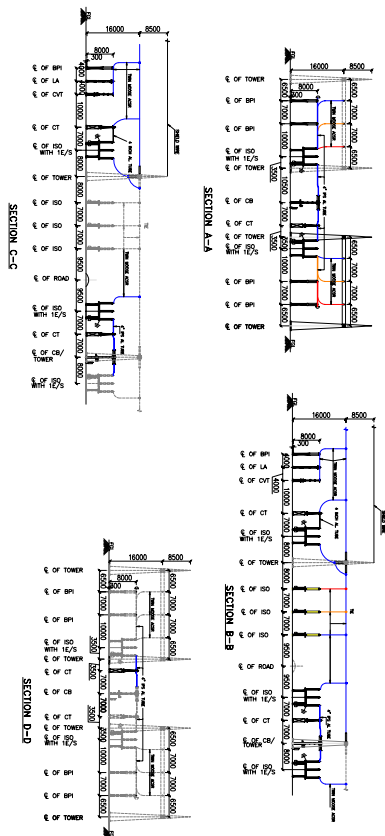
NOTES:

- ALL DIMENSIONS ARE IN MM. UNLESS NOTIFIED OTHERWISE.
- ALL STRUCTURE/CONDUCTOR HEIGHTS ARE ABOVE PLINTH LEVEL, PLINTH LEVEL IS 500 MM ABOVE G.L. (GROUND LEVEL).
- TYPE OF GANTRY STRUCTURES SHALL BE AS PER APPROVED STRUCTURAL LAYOUT DRAWING.
- KEPT NEAR SURGE ARRESTER AND SAME SHALL BE ENSURED BY BRHL DURING ERECTION AT SITE.
- THIS DRG. SHALL BE READ IN CONJUNCTION WITH STD AND TECHNICAL SPEC.
- FLG. CORRESPONDS TO RL(+127.00M).

THIS DRAWING IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANYWAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

REF. DWG

NING TENDER DRG. NO. 0370-572-PGE-A-011 REV. 0
SINGLE LINE DIAGRAM 0370-572-PGE-T-423
NABINAGAR TPP LAYOUT PLAN & SECTION 0270-572-PGE-F-302



SECTION C-C

SECTION D-D

REVISION	DATE	BY	CHKD	REMARKS
01	05.08.13	05.08.13	05.08.13	05.08.13

REVISION	DATE	BY	CHKD	REMARKS
02	07.01.14	07.01.14	07.01.14	07.01.14

REVISION	DATE	BY	CHKD	REMARKS
03	05.08.13	05.08.13	05.08.13	05.08.13

REVISION	DATE	BY	CHKD	REMARKS
04	05.08.13	05.08.13	05.08.13	05.08.13

REVISION	DATE	BY	CHKD	REMARKS
01	05.08.13	05.08.13	05.08.13	05.08.13

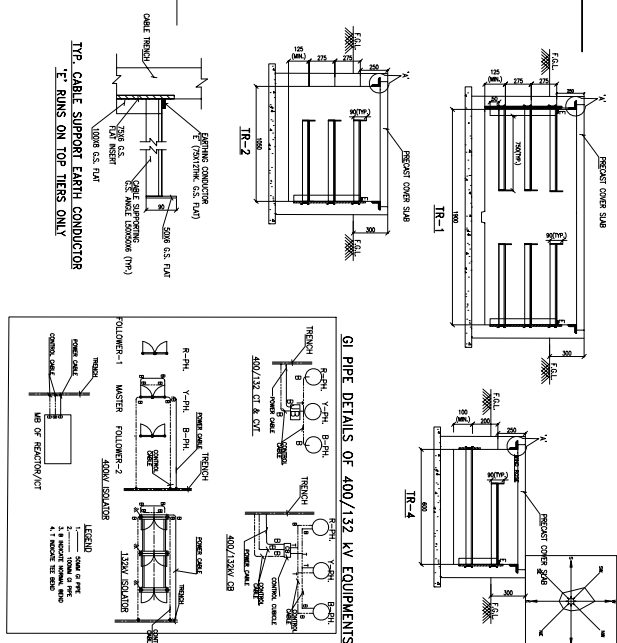
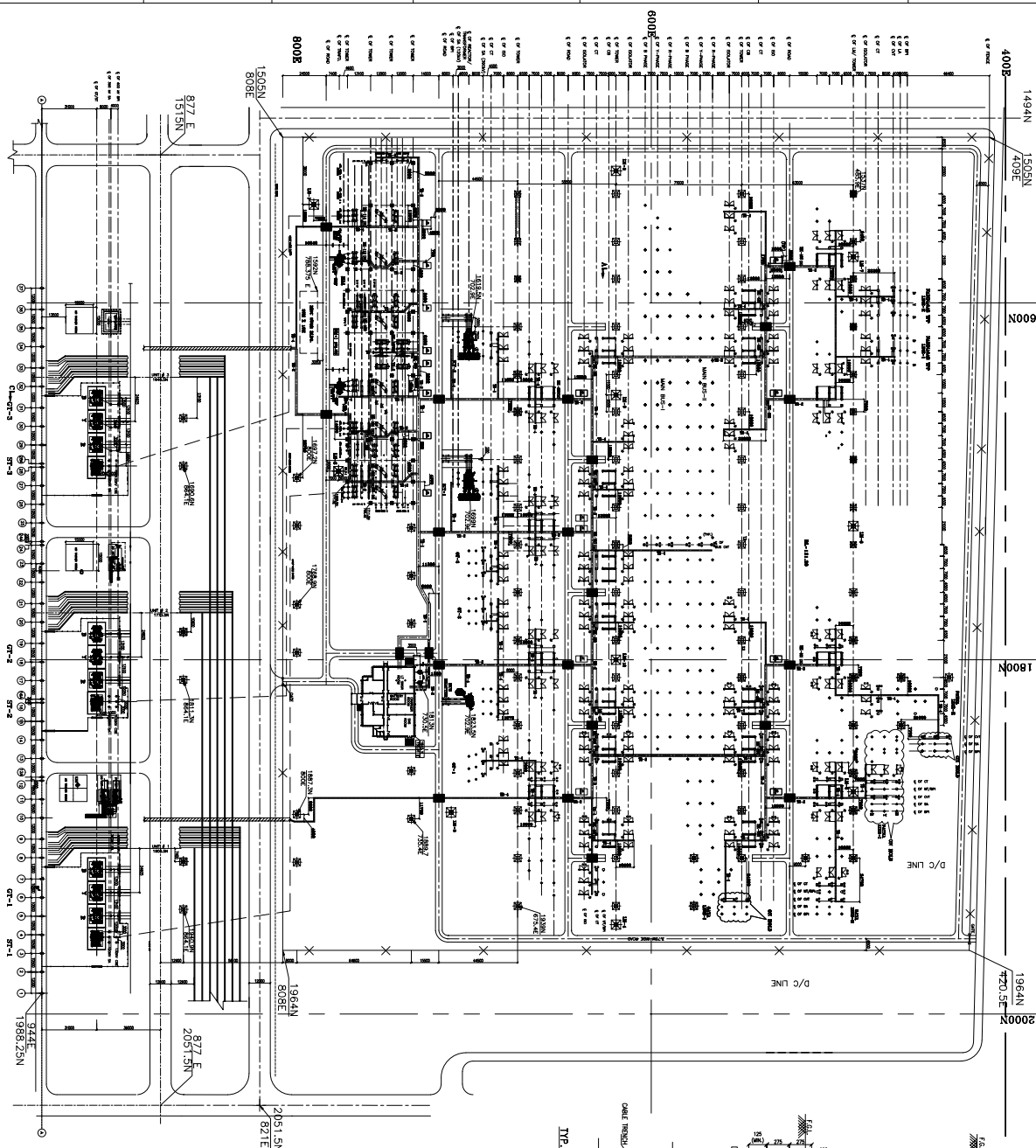
REVISION	DATE	BY	CHKD	REMARKS
02	07.01.14	07.01.14	07.01.14	07.01.14

REVISION	DATE	BY	CHKD	REMARKS
03	05.08.13	05.08.13	05.08.13	05.08.13

REVISION	DATE	BY	CHKD	REMARKS
04	05.08.13	05.08.13	05.08.13	05.08.13

COPY RIGHT AND CONFIDENTIAL

INVENTORY No.	SIGN. & DATE	REF. DRG. No.
---------------	--------------	---------------



- NOTES :-

TYP. CABLE SUPPORT EARTH CONDUCTOR
'E' RUNS ON TOP TIERS ONLY

- [illegible]

REFERENCE DRG. :-

0370-572-P-E-P-42-42- 400V MARIQUA STR- LAYOUT PLAN & SECTION
0370-572-P-E-P-42-8 132V MARIQUA STR- LAYOUT PLAN & SECTION
0370-572-P-E-P-42-2 400V MARIQUA (STRP) - SINGLE LINE DIAGRAM
0370-572-P-E-P-42-3 132V MARIQUA (STRP) - SINGLE LINE DIAGRAM
0370-999-P-M-F-011- PVP/CAKE TRUSTLE IN TRANSFORMER YARD & PERPENDICULAR TO A-MO

ADDITIONAL INFORMATION W.O.N. 81004	श्रीगंगा पावर गेनरेटिंग को. प्रा. लि. (प्रा.) NABINAGAR POWER GENERATING CO. PVT. LTD. (PREG.)	प्रतिपत्र 400/132KV SWITCHYARD PACKAGE AT NABINAGAR STPP (3X600MW)	नाम NAME	संज्ञा SIGN	दिनांक DATE
STATUS OF DRAWING	श्रीगंगा पावर गेनरेटिंग को. प्रा. लि. (प्रा.) NABINAGAR POWER GENERATING CO. PVT. LTD. (PREG.)				
DISTRIBUTION OF PRINTS	श्रीगंगा पावर गेनरेटिंग को. प्रा. लि. (प्रा.) NABINAGAR POWER GENERATING CO. PVT. LTD. (PREG.)				

DRINK	RK	-SD-	03.08.1
DECIDED	MM/DCM	-SD-	03.08.1
APPROVED	RS	-SD-	03.08.1

REV.	DATE	APPROVED	DATE	SCALE	CARD CODE	DRAWING NO.	REV.
		DRAWN		1 : 850			
		CHECKED					
		APPROVED					
ZONE	TITLE						

4	3	2	1	TB-0-350-316-018 400KV NABINAGAR STPP- CABLE TRENCH LAYOUT		00
				SHEET NO. 01	NEXT SHEET	--

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COMPUTER DRG. PATH NAME :

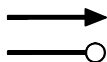
REF. DRG. NO. TB-4-359-316-161

SIGN & DATE

INVENTORY NO.

REV.	DATE	ALTERED RJ	REV.	DATE	ALTERED RJ	REV.	DATE	ALTERED
		CHECKED MS/DKM			CHECKED MS/DKM	00		CHECKED
		APPD RS			APPD RS			APPD
						JOB No. 81004		

LEGEND



CONNECTION TO GROUND MAT THROUGH RISER.

CONNECTION TO ROD ELECTRODE WITH TREATED PIT.

GENERAL NOTES:

- 1 EARTH STRIP CLEATED TO LATTICE /PIPE TYPE STRUCTURE AT AN INTERVAL OF 1.0M SUITABLE PROVISION SHALL BE MADE WITH SUPPORT STRUCTURE.
- 2 ALL EARTH STRIPS SHALL BE TAKEN ALONG EDGE OF STRUCTURE. DRAWING SHOWS TYPICAL ARRANGEMENT ONLY.
- 3 ALL STRUCTURES/EQUIPMENTS SHALL BE EARTHED AS SHOWN IN THE FOLLOWING SHEETS.
- 4 BOLT SIZE FOR CONNECTING EARTHING FLAT TO THE EQPT/STRUCTURE SHALL BE TO SUIT RESPECTIVE HOLE SIZE.
5. ALL EARTHING SHALL BE DONE IN ACCORDANCE WITH IS:3043 UNLESS OTHERWISE STATED IN TECHNICAL SPECIFICATION
- 6 ~~TWO EARTHING STRIPS CAN BE CONNECTED TO ONE RISER.~~
- 7 EACH RISER OF A PARTICULAR EQUIPMENT SHALL BE CONNECTED TO A DIFFERENT EARTHROD (EITHER HORIZONTAL OR VERTICAL CONDUCTORS OF MAIN EARTHMAT).
- 8 FOR WELDING DETAILS REFER SHEET #20 & 21
- 9 E/WIRE DOWN CONDUCTOR SHALL BE CLEATED AT AN INTERVAL OF 2.0 M ALONG WITH STRUCTURE.

SL.NO.	ITEM	NABINAGAR STPP	NABINAGAR TPP(EXTN)	TOTAL
01.	75X12 GI FLAT	86.9 MT	9.54 MT	96.44 MT
02.	50X6 GI FLAT	7.32 MT	0.6 MT	7.92 MT

Quantity shall be as per actual requirements

SHEET NO. DESCRIPTION

01. TITLE
- 1A. NOTES
02. 400kV & 132kV SF6 CIRCUIT BREAKER
03. 400kV & 132 kV CVT
04. 400kV, 132kV & 33kV POST INSULATOR (SOLID CORE TYPE)
05. LIGHTNING ARRESTER (390kV, 120kV & 30 kV)
06. MARSHALLING KIOSK
- 7A. 400kV HORIZONTAL CENTER BREAK ISOLATOR (TYPICAL) WITH ONE EARTH SWITCH
- 7B. 132kV HORIZONTAL CENTER BREAK ISOLATOR WITH ONE EARTH SWITCH
- 7C. 132kV HORIZONTAL CENTER BREAK ISOLATOR WITH TWO EARTH SWITCH
- 7D. 33kV HORIZONTAL CENTER BREAK ISOLATOR WITHOUT EARTH SWITCH
- 7E. 33kV HORIZONTAL CENTER BREAK ISOLATOR WITH ONE EARTH SWITCH
- 7F. 132kV HORIZONTAL CENTER BREAK ISOLATOR WITHOUT EARTH SWITCH
08. TOWER WITH PEAK
- 8A. TOWER WITHOUT PEAK
- 8B. LIGHTNING MAST
09. 400kV & 132kV CURRENT TRANSFORMER
10. CABLE TRENCH
11. PIPE EARTH ELECTRODE WITH TREATED PIT
12. ROD EARTH ELECTRODE WITHOUT TEST PIT
- 12A. ROD EARTH ELECTRODE WITH TEST PIT

SHEET NO. DESCRIPTION

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

NTPC DRAWING NO. 0370-572-PVE-F-442				
CUSTOMER NABINAGAR POWER GENERATING CO. PVT. LTD. (NPGC)				
PROJECT : NABINAGR STPP (3X660 MW) 400/132kV SWITCHYARD PACKAGE				
	BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION NEW DELHI		DEPT CODE	NAME
			DRN	RK
			CHD	SK
		APPD	DKM/RS	
TITLE Equipment Earthing Philosophy & Details				
		DEPT.	SCALE	DRAWING NO.
		SIGN		TB-4-350-316-017
		DATE		SHEET 01 OF 22 REV. 00

1. RISER FROM THE EARTH GRID SHALL BE 40MM DIAMETER MILD STEEL ROD. RISER SHALL RISE FROM THE GROUND ALONG THE NEAREST EQUIPMENT FOUNDATION/BUILDING COLUMN/WALL TO AVOID ANY OBSTRUCTION TO MOVEMENT OF PERSONNEL.
 2. CONNECTION TO ALL EQUIPMENT AND TOWERS SHALL BE BY BOLTED JOINTS. CONTACT SURFACES SHALL BE THOROUGHLY CLEANED BEFORE CONNECTIONS. EQUIPMENT BOLTED CONNECTIONS AFTER BEING TESTED AND CHECKED SHALL BE PAINTED WITH ANTI CORROSIVE PAINT/COMPOUND.
 3. CONNECTIONS BETWEEN EQUIPMENT EARTHING LEADS AND BETWEEN MAIN EARTHING CONDUCTORS SHALL BE OF WELDED TYPE. FOR RUST PROTECTION THE WELDS SHOULD BE TREATED WITH RED LEAD COMPOUND AND AFTERWARDS THICKLY COATED WITH BITUMEN COMPOUND.
THE SURFACES TO BE WELDED SHALL BE CLEANED OF DIRT, OIL, GREASE AND OXIDES BEFORE WELDING. ANY OXIDE FILMS THAT MAY HAVE FORMED DURING WELDING MUST BE REMOVED FROM THE WELDED JOINT.
 4. EARTHING CONDUCTOR FOR EQUIPMENT SHALL BE OF GALVANISED M.S. OF SIZE 75x12 mm.
THE CONDUCTOR BELOW THE GROUND LEVEL SHALL BE 40 mm DIA **BLACK** MS ROD.
 5. IN THE ATTACHED DRAWINGS GL REPRESENTS GROUND LEVEL.
 6. ALL THE EQUIPMENTS SHALL BE EARTHED AT TWO POINTS WITH 75x12 mm. G.S. FLAT EVEN THOUGH THEY ARE SHOWN OR NOT IN THE DRAWING DUE TO CLARITY.
 7. ALL JUNCTION BOXES, OPERATING MECHANISAM BOXES, **GROUND MOUNTED** CONTROL CABINETS SHALL BE EARTHED AT TWO POINTS WITH 50x6mm G.S. FLAT BY TWO SEPARATE AND DISTINCT EARTH CONNECTERS.
- However ground mounted boxes shall be earthed at two points with 75x12 mm GS flat at two separate and distinct earthing rod of grid.**
8. EARTHING CONDUCTORS FROM EQUIPMENT STRUCTURES SHALL BE CONNECTED TO THE NEAREST POSSIBLE EARTH MAT RISER. EQUIPMENT EARTHING SHALL BE AS PER IS 3043.
 9. ALL JOINTS BETWEEN 40 DIA M.S. ROD AND 75x12 mm. G.S. FLAT SHALL BE BELOW GRAVEL LEVEL.
 10. FOR WELDED JOINTS LOW HYDROGEN CONTENT ELECTRODES SHALL BE USED.
 11. METTALIC SHEATHS/SCREENS, AND ARMOUR OF MULTI CORE CABLES SHALL BE EARTHED AT BOTH ENDS.
METTALIC SHEATHS AND ARMOUR OF SINGLE CORE CABLES SHALL BE EARTHED **AT SWITCHGEAR END ONLY**
UNLESS OTHERWISE INSTRUCTED BY THE EMPLOYER **AS PER STANDARDS**
 12. EQUIPMENT BOLTED CONNECTIONS AFTER BEING TESTED AND CHECKED SHALL BE PAINTED WITH ANTI CORROSIVE PAINT/COMPOUND.
 13. LOCATION OF EARTHING CONDUCTORS/RISERS SHOWN IN THE EARTHING DRAWING MAY CHANGE TO SUIT THE SITE CONDITION.
 14. FOR SURGE ARRESTER, EARTHING LEAD FROM SURGE COUNTER TO MAIN EARTHMAT SHALL BE SHORTEST IN LENGTH AS PRACTICALLY AS POSSIBLE.
 15. AN ADDITIONAL AUXILIARY GRID OF 1500MMX1500MM COMPRISING OF CLOSELY SPACED(300MMX300MM) 40 DIA CONDUCTORS AT A DEPTH OF 300MM FROM FINISHED GROUND LEVEL SHALL BE PROVIDED BELOW THE OPERATING HANDLE OF ISOLATORS AND EARTH SWITCHES. THIS GRID SHALL BE CONNECTED TO THE MAIN GROUND GRID. THE EARTH CONNECTION TO OPERATING HANDLE SHALL BE MADE OF FLEXIBLE CONNECTION. THE MOM BOX OF THE ISOLATOR TO BE CONNECTED TO THIS AUX. GRID.
 16. ALL NON CURRENT CARRYING METALIC PARTS SHALL BE EARTHED AT TWO DIFFERENT PLACES.
 17. ALL EQUIPMENT DRAWINGS SHOWN ARE INDICATIVE ONLY.
 18. WELDING OF EARTHING CONDUCTOR **SHALL BE CONNECTED IN VERTICAL PLANE WHEREVER POSSIBLE.**
 19. **MS ROD SHALL BE AS PER GRADE-A DESIGNATION Fe410WA OF IS 2062-2011 OR GREADE SAE 1018 AS PER ASTM A 576-90B.**

Rod shall be spec requirements/ appro

Pl refer Annexure-I of Chapter-E13 of tech spec for earthing requirements.

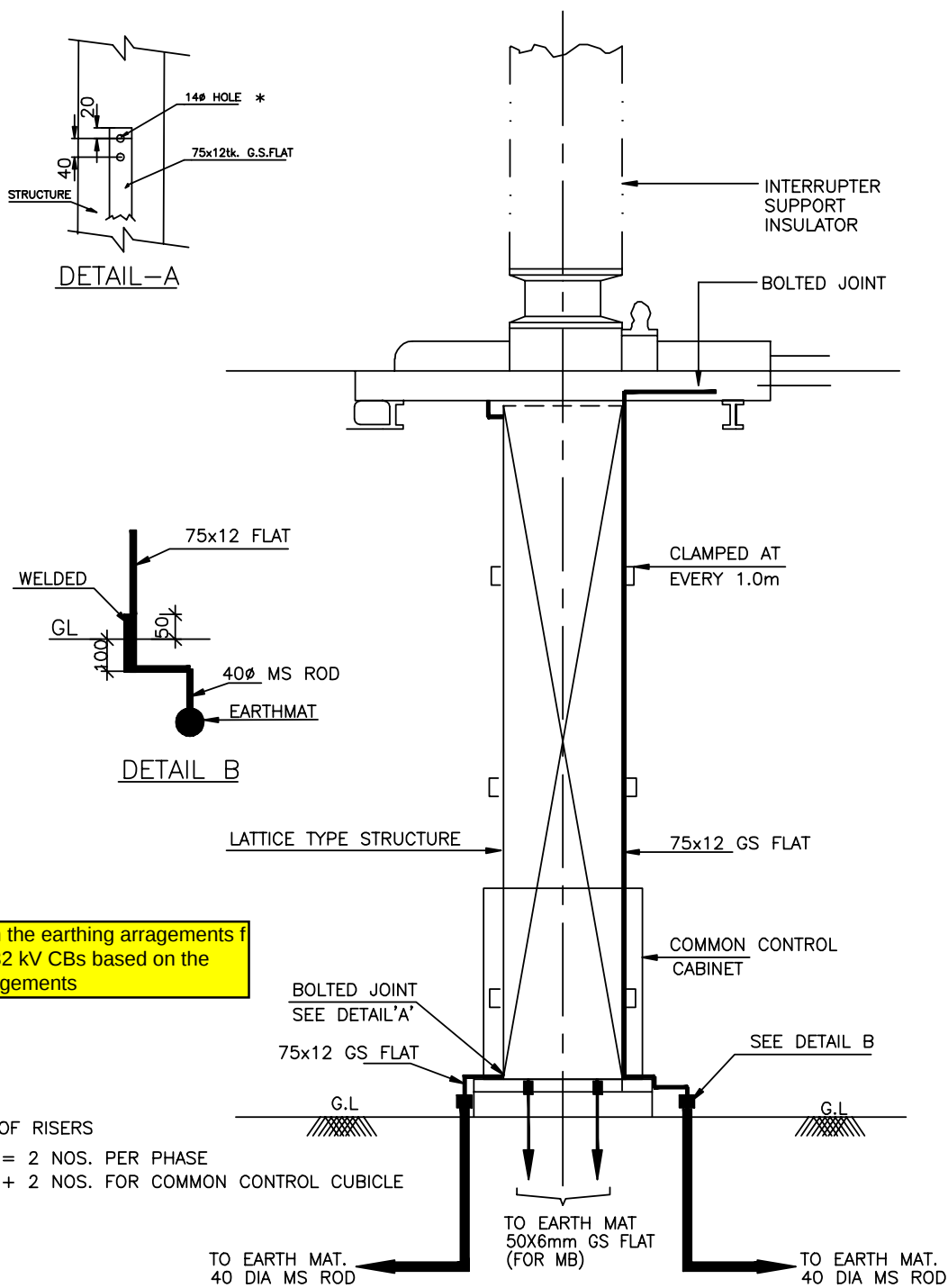


EQUIPMENT EARTHING DETAILS NOTES

DRG. No.

TB-4-350-316-017

SHEET No.
1A



Please furnish the earthing arrangements for 400kV & 132 kV CBs based on the general arrangements

NOTE:

1) * BOLT SIZE AND HOLE SIZE SHALL BE TO SUIT RESPECTIVE EQPT./STRUCTURE.



EQUIPMENT EARTHING DETAILS

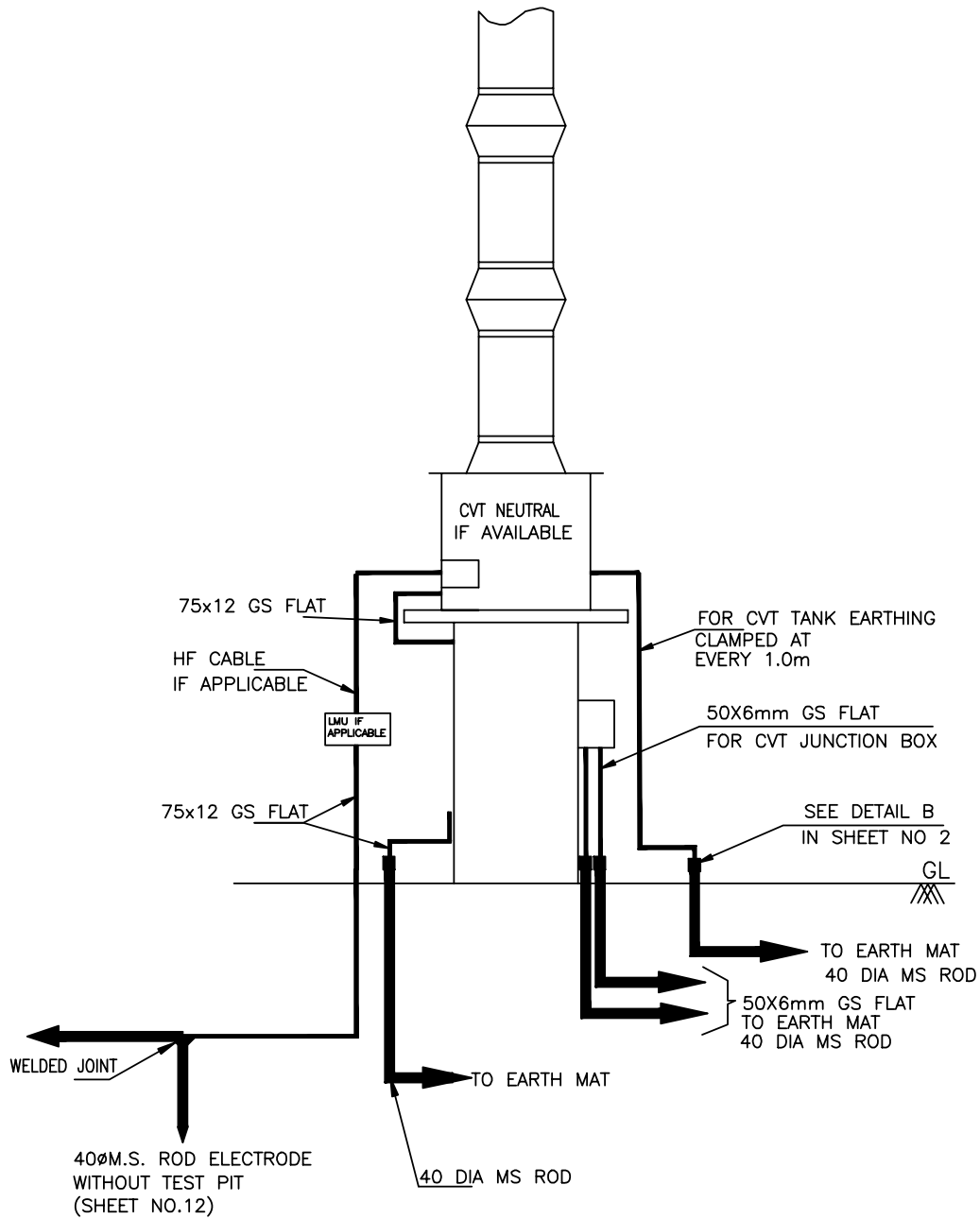
400kV & 132kV SF6 CIRCUIT BREAKER

COMPUTER REF. NO.

DRG. No.

TB-4-350-316-017

SHEET No.
2



NOS.OF RISERS

= 2 NOS. PER PHASE

+ 2 NOS. FOR CVT JUNCTION BOX

ROD ELECTRODE = 1 NO. PER CVT IF NEUTRAL IS CONNECTED TO GROUND VIA LMU



EQUIPMENT EARTHING DETAILS

400kV & 132kV CVT

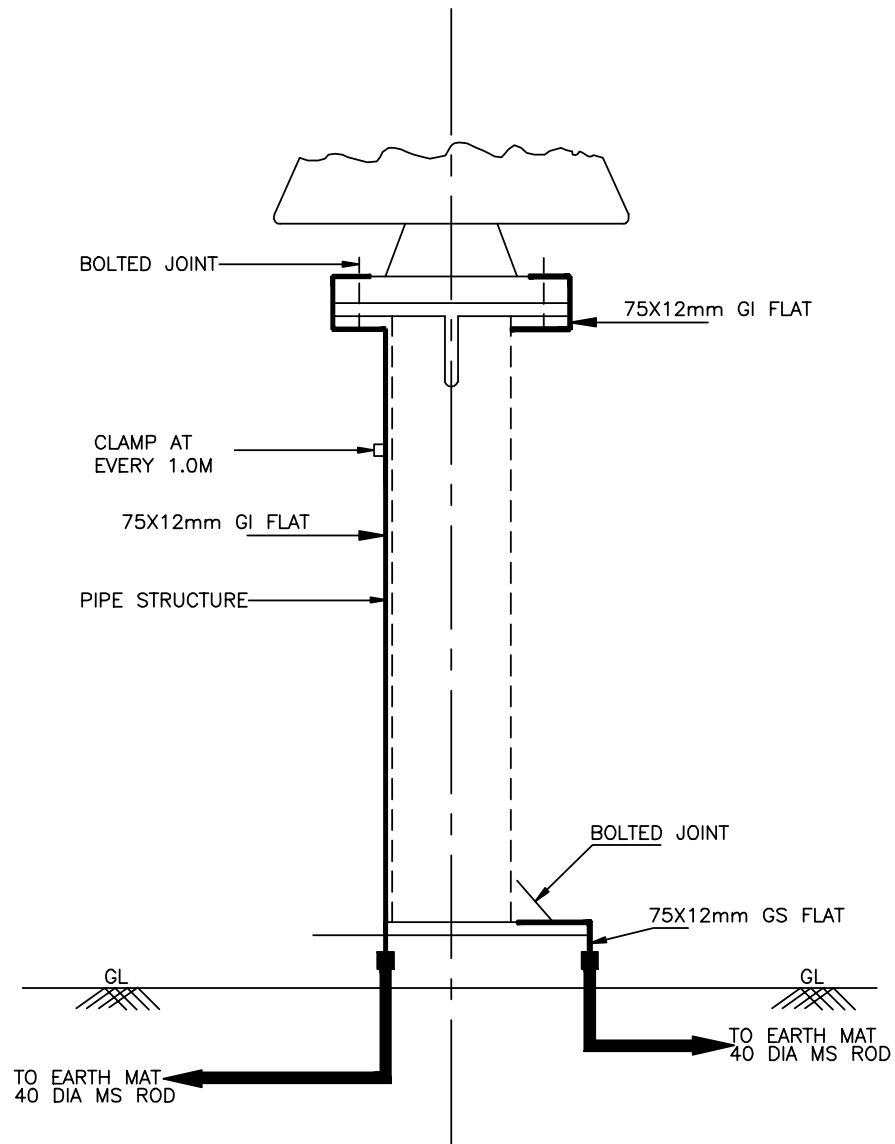
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DRG. No.

TB-4-350-316-017

SHEET No.

3



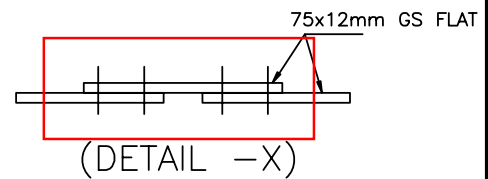
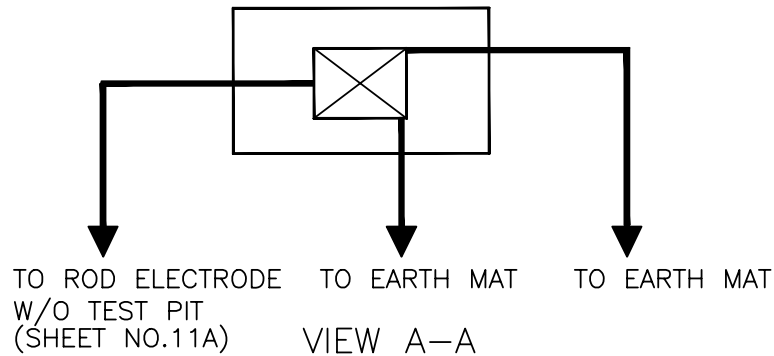
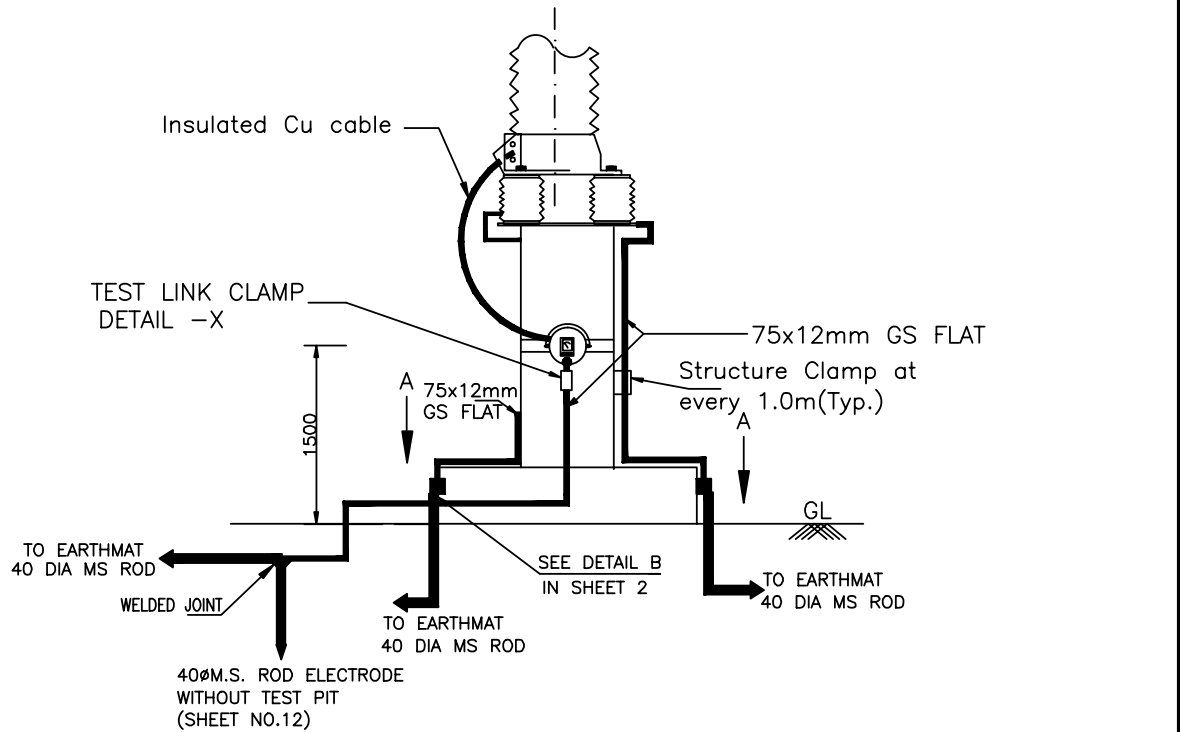
NOS.OF RISERS = 2 NOS.



EQUIPMENT EARTHING DETAILS 400kV, 132kV & 33kV POST INSULATOR (SOLID CORE TYPE)

DRG. No. TB-4-350-316-017

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 = 2 NOS. PER PHASE.
3. TEST LINK SHALL HAVE PROVISION TO BOLT TEST LEAD BEFORE ISOLATING THE
MAIN EARTHING CONNECTIONS (AS PER SKETCH ABOVE) = 1NO.

Please furnish the dimensions and details of not & Bolts



EQUIPMENT EARTHING DETAILS

LIGHTNING ARRESTER (390kV, 120kV & 30 kV)

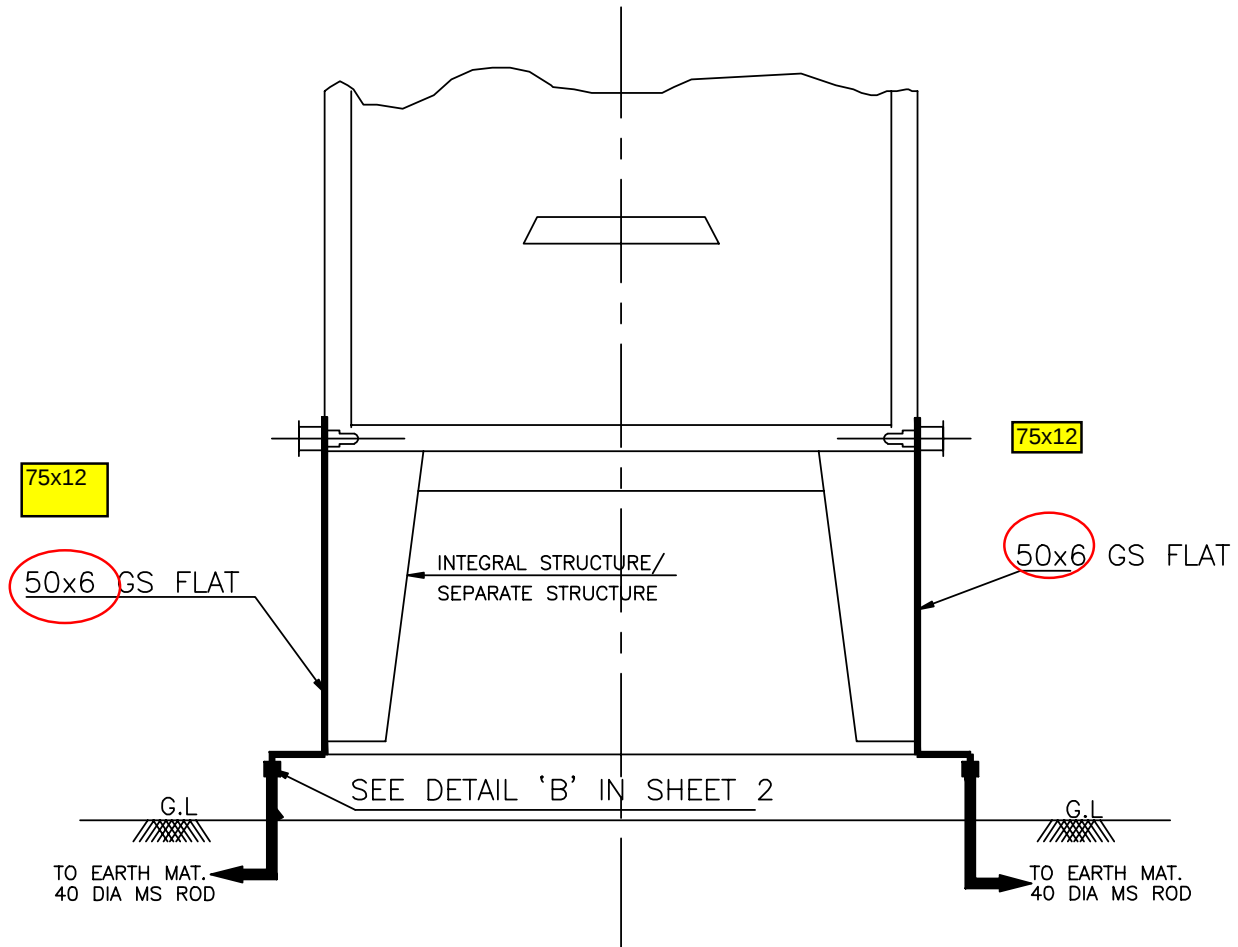
COMPU. DRG. REF.

DRG.NO.

TB-4-350-316-017

SHEET No.

5



NOS.OF RISERS = 2 NOS.



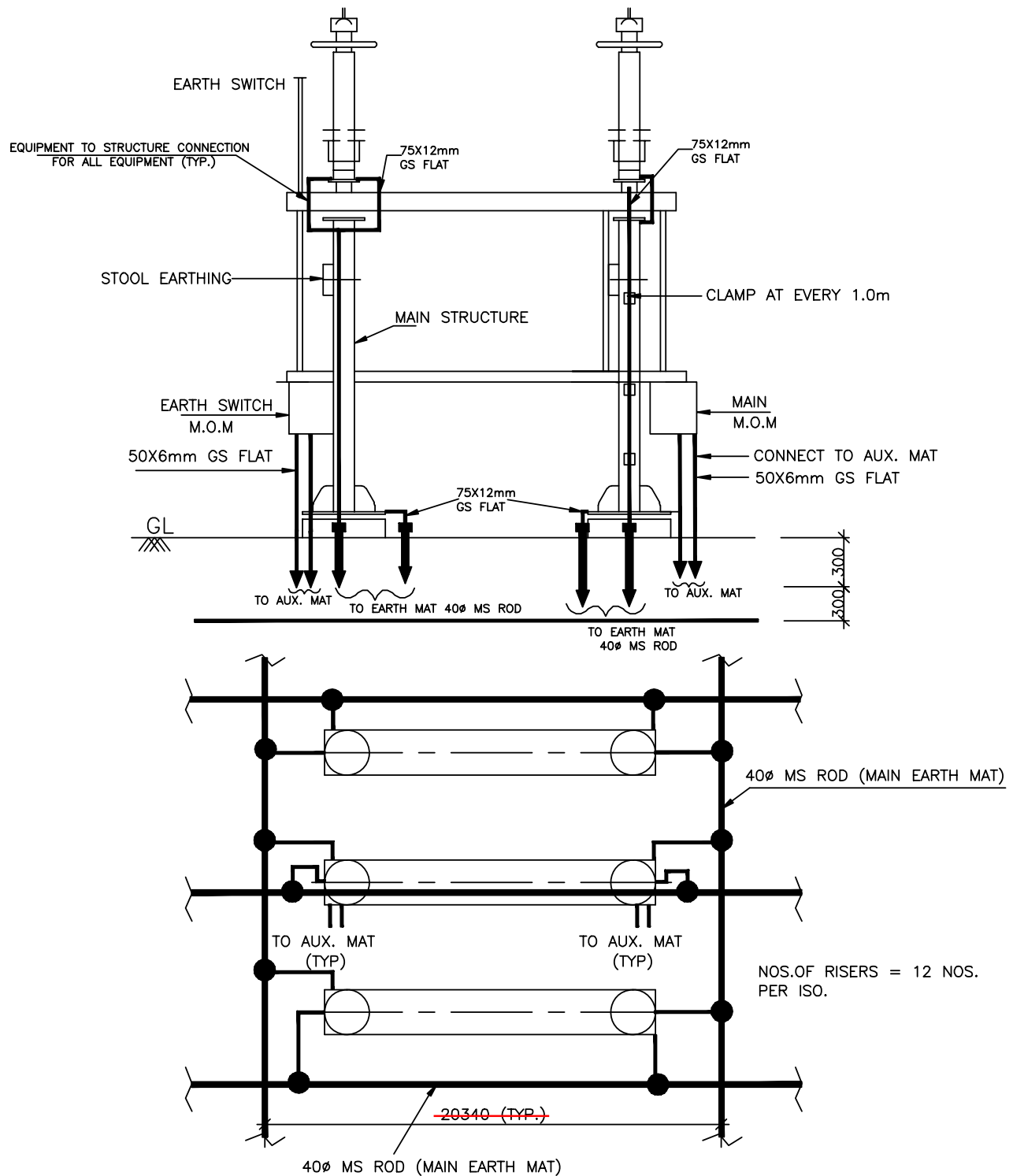
EQUIPMENT EARTHING DETAILS MARSHALLING KIOSK

COMPUTERREF.NO.

DRG. No.

TB-4-350-316-017

SHEET No.
6



NOTES

- AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 15)

● RISER

M/s BHEL to ensure the Isolator arrangement drawing



EQUIPMENT EARTHING DETAILS

400KV HORIZONTAL CENTER BREAK ISOLATOR (TYPICAL) WITH ONE EARTHSWITCH

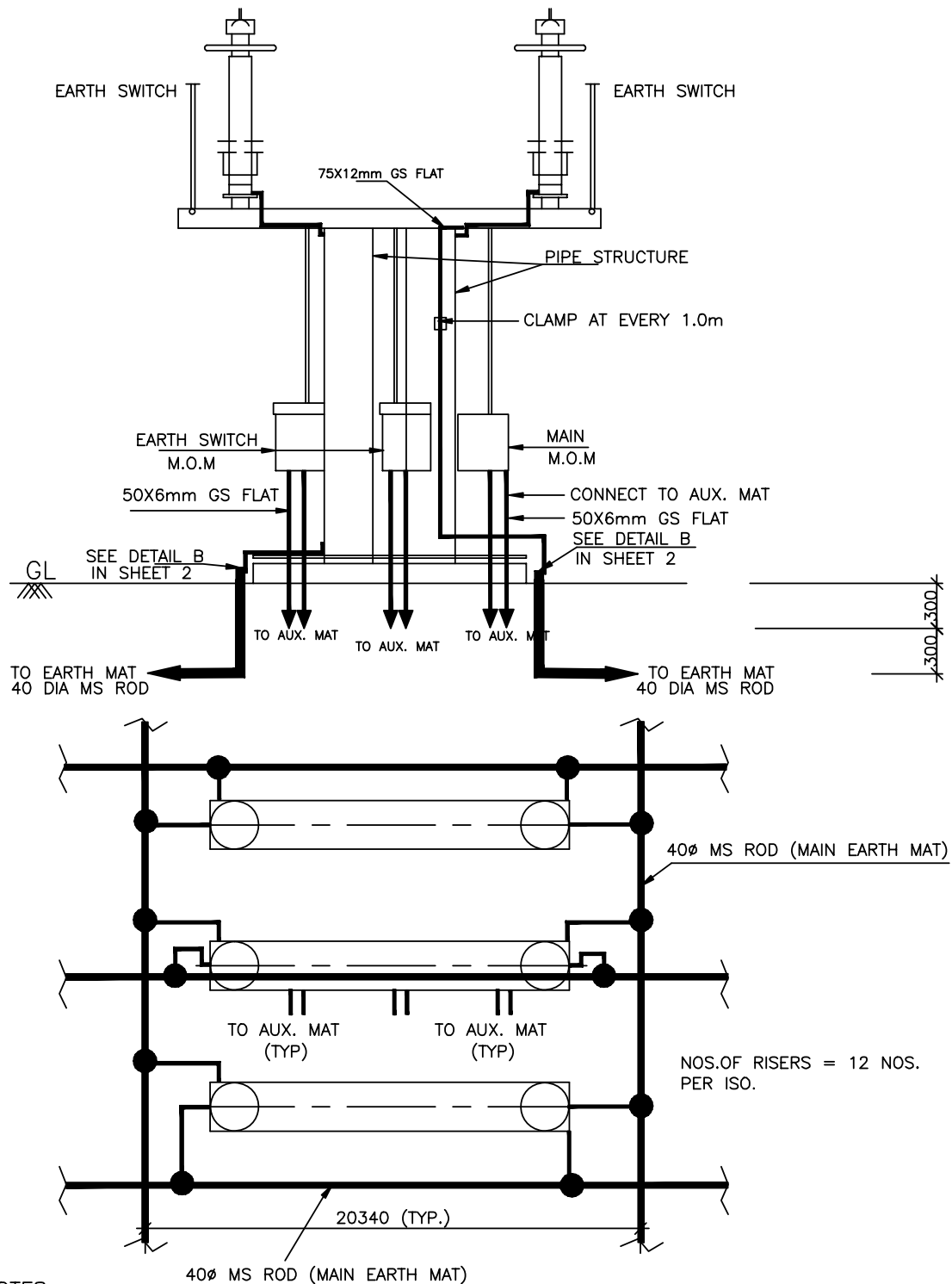
COMPUTERREF.NO.

DRG. No.

TB-4-350-316-017

REV. 00

SHEET No.
7A



NOTES

- AUXILIARY EARTH MAT SHALL BE PROVIDED NEAR EVERY MOM BOX (REFER SHEET 15)
- RISER

M/s BHEL to ensure the Isolator arrangement drawing



EQUIPMENT EARTHING DETAILS

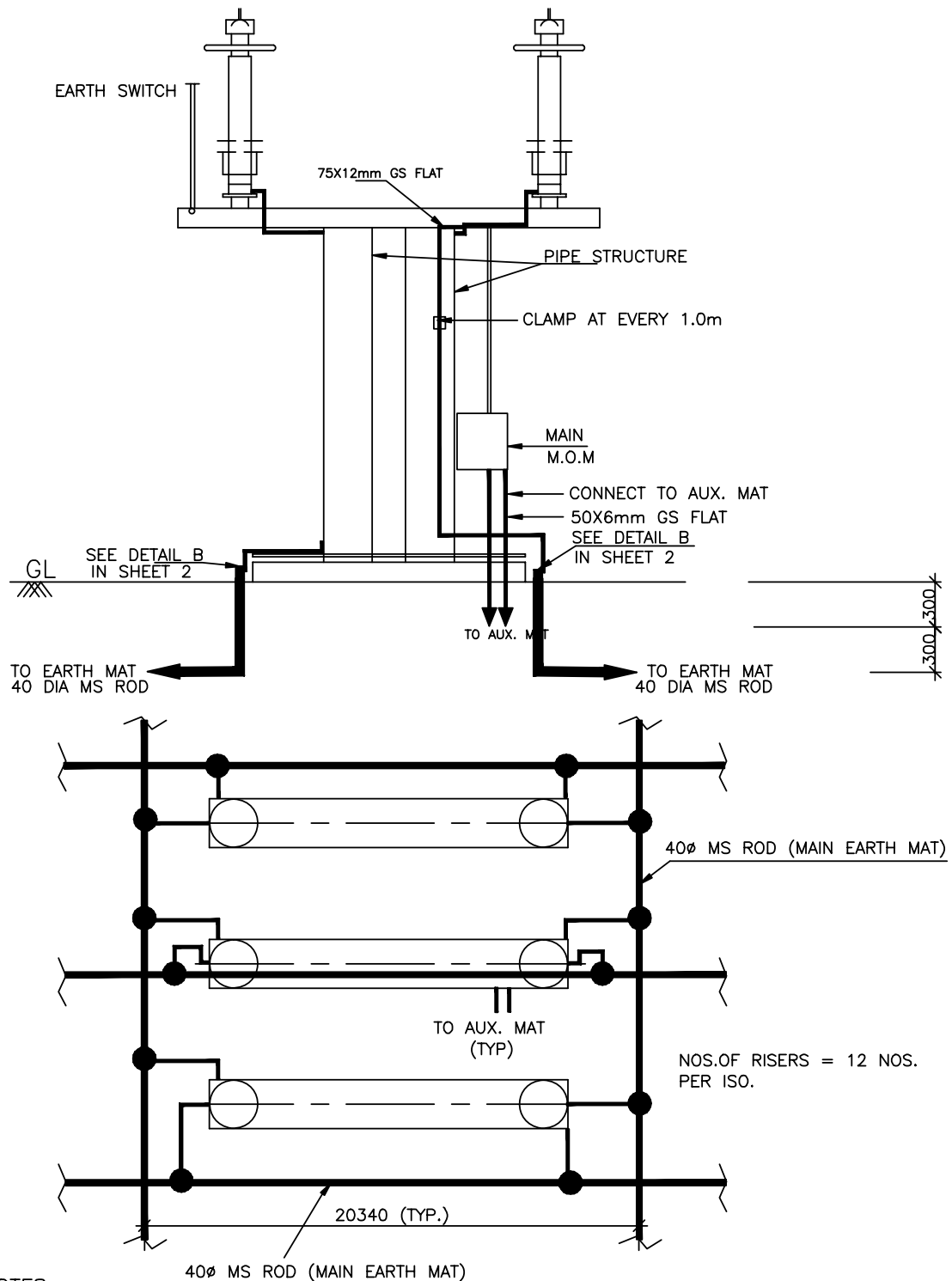
132kV HORIZONTAL CENTER BREAK ISOLATOR WITH TWO EARTHSWITCHES

COMPUTERREF.NO.

DRG. No.

TB-4-350-316-017

SHEET No.
7C



NOTES

- AUXILIARY EARTH MAT SHALL BE PROVIDED NEAR EVERY MOM BOX (REFER SHEET 15)
- RISER

M/s BHEL to ensure the Isolator arrangement drawing



EQUIPMENT EARTHING DETAILS

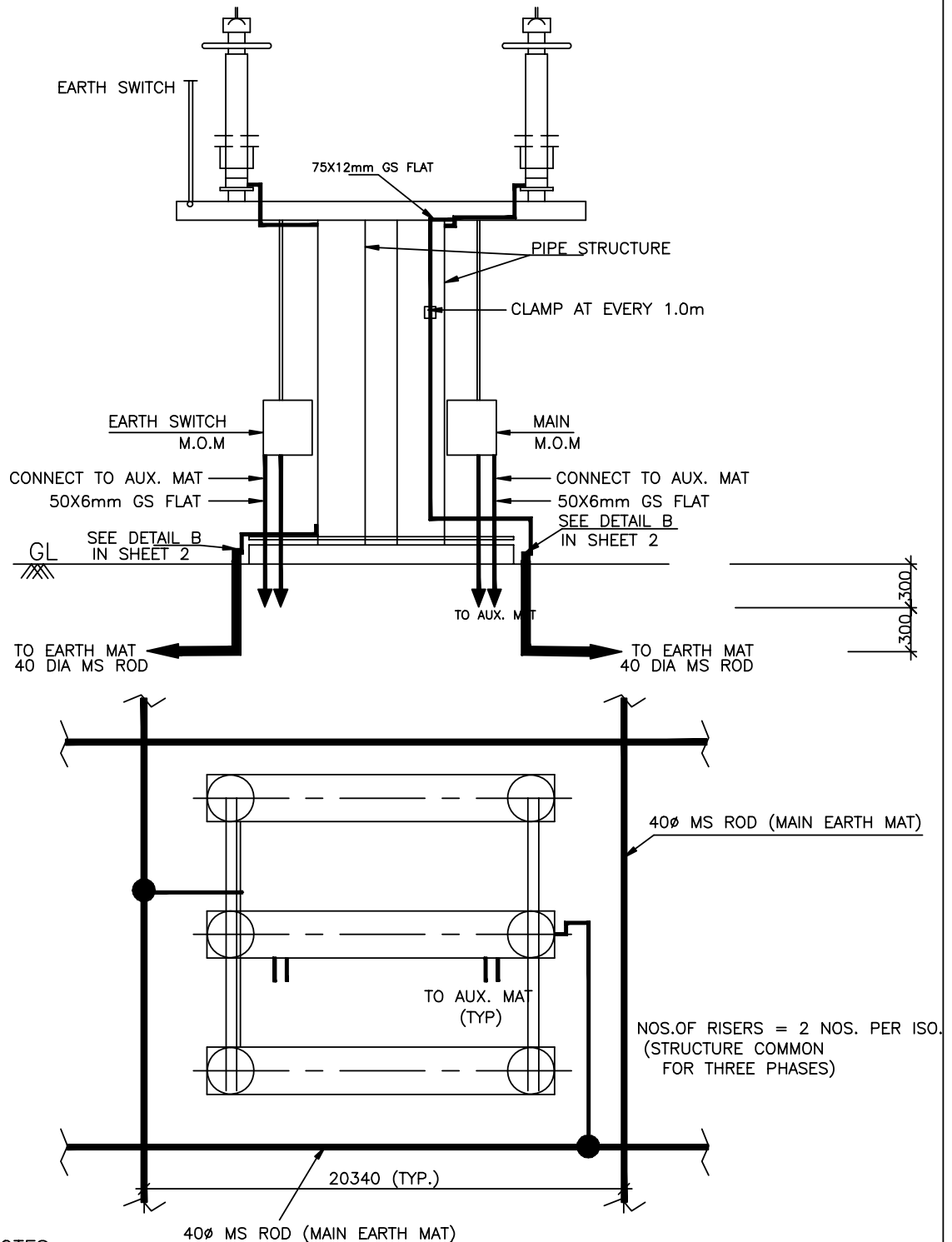
132kV HORIZONTAL CENTER BREAK ISOLATOR WITHOUT EARTHSWITCH

COMPUTERREF.NO.

DRG. No.

TB-4-350-316-017

SHEET No.
7D



NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED NEAR EVERY MOM BOX (REFER SHEET 15)

● RISER

M/s BHEL to ensure the Isolator arrangement drawing



EQUIPMENT EARTHING DETAILS

33kV HORIZONTAL CENTER BREAK ISOLATOR WITH EARTH SWITCH

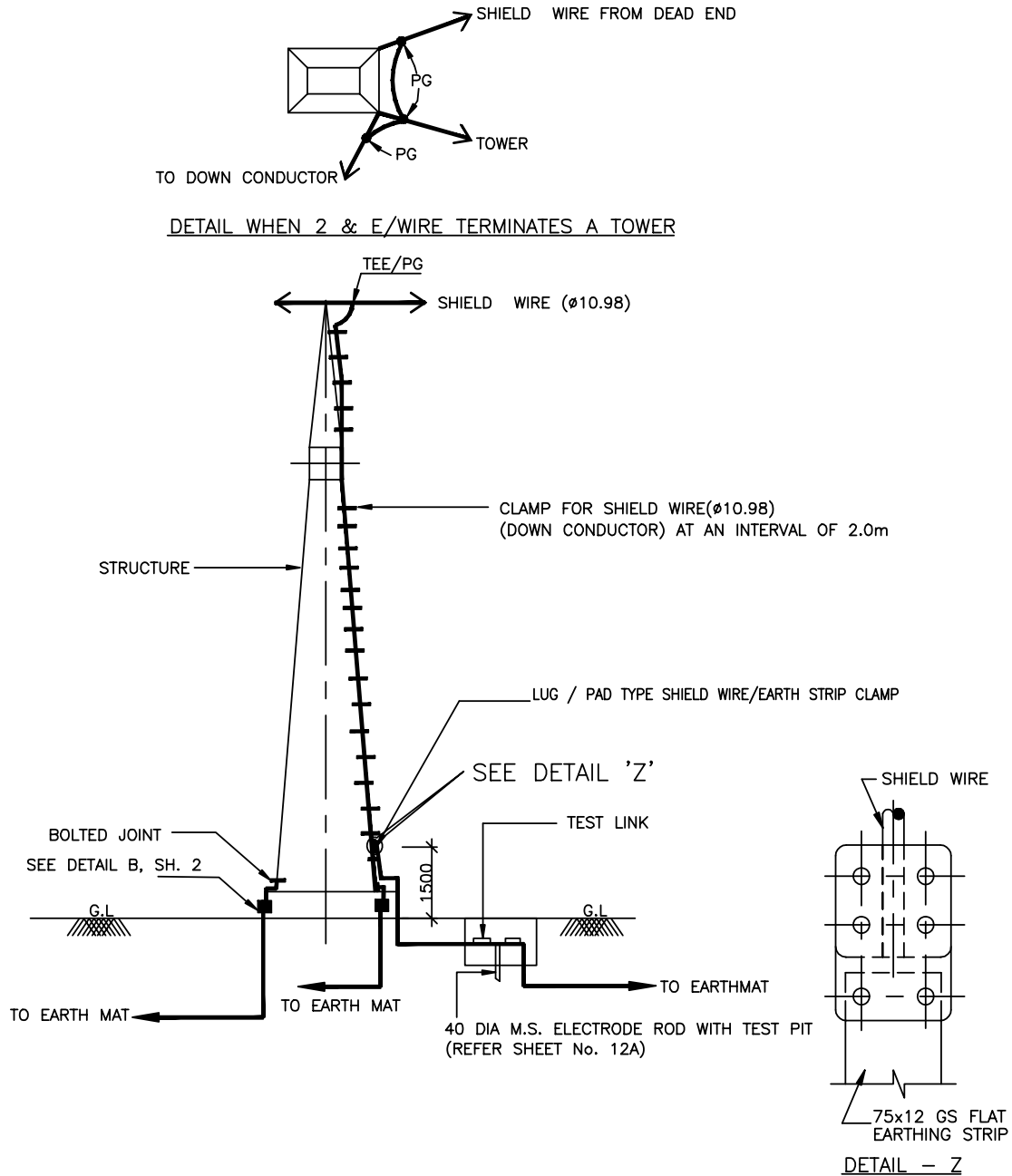
COMPUTERREF.NO.

DRG. No.

TB-4-350-316-017

SHEET No.

7E



NOTE:

1. TWO EARTHING STRIP SHALL BE CONNECTED TO ONE RISER.
2. NO. OF ROD ELECTRODE : 1 NO. PER TOWER WITH DOWN CONDUCTOR.
3. NO. OF RISERS = 2 NOS.



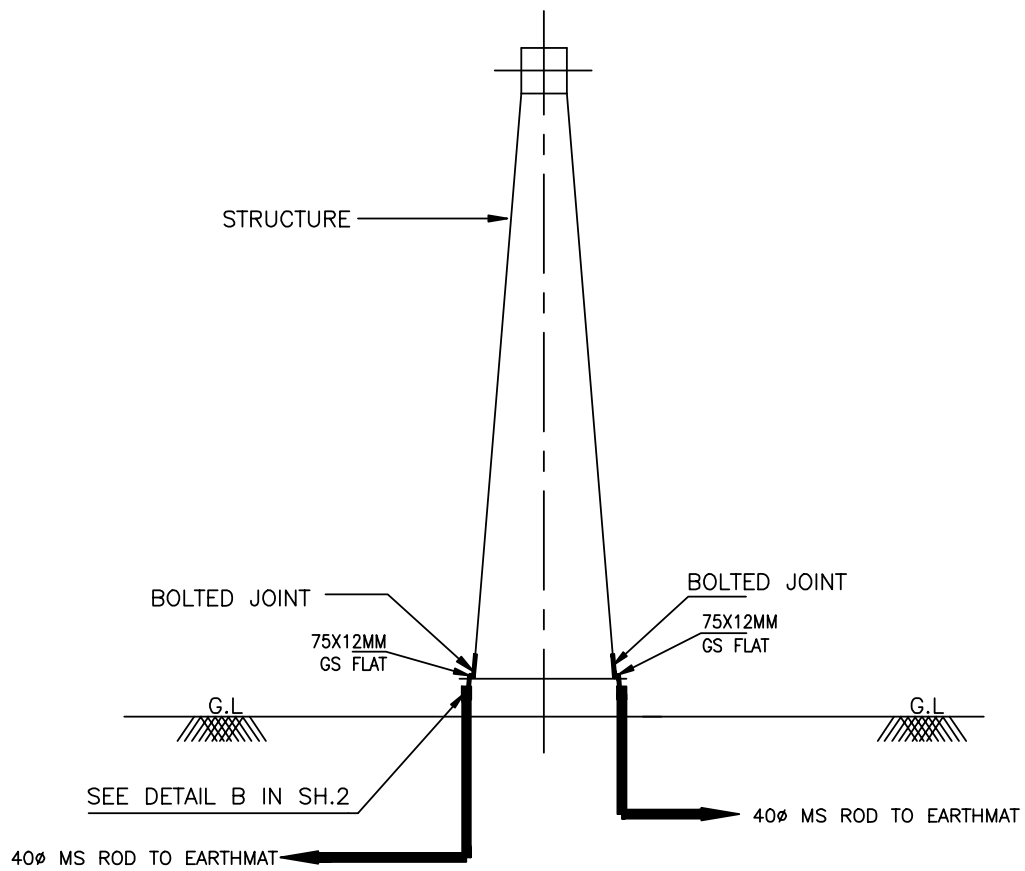
EQUIPMENT EARTHING DETAILS
TOWER WITH PEAK

COMPUTERREF.NO.

DRG. No.

TB-0-350-316-017

SHEET No.
8



NOS.OF RISERS = 2 NOS. PER TOWER



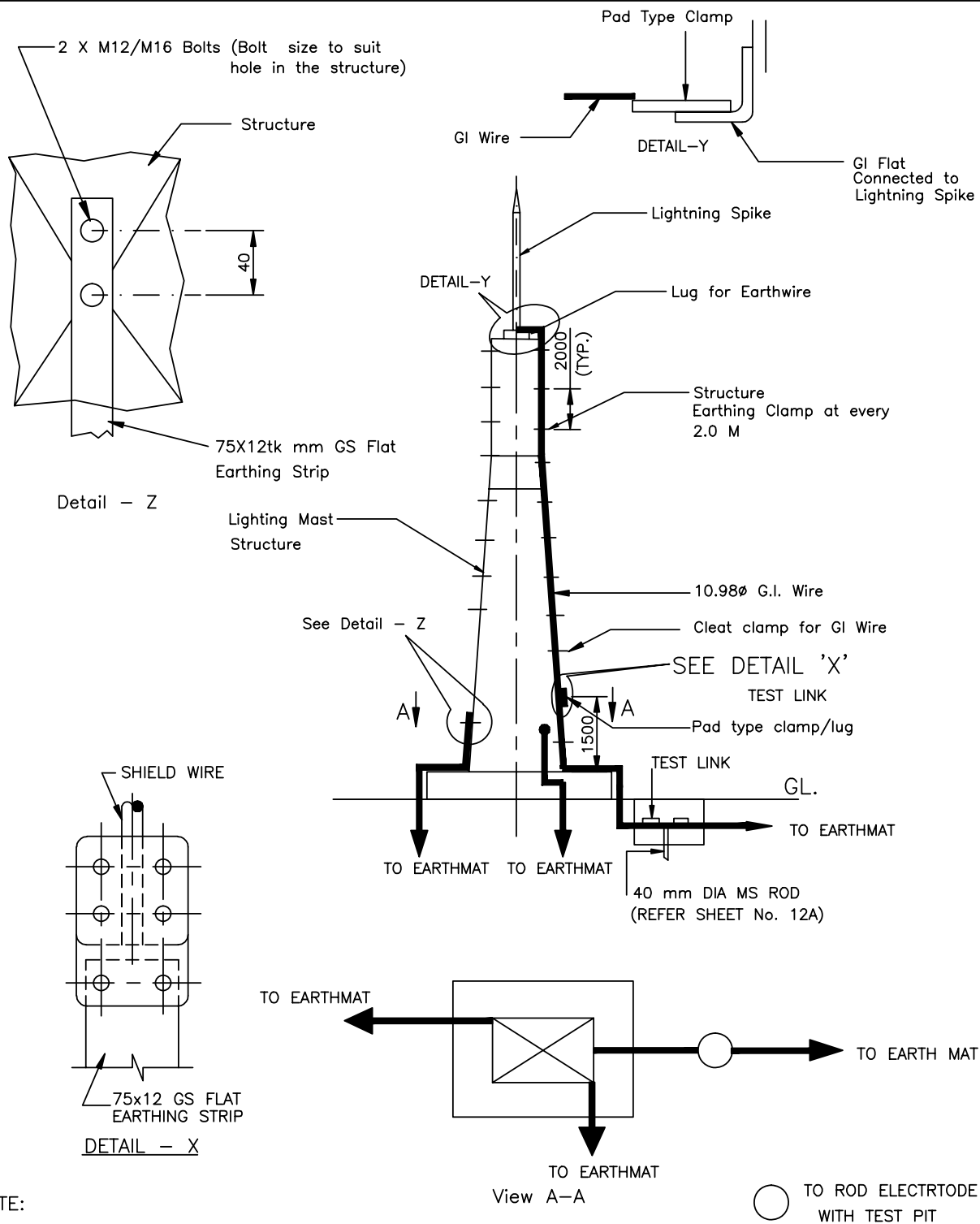
EQUIPMENT EARTHING DETAILS TOWER WITHOUT PEAK

COMPUTERREF.NO.

DRG. No.

TB-4-350-316-017

SHEET No.
8A



NOTE:

1. TWO EARTHING STRIP SHALL BE CONNECTED TO ONE RISER.
2. NO. OF ROD ELECTRODE WITH TEST PIT : 1 NO.
3. PAD TYPE CLAMP 1 NOS.
4. THE DOWN CONDUCTORS (E/WIRE) SHALL BE CONNECTED TO EARTH ELECTRODE.



EQUIPMENT EARTHING DETAILS

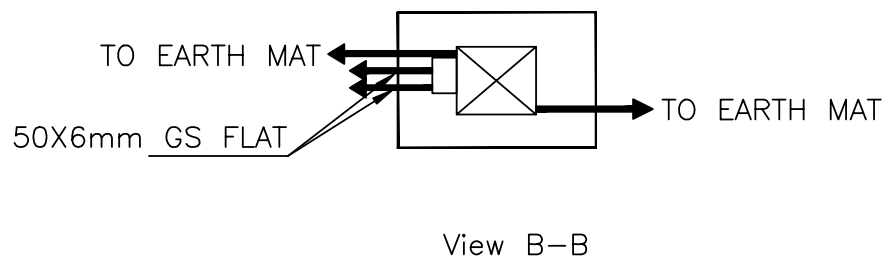
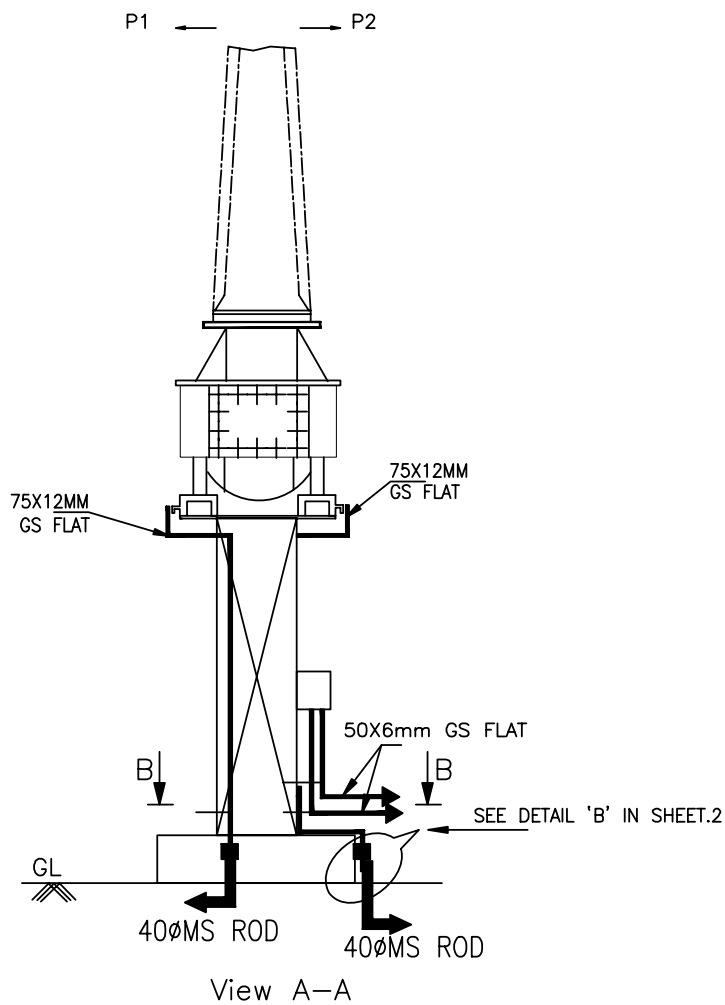
Lightning Mast

COMPU. DRG. REF.

DRG.NO.

TB-4-350-316-017

SHEET No.
8B



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



EQUIPMENT EARTHING DETAILS 400kV & 132kV Current Transformer

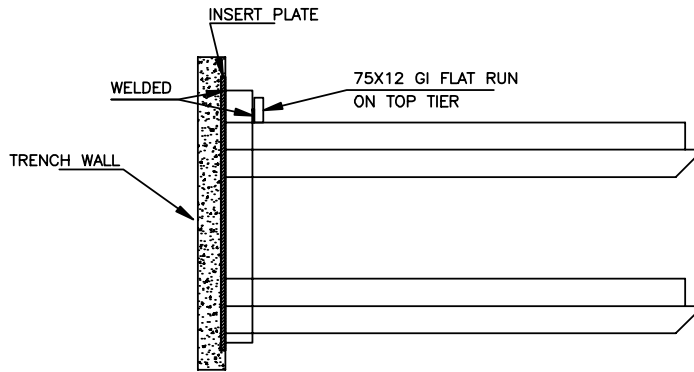
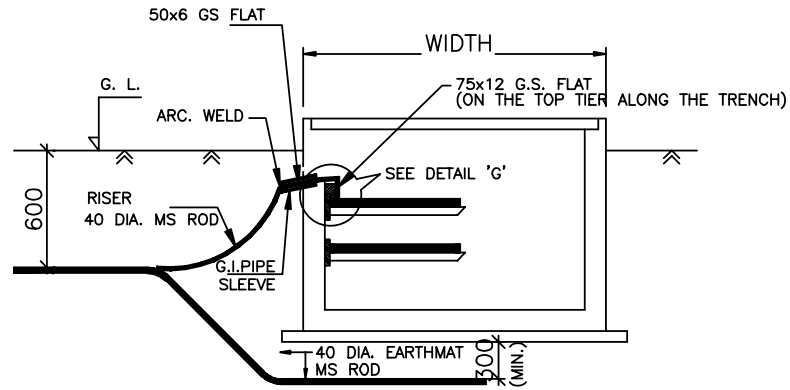
COMPU. DRG. REF.

DRG.NO.

TB-4-350-316-017

SHEET No.

9



DETAIL 'G'

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

NOTE:

1. ALL TRENCHES SHALL BE EARTHED AT AN INTERVAL OF 30M 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 0.6m IN OUTDOOR INTERVAL & 0.75 IN INDOOR.
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.



EQUIPMENT EARTHING DETAILS
CABLE TRENCH

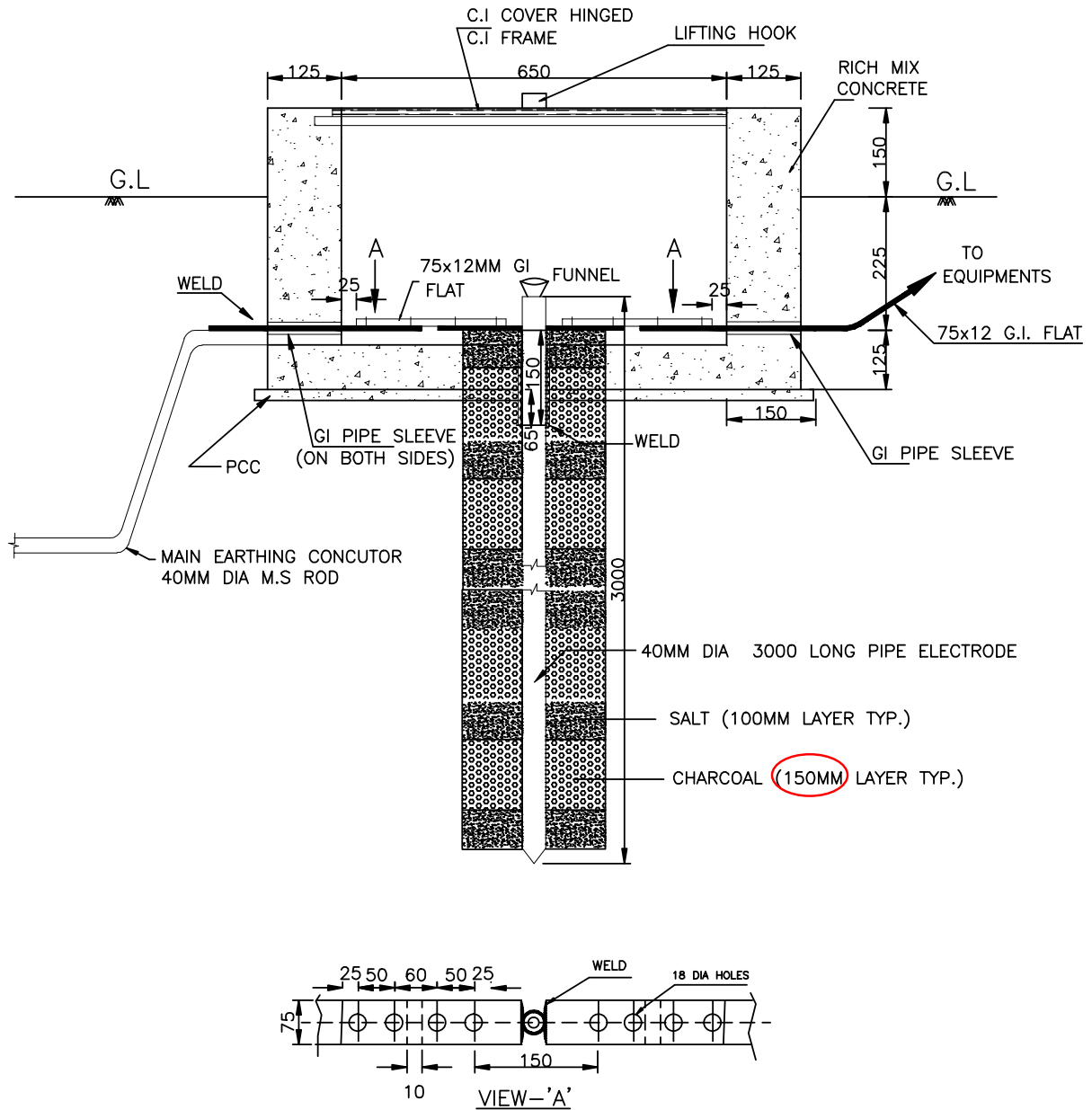
COMPU. DRG. REF.

DRG. NO.

TB-4-350-316-017

SHEET
10

Please furnish the cover detail with its hinged arrangement



NOTE:

1. SUPPLY OF FIXING BOLTS NUTS & WASHERS FOR GI FLAT EARTHING CONDUCTOR IS ALSO FORMS PART OF THE SCOPE.
2. TO BE USED FOR CONNECTING TRANSFORMER /REACTOR NEUTRAL



EQUIPMENT EARTHING DETAILS PIPE EARTH ELECTRODE WITH TREATED PIT

COMPU. DRG. REF.

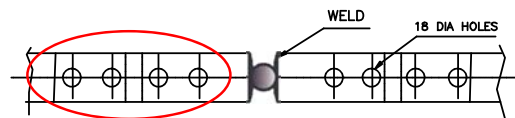
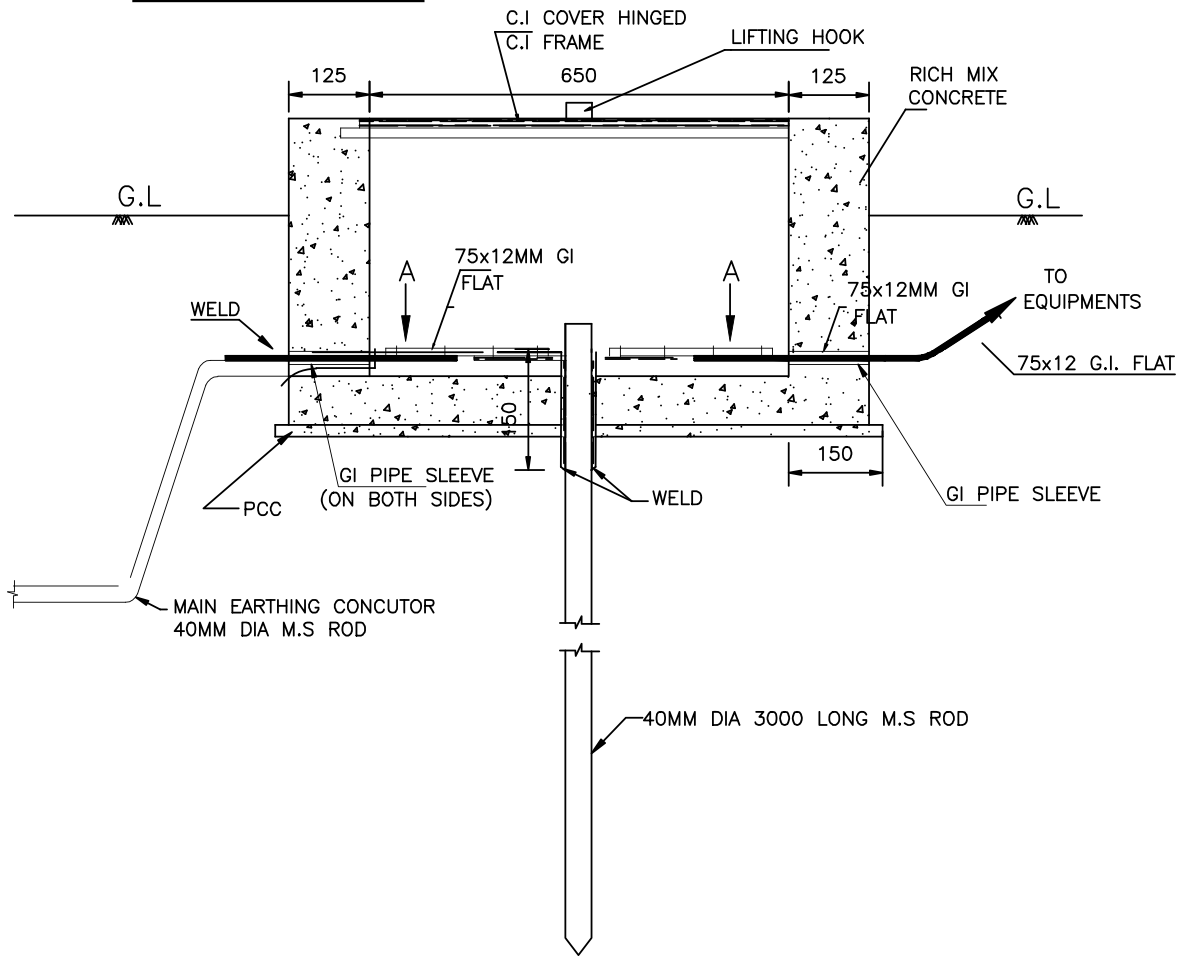
DRG. No.

TB-4-350-316-017

SHEET No.

11

Comments as marked above



VIEW-'A'

NOTES:-

1. SUPPLY OF FIXING BOLTS NUTS & WASHERS FOR GI FLAT EARTHING CONDUCTOR IS ALSO FORMS PART OF THE SCOPE.
2. ALL NUTS, BOLTS & WASHERS SHALL BE GALVANISED.



EQUIPMENT EARTHING DETAILS
ROD EARTH ELECTRODE WITHOUT TEST PIT

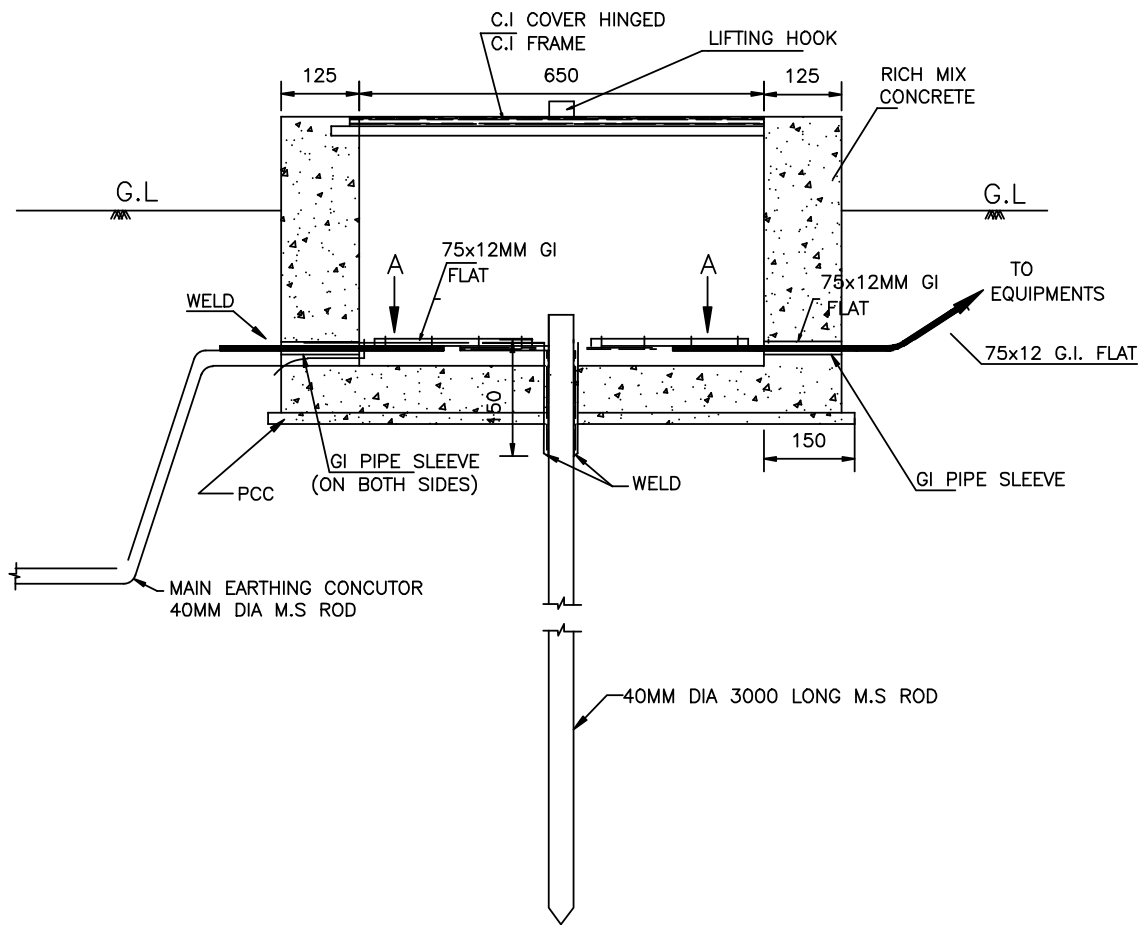
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DRG. No.

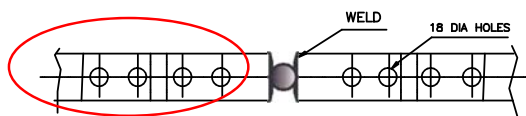
TB-4-350-316-017

SHEET No.

12



Mark dimensions



NOTES:-

1. SUPPLY OF FIXING BOLTS NUTS & WASHERS FOR GI FLAT EARTHING CONDUCTOR IS ALSO FORMS PART OF THE SCOPE.
2. ALL NUTS, BOLTS & WASHERS SHALL BE GALVANISED.



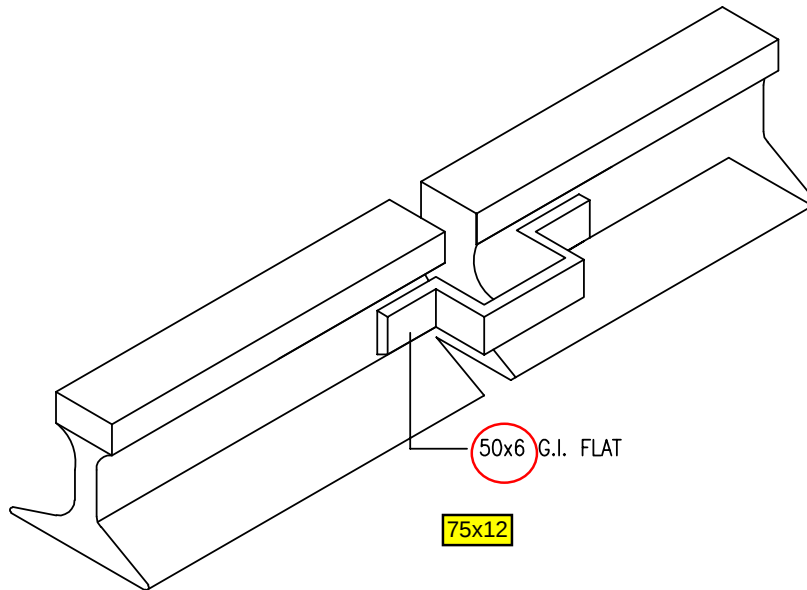
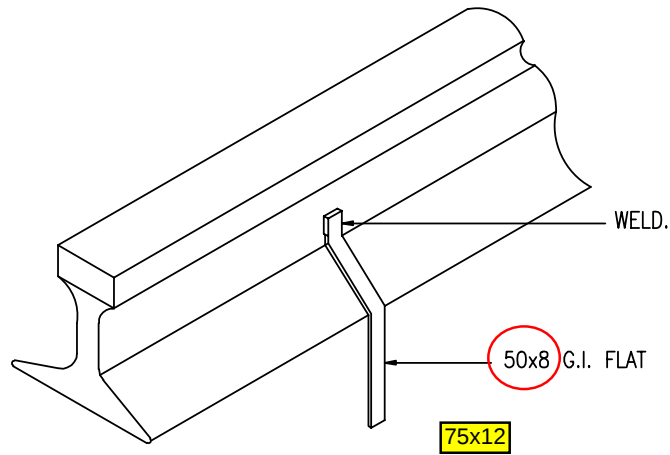
EQUIPMENT EARTHING DETAILS ROD EARTH ELECTRODE WITH TEST PIT

COMPU. DRG. REF.

DRG. No.

TB-4-350-316-017

SHEET No.
12A



NOTE:—

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



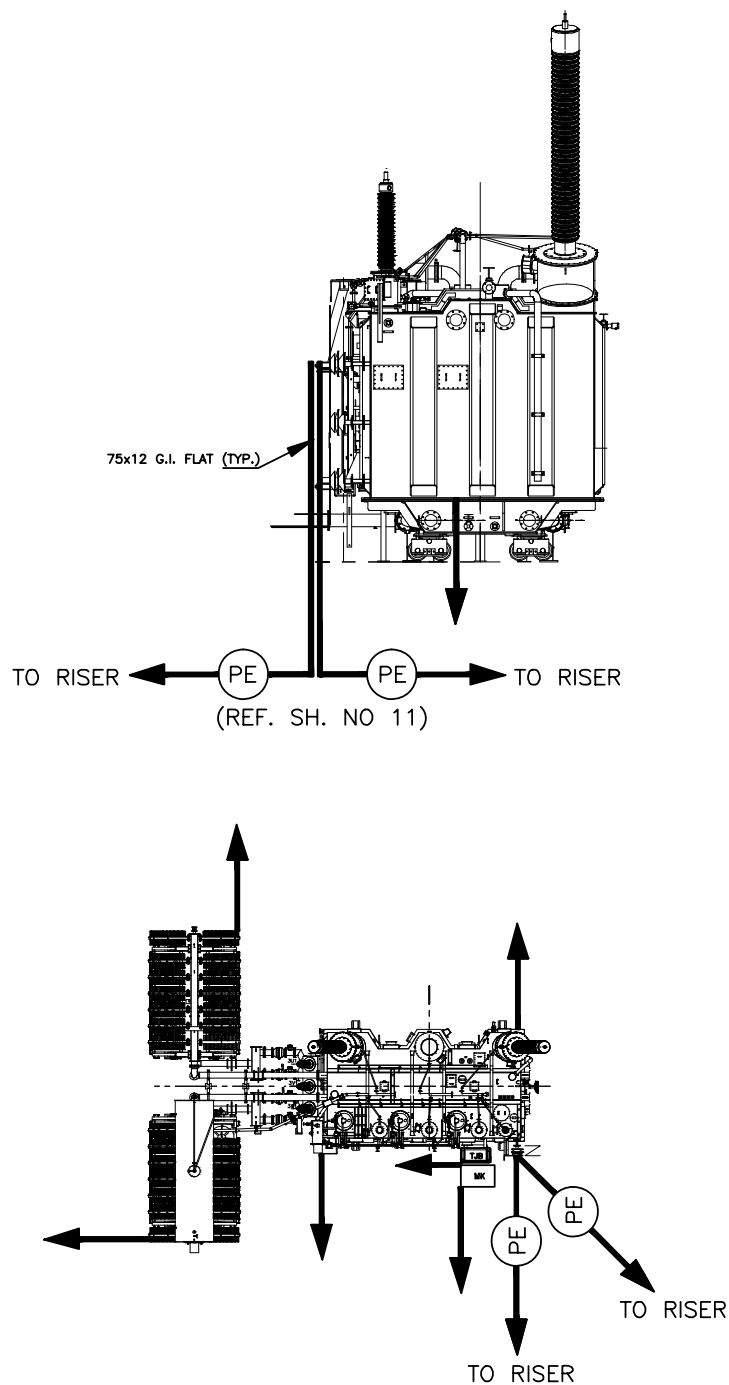
EQUIPMENT EARTHING DETAILS RAIL BONDING

COMPU. DRG. REF.

DRG. NO.

TB-4-350-316-017

SHEET No.
13



NO.OF PIPE EARTH ELECTRODE WITH TREATED PIT (REFER SHEET NO. 11) = 2 NOS.

NO.OF RISERS = 8 NOS. FOR EARTHING OF FOLLOWING PARTS OF TRANSFORMER BY 75X12 GI FLAT (TWO EARTHING STRIPS CAN BE CONNECTED TO ONE RISER):

MAIN TANK	2 Nos.
RADIATOR BANK	2 Nos.
MARSHALLING BOX	2 Nos.
NEUTRAL EARTHING	2 Nos.



EQUIPMENT EARTHING DETAILS TRANSFORMER

COMPU. DRG. REF.

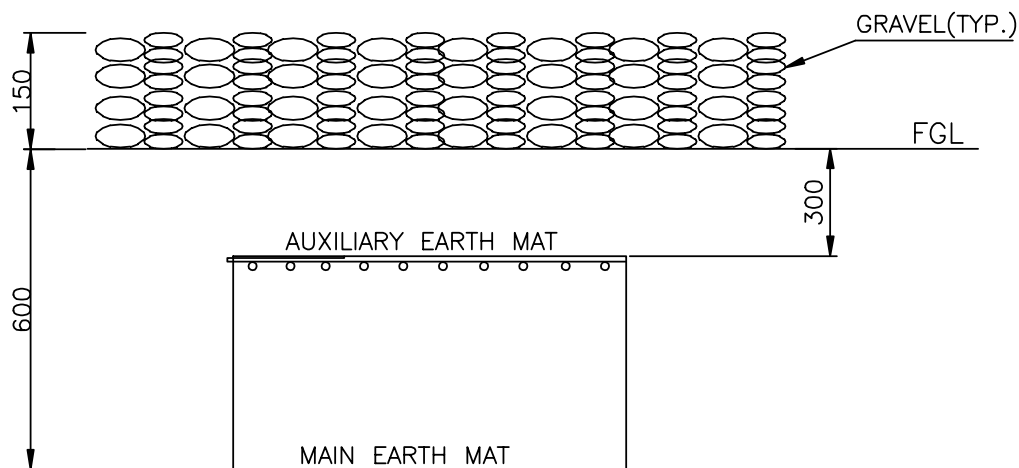
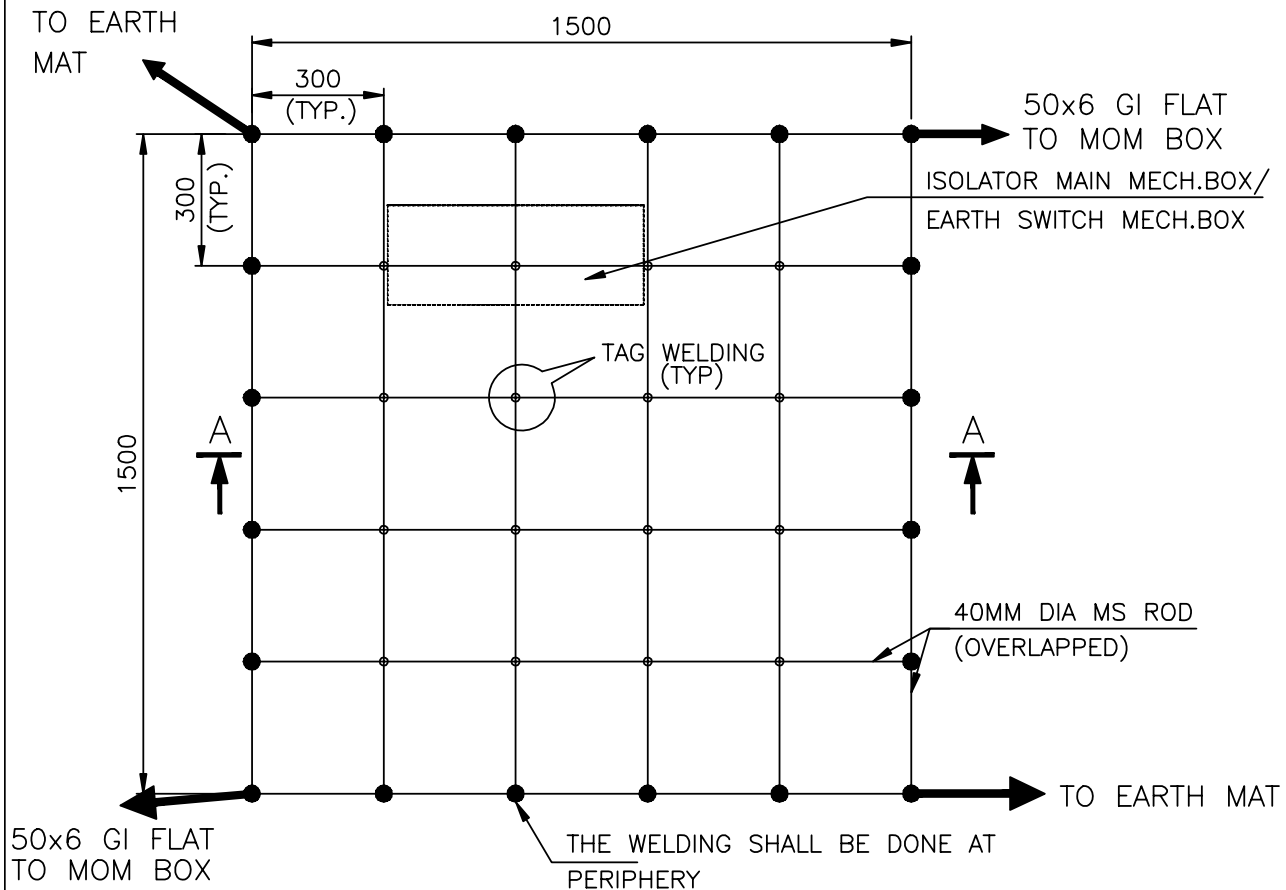
D:\RAWAT\MURADNAGAR\EQ-ERTH\SH26

Report No.

TB-4-350-316-017

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

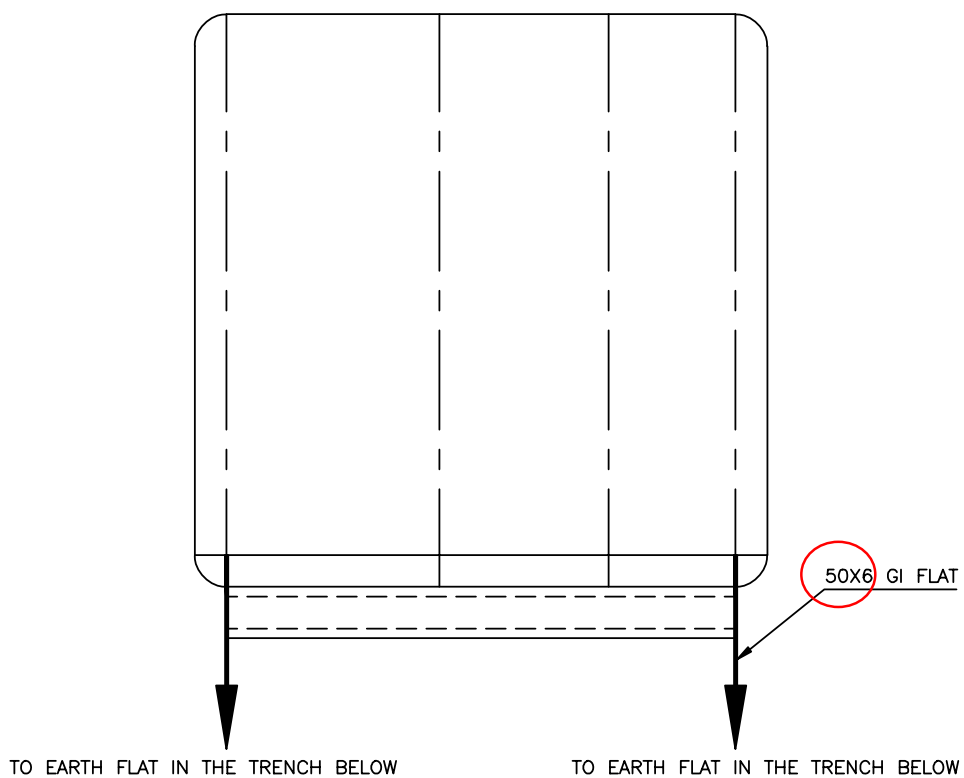
COMPU. DRG. REF.

Report No.

TB-4-350-316-017

SHEET No.

15



EQUIPMENT
CONTROL & RELAY PANELS

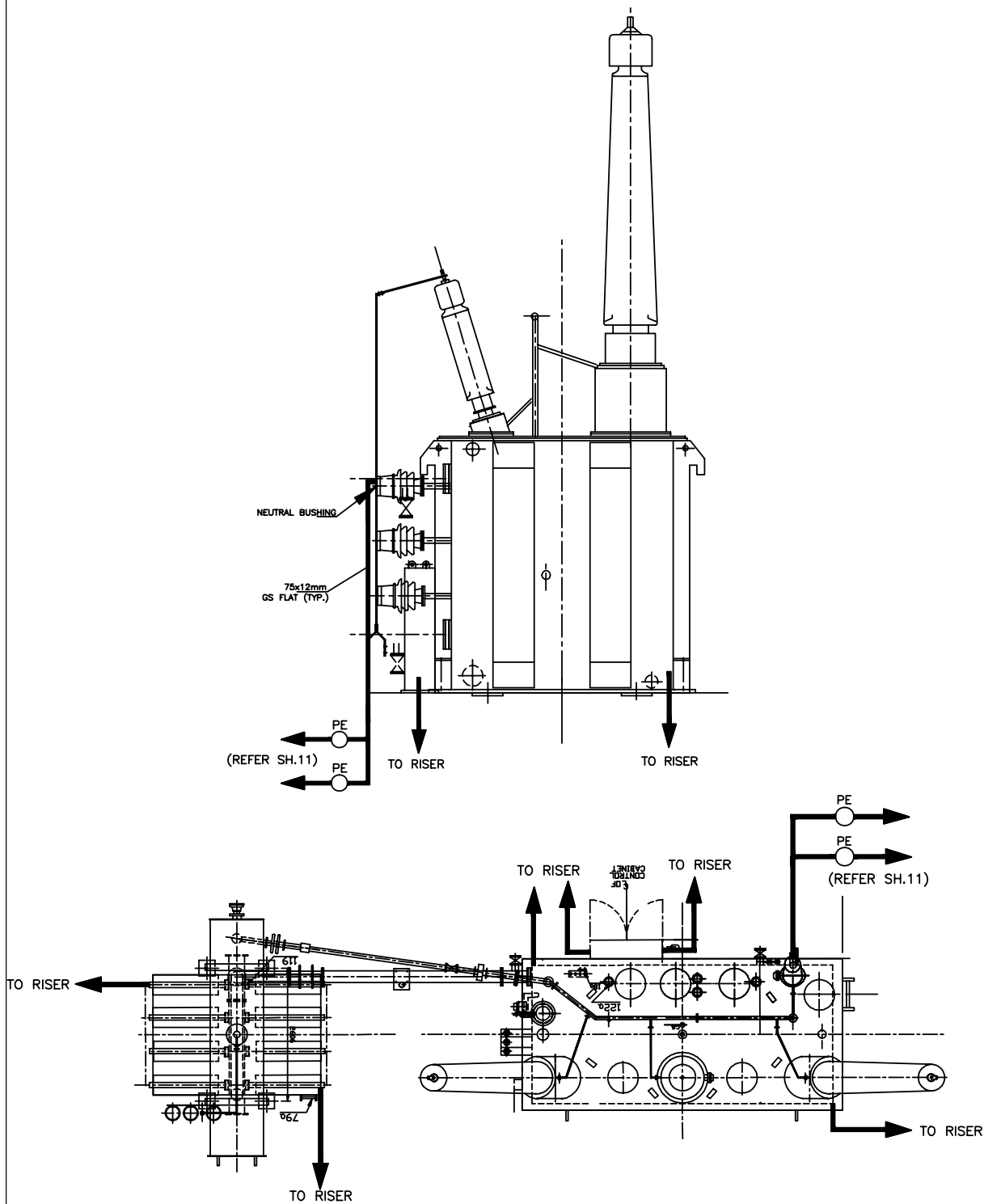


EQUIPMENT EARTHING DETAILS CONTROL AND RELAY PANELS

DRG. No. TB-4-350-316-017

REV. 00

SHEET No.
16



NO. OF PIPE EARTH ELECTRODE WITH TREATED PIT (REFER SHEET NO. 11) = 2 NOS.
 NO.OF RISERS = 6 NOS. FOR EARTHING OF FOLLOWING PARTS OF 400KV BUS REACTOR
 BY 75X12MM GI FLAT :
 MAIN TANK 2 Nos.
 RADIATOR SUPPORT – 2 Nos.
 CONTROL CABINET – 2 Nos.



EQUIPMENT EARTHING DETAILS BUS REACTOR

COMPU. DRG. REF.

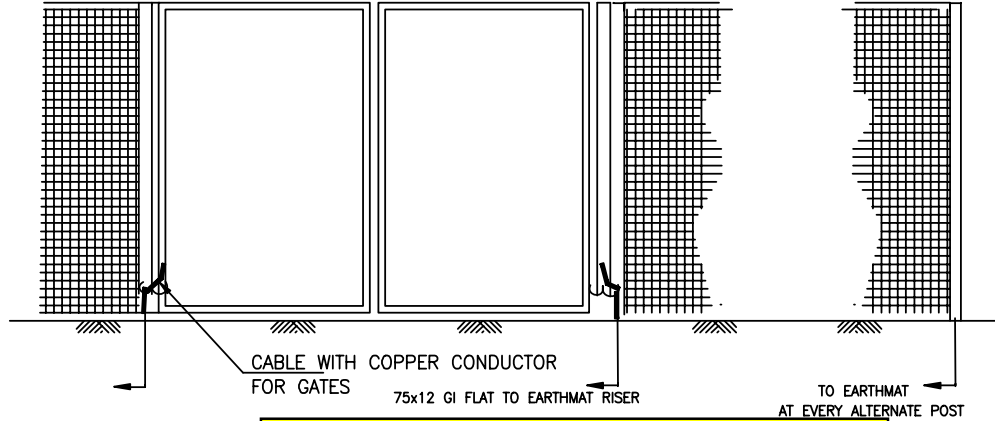
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TB-4-350-316-017

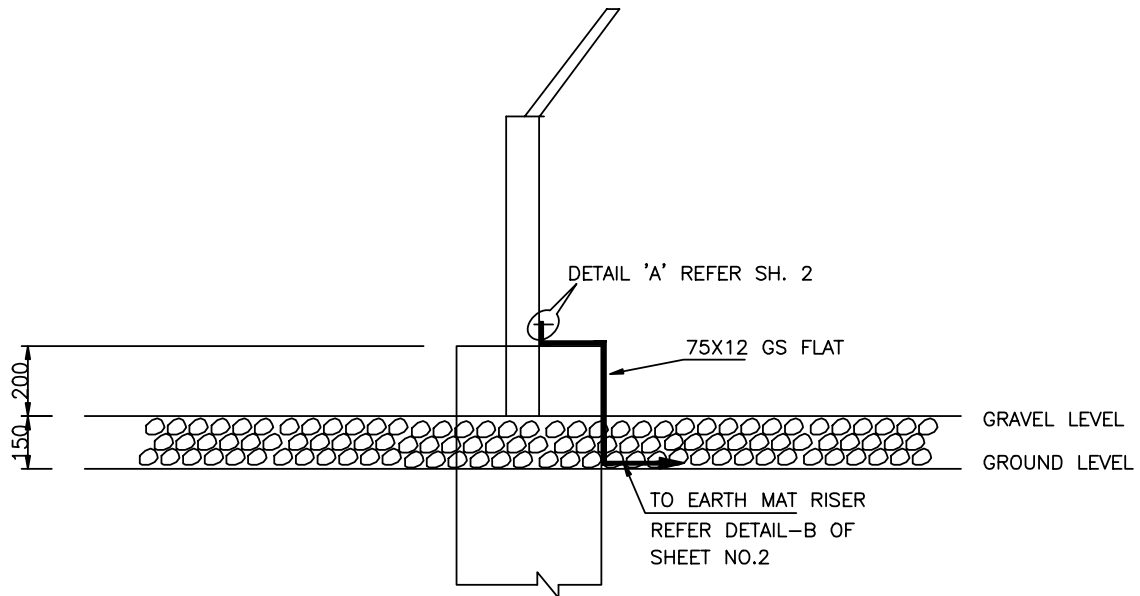
SHEET
17

FENCE GATE

FENCE GROUNDING



Pl refer fence and gate drawing and its earthing arrangements



EVERY POST OF FENCE & GATES SHALL BE CONNECTED TO EARTHING LOOP BY 75X12 MM GS FLAT.
EARTHING CONDUCTOR SHALL BE BURIED 2000mm OUTSIDE THE SWITCHYARD FENCE.

FENCE EARTHING

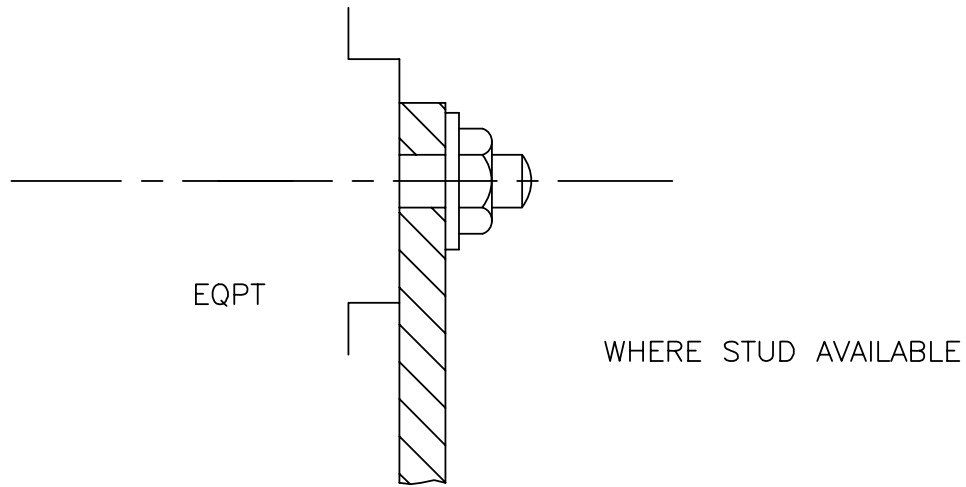


EQUIPMENT EARTHING DETAILS GATE/FENCE POST

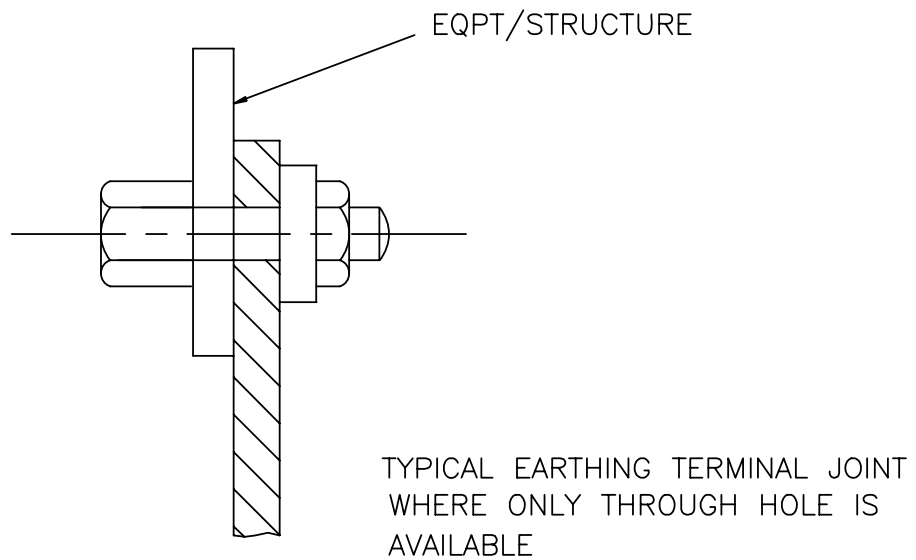
DRG. No.

TB-4-350-316-017

SHEET No.
18



TYPICAL EARTHING TERMINAL JOINT



NOTE

1. THIS IS GENERAL TYPICAL BOLTING ARRANGEMENT APPLICABLE TO ALL PANELS, EQUIPMENT, ETC, WHERE BOLTING ARRANGEMENT IS PROVIDED.
2. IN CASE EARTHING TERMINAL COMPRISES ONLY A TAPPED HOLE SUITABLE BOLT/ SCREW WITH WASHER MAY BE USED FOR EARTHING CONDUCTOR TERMINATION



EQUIPMENT EARTHING DETAILS TYPICAL ARRANGEMENT OF BOLTED JOINTS

DRG. No.

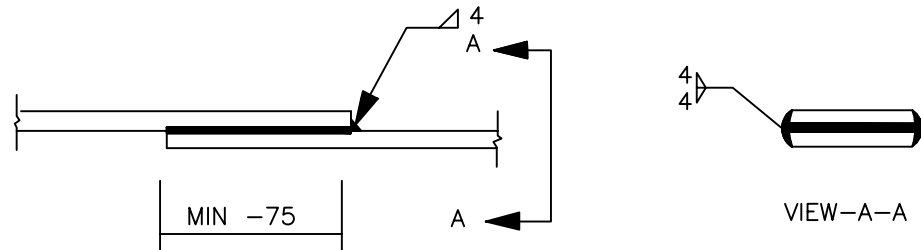
TB-4-350-316-017

REV. 00

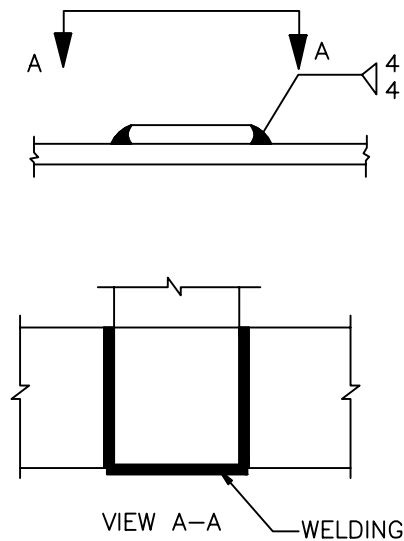
SHEET No.
19

C. STRIP TO STRIP (50X6 MS FLAT)

1. STRAIGHT LAP JOINT/RISER



2. CROSS LAP JOINT



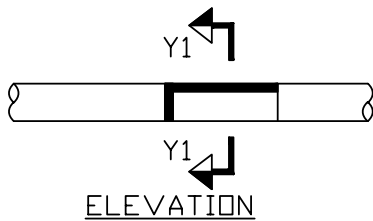
EQUIPMENT EARTHING DETAILS WELDING DETAILS

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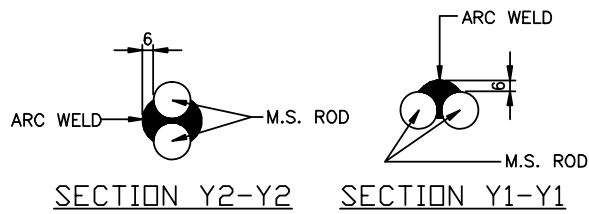
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TB-4-350-316-017

SHEET No.
20

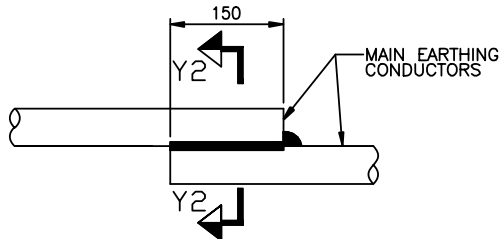


ELEVATION
(CONDUCTOR IN HORIZONTAL PLANE)

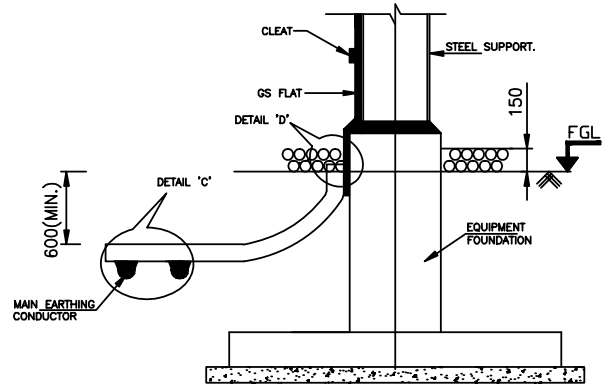
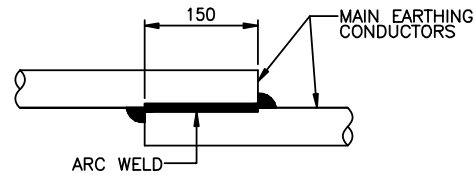


SECTION Y2-Y2

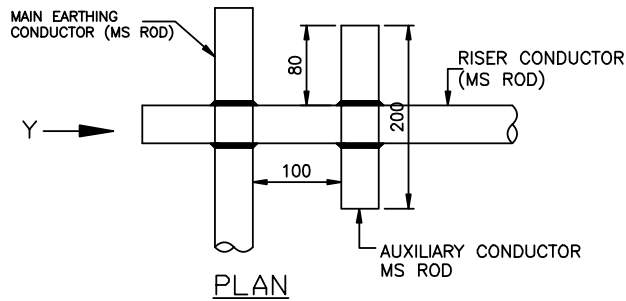
SECTION Y1-Y1



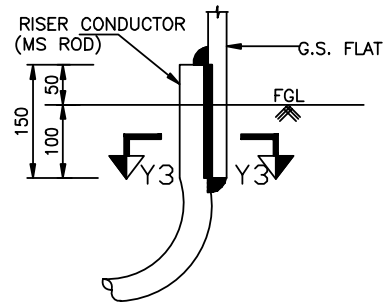
ELEVATION
(CONDUCTOR IN VERTICAL PLANE)



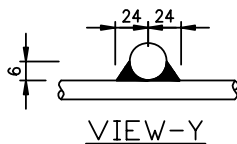
TYPICAL DETAILS OF RISER



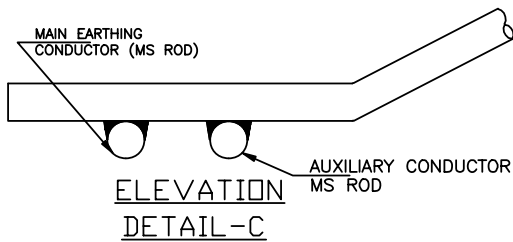
PLAN



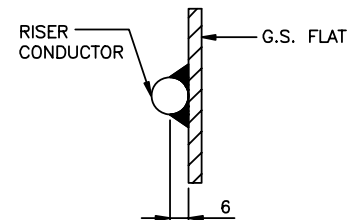
ELEVATION
DETAIL-D



VIEW-Y



ELEVATION
DETAIL-C



SECTION Y3-Y3

TYPICAL OVERLAPPING JOINT OF TWO CONDUCTORS



EQUIPMENT EARTHING DETAILS

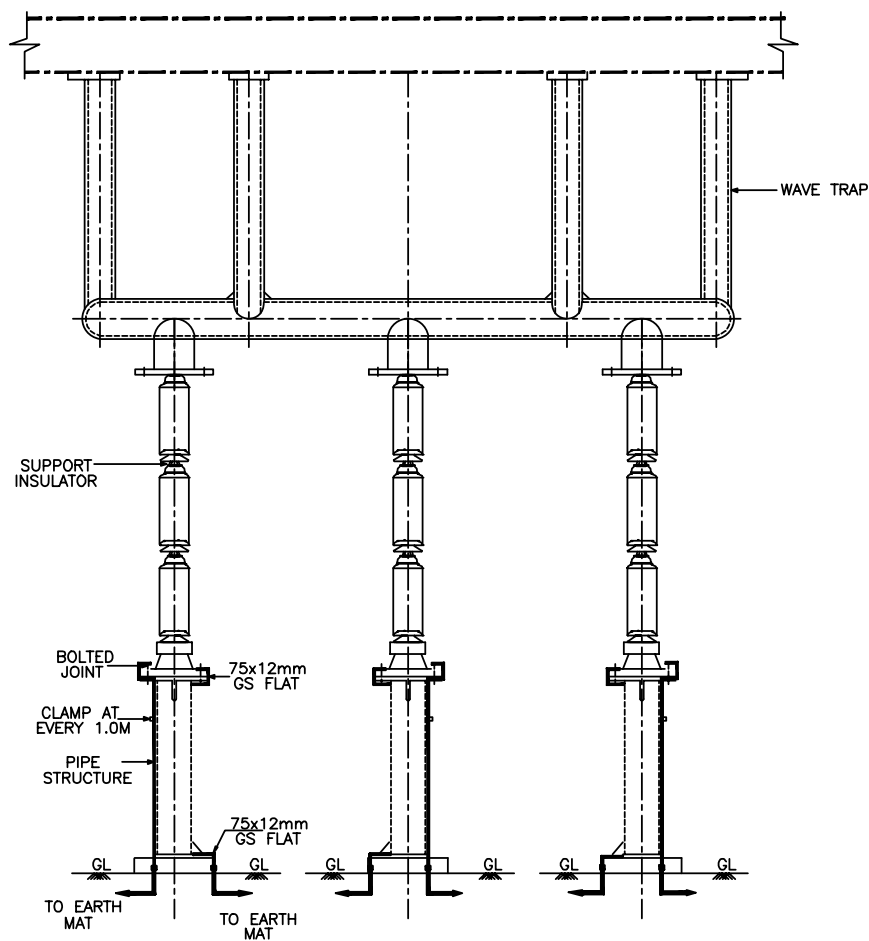
WELDING DETAILS

COMPUTERREF.NO.

DRG. No.

TB-4-350-316-017

SHEET No.
21



NOS.OF RISERS= 6 NOS.



EQUIPMENT EARTHING DETAILS 400kV WAVE TRAP

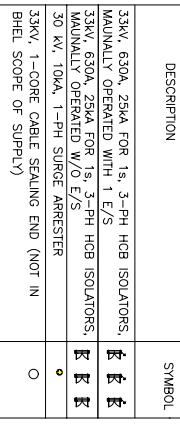
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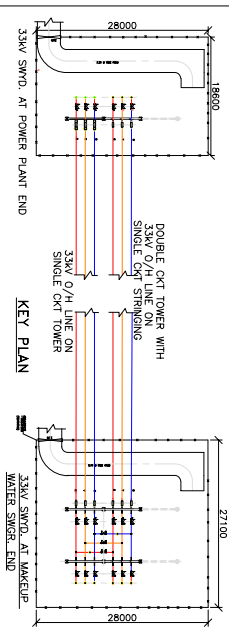
TB-0-350-316-017

SHEET No.
22

M/s BHEL to ensure earthing arrangements for all the equipments / auxiliary items under the switchyard package



MARK FGL.



SHOW KEY PLAN AT PLANT END. SHOW THE LOCATION WITH RESPECT TO SWITCHYARD.

33KV SWYD. AT POWER PLANT END	SHEET 1
33KV SWYD. AT MAKEUP WATER SWGR. END	SHEET 2

Reference drawing:
 610 230 270 310 350 390 430 470 510 550 590 630 670 710 750 790 830 870 910 950 990 1030 1070 1110 1150 1190 1230 1270 1310 1350 1390 1430 1470 1510 1550 1590 1630 1670 1710 1750 1790 1830 1870 1910 1950 1990 2030 2070 2110 2150 2190 2230 2270 2310 2350 2390 2430 2470 2510 2550 2590 2630 2670 2710 2750 2790 2830 2870 2910 2950 2990 3030 3070 3110 3150 3190 3230 3270 3310 3350 3390 3430 3470 3510 3550 3590 3630 3670 3710 3750 3790 3830 3870 3910 3950 3990 4030 4070 4110 4150 4190 4230 4270 4310 4350 4390 4430 4470 4510 4550 4590 4630 4670 4710 4750 4790 4830 4870 4910 4950 4990 5030 5070 5110 5150 5190 5230 5270 5310 5350 5390 5430 5470 5510 5550 5590 5630 5670 5710 5750 5790 5830 5870 5910 5950 5990 6030 6070 6110 6150 6190 6230 6270 6310 6350 6390 6430 6470 6510 6550 6590 6630 6670 6710 6750 6790 6830 6870 6910 6950 6990 7030 7070 7110 7150 7190 7230 7270 7310 7350 7390 7430 7470 7510 7550 7590 7630 7670 7710 7750 7790 7830 7870 7910 7950 7990 8030 8070 8110 8150 8190 8230 8270 8310 8350 8390 8430 8470 8510 8550 8590 8630 8670 8710 8750 8790 8830 8870 8910 8950 8990 9030 9070 9110 9150 9190 9230 9270 9310 9350 9390 9430 9470 9510 9550 9590 9630 9670 9710 9750 9790 9830 9870 9910 9950 9990 10030 10070 10110 10150 10190 10230 10270 10310 10350 10390 10430 10470 10510 10550 10590 10630 10670 10710 10750 10790 10830 10870 10910 10950 10990 11030 11070 11110 11150 11190 11230 11270 11310 11350 11390 11430 11470 11510 11550 11590 11630 11670 11710 11750 11790 11830 11870 11910 11950 11990 12030 12070 12110 12150 12190 12230 12270 12310 12350 12390 12430 12470 12510 12550 12590 12630 12670 12710 12750 12790 12830 12870 12910 12950 12990 13030 13070 13110 13150 13190 13230 13270 13310 13350 13390 13430 13470 13510 13550 13590 13630 13670 13710 13750 13790 13830 13870 13910 13950 13990 14030 14070 14110 14150 14190 14230 14270 14310 14350 14390 14430 14470 14510 14550 14590 14630 14670 14710 14750 14790 14830 14870 14910 14950 14990 15030 15070 15110 15150 15190 15230 15270 15310 15350 15390 15430 15470 15510 15550 15590 15630 15670 15710 15750 15790 15830 15870 15910 15950 15990 16030 16070 16110 16150 16190 16230 16270 16310 16350 16390 16430 16470 16510 16550 16590 16630 16670 16710 16750 16790 16830 16870 16910 16950 16990 17030 17070 17110 17150 17190 17230 17270 17310 17350 17390 17430 17470 17510 17550 17590 17630 17670 17710 17750 17790 17830 17870 17910 17950 17990 18030 18070 18110 18150 18190 18230 18270 18310 18350 18390 18430 18470 18510 18550 18590 18630 18670 18710 18750 18790 18830 18870 18910 18950 18990 19030 19070 19110 19150 19190 19230 19270 19310 19350 19390 19430 19470 19510 19550 19590 19630 19670 19710 19750 19790 19830 19870 19910 19950 19990 20030 20070 20110 20150 20190 20230 20270 20310 20350 20390 20430 20470 20510 20550 20590 20630 20670 20710 20750 20790 20830 20870 20910 20950 20990 21030 21070 21110 21150 21190 21230 21270 21310 21350 21390 21430 21470 21510 21550 21590 21630 21670 21710 21750 21790 21830 21870 21910 21950 21990 22030 22070 22110 22150 22190 22230 22270 22310 22350 22390 22430 22470 22510 22550 22590 22630 22670 22710 22750 22790 22830 22870 22910 22950 22990 23030 23070 23110 23150 23190 23230 23270 23310 23350 23390 23430 23470 23510 23550 23590 23630 23670 23710 23750 23790 23830 23870 23910 23950 23990 24030 24070 24110 24150 24190 24230 24270 24310 24350 24390 24430 24470 24510 24550 24590 24630 24670 24710 24750 24790 24830 24870 24910 24950 24990 25030 25070 25110 25150 25190 25230 25270 25310 25350 25390 25430 25470 25510 25550 25590 25630 25670 25710 25750 25790 25830 25870 25910 25950 25990 26030 26070 26110 26150 26190 26230 26270 26310 26350 26390 26430 26470 26510 26550 26590 26630 26670 26710 26750 26790 26830 26870 26910 26950 26990 27030 27070 27110 27150 27190 27230 27270 27310 27350 27390 27430 27470 27510 27550 27590 27630 27670 27710 27750 27790 27830 27870 27910 27950 27990 28030 28070 28110 28150 28190 28230 28270 28310 28350 28390 28430 28470 28510 28550 28590 28630 28670 28710 28750 28790 28830 28870 28910 28950 28990 29030 29070 29110 29150 291

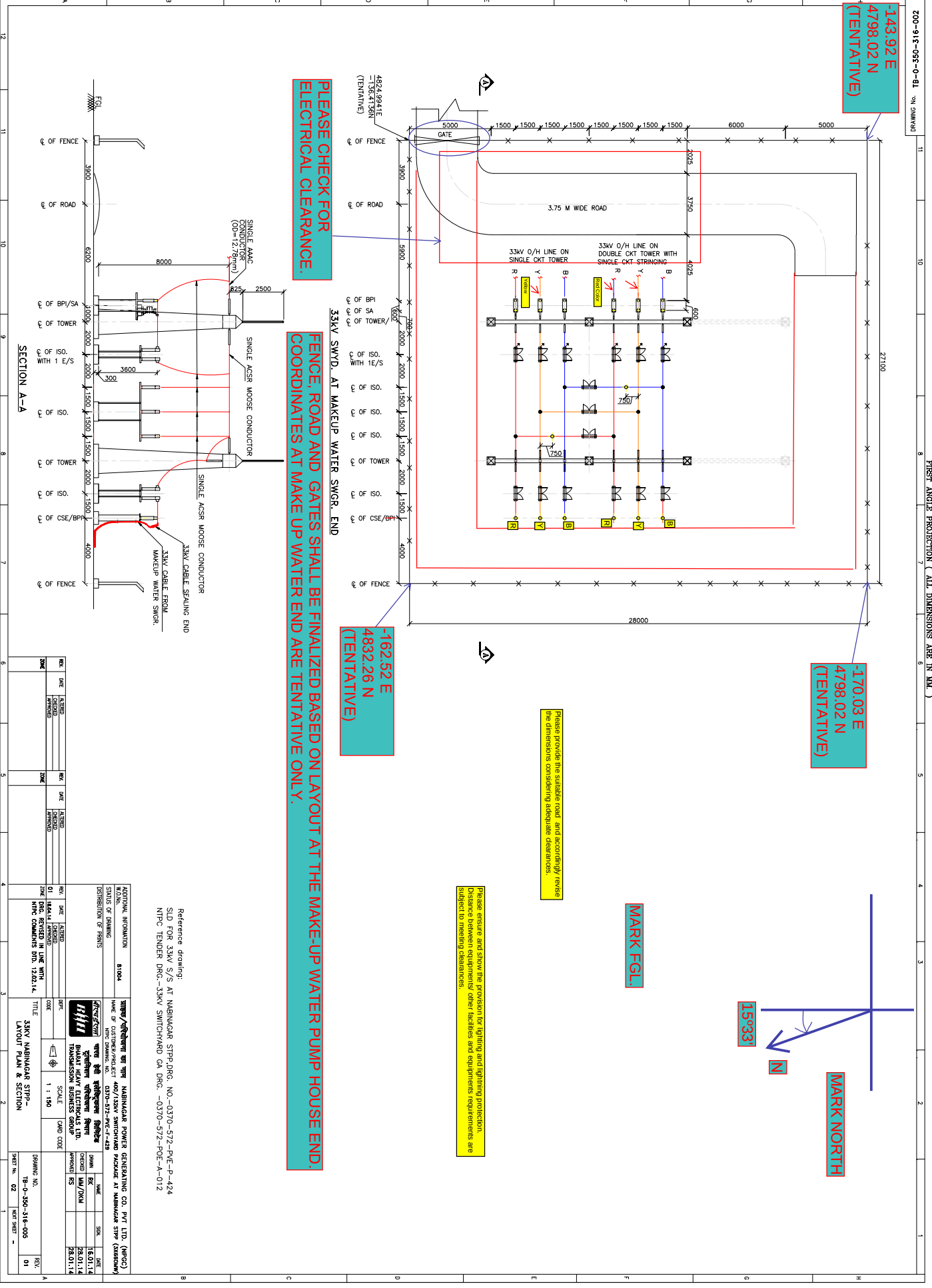
SLD FOR 33KV S/S AT NABINAGAR SIFF,DRG. NO.-03/0-5/2-PVE-P-424
NTPC TENDER DRG.-33KV SWITCHYARD GA DRG. -0370-572-POE-A-012

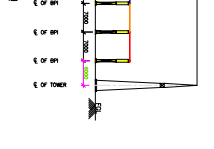
81004	नाबिनगर पावर जनरेशन को. प्रॉ. लि. (NPGC) NABINAGAR POWER GENERATING CO. PVT. LTD. (NPGC) 400/132KV SWITCHYARD PACKAGE AT NABINAGAR STPP (3X6300KW)
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EDITION OF PERIODICS		DATE	
NEWSPAPER BHAIRAVI HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP		28.01.14 28.01.14 28.01.14 28.01.14	

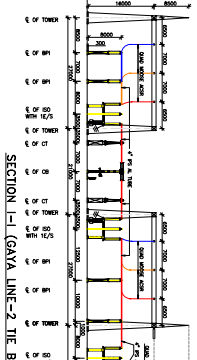
DATE	ALTERED	30%.	 SCALE 1" = 150'	CPO CODE	DRAWING NO. TB-0-350-316-005	REQ.
DESIGNED	CHECKED	CODE				
DATE	APPROVED					
PREPARED BY: REVISOR: REVISED IN LINE WITH COMMENTS DTD. 12.2.14.			335V NABINGAR STRP- LAYOUT PLAN & SECTION			
TITLE						
SHEET NO.		01	NEXT SHEET		02	

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED
		APPROVED			APPROVED
ZONE			ZONE		
6			5		4

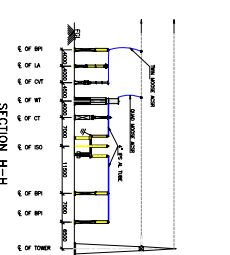




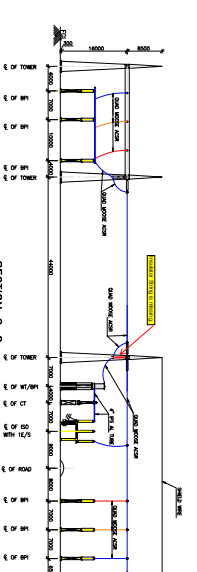
SECTION G1-G1 (GAYA LINE-1 TIE BAY)



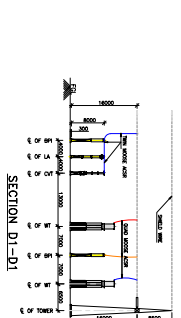
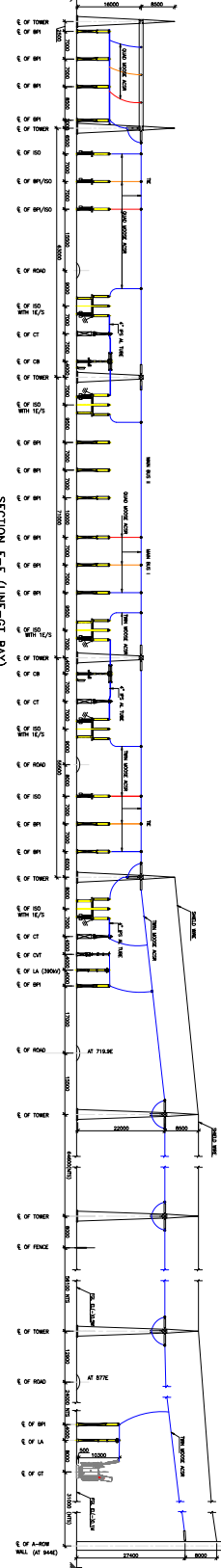
SECTION 1-1 (GAYA LINE-2 TIE BAY)



SECTION H-H



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SECTION D1-D1

TRANSFORMER YARD LAYOUT - NIPCC DRG. NO. 03/0-215-POE-F-001

[illegible]

