

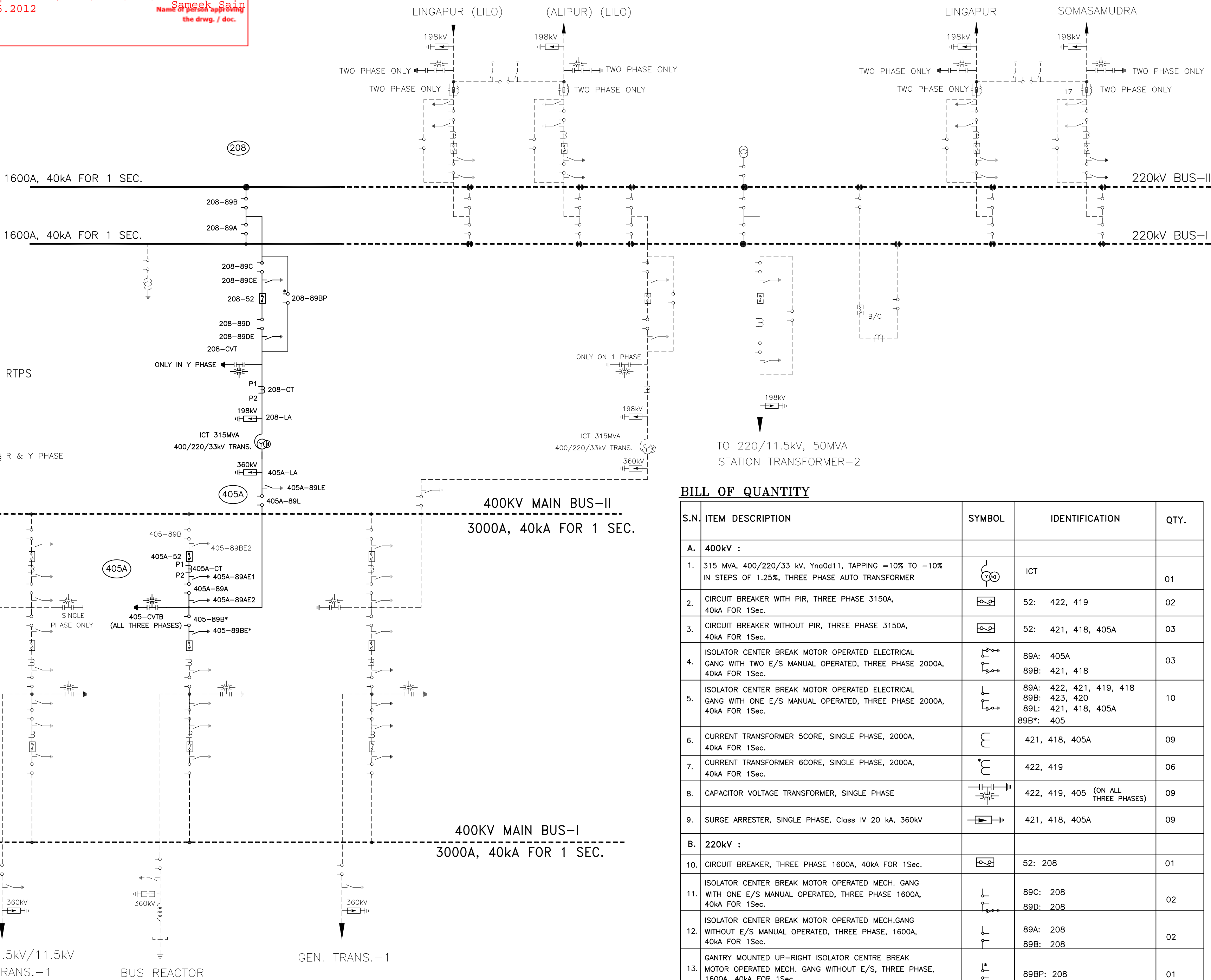
400kV CT (5 CORE) : DETAILS

CORE NO.	APPLICATION	CURRENT RATIO (A)	OUTPUT BURDEN (VA)	ACCURACY CLASS AS PER IEC44-1	MIN. KNEE POINT VOLTAGE (VOLTS)	MAX. CT SECONDARY WINDING RES. ohms	MAX. EXCITING CURRENT (mA) AT KNEE POINT VOLTAGE
5	BUS DIFFERENTIAL CHECK	2000-1000-500/1	-	PS	2000-1000-500	10-5-2.5	30 on 2000/1 tap 60 on 1000/1 tap 120 on 500/1 tap
4	BUS DIFFERENTIAL MAIN	2000-1000-500/1	-	PS	2000-1000-500	10-5-2.5	30 on 2000/1 tap 60 on 1000/1 tap 120 on 500/1 tap
3	METERING	2000-1000-500/1	25	0.2	-	-	ISF ≤ 5, WITH AUX. REACTOR.
2	TRANSF. BACKUP PROTECTION	2000-1000-500/1	-	PS	4000-2000-1000	10-5-2.5	30 on 2000/1 tap 60 on 1000/1 tap 120 on 500/1 tap
1	TRANSF. DIFF. PROTECTION	2000-1000-500/1	-	PS	4000-2000-1000	10-5-2.5	30 on 2000/1 tap 60 on 1000/1 tap 120 on 500/1 tap

220kV CT (5 CORE) : DETAILS

CORE NO.	APPLICATION	CURRENT RATIO (A)	OUTPUT BURDEN (VA)	ACCURACY CLASS AS PER IEC44-1	MIN. KNEE POINT VOLTAGE (VOLTS)	MAX. CT SECONDARY WINDING RES. ohms	MAX. EXCITING CURRENT (mA) AT KNEE POINT VOLTAGE
5	BUS DIFFERENTIAL CHECK	1600-1200-800-400/1	-	PS	1600-1200-800-400	8-6-4-2	30/45 on 1600/1200 tap 60/120 on 800/400 tap
4	BUS DIFFERENTIAL MAIN	1600-1200-800-400/1	-	PS	1600-1200-800-400	8-6-4-2	30/45 on 1600/1200 tap 60/120 on 800/400 tap
3	METERING	1600-1200-800-400/1	15	0.2	-	-	ISF ≤ 5
2	TRANSF. BACKUP/ LINE BACKUP PROTECTION	1600-1200-800-400/1	-	PS	1600-1200-800-400	8-6-4-2	30/45 on 1600/1200 tap 60/120 on 800/400 tap
1	TRANSF. DIFF./ LINE PROTECTION	1600-1200-800-400/1	-	PS	1600-1200-800-400	8-6-4-2	30/45 on 1600/1200 tap 60/120 on 800/400 tap

Approval Category:  
A' DRAWING APPROVED AS SUBMITTED, RELEASE DISTRIBUTION PRINTS  
Transmittal No. P.001794/TEPL/BHEL/TBG/026  
Date: 16.05.2012  
Saneek Sain  
Name of person approving the drawg. / doc.



BILL OF QUANTITY

S.N.	ITEM DESCRIPTION	SYMBOL	IDENTIFICATION	QTY.
<b>A. 400kV :</b>				
1.	315 MVA, 400/220/33 kV, Yna0d11, TAPPING =10% TO -10% IN STEPS OF 1.25%, THREE PHASE AUTO TRANSFORMER		ICT	01
2.	CIRCUIT BREAKER WITH PIR, THREE PHASE 3150A, 40kA FOR 1Sec.		52: 422, 419	02
3.	CIRCUIT BREAKER WITHOUT PIR, THREE PHASE 3150A, 40kA FOR 1Sec.		52: 421, 418, 405A	03
4.	ISOLATOR CENTER BREAK MOTOR OPERATED ELECTRICAL GANG WITH TWO E/S MANUAL OPERATED, THREE PHASE 2000A, 40kA FOR 1Sec.		89A: 405A 89B: 421, 418	03
5.	ISOLATOR CENTER BREAK MOTOR OPERATED ELECTRICAL GANG WITH ONE E/S MANUAL OPERATED, THREE PHASE 2000A, 40kA FOR 1Sec.		89A: 422, 421, 419, 418 89B: 423, 420 89L: 421, 418, 405A 89B*: 405	10
6.	CURRENT TRANSFORMER 50RE, SINGLE PHASE, 2000A, 40kA FOR 1Sec.		421, 418, 405A	09
7.	CURRENT TRANSFORMER 60RE, SINGLE PHASE, 2000A, 40kA FOR 1Sec.		422, 419	06
8.	CAPACITOR VOLTAGE TRANSFORMER, SINGLE PHASE		422, 419, 405 (ON ALL THREE PHASES)	09
9.	SURGE ARRESTER, SINGLE PHASE, Class IV 20 kA, 360kV		421, 418, 405A	09
<b>B. 220kV :</b>				
10.	CIRCUIT BREAKER, THREE PHASE 1600A, 40kA FOR 1Sec.		52: 208	01
11.	ISOLATOR CENTER BREAK MOTOR OPERATED MECH. GANG WITH ONE E/S MANUAL OPERATED, THREE PHASE 1600A, 40kA FOR 1Sec.		89C: 208 89D: 208	02
12.	ISOLATOR CENTER BREAK MOTOR OPERATED MECH.GANG WITHOUT E/S MANUAL OPERATED, THREE PHASE, 1600A, 40kA FOR 1Sec.		89A: 208 89B: 208	02
13.	GANTRY MOUNTED UP-RIGHT ISOLATOR CENTRE BREAK MOTOR OPERATED MECH. GANG WITHOUT E/S, THREE PHASE, 1600A, 40kA FOR 1Sec.		89BP: 208	01
14.	CURRENT TRANSFORMER 50RE, SINGLE PHASE, 1600A, 40kA FOR 1Sec.		208	03
15.	CAPACITOR VOLTAGE TRANSFORMER, SINGLE PHASE		208 (ONLY IN Y PHASE)	01
16.	SURGE ARRESTER, SINGLE PHASE, Class III, 10 kA, 1-PH., 198kV		208	03

400kV CT (6 CORE) : DETAILS

CORE NO.	APPLICATION	CURRENT RATIO (A)	OUTPUT BURDEN (VA)	ACCURACY CLASS AS PER IEC44-1	MIN. KNEE POINT VOLTAGE (VOLTS)	MAX. CT SECONDARY WINDING RES. ohms	MAX. EXCITING CURRENT (mA) AT KNEE POINT VOLTAGE
6	DIFFERENTIAL	2000-1000-500/1	-	PS	2000-1000-500	10-5-2.5	30 on 2000/1 tap 60 on 1000/1 tap 120 on 500/1 tap
5	DIFFERENTIAL	2000-1000-500/1	-	PS	2000-1000-500	10-5-2.5	30 on 2000/1 tap 60 on 1000/1 tap 120 on 500/1 tap
3,4	METERING	2000-1000-500/1	25	0.2	-	-	ISF ≤ 5 WITH AUX. REACTOR.
2	TRANSF. BACKUP PROTECTION	2000-1000-500/1	-	PS	4000-2000-1000	10-5-2.5	30 on 2000/1 tap 60 on 1000/1 tap 120 on 500/1 tap
1	TRANSF. DIFF. PROTECTION	2000-1000-500/1	-	PS	4000-2000-1000	10-5-2.5	30 on 2000/1 tap 60 on 1000/1 tap 120 on 500/1 tap

400kV CVT DETAILS: 8800pF (+10%, -5%)

RATIO	400kV / J3	-110V / J3	-110V / J3	-110V / J3
SEC-I	CLASS 3P, 100VA			
SEC-II	CLASS 3P, 100VA			
SEC-III	0.2, 75VA			

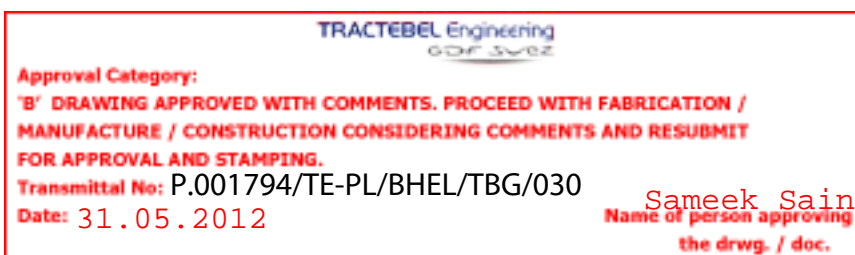
220kV CVT DETAILS 8800 pF (+10%, -5%)

RATIO	220kV / J3	-110V / J3	-110V / J3	-110V / J3
SEC-I	CLASS 3P, 100VA			
SEC-II	CLASS 3P, 100VA			
SEC-III	0.2, 75VA			

SYSTEM PARAMETERS	400kV	220kV
LIGHTNING IMPULSE WITHSTAND VOLTAGE (kVp)	1425	1050
SWITCHING IMPULSE WITHSTAND VOLTAGE (kVp)	1050	850
P.F. WITHSTAND VOLTAGE (kVrms)	630	460
HIGHER SYSTEM VOLTAGE (kV)	420	245
CREEPAGE DISTANCE (mm)	13020	7595
SHORT CIRCUIT CAPABILITY (KA FOR 1SEC)	40	40
DYNAMIC CURRENT RATING (kAp)	100	100










KPCL-BTPS-03-BID-E-003	TENDER DRAWING - SINGLE LINE DIAGRAM																							
REFERENCE DRAWING NO.																								
ADDITIONAL INFORMATION W.O.No. 80007	KARNATAKA POWER CORPORATION LIMITED BELLARY THERMAL POWER STATION STAGE-III (1x700MW)																							
STATUS OF DRAWING	CONSULTANTS TRACTEBEL ENGINEERING PVT. LTD.																							
DISTRIBUTION OF PRINTS	<table><tr><td>TRACTEBEL Engineering</td><td>भारत हेवी इलेक्ट्रिकल्स लिमिटेड</td><td>विकास / NAME</td><td>हस्ता / SIGN.</td><td>दि./DATE</td></tr><tr><td></td><td>राजेश</td><td>RAJESH</td><td>RAJESH</td><td>30.11.10</td></tr><tr><td></td><td>अक्षय</td><td>AK/MS/VK</td><td></td><td></td></tr><tr><td></td><td>डि.एस.</td><td>DS</td><td></td><td></td></tr></table>				TRACTEBEL Engineering	भारत हेवी इलेक्ट्रिकल्स लिमिटेड	विकास / NAME	हस्ता / SIGN.	दि./DATE		राजेश	RAJESH	RAJESH	30.11.10		अक्षय	AK/MS/VK				डि.एस.	DS		
TRACTEBEL Engineering	भारत हेवी इलेक्ट्रिकल्स लिमिटेड	विकास / NAME	हस्ता / SIGN.	दि./DATE																				
	राजेश	RAJESH	RAJESH	30.11.10																				
	अक्षय	AK/MS/VK																						
	डि.एस.	DS																						
	विभाग DEPT.	उत्तुपात / SCALE	कार्ड कोड CARD CODE																					
	कोड CODE	NTS																						
	शीर्षक/TITLE SINGLE LINE DIAGRAM OF 400/220kV SWITCHYARD EXT			पृष्ठ क्र./DRAWING NO. TB 1 333 510 001																				
	पृष्ठ क्र./SHEET No. 1			अगला पृष्ठ/NEXT SHEET																				



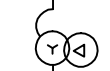
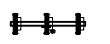
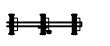
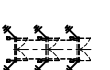





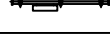
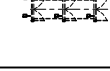











DESCRIPTION	400kV	220kV
HIGHEST SYSTEM VOLTAGE (kV)	420	245
LIGHTNING IMPULSE WITHSTAND VOLTAGE (kVp)	1425	1050
SWITCHING IMPULSE WITHSTAND VOLTAGE (kVp)	1050	850
P.F. WITHSTAND VOLTAGE (kV rms)	630	460
SYSTEM FAULT LEVEL (kA for 1sec)	50	50
CREEPAGE DISTANCE (mm)	13020	7595

MINIMUM CLEARANCE TABLE	400kV	220kV
PHASE TO PHASE (PP)	4100	2400
PHASE TO EARTH (PE)	3500	2100
SECTION CLEARANCE (SC)	6500	5000
VERTICAL GROUND CLEARANCE TO NEAREST PART NOT AT EARTH POTENTIAL OF AN INSULATOR SUPPORTING LIVE CONDUCTOR/EQUIPMENT	2440	2440
MINIMUM GROUND CLEARANCE (FROM PLINTH LEVEL)	8000	5500

	PRESENT SCOPE
	CUSTOMER/FUTURE SCOPE
	SHIELD WIRE
	4" IPS AL. TUBE
	FENCE
	TENSION STRING INSULATOR
	SUSPENSION STRING INSULATOR
	COLUMN WITHOUT PEAK
	COLUMN WITH PEAK

2. \*\* - 6 NO. OF 400KV PIN IN ICT-2 BAY TO BE REMOVED & TO BE REUSED.
3. FINAL CO-ORDINATES OF GT-3 & ST-4 SHALL BE PROVIDED BY PEM.
4. ALL CONNECTIONS MARKED WITH ASCR CONDUCTOR ARE WITH "MOOSE" (OVERALL DIA = 31.77mm) UNLESS OTHERWISE SPECIFIED. ALL CONNECTIONS MARKED WITH AL TUBE ARE WITH 4.0" IPS.
5. SWITCHYARD SHALL BE PROVIDED WITH GRAVELS. THE THICKNESS OF GRAVEL SHALL BE 150mm.
6. SHIELD WIRE CONDUCTOR OVERALL SIZE 10.98mm
7. LA PRESSURE RELIEF VALVE SHALL NOT BE TOWARDS TRANSFORMER SIDE/ANY EQUIPMENT KEPT NEAR LIGHTNING ARRESTERS.
8. FENCE & GATES AT HYRULI LINES SIDE OF PHASE-2 SWITCHYARD IS TO BE DISMANTLED AND RE-ERECTED AT THE SOUTHERN END OF CURRENT SWITCHYARD.
9. \*\*\* - ONE NO. BUS W/MT & ONE NO. ISOLATOR WITHOUT E/S ON 220KV SIDE OF ICT-2 ARE TO BE DIS-M/NTED & RELOCATED AS SHOWN IN DRAWING.

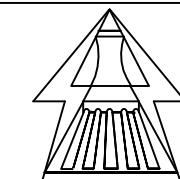

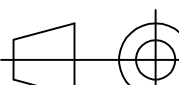

S.N.	ITEM DESCRIPTION	SYMBOL	KV	QTY.
1.	315 MVA, 400/220/33 kV, YnOd11, TAPPING =+10% to -10% IN STEPS OF 1.25%, THREE PHASE AUTO TRANSFORMER		ICT	01
2.	CIRCUIT BREAKER WITH PIR, THREE PHASE 3150A, 40kA FOR 1Sec.		400	02
3.	CIRCUIT BREAKER WITHOUT PIR, THREE PHASE 3150A, 40kA FOR 1Sec.		400	03
4.	ISOLATOR CENTER BREAK MOTOR OPERATED ELECTRICAL GANG WITH TWO E/S MANUAL OPERATED, THREE PHASE 2000A, 40kA FOR 1Sec.		400	03
5.	ISOLATOR CENTER BREAK MOTOR OPERATED ELECTRICAL GANG WITH ONE E/S MANUAL OPERATED, THREE PHASE 2000A, 40kA FOR 1Sec.		400	10
6.	CURRENT TRANSFORMER SCORE, SINGLE PHASE, 2000A, 40kA FOR 1Sec.		400	09
7.	CURRENT TRANSFORMER SCORE, SINGLE PHASE, 2000A, 40kA FOR 1Sec.		400	06
8.	CAPACITOR VOLTAGE TRANSFORMER, SINGLE PHASE		400	09
9.	SURGE ARRESTER, SINGLE PHASE, Class IV 20 kA, 360kV		400	09
10.	CIRCUIT BREAKER, THREE PHASE 1600A, 40kA FOR 1Sec.		220	01
11.	ISOLATOR CENTER BREAK MOTOR OPERATED MECH. GANG WITH ONE E/S MANUAL OPERATED, THREE PHASE 1600A, 40kA FOR 1Sec.		220	02
12.	ISOLATOR CENTER BREAK MOTOR OPERATED MECH.GANG WITHOUT E/S, THREE PHASE, 1600A, 40kA FOR 1Sec.		220	02+01**
13.	GANTRY MOUNTED UP-RIGHT ISOLATOR CENTRE BREAK MOTOR OPERATED MECH. GANG WITHOUT E/S, THREE PHASE, 1600A, 40kA FOR 1Sec.		220	01
14.	CURRENT TRANSFORMER SCORE, SINGLE PHASE, 1600A, 40kA FOR 1Sec.		220	03
15.	CAPACITOR VOLTAGE TRANSFORMER, SINGLE PHASE		220	01
16.	SURGE ARRESTER, SINGLE PHASE, Class III, 10 kA, 1-PH., 198kV		220	03
17.	POST INSULATOR (HIGH LEVEL)		400	60
18.	POST INSULATOR (LOW LEVEL)		400	42+6*
19.	POST INSULATOR (HIGH LEVEL)		220	19
20.	POST INSULATOR (LOW LEVEL)		220	13

REFERENCE:

SINGLE LINE DIAGRAM OF 400/220KV SWITCHYARD EXT  
SECTIONAL ELEVATION OF 400/220KV SWITCHYARD  
PLOT PLAN

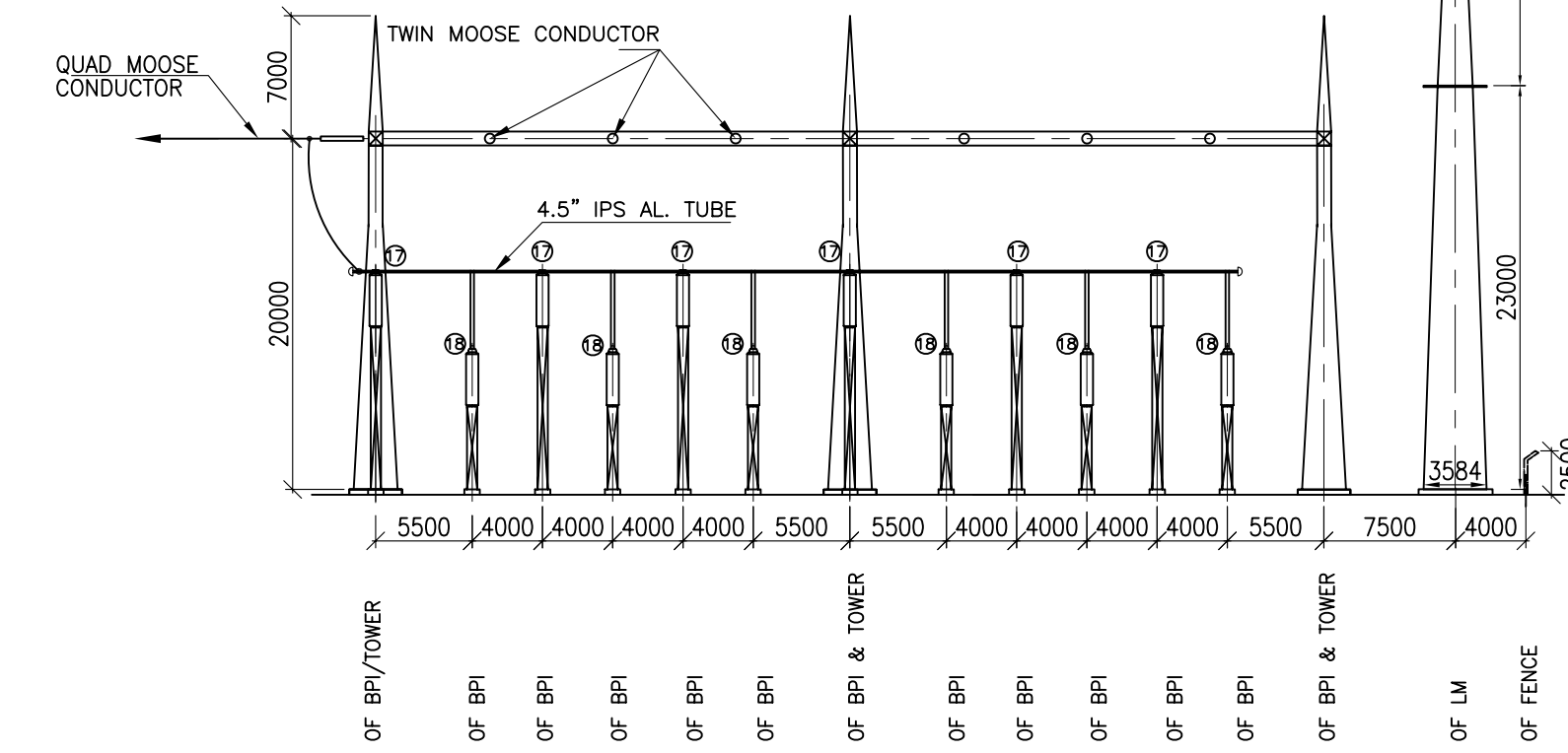
ADDITIONAL INFORMATION	
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STATUS	CONTRACT
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TRACTEBEL	- 1 COPY
BHEL/TBEM(CMIL)	- 1 COPY
BHEL/PEM	- 1 COPY

	REV.	DATE	ALTERED	MANOJ
	01	30.01.12	CHECKED	MS/DKM
			APPROVED	RS
02.	ZONE	REVISED BASED ON CUSTOMER COMMENTS DATED 17.11.11.		

 KARNATAKA POWER CORPORATION LTD.	KARNATAKA POWER CORPORATION LIMITED BELLARY THERMAL POWER STATION STAGE-III (1x700MW)									
CONSULTANTS TRACTEBEL Engineering & Construction	TRACTEBEL ENGINEERING PVT. LTD.									
	BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION NEW DELHI									
COPY RIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company.					DEPT CODE			NAME	SIGN	DATE
					422		DESIGN CHKD BY	<b>RK MS/AK DKM/RS</b>	-SD-	
							APP'D			
TITLE LAYOUT PLAN OF 400/220kV SWITCHYARD										
					DEPT.	SCALE : 1:800		DRAWING NO.		
				SIGN				TB - 0 333 316 001		
				DATE				SHEET -- OF -- REV. 02		



INVENTORY No.



SECTION-E-E

1. TB 1 333 510 001	SINGLE LINE DIAGRAM OF 400/220KV SWITCHYARD EXT
2. TB 1 333 316 001	LAYOUT PLAN OF 400/220KV SWITCHYARD
3. PE-DG-367-100-M001	PLOT PLAN

KARNATAKA POWER  
CORPORATION LTD.

KARNATAKA POWER CORPORATION LIMITED  
BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)

CONSULTANTS

TRACTEBEL Engineering  
GROUP PVT. LTD.

TRACTEBEL ENGINEERING PVT. LTD.

BHARAT HEAVY ELECTRICALS LTD.  
TRANSMISSION PROJECTS DIVISION  
NEW DELHI

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DEPT CODE	NAME	SIGN	DATE
422	DESIN RK	--SD--	
	CHD MS/AK		
	APPD DKM/RS		

TITLE

SECTIONAL ELEVATION OF 400/220kV SWITCHYARD

						DEPT.	SCALE 1:420
						SIGN	
						DATE	

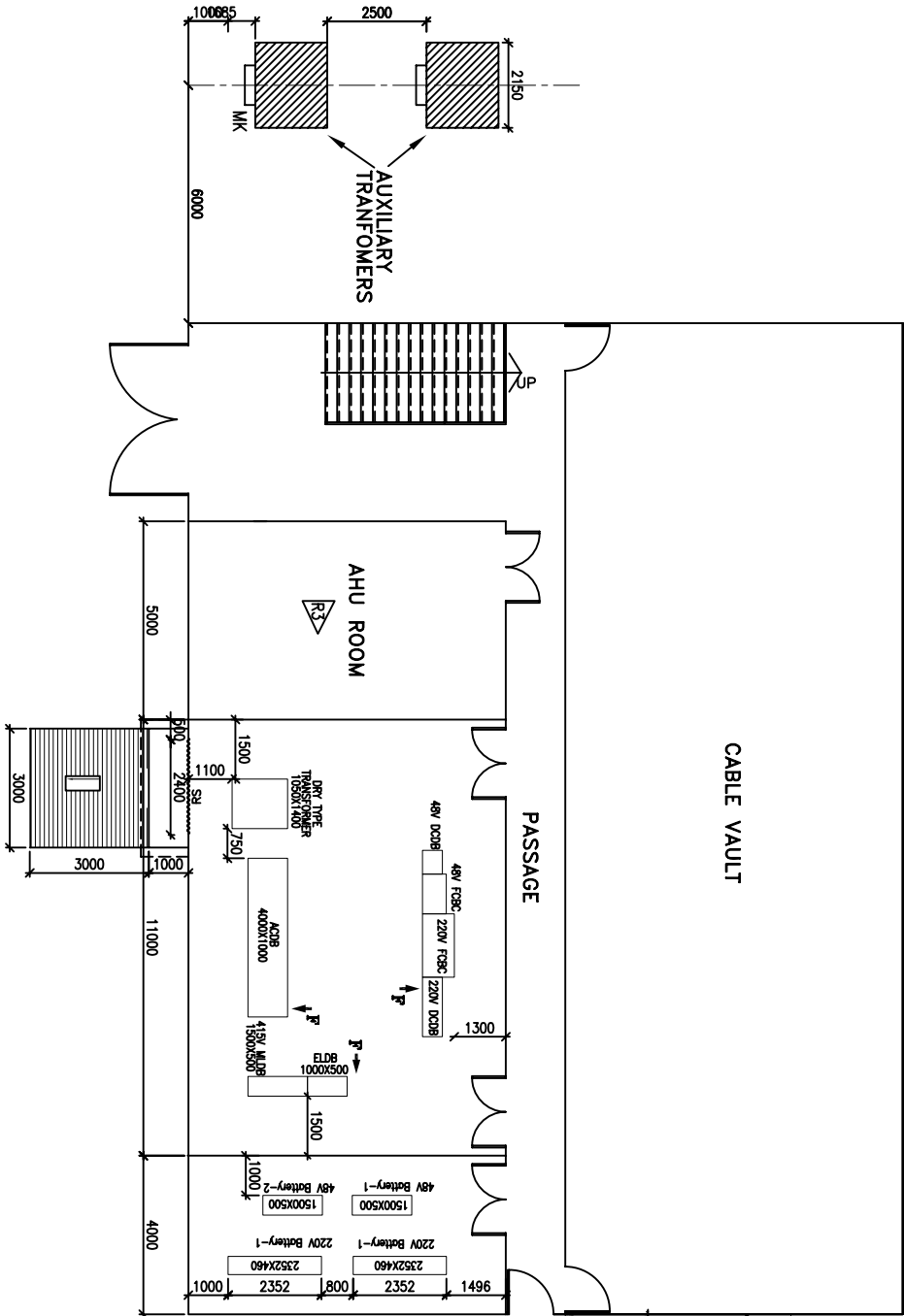
DRAWING NO.

TB 1 333 316 002

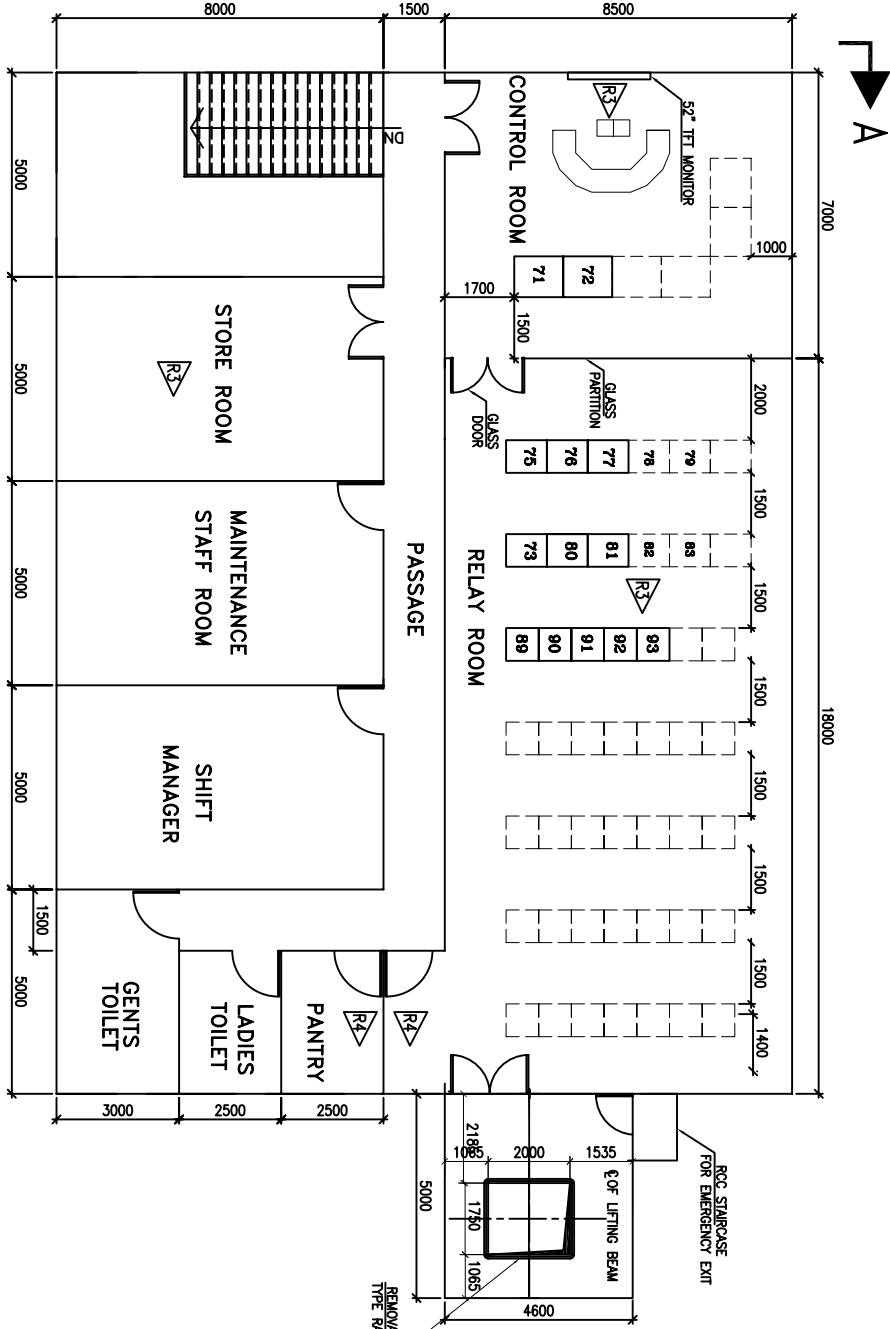
SHEET -- OF -- REV. 02



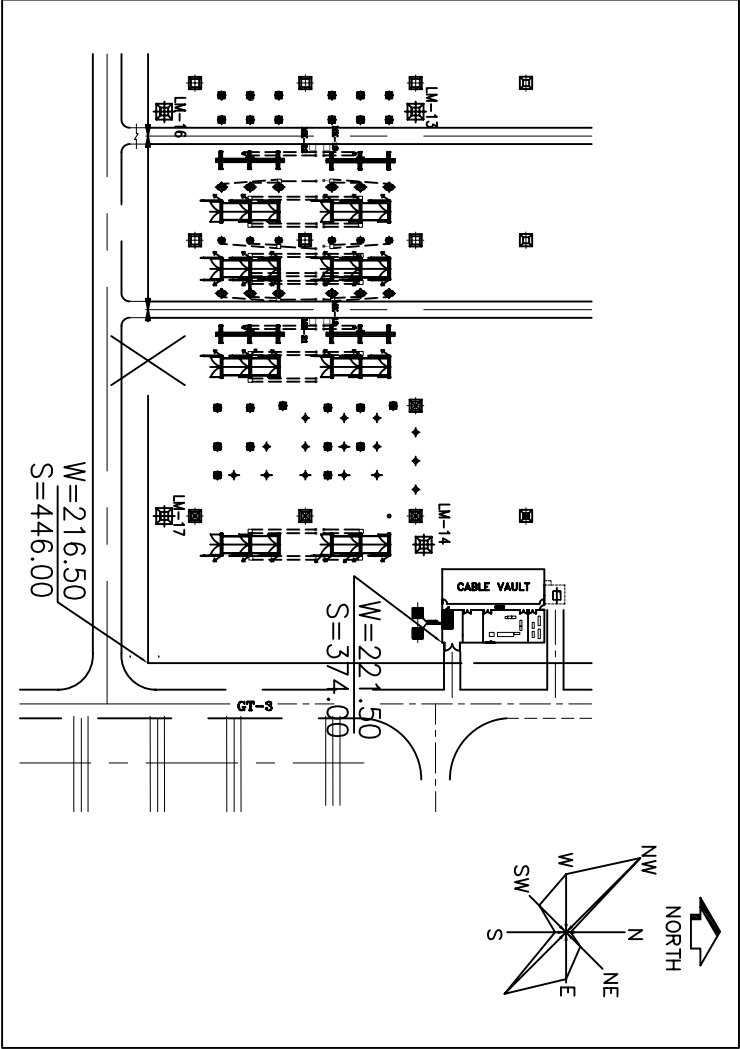
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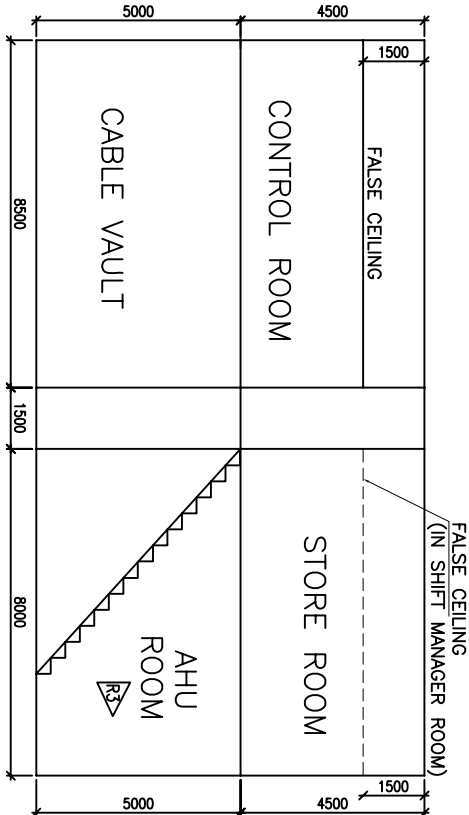
GROUND FLOOR PLAN FOR NEW SWITCHYARD  
CONTROL ROOM BUILDING FOR BTPS-3



FIRST FLOOR PLAN FOR NEW SWITCHYARD  
CONTROL ROOM BUILDING FOR BTPS-3



SECTION OF A-A



NOTE:  
1. AREAS ON FIRST FLOOR VIZ. CONTROL ROOM, RELAY ROOM & SHIFT MANAGER ROOM & MAINTENANCE STAFF ROOM SHALL BE AIR-CONDITIONED.  
2. PANEL LAYOUT DRAWING WILL BE SUBMITTED SEPARATELY.  
3. DETAILED CIVIL STRUCTURAL DRAWING WILL BE SUBMITTED SEPARATELY.  
4. BATTERY ROOM SHALL BE PROVIDED WITH ACID PROOF TILES FOR FLOORING & WALLS, EXHAUST FANS, EYE WASH BASIN, CORROSION PROOF ILLUMINATION SYSTEM ETC.  
5. CLEAR GAP BETWEEN BOTTOM OF BEAM TO FALSE CEILING SHALL BE MINIMUM 1m.  
6. AC PLANT ROOM SHALL BE MADE AIR TIGHT.  
----- INDICATES EXISTING/FUTURE OR NOT IN BRHL SCOPE  
..... INDICATES PRESENT SCOPE  
~~~~~ ROLLING SHUTTER (RS)  
7. CABLE ENTRY FOR ALL PANELS SHALL BE THROUGH BOTTOM.  
8. RAILING SHALL BE PROVIDED ON ALL SIDES OF CUTOUT FOR PANEL LIFTING.

| ADDITIONAL INFORMATION                                                       |          |
|------------------------------------------------------------------------------|----------|
| W.O. NO.                                                                     | CONTRACT |
| CONSULTANTS                                                                  |          |
| BHARAT HEAVY ELECTRICALS LTD.<br>TRANSMISSION PROJECTS DIVISION<br>NEW DELHI |          |
| TRACTEBEL ENGINEERING PVT. LTD.                                              |          |



BHARAT HEAVY ELECTRICALS LTD.  
TRANSMISSION PROJECTS DIVISION  
NEW DELHI



TRACTEBEL ENGINEERING PVT. LTD.



KARNATAKA POWER CORPORATION LIMITED  
BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



CONCEPTUAL CONTROL ROOM LAYOUT  
OF 400/220KV SWITCHYARD EXT



BHARTI HEAVY ELECTRICALS LIMITED  
TRANSMISSION PROJECTS DIVISION  
NEW DELHI



TRACTEBEL ENGINEERING PVT. LTD.



KARNATAKA POWER CORPORATION LIMITED  
BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



CONCEPTUAL CONTROL ROOM LAYOUT  
OF 400/220KV SWITCHYARD EXT



BHARTI HEAVY ELECTRICALS LIMITED  
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TRACTEBEL ENGINEERING PVT. LTD.



KARNATAKA POWER CORPORATION LIMITED  
BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



CONCEPTUAL CONTROL ROOM LAYOUT  
OF 400/220KV SWITCHYARD EXT



BHARTI HEAVY ELECTRICALS LIMITED  
TRANSMISSION PROJECTS DIVISION  
NEW DELHI



TRACTEBEL ENGINEERING PVT. LTD.



KARNATAKA POWER CORPORATION LIMITED  
BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



CONCEPTUAL CONTROL ROOM LAYOUT  
OF 400/220KV SWITCHYARD EXT



BHARTI HEAVY ELECTRICALS LIMITED  
TRANSMISSION PROJECTS DIVISION  
NEW DELHI



TRACTEBEL ENGINEERING PVT. LTD.



KARNATAKA POWER CORPORATION LIMITED  
BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



BELLARY THERMAL POWER STATION  
STAGE-III (1x700MW)



CONCEPTUAL CONTROL ROOM LAYOUT  
OF 400/220KV SWITCHYARD EXT



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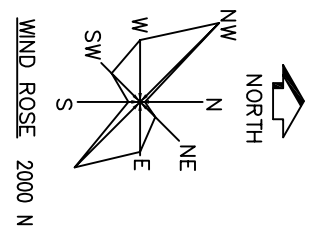


KARNATAKA POWER CORPORATION LIMITED  
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STAGE-III (1x700MW)



BELLARY THERMAL POWER STATION  
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NOTES:

- INDICATES CABLES LAID IN GI CONDUITS OF 100mm & 50mm OUTER DIA AT DEPTH OF 300mm (MAX.).
- CABLES FROM EQUIPMENT TO CABLE TRENCH & ABOVE GROUND CABLES CONNECTING TO INDIVIDUAL EQUIPMENT SHALL RUN IN GI PIPES.
- MARKED THIS INDICATES CABLE ENTRY/EXIT FROM EQUIPMENT.
- CABLES SHALL BE LAID IN THREE LAYERS AND CABLE SHALL BE SECURELY FIXED.

- INSERTS SHALL BE EMBEDDED AT EVERY 1.5M INTERVAL FOR CABLE TRAY SUPPORTS IN OUTDOOR CABLE TRENCH.
- 600x500x6000 OPENING WITHOUT ANY RACK SHALL BE PROVIDED BELOW MK & JB FOR CABLE ENTRY.
- AUXILIARY POWER CABLES SHALL BE LAID IN TOP TIERS AND CONTROL CABLES IN BOTTOM TIERS.
- GI CONDUITS MUST BE SECURELY FIXED AT BOTH ENDS, EITHER EMBEDDED IN CONCRETE OR PROPERLY CLAMPED.
- AFTER LAYING THE CABLES THE ENDS OF PIPES MUST BE FULLY SEALED TO PREVENT INGRESS OF WATER INSIDE THE PIPE.
- CONTROL CABLES & POWER CABLES SHALL BE LAID IN SEPARATE GI CONDUITS.
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
- EARTHING CONDUCTOR SHALL BE WELDED ON THE CABLE SUPPORTING STRUCTURE BEFORE INSTALLATION OF CABLE.
- CABLE TRENCH SHALL BE PROVIDED ON MARSHALLING BOX SIDE OF EQUIPMENT.

- 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.
- ALL GI CONDUITS MUST BE SLOPED TOWARDS THE CABLE TRENCH TO PREVENT ACCUMULATION OF WATER INSIDE THE PIPES.
- CIVIL DETAILS OF TRENCH WITH OPENINGS FOR ROUTING OF CABLES & LOCATION OF EQUIPMENT FOUNDATIONS WILL BE SHOWN IN A SEPARATE CIVIL DRAWING.
- HORIZONTAL BENDS IN CONDUITS TO BE AVOIDED. CONDUITS TO BE RUN STRAIGHT FROM EQUIPMENT TO TRENCH/MK/JB.
- MINIMUM 40% VOID SHALL BE LEFT OUT IN THE PIPES.
- BOTH ENDS OF GI CONDUITS (CONNECTING MAIN CABLE TRENCH AND EQUIPMENT JB) SHALL BE CLOSED BY FIRE PROOF SEALING COMPOUND.
- PULL BOXES (400x400x400) SHALL BE USED AT THE FREE END TURNING AND @15M IF PIPE LENGTH EXCEEDS 15M.
- DETAILS OF LADDER TYPE CABLE TRAY SHALL BE FURNISHED SEPARATELY.

- EXISTING/ PEW'S SCOPE
- PRESENT SCOPE
- 2-2 TRENCH SECTION
- 2A-2A TRENCH SECTION
- 3-3 TRENCH SECTION
- 3A-3A TRENCH SECTION

TABLE-1

| GI PIPES : WELDED GALV (AS PER IS:1259-1990) - FROM TRENCH TO EQUIP. |           |
|----------------------------------------------------------------------|-----------|
| SIZE                                                                 | THICKNESS |
| 1. 400/220KV                                                         | 10mm      |
| 2. 400/220KV                                                         | 10mm      |
| 3. 400/220KV                                                         | 10mm      |
| 4. 400/220KV                                                         | 10mm      |
| 5. 400/220KV                                                         | 10mm      |
| 6. 400/220KV                                                         | 10mm      |
| 7. 400/220KV                                                         | 10mm      |
| 8. 400/220KV                                                         | 10mm      |
| 9. 400/220KV                                                         | 10mm      |
| 10. 400/220KV                                                        | 10mm      |

REFERENCE:

- IS 133 510 001 SINGLE LINE DIAGRAM OF 400/220KV SWITCHYARD
- IS 133 516 002 SECTIONAL ELEVATION OF 400/220KV SWITCHYARD
- IS 133 517 001 PLOT PLAN

KARNATAKA POWER CORPORATION LIMITED

BELLARY THERMAL POWER STATION

STAGE-III (1x700MW)

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NEW DELHI

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TITLE

TRENCH LAYOUT OF 400/220KV SWITCHYARD

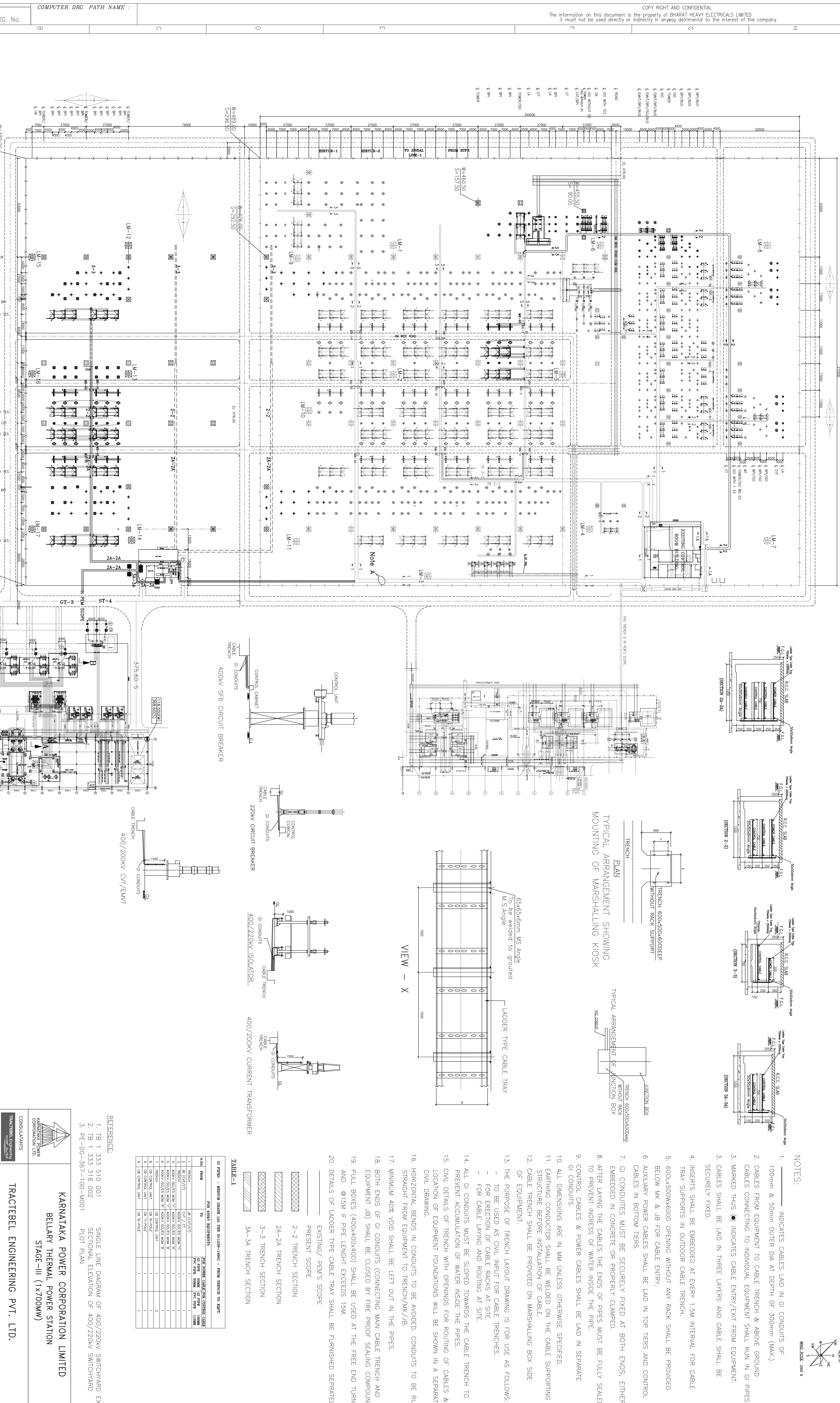
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| APPROVED |       |      |      |

| REV. | DATE       | ALTERED | CHECKED | APPROVED |
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| 4    | 13/07/2011 | 1       | 1       | 1        |
| 5    | 13/07/2011 | 1       | 1       | 1        |
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| 8    | 13/07/2011 | 1       | 1       | 1        |
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| 10   | 13/07/2011 | 1       | 1       | 1        |
| 11   | 13/07/2011 | 1       | 1       | 1        |
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| 12   | 13/07/2011 | 1       | 1       | 1        |



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COMPUTER DRG. PATH NAME :

INVENTORY No.

SIGN. & DATE

REF. DRG. No.



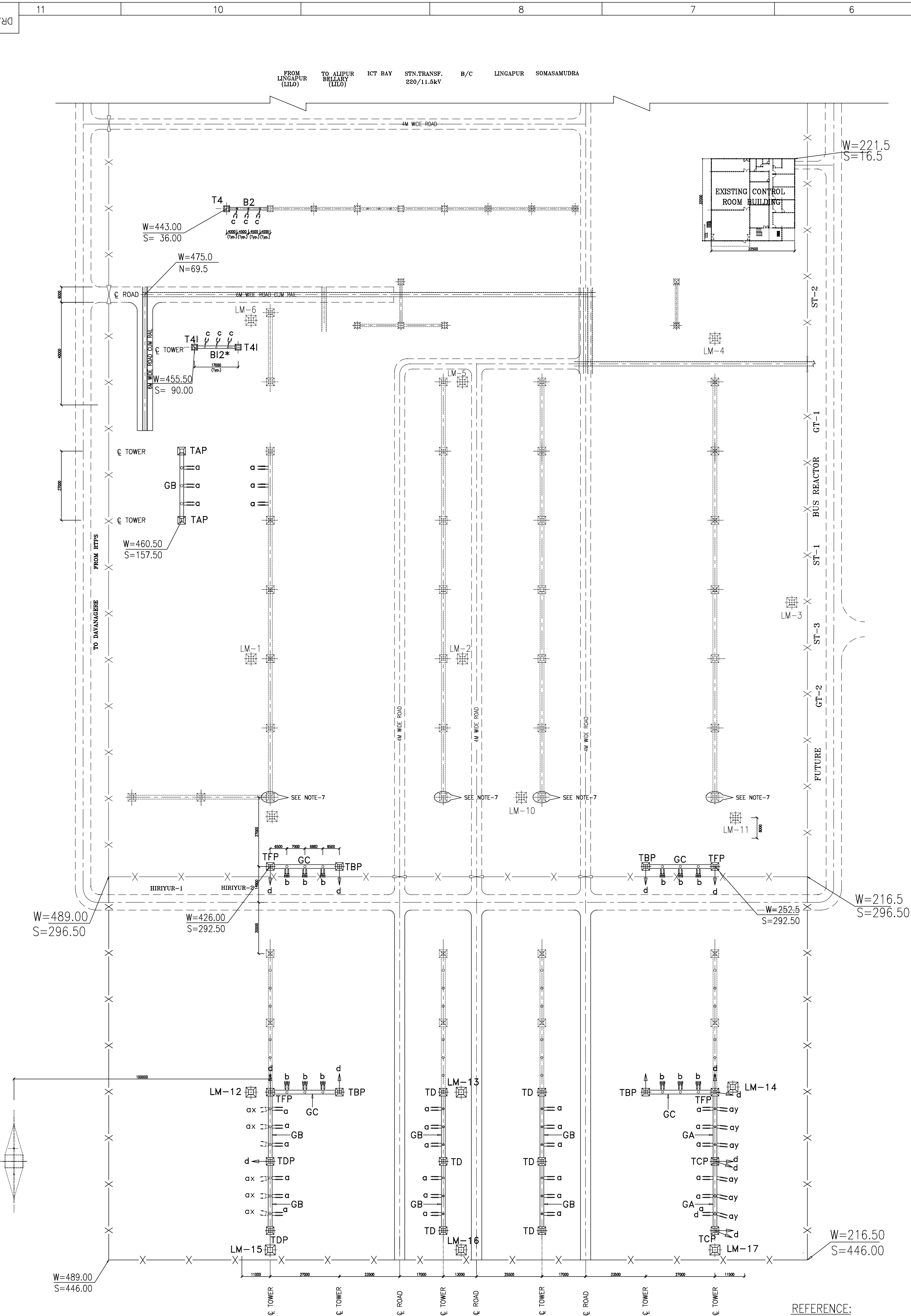
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COMPUTER DRG. PATH NAME :

REF. DRG. No.

SIGN. & DATE

INVENTORY No.



STRUCTURE LOADING

| NOTATION | VOLTAGE (kV) | No. of points of anchoring | No. & Type of Cond./ Shield Wire per Phase           | Normal Tension Per Phase (kg) | S/C Tension Per Phase(kg) | Separation Between Spacers (meters) | REMARKS                                                                                     |
|----------|--------------|----------------------------|------------------------------------------------------|-------------------------------|---------------------------|-------------------------------------|---------------------------------------------------------------------------------------------|
| ax       | 400          | 2                          | TWIN ACSR MOOSE with 30° deviation. SPAN = 100000 MM | 2000                          | —*                        | —                                   | *#: APPROVED BY KPCL VIDE LETTER NO. TDBT2/EPC/TBEM/963 DATED 15.06.09 FOR BELLARY STAGE-II |
| a        | 400          | 2                          | TWIN ACSR MOOSE SPAN = 67500 MM                      | 2000                          | 4265 #                    | 7                                   |                                                                                             |
| ay       | 400          | 2                          | TWIN ACSR MOOSE SPAN = 150000 MM with 30° deviation. | 6000                          | 7532 #                    | 9                                   |                                                                                             |
| b        | 400          | 2                          | QUAD ACSR MOOSE SPAN = 88000 MM                      | 4000                          | 4480                      | 6                                   |                                                                                             |
| c        | 220          | 1                          | TWIN ACSR MOOSE SPAN = 56000 MM with 30° deviation.  | 2000                          | 2510                      | 2                                   |                                                                                             |
| d        | —            | —                          | SHIELD WIRE                                          | 800 with 30° deviation        | Not Aplicable             | Not Aplicable                       |                                                                                             |

TOWERS

| SL.NO.              | TOWER DESIGNATION | STR. HEIGHT      | QTY.  | VOLTAGE (kV) |
|---------------------|-------------------|------------------|-------|--------------|
| 1                   | TAP \$            | 20M+7.0M (P)     | 02    | 400          |
| 2                   | TBP \$            | 20M+7.0M (P)     | 04    | 400          |
| 3                   | TCP \$            | 20M+7.0M (P)     | 02    | 400          |
| 4                   | TD/TDP \$         | 20M+7.0M (P)     | 06/02 | 400          |
| 5                   | TFP               | 20M+7.0M (P)     | 04    | 400          |
| 6                   | T4 \$             | 16.2M            | 01    | 220          |
| 7                   | T4I \$            | 16.2M            | 02    | 220          |
| TOTAL NO. OF TOWERS |                   |                  | 23    |              |
| 8                   | TLM \$            | 40M+2.0M (Spike) | 06    | LM           |

\$ : ALREADY APPROVED STRUCTURE DESIGN/DRAWING FOR PHASE-1 & 2 TO BE FOLLOWED.

NOTES:

- ALL DIMENSIONS ARE IN MM
- SUB CONDUCTOR SPACING SHALL BE AS FOLLOWS:  
450mm FOR 400kV  
250mm FOR 220kV
- DEVIATION ANGLE FOR TERMINAL/ TAKE OF GANTRY SHALL BE ±30° OF THE CONDUCTOR/SHIELD WIRE IN HORIZONTAL & VERTICAL PLANE.
- THE TRANSVERSE, VERTICAL, LOGITUDINAL LOADS SHALL BE CONSIDERD AS PER IS 802: 1995
- WEIGHT OF THE MAN WITH TOOLS AT ANY POINT OF TIME SHALL BE CONSIDERED ON BEAM AS 150 Kg.
- ALL HEIGHTS ARE WITH REFERENCE TO PLINTH LEVEL. PLINTH LEVEL IS 300 MM ABOVE FINISH GROUND LEVEL
- SIXTH COLUMN OF THE TABLE FOR "SHORT CIRCUIT TENSION" SHOWS MAXIMUM SHORT CIRCUIT FORCE IN KG. UNDER MINIMUM TEMPERATURE AND MAXIMUM WIND CONDITIONS.
- EXISTING TOWERS AS MARKED ARE NOT EXTENDABLE TYPE.

BEAMS

| SL.NO.             | STR. DESIGNATION | SPAN | QTY. | VOLTAGE (kV) |
|--------------------|------------------|------|------|--------------|
| 1                  | GA \$            | 27M  | 02   | 400          |
| 2                  | GB \$            | 27M  | 07   | 400          |
| 3                  | GC               | 27M  | 04   | 400          |
| 4                  | B2 \$            | 17M  | 01   | 220          |
| 5                  | BI2* \$          | 17M  | 01   | 220          |
| TOTAL NO. OF BEAMS |                  | 15   |      |              |

BI2\* : UP-RIGHT ISOLATOR SHALL BE MOUNTED OVER THIS GANTRY.



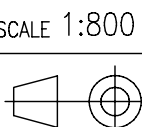
Approval Category:  
\* DRAWING APPROVED AS SUBMITTED. RELEASE DISTRIBUTION PRINTS  
Transmittal No. P.001794/TEPL/BHEL/TBG/026  
Date: 16.05.2012  
Name of person approving: Sameek Saini  
the drwg. / doc.

REFERENCE:

- TB 0 333 316 001 LAYOUT PLAN OF 400/220kV SWITCHYARD EXT
- TB 1 333 316 002 SECTIONAL ELEVATION OF 400/220kV SWITCHYARD

|                        |          |
|------------------------|----------|
| ADDITIONAL INFORMATION | 80007    |
| W.O. NO.               |          |
| STATUS                 | CONTRACT |
| DISTRIBUTION           |          |

| REV. | DATE     | ALTERED        | AK             |
|------|----------|----------------|----------------|
| 01   | 04.01.12 | CHECKED MS     | CHECKED MS     |
| 02   | 09.01.12 | CHECKED DKM    | CHECKED DKM    |
| 03   | 30.01.12 | CHECKED MS/DKM | CHECKED MS/DKM |
| 04   | 17.04.12 | MANOJ          | MANOJ          |

|                                                                                                                                                                                                                             |  |                                                                                             |                                                                                       |              |                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------|------------------|
| <br>KARNATAKA POWER CORPORATION LTD.                                                                                                   |  | KARNATAKA POWER CORPORATION LIMITED<br>BELLARY THERMAL POWER STATION<br>STAGE-III (1x700MW) |                                                                                       |              |                  |
| CONSULTANTS                                                                                                                                                                                                                 |  | TRACTEBEL ENGINEERING PVT. LTD.                                                             |                                                                                       |              |                  |
|                                                                                                                                        |  | BHARAT HEAVY ELECTRICALS LTD.<br>TRANSMISSION PROJECTS DIVISION<br>NEW DELHI                |                                                                                       |              |                  |
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| TITLE                                                                                                                                                                                                                       |  | STRUCTURE LOADING DIAGRAM OF 400/220kV<br>SWITCHYARD EXTENSION                              |                                                                                       |              |                  |
|                                                                                                                                                                                                                             |  |                                                                                             |                                                                                       |              |                  |
|                                                                                                                                                                                                                             |  | DEPT.                                                                                       | SCALE 1:800                                                                           |              | DRAWING NO.      |
|                                                                                                                                                                                                                             |  | SIGN                                                                                        |  |              | TB 1 333 316 008 |
|                                                                                                                                                                                                                             |  | DATE                                                                                        |                                                                                       |              |                  |
|                                                                                                                                                                                                                             |  |                                                                                             | SHEET 01                                                                              | OF 01        | REV. 04          |