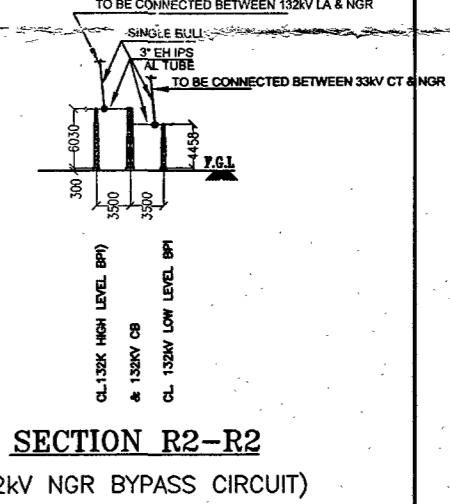
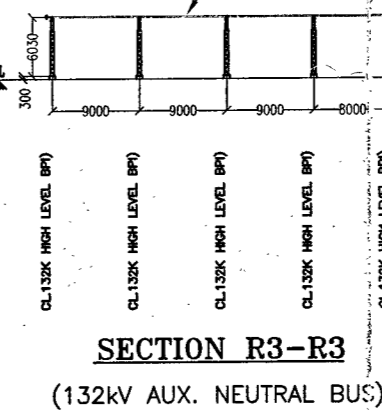
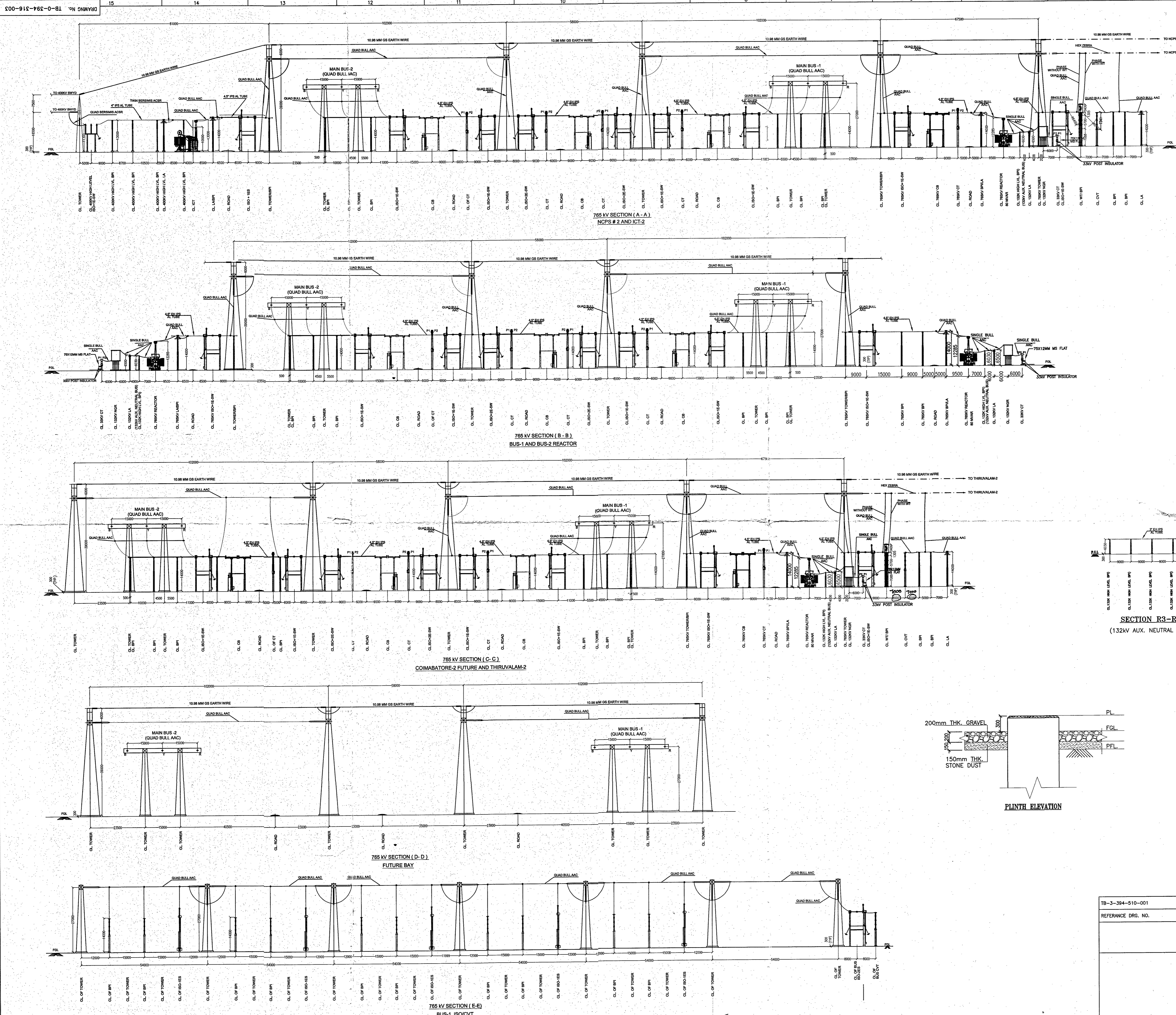


**ANNEXURE-5 (DRAWINGS LIST)**

<b>Sl. No.</b>	<b>Description of drg./doc.</b>	<b>Drg./doc. No.</b>	<b>Rev no.</b>
1.	Layout for 765kV/400kV Ariyalur S/s	TB-0-394-316-002	05
2.	Section and elevation for 765kV/400kV Ariyalur S/s	TB-0-394-316-003	05
3.	Single line diagram for 765kV/400kV Ariyalur S/s	TB-0-394-510-001	05
4.	Outdoor trench layout for 765kV/400kV Ariyalur S/s	TB-0-394-316-005	02
5.	Conceptual switchyard panel room drawing	TB-3-394-316-017	00
6.	Structure loading diagram of 765kV/400kV Ariyalur S/s	TB-0-394-316-011	00
7.	Earthmat layout for 765kV/400kV Ariyalur S/s	TB-0-394-316-007	03
8.	Equipment and structure earthing details	TB-4-394-316-012	01
9.	Conceptual control room building layout for 765kV/400kV Ariyalur S/S	TB-3-394-316-010	01
10.	Single line diagram for LT AC & DC sytem	TB-0-394-316-004	02
11.	Erection key diagram	TB-3-394-316-006	01
12.	Panel placement Layout (Control room & SPR)	TB-3-394-316-008A	02
13.	500MVA, 765/400kV ICT drawings	1TY.710.30027.101 8TY.860.30027.1	01 02
14.	80MVAr, 765kV Reactor drawings	CGT3-OGA-14224Q CGT3-R&D-14685Q	02 01



5	4
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TB-3-394-510-001	SINGLE LINE DIAGRAM OF 765 /400 KV SWITCHYARD ARYALUR
REFERENCE DRG. NO.	TITLE
	TAMILNADU TRANSMISSION CORPORATION, LTD. 765/400KV AIS S/S ARYALUR IN VILLUPURAM
NAME OF CUSTOMER/PROJECT	
SCALE	1:1000
DRG CODE	
TITLE	765KV SECTION ELEVATION OF 765/400 KV S/S ARYALUR
DRAWING NO.	TB-0-394-316-003
REV.	05
DATE	24/02/2020
BY	Assistant Engineer
CHECKED	Executive Engineer
APPROVED	Chief Engineer

ASSISTANT EXECUTIVE ENGINEER,  
SUB STATION ERECTION,  
CUDDALORE - 607 004.

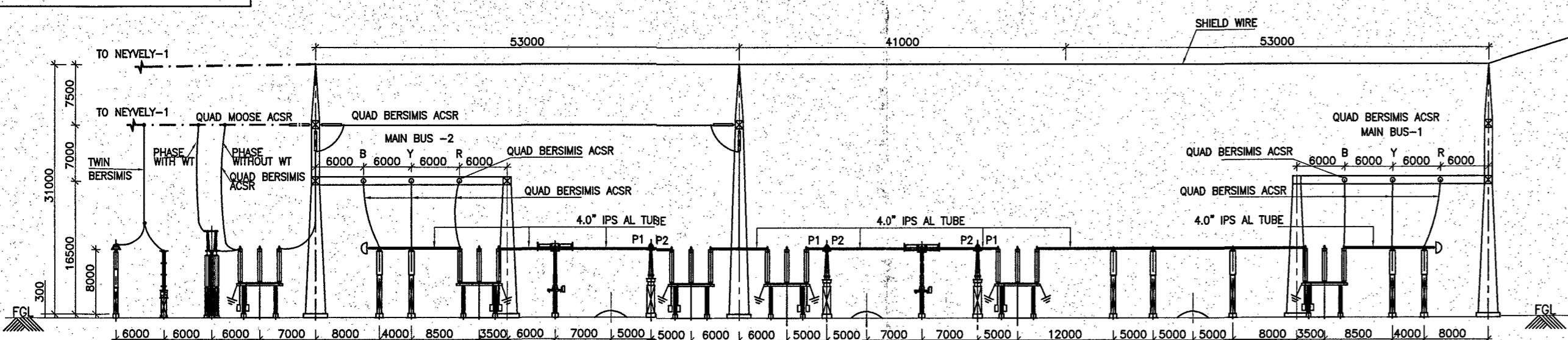
Assistant Engineer,  
Transmission Line Construction/TANTRANSCO  
Sankarapuram.

Executive Engineer,  
Transmission Line Construction/TANTRANSCO  
Sankarapuram.

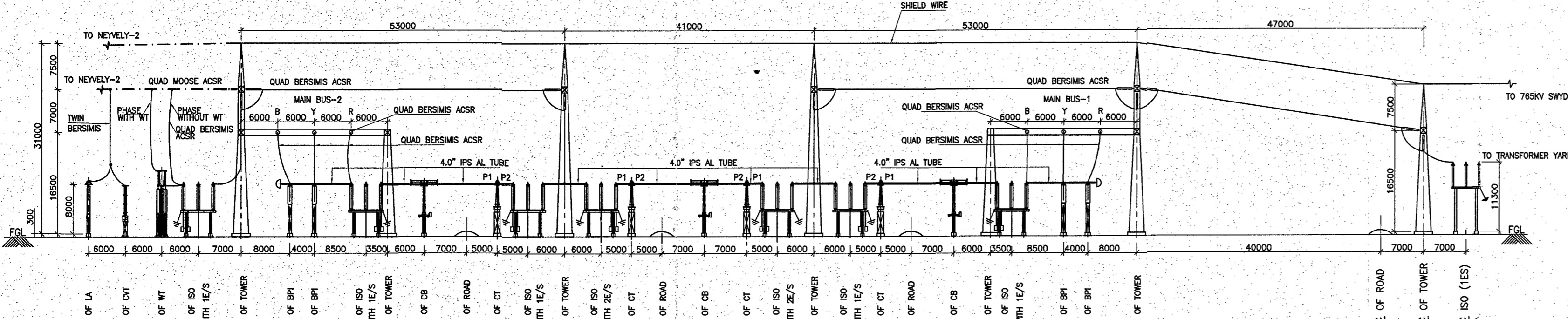
ADDL CHIEF ENGINEER  
GENERAL CONSTRUCTION CIRCLE  
TANTRANSCO  
TIRUCHIRAPPALLI - 620 020.

CHIEF ENGINEER, TRANSMISSION PROJECT-II  
TANTRANSCO, Trichy - 20.

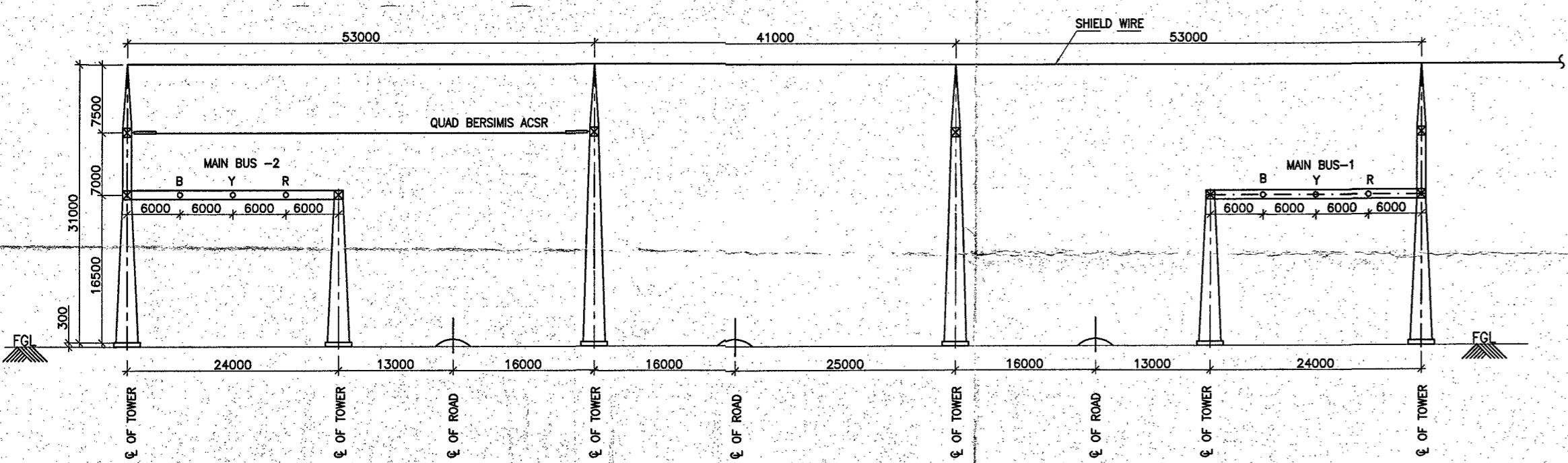
500-912-765-0-01 ON 01/01/2020



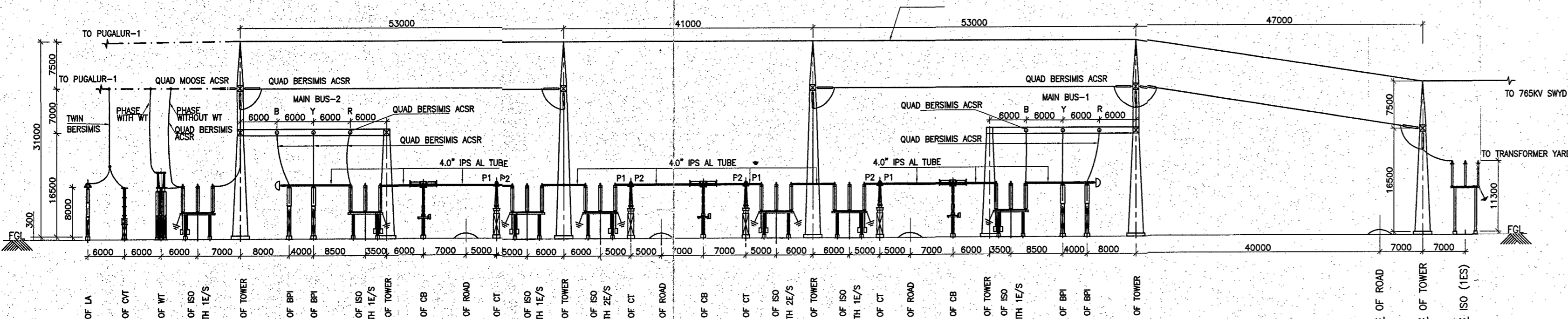
400KV (SECTION F-F)  
NEVELY # 1



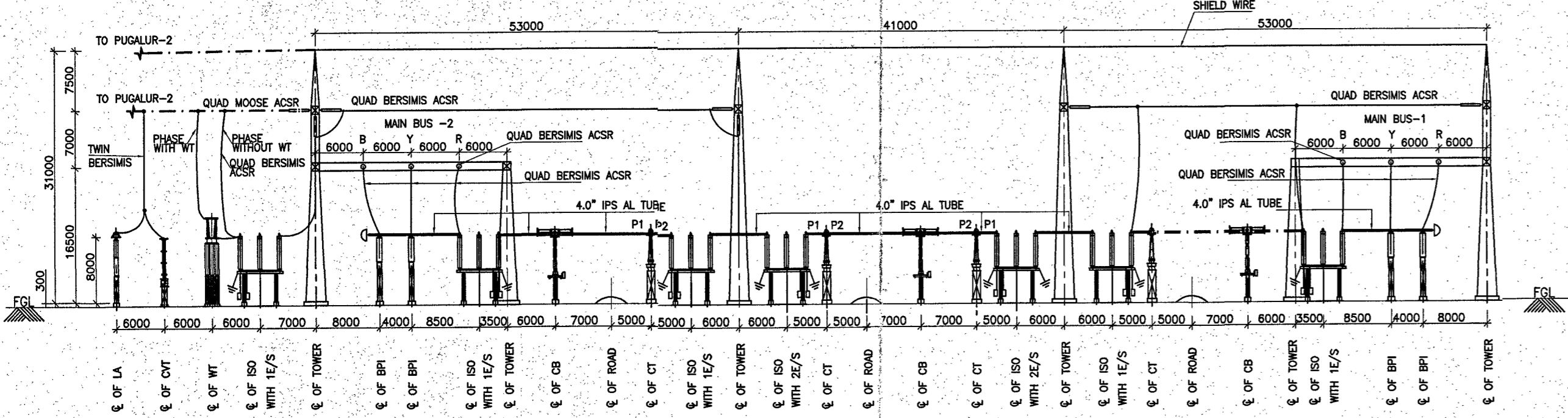
400KV (SECTION G-G)  
NEVELY # 2 AND ICT-1



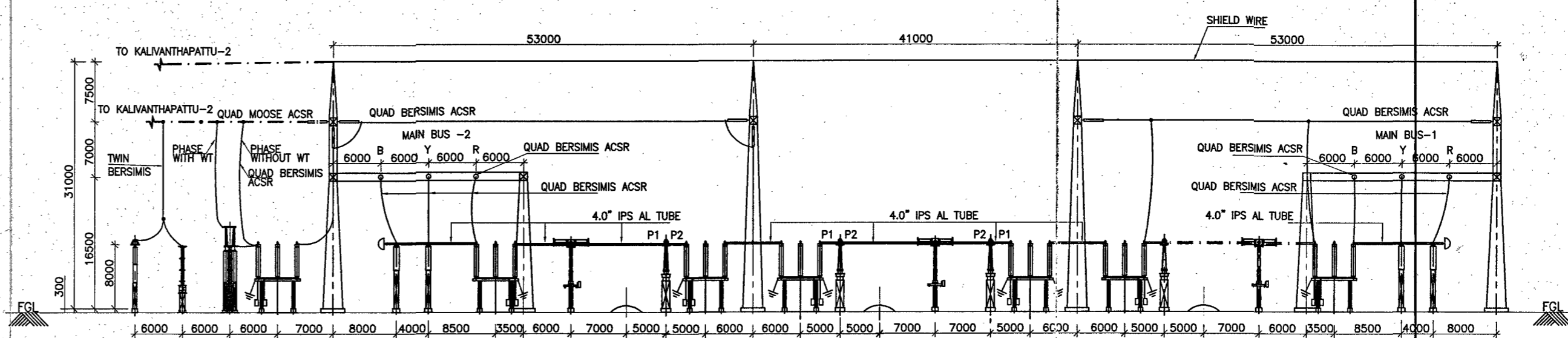
400KV (SECTION H-H)  
FUTURE BUS-2 REACTOR



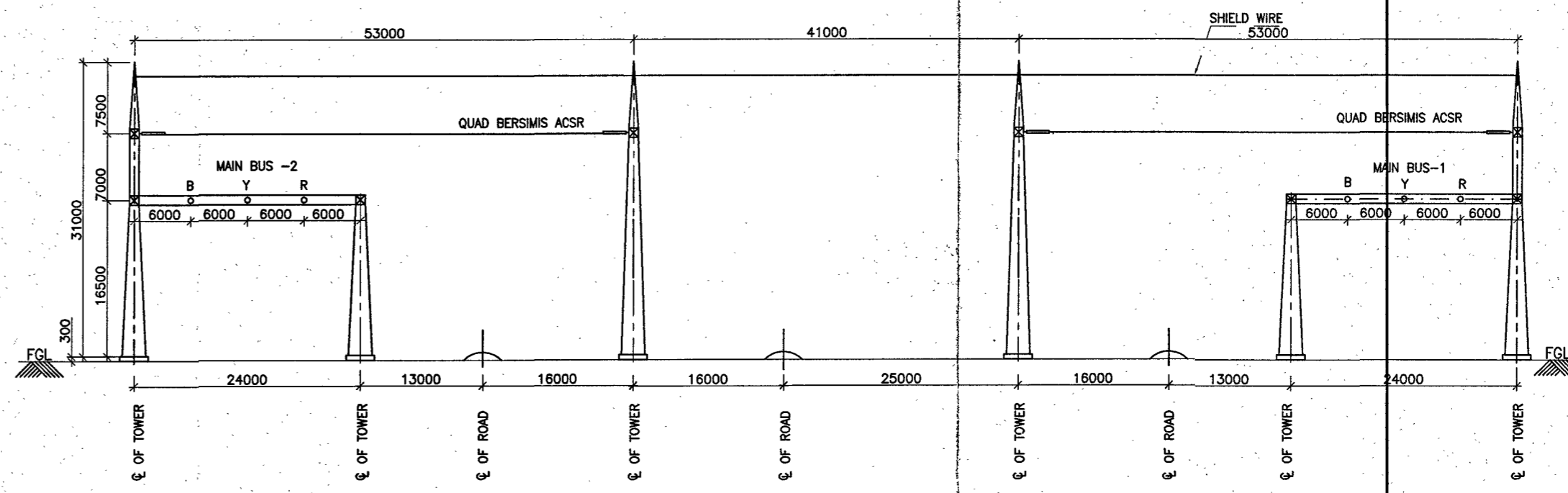
400KV (SECTION I-I)  
PUGALUR # 1 AND ICT-2



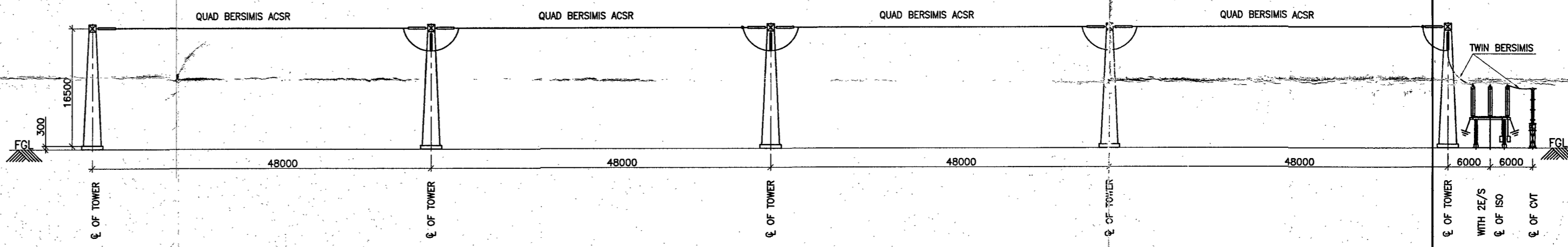
400KV (SECTION J-J)  
PUGALUR # 2 & FUTURE BUS-1 REACTOR



400KV (SECTION K-K)  
KALIVANTHAPATTU # 2 & FUTURE BAY # 4



400KV (SECTION L-L)  
FUTURE-1 & FUTURE-2



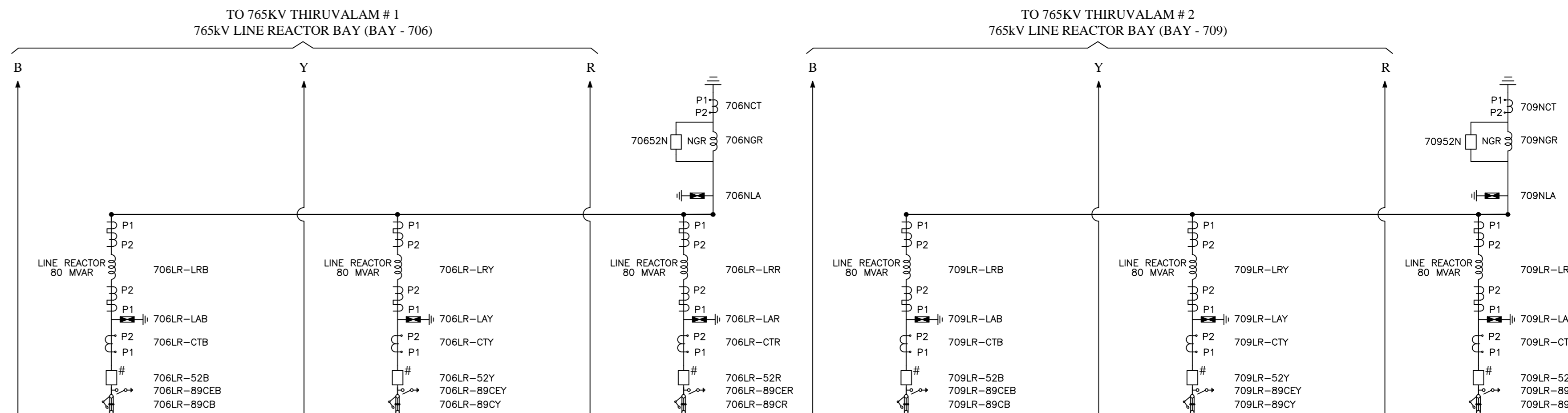
400KV (SECTION M-M)  
BUS-1 CVT AND ISOLATOR/CVT

INVENTORY NO. :  
SIN. & DATE :  
REF. DRG. NO. :  
COMPUTER DRG. DATE NAME :  
THE DRAWING IS THE PROPERTY OF TAMILNADU TRANSMISSION CORPORATION, LTD. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM THE COMPANY.

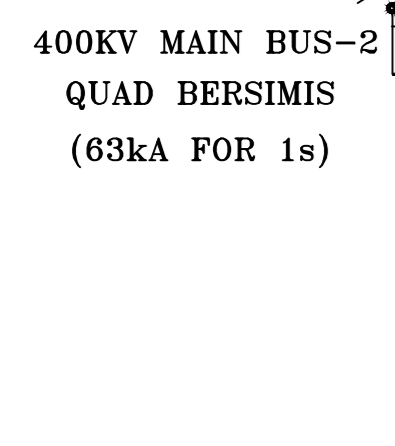
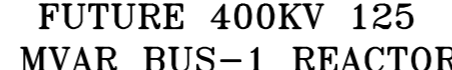
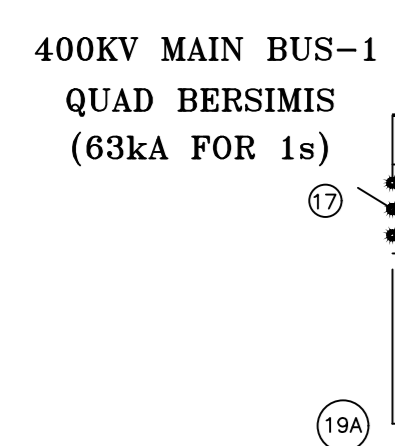
ASSISTANT EXECUTIVE ENGINEER, SUB STATION ERECTION, CUDDALORE - 607 004.  
Assistant Engineer, Transmission Line Construction/TANTRANSCO, Sankarapuram.  
Assistant Executive Engineer, Transmission Line Construction/TANTRANSCO, Sankarapuram.  
EXECUTIVE ENGINEER, CIVIL/TP/765KV, SANKARAPURAM.  
ADDL. CHIEF ENGINEER, GENERAL CONSTRUCTION CIRCLE, TANTRANSCO, TIRUCHIRAPPALLI - 620 020.

CHIEF ENGINEER, TRANSMISSION PROJECT-II, TANTRANSCO, Trichy - 20.

TB-3-394-510-001	SINGLE LINE DIAGRAM OF 765 /400 KV SWITCHYARD ARYALUR
REFERENCE DRG. NO.	TITLE
TAMILNADU TRANSMISSION CORPORATION, LTD. 765/400KV AIS S/S ARYALUR IN VILLUPURAM	
NAME OF CUSTOMER/PROJECT	
/SCALE 1:1000	
/TITLE 400KV SECTION-ELEVATION OF 765/400 KV S/S ARYALUR	
DRAWING NO. TB-0-394-316-003	
/SHEET NO. 2	
/NEXT SHEET	

[illegible][illegible]

**DETAIL-D**  
(ARRANGEMENT OF 765/400kV ICT-2 AND AUX. BUS.)



400 KV  
NEYVELY # 2

400 KV M  
NEYVELY # 1

FUTURE 400KV 125  
MVAR BUS-2 REACTOR

400 KV  
RUCALUR # 2

400 KV  
RUGALUR # 1 KAI

400 KV  
SALIVANTHARATTU # 1

400 KV  
KALIVANTHARATT

400 KV	
#	FUTURE #
2	

### 400KV SINGLE LINE DIAGRAM

REV.	DATE	ALTERED	WPK		REV.	DATE	ALTERED	PX	-SD-	REV.	DATE	ALTERED	PX	-SD-	REV.	DATE	ALTERED	PX	-SD-
06	03.08.21	CHECKED	WTK		04	11.02.19	CHECKED	SX/SB/YK	-SD-	03	16.01.10	CHECKED	SX/SB/YK	-SD-	02	10.08.17	CHECKED	SX/SB/YK	-SD-
		APPROVED	SBS				APPROVED	DM/AG	-SD-			APPROVED	DM/AG	-SD-			APPROVED	DM/RS	-SD-
ZONE	ADDDY & TRSY LNW FEEDER NAMES REVISED AS PER HANDBOOK LETTER DATED 20.05.21 & 03.05.21.				ZONE	AS PER SPT APPROV DM/AG DATED 06.05.19				ZONE	AS PER CUSTOMER LETTER DATED 04.05.16.				ZONE	AS PER CUSTOMER LETTER DATED 01.06.17 & 09.06.17			

[illegible]

FIRST ANGLE PROJECTION ( ALL DIMENSIONS ARE IN MM. )

100-010-394-510-TB DRAWING No.

BILL OF QTY. FOR 765kV MAIN EQUIPMENTS:

SL.NO.	DESCRIPTION	RATING	QTY.(NO.) (ORIGINAL SCOPE)	QTY.(NO.) (ADDITIONAL SCOPE) \$\$	SYMBOL	LEGEND
1	500 MVA, (1-PH) ICT	765/400/33KV	6	-		T
2	80MVAR LINE REACTOR (1-PH) WITH NGR	765KV	6	6		LR/NGR
3	80MVAR BUS REACTOR (1-PH) WITH NGR	765KV	6	-		BR/NGR
4	SF6 CIRCUIT BREAKER WITH PIR, WITH CSD (3-PH)	3150A	2	-		52
5	SF6 CIRCUIT BREAKER WITH PIR,WITHOUT CSD (3-PH)	3150A	6	-		52
6	SF6 CIRCUIT BREAKER WITHOUT PIR,WITH CSD (3-PH)	3150A	7	2		52
7	ISOLATOR WITH ONE E/SW (3 PH) VERTICAL KNEE TYPE	3150A	30	2		89/89E
8	ISOLATOR WITH TWO E/SW (3 PH) VERTICAL KNEE TYPE	3150A	12	-		89/89E1 /89E2
9	6 CORE CURRENT TRANSFORMER (1 PH.)	3000A	60	6		CT
10	CVT (1 PH.) WITH SECONDARY BURDEN 50VA	4400pF	12	-		CVT
10A	CVT (1 PH.) WITH SECONDARY BURDEN 100VA	4400pF	06	-		CVT
11	SURGE ARRESTER (1 PH.)	624 kV	30	6		LA

BILL OF QTY. FOR 400kV MAIN EQUIPMENTS:

SL.NO.	DESCRIPTION	RATING	QTY.(NO.) (ORIGINAL SCOPE)	QTY.(NO.) (ADDITIONAL SCOPE) \$\$	QTY.(NO.) (ADDITIONAL SCOPE) \$\$\$	SYMBOL	LEGEND
15	SF6 CIRCUIT BREAKER WITHOUT PIR,WITHOUT CSD (3-PH)	3150A	05	-	1		52
16	ISOLATOR WITH ONE E/SW (3 PH) DOUBLE BREAK TYPE	3150A	28	-	3		89/89E
17	ISOLATOR WITH TWO E/SW (3 PH) DOUBLE BREAK TYPE	3150A	12	-	2		89/89E1 /89E2
18	6 CORE CURRENT TRANSFORMER (1 PH.)	3000A	54	-	6		CT
19	CVT (1 PH.) WITH SECONDARY BURDEN 50VA	4400pF	18	-	-		CVT
19A	CVT (1 PH.) WITH SECONDARY BURDEN 100VA	4400pF	06	-	-		CVT
20	SURGE ARRESTER (1 PH.)	390 kV	24	-	-		LA
21	SF6 CIRCUIT BREAKER WITH PIR WITHOUT CSD	3150A	08	PIR FEATURE INCLUDED	-		52

SYSTEM PARAMETERS

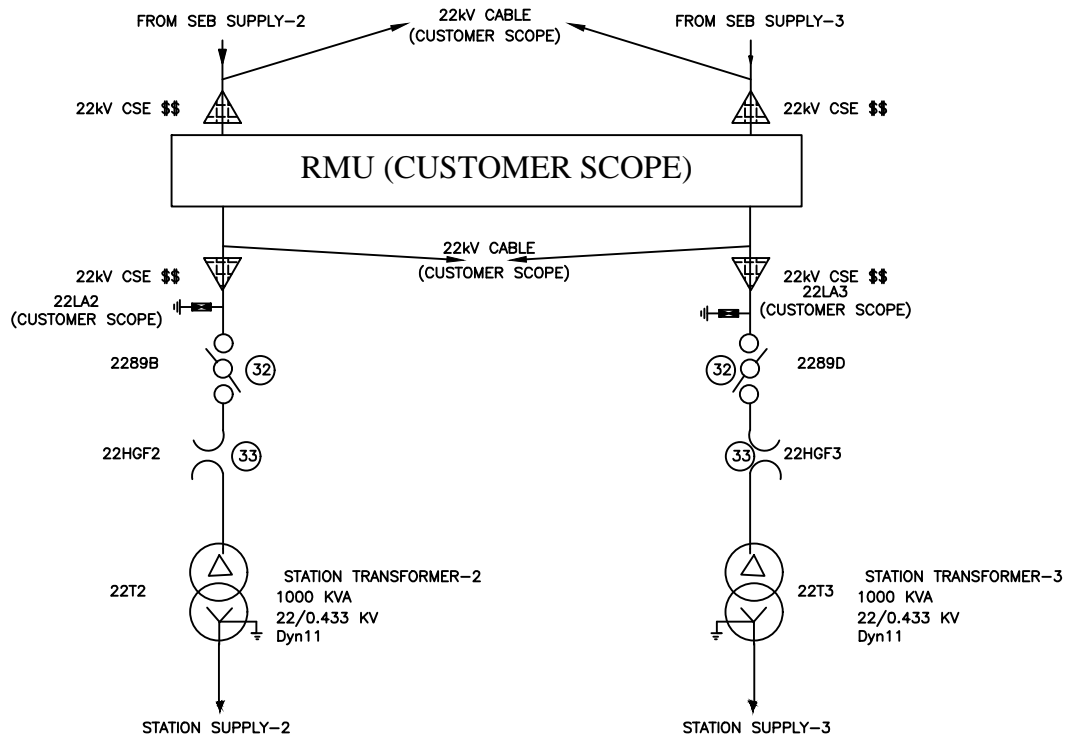
SL.NO.	DESCRIPTION	765 kV	400 kV	33 kV
01	HIGHEST SYSTEM VOLTAGE	800kV (r.m.s.)	420kV (r.m.s.)	36kV (r.m.s.)
02	SYSTEM OPERATING VOLTAGE	765kV	400kV	33kV
03	P.F. WITHSTAND VOLTAGE	830kV (r.m.s.)	630kV (r.m.s.)	70kV (r.m.s.)
04	LIGHTING IMPULSE WITHSTAND VOLTAGE	2100 kVP	1550 kVP	170 kVP
05	SWITCHING IMPULSE WITHSTAND VOLTAGE	1550 kVP	1050 kVP	---
06	SYSTEM FAULT LEVEL	50KA FOR 1 Sec.	63KA FOR 1 Sec.	25KA FOR 1 Sec.
07	CREEPAGE	25MM/KV	25MM/KV	25MM/KV
08	SYSTEM EARTHING	EFFECTIVELY EARTHED	EFFECTIVELY EARTHED	EFFECTIVELY EARTHED

BILL OF QTY. FOR 132kV,33kV & 22kV MAIN EQUIPMENTS:

SL.NO.	DESCRIPTION	RATING	QTY.(NO.) (ORIGINAL SCOPE)	QTY.(NO.) (ADDITIONAL SCOPE) \$\$	SYMBOL	LEGEND
25	SURGE ARRESTER (1 PH.)	132 kV, 10 KA 5 KJ/KV	4	2		LA
26	NEUTRAL CT. OF ICT (1 PH.)	33KV	-	-		CT
27	SF6 CIRCUIT BREAKER (3 PH.)	33KV,1250A	-	-		52
28	DOUBLE BREAK ISOLATOR WITHOUT E/S (3 PH.)	33KV,400A	-	-		89
29	CURRENT TRANSFORMER (1 PH.)	33KV,50A	-	-		CT
30	POTENTIAL TRANSFORMER (1 PH.)	33KV	-	-		PT
31	NEUTRAL CT. OF NGR (1 PH.)	33KV	4	2		CT
32	DOUBLE BREAK ISOLATOR WITHOUT E/S (3 PH.)	22KV,400A	-	2		89
33	HORN GAP FUSE (3 PH.)	22KV	-	2		HGF
34	SF6 CB FOR NGR BYPASS (1 PH.)	132kV, 1250A	-	6		52

LEGENDS:-

	PRESENT SCOPE
	FUTURE



\$\$ ADDITIONAL SCOPE / REQUIREMENTS DUE TO INCLUSION OF LINE REACTOR IN 765kV NCPS LINE, PIR FEATURE IN 400kV CB, 22kV ISOLATOR, 22kV HORN GAP FUSE AND 22kV CABLE SEALING END.

\$\$\$ ADDITIONAL SCOPE / REQUIREMENTS DUE TO CHANGE IN 400kV LINE BAY LOCATION.

REV.	DATE	ALTERED BY	APPROVED BY
05	03.03.21	MVK	SKS
400kV & 765kV LINE FEEDER NAMES REVISED AS PER TANTRANSO LETTER DTD. 26.02.21 & 03.03.21.			

REV.	DATE	ALTERED BY	APPROVED BY
04	11.02.19	PK	DM/AG
AS PER SITE MEETING DATED 08.02.19			

REV.	DATE	ALTERED BY	APPROVED BY
03	16.01.19	PK	DM/AG
AS PER CUSTOMER LETTER DATED 06.10.18.			

REV.	DATE	ALTERED BY	APPROVED BY
02	19.06.17	PK	DM/RS
AS PER CUSTOMER LETTER DATED 01.06.17 & 09.06.17			

ADDITIONAL INFORMATION W.O.No. 86009	आहक/परियोजना का नाम TAMILNADU TRANSMISSION CORPORATION. LTD. NAME OF CUSTOMER/PROJECT 765/400KV AIS S/S ARIYALUR IN VILLUPURAM
STATUS OF DRAWING CONTRACT	
DISTRIBUTION OF PRINTS	
REV. 01 DATE 24-05-17 ALTERED BY SK/RD/VK CHECKED SK/RD/VK APPROVED DM/RS	नाम /NAME PK हस्ता./SIGN. -SD- दि./DATE 24.04.17 SK/RD/VK -SD- DM/RS -SD-
REV. 02 DATE 19.06.17 ALTERED BY PK CHECKED SK/RD/VK APPROVED DM/RS	REV. 03 DATE 16.01.19 ALTERED BY PK CHECKED SK/RD/VK APPROVED DM/AG
REV. 04 DATE 11.02.19 ALTERED BY PK CHECKED SK/RD/VK APPROVED DM/AG	REV. 05 DATE 03.03.21 ALTERED BY MVK CHECKED MVK APPROVED SKS
REV. 06 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 07 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
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REV. 94 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 95 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 96 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 97 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
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REV. 102 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 103 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
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REV. 106 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 107 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 108 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 109 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
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REV. 112 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 113 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 114 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 115 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 116 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 117 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
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REV. 140 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 141 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 142 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 143 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 144 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 145 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 146 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 147 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 148 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 149 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 150 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 151 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 152 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 153 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 154 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 155 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 156 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 157 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 158 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 159 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK
REV. 160 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK	REV. 161 DATE 03.03.21 ALTERED BY SKS CHECKED SKS APPROVED MVK

FIRST ANGLE PROJECTION ( ALL DIMENSIONS ARE IN MM. )

100-015-394-510-001

DRAWING No.

7

6

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765kV MAIN CT DETAILS

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	3000-2000-1000/1 A	-	3000-2000-1000	20-30-60	15-10-5	PS	Protection
2	3000-2000-1000/1 A	-	3000-2000-1000	20-30-60	15-10-5	PS	Protection
3	3000-2000-1000-500/1 A	20	-	-	-	0.2s, ISF ≤ 10	Metering
4	3000-2000-1000-500/1 A	20	-	-	-	0.2s, ISF ≤ 10	Metering
5	3000-2000-1000/1 A	-	3000-2000-1000	20-30-60	15-10-5	PS	Protection
6	3000-2000-1000/1 A	-	3000-2000-1000	20-30-60	15-10-5	PS	Protection

765kV, 4400pF (+10%, -5%) BUS CVT DETAILS (6 Nos.) \$

Winding No.	Ratio	Accuracy Class	Rated Burden (VA)	Purpose
1	(765 kV/√3) / (110V/√3)	3P	100	Protection
2	(765 kV/√3) / (110V/√3)	3P	100	Protection
3	(765 kV/√3) / (110V/√3)	0.2	100	Metering

\$ Rated total simultaneous burden of CVT shall be 100VA (for 0.2 accuracy in winding-3) and rated total thermal burden of CVT shall be 300VA.

765kV, 4400pF (+10%, -5%) LINE CVT DETAILS (12 Nos.) \$

Winding No.	Ratio	Accuracy Class	Rated Burden (VA)	Purpose
1	(765 kV/√3) / (110V/√3)	3P	50	Protection
2	(765 kV/√3) / (110V/√3)	3P	50	Protection
3	(765 kV/√3) / (110V/√3)	0.2	50	Metering

\$ Rated total simultaneous burden of CVT shall be 100VA (for 0.2 accuracy in winding-3) and rated total thermal burden of CVT shall be 300VA.

ICT BUSHING CT DETAILS

765kV SIDE BUSHING CT (On Each Single Phase ICT)

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	3000/1 A	-	3000	20	12	PS	REF
2	1500/1 A	30	-	-	-	0.2, ISF ≤ 5	Metering
3	3000/1 A	-	3000	20	12	PS	Differential

400kV SIDE BUSHING CT (On Each Single Phase ICT)

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	3000/1 A	-	3000	20	12	PS	REF
2	3000/1 A	30	-	-	-	0.2, ISF ≤ 5	Metering
3	3000/1 A	-	3000	20	12	PS	Differential

NEUTRAL SIDE BUSHING CT (On Each Single Phase ICT)

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	3000/1 A	-	3000	20	12	PS	REF
2	3000/1 A	-	3000	20	12	PS	Differential

NEUTRAL SIDE OUTDOOR CT

(1 No. for Each Bank of 3 Nos. Single Phase ICT), after Neutral formation

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	400/1 A	-	400	60	1.6	PS	E/F

SHUNT REACTOR BUSHING CT DETAILS

765kV SHUNT REACTOR (LINE SIDE, On Each Single Phase Reactor)

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV/4	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	300/1 A	-	300	40	1	PS	REACTOR DIFF
2	300/1 A	-	300	40	1	PS	REF
3	300/1 A	-	300	40	1	PS	REACTOR BACK-UP
4	300/1 A	10	-	-	-	1	METERING

765kV, 4400pF (+10%, -5%) LINE CVT DETAILS (12 Nos.) \$

Winding No.	Ratio	Accuracy Class	Rated Burden (VA)	Purpose
1	(765 kV/√3) / (110V/√3)	3P	50	Protection
2	(765 kV/√3) / (110V/√3)	3P	50	Protection
3	(765 kV/√3) / (110V/√3)	0.2	50	Metering

\$ Rated total simultaneous burden of CVT shall be 100VA (for 0.2 accuracy in winding-3) and rated total thermal burden of CVT shall be 300VA.

ICT BUSHING CT DETAILS

765kV SIDE BUSHING CT (On Each Single Phase ICT)

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	3000/1 A	-	3000	20	12	PS	REF
2	1500/1 A	30	-	-	-	0.2, ISF ≤ 5	Metering
3	3000/1 A	-	3000	20	12	PS	Differential

400kV & 765kV LINE FEEDER NAMES REVISED AS PER TANTRANSCO LETTER DTD. 26.02.21 & 03.03.21.

400kV & 765kV LINE FEEDER NAMES REVISED AS PER TANTRANSCO LETTER DTD. 26.02.21 & 03.03.21.

AS PER SITE MEETING DATED 08.02.19

AS PER CUSTOMER LETTER DATED 06.10.18.

AS PER CUSTOMER LETTER DATED 01.06.17 & 09.06.17

AS PER CUSTOMER LETTER DATED 11.05.17

ADDITIONAL INFORMATION W.O.No. 86009

STATUS OF DRAWING CONTRACT

DISTRIBUTION OF PRINTS

आइएन/परियोजना का नाम TAMILNADU TRANSMISSION CORPORATION. LTD.

NAME OF CUSTOMER/PROJECT 765/400KV AIS S/S ARIYALUR IN VILLUPURAM

नीएचईएल

BHE

भारत हेवी इलेक्ट्रिकल्स लिमिटेड

द्रांसाविधान परियोजना विभाग

BHARAT HEAVY ELECTRICALS LTD.

TRANSMISSION PROJECTS DIVISION

ड्राफ्ट/SCALE

NTS

कार्ड कोड

CARD CODE

ड्राईंग/DRAWING NO.

TB-3-394-510-001

पृष्ठ क्र./SHEET No.03

अगला पृष्ठ/NEXT SHEET 04

पुनः/REV.

05

8

7

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INVENTORY No.

SIGN. & DATE

REF. DRG. No.

COMPUTER DRG. PATH NAME :

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FIRST ANGLE PROJECTION ( ALL DIMENSIONS ARE IN MM. )

100-015-394-510-001

DRAWING No. TB-0-394-510-001

7

6

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765kV SHUNT REACTOR (NEUTRAL SIDE, On Each Single Phase Reactor)

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV/4	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	3000-2000-500/1 A	-	3000-2000-500	40 at highest tap	12-8-2	PS	DISTANCE PROT N/SPARE
2	3000-2000-500/1 A	-	3000-2000-500	40 at highest tap	12-8-2	PS	DISTANCE PROT N/SPARE
3	300/1 A	-	300	40	1	PS	REACTOR DIFF
4	200/5	10	-	-	-	1	WTI CT

400kV, 4400pF (+10%, -5%) LINE CVT DETAILS (18 Nos.)

Winding No.	Ratio	Accuracy Class	Rated Burden (VA)	Purpose
1	(400 kV/√3) / (110V/√3)	3P	50	Protection
2	(400 kV/√3) / (110V/√3)	3P	50	Protection
3	(400 kV/√3) / (110V/√3)	0.2	50	Metering

\$ Rated total simultaneous burden of CVT shall be 50VA (for 0.2 accuracy in winding-3) and rated total thermal burden of CVT shall be 300VA.

REACTOR NGR NEUTRAL SIDE OUTDOOR CT

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	300/1 A	-	300	60	1.2	PS	REF

400kV MAIN CT DETAILS

Core No.	Current Ratio	Output Burden (VA) at lowest Tap	Minimum KPV (Volts)	Max Ie (mA) at KPV	Maximum Rct (Ohms)	Accuracy Class	Purpose
1	3000-2000-1000/1 A	-	3000-2000-1000	20-30-60	15-10-5	PS	Protection
2	3000-2000-1000/1 A	-	3000-2000-1000	20-30-60	15-10-5	PS	Protection
3	3000-2000-1000-500/1 A	20	-	-	-	0.2s, ISF ≤ 5	Metering
4	3000-2000-1000-500/1 A	20	-	-	-	0.2s, ISF ≤ 5	Metering
5	3000-2000-1000/1 A	-	3000-2000-1000	20-30-60	15-10-5	PS	Protection
6	3000-2000-1000/1 A	-	3000-2000-1000	20-30-60	15-10-5	PS	Protection

400kV, 4400pF (+10%, -5%) BUS CVT DETAILS (6 Nos.) \$

Winding No.	Ratio	Accuracy Class	Rated Burden (VA)	Purpose
1	(400 kV/√3) / (110V/√3)	3P	100	Protection
2	(400 kV/√3) / (110V/√3)	3P	100	Protection
3	(400 kV/√3) / (110V/√3)	0.2	100	Metering

\$ Rated total simultaneous burden of CVT shall be 100VA (for 0.2 accuracy in winding-3) and rated total thermal burden of CVT shall be 300VA.

REV. 05

DATE 03.03.21

ALTERED MVK

CHECKED MVK

APPROVED SKS

ZONE

400kV & 765kV LINE FEEDER NAMES REVISED AS PER TANTRANSCO LETTER DTD. 26.02.21 & 03.03.21.

REV. 04

DATE 11.02.19

ALTERED PK

CHECKED SK/RD/VK

APPROVED DM/AG

ZONE

AS PER SITE MEETING DATED 08.02.19

REV. 03

DATE 16.01.19

ALTERED PK

CHECKED SK/RD/VK

APPROVED DM/AG

ZONE

AS PER CUSTOMER LETTER DATED 08.02.19

REV. 02

DATE 19-06-17

ALTERED PK

CHECKED SK/RD/VK

APPROVED DM/RS

ZONE

AS PER CUSTOMER LETTER DATED 01.06.17 & 09.06.17

REV. 01

DATE 24-05-17

ALTERED PK

CHECKED SK/RD/VK

APPROVED DM/RS

ZONE

AS PER CUSTOMER LETTER DATED 11.05.17

8

7

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ADDITIONAL INFORMATION

W.O.No. 86009

STATUS OF DRAWING CONTRACT

DISTRIBUTION OF PRINTS

आइक/परियोजना का नाम

TAMILNADU TRANSMISSION CORPORATION. LTD.

NAME OF CUSTOMER/PROJECT

765/400KV AIS S/S ARIYALUR IN VILLUPURAM

नॉएच ई एल

भारत हेवी इलेक्ट्रिकल्स लिमिटेड

द्वारा निदेशन परियोजना विभाग

BHARAT HEAVY ELECTRICALS LTD.

TRANSMISSION PROJECTS DIVISION

ड्राइंग/DEPT. TBEM

कोड 422

अनुपात / SCALE NTS

कार्ड कोड CARD CODE

शीर्षक/TITLE

SINGLE LINE DIAGRAM

FOR 765/400KV S/S ARIYALUR

ड्राइंग.क्र./DRAWING NO.

TB-3-394-510-001

पृष्ठ क्र./SHEET No.04

अगला पृष्ठ/NEXT SHEET -

पुनः/REV.

05



FIRST ANGLE PROJECTION ( ALL DIMENSIONS ARE IN MM. )

DRAWING No. TB-3-394-316-017

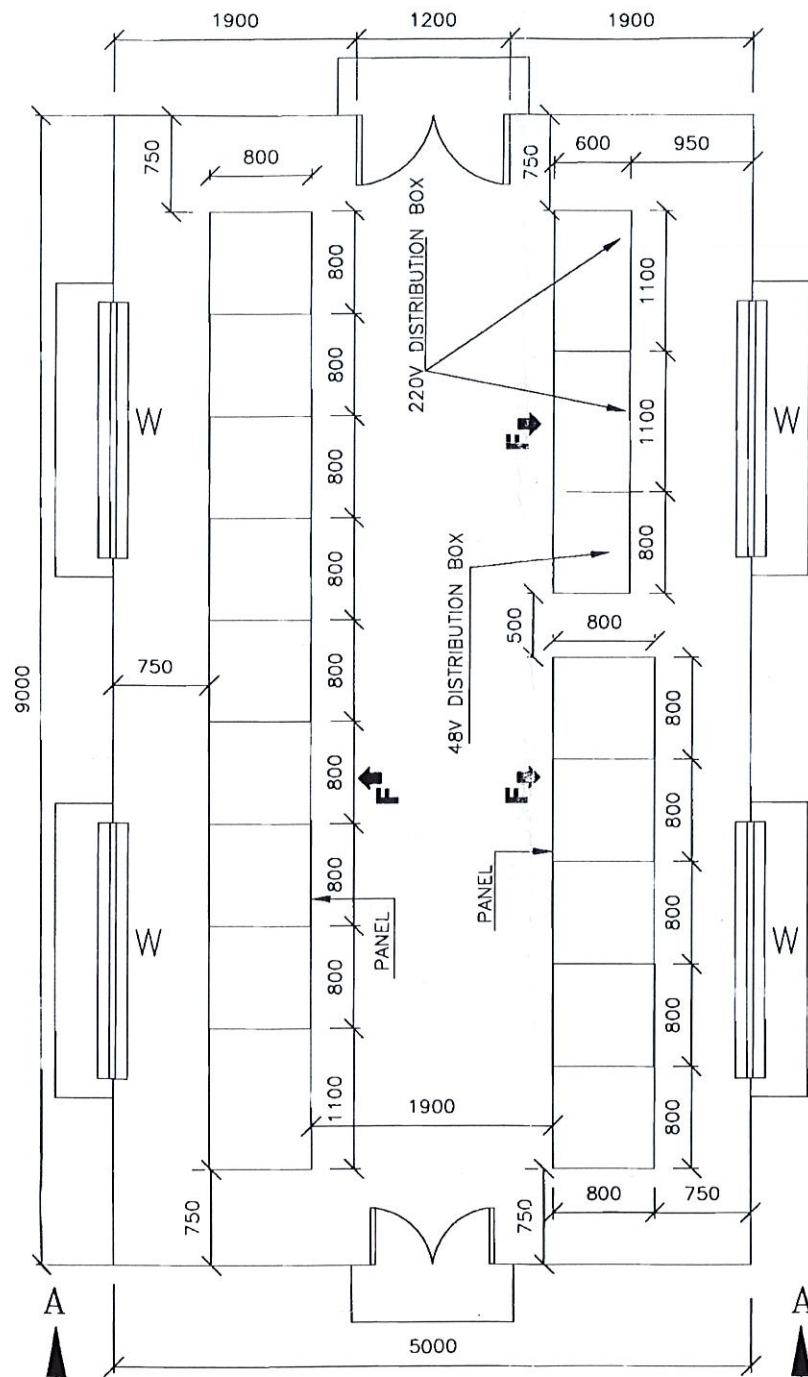
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COMPUTER DRG. PATH NAME :

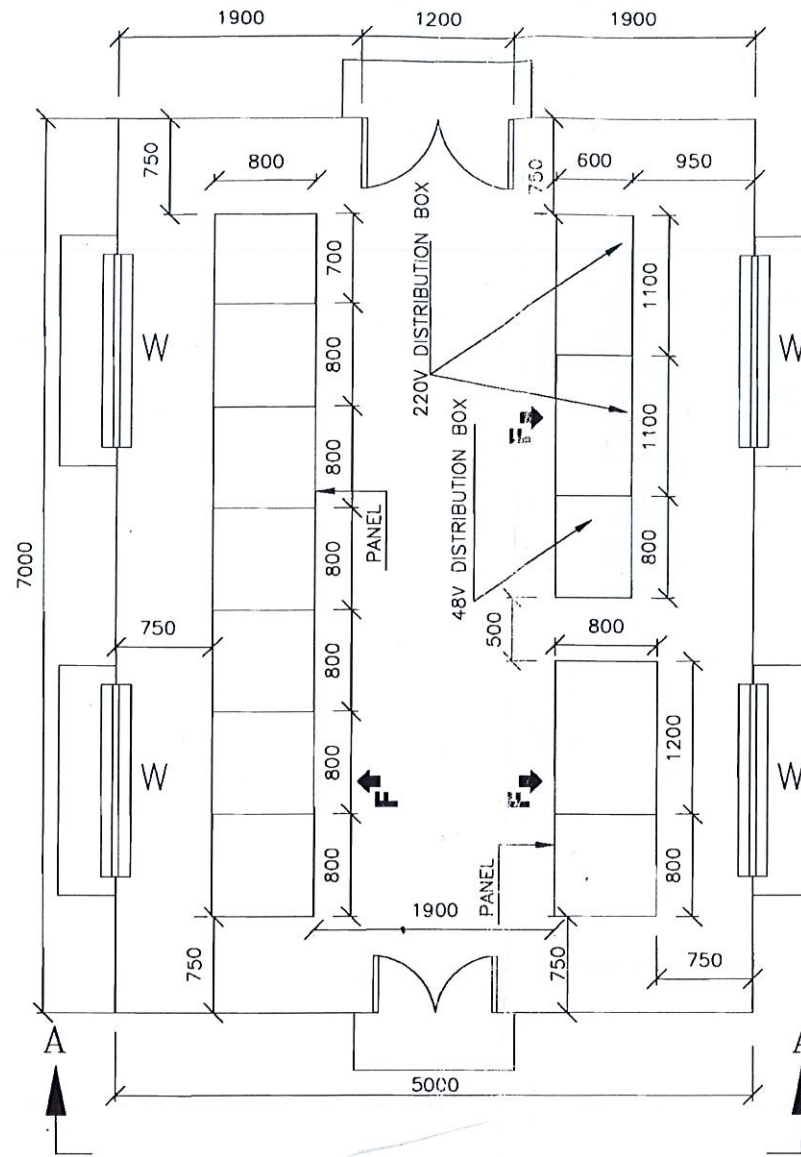
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SIGN. & DATE

INVENTORY No.

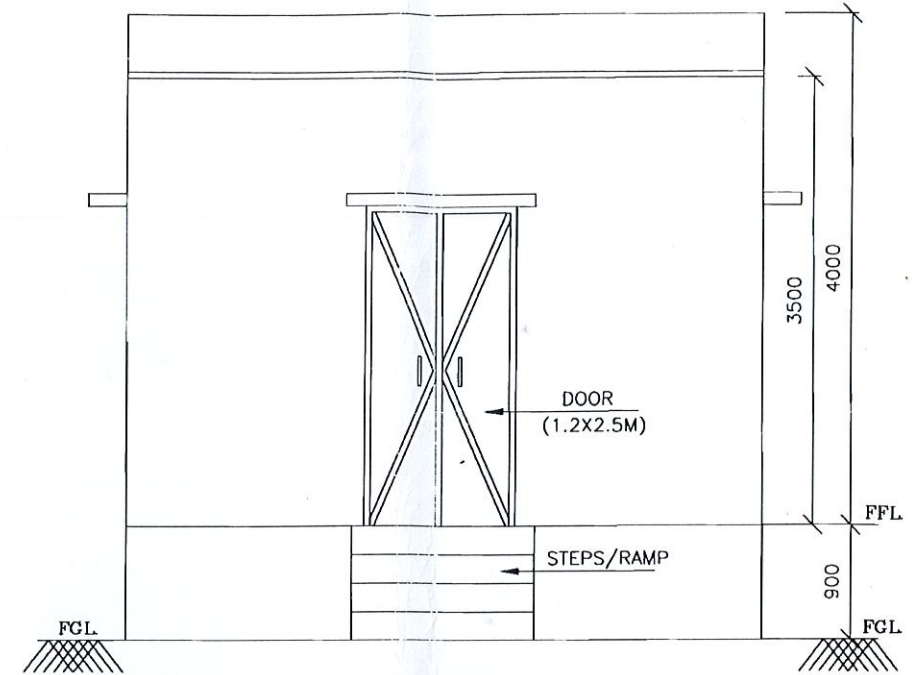


TYP. PLAN OF 765kV SWITCHYARD PANEL ROOM



TYP. PLAN OF 400kV SWITCHYARD PANEL ROOM

SR. NO.	SIZE OF SPR	LOCATION	QTY.
1.	9000X5000	765kV YARD	5Nos.
2.	7000X5000	400kV YARD	5Nos.



ELEVATION A-A

NOTES:-

1. ALL DIMENSION ARE IN mm.
2. SEPARATE DRAWING SHALL BE SUBMITTED FOR DETAILED CIVIL ARCHITECTURE, PANEL PLACEMENT, ILLUMINATION AND TRENCH LAYOUT OF SPR.
3. THE DIMENSION AND ARRANGEMENT OF PANELS INSIDE SPR ARE INDICATIVE AND SAME SHALL BE FINALIZED DURING DETAILED ENGINEERING.
4. ALL THE DIMENSIONS OF SPR ARE FROM CENTER LINE OF WALL (THICKNESS OF WALL 230MM).
5. TWO NOS. OF SPLIT AIR CONDITIONERS (1MAIN + 1 STAND BY) OF ADEQUATE CAPACITY SHALL BE PROVIDED IN EACH SPR. SEPARATE DESIGN DOCUMENT SHALL BE SUBMITTED FOR SIZING OF SPLIT AIR CONDITIONER.
6. 02 NOS WINDOWS (FIXED TYP.) SHALL BE PROVIDED ALONG EACH LONGITUDINAL WALL. (i.e. 9.0m. & 7m SIDE)
7. STEPS SHALL BE PROVIDED AT ONE ENTRANCE AND RAMP SHALL BE PROVIDED AT OTHER ENTRANCE SIDE.
8. RAMP SHALL BE PROVIDED TOWARDS ROAD SIDE.

LEGEND :-

- F.F.L. - FINISHED FLOOR LEVEL  
F.G.L. - FINISHED GROUND LEVEL  
F. - FRONT

ADDITIONAL INFORMATION W.O.No.		NAME OF CUSTOMER/PROJECT TAMILNADU TRANSMISSION CORPORATION. LTD. 765/400KV AIS S/S ARYALUR IN VILLUPURAM	
STATUS OF DRAWING CONTRACT		DISTRIBUTION OF PRINTS	
REV.	DATE	ALTERED CHECKED APPROVED	DEPT. 422 CODE
ZONE		TBM NTS CARD CODE	
TITLES		CONCEPTUAL SWITCHYARD PANEL ROOM DRAWING	
DESIGNER'S NAME		DESIGNER'S SIGNATURE	
CHECKED BY		CHECKED BY SIGNATURE	
APPROVED BY		APPROVED BY SIGNATURE	
DATE		DATE	
DRAWING NO.		DRAWING NO.	
SHEET NO.		SHEET NO.	

APPROVED &  
CHIEF ENGINEER / CIVIL  
TRANSMISSION & TANTRANSCO  
6th Floor, N.P.K.R.R. Maaligai,  
144, Anna Salai, Chennai-600 002

T-1966/D 189/18 dt 22.6/17

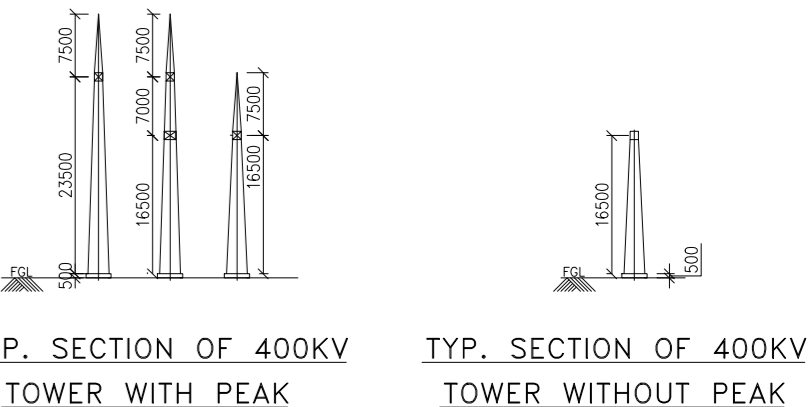
REV. DATE  
05.06.17

DESIGNER'S NAME  
DESIGNER'S SIGNATURE  
CHECKED BY  
CHECKED BY SIGNATURE  
APPROVED BY  
APPROVED BY SIGNATURE  
DATE  
DATE

LEGEND:-	
	PRESENT SCOPE (BHEL)
	CUSTOMER/FUTURE
	765kV TOWER W/O PEAK
	765kV TOWER WITH PEAK
	400kV TOWER WITH PEAK
	400kV TOWER W/O PEAK
	SHIELD WIRE
	SUSPENSION STRING HARDWARE

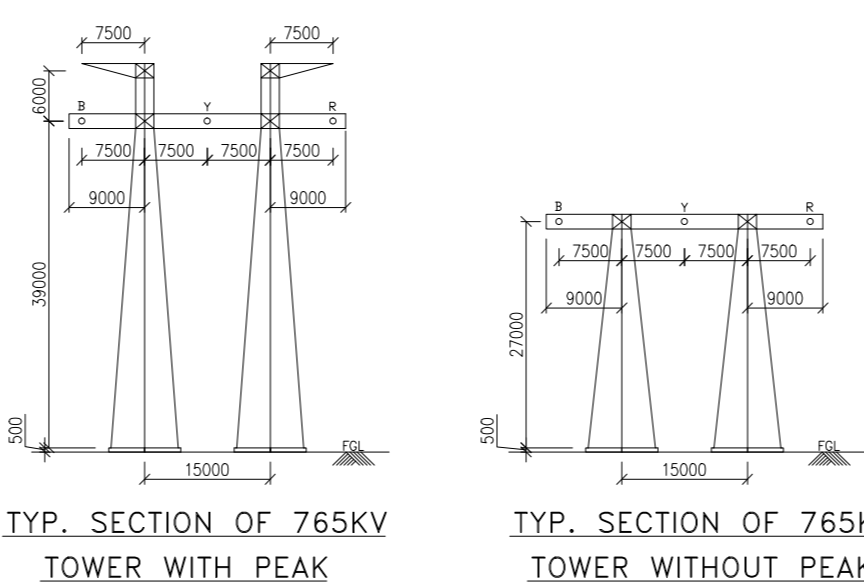
TOWER DETAIL OF 400KV-V			
TOWERS DESIGNATION	TOWER HEIGHT DETAIL FROM PLAIN TOP (m)	QUANTITY (NO.)	REMARKS
(T1)	16.5	10	1. BEAM TAKE OFF ONE SIDE AT A HEIGHT OF 16.5m. 2. WITHOUT EASE
(T2)	16.5x7.5	04	1. BEAM TAKE OFF TWO SIDE AT A HEIGHT OF 16.5m. 2. PEAK OF HEIGHT 7.5m
(T3)	23.5x7.5	02	1. BEAM TAKE OFF TWO SIDE AT A HEIGHT OF 23.5m. 2. PEAK OF HEIGHT 7.5m
(T4)	16.5x7.5x7.5	10	1. BEAM TAKE OFF THREE Sides AT A HEIGHT OF 16.5m AND CROSSING TOP AT A HEIGHT OF 23.5m. 2. PEAK OF HEIGHT 7.5m
(T5)	23.5x7.5	06	1. BEAM TAKE OFF TWO SIDE AT A HEIGHT OF 23.5m. 2. PEAK OF HEIGHT 7.5m
(T6)	23.5x7.5	03	1. BEAM TAKE OFF ONE SIDE AT A HEIGHT OF 23.5m. 2. PEAK OF HEIGHT 7.5m
(T7)	23.5x7.5	14	1. BEAM TAKE OFF TWO SIDE AT A HEIGHT OF 23.5m. 2. PEAK OF HEIGHT 7.5m
	TOTAL	49	

400kv BEAM				
TYPE	DESIGNATION	LENGTH	DEVIATION	QUANTITY (NOs.)
1	G1	24 MTR.	±30" DEVIATION	14
2	G2	24 MTR.	WITHOUT DEVIATION	26
TOTAL				40






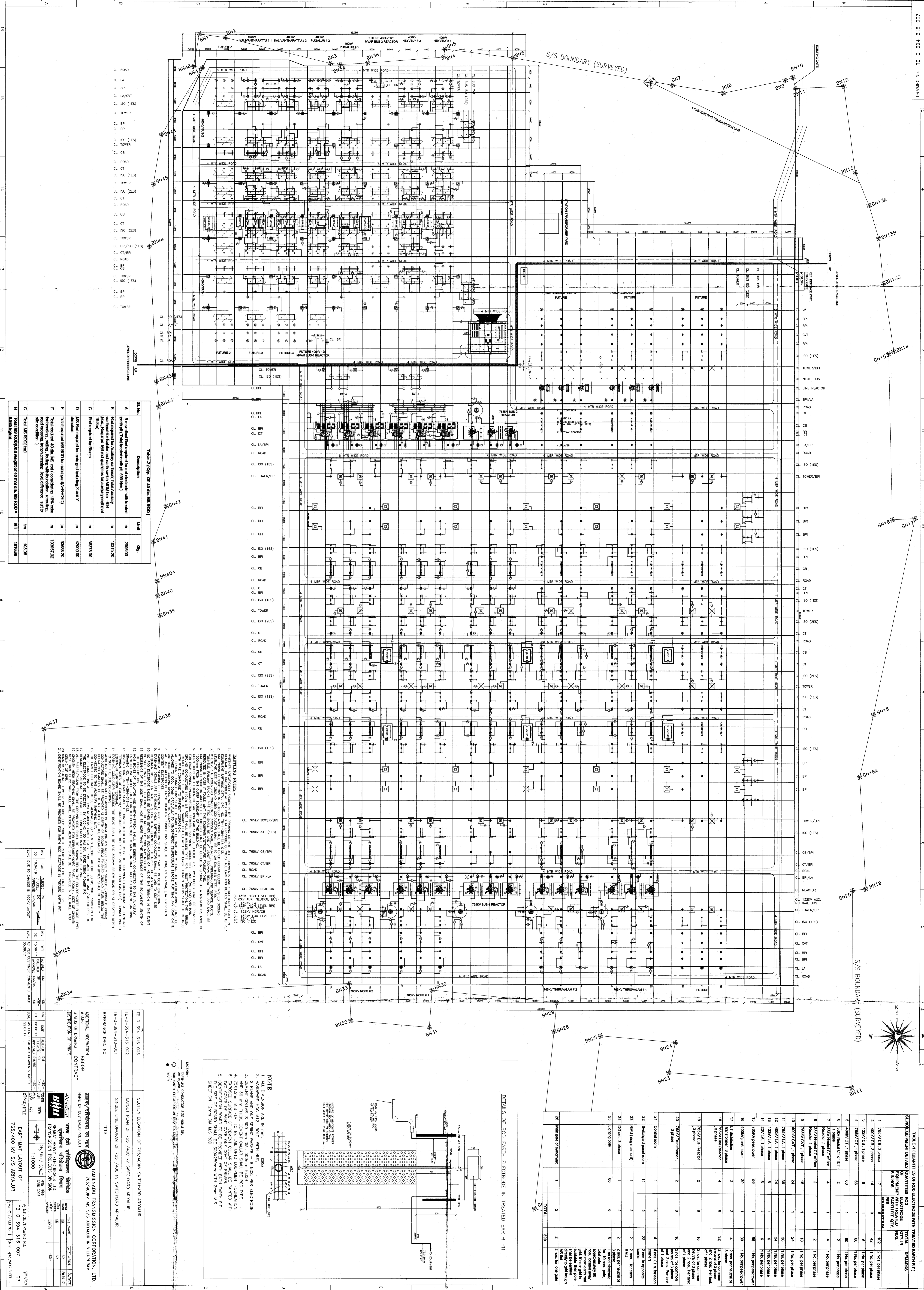
- NOTE: ALL DIMENSIONS ARE IN MM.
2. THE STRUCTURE SHALL BE DESIGNED FOR A FACTOR OF SAFETY OF 2 FOR NORMALLY BROKEN WIRE CONDITION AT 1.5 FOR SHORT CIRCUIT FORCE CONDITIONS.
3. THE TRANSMITTER, VOLTAGE TRANSFORMER AND CURRENT TRANSFORMER SHALL BE CONFORMED AS PER IS 8622, 1955.
4. WEIGHT OF THE MAN WITH TOOLS AT ANY POINT OF TIME SHALL BE CONSIDERED ON BEAM AS 150 KG.
5. ALL HEIGHTS ARE WITH REFERENCE TO PLUMB LINE. PLUMB LINE IS 500mm ABOVE FINISHED FLOOR.
6. FIFTH COLUMN OF THE TABLE FOR "LOADING DETAILS" SHOWS MAXIMUM SHORT CIRCUIT FORCE IN KG. UNDER MAXIMUM TEMPERATURE AND MAXIMUM WIND CONDITIONS.
7. 75KV AND 40KV BEAM SHALL HAVE ANCHORING POINT ON BOTH SIDE OF BEAM WITH ANCHOR STRONG 450mm FOR TENSION OF DOUBLE TENSION STRONG HARDWARE.
- 25mm DA HOLE SHALL BE PROVIDED IN 75KV BEAM FOR ANCHORING OF DOUBLE TENSION STRONG HARDWARE.
- 25mm DA HOLE SHALL BE PROVIDED IN 40KV BEAM FOR ANCHORING OF DOUBLE TENSION STRONG HARDWARE.
7. 75KV AND 40KV BEAM HAVE PROVISION OF SINGLE ANCHORING POINT ON CENTER OF BEAM.
- 25mm DA HOLE SHALL BE PROVIDED IN 75KV BEAM FOR ANCHORING OF SINGLE TENSION STRONG HARDWARE.
- 25mm DA HOLE SHALL BE PROVIDED IN 40KV BEAM FOR ANCHORING OF SINGLE TENSION STRONG HARDWARE.
- 25mm DA HOLE SHALL BE PROVIDED IN 75KV BEAM FOR ANCHORING OF SINGLE SUSPENSION STRONG HARDWARE.
- 25mm DA HOLE SHALL BE PROVIDED IN 40KV BEAM FOR ANCHORING OF SINGLE SUSPENSION STRONG HARDWARE.

765kV BEAM FOR SHIELD WIRE				
TYPE	DESIGNATION	CENTER TO CENTER SPAN OF BEAM	DEVIATION OF SHIELD WIRE	QUANTITY (NOS.)
1	P7A	7.50 MTR.	1. WITHOUT DEVIATION 2. WITH $\pm 30'$ DEVIATION	48
2	P7B	7.50 MTR.	$\pm 30'$ DEVIATION	08
TOTAL				56



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

TB-0-394-316-003			SECTION ELEVATION OF 765/400KV SWITCHYARD ARIYALUR																		
TB-0-394-316-002			LAYOUT PLAN OF 765 /400 KV SWITCHYARD ARIYALUR																		
TB-3-394-510-001			SINGLE LINE DIAGRAM OF 765 /400 KV SWITCHYARD ARIYALUR																		
REFERENCE DRG. NO.			TITLE																		
ADDITIONAL INFORMATION W.D.NO. 86009 STATUS OF DRAWING CONTRACT DISTRIBUTION OF PRINTS			<div><div></div><div>TAMILNADU TRANSMISSION CORPORATION. LTD. 765/400KV AIS S/S ARIYALUR IN VILLUPURAM</div></div> <div>புரட்சி/பரிசீலனை காப்பு NAME OF CUSTOMER/PROJECT</div> <div><div></div><div>भारत भारती भारोद्योगन लिमिटेड இந்தியாவின் பரிசோதனை நிகா BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION</div></div> <div><table><tr><td>பிரைட் டிரைவ்</td><td>ஸ்டாப் / NAME</td><td>ஈனஸ் / SIGN.</td><td>DATE</td></tr><tr><td>DRGNO</td><td>DW</td><td></td><td>08.07.17</td></tr><tr><td>CHECKED</td><td>உக</td><td></td><td></td></tr><tr><td>APPROVED</td><td>DWG'S</td><td></td><td></td></tr></table><div>விநாய சப்தி TBEM பிளே கார்டு 422</div></div> <div><div></div><div>அளவாங்கு / SCALE      வட்ட கோடு CARD CODE 1:1000</div></div> <div>பொறித்தல்/TITLE STRUCTURE LOADING DIAGRAM OF 765/400 kV S/S ARIYALUR</div> <div><div>கூர்ச்சி.க./DRAWING NO. TB-0-394-316-011 புறம்/முகு/SHEET No 1      அடுத்த முகம்/NEXT sheet</div><div>புறம்/முகு/ 00</div></div>			பிரைட் டிரைவ்	ஸ்டாப் / NAME	ஈனஸ் / SIGN.	DATE	DRGNO	DW		08.07.17	CHECKED	உக			APPROVED	DWG'S		
பிரைட் டிரைவ்	ஸ்டாப் / NAME	ஈனஸ் / SIGN.	DATE																		
DRGNO	DW		08.07.17																		
CHECKED	உக																				
APPROVED	DWG'S																				



## TAMILNADU TRANSMISSION CORPORATION LIMITED

From  
Er. K.Natarajan,B.E.,  
Chief Engineer/Transmission  
6<sup>th</sup> Floor, NPKRR Maaligai,  
144,Anna Salai,  
Chennai-2.

To  
AGM-PMG Commercial,BHEL.,  
Transmission Business Group  
Tower A,5<sup>th</sup> Floor/Advant Navis,  
Business Park/Plot No.7, Sector  
142,Noida Expressway,  
Noida 201305.  
Email: skjain@bhel.in

Lr.No.SE/TRIV/EE4/AEE1/F.T-1966 Approvals /D. 212 / 2017 dt 10.11.2017

Sir,

Sub: TANTRANSCO - Spec.No. T-1966 - Establishment of 765/400KV  
AIS SS at Ariyalur under total turnkey basis – Equipment earthing  
drawing - Approval - Reg.

Ref: 1.BHEL/SUB VENDOR DRG.NO TB-4 -316 -012 (Revised Drawing

Submitted during meeting dt 25.10.17)

2. SE/TR IV/EE 4/AEE 1/F.T-1966/D.No.204(a) /28.10.17

3. SE/GCC/Trv/AEE/MM/AE/M/F.Ariyalur 765KV SS/D.No.775/17,

Dated 07.11.17

\*\*\*\*\*

The following Equipment Earthing Drawing TB-4-394-316-012 for  
establishment of 765/400KV AIS SS at Ariyalur furnished vide reference 1<sup>st</sup> cited is  
found to be generally in order and approved:

Sl. No	Drawing Description	Sheet reference
1	General notes	01 of 26
2	Typical Equipment Earthing Details of 765/400/132KV Circuit Breaker	02 of 26
3	Typical Equipment Earthing Details of CVT of 765/440KV	03 of 26
4	Typical Equipment Earthing Details of 765/400/132/33KV Post Insulator	04 of 26
5	Typical Equipment Earthing Details of 634/390/132/22KV LA	05 of 26
6	Typical Equipment Earthing Details of 765/400/132/33KV Current Transformer	06 of 26

<b>Sl. No</b>	<b>Drawing Description</b>	<b>Sheet reference</b>
7	Typical Equipment Earthing Details of 400/22KV isolator and Earth switch	07 of 26
8.	Typical Equipment Earthing Details of 765KV isolator and Earth switch	08 of 26
9	Typical Equipment Earthing Details of Tower with peak and without peak	09,10 of 26
10	Typical Equipment Earthing Details of Auxiliary earth mat for Isolator main and Earth switch Mechanism box	11 of 26
11	Typical Equipment Earthing Details of Rod electrode with treated earth pit	12 of 26
12	Typical Equipment Earthing Details of Marshalling kiosk/Outdoor lighting	13 of 26
13	Typical Equipment Earthing Details of LT switch gear/charger/Relay & control panel/indoor lighting panel	14 of 26
14	Typical Equipment Earthing Details of cable trench	15 of 26
15	Typical Equipment Earthing Details of Rail bonding	16 of 26
16	Typical Equipment Earthing Details of typical arrangements of bolted joints	17 of 26
17	Typical Equipment Earthing Details of equipment Earthing and structure earthing details of gate	18 of 26
18	Typical Equipment Earthing Details of LT Transformer	19 of 26
19	Typical Equipment Earthing Details of single phase 765KV/400KV/33KV ICT	20 of 26
20	Typical Equipment Earthing Details of Equipment earthing details single phase 765KV Reactor	21 of 26
21	Typical Equipment and structure Earthing Details of Air core NGR (Neutral Grounding Reactor)	22 of 26
22	Typical Equipment and structure Earthing Details Welding details	23,24,25, 26 of 26

This approval does not absolve you of your responsibility to fulfil the contractual obligations/terms and conditions of LOA.

Kindly acknowledge the receipt of the letter.

Encl.: Equipment Earthing Drawing

  
Superintending Engineer/TR-IV  
for Chief Engineer/ Transmission 4/15

Copy to the Chief Engineer /Transmission Projects II/Trichy

Copy to the Superintending Engineer / GCC / Trichy

## GENERAL NOTES:-

- EARTH STRIP CLEATED TO LATTICE TYPE EQUIPMENTS STRUCTURE AT AN INTERVAL OF 1000mm.
- ALL ELECTRICAL EQUIPMENTS SHALL BE EARTHED BY TWO SEPARATE AND DISTINCT EARTH CONNECTIONS AND SHALL BE CONNECTED TO DIFFERENT CONDUCTORS OF EARTHING GRID.
- 40 DIA mm MS ROD RISERS SHOULD BE BROUGHT CLOSE TO EQUIPMENTS FOUNDATION.
- THE MAIN EARTH MAT SHALL BE 800mm BELOW FGL.
- TWO NOS. ROD ELECTRODE WITH TREATED EARTH PIT SHALL BE PROVIDED FOR DG NEUTRAL.
- TWO NOS. ROD ELECTRODE WITH TREATED EARTH PIT SHALL BE PROVIDED FOR CARRIER EQUIPMENTS (IF APPLICABLE). AND SAME SHALL BE ISOLATED FROM MAIN GRID.
- WELDING FROM BOTH SIDE TO BE PROVIDED FOR CROSS JOINT OF FLAT/ROD.
- MINIMUM SPACING BETWEEN TWO ROD ELECTRODE WITH TREATD EARTH PIT SHALL BE 6m .

### SHEET NO.

### DESCRIPTION

- 765kV/400kV/132kV CIRCUIT BREAKER
- 765kV/400kV CVT
- 765kV/400kV/132kV/33kV POST INSULATOR
- LIGHTNING ARRESTER(624kV/390kV/132kV/22kV)
- 765kV/400kV/33kV CURRENT TRANSFORMER
- 400kV/22kV HDB ISOLATOR & EARTH SWITCH (TYPICAL)
- 765KV VERTICAL KNEE TYPE ISOLATOR & EARTH SWITCH (TYPICAL)
- TOWER WITH PEAK
- TOWER WITHOUT PEAK
- AUXILIARY EARTH MAT FOR ISOLATOR MAIN & EARTH SWITCH MECHANISM BOX
- ROD ELECTRODE WITH TREATED EARTH PIT
- MARSHALLING KIOSK/OUTDOOR LIGHTING PANEL
- LT SWITCHGEAR/CHARGER/RELAY & CONTROL PANEL/INDOOR LIGHTING PANEL
- CABLE TRENCH

### SHEET NO.

### DESCRIPTION

- RAIL BONDING
- TYPICAL ARRANGEMENT OF BOLTED JOINTS.
- EARTHING OF GATE.
- LI TRANSFORMER.
- SINGLE PHASE 765kV/400kV/33kV ICT.
- SINGLE PHASE 765KV REACTOR
- AIR CORE NGR (NEUTRAL GROUNDING REACTOR).
- WELDING DETAILS.
- WELDING DETAILS.
- WELDING DETAILS.
- WELDING DETAILS.

## LEGEND:-

- CONNECTION TO GROUND MAT THROUGH RISER.
- (E) ROD ELECTRODE WITH TREATED EARTH PIT
- 75X12mm MS FLAT
- 50X8mm MS FLAT
- 40mm MS ROD
- \* BOLTED JOINTS.

APPROVED &  
COMMUNICATION VIDE Lr. No:

SE/IR-IV/BB4/AEB-1/E...T.1266 Approvals/D.20/17  
dt 10.11.17

Superintending Engineer/Transmission/IV  
TANTRANSCO

6th Floor, N.E.R.R., Maaligai,  
144, Anna Salai, Chennai - 600 002

4/4

W.O.NO. 86009

STATUS CONTRACT

DRG./REF. NO.(INTERNAL)

CUSTOMER PROJECT:-



TAMILNADU TRANSMISSION CORPORATION. LTD.  
765/400KV AIS S/S ARIYALUR IN VILLUPURAM



भारत हेवी इलेक्ट्रिकल्स लिमिटेड  
दूरसंचालन परियोजना विभाग

BHARAT HEAVY ELECTRICALS LTD  
TRANSMISSION BUSINESS GROUP

DEPT CODE	NAME	SIGN.	DATE
DRN	PK	--SD--	08.08.17
DESN	DM	--SD--	
CHD	SK	--SD--	
APPD	DM/RS		

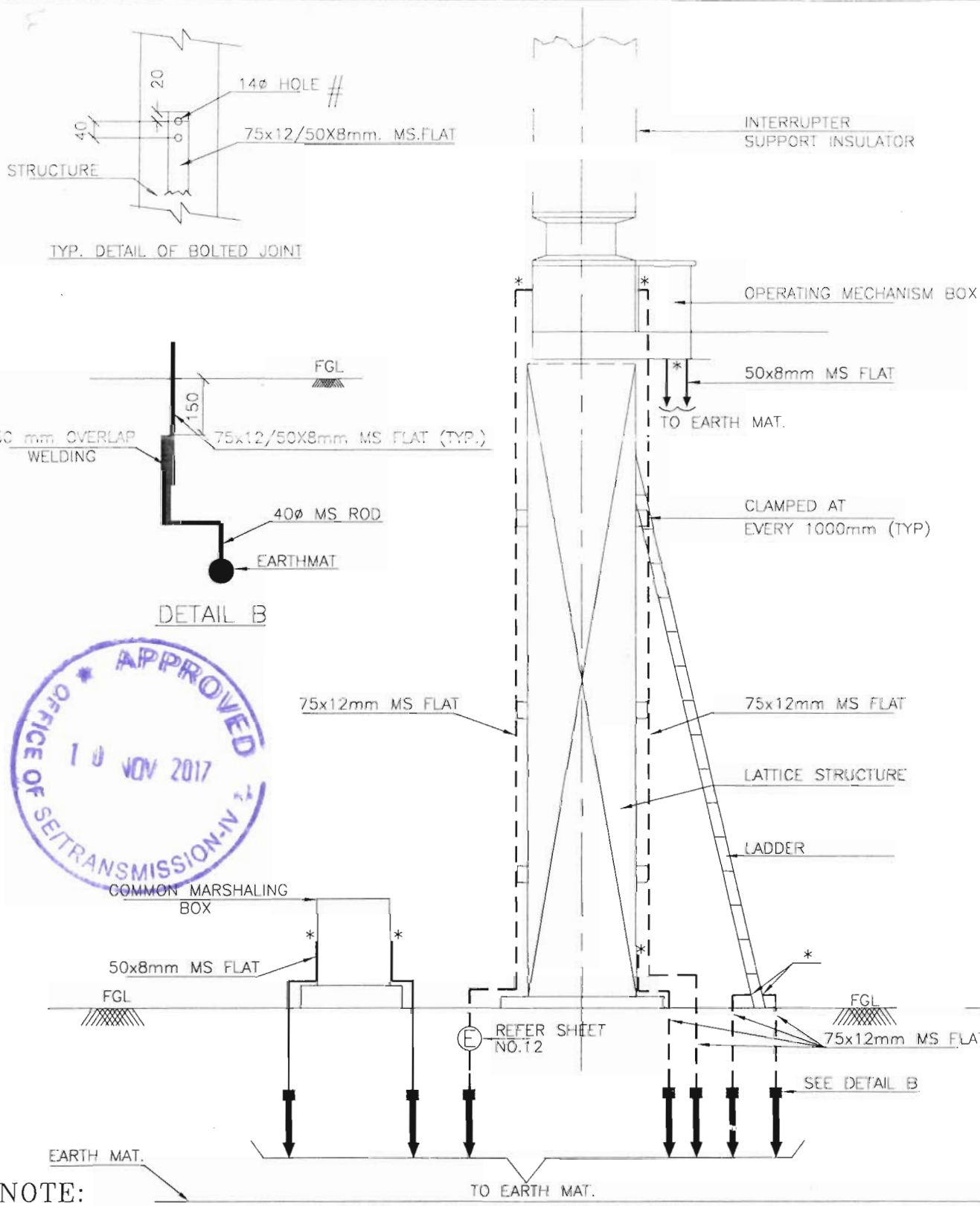
TITLE

EQUIPMENT & STRUCTURE EARTHING DETAILS

REV.	DATE	ALTERED	PK	SCALE
01	15.09.17	CHECKED	SK	1:800
		APPROVED	DM/RS	
ZONE	AS PER CUSTOMER COMMENT DATED 05.09.17			

BHEL/SUB VENDOR DRG NO.  
TB-4-394-316-012

REV. 01 SHEET No. 01



## EQUIPMENT & STRUCTURE EARTHING DETAILS

### 765kV/400kV/132kV CIRCUIT BREAKER

COMPUTER REF. NO.

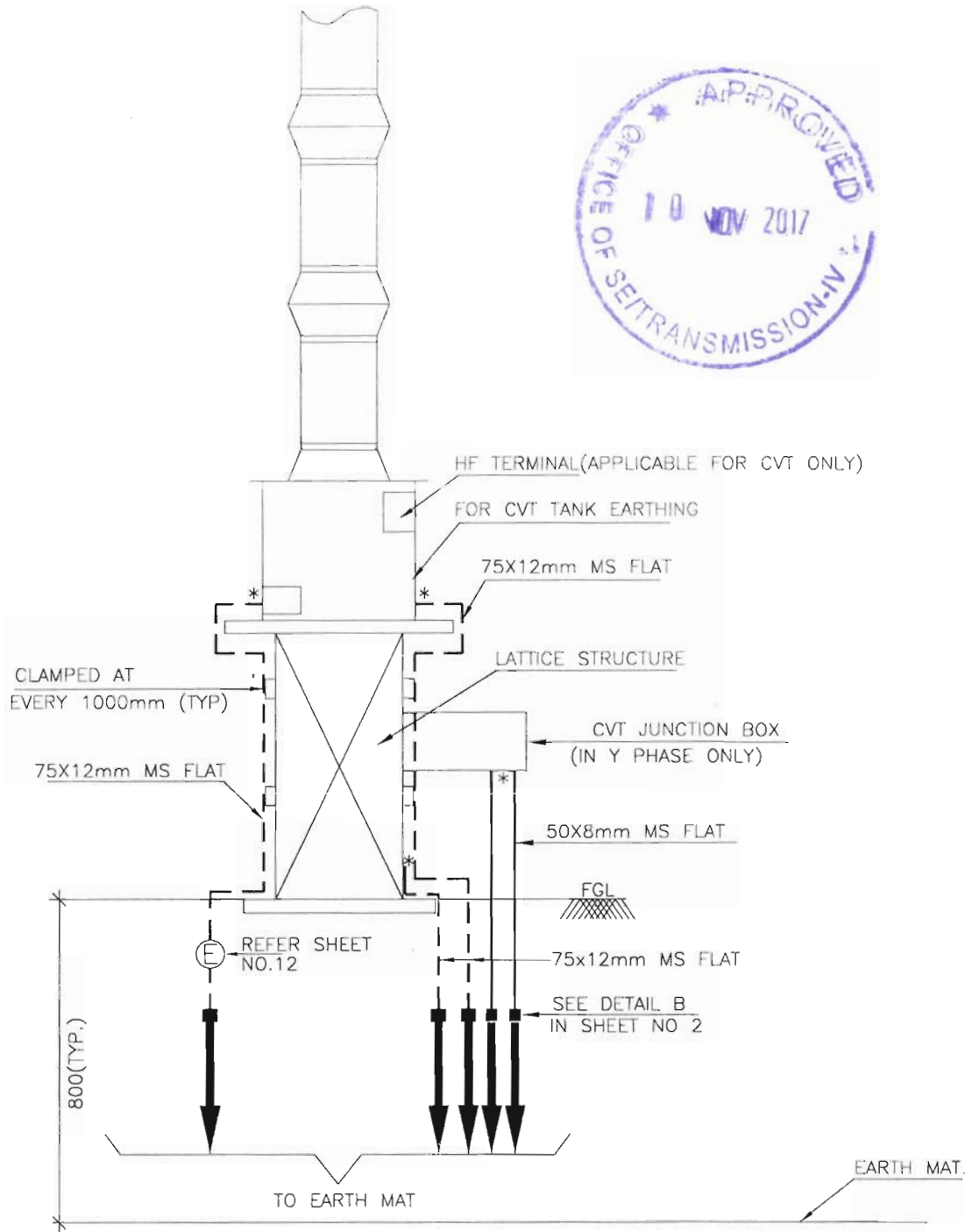
DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.

2



### NOTE:

1. No. OF ROD ELECTRODE WITH TREATED EARTH PIT = 1 No. PER PHASE.
2. NO. OF RISERS = 3 NOS PER PHASE.
3. NO. OF RISERS FOR CVT JUNCTION BOX = 2 NOS PER 3 PHASE.
4. \* BOLTED JOINTS.



## EQUIPMENT & STRUCTURE EARTHING DETAILS

765kV/400kV CVT

COMPUTER REF. NO.

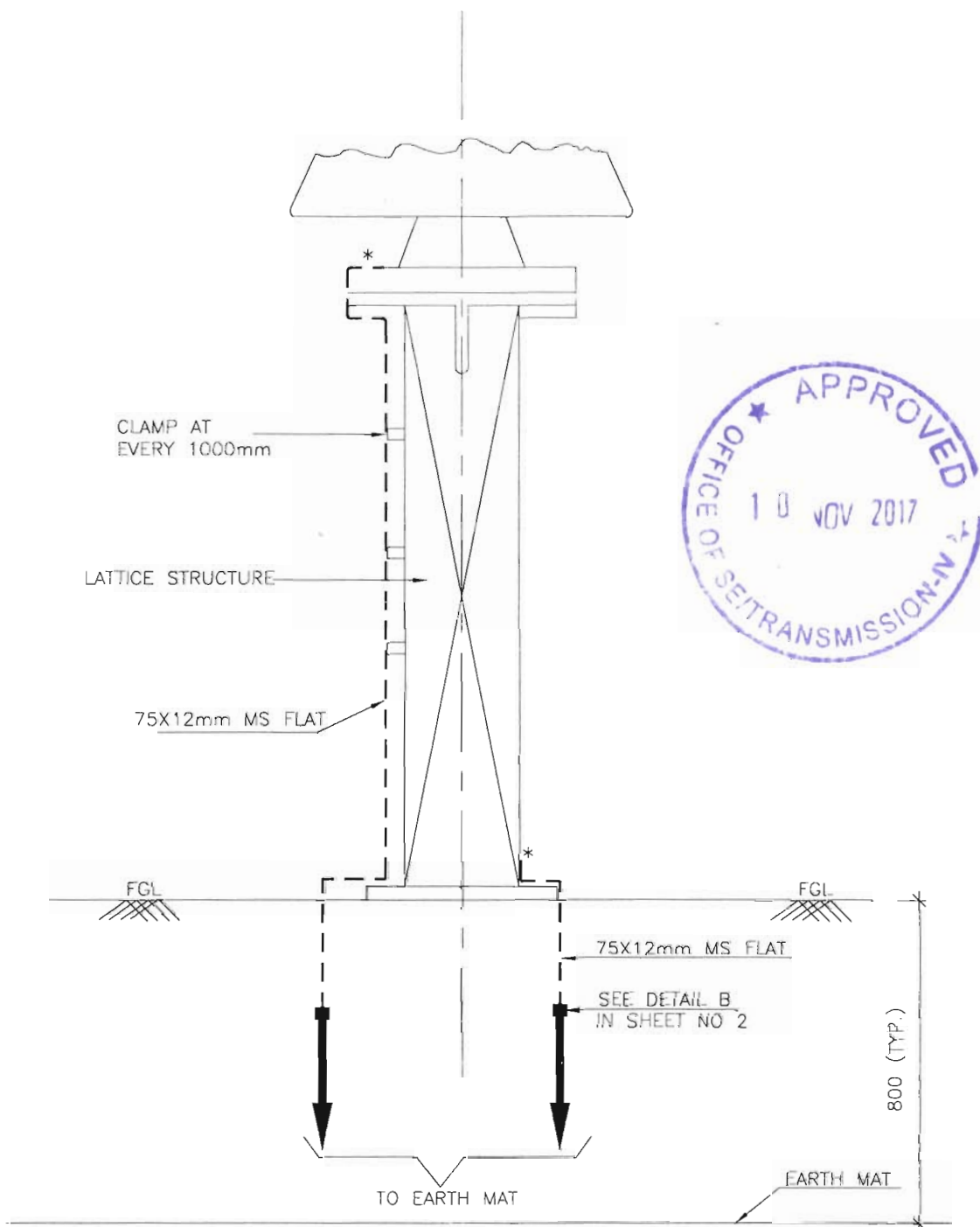
DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.

3



**NOTE:**

- (1) NO. OF RISERS = 2 NOS./PHASE.
- (2) \* BOLTED JOINTS.



# EQUIPMENT & STRUCTURE EARTHING DETAILS

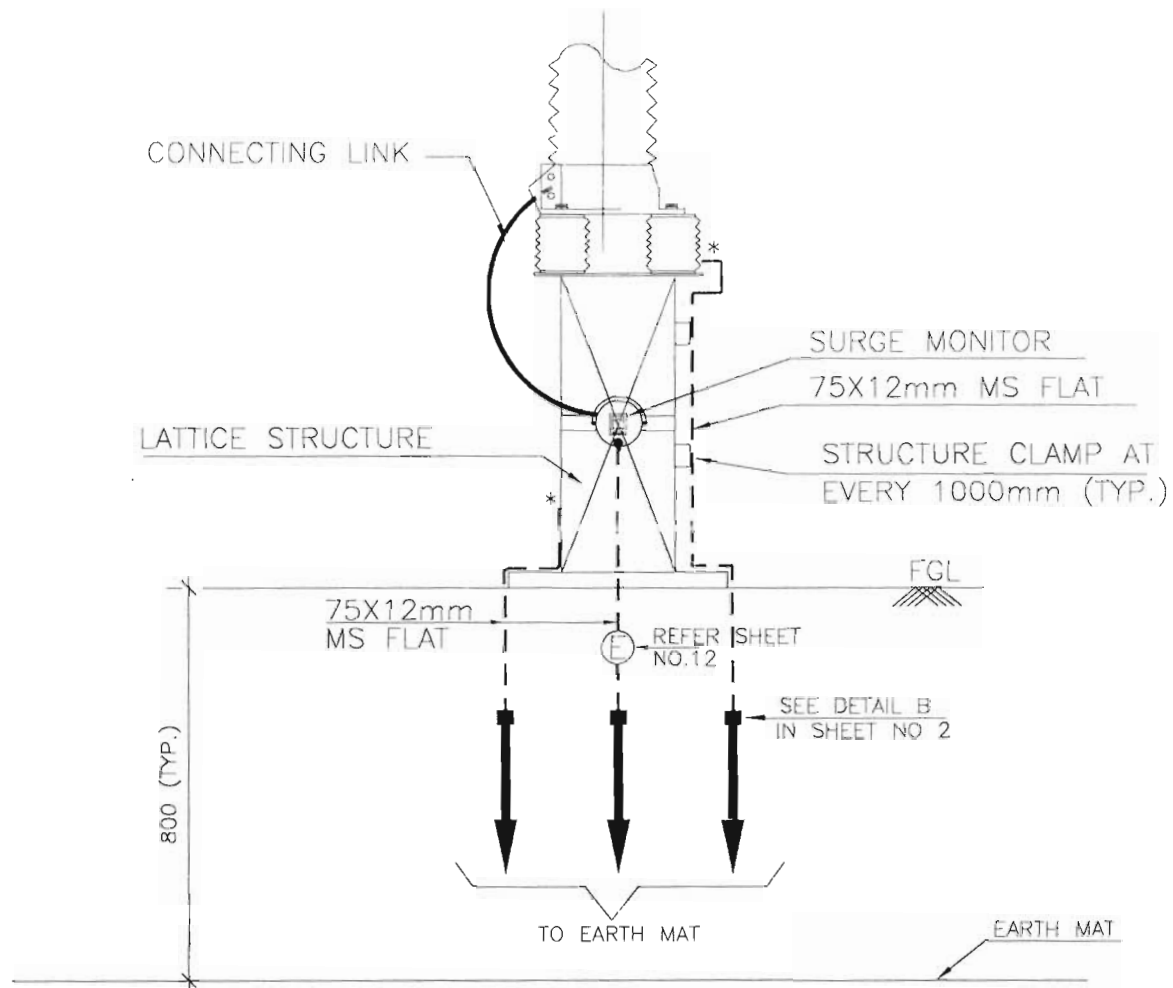
765kV/400kV/132kV/33kV POST INSULATOR

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
4



### NOTES;

1. LA SHALL BE EARTHED THROUGH EARTH TERMINAL OF SURGE MONITOR.
2. No. OF ROD ELECTRODE WITH TREATED EARTH PIT = 1 No. PER PHASE.
3. \* BOLTED JOINTS.
4. NO. OF RISERS= 3 NOS. PER PHASE.



## EQUIPMENT & STRUCTURE EARTHING DETAILS

### LIGHTNING ARRESTER(624kV/390kV/132kV/22kV)

COMPU. DRG. REF.

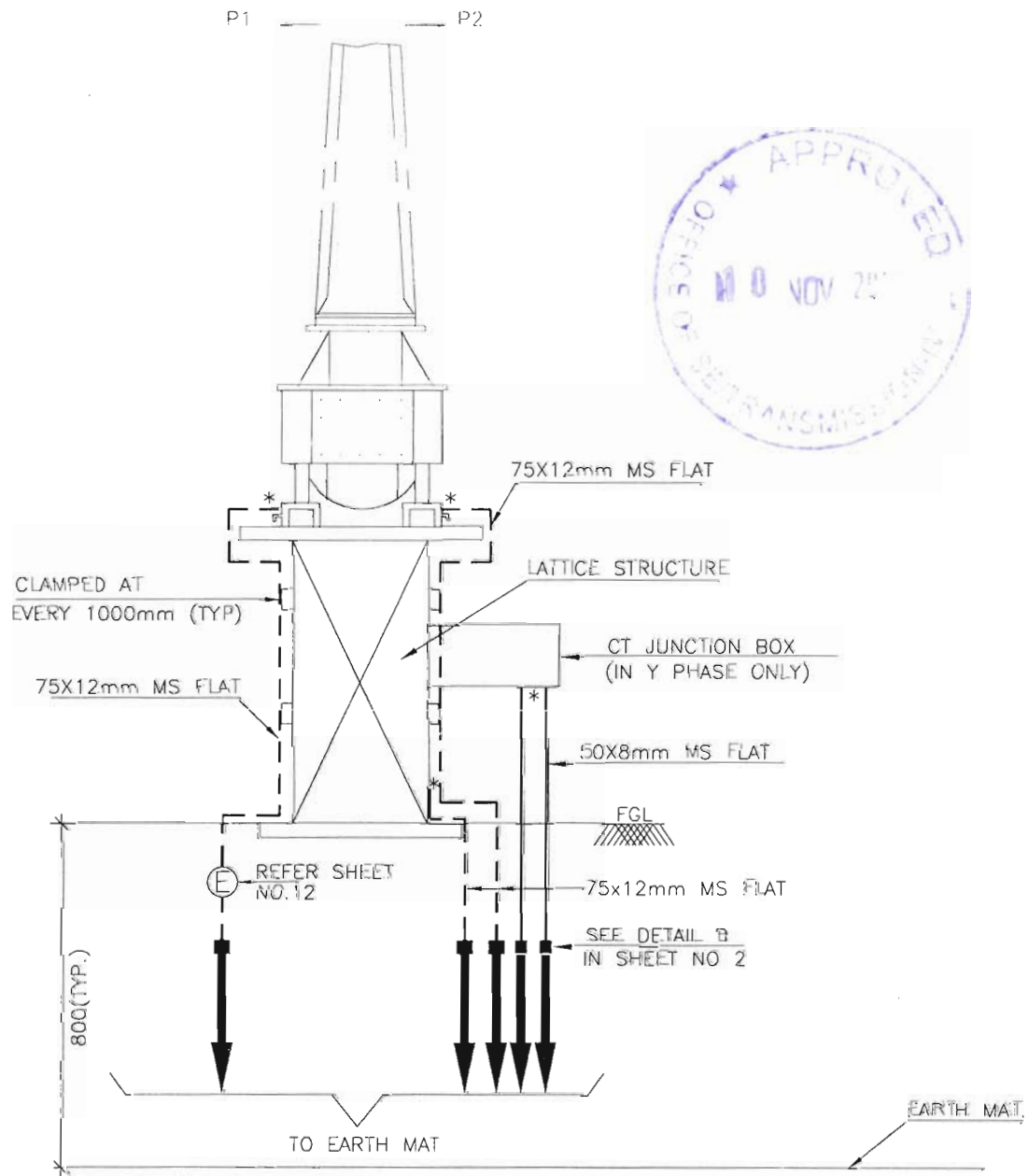
DRG.NO.

TB-4-394-316-012

REV. 01

SHEET No.

5



### NOTE:-

1. No. OF ROD ELECTRODE WITH TREATED EARTH PIT = 1 No. PER PHASE.
2. NO. OF RISERS = 3 NOS PER PHASE.
3. NO. OF RISERS FOR CT JUNCTION BOX = 2 NOS PER 3 PHASE.
4. \* BOLTED JOINTS.



## EQUIPMENT & STRUCTURE EARTHING DETAILS

### 765kV/400kV/33kV CURRENT TRANSFORMER

COMPU. DRG. REF.

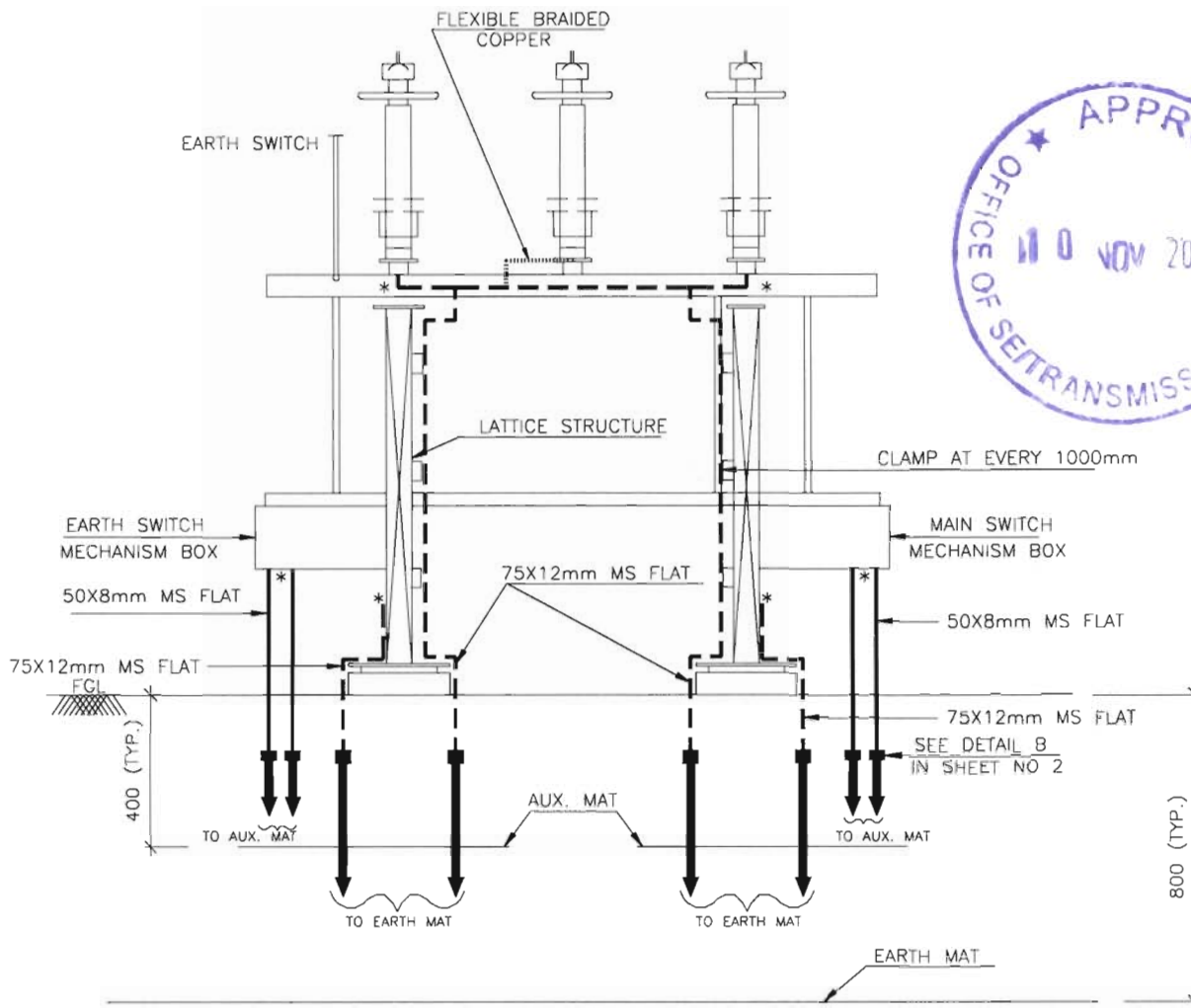
DRG.NO.

TB-4-394-316-012

REV. 01

SHEET No.

6



## NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 11).
2. NO. OF RISERS FOR ISOLATOR = 4 NOS. PER PHASE.
3. NO. OF RISERS FOR MAIN SWITCH MECHANISM BOX = 2 NOS. PER BOX.
4. NO. OF RISERS FOR EARTH SWITCH MECHANISM BOX = 2 NOS. PER BOX.
5. \* BOLTED JOINTS.
6. NO. OF AUXILIARY EARTHMAT = 1 No. FOR EACH MECHANISM BOX.
7. NO. OF AUXILIARY EARTHMAT & MECHANISM BOX IS INDICATIVE ONLY. IT SHALL BE EXECUTED AS PER ACTUAL NUMBER/POSITION OF MECHANISM BOX.



## EQUIPMENT & STRUCTURE EARTHING DETAILS

400kV/22kV HDB  
ISOLATOR & EARTH SWITCH (TYPICAL)

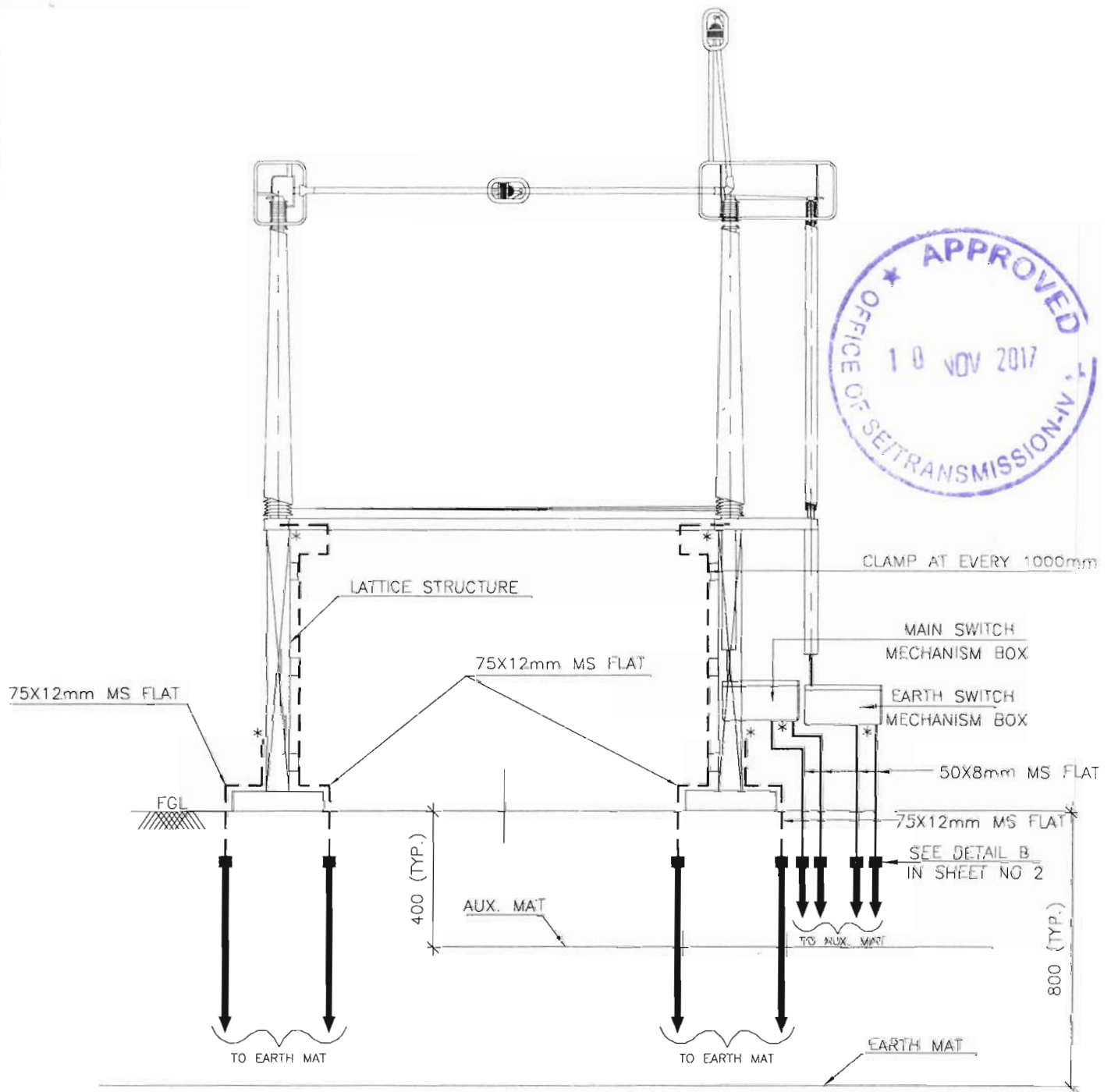
COMPUTER REF. NO.

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
7



## NOTES

1. AUXILIARY EARTH MAT SHALL BE PROVIDED BELOW EVERY MOM BOX (REFER SHEET 11).
2. NO. OF RISERS FOR ISOLATOR = 4 NOS. PER PHASE.
3. NO. OF RISERS FOR MAIN SWITCH MECHANISM BOX = 2 NOS. PER BOX.
4. NO. OF RISERS FOR EARTH SWITCH MECHANISM BOX = 2 NOS. PER BOX.
5. \* BOLTED JOINTS.
6. NO. OF AUXILIARY EARTH MAT = 1 No. FOR EACH MECHANISM BOX.
7. NO. OF AUXILIARY EARTH MAT & MECHANISM BOX IS INDICATIVE ONLY. IT SHALL BE EXECUTED AS PER ACTUAL NUMBER/POSITION OF MECHANISM BOX.



## EQUIPMENT & STRUCTURE EARTHING DETAILS

765KV VERTICAL KNEE TYPE  
ISOLATOR & EARTH SWITCH (TYPICAL)

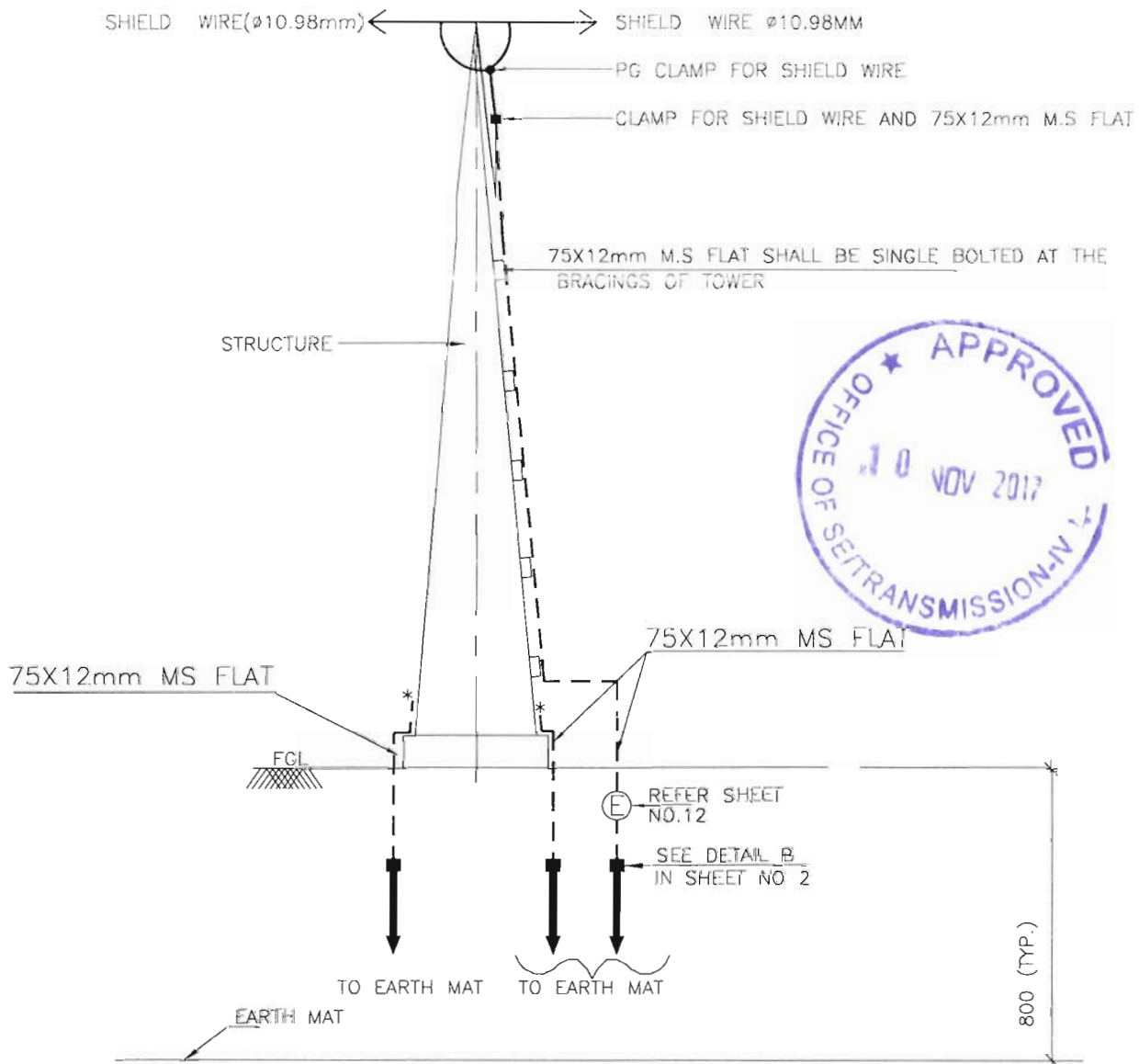
COMPUTER REF. NO.

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
8



#### NOTE:

1. NO. OF ROD ELECTRODE WITH TREATED EARTH PIT : 1 NO. PER PEAK TOWER.
2. NO. OF RISERS = 3 NOS. / TOWER.
3. \* BOLTED JOINTS.
4. IF THERE ARE THREE NOS. SHIELD WIRE TERMINATING ON ONE TOWER THEN TWO NOS. PG CLAMP ARE REQUIRED.



## EQUIPMENT & STRUCTURE EARTHING DETAILS

### TOWER WITH PEAK

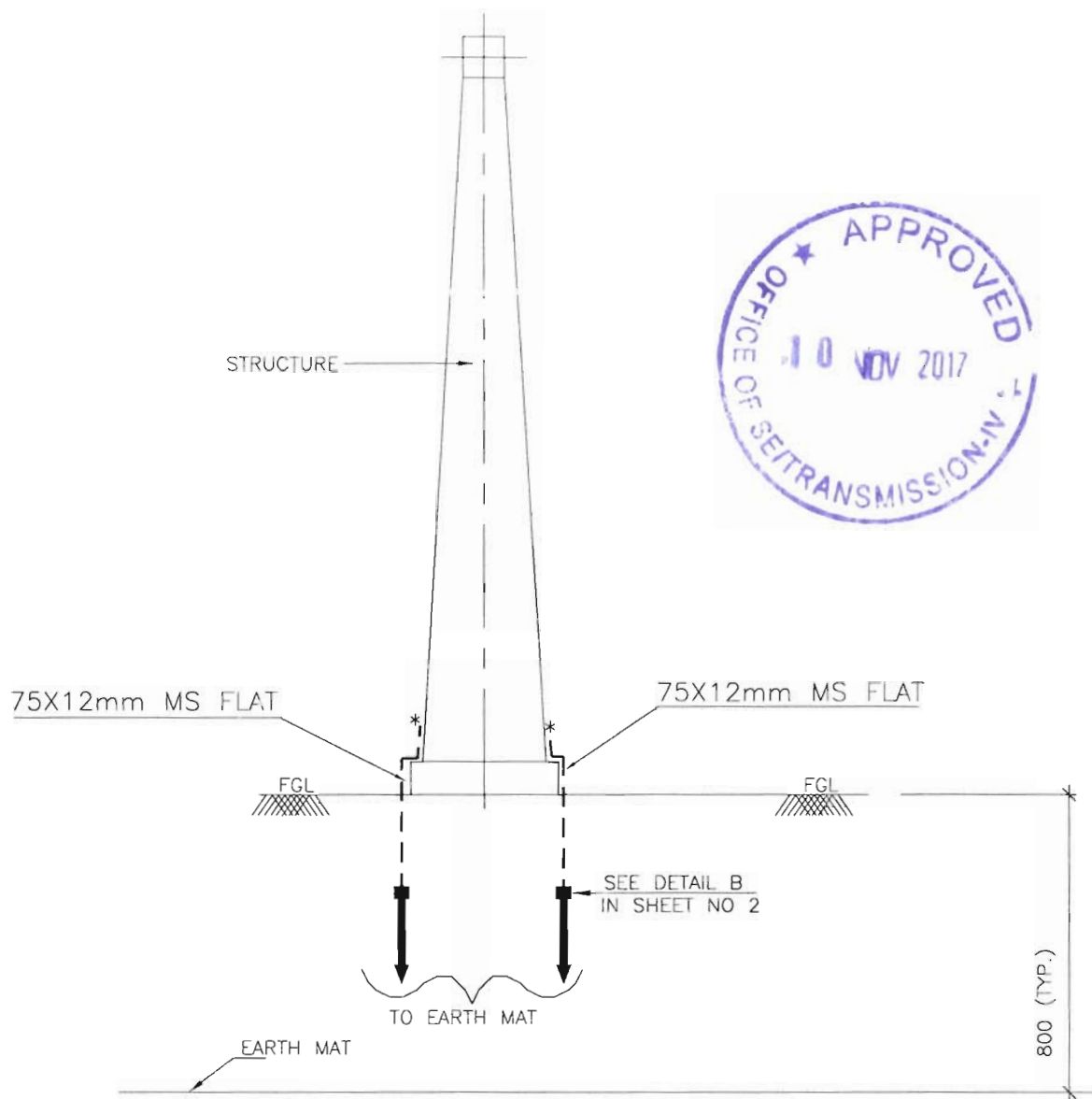
COMPUTER REF. NO.

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
3



**NOTE:**

1. NO. OF RISERS = 2 NOS. / TOWER.
2. \* BOLTED JOINTS.



EQUIPMENT & STRUCTURE EARTHING DETAILS  
TOWER WITHOUT PEAK

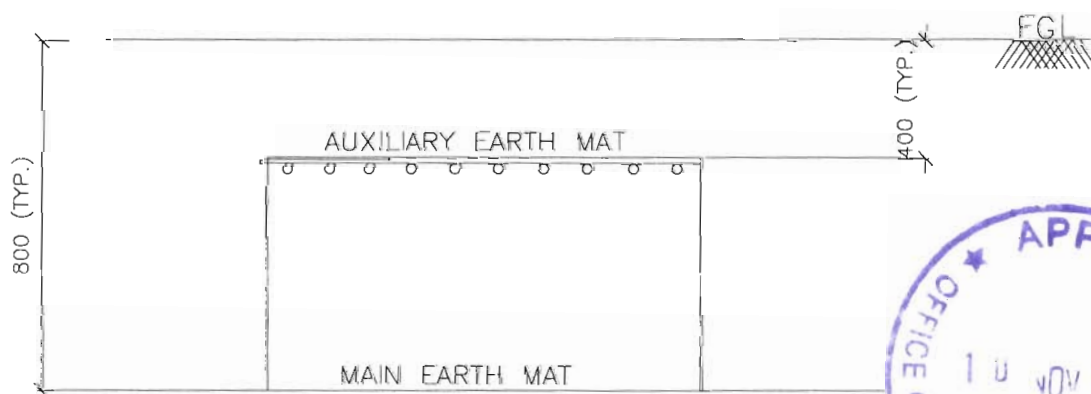
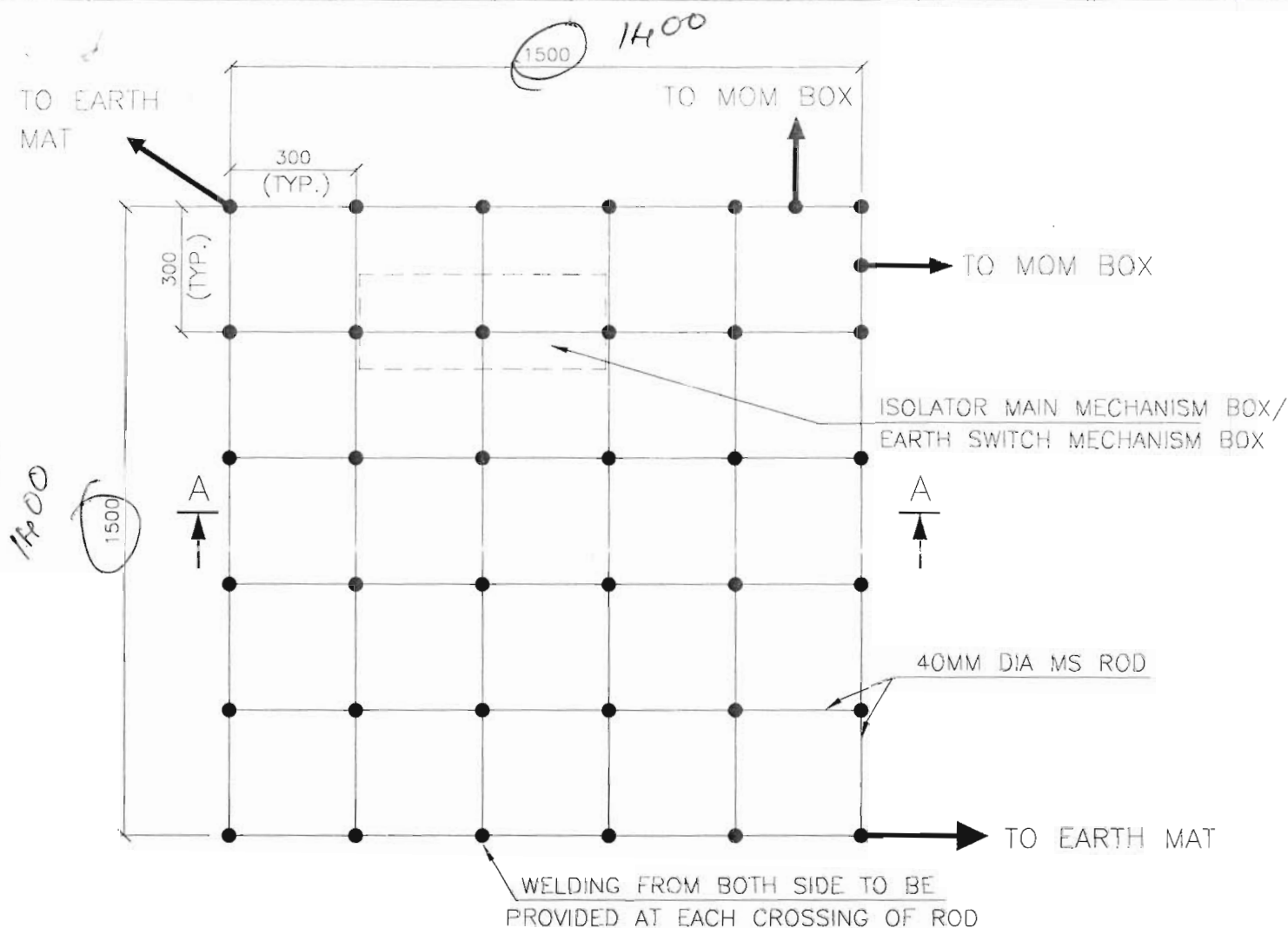
COMPUTER REF. NO.

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
10



SECTION A - A

NOTE:

1. 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 & STRUCTURE EARTHING DETAILS  
AUXILIARY EARTH MAT FOR ISOLATOR MAIN & EARTH SWITCH  
MECHANISM BOX

COMPU. DRG. REF.

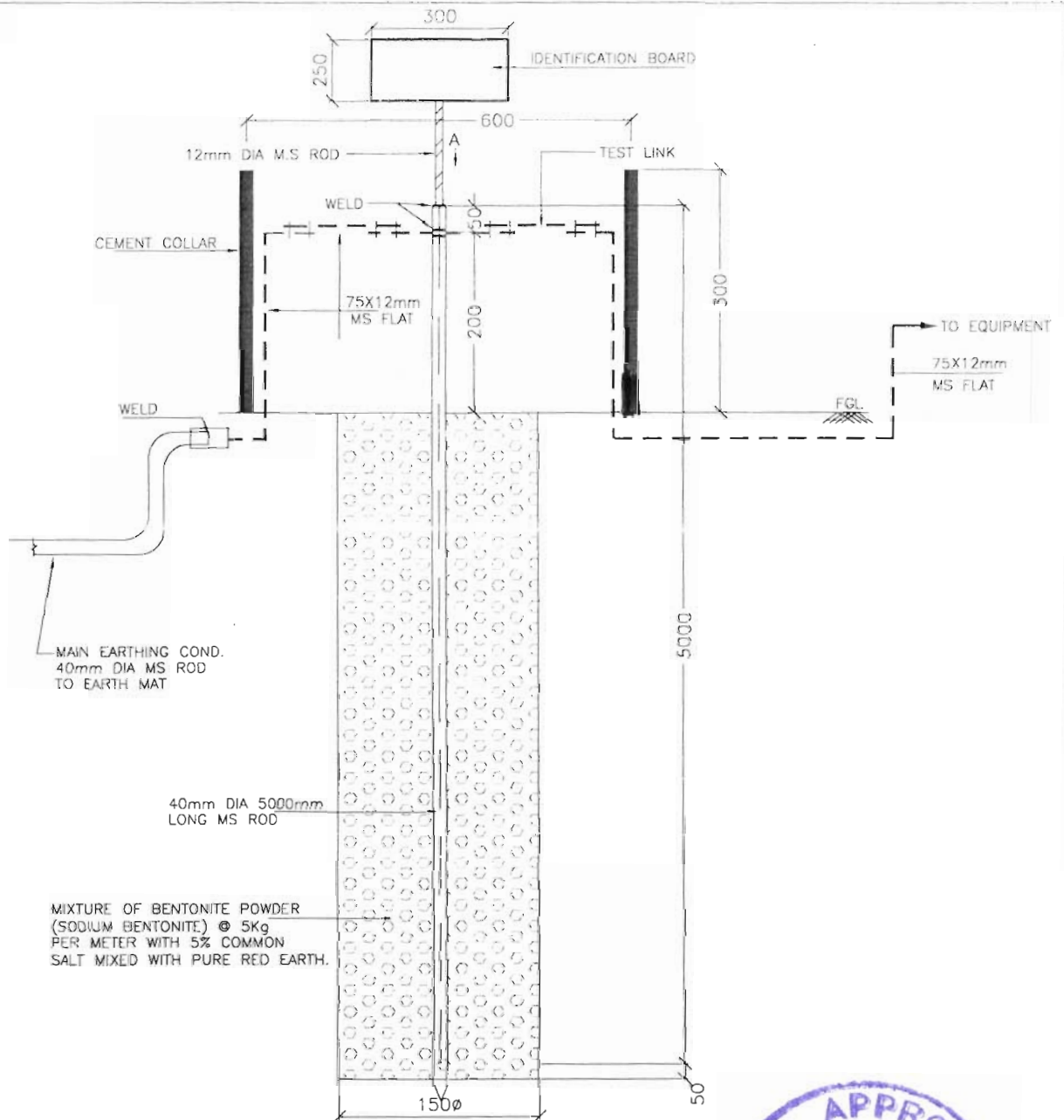
Report No.

TB-4-394-316-012

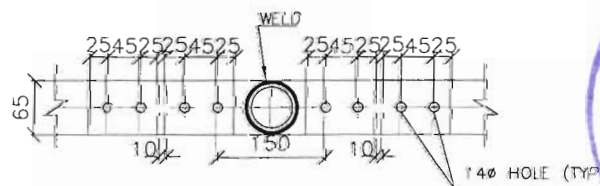
REV. 01

SHEET No.

11



MIXTURE OF BENTONITE POWDER  
(SODIUM BENTONITE) @ 5Kg  
PER METER WITH 5% COMMON  
SALT MIXED WITH PURE RED EARTH.



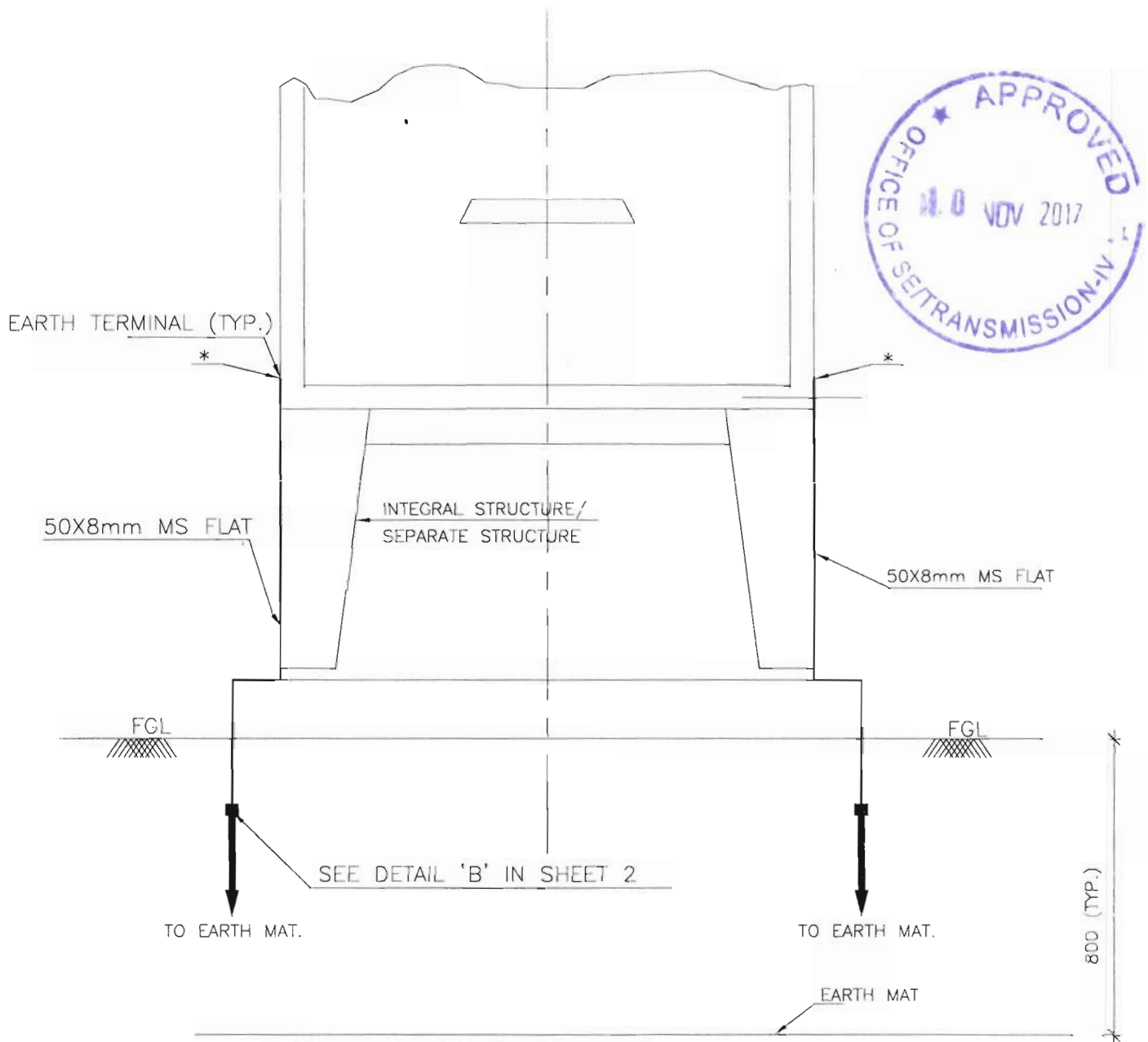
#### NOTE:

1. ALL DIMENSION ARE IN mm.
2. HARDWARE HDG M12 BOLT WITH NUT,  
2 PLANE AND ONE SPRING WASHER = 8 NOS. PER ELECTRODE.
3. CEMENT COLLAR IS 600 mm DIA., 300mm HEIGHT  
AND 36 mm THICK. CEMENT CALLAR SHALL BE RCC TYPE.
4. 75X12mm M.S FLAT TO BE LAID UPTO EQUIPMENT FOUNDATION.
5. EXPOSED SURFACE OF CEMENT COLLAR SHALL BE PAINTED WITH  
TWO COATS OF PAINT OVER ONE COAT OF PRIMER.
5. IDENTIFICATION BOARD TO BE PROVIDED WITH EACH EARTH PIT.  
THE SIZE OF BOARD SHALL BE 300X250mm WITH 2mm M.S  
SHEET ON 12mm DIA M.S ROD.



## EQUIPMENT & STRUCTURE EARTHING DETAILS

### ROD ELECTRODE WITH TREATED EARTH PIT



# NOTES;

1. NO. OF RISERS= 2NOS.
2. \* BOLTED JOINTS.



## EQUIPMENT & STRUCTURE EARTHING DETAILS MARSHALLING KIOSK/OUTDOOR LIGHTING PANEL

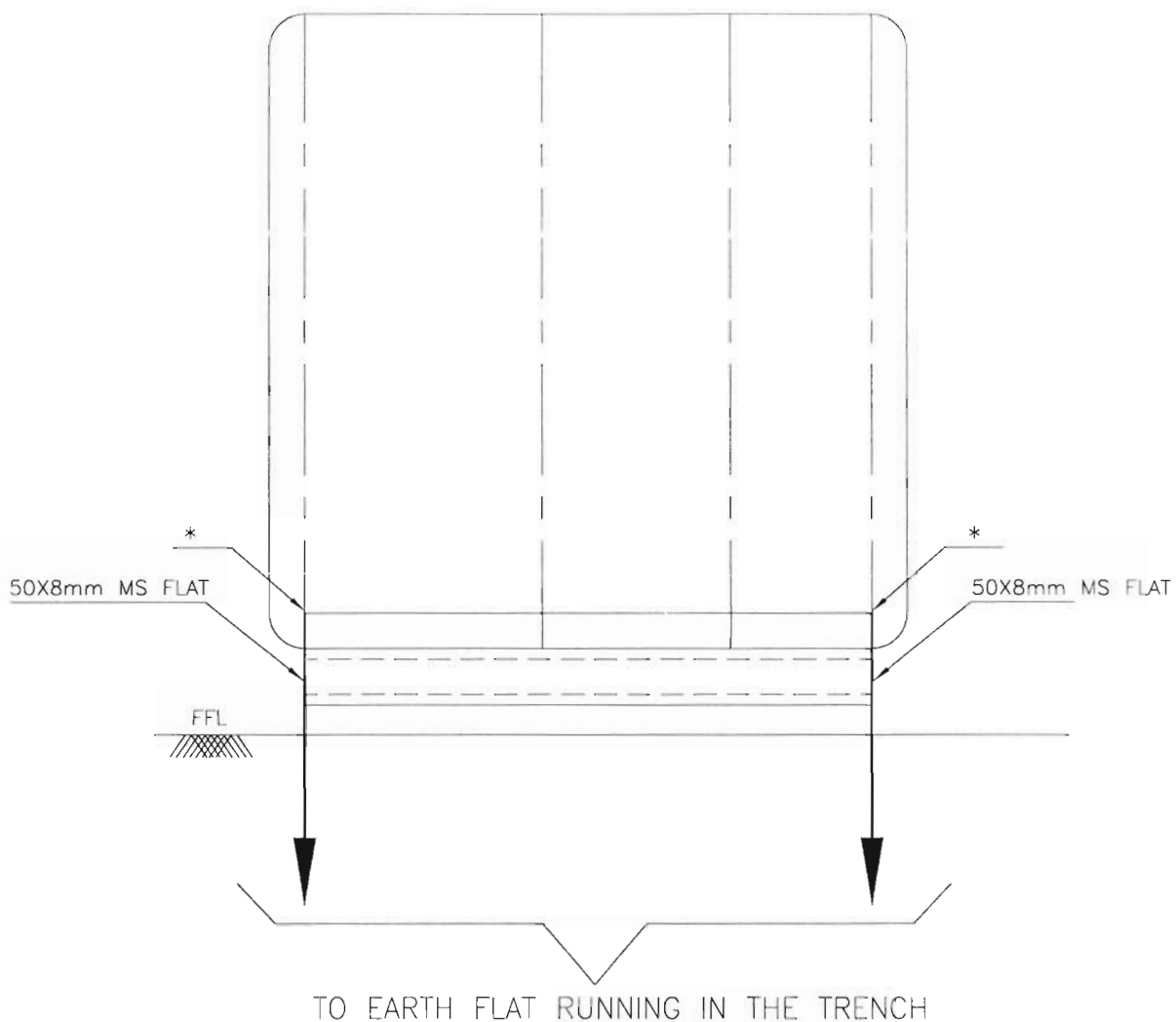
COMPUTER REF. NO.

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
13



NOTE:-

1. \* BOLTED JOINTS.



EQUIPMENT & STRUCTURE EARTHING DETAILS  
LT SWITCHGEAR/CHARGER/RELAY & CONTROL PANEL/INDOOR  
LIGHTING PANEL

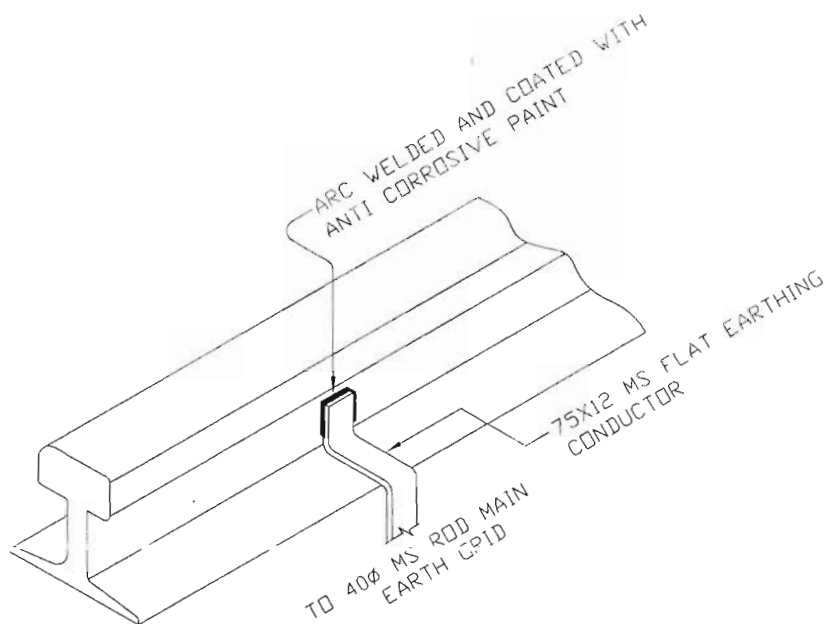
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TB-4-394-316-012

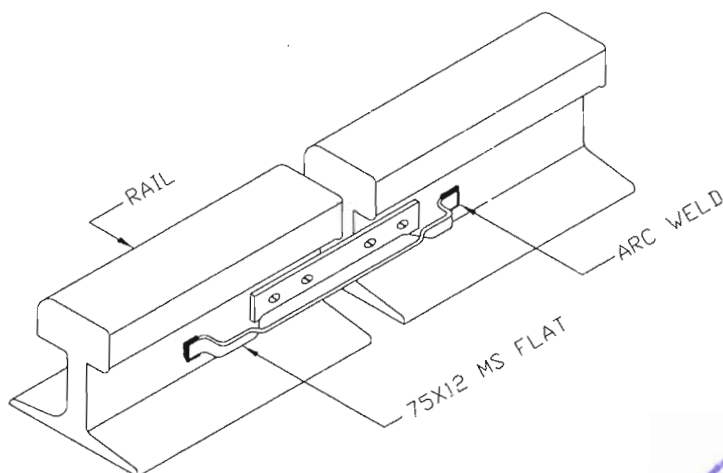
REV. 01

SHEET No.  
14





RAIL EARTHING



RAIL BONDING



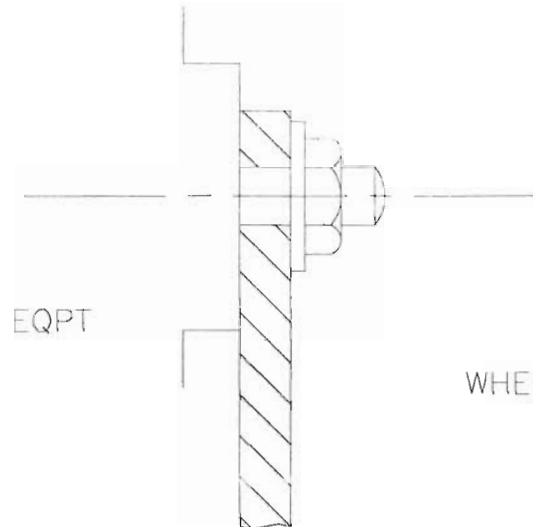
**NOTE:-**

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



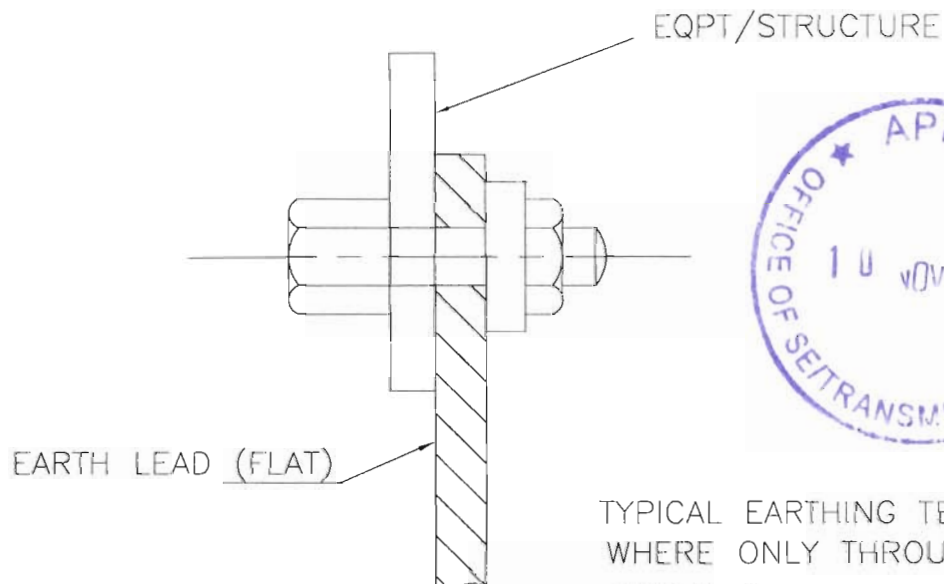
EQUIPMENT & STRUCTURE EARTHING DETAILS

RAIL BONDING



WHERE STUD AVAILABLE

TYPICAL EARTHING TERMINAL JOINT



TYPICAL EARTHING TERMINAL JOINT  
WHERE ONLY THROUGH HOLE IS  
AVAILABLE

### 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



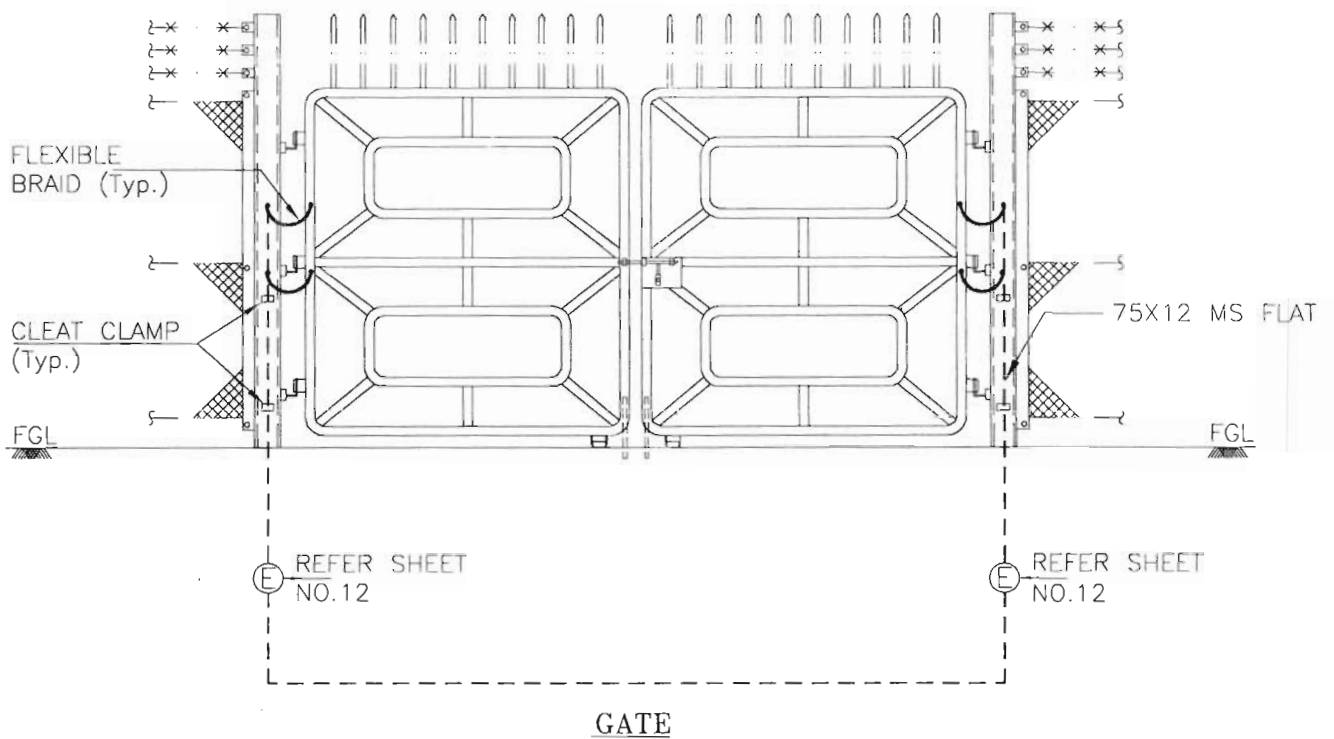
EQUIPMENT & STRUCTURE EARTHING DETAILS  
TYPICAL ARRANGEMENT OF BOLTED JOINTS

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
17



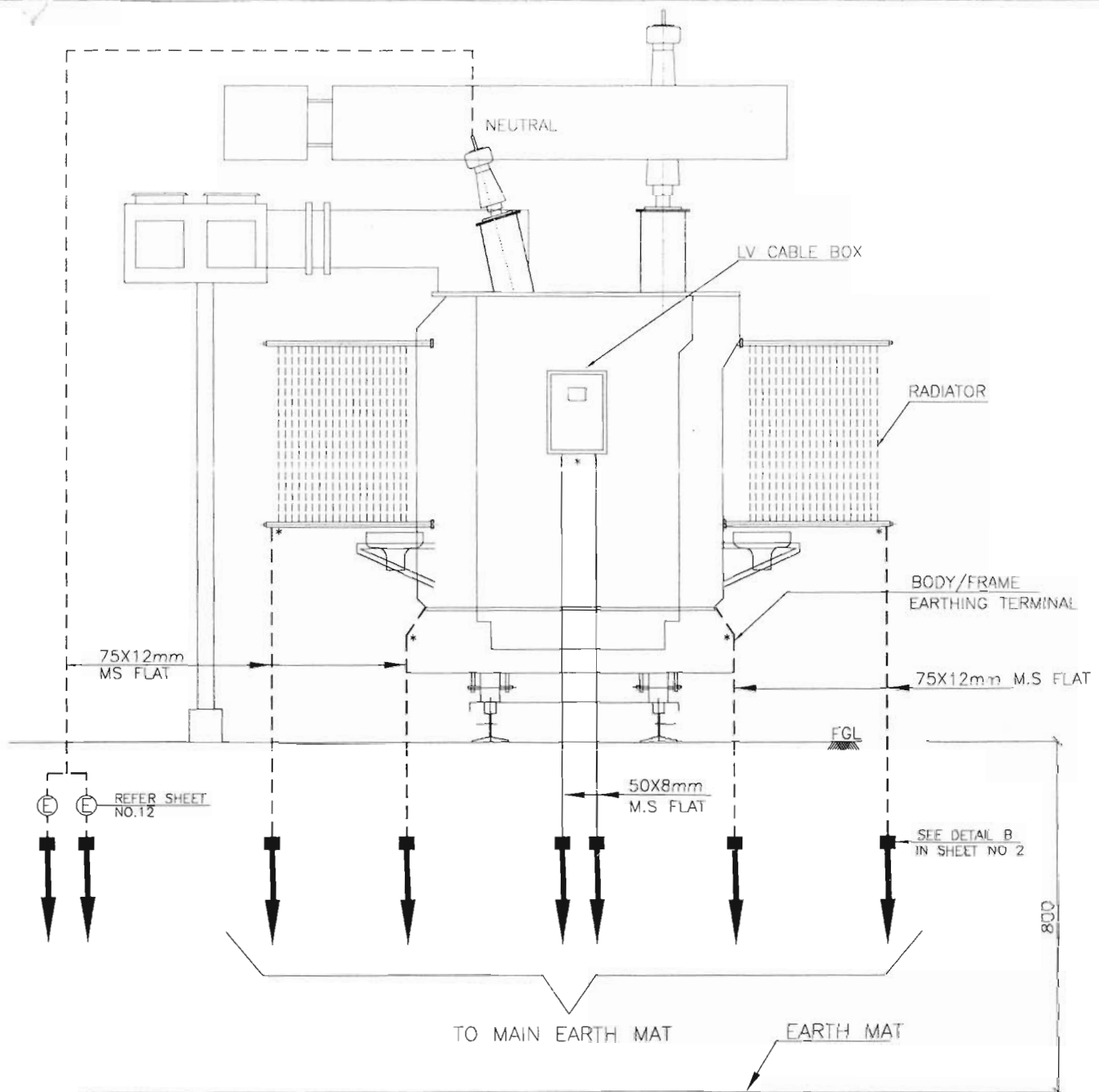
EQUIPMENT & STRUCTURE EARTHING DETAILS  
EARTHING OF GATE

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
18



**NOTE:**

1. NO. OF RISERS FOR MAIN TANK = 2 NOS.
2. NO. OF RISERS FOR NEUTRAL = 2 NOS.
3. NO. OF RISERS FOR RADIATOR = 2 NOS.
4. NO. OF RISERS FOR LT CABLE BOX = 2 NOS.
5. NO. OF ROD ELECTRODE WITH TREATED EARTH PIT : 2 NOS.
6. \* BOLTED JOINTS.



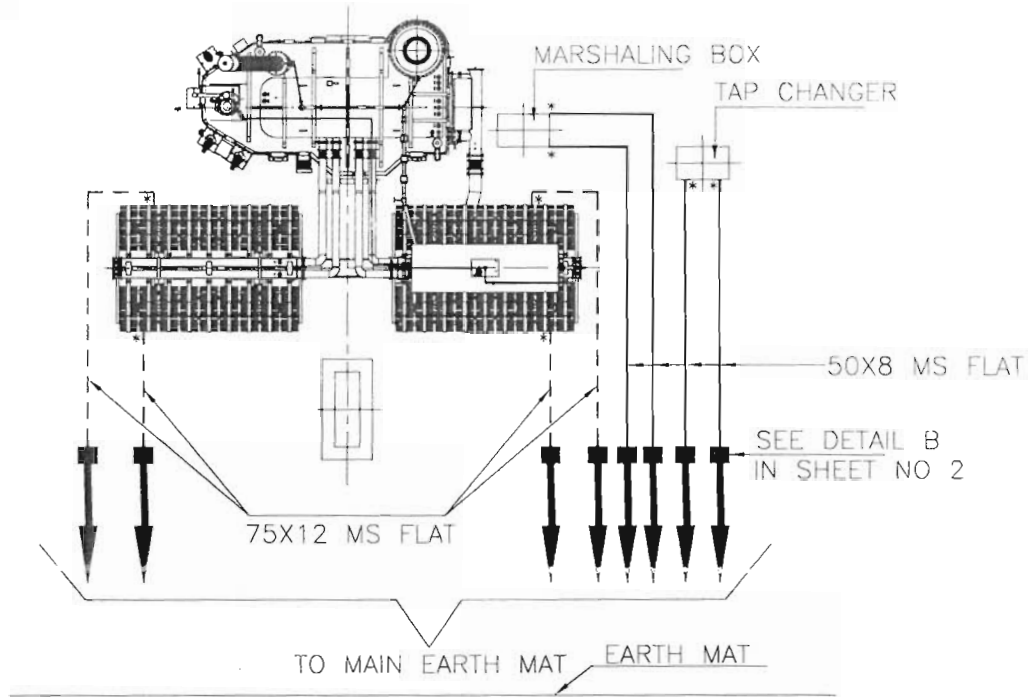
**EQUIPMENT EARTHING DETAILS**  
**LT TRANSFORMER**

DRG. No.

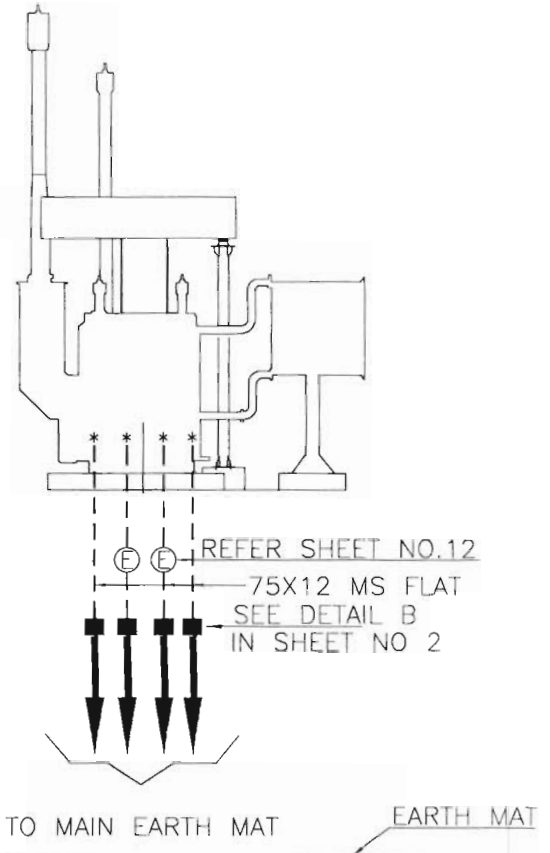
TB-4-394-316-012

REV. 01

SHEET No.  
19



PLAN



ELEVATION

NOTE:

1. NO. OF RISERS FOR MAIN TANK = 4 NOS.
2. NO. OF RISERS FOR RADIATOR = 4 NOS.
3. NO. OF RISERS FOR MARSHALING BOX = 2 NOS.
4. NO. OF RISERS FOR TAP CHANGER = 2 NOS.
5. NO. OF ROD ELECTRODE WITH TREATED EARTH PIT FOR TANK OF ICT : 2 NOS.
6. COMMON NEUTRAL OF THREE NOS. SINGLE PHASE ICT SHALL BE EARTHED THROUGH COMMON NEUTRAL 33kv CT. COMMON NEUTRAL OF 33kv CT SHALL BE FINALLY CONNECTED THROUGH TWO NOS. ROD ELECTRODE WITH TREATED EARTH PIT.
7. \* BOLTED JOINTS.



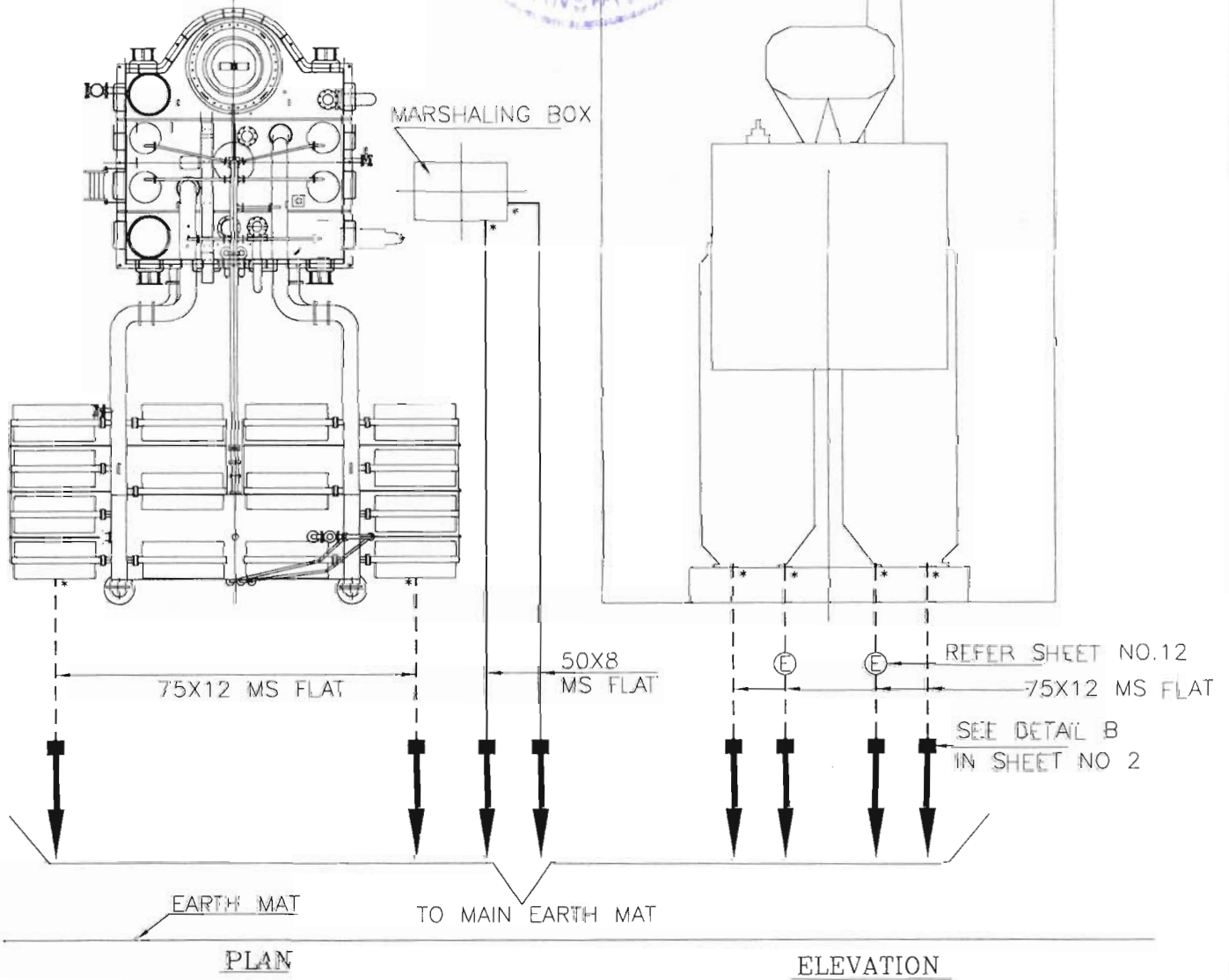
EQUIPMENT EARTHING DETAILS  
SINGLE PHASE 765kv/400kv/33kv ICT

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
20



**NOTE:-**

1. NO. OF RISERS FOR MAIN TANK = 4 NOS.
2. NO. OF RISERS FOR RADIATOR = 2 NOS.
3. NO. OF RISERS FOR MARSHALING BOX = 2 NOS.
4. NO. OF ROD ELECTRODE WITH TREATED EARTH PIT FOR TANK OF REACTOR : 2 NOS.
5. COMMON NEUTRAL OF THREE NOS. SINGLE PHASE REACTOR SHALL BE EARTHED THROUGH COMMON NEUTRAL 33KV CT. COMMON NEUTRAL OF 33KV CT SHALL BE FINALLY CONNECTED THROUGH TWO NOS. ROD ELECTRODE WITH TREATED EARTH PIT.
6. \* BOLTED JOINTS.



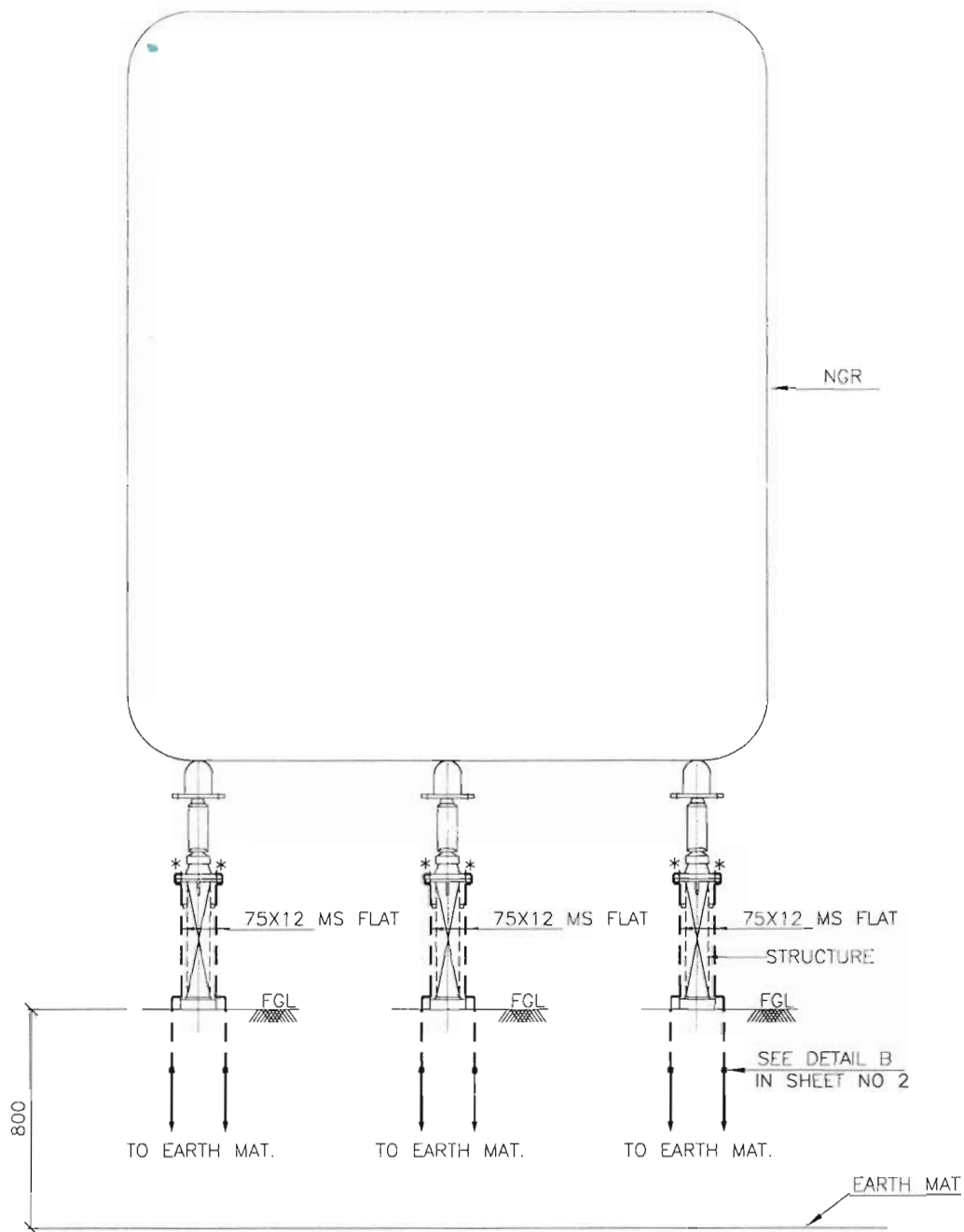
**EQUIPMENT EARTHING DETAILS  
SINGLE PHASE 765kV REACTOR**

DRG. No.

TB-4-394-316-012

REV. 01

SHEET No.  
21



**NOTE:-**

1. NO. OF RISERS FOR NGR = 12 NOS. (TOTAL STRUCTURE ARE 6 NOS. PER NGR)
2. \* BOLTED JOINTS.
3. NEUTRAL OF NGR SHALL BE EARTHED THROUGH COMMON NEUTRAL 33kv CT. NEUTRAL 33kv CT SHALL BE FINALLY CONNECTED THROUGH TWO NOS. ROD ELECTRODE WITH TREATED EARTH PIT.



**EQUIPMENT & STRUCTURE EARTHING DETAILS**  
AIR CORE NGR (NEUTRAL GROUNDING REACTOR)

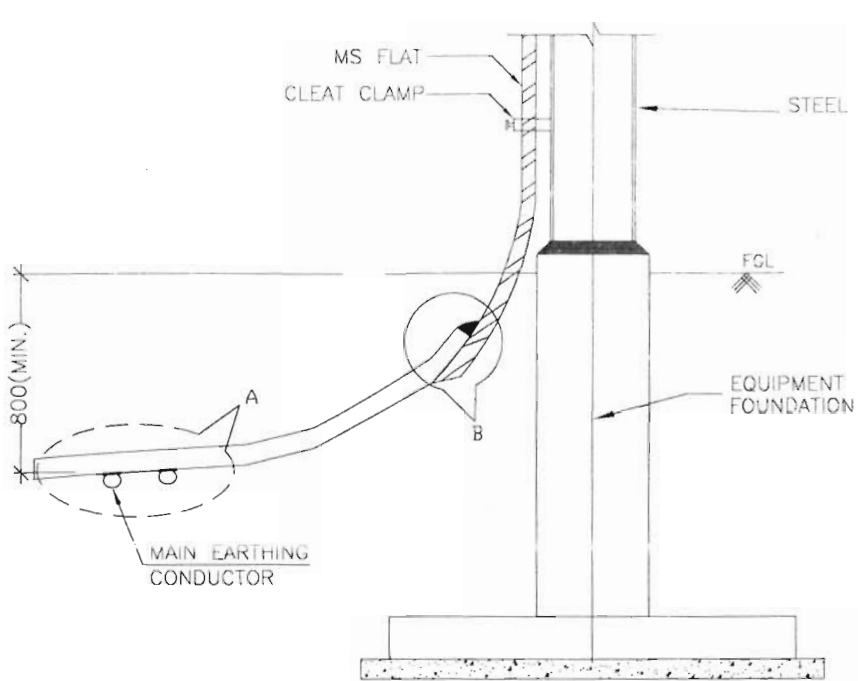
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DRG. No.

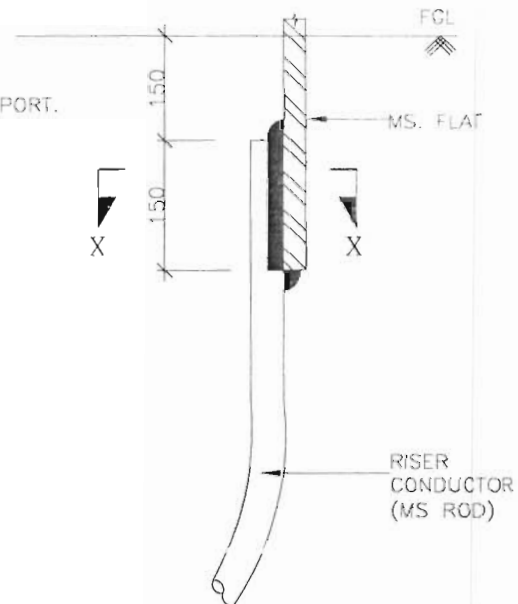
TB-4-394-316-012

REV. 01

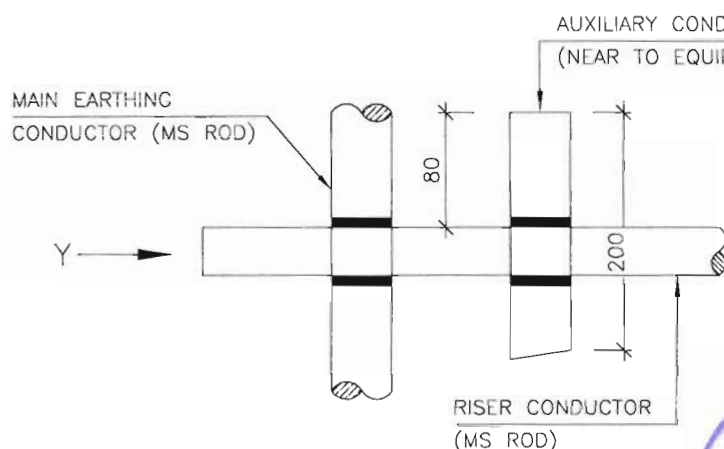
SHEET No.  
22



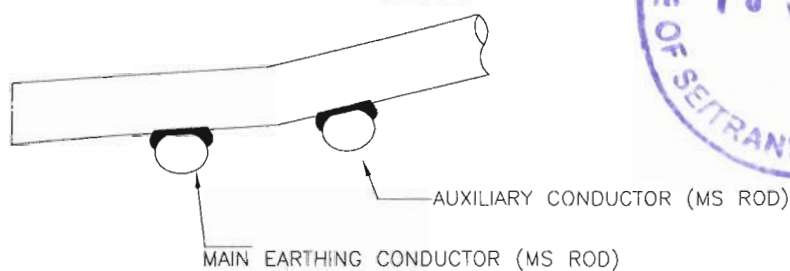
TYPICAL DETAILS OF RISER



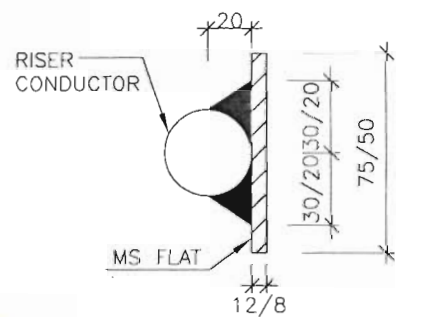
ELEVATION  
DETAIL-B



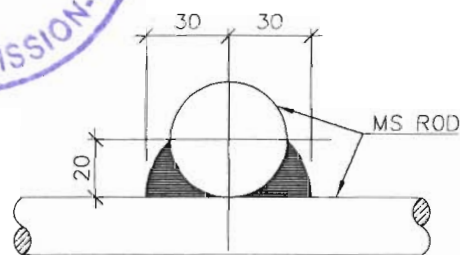
PLAN



ELEVATION  
DETAIL - A



SECTION X-X



VIEW - (Y)



# EQUIPMENT & STRUCTURE EARTHING DETAILS

## WELDING DETAILS

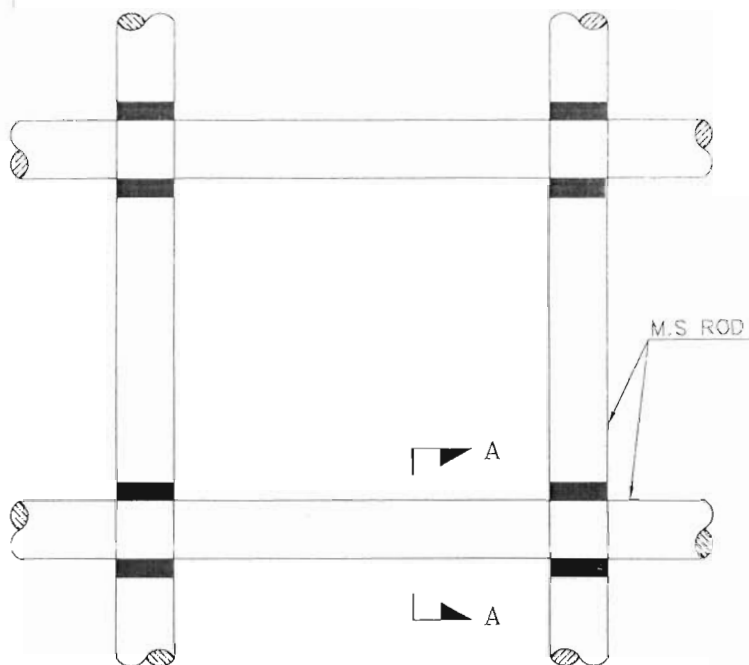
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DRG. No.

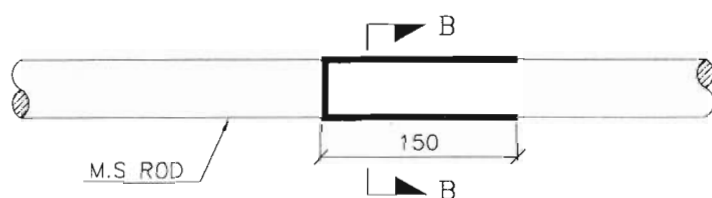
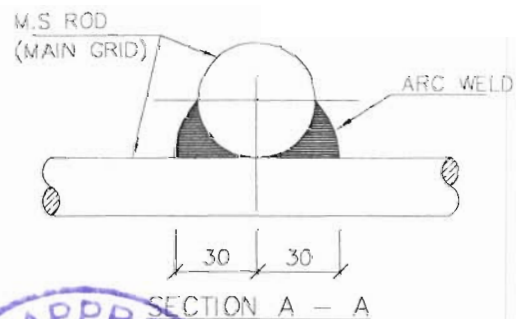
TB-4-394-316-012

REV. 01

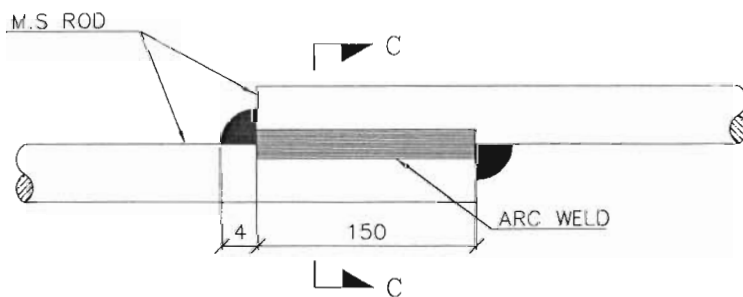
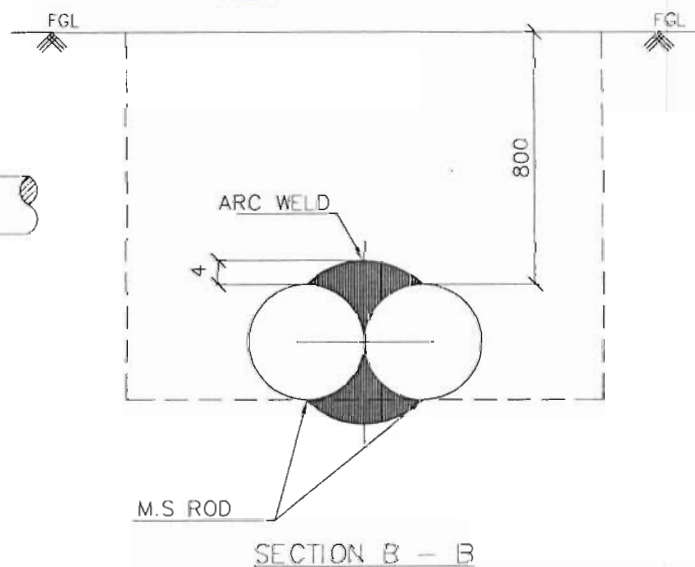
SHEET No.  
23



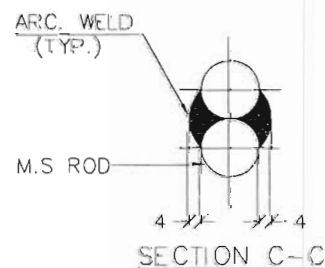
PLAN  
DETAIL OF CROSS JOIN



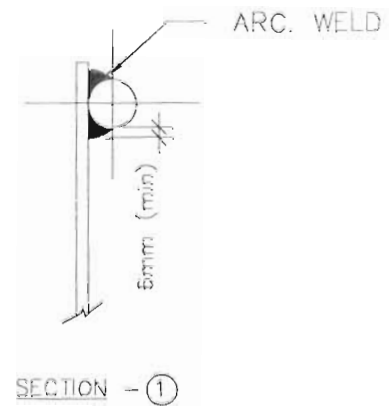
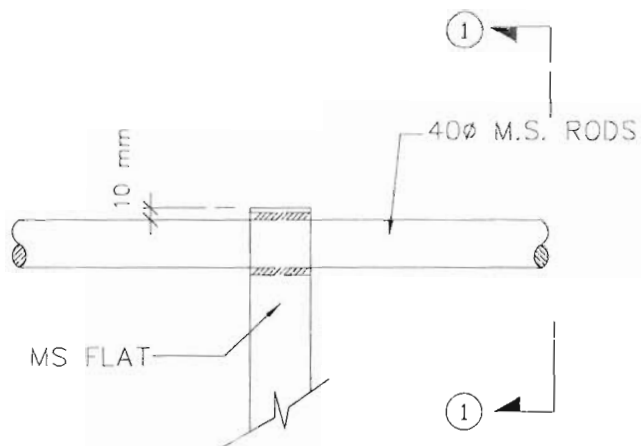
ELEVATION  
(CONDUCTORS KEPT ON SIDE)



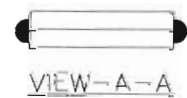
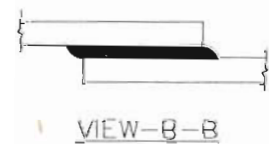
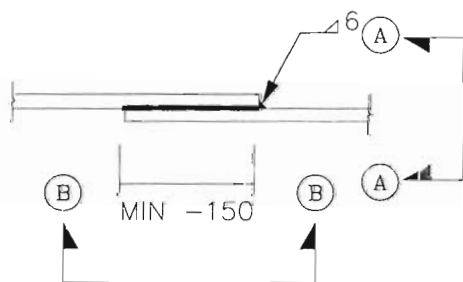
ELEVATION  
(CONDUCTORS ONE ABOVE THE OTHER)



# EQUIPMENT & STRUCTURE EARTHING DETAILS WELDING DETAILS



CROSS JOINT  
BETWEEN M.S. ROD & MS FLATS



STRIP TO STRIP STRAIGHT LAP JOINT



# EQUIPMENT & STRUCTURE EARTHING DETAILS WELDING DETAILS

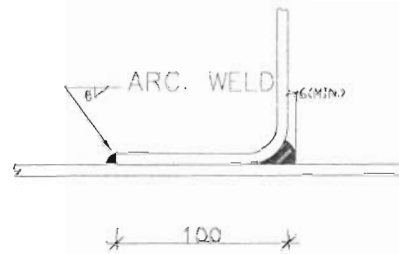
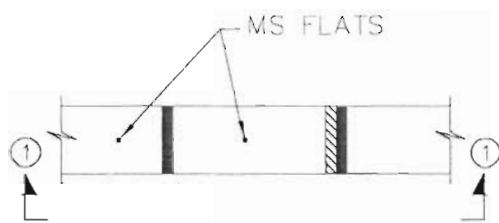
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DRG. No.

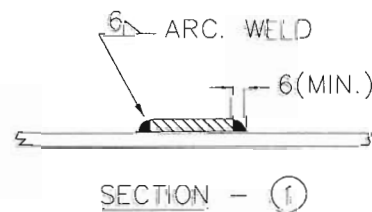
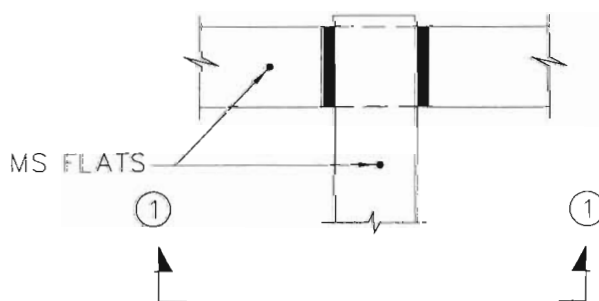
TB-4-394-316-012

REV. 01

SHEET No.  
25



SECTION - ①  
ANGULAR JOINT  
BETWEEN MS FLATS

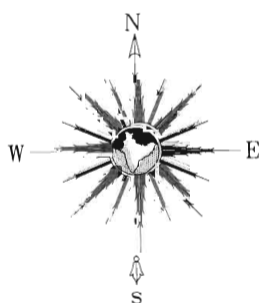


CROSS JOINT  
BETWEEN MS FLATS



# EQUIPMENT & STRUCTURE EARTHING DETAILS

## WELDING DETAILS



Sl. No	Description of Panel/equipment	Qty.	Approx Dimension of one set		
			W	D	H
1	415V Main ACDB	1 Set	6000	1000	2450
2	415V Sub ACDB-1	1 Set	10000	1000	2450
3	415V Sub ACDB-2	1 Set	8000	1000	2450
4	220V DCDB-1 for 765kV Switchyard *	1 Set	6000	800	2450
5	220V DCDB-2 for 400kV Switchyard *	1 Set	5000	800	2450
6	48V DCDB *	1 Set	3000	800	2450
7,8,9	220V, 100A charger for 765kV Yard	3 Set	1200	800	1500
10,11,12	220V, 100A charger for 400kV Yard	3 Set	1200	800	1500
13,14,15	48V, 250A Charger	3 Set	1200	800	1500
16,17	220V, 535AH Lead acid Tubular battery for 765 kV Yard	2 Set	4300*2	570*2	721
18,19	220V, 535AH lead acid Tubular battery for 400 kV Yard	2 Set	4300*2	570*2	721
20,21	48V 1250A Lead Acid tubular battery	2 Set	1200	1100	1700

REV.	DATE	ALTERED	MM
01	21.07.17	CHECKED	SK
ZONE		APPROVED	BM/PS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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## GROUND FLOOR PLAN

4 MTR WIDE ROAD

$$\frac{5000 \times 6000}{5000 \times 6000}$$

W.O. No. 86009



TAMILNADU TRANSMISSION CORPORATION. LTD.

765/400KV AIS S/S ARITYALUR IN VILLUPURAM

[illegible]

77

TRANSMISSION PROJECTS DIVISION

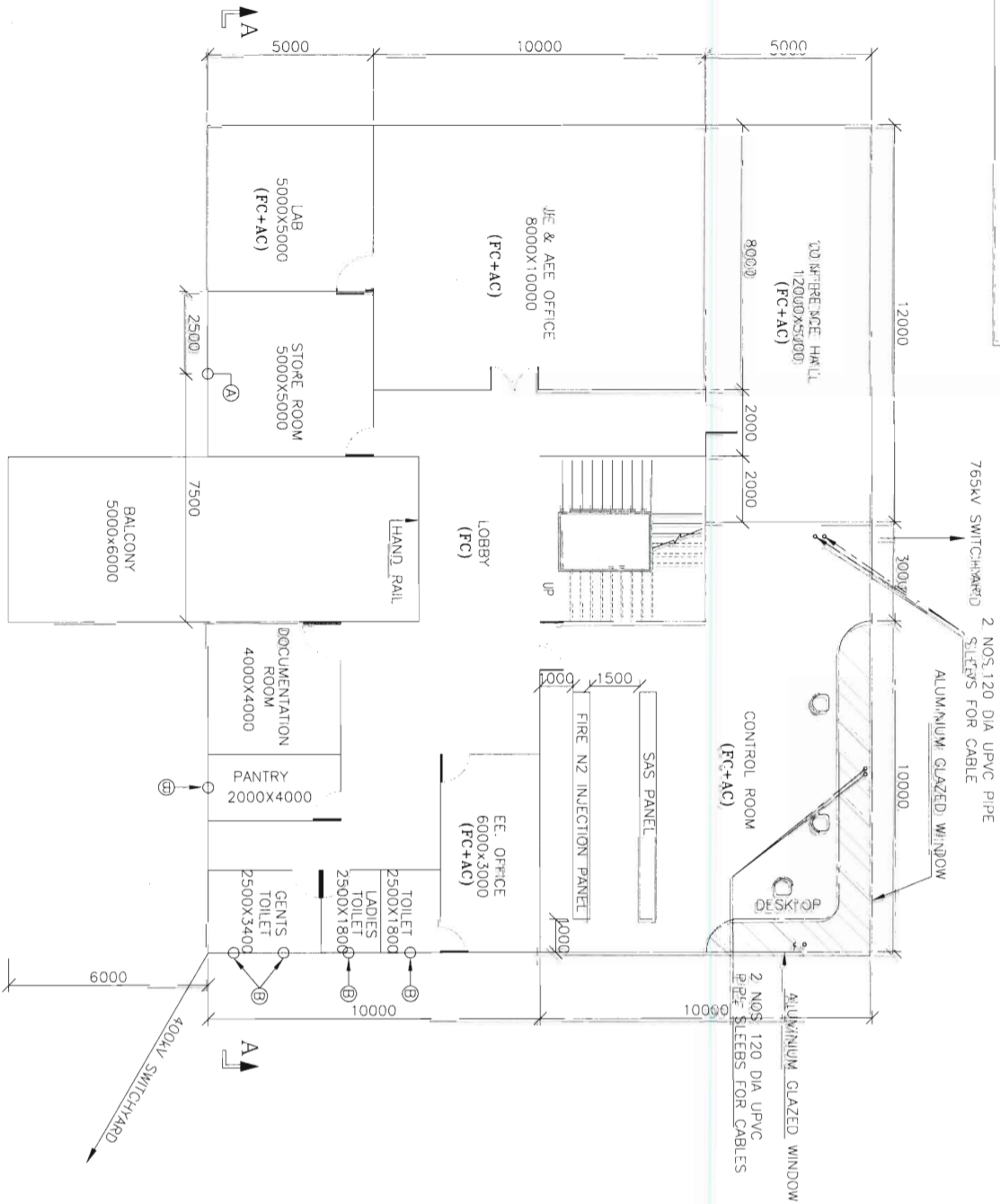
२०११ APPROVED	DM/RS	-SD-
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CODE		N/A
479		

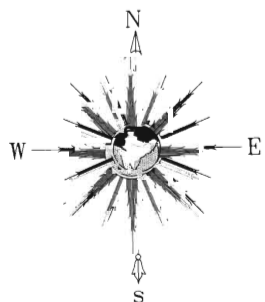
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CONCEPTUAL CONTROL ROOM BUILDING LAYOUT FOR 765/400KV S/S ARYALUR	01	TB-3-394-316-010
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TB-3-394-316-010	01
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FIRST FLOOR PLAN



NOTES:-

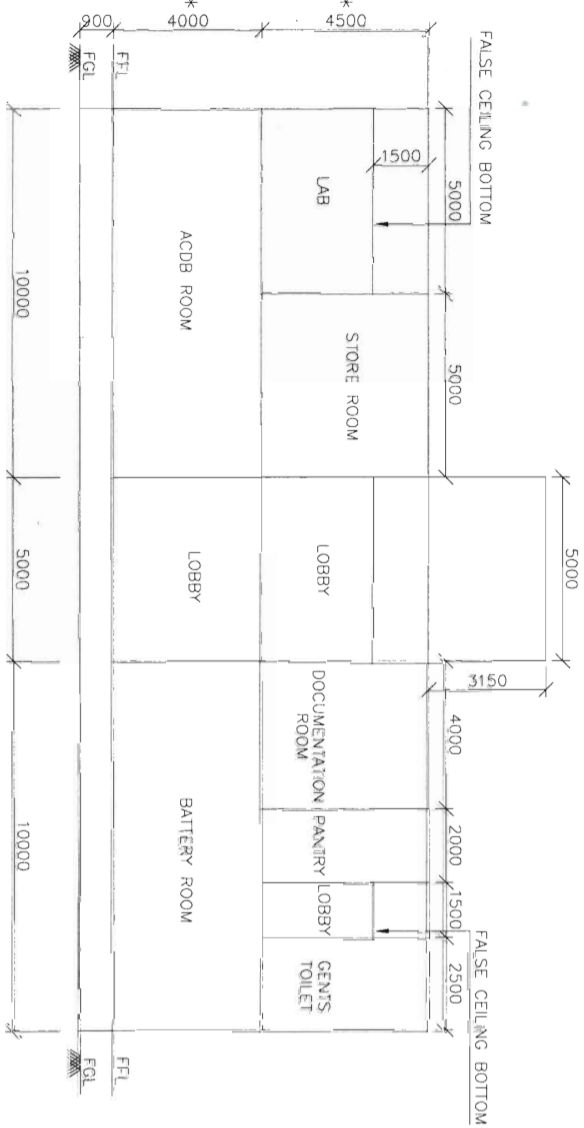
1. ALL DIMENSION ARE IN mm.
2. SEPARATE DRAWING SHALL BE SUBMITTED FOR DETAILED ARCHITECTURE AND TRENCH LAYOUT OF CONTROL ROOM BUILDING.
3. STORE, BATTERY, PANTRY AND TOILET SHALL BE PROVIDED WITH EXHAUST FAN.
4. THE DIMENSION AND ARRANGEMENT OF PANELS INSIDE ROOM ARE INDICATIVE AND SHALL BE FINALISED DURING DETAILED ENGINEERING.
5. INDIVIDUAL DIMENSIONS AS INDICATED HERE SHOULD BE TREATED AS MINIMUM CLEAR DIMENSIONS OF ROOM DURING DETAILED ENGINEERING. ALL REQUIREMENTS OF SPECIFICATION WITH RESPECT TO CIVIL ARCHITECTURAL AND ELECTRICAL ARE TO BE TAKEN CARE OF.
6. ALUMINIUM GLAZED WINDOW SHALL BE PROVIDED IN THE FIRST FLOOR (AROUND THE CONTROL ROOM) TO HAVE A CLEAR VIEW OF SWITCHYARD EQUIPMENT
7. CONTROL ROOM, ACDB ROOM, DCDB ROOM, BATTERY ROOM SHALL BE PROVIDED WITH FIRE PROOF DOOR. THE FIRE PROOF DOOR SHALL BE RATED FOR A MINIMUM OF TWO HOURS.
8. FALSE CEILING WITH UNDER DECK INSULATION SHALL BE PROVIDED IN LAB, FOTE ROOM, LOBBY OF FIRST FLOOR, CONFERENCE HALL, JE & AEE OFFICE ROOM AND CONTROL ROOM.
9. FOTE ROOM, LAB, CONFERENCE HALL, JE OR AEE OFFICE, EEE OFFICE ROOM AND CONTROL ROOM SHALL BE PROVIDED WITH SPLIT AC.
10. ACDB, DCDB, DOCUMENTATION ROOM AND STORE SHALL BE PROVIDED WITH CEILING FAN.
11. LIGHTING PANEL AND FIRE ALARM PANEL WILL BE WALL MOUNTED.
12. THE HEIGHT OF DOOR FOR ACDB, DCDB AND CONTROL ROOM SHALL BE 3 METER.

DETAILS OF CIRCULAR OPENING HOLES IN CONTROL ROOM BLDG.

1. (A) - CIRCULAR OPENING  $\phi$  550MM FOR EXHAUST FANS SHALL BE PROVIDED AT A ELEVATION OF 2500MM (BOTTOM OF OPENING) FROM FFL.
2. (B) - CIRCULAR OPENING  $\phi$  400MM FOR EXHAUST FANS SHALL BE PROVIDED AT A ELEVATION OF 2500MM (BOTTOM OF OPENING) FROM FFL.

LEGEND:-

- ACDB = AC DISTRIBUTION BOARD  
DCDB = DC DISTRIBUTION BOARD  
FFL = FINISHED FLOOR LEVEL  
FGL = FINISHED GROUND LEVEL  
F = FRUNT  
= PAVEMENT  
FC = FALSE CEILING  
AC = AIR CONDITIONING (SPLIT AC)



SECTION A-A

\* (DIMENSION FFL TO FFL)

REV	DATE	ALTERED
01	21.07.17	CHECKED APPROVED

REV	DATE	ALTERED
01	21.07.17	CHECKED APPROVED

REV	DATE	ALTERED
01	21.07.17	CHECKED APPROVED

REV	DATE	ALTERED
01	21.07.17	CHECKED APPROVED

REV	DATE	ALTERED
01	21.07.17	CHECKED APPROVED



BHARAT HEAVY ELECTRICALS LTD.  
TRANSMISSION PROJECTS DIVISION

REV	DATE	ALTERED
01	21.07.17	CHECKED APPROVED



TAMILNADU TRANSMISSION CORPORATION, LTD.

REV	DATE	ALTERED
01	21.07.17	CHECKED APPROVED

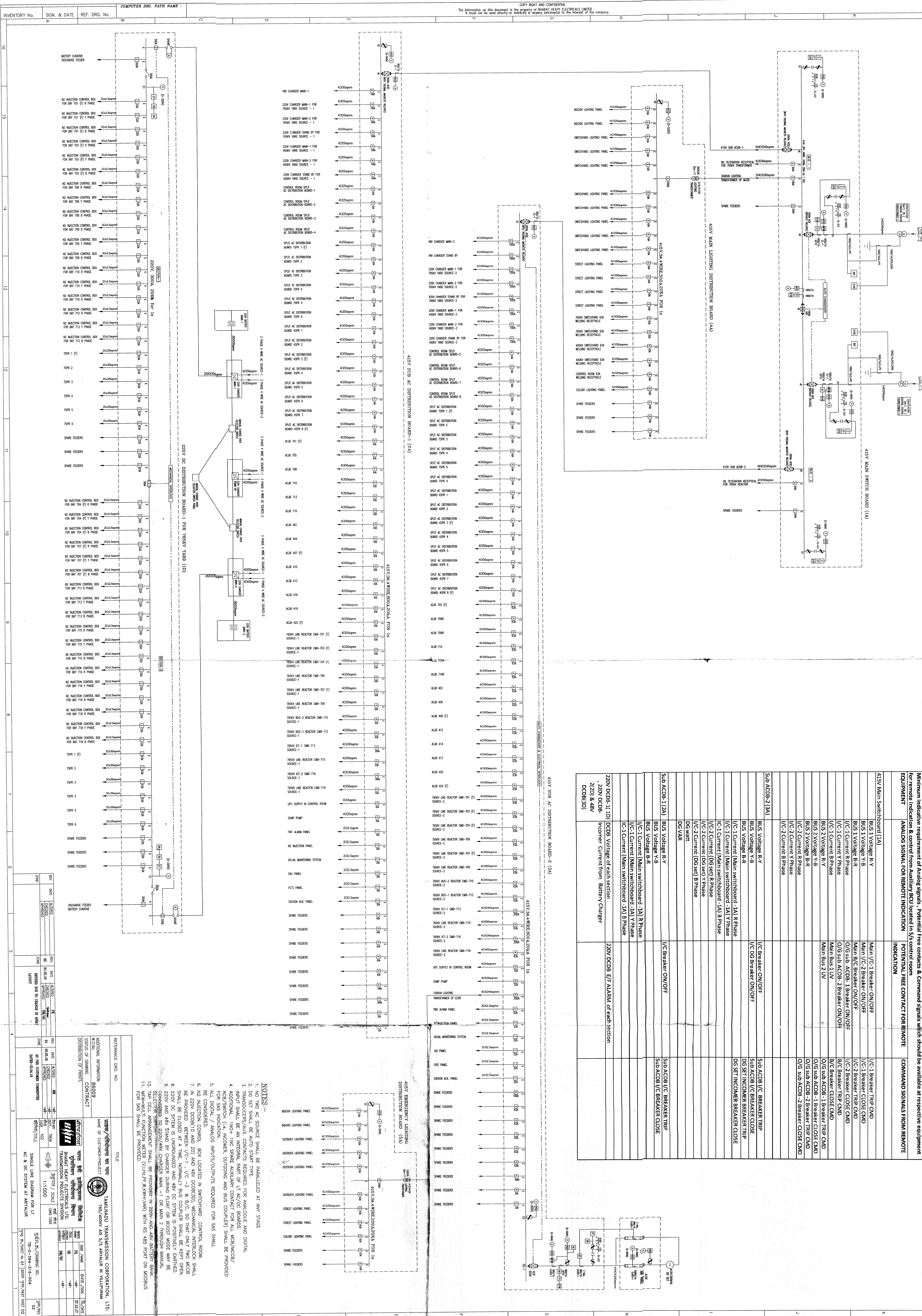


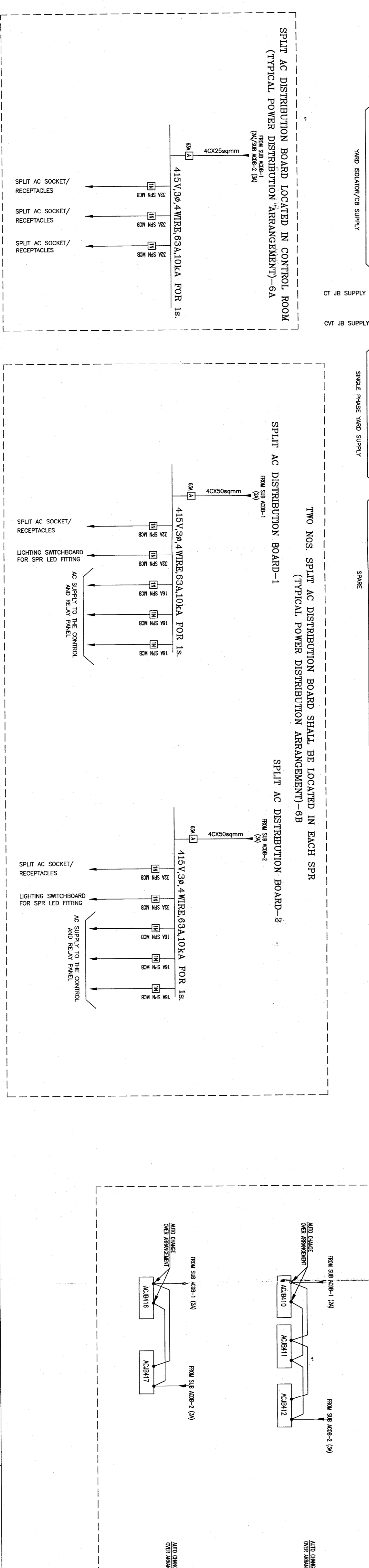
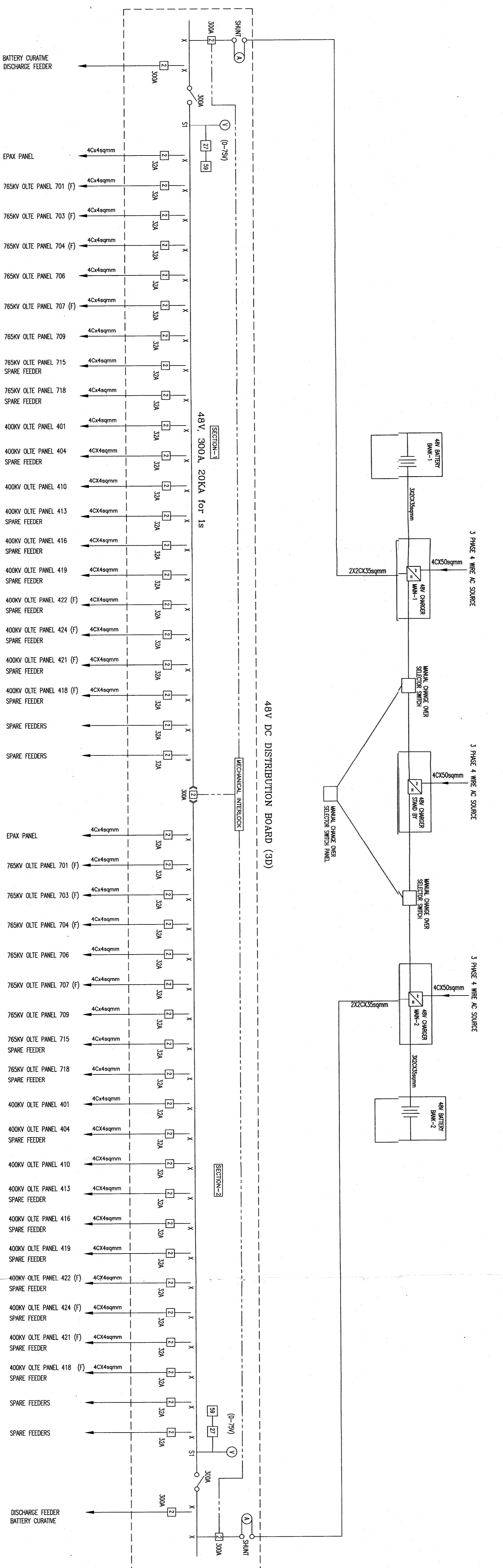
BHARAT HEAVY ELECTRICALS LTD.  
TRANSMISSION PROJECTS DIVISION

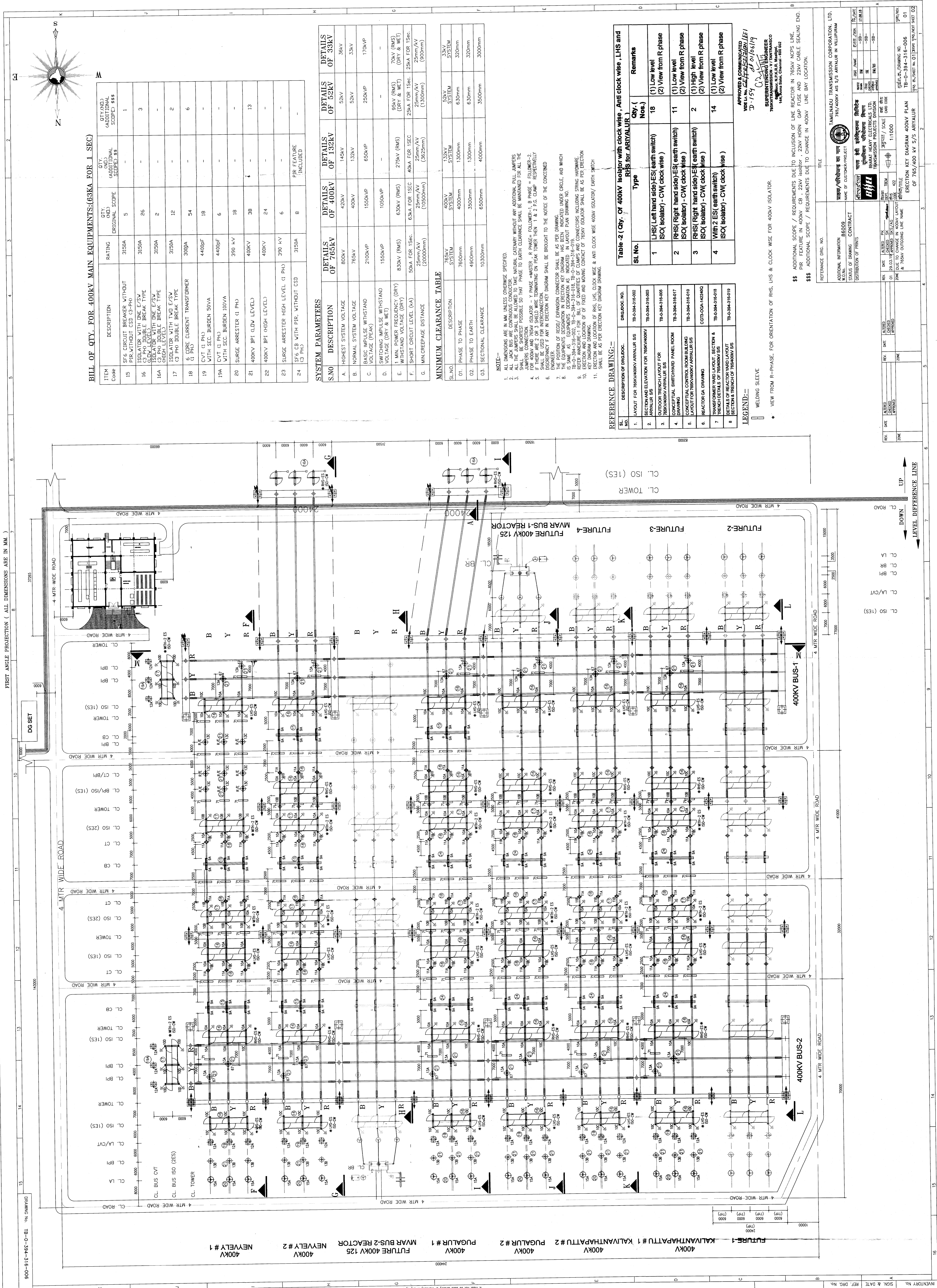
REV	DATE	ALTERED
01	21.07.17	CHECKED APPROVED

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BILL OF QTY. FOR 400KV MAIN EQUIPMENTS(63KA FOR 1 SEC)

ITEM Code	DESCRIPTION	RATING	QTY. (IND.) ORIGINAL SCOPE	QTY. (IND.) ADDITIONAL SCOPE	\$\$\$
15	ST6 CIRCUIT BREAKER WITHOUT PIR WITHOUT CSD (3 PH)	3150A	5	-	1
16	ISOLATOR WITH ONE E/S/W (3 PH) DOUBLE BREAK TYPE	3150A	26	-	3
16A	ISOLATOR WITH ONE E/S/W (3 PH) DOUBLE BREAK TYPE (HIGH LEVEL)	3150A	2	-	-
17	ISOLATOR WITH TWO E/S/W (3 PH) DOUBLE BREAK TYPE	3150A	12	-	2
18	6 CORE CURRENT TRANSFORMER (1 PH)	3000A	54	-	6
19	CVT (1 PH) WITH SEC. BURDEN 50VA	4400pF	18	-	-
19A	CVT (1 PH) WITH SEC. BURDEN 100VA	4400pF	6	-	-
20	SURGE ARRESTER (1 PH)	390 kV	18	-	-
21	400KV BPT (LOW LEVEL)	400KV	38	-	13
22	400KV BPT (HIGH LEVEL)	400KV	24	-	-
23	SURGE ARRESTER HIGH LEVEL (1 PH)	390 kV	6	-	-
24	ST6 CB WITH PIR, WITHOUT CSD (3 PH)	3150A	8	-	-

SYSTEM PARAMETERS

S.NO	DESCRIPTION	DETAILS OF 765kV	DETAILS OF 400kV	DETAILS OF 132kV	DETAILS OF 33kV
A.	HIGHEST SYSTEM VOLTAGE	800kV	420kV	145kV	36kV
B.	NORMAL SYSTEM VOLTAGE	765kV	400kV	132kV	33kV
C.	BASIC IMPULSE WITHSTAND VOLTAGE (PEAK)	2100kV	1550kV	650kV	170kV
D.	SWITCHING IMPULSE WITHSTAND VOLTAGE (DRY & WET)	1550kV	1050kV	-	-
E.	1 MIN. POWER FREQUENCY (DRY) WITHSTAND VOLTAGE (DRY)	830kV (RMS)	630kV (RMS)	275kV (RMS)	70kV (RMS) (DRY & WET)
F.	SHORT CIRCUIT LEVEL (kA)	50kA FOR 1sec. 25mm/kV (10500mm)	63kA FOR 1SEC 40kA FOR 1SEC 25mm/kV (10500mm)	40kA FOR 1SEC 25kA FOR 1SEC 25mm/kV (900mm)	25kA FOR 1SEC 25kA FOR 1SEC 25mm/kV (900mm)
G.	MIN CREEPAGE DISTANCE	-	-	-	-

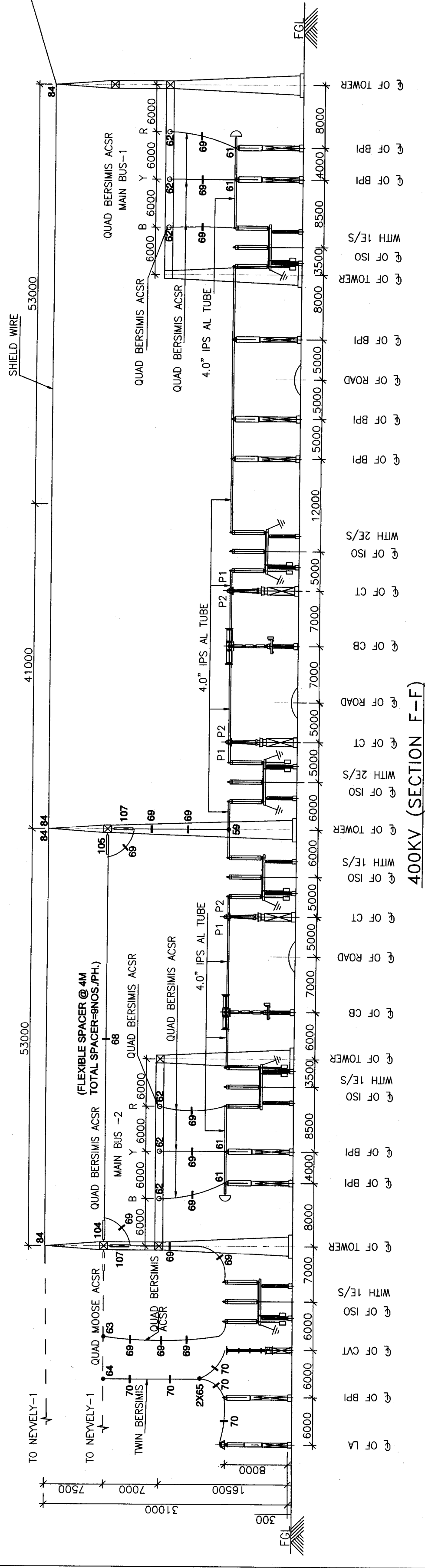
MINIMUM CLEARANCE TABLE

S.NO.	DESCRIPTION	765kV SYSTEM	400kV SYSTEM	132kV SYSTEM	33kV SYSTEM
01.	PHASE TO PHASE	7600mm	4000mm	1300mm	320mm
02.	PHASE TO EARTH	4800mm	3500mm	1300mm	320mm
03.	SECTIONAL CLEARANCE	10300mm	6500mm	4000mm	3000mm

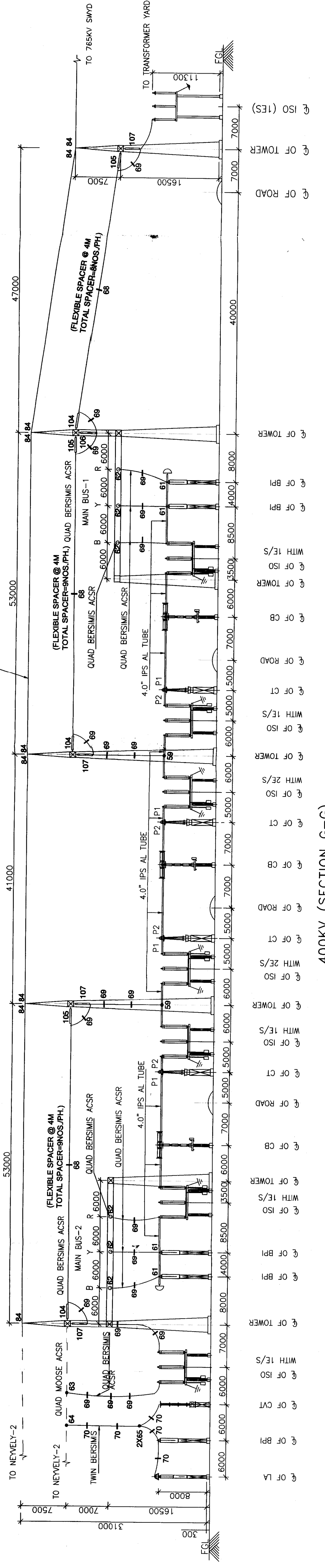
NOTE:-

- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
- ALL JACK BUS ARE CONTIGUOUS CONDUCTING LIKE NATURAL CANTENARY WITHOUT ANY ADDITIONAL PULL JUMPERS.
- SHALL BE SHORTEST POSSIBLE SO THAT PHASE TO EARTH CLEARANCE SHALL BE MAINTAINED FOR ALL THE JUMPERS CONNECTION.
- ISOLATOR - 1 PHASE - MASTER, 2 PHASE - FOLLOWER-1, 3 PHASE - FOLLOWER-2.
- IF THERE ARE 2 OR 3 SHIELD WIRE TERMINATING ON PEAK TOWER THEN 1 & 2 P.G. CLAMP RESPECTIVELY SHALL BE USED FOR INTERCONNECTION.
- CONCEPTUAL KEY DIAGRAM SHALL BE BROUGHT TO THE NOTICE OF THE CONCERNED ENGINEER.
- THE POSITION OF REGD/ EXPANSION CONNECTOR SHALL BE AS PER DRAWING.
- THE EQUIPMENTS DESIGNATION IN ERECTION AS INDICATED IN THE DRAWING SHALL BE INDICATED IN LAYOUT PLAN DRAWING NO. TB-0-394-316-018, TB-0-394-316-019, TB-0-394-316-020, TB-0-394-316-021, TB-0-394-316-022, TB-0-394-316-023, TB-0-394-316-024, TB-0-394-316-025, TB-0-394-316-026, TB-0-394-316-027, TB-0-394-316-028, TB-0-394-316-029, TB-0-394-316-030, TB-0-394-316-031, TB-0-394-316-032, TB-0-394-316-033, TB-0-394-316-034, TB-0-394-316-035, TB-0-394-316-036, TB-0-394-316-037, TB-0-394-316-038, TB-0-394-316-039, TB-0-394-316-040, TB-0-394-316-041, TB-0-394-316-042, TB-0-394-316-043, TB-0-394-316-044, TB-0-394-316-045, TB-0-394-316-046, TB-0-394-316-047, TB-0-394-316-048, TB-0-394-316-049, TB-0-394-316-050, TB-0-394-316-051, TB-0-394-316-052, TB-0-394-316-053, TB-0-394-316-054, TB-0-394-316-055, TB-0-394-316-056, TB-0-394-316-057, TB-0-394-316-058, TB-0-394-316-059, TB-0-394-316-060, TB-0-394-316-061, TB-0-394-316-062, TB-0-394-316-063, TB-0-394-316-064, TB-0-394-316-065, TB-0-394-316-066, TB-0-394-316-067, TB-0-394-316-068, TB-0-394-316-069, TB-0-394-316-070, TB-0-394-316-071, TB-0-394-316-072, 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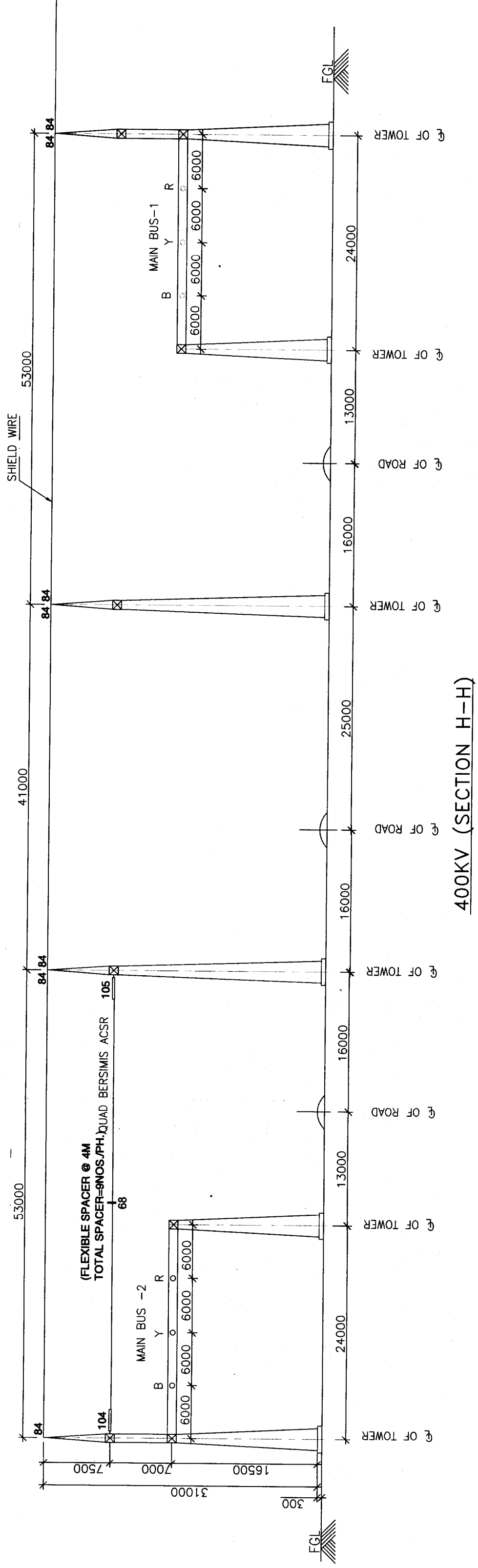
FIRST ANGLE PROJECTION ( ALL DIMENSIONS ARE IN MM )



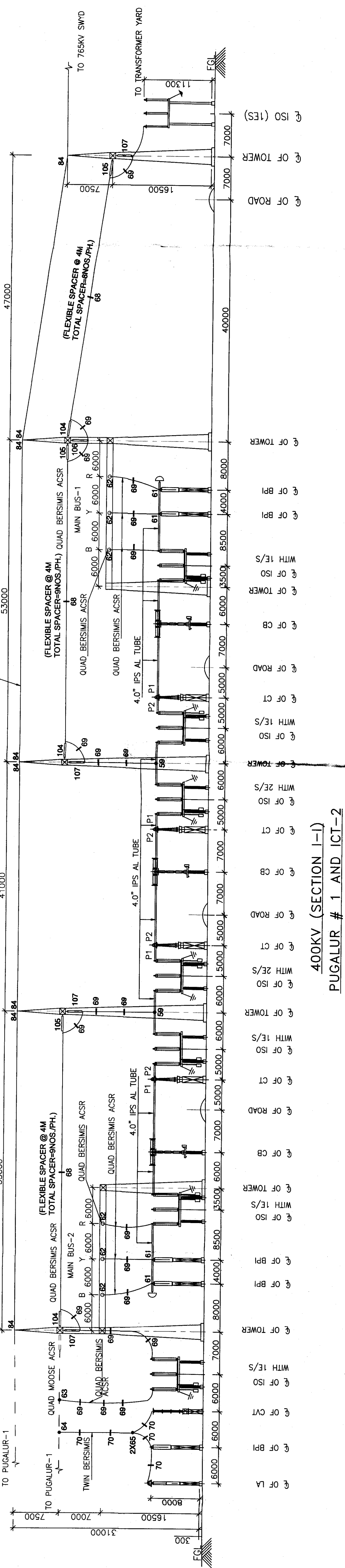
400KV (SECTION F-F)  
NEWELY # 1



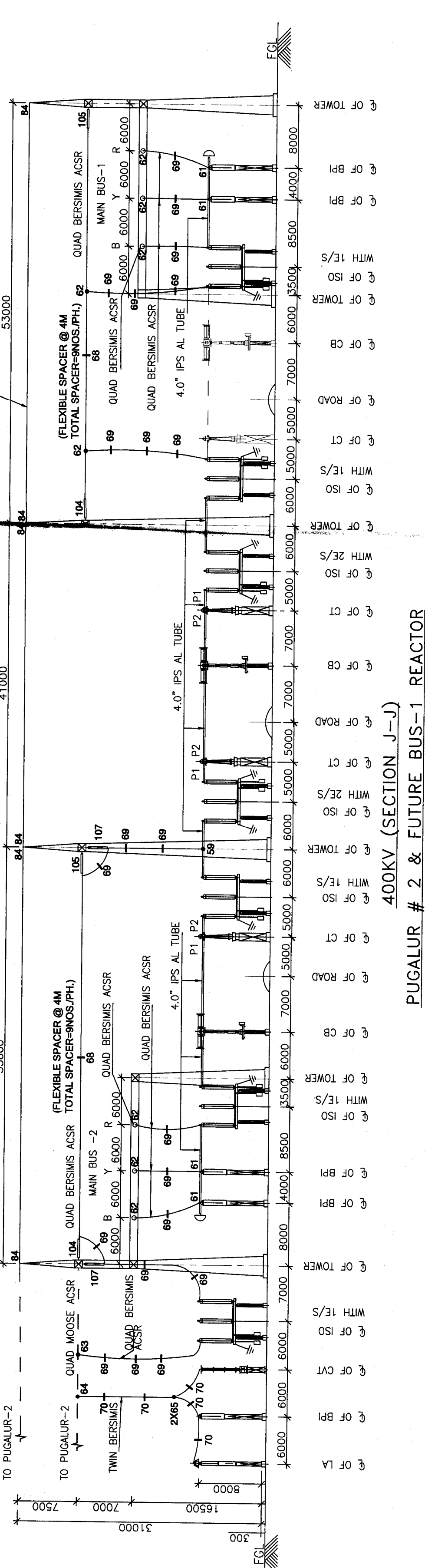
400KV (SECTION G-G)  
NEWELY # 2 AND ICT-1



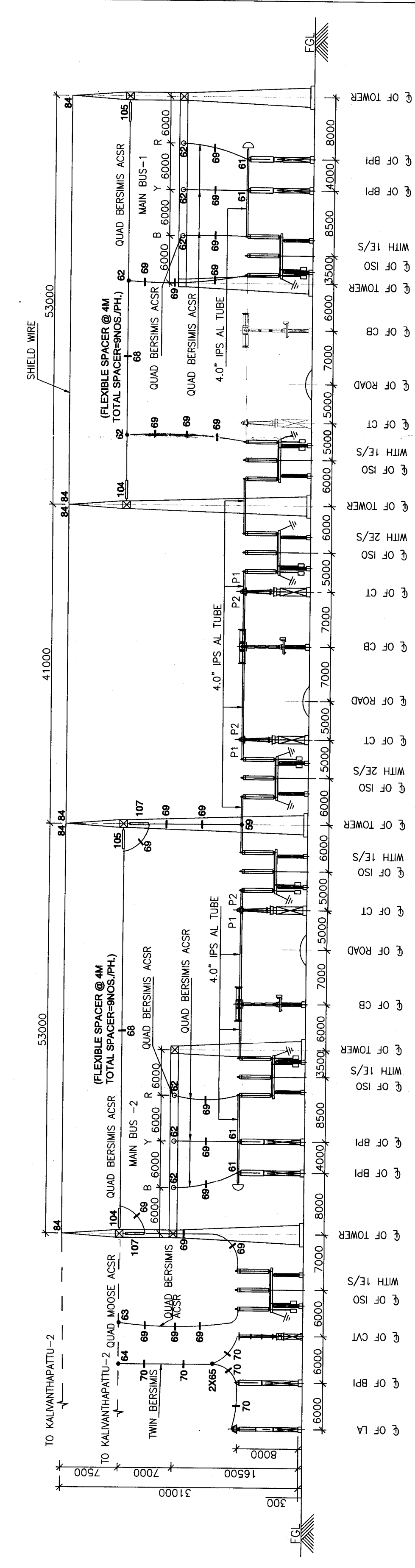
400KV (SECTION H-H)  
FUTURE BUS-2 REACTOR



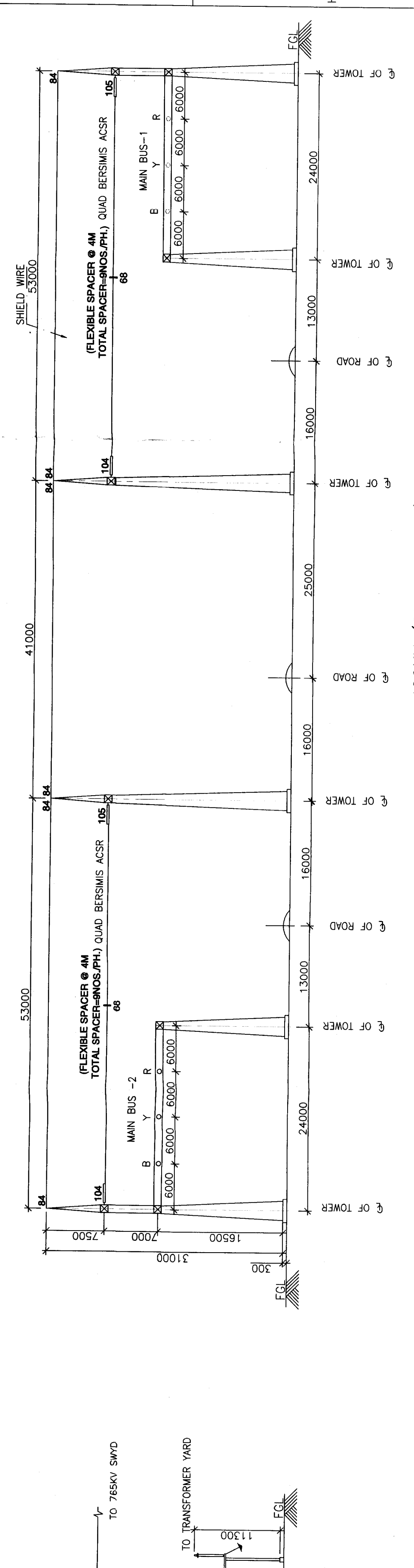
400KV (SECTION I-I)  
PUGALUR # 1 AND ICT-2



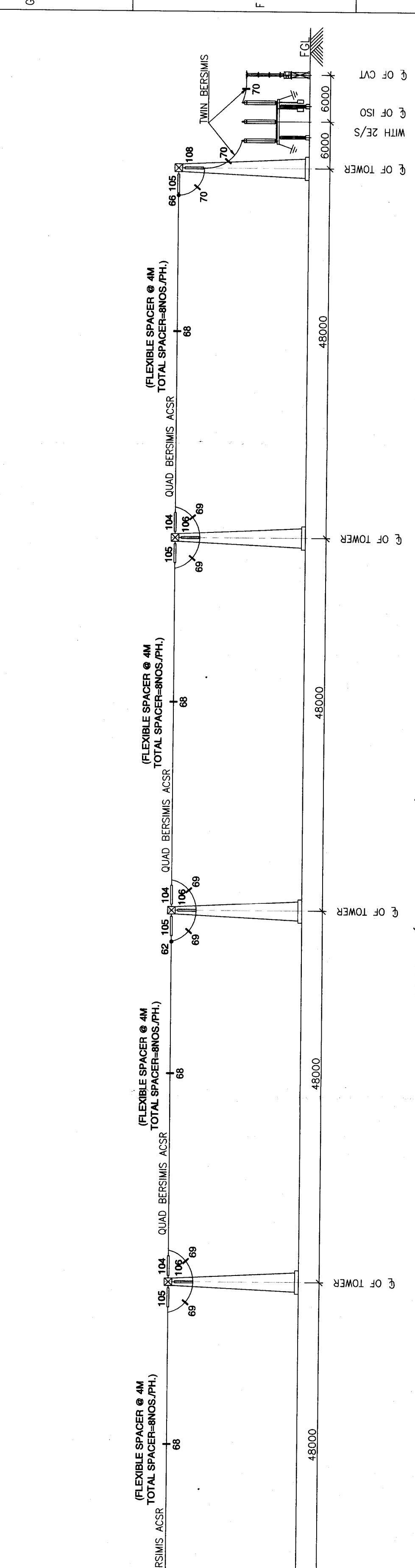
400KV (SECTION J-J)  
PUGALUR # 2 & FUTURE BUS-1 REACTOR



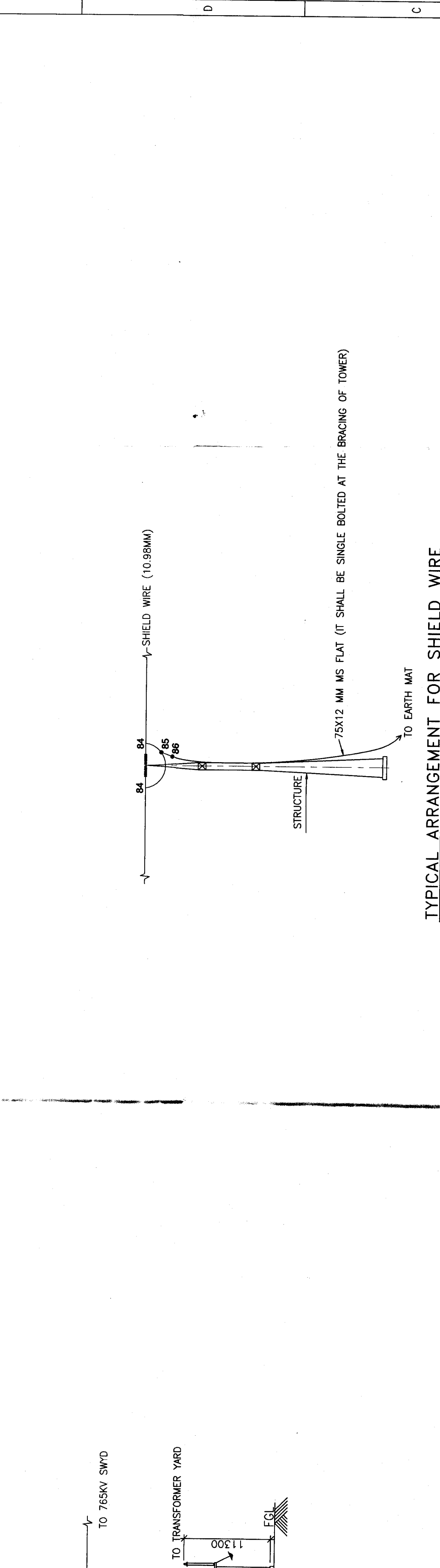
400KV (SECTION K-K)  
KALIVANTHAPATTU # 2 & FUTURE BAY # 4



400KV (SECTION L-L)  
FUTURE-1 & FUTURE-2



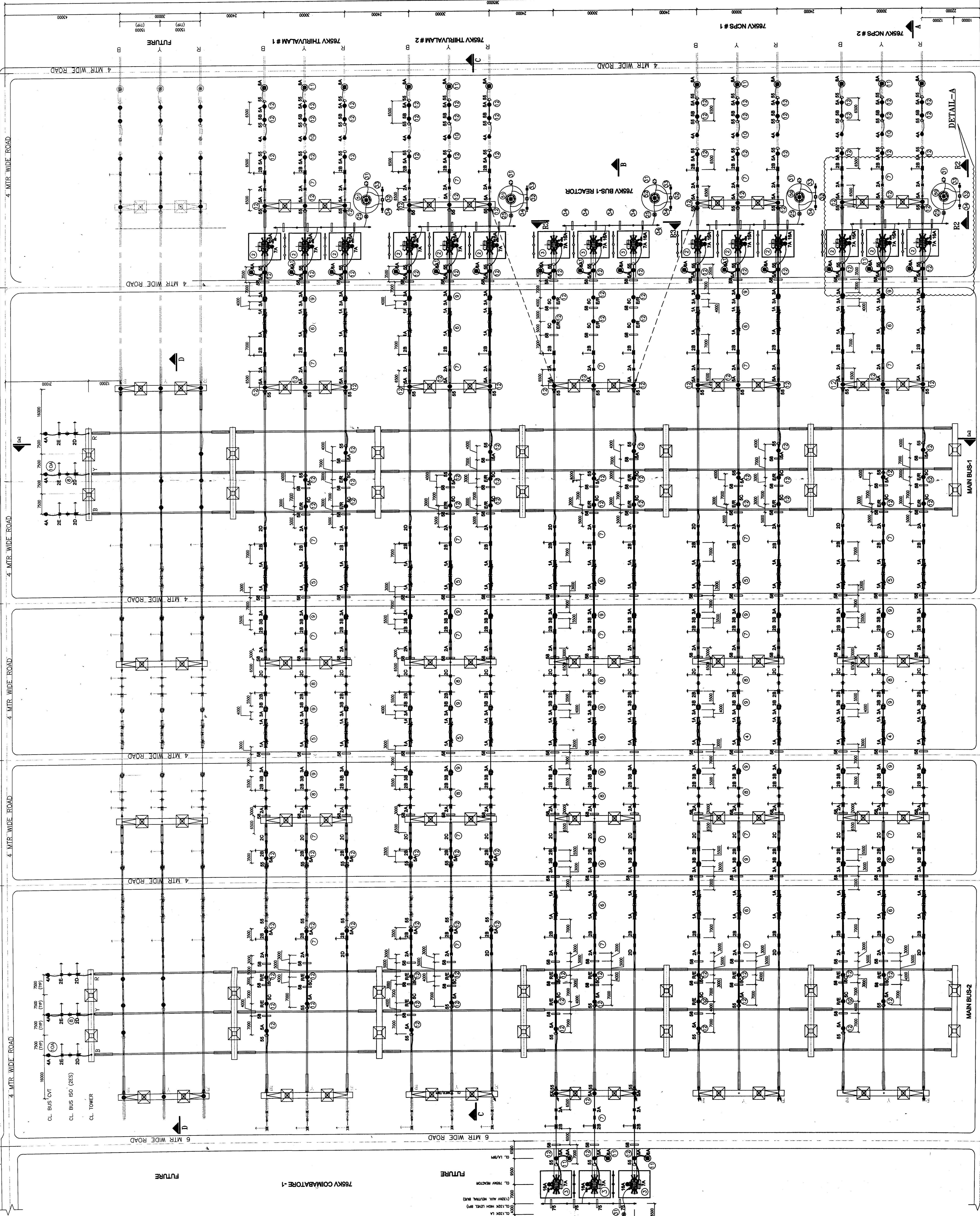
400KV (SECTION M-M)  
BUS-1 CVT AND ISOLATOR/CVT



TYPICAL ARRANGEMENT FOR SHIELD WIRE  
CONNECTION TO EARTH MAT (400KV TOWER)

APPROVED & SIGNED  
DATE: 01/06/19  
SUPERINTENDING ENGINEER  
TAMILNADU TRANSMISSION CORPORATION LTD.  
14, Anna Salai, Chennai - 600 002

PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 2 & FUTURE BUS-1 REACTOR										PUCALUR # 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ITEM Code	DESCRIPTION	RATING	QTY. AND 3RD PRICE	QTY. AND 3RD PRICE
1	500 KVA C-PM AUTOTRANSFORMER	765/440/230KV	6	
2	BAYWAVE LINE REACTOR (1-PM)	765KV	6	
3	800KVA BUS REACTOR (1-PM)	765KV	6	
4	15% CIRCUIT BREAKER WITH PWR. WITH CS2 C-PM	3150A	2	
5	8% CIRCUIT BREAKER WITH PWR. WITH CS2 C-PM	3150A	6	
6	8% CIRCUIT BREAKER WITHOUT PWR. WITH CS2 C-PM	3150A	7	2
7	ISOLATOR WITH ONE C/PW C-PM VERTICAL KNEE TYPE	3150A	30	2
8	ISOLATOR WITH TWO C/PW C-PM VERTICAL KNEE TYPE	3150A	12	-
9	EDME CURRENT TRANSFORMER C-PM	5000A	60	6
10	CVT 110 KVS WITH SEC. BUREN 50VA	4000PF	12	-
10A	CVT 110 KVS WITH SEC. BUREN 100VA	4000PF	6	-
11	SURGE ARRESTOR (1-PM)	624 KV	30	6
12	POST INSULATOR	765 KV	152	12

APPROVED & COMMUNICATED  
WIDE LR. NO. CEIT/RISE/765W/EEI  
D. 154 dt. 01/06/19  
*W. J. S.*  
SUPERINTENDING ENGINEER  
765KV/TRANSMISSION - V / TANRANSCO  
6th Floor, N.P.K.R.R. Maastigal,  
144, Anna Salai, Chennai - 600 002

CL. 765KV ROAD

CL. 765KV BPI/LA

CL. 765KV REACTOR

CL. 132KV HIGH LEVEL BPI (132KV AUX. NEUTRAL BUS)

CL. 132KV LA

CL. 132KV HIGH LEVEL BPI

CL. OF TOWER/BPI

CL. 132KV NGR/CB

CL. 132KV LOW LEVEL BPI

CL. 33KV CT

5000

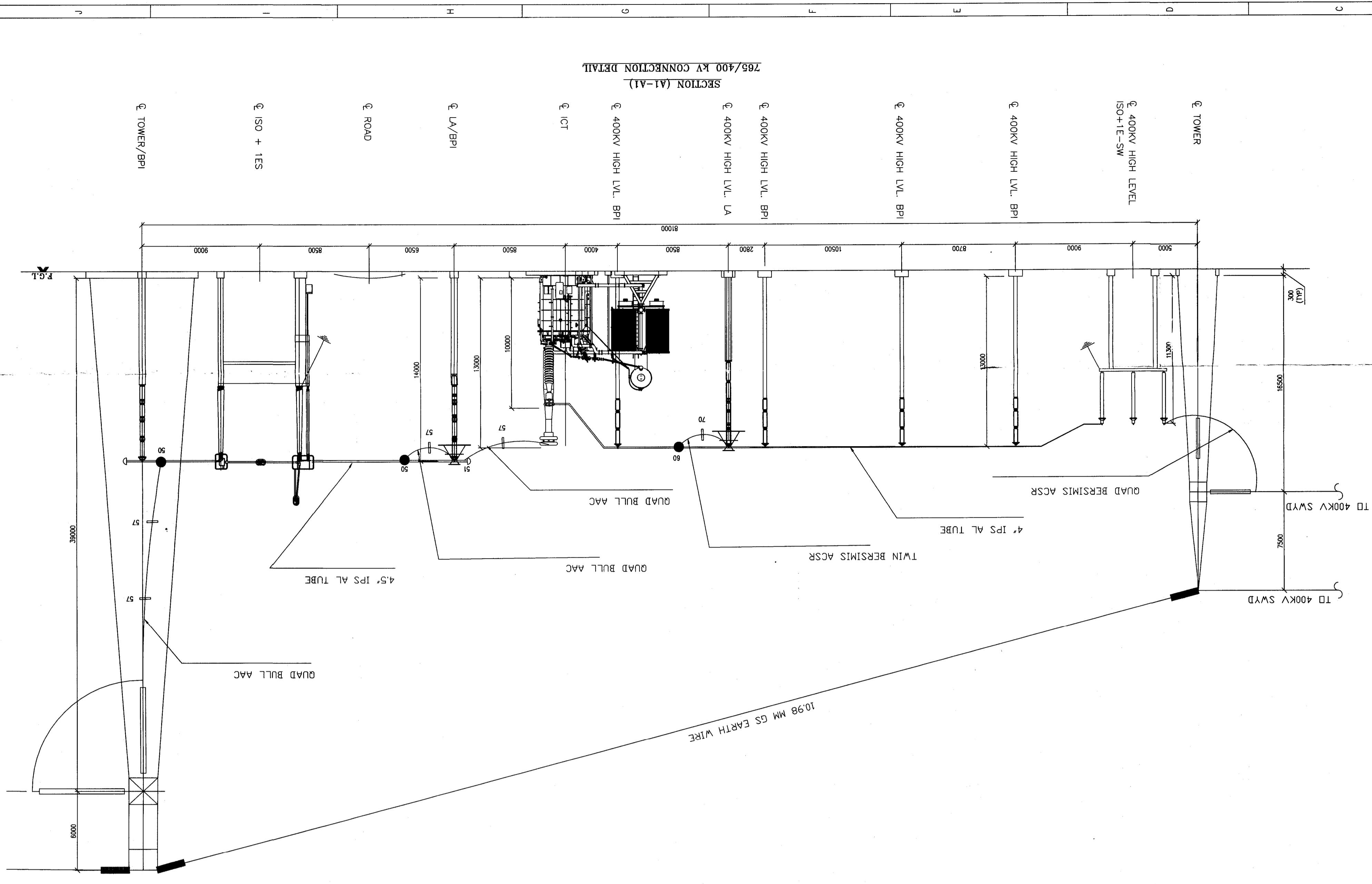
7000


9500

\$\$: ADDITIONAL SCOPE / REQUIREMENTS DUE TO INCLUSION OF LINE REACTOR IN 765KV NCPS LINE. PIR FEATURE IN 400KV CB, 22kV Isolator, 22KV HORN GAP FUSE AND 22KV CABLE SEALING END

[illegible][illegible]



[illegible]

<b>श्रीलंका/श्रीलंका के नाम</b> NAME OF CUSTOMER/PROJECT				<b>तमिलनाडु ट्रांसमिशन कॉर्पोरेशन लि.</b> TAMILNADU TRANSMISSION CORPORATION, LTD.		765/40KV A/S S/S ARYALAR IN VILUPPURAM	
<b>ADDITIONAL INFORMATION</b> 86009		<b>CONTRACT</b>		<b>STATUS OF DRAWING</b> 6009		<b>W.D.M.</b>	
<b>DISTRIBUTION OF PRINTS</b>		<b>DATE</b>		<b>PK</b>		<b>DATE</b>	
1		2		3		4	
5		6		7		8	
9		10		11		12	
13		14		15		16	
17		18		19		20	
21		22		23		24	
25		26		27		28	
29		30		31		32	
33		34		35		36	
37		38		39		40	
41		42		43		44	
45		46		47		48	
49		50		51		52	
53		54		55		56	
57		58		59		60	
61		62		63		64	
65		66		67		68	
69		70		71		72	
73		74		75		76	
77		78		79		80	
81		82		83		84	
85		86		87		88	
89		90		91		92	
93		94		95		96	
97		98		99		100	
101		102		103		104	
105		106		107		108	
109		110		111		112	
113		114		115		116	
117		118		119		120	
121		122		123		124	
125		126		127		128	
129		130		131		132	
133		134		135		136	
137		138		139		140	
141		142		143		144	
145		146		147		148	
149		150		151		152	
153		154		155		156	
157		158		159		160	
161		162		163		164	
165		166		167		168	
169		170		171		172	
173		174		175		176	
177		178		179		180	
181		182		183		184	
185		186		187		188	
189		190		191		192	
193		194		195		196	
197		198		199		200	
201		202		203		204	
20							

EN	DATE	AUSIED		EN	DATE	AUSIED	
		USED	APPROVED			USED	APPROVED
ZONE				ZONE			
				5			

EKD Sl. No.	Description of connector with rating	Unit of Qty.	Bay 716, 717, 718=765KV NCPS # 2 & ICT-2	Bay 713, 714, 715=765KV NCPS # 1 & ICT-1	Bay 710, 711, 712=765KV Bus-1 Reactor & Bus-2 Reactor	Bay 707, 708, 709=765KV Thiruvallam # 2 & Coimbatore-2(F)	Bay 704, 705, 706=765KV Thiruvallam # 1 & Coimbatore-1(F)	Bay 701, 702, 703=765KV V (F) & (F)	765KV main Bus-1 and main Bus-2	Bay 401,402, 403 =400KV Neyveli # 1	Bay 404,405, 406 =400KV Neyveli # 2 & ICT-1	Bay 407,408, 409 =400KV Bus-2 Reactor (F) 1 & ICT-2	Bay 410,411, 412 =400KV Pugalur # Reactor (F)	Bay 413,414, 415 =400KV Pugalur # 2 & Bus-1 Reactor (F)	Bay 416,417, 418 =400KV Kaliyandi thapattu # 2 & Future # 4	Bay 419,420, 421 =400KV Kaliyandi thapattu # 1 & Future # 3	Bay 422,423, 424 =400KV Future # 1 & Future # 2	400KV main Bus-1 and main Bus-2	Main Qty.	Mandatory Spare	Total Qty.	Remarks
765 kV EQUIPMENT CONNECTORS																						
1A	765KV, 3150A, 50KA for 1 Second Circuit Breaker, Expansion type connector suitable for 4.5" IPS Aluminium tube with horizontal approach	Nos	24	24	18	18	18												102	3	105	*
2A	765KV, 3150A, 50KA for 1 Second Isolator, Rigid type connector suitable for 4.5" IPS Aluminium tube with horizontal approach- Fixed contact side (i.e. stem terminal)	Nos	19	19	16	16	16												86	3	89	*
2B	765KV, 3150A, 50KA for 1 Second Isolator, Rigid type connector suitable for 4.5" IPS Aluminium tube with horizontal approach- Moving contact side (i.e. pad terminal)	Nos	27	27	24	24	24												126	3	129	*
2C	765KV, 3150A, 50KA for 1 Second Isolator, Expansion type connector suitable for 4.5" IPS Aluminium tube with horizontal approach- Fixed contact side (i.e. stem terminal)	Nos	6	6	6	6	6												30	3	33	*
2D	765KV, 3150A, 50KA for 1 Second Isolator, Rigid type connector suitable for Quad AAC Bull conductor with horizontal approach- Fixed contact side (i.e. stem terminal)	Nos	2	2	2	2	2		6										16	3	19	*
2E	765KV, 3150A, 50KA for 1 Second Isolator, Rigid type connector suitable for Quad AAC Bull conductor with horizontal approach- Moving contact side (i.e. pad terminal)	Nos							6										6	3	9	*
3A	765KV, 3150A, 50KA for 1 Second Current Transformer, Rigid type connector suitable for 4.5" IPS Aluminium tube with horizontal approach	Nos	18	18	12	15	15												78	3	81	*
3B	765KV, 3150A, 50KA for 1 Second Current Transformer, Expansion type connector suitable for 4.5" IPS Aluminium tube with horizontal approach	Nos	12	12	12	9	9												54	3	57	*
4A	765KV, 50KA for 1 Second Capacitor Voltage Transformer, Rigid type connector suitable for Quad AAC Bull conductor with horizontal approach	Nos	3	3		3	3		6										18	3	21	*
5A	765KV, 50KA for 1 Second bus post insulator, through sliding type connector suitable for 4.5" IPS Al tube with horizontal approach	Nos	25	25	16	25	25												116	3	119	Equivalent to contract BOQ sl. No 66
5B	765KV, 50KA for 1 Second bus post insulator, Rigid through type connector suitable for 4.5" IPS Al tube with horizontal approach	Nos	3	3		3	3												12	3	15	Equivalent to contract BOQ sl. No 66
5C	765KV, 3150A, 50KA for 1 Second, bus post insulator, Rigid type connector suitable for 4.5" IPS Al tube with horizontal approach	Nos	6	6	12	6	6												36	3	39	Equivalent to contract BOQ sl. No 140b
6A	765KV, 2000A, 50KA for 1 Second 500MVA Auto transformer HV bushing, Rigid type connector suitable for Quad AAC Bull conductor with horizontal approach	Nos	3	3															6	3	9	*
7A	765KV, 2000A, 50KA for 1 Second 80MVAR Reactor HV bushing, Rigid type connector suitable for Quad AAC Bull conductor with horizontal approach	Nos	3	3	6	3	3												18	3	21	*

APPROVED & COMMUNICATED

VIDE Lr. No. CE/ITR/ISE/765KV/EE/1

D. 154 02/01/2019

SUPERINTENDING ENGINEER

765KV/TRANSMISSION - V / TANTRA

6th Floor, N.P.K.R.R. Maalgat

144, Anna Salai, Chennai - 600 04

**APPROVED & COMMUNICATED**  
**VIDE Lr. No. CE/TRANS/765KV/EE/1**

**D. 154**  
**24/01/2019**  
**SRINIVAS**  
**6th Floor, N.P.K.R.R. Maalg**  
**144, Anna Salai, Chennai - 600 004**

*S. S. Kumar*

Project- 765KV/400KV Ariyalur S/S., BILL OF QUANTITIES

EKD Sl. No.	Description of connector with rating	Unit of Qty.	Bay 716, 717, 718=765KV NCPS # 2 & ICT-2	Bay 713, 714, 715=765KV NCPS # 1 & ICT-1	Bay 710, 711, 712=765KV Bus-1 Reactor & Bus-2 Reactor	Bay 707, 708, 709=765KV Thiruvallam # 2 & Coimabator e-2(F)	Bay 704, 705, 706=765KV Thiruvalla m # 1 & Coimabato re-1 (F)	Bay 701, 702, 703=765k V (F) & (F)	765KV main Bus-1 and Neyveli # 1	Bay 401,402, 403 =400KV Neyveli # 1	Bay 404,405, 406 =400KV Neyveli # 2 & ICT-1	Bay 407,408, 409 =400KV Bus-2 Reactor (F)	Bay 410,411, 412 =400KV Pugalur # & ICT-2	Bay 413,414, 415=400KV Pugalur # 2 & Bus-1 Reactor (F)	Bay 416,417, 418 =400KV Kallivan thapattu # 2 & Future # 4	Bay 419,420, 421 =400KV Kallivan thapattu # 1 & Future # 3	Bay 422,423, 424 =400KV Future # 2	400KV main Bus-1 and main Bus-2	Main Qty.	Manda tory Spare	Total Qty.	Remarks
8A	765KV . 50KA for 1 Second Surge Arrester . Rigid type connector suitable for Quad AAC Bull conductor with horizontal approach	Nos.	9	9	6	6	6												36	3	39	*
	<b>400KV EQUIPMENT CONNECTORS</b>																					
9A	400KV . 3150A, 63KA for 1 Second Circuit Breaker, Expansion type connector suitable for 4" IPS Aluminium tube with horizontal approach	Nos.								12	18			18	12	12	12		84	3	87	*
10A	400KV . 3150A, 63KA for 1 Second Isolator, Rigid type connector suitable for 4" IPS Aluminium tube with horizontal approach	Nos.							22	28			28	22	22	22			144	3	147	*
10B	400KV . 3150A, 63KA for 1 Second Isolator, Expansion type connector suitable for 4" IPS Aluminium tube with horizontal approach	Nos.							6	9			9	6	6	6			42	3	45	*
10C	400KV . 3150A, 63KA for 1 Second Isolator, Rigid type connector suitable for Quad ACSR Bersimis conductor with horizontal approach	Nos.							8	11			11	14	14	14			72	3	75	*
10D	400KV . 2000, 63KA for 1 Second Isolator, Rigid type connector suitable for twin ACSR Bersimis conductor with horizontal approach	Nos.																12	12	3	15	*
11A	400KV . 3150A, 63KA for 1 Second Current Transformer, Rigid type connector suitable for 4" IPS Aluminium tube with horizontal approach	Nos.							9	12			12	9	9	9			60	3	63	*
11B	400KV . 3150A, 63KA for 1 Second Current Transformer, Expansion type connector suitable for 4" IPS Aluminium tube with horizontal approach	Nos.							9	12			12	9	9	9			60	3	63	*
12A	400KV . 63KA for 1 Second Capacitor Voltage Transformer, Rigid type connector suitable for twin ACSR Bersimis conductor with horizontal approach	Nos.							3	3			3	3	3	3			24	3	27	*
13A	400KV . 63KA for 1 Second bus post insulator, through sliding type connector suitable for 4" IPS Al tube with horizontal approach	Nos.							4	4			4	4	4	4			24	3	27	Equivalent to contract BOQ sl. No. 67
13B	400KV . 63KA for 1 Second bus post insulator, Rigid through type connector suitable for twin ACSR Bersimis conductor with horizontal approach	Nos.							3	3			3	3	3	3			18	3	21	Equivalent to contract BOQ sl. No. 67
13C	400KV . 3150A, 63KA for 1 Second bus post insulator, Rigid /Expansion type connector suitable for 4" IPS Al tube with horizontal approach	Nos.							9	12			12						33	3	36	Equivalent to contract BOQ sl. No. 61
14A	400KV . 2500A, 63KA for 1 Second 500MVA Auto transformer IV bushing, Rigid type connector suitable for 4" IPS Aluminium tube with horizontal approach	Nos.								3			3						6	3	9	*
15A	400KV . 63KA for 1 Second Surge Arrester, Rigid type connector suitable for twin ACSR Bersimis conductor with horizontal approach	Nos.							3	6			6	3	3	3			24	3	27	*
	<b>132/54/52/36/33KV EQUIPMENT CONNECTORS</b>																					
16A	132KV . 1250A, 40KA for 1 Second 80MVAR Reactor Neutral bushing, Rigid type connector suitable for single AAC Bull conductor with horizontal approach	Nos.	3	3	6	3	3												18	3	21	*

*Staff Mr*

## Project- 765KV/400KV Ariyalur S/s., BILL OF QUANTITIES

EKD Sl. No.	Description of connector with rating	Unit of Qty.	Bay 716, 717, 718=765KV NCPs # 2 & ICT-2	Bay 713, 714, 715=765KV NCPs # 1 & ICT-1	Bay 710, 711, 712=765KV Bus-1 Reactor & Bus-2 Reactor	Bay 707, 708, 709=765KV Thiruvallam # 2 & Coimabator e-2(F)	Bay 704, 705, 706=765KV Thiruvalla m # 1 & Coimabato re-1 (F)	Bay 701, 702, 703=765KV V (F) & (F)	765KV main Bus-1 and main Bus-2	Bay 401,402, 403 =400KV Neyveli # 1	Bay 404,405, 406 =400KV Neyveli # 2 & ICT-1	Bay 407,408, 409 =400KV Bus-2 Reactor (F) 1 & ICT-2	Bay 410,411, 412 =400KV Pugalur # 2 & Bus-1 Reactor (F)	Bay 416,417, 418 =400KV Kaliyanti happattu # 2 & Future # 4	Bay 419,420, 421 =400KV Kaliyanti happattu # 1 & Future # 3	Bay 422,423, 424 =400KV Future # 1 & Future # 2	400KV main Bus-1 and main Bus-2	Main Qty.	Manda tory Spare	Total Qty.	Remarks
16B	132KV , 1250A, 40KA for 1 Second NGR Neutral bushing (towards LA side) . Rigid type connector suitable for single AAC Bull conductor with horizontal approach	Nos.	1	1	2	1	1											6	3	9	*
16C	132KV , 1250A, 40KA for 1 Second NGR Neutral bushing (towards CT side) . Rigid type connector suitable for single AAC Bull conductor with horizontal approach	Nos.	1	1	2	1	1											6	3	9	*
17A	33KV , 1250A, 25KA for 1 Second neutral current transformer of NGR , Rigid type connector suitable for single AAC Bull conductor with horizontal approach	Nos.	1	1	2	1	1											6	3	9	*
17B	33KV , 1250A, 25KA for 1 Second neutral current transformer of NGR , Rigid type connector suitable for single 75X12 mm MS flat with horizontal approach	Nos.	1	1	2	1	1											6	3	9	*
17C	33KV , 1250A, 25KA for 1 Second neutral current transformer of 500MVA Auto transformer , Rigid type connector suitable for twin ACSR Bersimis conductor with horizontal approach	Nos.	1	1														2	3	5	*
17D	33KV , 1250A, 25KA for 1 Second neutral current transformer of 500MVA Auto transformer , Rigid type connector suitable for single 75X12 mm MS flat with horizontal approach	Nos.	1	1														2	3	5	*
18A	132KV , 1250A, 31.5KA for 1 Second Circuit breaker , Expansion type connector suitable for 3" IPS Aluminium tube with horizontal approach	Nos.	2	2	4	2	2											12	3	15	*
19A	132KV , 40KA for 1 Second bus post insulator , through sliding type connector suitable for 3" IPS Al tube with horizontal approach	Nos.	1	1	2	1	1											6	3	9	Equivalent to contract BOQ sl. No. 68
19B	132KV , 40KA for 1 Second bus post insulator , Rigid through type connector suitable for 3" IPS Al tube with horizontal approach	Nos.	3	3	6	3	3											18	3	21	Equivalent to contract BOQ sl. No. 68
19C	132KV , 1250A, 40KA for 1 Second bus post insulator , Rigid /Expansion type connector suitable for 3" IPS Al tube with horizontal approach	Nos.	3	3	6	3	3											18	3	21	Equivalent to contract BOQ sl. No. 64
20A	52KV , 1250A, 25KA for 1 Second 500MVA Auto transformer LV bushing , Rigid type connector suitable for 3" IPS Aluminium tube with horizontal approach	Nos.	6	6														12	3	15	*
21A	36KV , 1250A, 25KA for 1 Second 500MVA Auto transformer Neutral bushing , Rigid type connector suitable for 3" IPS Aluminium tube with horizontal approach	Nos.	3	3														6	3	9	*
22A	54KV , 25KA for 1 Second Surge Arrestor , Rigid type connector suitable for single ACSR Bersimis conductor with horizontal approach	Nos.	6	6														12	3	15	*
23A	132KV , 40KA for 1 Second Surge Arrestor , Rigid type connector suitable for single AAC Bull conductor with horizontal approach	Nos.	1	1	2	1	1											6	3	9	*
24A	66KV , 25KA for 1 Second bus post insulator , through sliding type connector suitable for 3" IPS Al tube with horizontal approach	Nos.	9	9														18	3	21	Equivalent to contract BOQ sl. No. 68

Said W

**Project- 765KV/400KV Ariyalur S/s., BILL OF QUANTITIES**

EKD Sl. No.	Description of connector with rating	Unit of Qty.	Bay 716, 717, 718=765KV NCPs # 2 & ICT-2	Bay 713, 714, 715=765KV NCPs # 1 & ICT-1	Bay 710, 711, 712=765KV Bus-1 Reactor & Bus-2 Coimabator e-2(F)	Bay 707, 708, 709=765KV Thiruvallam # 2 & Coimabator re-1 (F)	Bay 704, 705, 706=765KV Thiruvalla m # 1 & Coimabato re-1 (F)	Bay 701, 702, 703=765KV V (F) & (F)	765KV main Bus-1 and main Bus-2	Bay 401,402, 403 =400KV Neyveli # 1	Bay 404,405, 406 =400KV Neyveli # 2 & ICT-1	Bay 407,408, 409 =400KV Bus-2 Reactor (F) 1 & ICT-2	Bay 410,411, 412 =400KV Pugalur # 2 & Bus-1 Reactor (F)	Bay 413-414, 415=400KV Pugalur # 2 =400KV Kaltivan thapatt u # 1 & Future # 4	Bay 416,417, 418 =400KV Kaltivan thapatt u # 1 & Future # 3	Bay 419,420, 421 =400KV Future # 1 & Future # 2	400KV main Bus-1 and main Bus-2	Main Qty.	Manda tory Spare	Total Qty.	Remarks
24B	66KV . 25KA for 1 Second bus post insulator . rigid through type connector suitable for 3" IPS Al tube with horizontal approach	Nos.	3	3														6	3	9	Equivalent to contract BOQ sl. No. 68
24C	66KV . 1250A, 25KA for 1 Second bus post insulator . Rigid /Expansion type connector suitable for 3" IPS Al tube with horizontal approach	Nos.	21	21														42	3	45	Equivalent to contract BOQ sl. No. 62
25A	33KV . 25KA for 1 Second bus post insulator . through sliding type connector suitable for 3" IPS Al tube with horizontal approach	Nos.	4	4														8	3	11	Equivalent to contract BOQ sl. No. 68
25B	33KV . 25KA for 1 Second bus post insulator . Rigid through type connector suitable for 3" IPS Al tube with horizontal approach	Nos.	1	1														2	3	5	Equivalent to contract BOQ sl. No. 68
25C	33KV . 1250A, 25KA for 1 Second bus post insulator . Rigid /Expansion type connector suitable for 3" IPS Al tube with horizontal approach	Nos.	10	10														20	3	23	Equivalent to contract BOQ sl. No. 62
25D	33KV . 25KA for 1 Second Bus post insulator . Rigid through type connector suitable for single 75X12 mm MS flat with horizontal approach	Nos.	4	4	4	2	2											16	3	19	Equivalent to contract BOQ sl. No. 68
	<b>Two way PG Clamps / Tee/Welding sleeves and Spacers</b>																				
50	765KV . 3150A . Tee connector suitable for 4.5" tube run and Quad Bull AAC tap	Nos.	27	27	18	24	24											120	6	126	Equivalent to contract BOQ sl. No. 63
51	765KV . 3150A . straight connector suitable for 4.5" IPS Al tube and Quad Bull AAC Conductor in horizontal approach	Nos.	16	16	10	13	13											68	4	72	Equivalent to contract BOQ sl. No. 63
52	765KV . 3150A . Tee connector suitable for Quad Bull AAC run and Quad Bull AAC tap	Nos.	6	6	6	12	12		6									48	3	51	Equivalent to contract BOQ sl. No. 61
53	765KV . 3150A . Tee connector suitable for Hexa Zebra run and Quad Bull AAC tap	Nos.	6	6		6	6											24	2	26	Equivalent to contract BOQ sl. No. 140 b
54	765KV . 1000A . Two way PG clamp for single Bull AAC conductor	Nos.	12	12		12	12											48	3	51	Equivalent to contract BOQ sl. No. 72
55	765KV Corona end bell for 4.5" IPS Al tube	Nos.	28	28	16	28	28											128	7	135	Equivalent to contract BOQ sl. No. 69
56	765KV flexible spacers suitable for Quad Bull AAC conductor	Nos.	81	81	60	81	81	60	324									768	39	807	Equivalent to contract BOQ sl. No. 72
57	765KV Rigid spacers suitable for Quad Bull AAC conductor	Nos.	96	96	60	90	90		78									510	26	536	Equivalent to contract BOQ sl. No. 72
58	765KV AL welding sleeve for 4.5" Al tube	Nos.	155															155	13	168	Equivalent to contract BOQ sl. No. 76

*3906 W*

## Project- 765KV/400KV Ariyalur S/S., BILL OF QUANTITIES

EKD Sl. No.	Description of connector with rating	Unit of Qty.	Bay 716, 717, 718=765kV NCPs # 2 & ICT-2	Bay 713, 714, 715=765kV NCPs # 1 & ICT-1	Bay 710, 711, 712=765kV Bus-1 Reactor & Bus-2 Reactor	Bay 707, 708, 709=765kV Thiruvallam # 2 & Coimbatore re-2(F)	Bay 704, 705, 706=765kV Thiruvalla m # 1 & Coimbatore re-1 (F)	Bay 701, 702, 703=765kV V (F) & (F)	765kV main Bus-1 and main Bus-2	Bay 401,402, 403 =400kV Neyveli # 1	Bay 404,405, 406 =400kV Neyveli # 2 & ICT-1	Bay 407,408, 409 =400kV Bus-2 Reactor (F)	Bay 410,411, 412 =400kV Pugalur # 1 & ICT-2	Bay 413,414, 415 =400kV Pugalur # 2 & Bus-1 Reactor (F)	Bay 416,417, 418 =400kV Kalyant thapattu # 2 & Future # 4	Bay 419,420, 421 =400kV Kalyan thapattu # 1 & Future # 3	Bay 422,423, 424 =400kV Future # 1 & Future # 2	400kV main Bus-1 and main Bus-2	Main Qty.	Manda tory Spare	Total Qty.	Remarks	
	400kV, 3150A, Tee connector suitable for 4" tube run and Quad ACSR Bersimis tap	Nos.								3	6			6	3		3		24	2	26	Equivalent to contract BOQ sl. No. 64	
59	400kV, 2000A, Tee connector suitable for 4" tube run and twin ACSR Bersimis tap	Nos.									3			3					6	1	7	Equivalent to contract BOQ sl. No. 64	
60	400kV, 3150A, straight connector suitable for 4" IPS Al tube and Quad ACSR Bersimis Conductor in horizontal approach	Nos.								4	4			4	4	4	4		24	2	26	Equivalent to contract BOQ sl. No. 64	
61	400kV, 3150A, Tee connector suitable for Quad ACSR Bersimis run and Quad ACSR Bersimis tap	Nos.								6	6			6	12	12		6	60	3	63	Equivalent to contract BOQ sl. No. 62	
62	400kV, 3150A, Tee connector suitable for Quad ACSR moose run and Quad ACSR Bersimis tap	Nos.								3	3			3	3	3			18	1	19	Equivalent to contract BOQ sl. No. 62	
63	400kV, 2000A, Tee connector suitable for Quad ACSR moose run and twin ACSR Bersimis tap	Nos.								3	3			3	3	3			18	1	19	Equivalent to contract BOQ sl. No. 62	
64	400kV, 1000A, Two way PG clamp for single ACSR Bersimis conductor	Nos.								6	6			6	6	6			36	2	38	Equivalent to contract BOQ sl. No. 72	
65	400kV, 2000A, Tee connector suitable for Quad ACSR Bersimis run and twin ACSR Bersimis tap	Nos.																6	6	1	7	Equivalent to contract BOQ sl. No. 144	
66	400kV Corona end bell for 4" IPS Al tube	Nos.								4	4			4	4	4			24	2	26	Equivalent to contract BOQ sl. No. 70	
67	400kV flexible spacers suitable for Quad ACSR Bersimis conductor	Nos.								27	78	27		78	54	54		54	192	618	31	649	Equivalent to contract BOQ sl. No. 73
68	400kV Rigid spacers suitable for Quad ACSR Bersimis conductor	Nos.								33	51			51	51	51		36	324	16	340	Equivalent to contract BOQ sl. No. 73	
69	400kV Rigid spacers suitable for twin ACSR Bersimis conductor	Nos.								15	18			18	15	15		18	114	6	120	Equivalent to contract BOQ sl. No. 73	
70	400kV AL welding sleeve for 4 " Al tube	Nos.								126										126	6	132	Equivalent to contract BOQ sl. No. 76
71	132kV, 1250A, Tee connector suitable for 3" tube run and single AAC Bull tap	Nos.	6	6	12	6	6												36	2	38	Equivalent to contract BOQ sl. No. 59	
72	132kV, 1250A, Tee connector suitable for single AAC Bull run and single AAC Bull tap	Nos.	2	2	4	2	2												12	1	13	Equivalent to contract BOQ sl. No. 59	
73	132kV Corona end bell for 3" IPS Al tube	Nos.	4	4	8	4	4												24	2	26	Equivalent to contract BOQ sl. No. 59	
74	132kV AL welding sleeve for 3 " Al tube	Nos.	24																24	2	26	Equivalent to contract BOQ sl. No. 71	

Sayed W

Project: 765KV/400KV Ariyalur S/s., BILL OF QUANTITIES

EKD Sl. No.	Description of connector with rating	Unit of Qty.	Bay 716, 717, 718=765KV NCPS # 2 & ICT-2	Bay 713, 714, 715=765KV NCPS # 1 & ICT-1	Bay 710, 711, 712=765KV Bus-1 Reactor & Bus-2 Reactor	Bay 707, 708, 709=765KV Thiruvallam # 2 & Coimbatore-2(F)	Bay 704, 705, 706=765KV Thiruvallam # 1 & Coimbatore-1(F)	Bay 701, 702, 703=765KV V (F) & (F)	765KV main Bus-1 and main Bus-2	Bay 401, 402, 403 =400KV Neyveli # 1 & ICT-1	Bay 404, 405, 406 =400KV Neyveli # 2 & ICT-1	Bay 407, 408, 409 =400KV Bus-2 Reactor (F) 1 & ICT-2	Bay 410, 411, 412 =400KV Pugalar # 2 & Bus-1 Reactor (F)	Bay 413, 414, 415=400KV Pugalar # 2 & Bus-1 Reactor (F)	Bay 416, 417, 418 =400KV Kalivani bhapatlu # 2 & Future # 4	Bay 419, 420, 421 =400KV Kalivani bhapatlu # 1 & Future # 3	Bay 422, 423, 424 =400KV Future # 1 & Future # 2	400KV main Bus-1 and main Bus-2	Main Qty.	Mandatory Spare	Total Qty.	Remarks	
	66kV, 1250A, Tee connector suitable for 3" tube run and single ACSR Bersimis tap	Nos.	6	6																12	1	13	Equivalent to contract BOQ sl. No. 76
76	66kV, 1250A, Tee connector suitable for 3" tube run and twin ACSR Bersimis tap	Nos.	12	12																24	2	26	Equivalent to contract BOQ sl. No. 59
77	66kV Rigid spacers suitable for twin ACSR Bersimis conductor	Nos.	9	9																18	1	19	Equivalent to contract BOQ sl. No. 147
78	66kV Corona end bell for 3" IPS Al. tube	Nos.	12	12																24	2	26	Equivalent to contract BOQ sl. No. 71
79	66kV AL welding sleeve for 3" Al tube	Nos.	48																	48	3	51	Equivalent to contract BOQ sl. No. 76
80	33kV, 1250A, Tee connector suitable for 3" tube run and twin ACSR Bersimis tap	Nos.	7	7																14	1	15	Equivalent to contract BOQ sl. No. 59
81	33kV Corona end bell for 3" IPS Al. tube	Nos.	5	5																10	1	11	Equivalent to contract BOQ sl. No. 71
82	33kV AL welding sleeve for 3" Al tube	Nos.	22																	22	2	24	Equivalent to contract BOQ sl. No. 76
83	Tension clamps for 7/3.66mm(10.98mm dia) GI Wire	Nos.	20	21	17	18	16	12												169	9	178	Equivalent to contract BOQ sl. No. 76
84	Two way PG clamps for 7/3.66mm(10.98mm dia) GI Wire	Nos.	12	13	9	10	8	4												103	5	108	Equivalent to contract BOQ sl. No. 76
85	For connecting 7/3.66mm(10.98mm dia) GI Wire on one side and 75x12 mm MS flat on other side	Nos.	10	10	8	10	10	8												100	5	105	Equivalent to contract BOQ sl. No. 76
86	Structure clamps for 75X 12 mm MS flat on Lattice type structure	Nos.	8100																	8100	400	8500	20 Nos. of this item is equivalent to 1 no. contract BOQ sl. No. 75. So total billable quantity of required sl. No. 87 is equal to 425 Nos of contract BOQ sl. No. 75.
87	Structure clamps for 50x8 mm MS flat on Lattice type structure	Nos.	1210																	1210	60	1270	20 Nos. of this item is equivalent to 1 no. contract BOQ sl. No. 75. So total billable quantity of required sl. No. 88 is equal to 64 Nos of contract BOQ sl. No. 75.
88	Insulator string and Hardware																						

ERECTOR KEY DIAGRAM  
DRAWING NO. TB-0-394-316-006, Rev. 01

ERECTION KEY DIAGRAM

DRAWING NO. TB-0-394-316-006, Rev. 01

Saravalli

Project- 765KV/400KV Ariyalur S/s., BILL OF QUANTITIES

EKD Sl. No.	Description of connector with rating	Unit of Qty.	Bay 716, 717, 718=765KV NCPs # 2 & ICT-2	Bay 713, 714, 715=765KV NCPs # 1 & ICT-1	Bay 710, 711, 712=765KV Bus-1 Reactor & Bus-2 Reactor	Bay 707, 708, 709=765KV Thiruvallam # 2 & Coimabator e-2(F)	Bay 704, 705, 706=765KV Thiruvallam # 1 & Coimabator e-1 (F)	Bay 701, 702, 703=765KV V (F) & (F)	765KV main Bus -1 and main Bus-2	Bay 401,402, 403 =400KV Neyveli # 1	Bay 404,405, 406 =400KV Neyveli # 2 & ICT-1	Bay 407,408, 409 =400KV Bus-2 Reactor (F)	Bay 410,411, 412 =400KV Pugalur # 1 & ICT-2	Bay 413,414, 415 =400KV Pugalur # 2 & Bus-1 Reactor (F)	Bay 416,417, 418 =400KV Kalivanti thapattu # 2 & Future # 4	Bay 419,420, 421 =400KV Kalivanti thapattu # 1 & Future # 3	Bay 422,423, 424 =400KV Future # 1 & Future # 2	400KV main Bus -1 and main Bus-2	Main Qty.	Mandatory Spare	Total Qty.	Remarks	
	765 kV Double Tension String hardware with double anchoring point (anchor spacing 450mm), suitable for 2x44 Nos. 210KN disc with hardware set with all hardware accessories including tension clamp and Turn Buckle set suitable for Quad AAC Bull Conductor (sub conductor spacing 450mm)	Nos.	9	9	6	9	9	6	36										84	0	84	Equivalent to contract BOQ sl. No. 41	
100	765 kV Double Tension String hardware with double anchoring point (anchor spacing 450mm), suitable for 2x44 Nos. 210KN disc with hardware set with all hardware accessories including tension clamp but without Turn Buckle set suitable for Quad AAC Bull Conductor (sub conductor spacing 450mm)	Nos.	9	9	6	9	9	6	36										84	0	84	Equivalent to contract BOQ sl. No. 42	
101	765 kV Single Suspension String hardware with single anchoring point, suitable for 44 Nos. 210KN disc with hardware set with all hardware accessories including through type suspension clamp suitable for Quad AAC Bull AAC Conductor (sub conductor spacing 450mm).	Nos.	3	3			3	3	30										42	3	45	(1) Main item=Equivalent to contract BOQ sl. No. 77, (2)Spare item=Equivalent to contract BOQ sl. No. 131.n	
102	765 kV Single Suspension String hardware with single anchoring point, suitable for 44 Nos. 210KN disc with hardware set with all hardware accessories including drop type suspension clamp suitable for Quad AAC Bull AAC Conductor (sub conductor spacing 450mm).	Nos.	12	12	12		6	6	6										54	3	57	(1) Main item=Equivalent to contract BOQ sl. No. 78, (2)Spare item=Equivalent to contract BOQ sl. No. 131.o	
103	400 kV Double Tension String hardware with double anchoring point (anchor spacing 450mm), suitable for 2x25 Nos. 160KN disc with hardware set with all hardware accessories including tension clamp and Turn Buckle set suitable for Quad ACSR Berrimis Conductor (sub conductor spacing 450mm)	Nos.								3	9	3	9	6	6	6	6	6	24	72	0	72	Equivalent to contract BOQ sl. No. 44
104	400 kV Double Tension String hardware with double anchoring point (anchor spacing 450mm), suitable for 2x25 Nos. 160KN disc with hardware set with all hardware accessories including tension clamp but without Turn Buckle set suitable for Quad ACSR Berrimis Conductor (sub conductor spacing 450mm)	Nos.								3	9	3	9	6	6	6	6	6	24	72	0	72	(1) Main item=Equivalent to contract BOQ sl. No. 79, (2)Spare item=Equivalent to contract BOQ sl. No. 131.p
105	400 kV Single Suspension String hardware with single anchoring point, suitable for 25 Nos. 160KN disc with hardware set with all hardware accessories including through type suspension clamp suitable for Quad ACSR Berrimis Conductor (sub conductor spacing 450mm)	Nos.									3								18	24	1	25	
106	400 kV Single Suspension String hardware with single anchoring point, suitable for 25 Nos. 160KN disc with hardware set with all hardware accessories including drop type suspension clamp suitable for Quad ACSR Berrimis Conductor (sub conductor spacing 450mm)	Nos.								6	12			12	6	6	6		48	2	50	(1) Main item=Equivalent to contract BOQ sl. No. 79, (2)Spare item=Equivalent to contract BOQ sl. No. 131.p	
107	400 kV Single Suspension String hardware with single anchoring point, suitable for 25 Nos. 160KN disc with hardware set with all hardware accessories including drop type suspension clamp suitable for Quad ACSR Berrimis Conductor (sub conductor spacing 450mm)	Nos.																					

*Santhosh*

Project- 765KV/400KV Ariyalur S/s., BILL OF QUANTITIES

EKD Sl. No.	Description of connector with rating	Unit of Qty.	Bay 716, 717, 718=765KV NCPs # 2 & ICT-2	Bay 713, 714, 715=765KV NCPs # 1 & ICT-1	Bay 710, 711, 712=765KV Bus-1 Reactor & Bus-2 Reactor	Bay 707, 708, 709=765KV Thiruvallam # 2 & Coimabator e-2(f)	Bay 704, 705, 706=765KV Thiruvallam # 1 & Coimabator re-1 (f)	Bay 701, 702, 703=765k V (f) & (F)	765KV main Bus -1 and main Bus-2	Bay 401,402, 403 =400KV Neyveli # 1	Bay 404,405, 406 =400KV Neyveli # 2 & ICT-1	Bay 407,408, 409 =400KV Bus-2 Reactor (F)	Bay 410,411, 412 =400KV Pugalur # 1 & ICT-2	Bay 413,414, 415 =400KV Pugalur # 2 & Bus-1 Reactor (F)	Bay 416,417, 418 =400KV Kalivani hapattu # 2 & Future # 4	Bay 419,420, 421 =400KV Kalivan thapatti u # 1 & Future # 3	Bay 422,423, 424 =400KV Future # 1 & Future # 2	400KV main Bus -1 and main Bus-2	Main Qty.	Mandatory Spare	Total Qty.	Remarks	
108	400 kV Single Suspension String hardware with single anchoring point, suitable for 25 Nos. 160KN disc with hardware set with all hardware accessories including drop type suspension clamp suitable for twin ACSR Bersimis Conductor (sub conductor spacing 450mm).	Nos.																	6	6	3	9	(1) Main item=Equivalent to contract BOQ sl. No. 80, (2)Spare tem=Equivalent to contract BOQ sl. No. 131.4
109	11 KV 210 KN Anti fog Disc insulator	Nos.																		19008	719	19727	(1) Main item=Equivalent to contract BOQ sl. No. 34, (2)Spare tem=Equivalent to contract BOQ sl. No. 131.412, (3) commissioning spare (due to site breaking)=95nos.
110	11 KV 160 KN Anti fog Disc insulator	Nos.																		9150	515	9665	(1) Main item=Equivalent to contract BOQ sl. No. 35, (2)Spare tem=Equivalent to contract BOQ sl. No. 131.413, (3) commissioning spare (due to site breaking)=45nos.
Conductor /Tube Size																							
1	3.0" standard IPS Al Tube( Outer diameter =88.90mm, thickness 7.62mm), Tolerance in O.D. +2.2/-0.0mm, Tolerance in thickness +2.2/-0.0mm																						
2	4" standard IPS Al Tube( Outer diameter =114.2mm, thickness 8.51mm), Tolerance in O.D. +2.2/-0.0mm, Tolerance in thickness +2.2/-0.0mm																						
3	4.5" standard IPS Al Tube( Outer diameter =120mm, thickness 12.0mm), Tolerance in O.D. +1.5/-0.0mm, Tolerance in thickness +1.0/-0.0mm																						
4	Bull AAC conductor ( Overall diameter=38.25mm)																						
5	ACSR Moose conductor ( Overall diameter=31.77mm)																						
6	ACSR Bersimis conductor ( Overall diameter=35.05mm)																						
7	ACSR Zebra conductor ( Overall diameter=28.62mm)																						
Notes:																							
1	The sub-conductor spacing for 765KV Bull AAC conductor is 450mm.																						
2	The sub-conductor spacing for 765KV Hexa Zebra conductor is 457mm.																						
3	The sub-conductor spacing for 400KV Bersimis ACSR conductor is 450mm.																						
4	The sub-conductor spacing for 33kV / 66kV Bersimis conductor is 250mm.																						
5	Rigid /Expansion =Expansion type on one side and Rigid type on other side ( With Tube break, Continuity should be made by suitable arrangement and same shall be part of connector)																						
6	* =Main quantities of power connector is a part of main equipment quantities , it meant that it is not separate billable As per contract BOQ sl. No. 131.4, mandatory spare connector 3 nos. of each type of equipment's to be supplied for this project. Mandatory spare of power connector listed under remarks * shall be billable under contract BOQ sl. No. 131.4																						
7	Since some required connector is not available in LOA BOQ , therefore we have used equivalent words in remarks column for billing purpose only																						

*Saravali*

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COMPUTER DRG. PATH NAME :

SIGN. & DATE

REF. DRG. No.

INVENTORY No.

4 MTR WIDE ROAD

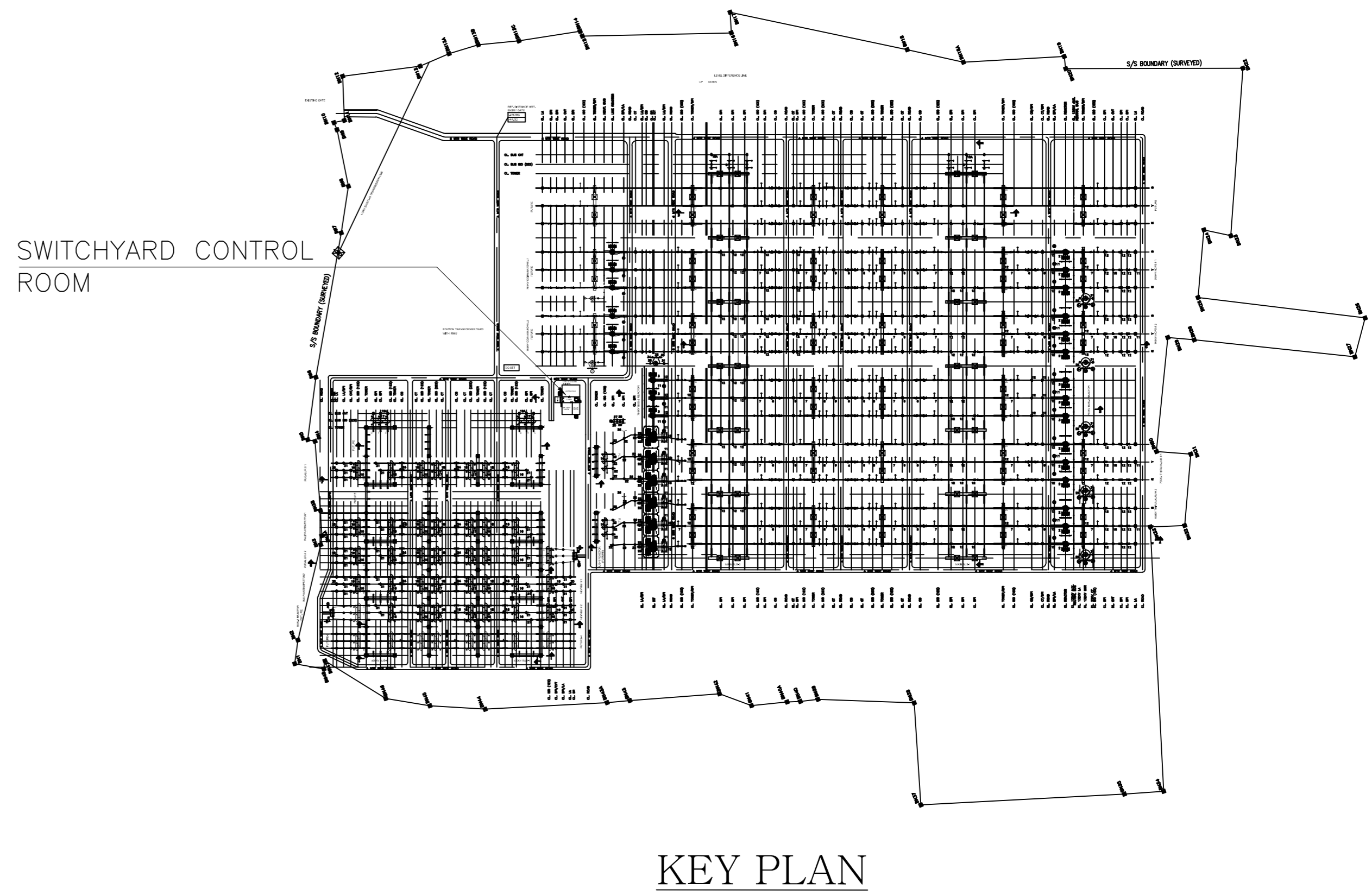
765KV SWITCHYARD

CONTROL ROOM BUILDING  
GROUND FLOOR PLAN

Sl. No	Description of Panel/equipment	Qty.	Approx Dimension of one set		
			W	D	H
			Dimension in mm		
BCU1	BCU1 Panel	1 No	900	800	2315
BCU2	BCU2 Panel	1 No	900	800	2315

REV.	DATE	ALTERED	MVK	SD/-
		CHECKED	MVK	SD/-
		APPROVED	SKS	SD/-
02	19.12.19	APPROVED	SKS	SD/-
ZONE		REVISED AS PER TANTRANSCO COMMENTS.		

REV.	DATE	ALTERED	MVK	SD/-
		CHECKED	MVK	SD/-
		APPROVED	SKS	SD/-
01	20.11.19	APPROVED	SKS	SD/-
ZONE		REVISED AS PER TANTRANSCO COMMENTS.		



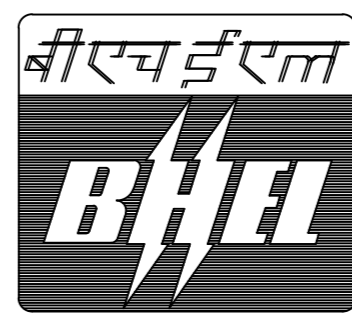
Sl. No	Description of Panel/equipment	Qty.	Approx Dimension of one set		
			W	D	H
			Dimension in mm		
1	415V Main ACDB	1 Set	6100	1200	2450
2	415V Sub ACDB-1	1 Set	4200	1200	2450
3	415V Sub ACDB-2	1 Set	5000	1200	2450
4	220V DCDB-1 for 765KV Switchyard *	1 Set	4300	800	2450
5	220V DCDB-2 for 400KV Switchyard *	1 Set	4300	800	2450
6	48V DCDB *	1 Set	4300	800	2450
7,8,9	220V, 100A charger for 765kV Yard	3 Set	1600	600	1500
10,11,12	220V, 100A charger for 400KV Yard	3 Set	1600	600	1500
13,14,15	48V, 250A Charger	3 Set	600	600	1500
16,17	220V, 535AH Lead acid Tubular battery for 765 kV Yard	2 Set	4300x2	570x2	721
18,19	220V, 535AH lead acid Tubular battery for 400 kV Yard	2 Set	4300x2	570x2	721
20,21	48V 1250A Lead Accid tubular battery	2 Set	1200	1100	1700
* 1 Set of 220V/48V DCDB consist section-1 ( i.e. Source -1 of DC ) and section -2 ( i.e. Source -2 of DC )					

Sl. No	Description of Panel/equipment	Qty.	Approx Dimension of one set		
			W	D	H
			Dimension in mm		
	OLTE1-OLTE5 OLTE Panels (1-5)	5 Nos	800	800	2000
EPAX	EPAX Panel	1 No			

ADDITIONAL INFORMATION  
W.O.No. 86009

STATUS OF DRAWING CONTRACT  
DISTRIBUTION OF PRINTS

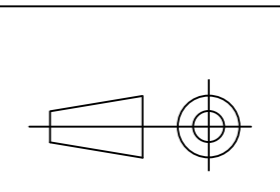
ग्राहक/परियोजना का नाम TAMILNADU TRANSMISSION CORPORATION. LTD.  
NAME OF CUSTOMER/PROJECT 765/400KV AIS S/S ARIYALUR IN VILLUPURAM



भारत हेवी इलेक्ट्रिकल्स लिमिटेड  
ट्रान्समिशन परियोजना विभाग  
BHARAT HEAVY ELECTRICALS LTD.  
TRANSMISSION PROJECTS DIVISION

ड्रॉइंग DRAWN	नाम /NAME	हस्ता./SIGN.	दि./DATE
PK		SD/-	22.10.19
जेंद्रा CHECKED	MVK/RD	SD/-	22.10.19
स्वीकृत APPROVED	SKS	SD/-	22.10.19

विभाग TBEM  
DEPT. 422



अनुपात / SCALE  
NTS

कार्ड कोड  
CARD CODE

शीर्षक/TITLE  
PANEL PLACEMENT LAYOUT  
FOR 765/400KV S/S ARIYALUR

ड्राईंग.क्र./DRAWING NO.  
TB-3-394-316-008A

पृष्ठ क्र./SHEET No.01 अगला पृष्ठ/NEXT SHEET 02

पुनः/REV.  
02




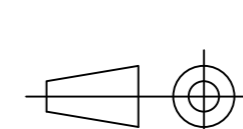
COMPUTER DRG. PATH NAME :

REF. DRG. No.

SIGN. &amp; DATE

INVENTORY No.



ADDITIONAL INFORMATION W.O.No. 86009					ग्राहक/परियोजना का नाम TAMILNADU TRANSMISSION CORPORATION. LTD. NAME OF CUSTOMER/PROJECT 765/400KV AIS S/S ARIYALUR IN VILLUPURAM							
STATUS OF DRAWING CONTRACT												
DISTRIBUTION OF PRINTS												
					 भारत हेवी इलेक्ट्रिकल्स लिमिटेड ट्रांसमिशन परियोजना विभाग BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION		बनाया DRAWN		नाम /NAME	हस्ता./SIGN.	दि./DATE	
							PK			SD/-	22.10.19	
							चेखा CHECKED		MVK/RD	SD/-	22.10.19	
					स्वीकृत APPROVED		SKS	SD/-	22.10.19			
REV.	DATE	ALTERED	MVK	Sd/-	विभाग DEPT.	TBEM		अनुपात / SCALE	कार्ड कोड CARD CODE			
01	20.11.19	CHECKED	MVK	Sd/-	कोड CODE	422		NTS				
ZONE	REVISED AS PER TANTRANSCO COMMENTS.				शीर्षक/TITLE PANEL PLACEMENT LAYOUT FOR 765/400KV S/S ARIYALUR					ड्राईंग.क्र./DRAWING NO. TB-3-394-316-008A		पुनः/REV. 02
										पृष्ठ क्र./SHEET No.03		अगला पृष्ठ/NEXT SHEET 04

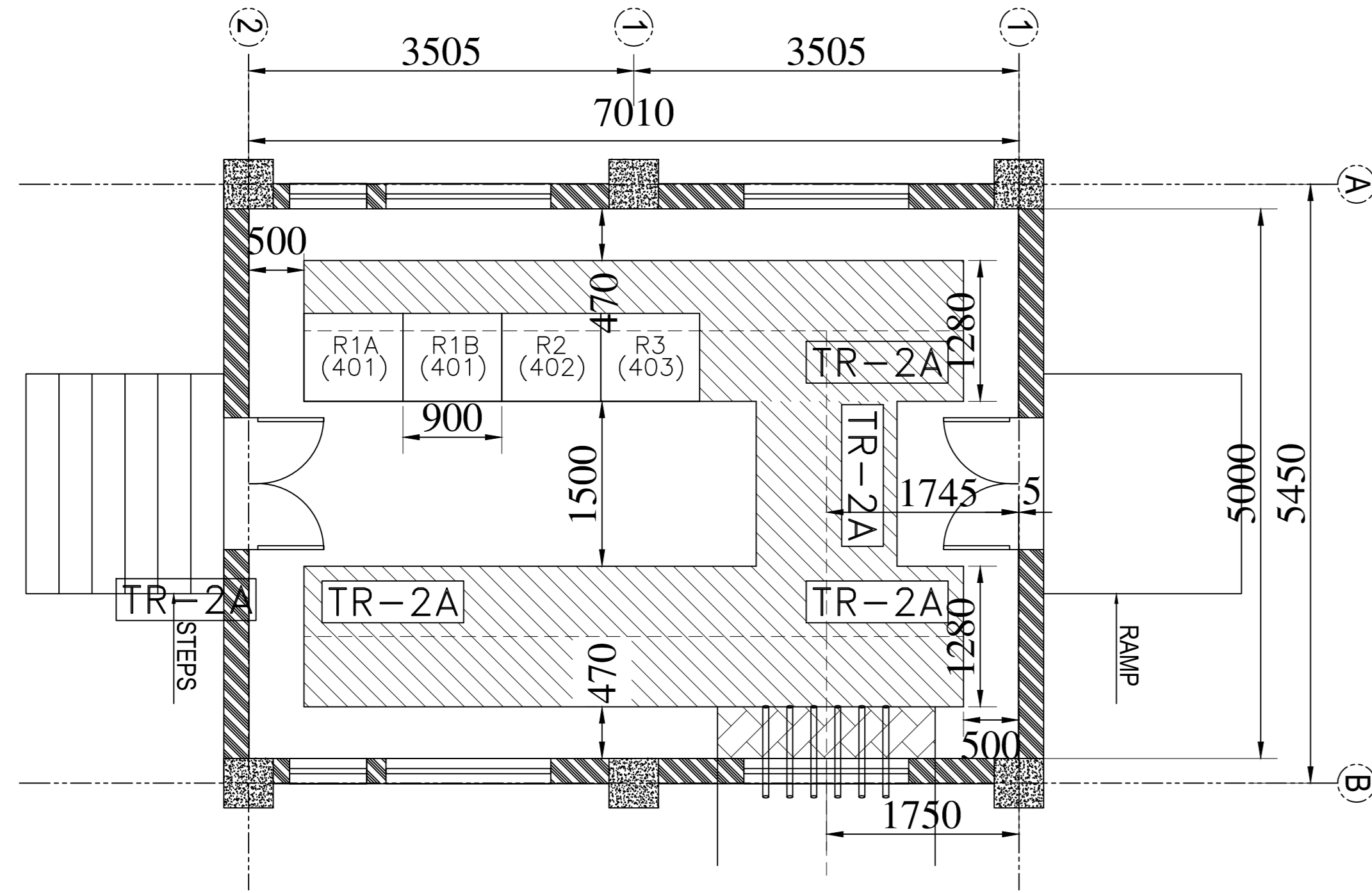
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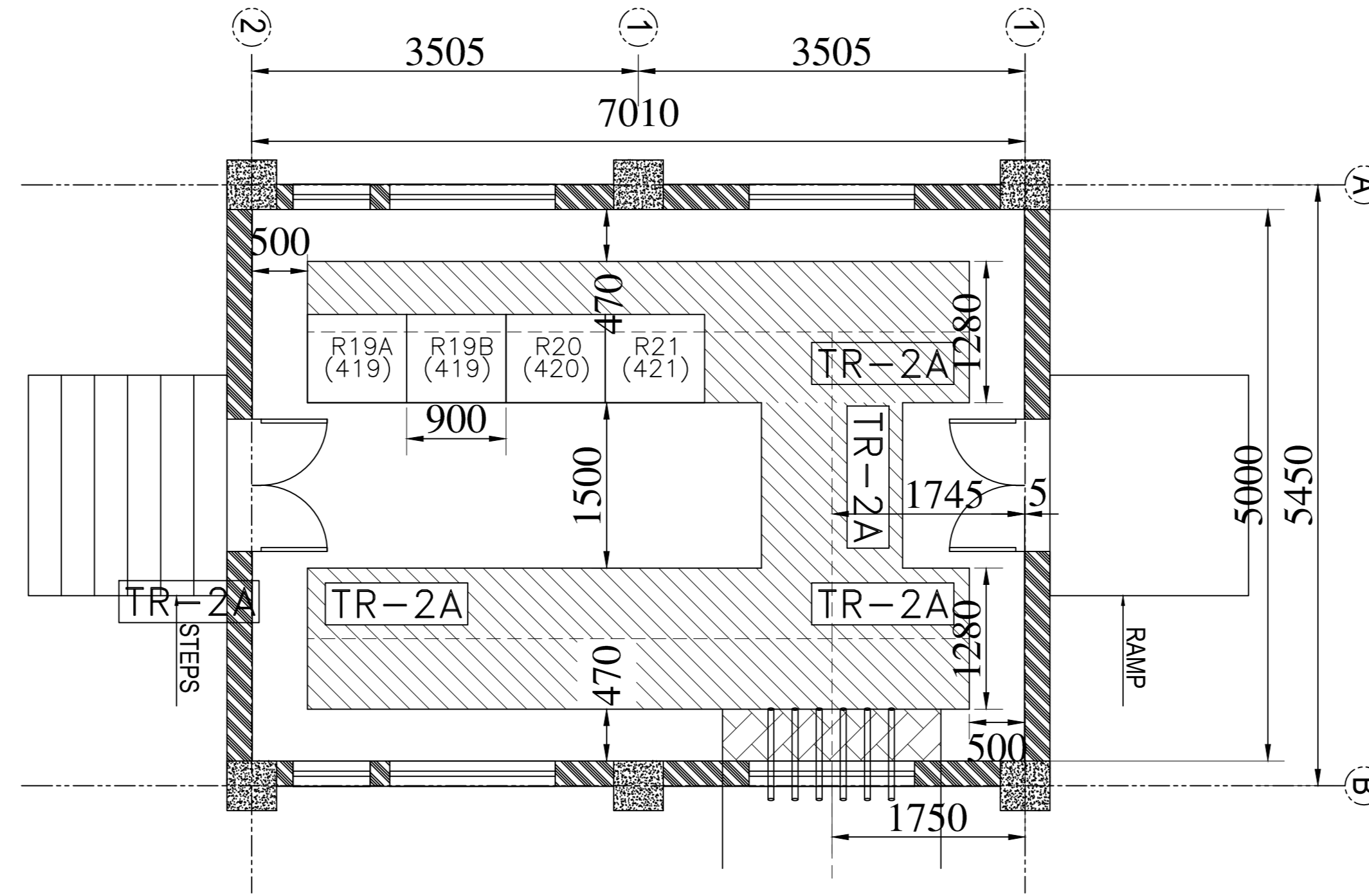
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SIGN. &amp; DATE

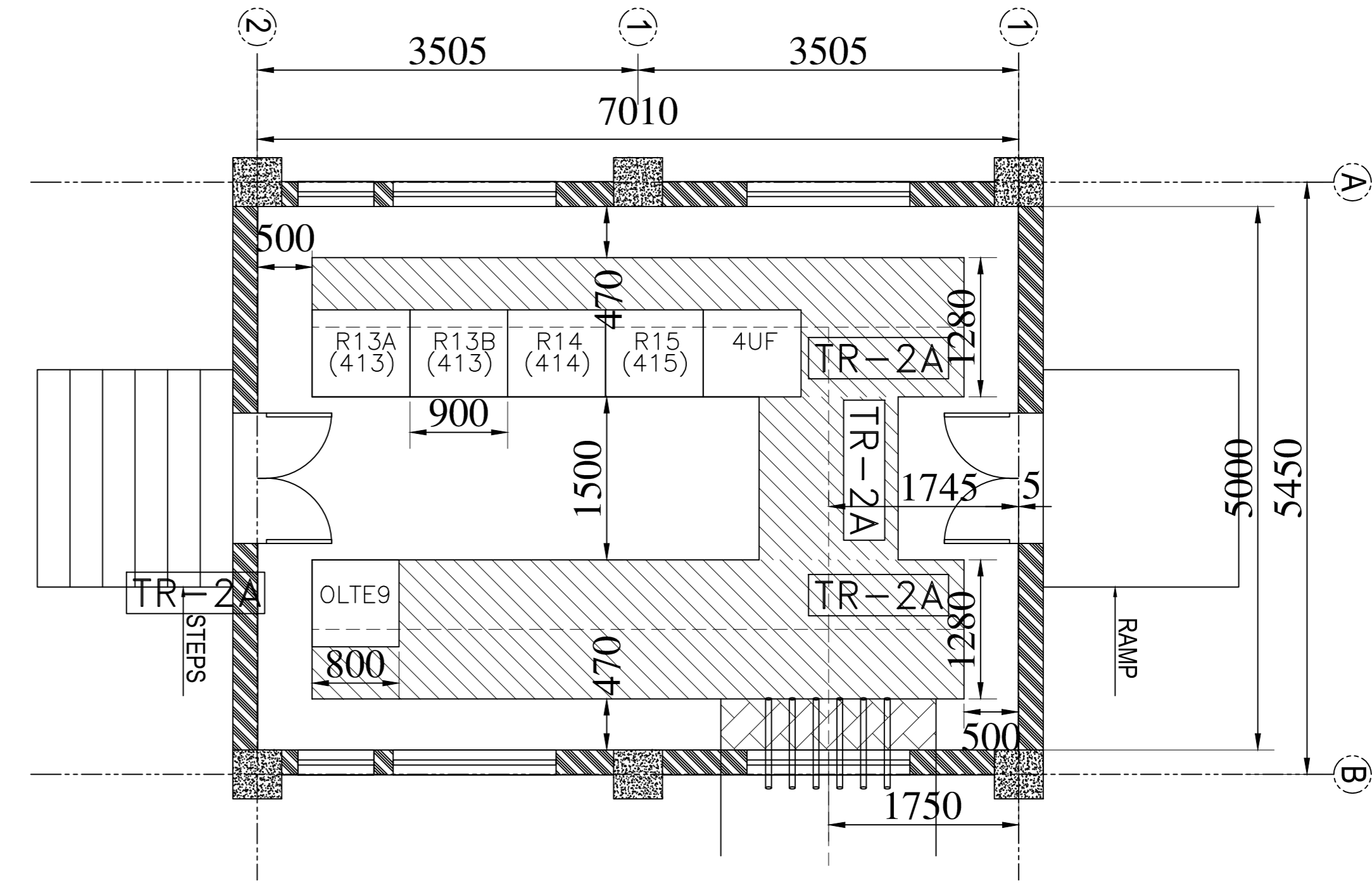
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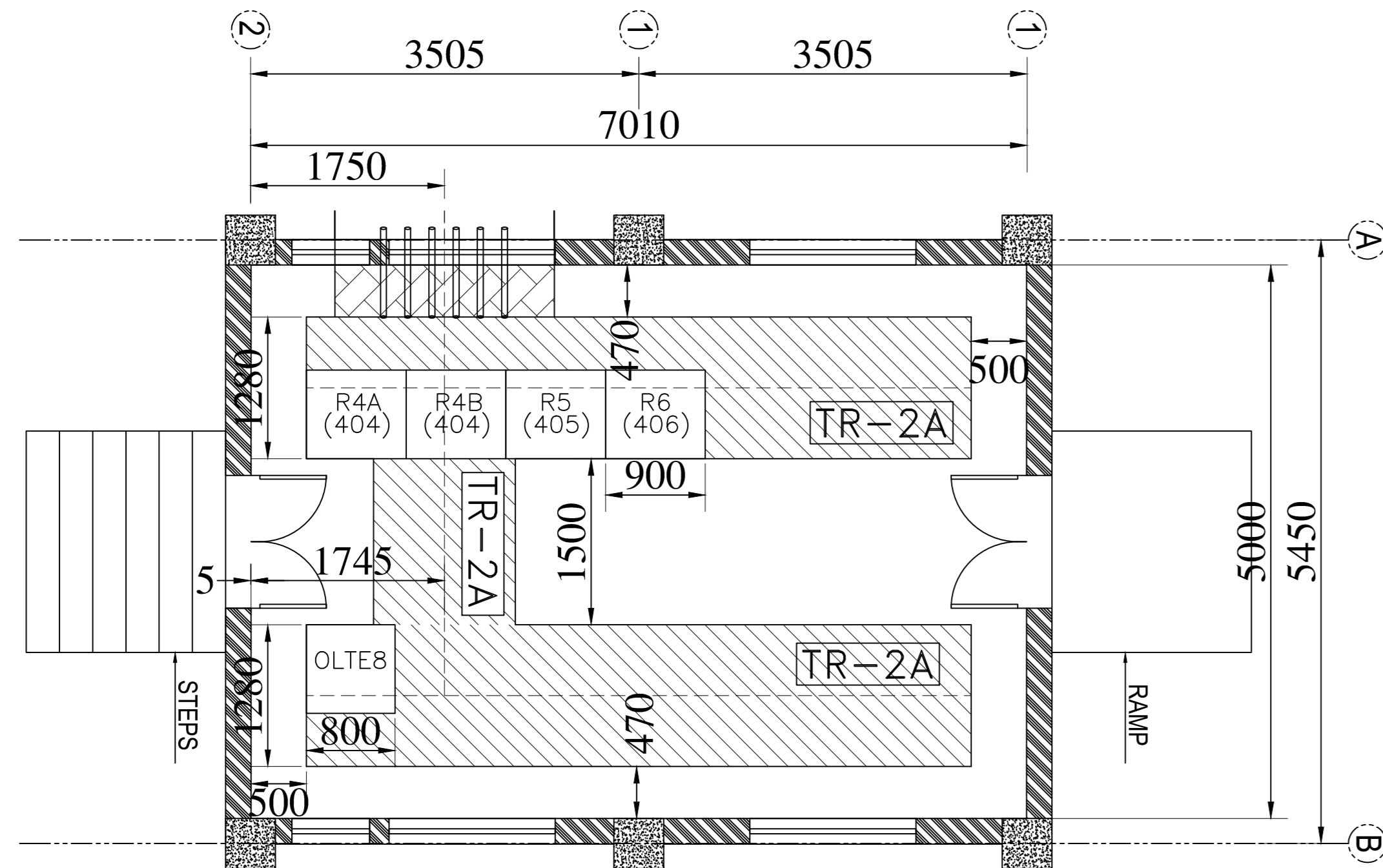
4SPR1



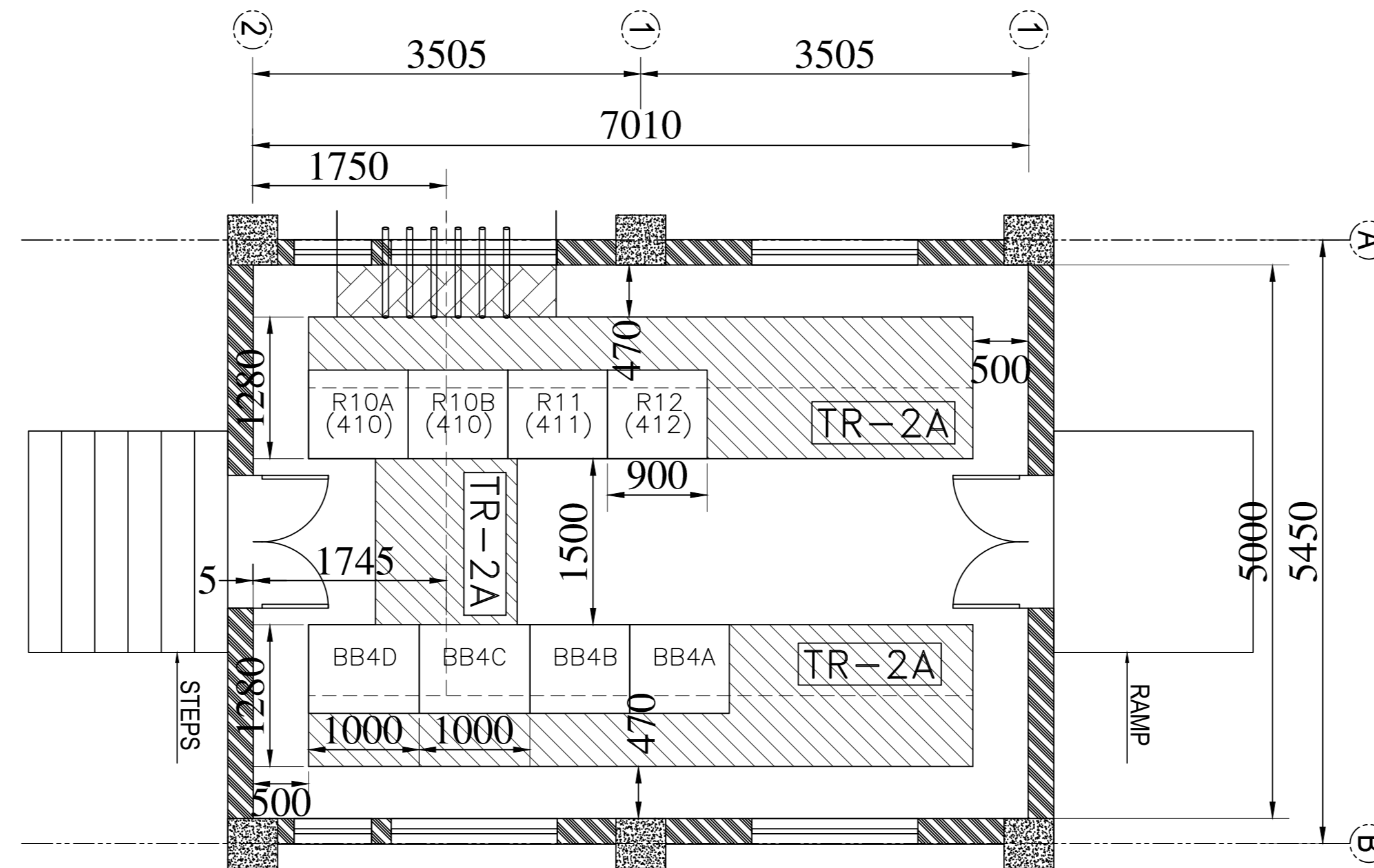
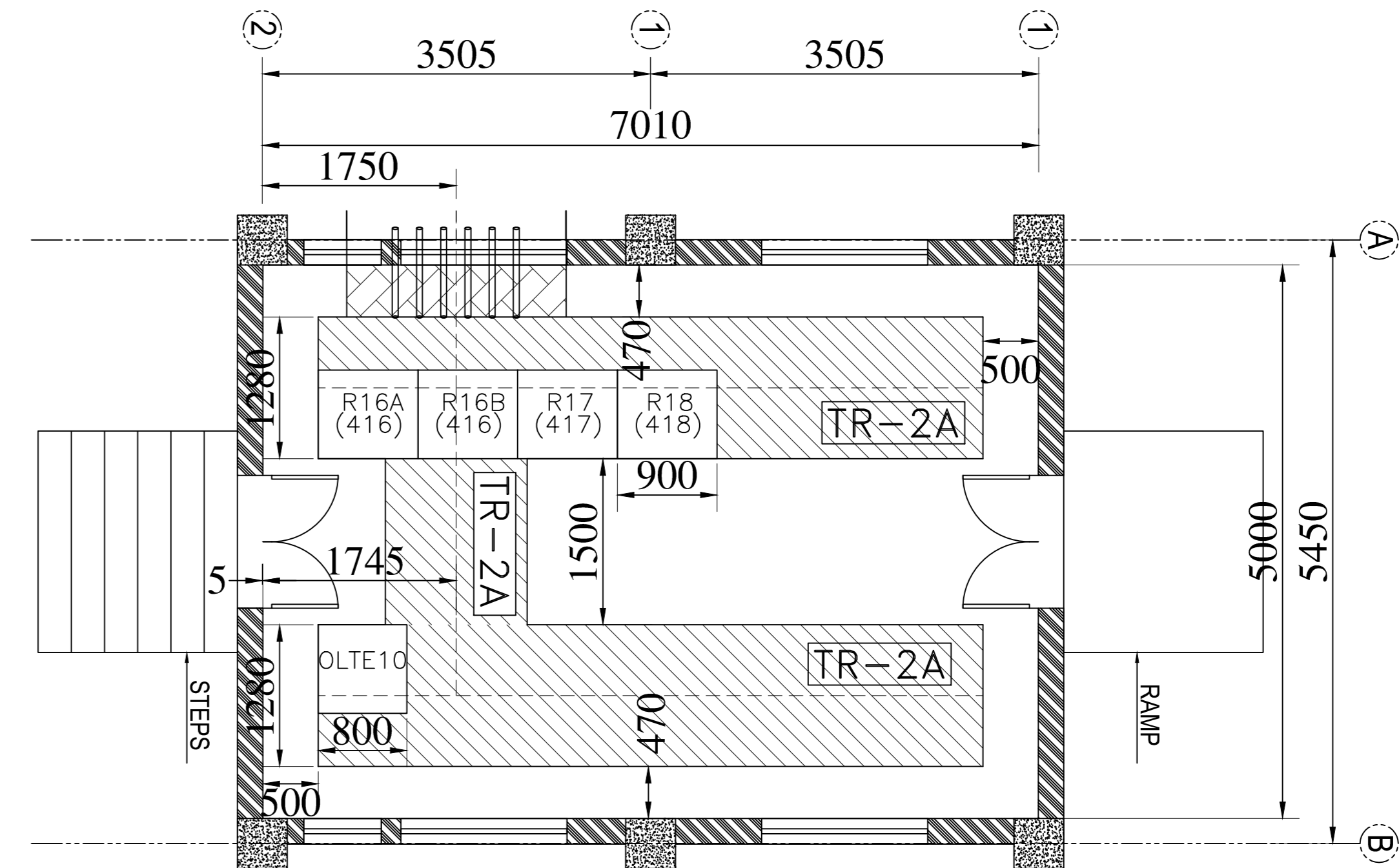
4SPR7



4SPR5



4SPR2

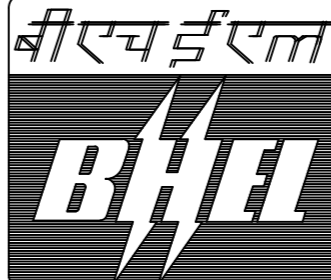
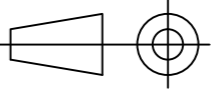
4SPR4

4SPR6

REV.	DATE	ALTERED
		CHECKED
		APPROVED
ZONE		

REV.	DATE	ALTERED	MVK
02	19.12.19	CHECKED	MVK
ZONE	APPROVED SKS		
	SHEET-1 & 2 REVISED.		

REV.	DATE	ALTERED	MVK	Sd/-
01	20.11.19	CHECKED	MVK	Sd/-
		APPROVED	SKS	Sd/-
ZONE	REVISED AS PER TANTRANSO COMMENTS.			

ब्राह्मक/परियोजना का नाम NAME OF CUSTOMER/PROJECT		TAMILNADU TRANSMISSION CORPORATION. LTD. 765/400KV AIS S/S ARIYALUR IN VILLUPURAM			
 भारत हेवी इलेक्ट्रिकल्स लिमिटेड ट्रांसमिशन परियोजना विभाग BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION		खयाल DRAWN	नाम /NAME PK	हस्ता./SIGN. SD/-	दि./DATE 22.10.19
		चेक CHECKED	मयक/RD MVK/RD	SD/-	22.10.19
		स्वीकृत APPROVED	SKS	SD/-	22.10.19
विभाग DEPT.	TBEM	अनुपात / SCALE NTS		कार्ड कोड CARD CODE	
कोड CODE	422				
शीर्षक/TITLE PANEL PLACEMENT LAYOUT FOR 765/400KV S/S ARIYALUR			ड्राइंग.क./DRAWING NO. TB-3-394-316-008A		पुनः/REV. 02
			पृष्ठ क./SHEET No.04	अगला पृष्ठ/NEXT SHEET 05	



101.710.30027.101

Drawing: General Arrangement Drawing  
Drawing No. : 1TY.710.30027.101  
Product Type: 500MVA, 765/400/33 kV ICT  
Total Sheets: 10

### Technical Requirement :

1. Tolerance on dimensions and weights are  $\pm 5\%$  except Rail Gauge & Rail Centre.
2. Transformer external Paint shade no. is RAL 7035.
3. Exact profile & placement of accessories may change during detailed engineering.
4. All accessories will be provided in standard colour shade and as per standard painting procedure followed by accessories supplier.
5. Arrow marked on Buchholz Relay arrow shall be conservator side after assembly.
6. Transformer tank is Conventional type with bolts joint.
7. All dimensions are in millimetre unless otherwise stated.
8. Equaliser connection (with 25NB Globe valve) between OLTC & Main tank provided to evacuate both transformer & OLTC simultaneously. Valve must be open during vacuum & close while transformer in service.
9. Pressure gauge, regulating valve for dry air cylinder to be fitted during transport.
10. Delta formation of three phase bank is to be done as given in Rating & Diagram plate drawing.
11. Rollers are only to shift transformer up to plinth level. After reaching at its location, rollers shall be removed & base plate shall be locked directly on plinth using locking arrangement as shown below.
12. Min. plinth dimensions are shown. Civil engineer need to consider site requirements before deciding plinth size.
13. Surge arrestor and LV Bushing connection shall be in M/s , BHEL scope work.
14. 1 set of roller per substation, will be supplied by TBEA.
15. Various cables are arranged through cable tray on transformer body. Accessories to IMB and IMB to CMB, cables are in TBEA scope of supply.

Sl. No.	Item	Mass (kg)
1	Core and Winding Assembly	145,000
2	Tank and Fittings	93,000
3	Total Oil in Complete Transformer (82,000 L)	70,000
4	Total Weight of Transformer (Oil Filled)	308,000
5	Transport Weight of Transformer (Dry Air Filled)	195,000

Min. Air Clearance (in mm)		
	Phase to Phase	Phase to Earth
HV Bushing	-	5800
IV Bushing	-	3500
LV Bushing	690	630
Neutral Bushing	-	320

APPROVED &

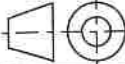
COMMUNICATION VIDE Lr. No:

Lr.No: CE / T.A. / Ariyalur 1CT/D 380 Dt 22/06/18

Supertinending Engineer Transmission/IV

TANTRANSCO

6th Floor, N.P.K.R.R. Maaligai.  
144, Anna Salai, Chennai - 600 002.

End Customer		M/s Tamil Nadu Transmisiion Corporation Limited			
Project		765/400kV Air Insulated substation Ariyalur			
Contractor		BHEL			
Product Type  ODFPSZ-500000/765TH		Drawing Code	1TY.710.30027.101		
		Name	General Arrangement		
Indent No.  T14117		Scale	Page Size	Mass (kg)	Projection
		NTS	A3		
Customer  BHEL A/c TANTRAJNSCO		Total Pages	10	Current Page	1

**TBEA**

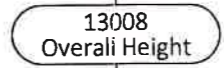
TBEA Energy (India) Pvt. Ltd.


"TBEA GREEN ENERGY PARK"  
National Highway No.8,  
Village : Miyagam, Karjan,  
Gujarat - 391240. India

Rev. No.	Date	Description	Prepared	Checked	Approved
01	12-04-2018	Customer comments incorporated	Rinto	Ashish	Satyam
00	07-03-2018	First issue	Gyan	Ashish	Satyam

ITY.710.30027.101

Overall Length=16200



End Customer		M/s Tamil Nadu Transmission Corporation Limited			
Project		765/400kV Air Insulated substation Ariyalur			
Contractor		BHEL			
Product Type  ODFPSZ-500000/765TH		Drawing Code	1TY.710.30027.101		
		Name	General Arrangement		
Indent No.  T14117		Scale	Page Size	Mass (kg)	Projection
		NTS	A3		
Customer BHEL A/c TANTRANSCO		Total Pages	10	Current Page	2

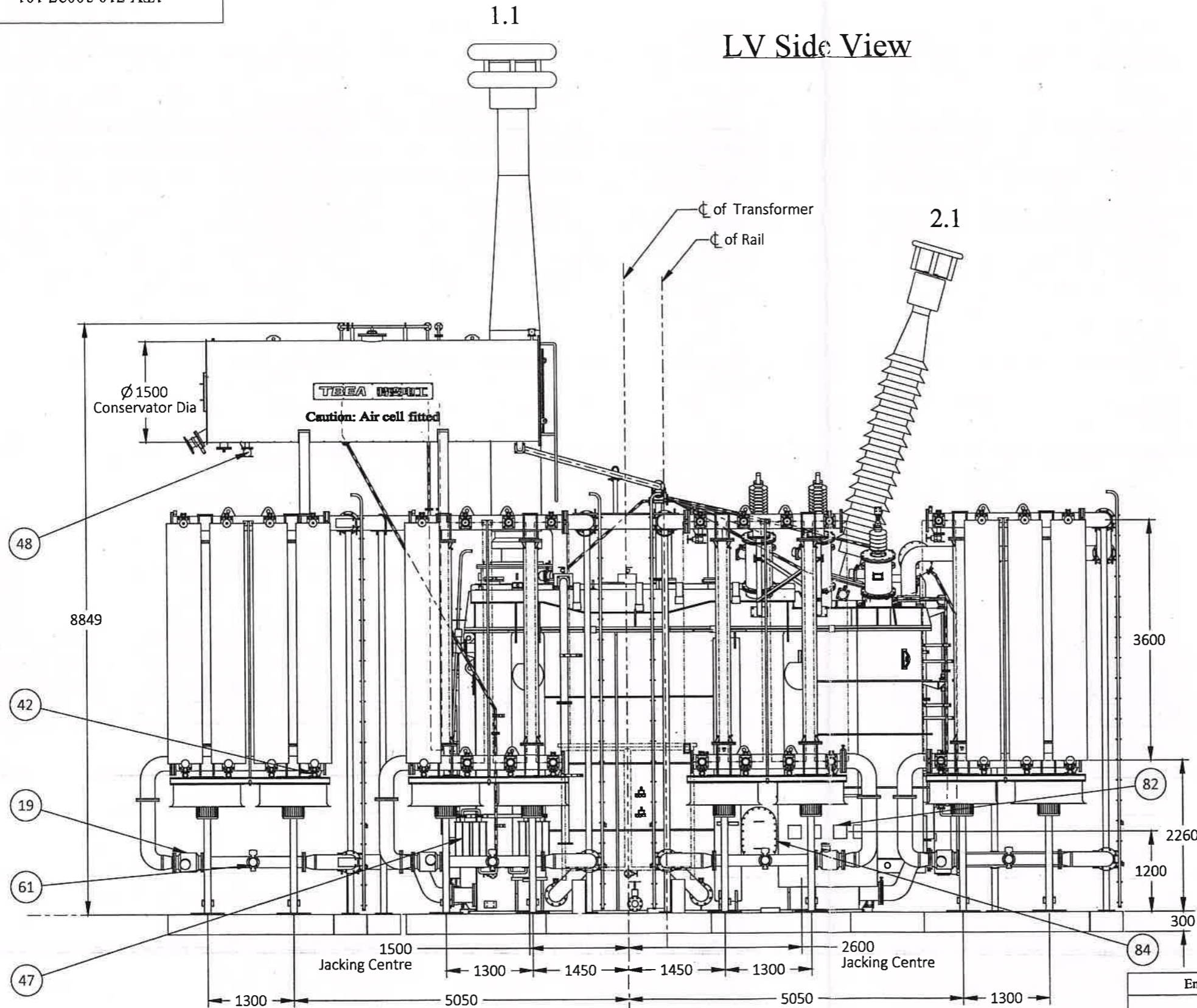
01	12-04-2018	Customer comments incorporated	Rinto	Ashish	Satyam
00	07-03-2018	First issue	Gyan	Ashish	Satyam
Rev. No.	Date	Description	Prepared	Checked	Approved

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TBEA Energy (India) Pvt. Ltd.  
TBEA GREEN ENERGY PARK  
National Highway No.8,  
Village : Miyagam, Karjan,  
Gujarat - 391240, India

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1TY.710.30027.101

# LV Side View



End Customer	M/s Tamil Nadu Transmission Corporation Limited			
Project	765/400kV Air Insulated substation Ariyalur			
Contractor	BHEL			
Product Type	ODFPSZ-500000/765TH			
Indent No.	T14117			
Customer	BHEL A/c TANTRANSCO			
Drawing Code	1TY.710.30027.101			
Name	General Arrangement			
Scale	Page Size	Mass (kg)	Projection	
NTS	A3			
Total Pages	10	Current Page	3	

<b>TBEA</b> TBEA Energy (India) Pvt. Ltd. "TBEA GREEN ENERGY PARK" National Highway No.8, Village : Miyagam, Karjan, Gujarat - 391240. India					
Rev. No.	Date	Description	Prepared	Checked	Approved
01	12-04-2018	Customer comments incorporated	Rinto	Ashish	Satyam
00	07-03-2018	First issue	Gyan	Ashish	Satyam

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All dimensions are in millimeter unless otherwise specified.

1TY.710.30027.101

Top View

Overall Width=13532



☐ Rail / Transformer

☐ of Rail ☐ of Transformer

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"TBEA GREEN ENERGY PARK"  
National Highway No.8,  
Village : Miyagam, Karjan,  
Gujarat - 391240. India

Rev. No.	Date	Description	Prepared	Checked	Approved
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00	07-03-2018	First issue	Gyan	Ashish	Satyam

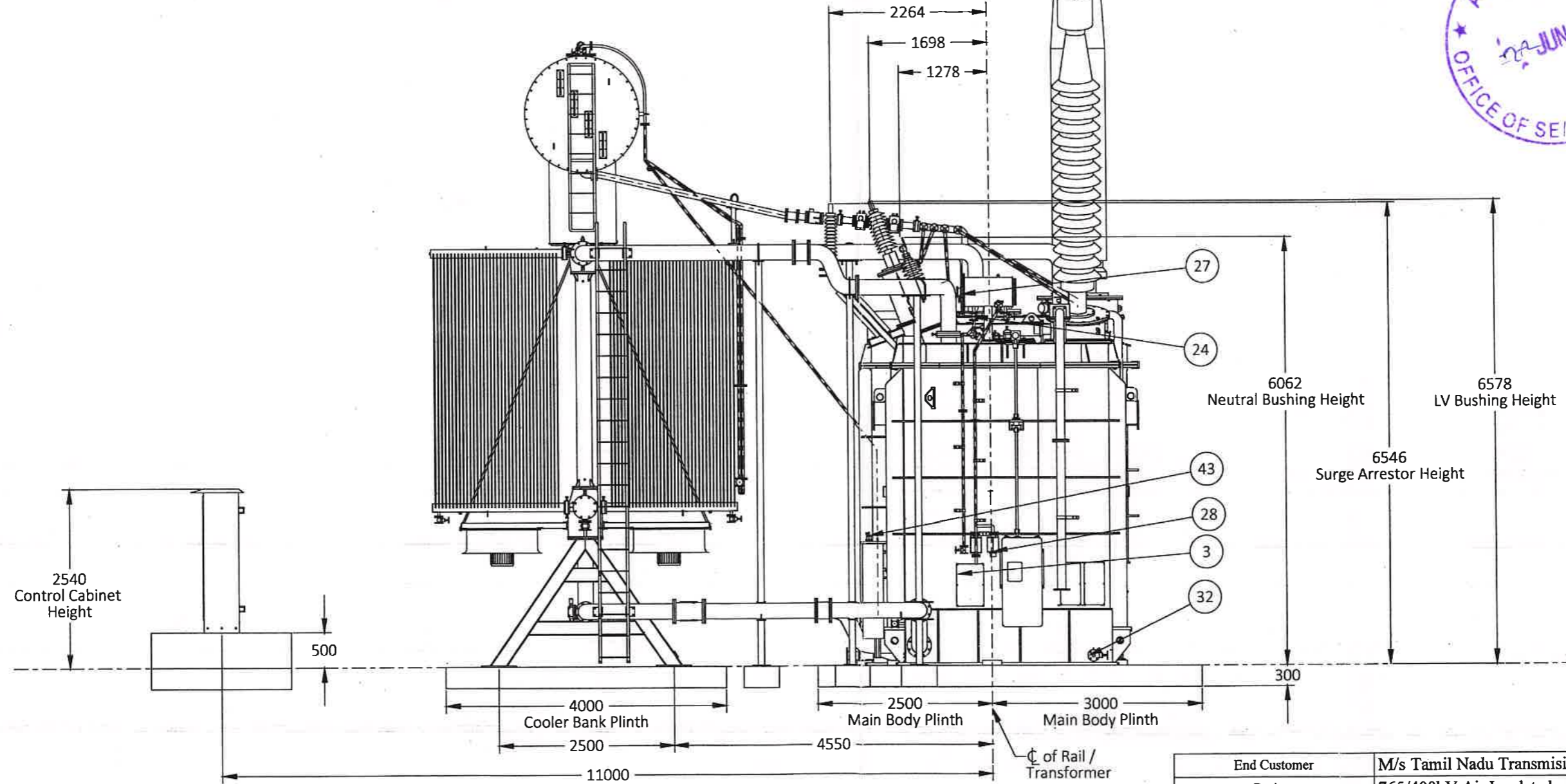
End Customer	M/s Tamil Nadu Transmisiion Corporation Limited			
Project	765/400kV Air Insulated substation Ariyalur			
Contractor	BHEL			
Product Type	ODFPSZ-500000/765TH	Drawing Code	1TY.710.30027.101	
Indet No.	T14117	Name	General Arrangement	
Customer	BHEL A/c TANTRANSCO	Scale	Page Size	Mass (kg)
		NTS	A3	
		Total Pages	10	Current Page
				4

All dimensions are in millimeter unless otherwise specified.

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1TY.710.30027.101

# Left Side View



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01	12-04-2018	Customer comments incorporated	Rinto	Ashish	Satyam
00	07-03-2018	First issue	Gyan	Ashish	Satyam

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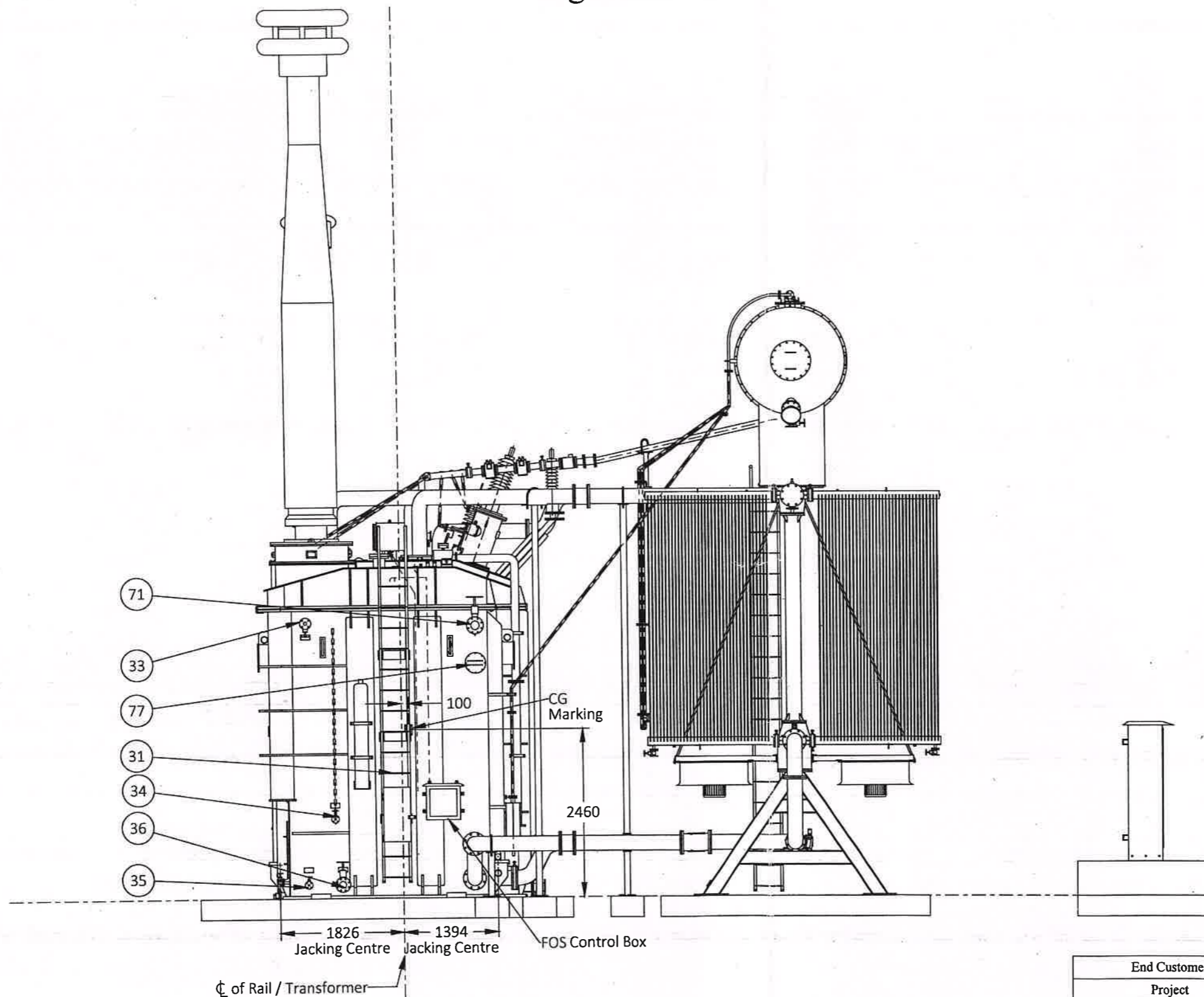
"TBEA GREEN ENERGY PARK"  
National Highway No.8,  
Village : Miyagam, Karjan,  
Gujarat - 391240. India


End Customer	M/s Tamil Nadu Transmisiion Corporation Limited			
Project	765/400kV Air Insulated substation Ariyalur			
Contractor	BHEL			
Product Type	ODFPSZ-500000/765TH	Drawing Code	1TY.710.30027.101	
Indent No.	T14117	Name	General Arrangement	
Customer	BHEL A/c TANTRANSCO	Scale	Page Size	Mass (kg)
		NTS	A3	
		Total Pages	10	Current Page
				5



All dimensions are in millimeter unless otherwise specified.

### Right Side View



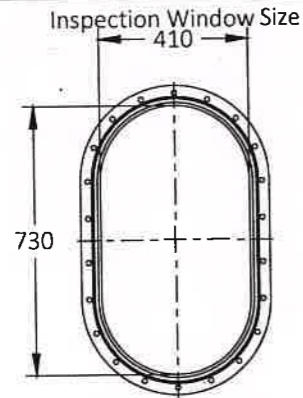
End Customer	M/s Tamil Nadu Transmisiion Corporation Limited			
Project	765/400kV Air Insulated substation Ariyalur			
Contractor	BHEL			
Product Type	Drawing Code	1TY.710.30027.101		
ODFPSZ-500000/765 TH	Name	General Arrangement		
Indent No.	Scale	Page Size	Mass (kg)	Projection
T14117	NTS	A3		
Customer	Total Pages	Current Page		
BHEL A/c TANTRANSCO	10		6	

01	12-04-2018	Customer comments incorporated	Rinto	Ashish	Satyam
00	07-03-2018	First issue	Gyan	Ashish	Satyam
Rev. No.	Date	Description	Prepared	Checked	Approved

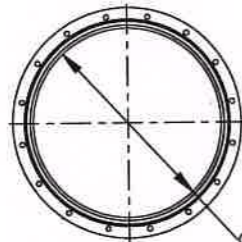
**TBEA**

**TBEA Energy (India) Pvt. Ltd.**  
**"TBEA GREEN ENERGY PARK**  
 National Highway No.8,  
 Village : Miyagam, Karjan,  
 Gujrat - 391240. India

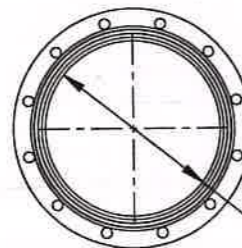
1TY.710.30027.101



Manhole

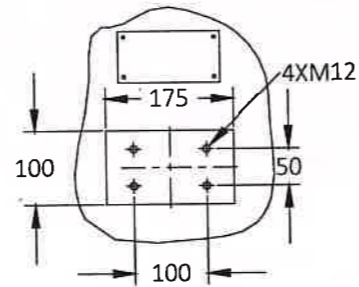


Inspection Window for HV & IV Bushing

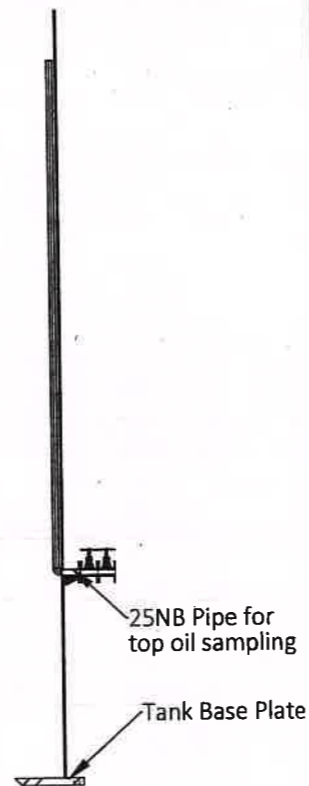


Inspection Window for LV & Neutral Bushing

Earthign Arrangement  
DETAIL A



Top Oil Sampling pipe view



Gasket details

Location	Diameter(mm)
Rim	19
Manhole	8
Conservator Inspection Window	8
Conservator Cover Flange	12
HV Bushing Flange	12
IV Bushing Flange	12
LV Bushing Flange	8
Inspection Window-LV	8
Inspection Window-N	8
Inspection Window-HV & IV	12

Transformer Tank Dimension

Location	Dimension
From transformer centre line to right end	2572
From transformer centre line to left end	4842
From rail/transformer centre line to front end	2107
From rail/transformer centre line to back end	1897
From plinth level to tank cover top	5119



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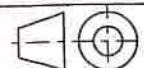
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National Highway No.8,  
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Gujarat - 391240, India

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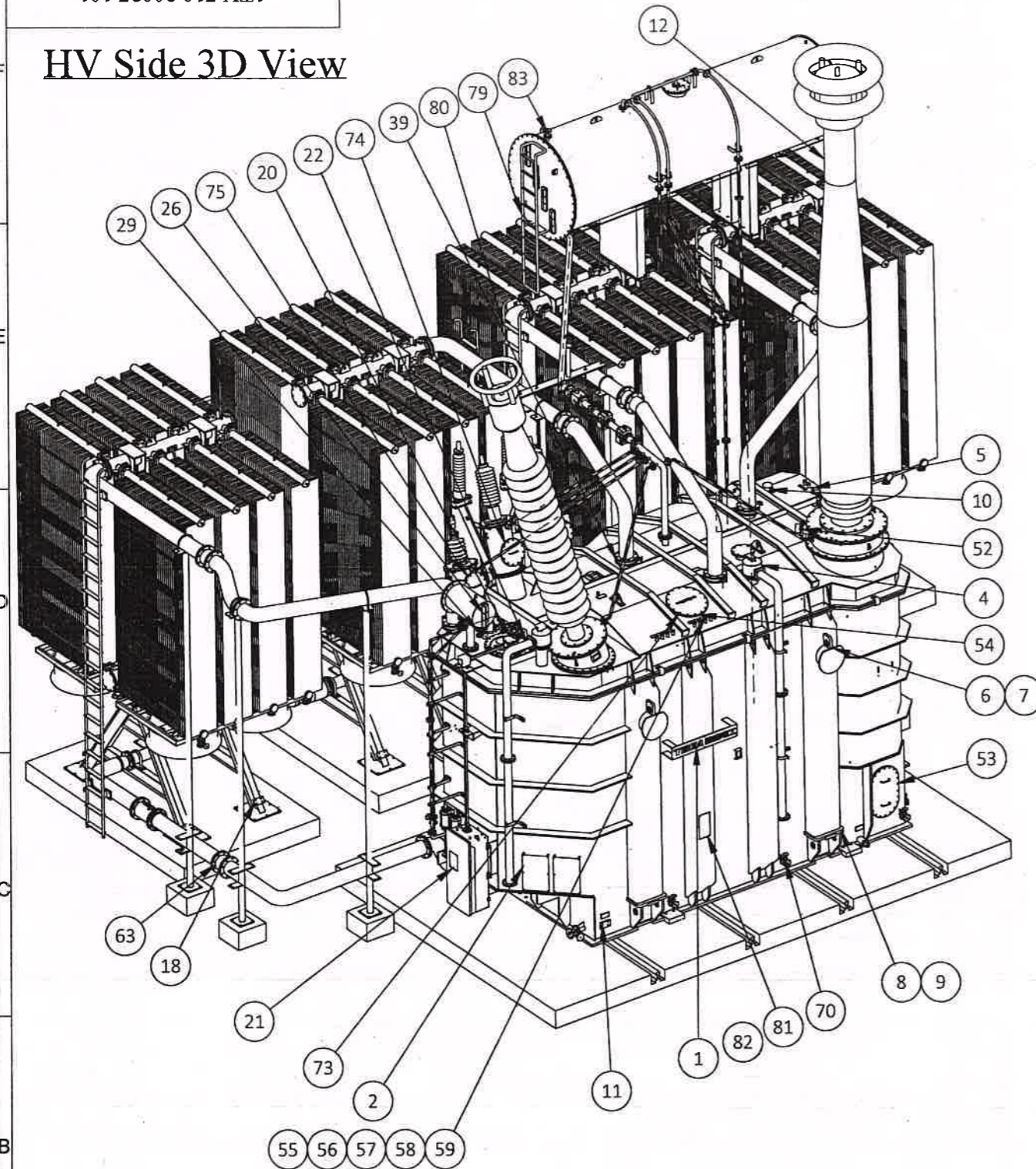
End Customer	M/s Tamil Nadu Transmisiion Corporation Limited			
Project	765/400kV Air Insulated substation Ariyalur			
Contractor	BHEL			
Product Type	ODFPSZ-500000/765TH	Drawing Code	1TY.710.30027.101	
Indent No.	T14117	Name	General Arrangement	
Customer	BHEL A/c TANTRANSCO	Scale	Page Size	Mass (kg)
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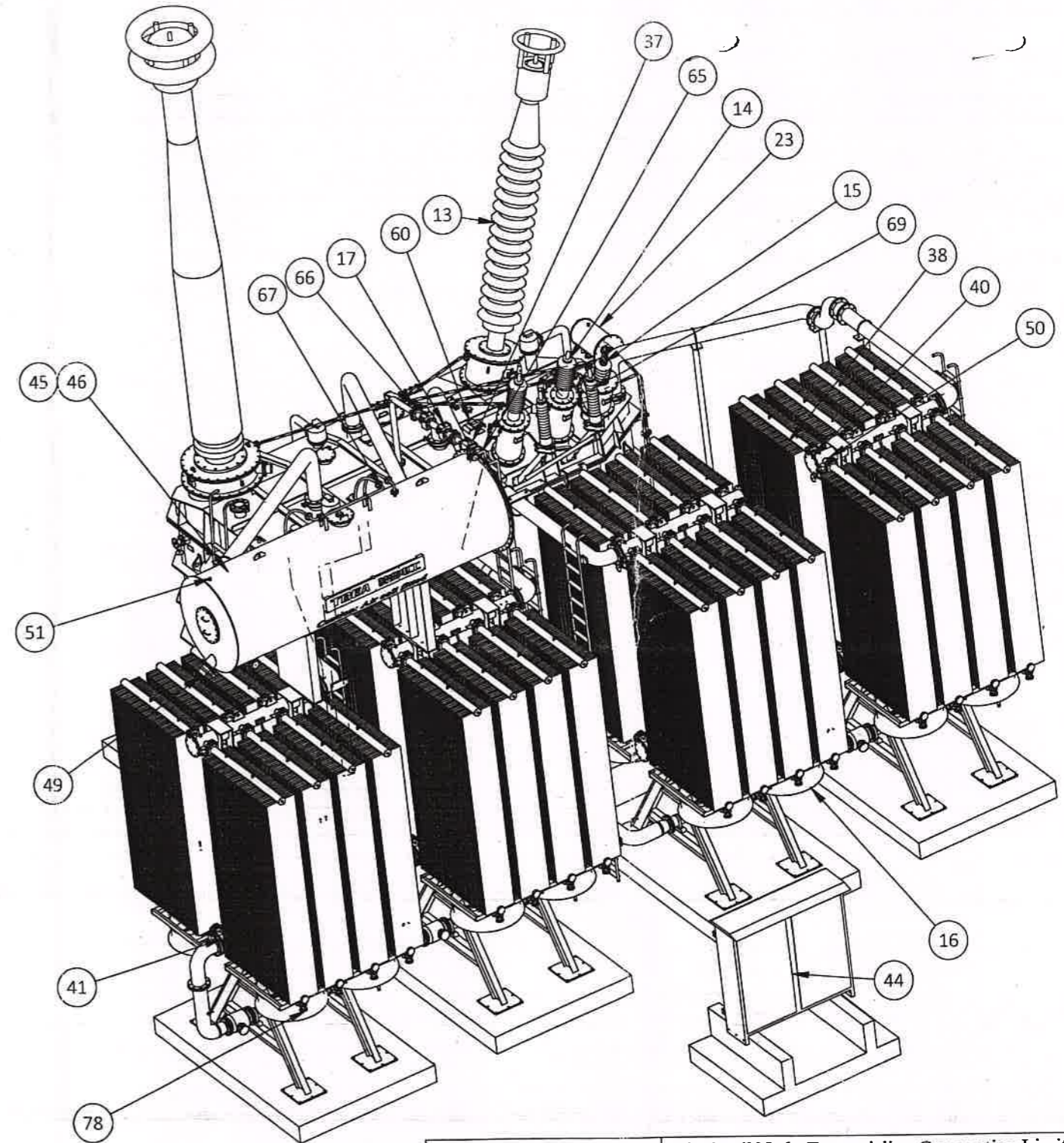
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## HV Side 3D View



## LV Side 3D View



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Village : Miyagam, Karjan,  
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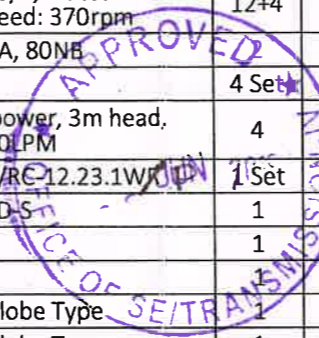
End Customer	M/s Tamil Nadu Transmisiion Corporation Limited			
Project	765/400kV Air Insulated substation Ariyalur			
Contractor	BHEL			
Product Type	ODFPSZ-500000/765TH	Drawing Code	1TY.710.30027.101	
Indent No.	T14117	Name	General Arrangement	
Customer	BHEL A/c TANTRANSCO	Scale	Page Size	Mass (kg)
		NTS	A3	
		Total Pages	10	Current Page
				8

All dimensions are in millimeter unless otherwise specified.

101'Z700E'01L'XLI

## Bill of Material

Item No.	Item Description		Technical Details	Qty.	Make
	Fixed	Removable			
1			TBEA Monogram Plate (Tank + Conservator)	1+1	
2			Rating and Diagram Plate	1+1	
3			Valve Schedule Plate	1	
4			Pressure Relief Device	3	Sukrut/Viat
5			Air Release Plug on Tank Cover	2	
6			Lifting Bollard	4	
7			Latching Lug	4	
8			Jacking Pad	4	
9			Pulling Eye	4	
10			Device for Core and Frame to Tank Earthing	1 Set	Sukrut / TBEA
11			Earthing Pad for Transformer Earthing (Maintank + cooler bank)	2+4	
12			HV Bushing	1	TBEA / Trench
13			IV Bushing	1	TBEA / Trench
14			LV Bushing	2	Xian / Trench / TBEA
15			Neutral Bushing	1	CJI/TBEA
16			Cooling Fan (3 working +1 stand by per bank)	12+4	Zhe jiang Mingxin Co. Ltd. / Marathon
17			Buchholz Relay (Main Conservator)	1	Sukrut / VIAT
18			Earthing Pad for Cooler Bank Earthing (1 on each ground feet)	4 Set	
19			Cooling Pump (1 pump per bank)	4	Flowwell
20			On Load Tap Changer	1 Set	MR Germany
21			OLTC Driving Mechanism	1	
22			Equilizing Connection Pipe (with 25NB Globe Valve) for OLTC to Tank	1	
23			Conservator for OLTC	1	
24			OLTC filtration valve	1	GG Valve
25			OSR isolation Valve	1	GG Valve
26			POLG for OLTC conservator	1 Set	
27			MOLG for OLTC conservator	1	Sukrut
28			Silica gel Breather for OLTC Conservator (2 Nos. in Series)	1 Set	Yogya
29			OSR connection Valve	1	GG Valve
30			Oil Surge Relay	1	
31			Detachable Ladder for access to top of Transformer	1	
32			Bottom Filter Valve	1	GG Valve
33			Top Filter Valve	1	GG Valve
34			Top Sampling Valve, (2 Nos. in Series)	2	GG Valve
35			Bottom Sampling Valve, (2 Nos. in Series)	2	GG Valve
36			Bottom Filling / Drain Valve	1	GG Valve
37			Dummy for PNRV	1	TBEA
38			Radiator	32	Tarang / Triveni / Hitech
39			Cooler Bank Isolating Valve	16	Petson
40			Top Cooler Bank Header with Lifts, Thermometer Pocket & Air Release Plug	4	
41			Bottom Cooler Bank Header with Lifts, Thermometer Pocket & Air Release Plug	4	
42			Drain Valve for Radiator Bank Header Pipe Assemblies	8	GG Valve
43			Gas Collection Device	2	Sukrut/Yogya
44			Cooler control cabinet	1	
45			Aircell (Flexible Separator) type Conservator for Main Tank	1	Unirub



End Customer	M/s Tamil Nadu Transmission Corporation Limited			
Project	765/400kV Air Insulated substation Ariyalur			
Contractor	BHEL			
Product Type	ODFPSZ-500000/765TH			
Indent No.	T14117			
Customer	BHEL A/c TANTRANSCO			
Drawing Code	1TY.710.30027.101			
Name	General Arrangement			
Scale	Page Size	Mass (kg)	Projection	
NTS	A3			
Total Pages	10	Current Page	9	

**TBEA**

TBEA Energy (India) Pvt. Ltd.

"TBEA GREEN ENERGY PARK"  
National Highway No.8,  
Village : Miyagam, Karjan,  
Gujarat - 391240, India

Rev. No.	Date	Description	Prepared	Checked	Approved
01	12-04-2018	Customer comments incorporated	Rinto	Ashish	Satyam
00	07-03-2018	First issue	Gyan	Ashish	Satyam

101'Z00E'01L'ALI

## Bill of Material

Item No.		Item Description	Technical Details	Qty.	Make
Fixed	Removable				
	46	Aircell (Flexible Separator) in Main Conservator		1	Unirub / Shenyang Hongda/ Rubber Products
	47	Silicagel Breather-Main Conservator (2 sets. in parallel)		2 sets	Yogya
	48	Oil Filling & Drain Valve for Main Conservator	50NB, Gate Type	1	GG Valve
	49	MOLG for main conservator		1	Sukrut
	50	Radiator Isolation Valve	100NB, Butterfly Valve	64	Petson/ Atvus
	51	Air Release Plug on Main Conservator		2	
	52	CT Terminal Box	CS-TB-SM2-S-1	4	Sukrut
	53	Manhole		1	
	54	Inspection Window on tank Cover		1	
	55	Bath for OTI		1	
	56	Bath for WTI		3	
	57	Bath for Thermometer Pocket		1	
	58	Bath for RTD		4	
	59	Spare Bath		2	
	60	Impact Recorder (Returnable Basis)		2	
	61	Oil Flow Indicator	CS-FI-402X-M-R6	4	Sukrut / VIAT
	62	Bidirectional Flanged Twin Roller(70T capacity) (Not shown in drawing)- only for transport		1 set	
	63	Expansion Joint in Cooling Pipeline , 200NB		8	
	64	Vacuum Valve on Cover, 150NB, Butterfly Type		1	Petson
	65	Expansion Joint in Buchholz Relay Pipeline , 80NB		1	
	66	Buchholz Relay Isolation Valve, Butterfly Valve, 80NB		2	Petson
	67	25NB Conservator to Aircell Equalizing Valve		1	GG Valve
	68	Common Marshalling Box per Bank (Not shown in drawing)		1 set	Suntech / Ashoka
	69	Surge Arrester		2	ELPRO/ TBEA Approved
	70	N2 injection valve provision for NIFPS System, , 25NB, Gate Type		3+3	GG Valve
	71	Oil Drain valve provision for NIFPS System, , 125NB, Gate Type		1	GG Valve
	72	Fire sensor bracket for NIFPS system on tank cover (Not shown)			
	73	Inspection window for HV & IV bushing		1	
	74	Inspection window for LV bushing		2	
	75	Inspection window for Neutral bushing		1	
	76	Cable tray arrangement with control cables, up to marshalling box (Not shown)			
	77	FOS + Conral box		1 Set	Neoptix/Lumashield/FISO
	78	Radiator drain valve	25NB, Globe Type	32	GG Valve
	79	Ladder for access to top of Conservator		1	
	80	Ladder for access to top of Radiator bank		4	
	81	Defect liability period display plate		1	
	82	Individual marshalling box		1	
	83	Conservator air release valve	25NB, Globe Type	1	
	84	Inspection window for OLTC & IV bushing		1	



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01	12-04-2018	Customer comments incorporated	Rinto	Ashish	Satyam
00	07-03-2018	First issue	Gyan	Ashish	Satyam
Rev. No.	Date	Description	Prepared	Checked	Approved

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TBEA Energy (India) Pvt. Ltd.

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Village : Miyagam, Karjan,  
Gujarat - 391240. India

End Customer	M/s Tamil Nadu Transmission Corporation Limited			
Project	765/400kV Air Insulated substation Ariyalur			
Contractor	BHEL			
Product Type	ODFPSZ-500000/765TH			
Indent No.	T14117			
Customer	BHEL A/c TANTRANSCO			
Drawing Code	1TY.710.30027.101			
Name	General Arrangement			
Scale	Page Size	Mass (kg)	Projection	
NTS	A3			
Total Pages	10	Current Page	10	

All dimensions are in millimeter unless otherwise specified.



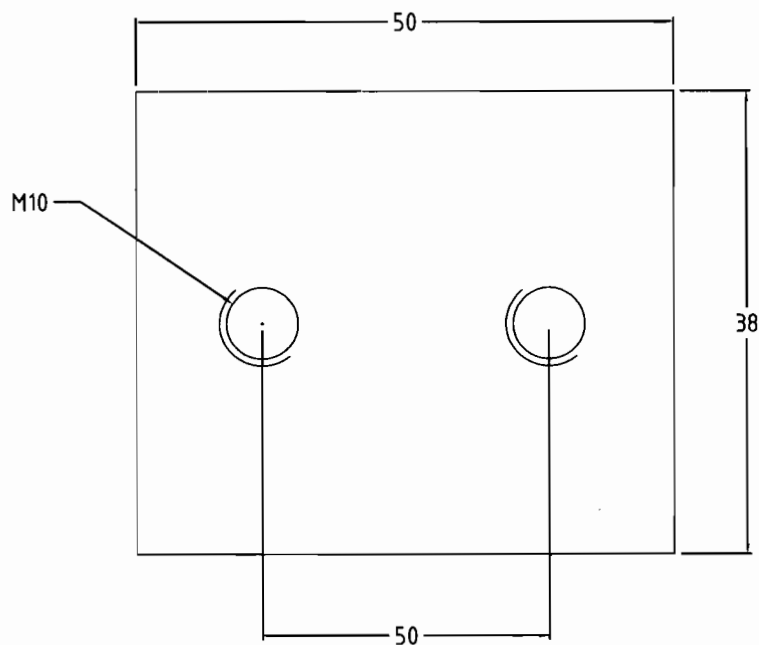
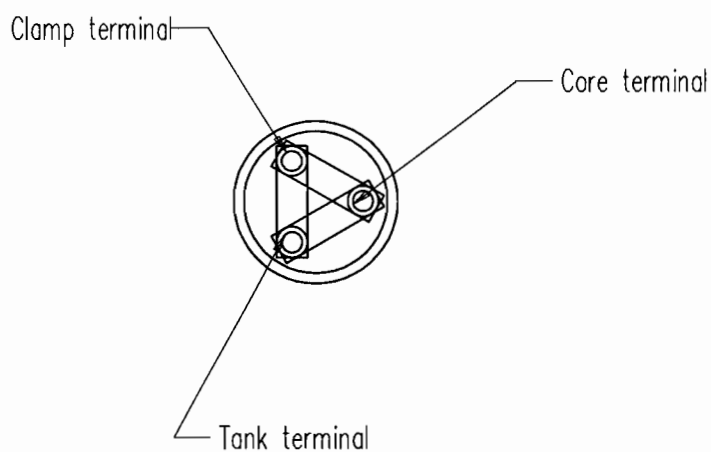
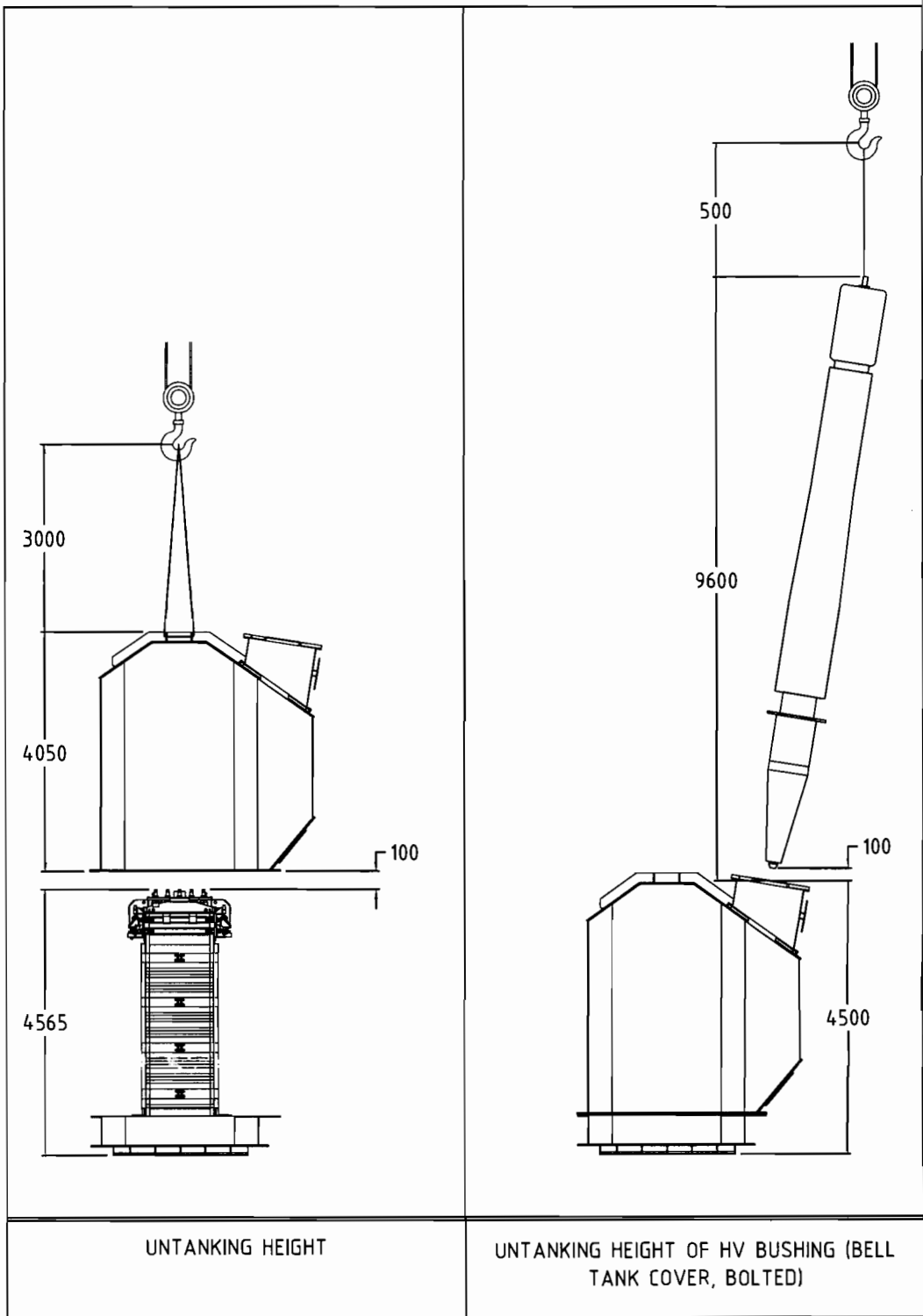
MINIMUM CLEARANCE IN AIR AS PER IEC 60076-3		
TERMINAL	PHASE TO PHASE	PHASE TO EARTH
HV	6700	5900
HVN	1500	1150

DESCRIPTION	MASS (kg)
ACTIVE PART	60900
TANK & ACCESSORIES	23000
TOTAL OIL	23100
OVERALL	107000

APPROXIMATE DIMENSIONS OF THE REACTOR		
	OVERALL	TRANSPORT
LENGTH	6870	4325
WIDTH	6050	3900
HEIGHT	12260	4800

NOTE:

1. TOLERANCE ON MASS & DIMENSIONS SHALL BE  $\pm 5\%$ , UNLESS OTHERWISE SPECIFIED.
2. ALL DIMENSIONS ARE IN MM.
3. PAINT SHADE:- RAL 7035.
4. ITEM NUMBER FOR FITTINGS ARE STANDARDIZED FOR OUR EASY REFERENCE AND HENCE NOT CONTINUOUS.
5. FOR ASSEMBLY OF LOOSE FABRICATED PARTS REFER TAG IDENTIFICATION DRAWING (PART OF OPERATION & MAINTENANCE MANUALS).

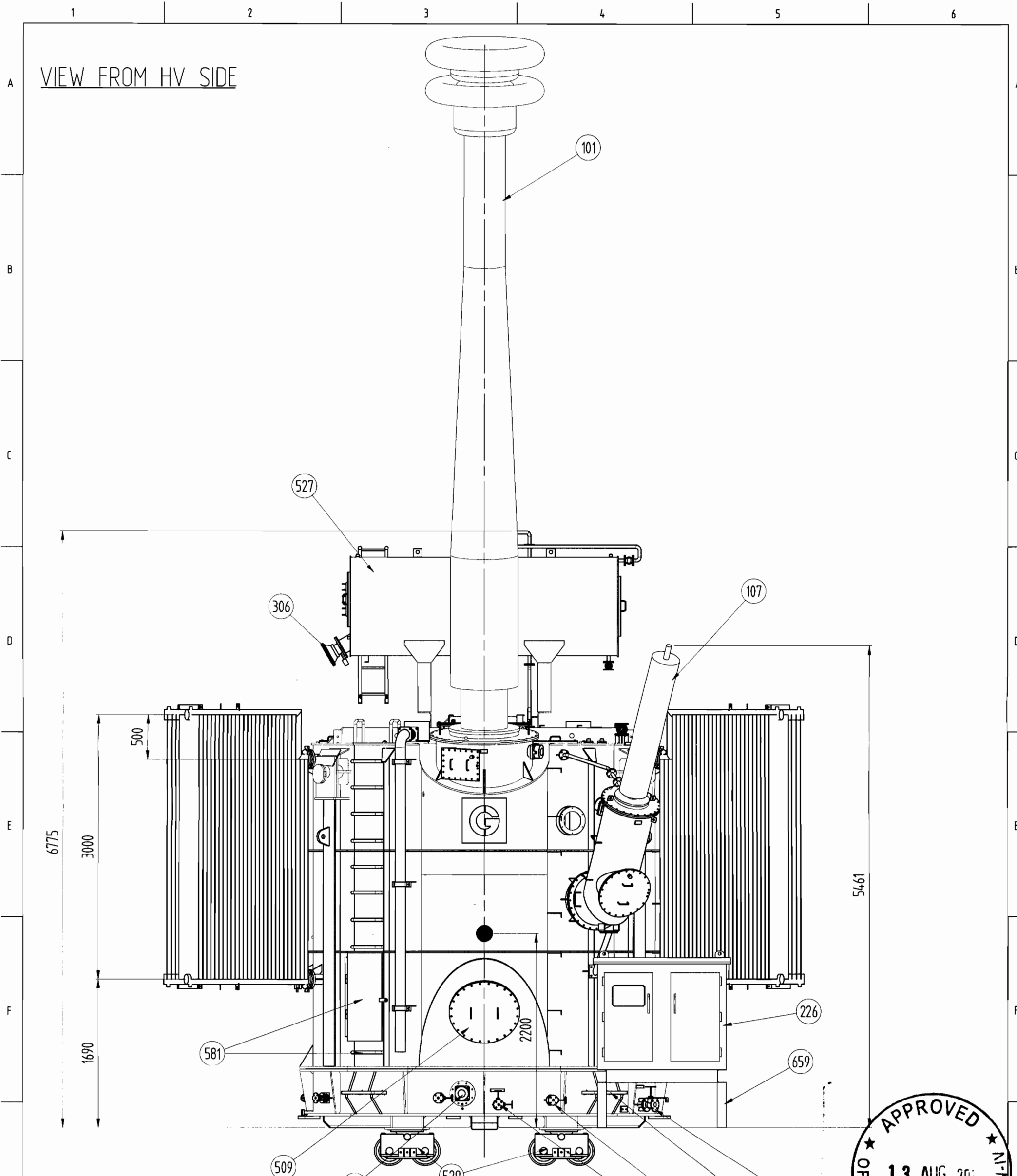


CORE-FRAME-TANK EARTHING DETAILS  
(WITH SUITABLE BUSHINGS)

2	Customer comments incorporated	14.07.2018	AJ	AP	MQ
1	Centre line marked	25.05.2018	AJ	AP	MQ
0	First issue	28.04.2018	AJ	AP	MQ
REV	DESCRIPTION	DATE	DRAWN	CHECKED	APPROVED
DOCUMENT TITLE:		WORK ORDER:		TOTAL MASS:	
OUTLINE DRAWING		BH11068		-	
CG Power and Industrial Solutions Limited (Formerly Crompton Greaves Limited)		DRAWING NO.:		REV.:	
TRANSFORMER DIVISION		CGT3-OGA-14224Q		2	
MANDIDEEP, BHOPAL		SCALE:	SHEET OF	FORMAT:	
			1 7	A3	

Customer	M/s Tamil Nadu Transmission Corporation Limited
Project	765 / 400 kV Air Insulated Substation Ariyalur
Contractor	BHEL
LOA NO.	TBMM / 157E227 / Ariyalur / 765kV Reactors / LOI / GA

APPROVED & No:  
COMMUNICATION VIDE Lr. No:  
CEIR/SE/765kV/Reactors/D.445/18,  
dt. 13.08.18.  
Supertinending Engineer/Transmission/IV  
TANTRANSCO  
6th Floor, N.E.R.R. Maaligal,  
144, Anna Salai, Chennai - 600 002.



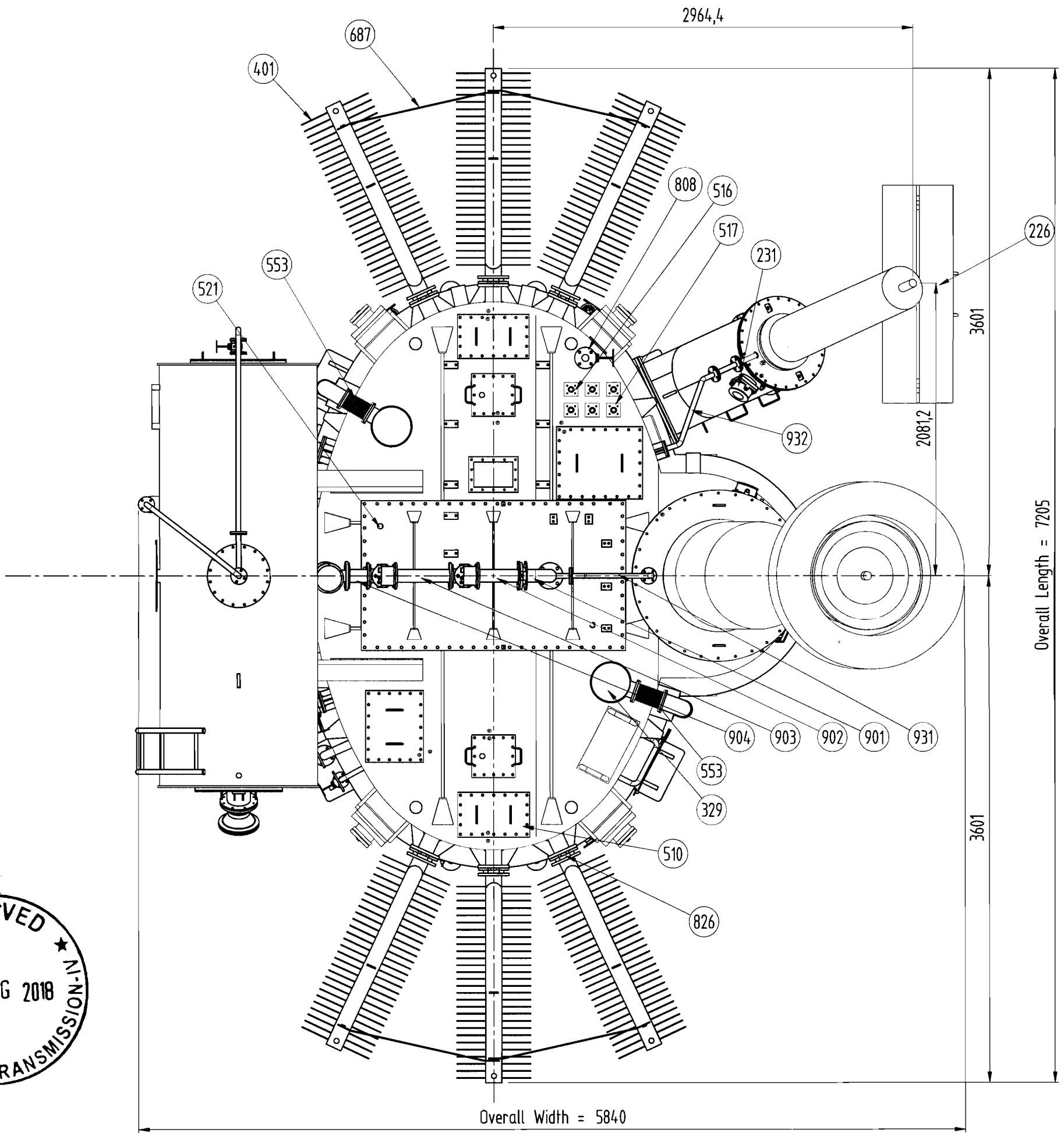
- NOTES :
- 1. TOLERANCE ON MASS AND DIMENSIONS SHALL BE  $\pm 5\%$ , UNLESS OTHERWISE SPECIFIED.
  - 2. ALL DIMENSIONS ARE IN MM
  - 3. DENOTES CENTRE OF GRAVITY.



2	Customer comments incorporated	14.07.2018	AJ	AP	MQ
1	Centre line marked	25.05.2018	AJ	AP	MQ
0	First issue	28.04.2018	AJ	AP	MQ
REV	DESCRIPTION	DATE	DRAWN	CHECKED	APPROVED
DOCUMENT TITLE		WORK ORDER		TOTAL MASS	
OUTLINE DRAWING		BH11068		-	
CG Power and Industrial Solutions Limited (Formerly Crompton Greaves Limited) TRANSFORMER DIVISION Mandideep, Bhopal		DRAWING NO		REV	
		CGT3-OGA-14224Q		2	
		SCALE	SHEET OF	FORMAT	
		1:40	2 7	A3	



Customer	M/s Tamil Nadu Trsansmission Corporation Limited
Project	765/400 kV Air Insulated Substation Ariyalur
Contractor	BHEL
LOA NO.	TBMM / 157E227 / Ariyalur / 765kV Reactors / LOI / GA

# TOP VIEW



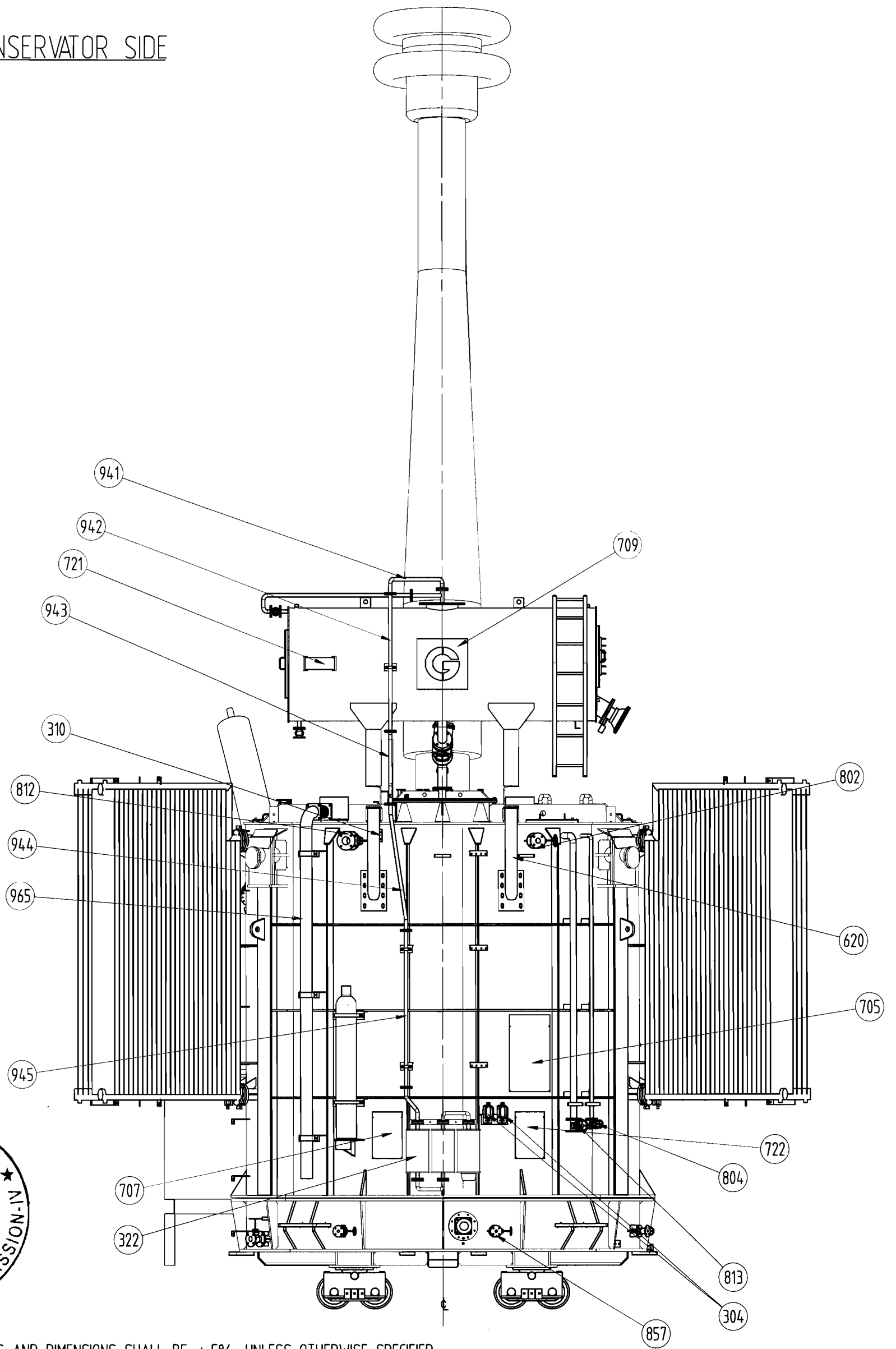
## NOTES :

1. TOLERANCE ON MASS AND DIMENSIONS SHALL BE  $\pm 5\%$ , UNLESS OTHERWISE SPECIFIED.
2. ALL DIMENSIONS ARE IN MM
3. ● DENOTES CENTRE OF GRAVITY.

2	Customer comments incorporated	14.07.2018	AJ	AP	MQ
1	Centre line marked	25.05.2018	AJ	AP	MQ
0	First issue	28.04.2018	AJ	AP	MQ
REV	DESCRIPTION	DATE	DRAWN	CHECKED	APPROVED
DOCUMENT TITLE		WORK ORDER		TOTAL MASS	
OUTLINE DRAWING		BH11068		-	
 <b>CG Power and Industrial Solutions Limited</b> (Formerly Crompton Greaves Limited) TRANSFORMER DIVISION Mandideep, Bhopal		DRAWING NO		REV	
		CGT3-OGA-14224Q		2	
		SCALE	SHEET OF	FORMAT	
		 1:30	3 7	A3	



Customer	M/s Tamil Nadu Trsansmission Corporation Limited
Project	765/400 kV Air Insulated Substation Ariyalur
Contractor	BHEL
LOA NO.	TBMM / 157E227 / Ariyalur / 765kV Reactors / LOI / GA

# VIEW FROM CONSERVATOR SIDE



## NOTES :

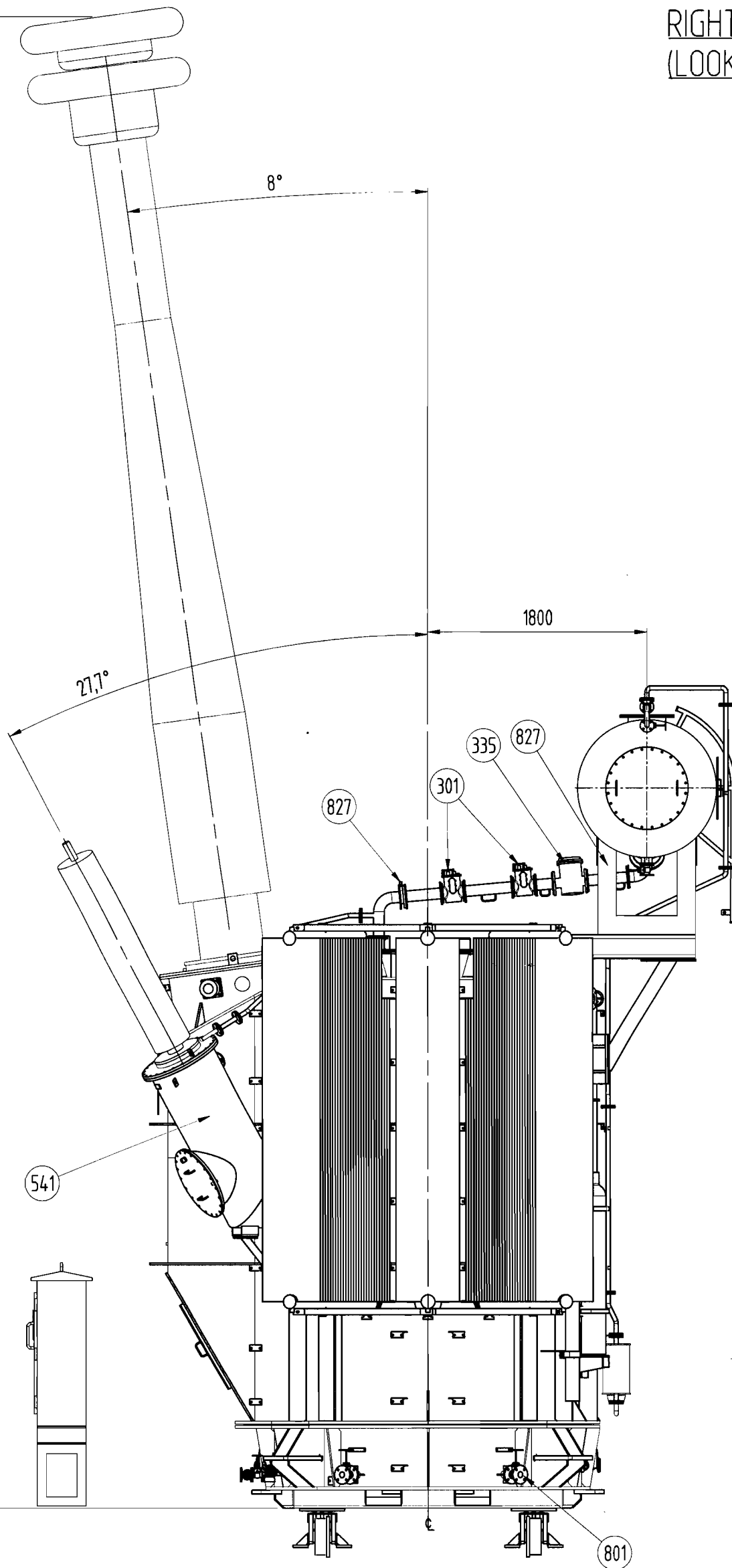
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2. ALL DIMENSIONS ARE IN MM
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OUTLINE DRAWING		BH11068		-	
 <b>CG Power and Industrial Solutions Limited</b> (Formerly Crompton Greaves Limited) TRANSFORMER DIVISION Mandideep, Bhopal		DRAWING NO		REV	
		CGT3-OGA-14224Q		2	
		SCALE	SHEET OF	FORMAT	
		 1:40	4 7	A3	

Customer	M/s Tamil Nadu Trsansmission Corporation Limited
Project	765/400 kV Air Insulated Substation Ariyalur
Contractor	BHEL
LOA NO.	TBMM / 157E227 / Ariyalur / 765kV Reactors / LOI / GA

OVERALL HEIGHT = 12285



RIGHT HAND SIDE VIEW  
(LOOKING FROM HV SIDE)



NOTES :

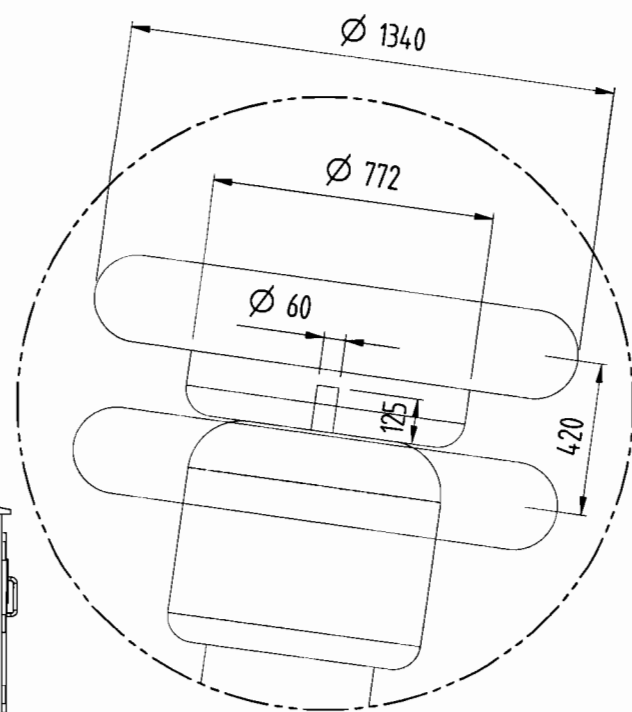
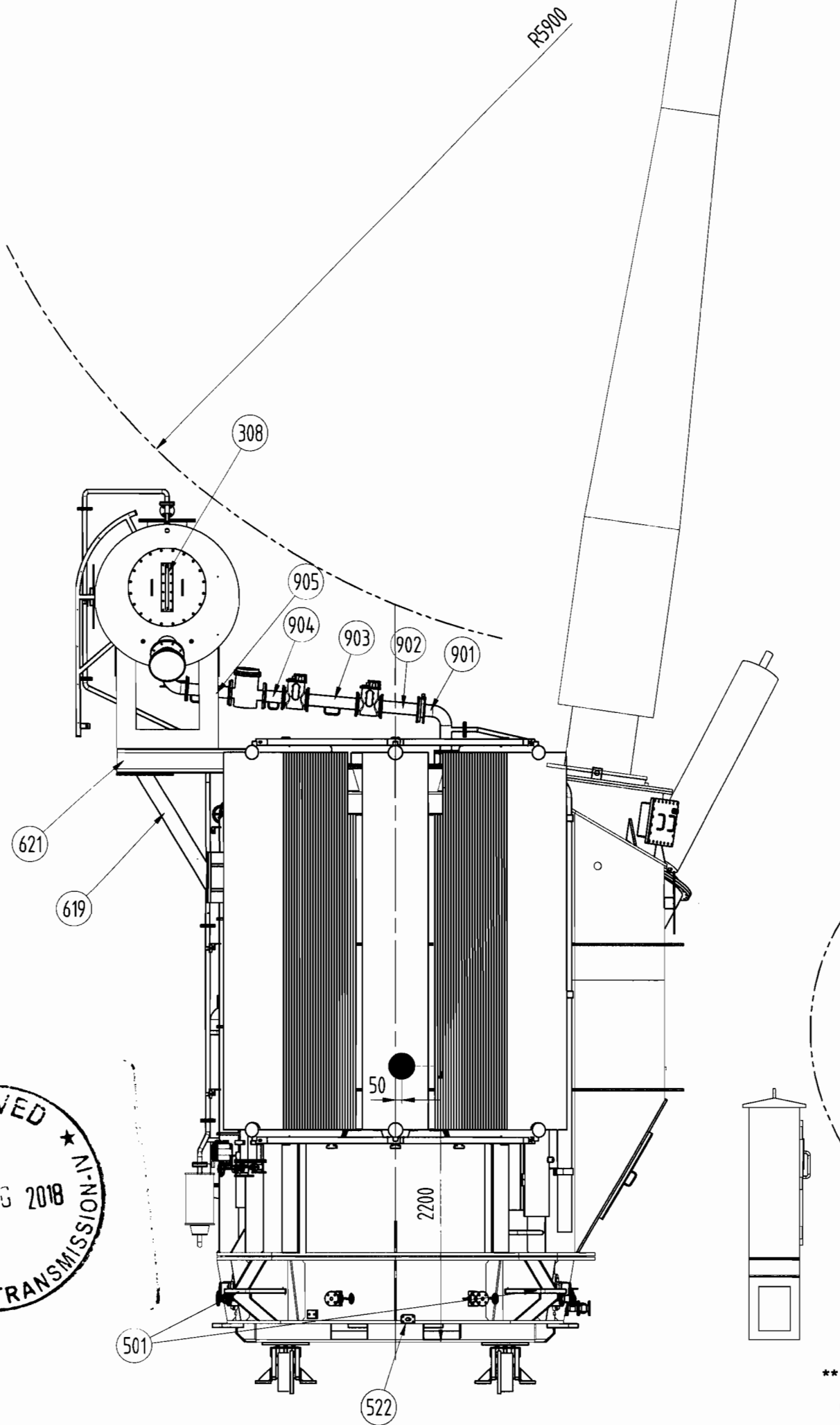
1. TOLERANCE ON MASS AND DIMENSIONS SHALL BE  $\pm 5\%$ , UNLESS OTHERWISE SPECIFIED.
2. ALL DIMENSIONS ARE MAXIMUM AND ARE IN MM
3. ● DENOTES CENTRE OF GRAVITY.



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DOCUMENT TITLE		WORK ORDER		TOTAL MASS.	
OUTLINE DRAWING		BH11068		-	
 CG Power and Industrial Solutions Limited (Formerly Crompton Greaves Limited) TRANSFORMER DIVISION Mandideep, Bhopal		DRAWING NO		REV	
		CGT3-OGA-14224Q		2	
		 SCALE	1:40	SHEET OF	5 7
				FORMAT	A3

Customer	M/s Tamil Nadu Trsansmission Corporation Limited
Project	765/400 kV Air Insulated Substation Ariyalur
Contractor	BHEL
LOA NO.	TBMM / 157E227 / Ariyalur / 765kV Reactors / LOI / GA

LEFT HAND SIDE VIEW  
(LOOKING FROM HV SIDE)




DETAIL B  
SCALE 1:20

\*\* HV BUSHING AIR END SHIELD IS NOT IN CGPISL SCOPE OF SUPPLY

NOTES :

1. TOLERANCE ON MASS AND DIMENSIONS SHALL BE  $\pm 5\%$ , UNLESS OTHERWISE SPECIFIED.
2. ALL DIMENSIONS ARE MAXIMUM AND ARE IN MM
3. ● DENOTES CENTRE OF GRAVITY.

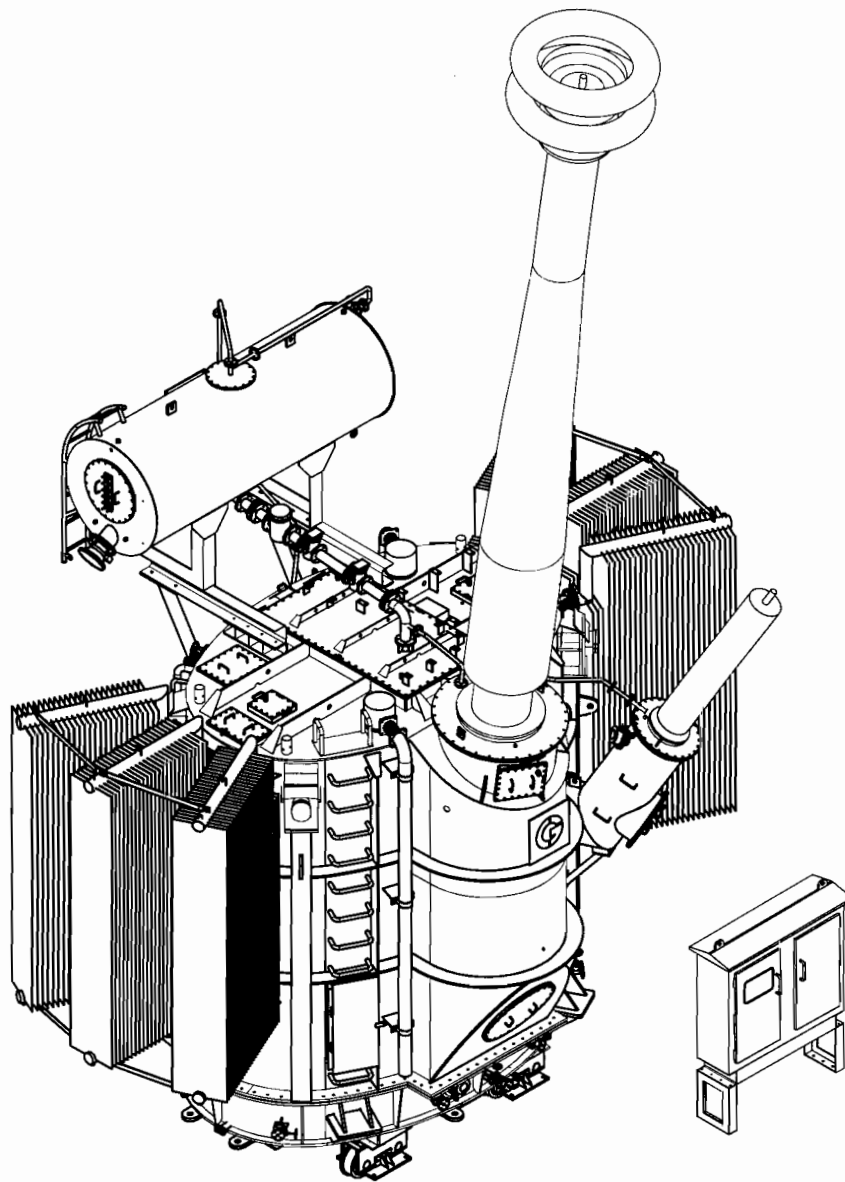
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OUTLINE DRAWING		BH11068		-	
 <b>CG Power and Industrial Solutions Limited</b> (Formerly Crompton Greaves Limited) TRANSFORMER DIVISION Mandideep, Bhopal		DRAWING NO		REV	
		CGT3-OGA-14224Q		2	
		SCALE	SHEET OF	FORMAT	
		1:40	6 7	A3	

Customer	M/s Tamil Nadu Trsansmission Corporation Limited
Project	765/400 kV Air Insulated Substation Ariyalur
Contractor	BHEL
LOA NO.	TBMM / 157E227 / Ariyalur / 765kV Reactors / LOI / GA

IT. NO.	DESCRIPTION	QTY	
101	HV BUSHING - 800kV	1	SH.2-A-4
107	NEUTRAL BUSHING - 145kV TERMINAL	1	SH.2-C-4
121	CORE EARTHING TERMINAL	1	SH.2-G-3
226	MARSHALLING BOX (GROUND MTD)	1	SH.2-E-6
231	CT SECONDARY TERMINAL BOX	4	SH.3-E-5
301	BUCHHOLZ RELAY	2	SH.5-D-4
304	GAS COLLECTING DEVICE	2	SH.4-F-5
306	MOG MAIN CONSERVATOR	1	SH.2-D-2
308	PLAIN OIL GAUGE MAIN CONSERVATOR	1	SH.6-C-2
310	TANK OIL GAUGE	1	SH.6-E-4
312	WTI MTD IN M.BOX	1	-
313	OTI MTD IN M.BOX	1	-
322	BREATHER MAIN CONSERVATOR	1	SH.4-F-3
329	PRESSURE RELIEF DEVICE WITH SHROUD	2	SH.3-D-5
332	SHOCK RECORDER	1	SH.3-E-5
335	PRE STRESSED NON RETURN VALVE (PNRV)	1	SH.5-D-4
401	RADIATOR	6	SH.3-B-4
501	LIFTING DEVICE FOR ASSEMBLED REACTOR	4	SH.6-G-3
503	JACKING PAD	4	SH.2-G-5
506	HAULAGE LUG	4	SH.2-G-2
509	INSPECTION COVER	1	SH.2-F-3
510	INSPECTION COVER	3	SH.3-E-5
511	INSPECTION COVER	1	SH.4-E-2
514	UNDERBASE	1	SH.2-G-2
516	THERMOMETER POCKET FOR WTI	1	SH.3-C-3
517	THERMOMETER POCKET FOR OTI	1	SH.3-C-3

IT. NO.	DESCRIPTION	QTY	
521	AIR RELEASE PLUG	2	SH.3-C-3
522	COMPLETE DRAIN ARRGT	1	SH.6-G-2
527	MAIN CONSERVATOR WITH COPS	1	SH.2-C-2
529	ROLLER ASSEMBLY	1-SET	SH.2-G-5
532	HV TURRET	1	SH.5-E-2
541	NEUTRAL TURRET	1	SH.5-E-5
553	EXPANSION BELLOW	2	SH.3-D-5
554	EXPANSION BELLOW 80 NB	1	SH.6-D-3
581	LADDER	1	SH.2-F-2
619	CONSERVATOR SUPPORT BRACKET	1-SET	SH.6-E-1
620	CONSERVATOR SUPPORT BRACKET	1-SET	SH.4-E-6
621	CONSERVATOR SUPPORT BRACKET	1-SET	SH.6-E-1
659	M.BOX SUPPORT BRACKET (GROUND MTD)	1	SH.2-F-5
687	RADIATOR TIE	8	SH.3-B-4
705	R&D PLATE	1	SH.4-E-5
707	VALVE SCHEDULE PLATE	1	SH.4-F-4
709	MONOGRAM PLATE	2	SH.4-C-5
721	COPS INSTRUCTION PLATE	1	SH.4-D-6
722	OIL FILLING INSTRUCTION PLATE	1	SH.4-F-5
801	DRAIN VALVE 50NB	1	SH.5-G4
802	FILTER VALVE TOP 50NB	1	SH.4-E-6
803	FILTER VALVE BTM 50NB	1	SH.2-F-5
804	SAMPLING VALVE TOP 25NB	2 (in series)	SH.6-G-2
806	SAMPLING VALVE BTM 25NB	2 (in series)	SH.2-G-4
808	VACUUM APPLICATION VALVE 150NB	1	SH.3-C-3
812	QUICK OIL DRAIN VALVE 80 NB	1	SH.4-D-2
813	OIL FILLING VALVE 50NB	1	SH.6-F-4

IT. NO.	DESCRIPTION	QTY	
816	CONSERVATOR DRAIN CUM SAMPLING VALVE 50NB	1	SH.4-D-3
826	RADIATOR SHUT-OFF VALVE 100NB	12	SH.3-F-4
827	B'RELAY SHUT-OFF VALVE 80NB	2	SH.5-D-3
851	CONS. COPS PROCESSING VALVE 25NB	1	SH.4-C-3
857	N2 INJECTION VALVE 25NB	6	SH.2-G-5
901-905	B'RELAY PIPE	1 EACH	SH.6-D-3
931	HV AIR VENT PIPE	1	SH.3-D-5
932	HVN AIR VENT PIPE	1	SH.3-D-2
941-945	MAIN BREATHER PIPE	1 EACH	SH.4-C-5
964	PRD SPILL PIPE	1	SH.2-F-4
965	PRD SPILL PIPE	1	SH.4-F-4
986	TOP SAMPLING PIPE	1	SH.6-F-2
991	OIL FILLING PIPE	1	SH.6-F-4
1000	FOS MOUNTING	1	SH.2-E-5



NOTES :

1. TOLERANCE ON MASS AND DIMENSIONS SHALL BE +5%, UNLESS OTHERWISE SPECIFIED.
2. ALL DIMENSIONS ARE IN MM.

Customer	M/s Tamil Nadu Trsansmission Corporation Limited
Project	765/400 kV Air Insulated Substation Ariyalur
Contractor	BHEL
LOA NO.	TBMM / 157E227 / Ariyalur / 765kV Reactors / LOI / GA

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REV	DESCRIPTION	DATE	DRAWN	CHECKED	APPROVED
DOCUMENT TITLE		WORK ORDER		TOTAL MASS	
OUTLINE DRAWING		BH11068		-	
CG Power and Industrial Solutions Limited (Formerly Crompton Greaves Limited) TRANSFORMER DIVISION Mandideep, Bhopal		DRAWING NO CGT3-OGA-14224Q		REV 2	
		SCALE	SHEET OF	FORMAT	
			7 7	A3	

DRAWING No: CGT3-R&amp;D-14685Q

IF IN DOUBT, ASK

NOTE :

\*\* FOLLOWING INFORMATION WILL BE ENGARGED

AFTER TEST AND BEFORE DESPATCH

1. SR. NO. OF SHUNT REACTOR
2. WTI CT CONNECTIONS
3. IMPEDANCE VOLTS %
4. WEIGHTS & VOLUME

NOTES FOR MANUFACTURING :

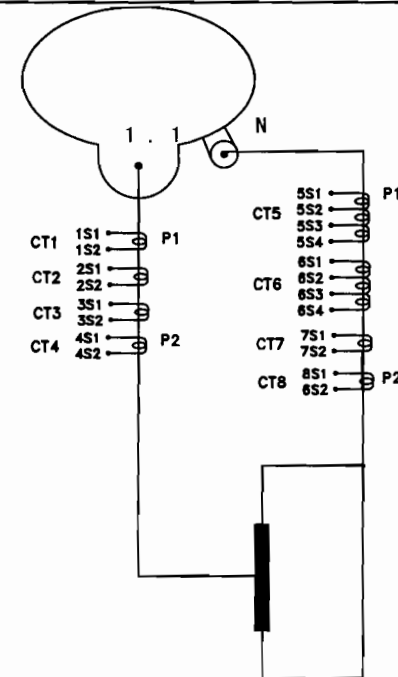
1. MATERIAL 1.2 mm THK ALUMINIUM (CHEMICALLY ENGRAVED).
2. FINISH - MAT/GLOSSY (BACK GROUND). ALL LETTERS, LINES, DIAGRAM ETC. TO BE IN BLACK COLOUR.
3. PLATE TO BE MANUFACTURED BY ETCHING PROCESS. HOLES TO BE DRILLED AFTER ETCHING.
4. PLATE SHALL BE SUITABLE FOR OUTDOOR USE IN TROPICAL CLIMATE.



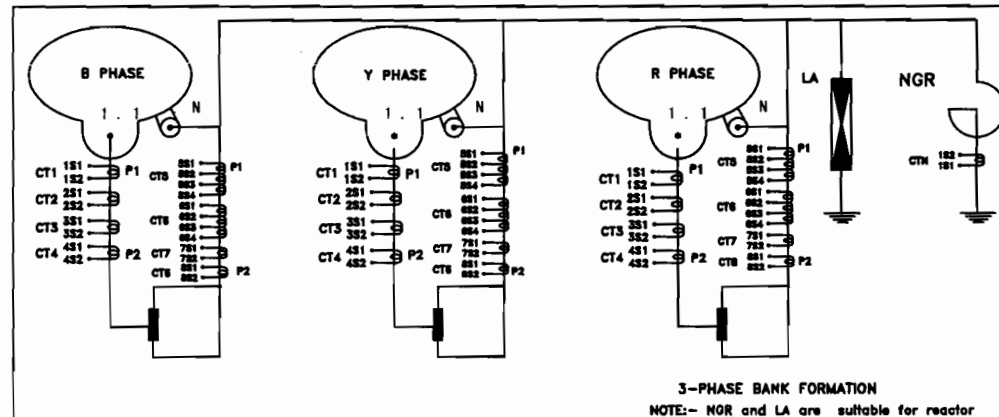
# SHUNT REACTOR

TO IEC 60076-6

RATED MVA	80.00
RATED kV (NO LOAD)	785 / $\sqrt{3}$
RATED AMPERES (ONAN)	181.12
PHASES	1
FREQUENCY	50 HZ
MAKER'S W.O. NO	BH11068
MAKER'S SERIAL NO	BH11068/**
DIAGRAM DRG NO.	CGT3-R&D-14685Q
YEAR OF MANUFACTURE	2018
TYPE OF COOLING	ONAN
GUARANTEED TEMP. RISE OVER 50 °C AMBIENT	40
OF OIL	°C
IN WINDING	°C
CONNECTION SYMBOL (AFTER 3 PHASE CONNECTION)	YN
UNTANKING MASS : CORE AND COIL	kg
TOTAL OIL	kg/liter
TOTAL WEIGHT	kg
TRANSPORT WEIGHT WITH OIL	kg
TRANSPORT WEIGHT (OAS FILLED)	kg
TANK AND FITTINGS	kg
POSITIVE PHASE SEQUENCE IMPEDANCE	OHMS/PH
ZERO PHASE SEQUENCE IMPEDANCE	OHMS/PH



INSULATION LEVEL	LINE: SI 1550 kVp LI 1950 kVp AC 830kVrms / NEUTRAL: LI 550 kVp AC 230 kVrms
NOA / PO No.	158P020 DATED 05.05.2018
PROJECT NAME	785 / 400 kV AIS S/S ARIYALUR
PROPERTY OF	Tamil Nadu Transmission Corporation Limited (TANTRANSCO)



- NOTES:
1. REFER INSTRUCTION MANUAL BEFORE ERECTION AND APPLYING VACUUM
  2. TRANSFORMER TANK, CONSERVATOR AND RADIATORS IS DESIGNED TO WITHSTAND FULL VACUUM. (760 MM OF MERCURY)
  3. HIGH VOLTAGE WHEN CT IS OPEN

CURRENT TRANSFORMER DETAILS AS PER IEC 61869									
LOCATION	CT NO	RATIO (A/A)	BURDEN (VA)	CLASS	Ref max (ohms)	Vk min (V)	Ie (mA) @ Vk/4 max	TERMINALS	PURPOSE
HV LINE	1	300/1	—	TPS	1.0	300	<40	1S1/1S2	DIFFERENTIAL
	2	300/1	—	TPS	1.0	300	<40	2S1/2S2	R.E.F.
	3	300/1	—	TPS	1.0	300	<40	3S1/3S2	BACK UP
NEUTRAL	4	300/1	10	1	—	—	<40	4S1/4S2	METERING
	5	500-2000-3000/1	—	TPS	2-8-12	3000 at 5000/1A	<40	5S1/5S4	PROTECTION
	6	500-2000-3000/1	—	TPS	2-8-12	3000 at 3000/1A	<40	6S1/6S4	PROTECTION
	7	300/1	—	TPS	1.0	300	<40	7S1/7S2	DIFFERENTIAL
	8	200/5	10	1	—	—	<40	8S1/8S2	WTI

BH11068  
CGT3-R&D-14685Q

ATTENTION : THE CONSERVATOR IS FITTED WITH AN AIRCELL

CG Power and Industrial Solutions Limited  
(Formerly Crompton Greaves Limited)  
TRANSFORMER DIVISION  
Mandideep, Bhopal

**APPROVED & COMMUNICATION VIDE Lr. No:**  
**CGT3-R&D-14685Q**  
**dt. 13.8.2018**

Supertinending Engineer/Transmission/IV  
TANTRANSCO  
6th Floor, N.P.K.R.R. Maaligar,  
144, Anna Salai, Chennai - 600 002.

REV. No	DESCRIPTION	DATE	ORG.	CHD.	APPD.
4					
3					
2					
1	REVISED AS PER CUSTOMER COMMENTS	04-06-2018	PR	AV	MMK
0	FIRST ISSUAL	18-05-2018	PR	AV	MMK
BILINGUAL RATING AND DIAGRAM PLATE- SHUNT REACTOR (1-ph)					
ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS SPECIFIED OTHERWISE			THIRD ANGLE PROJECTION		
GEN. TOL.: TSI-100	MATERIAL: AS SPECIFIED	SPEC.: TSI-99	SCALE: 1 : 1	WEIGHT: --	kg
CG Power and Industrial Solutions Limited (Formerly Crompton Greaves Limited) Mandideep, Bhopal			W.O. No:	DRAWING No:	
			BH11068	CGT3-R&D-14685Q	
			DATE:	SHEET:	REV. No:
			18-05-2018	1 / 1	01