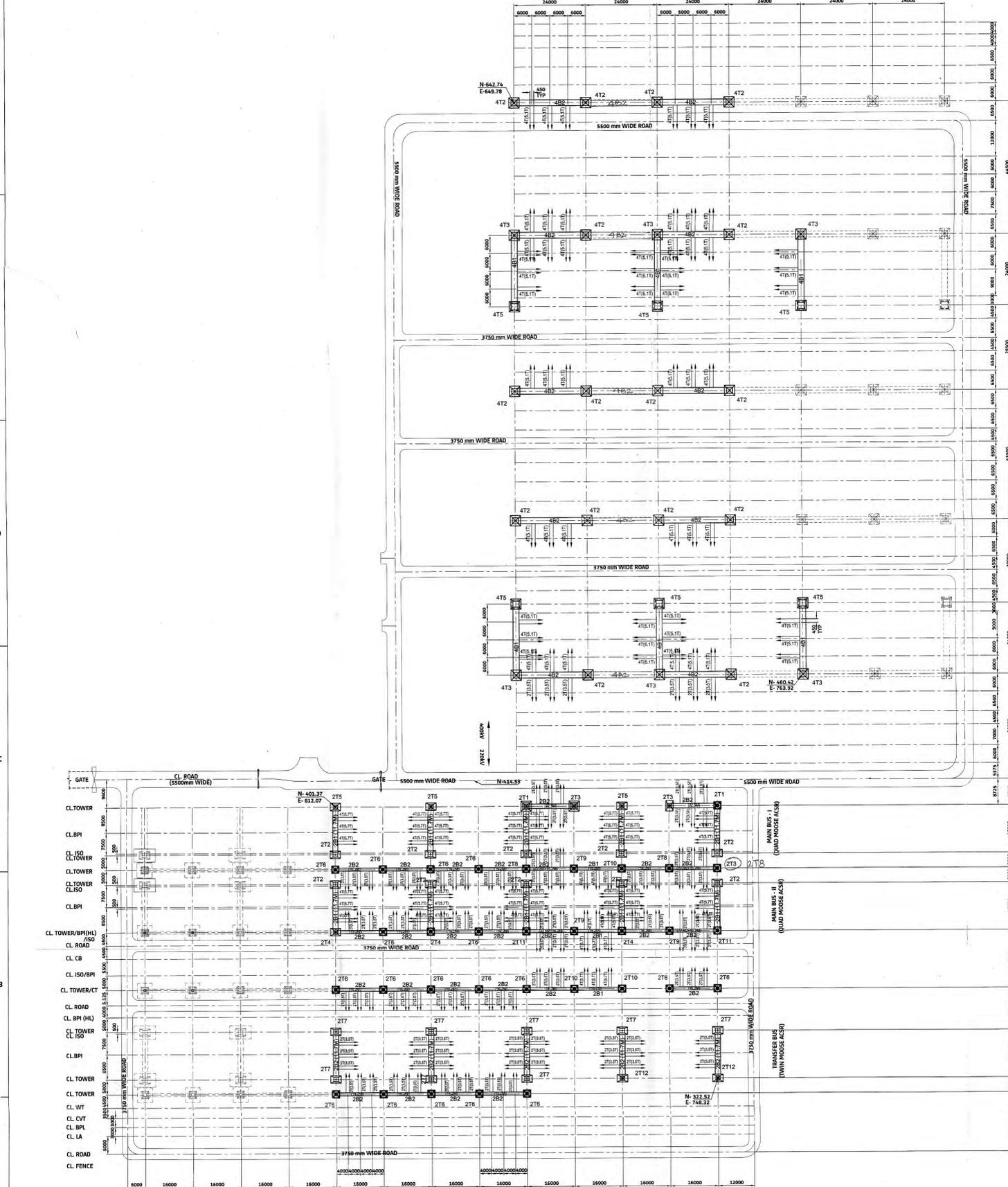


Structural Layout Plan

This drawing/document is approved for on-going project viz. construction of 400/220 KV Substation, Jagdalpur, subject to conditions mentioned in I.O. Letter No. 227 dated 15 JUN 2015. Conveying Approval of the drawing/document to the contractor who shall be responsible for providing material as per our tender specification & no deviation shall be allowed. If any shortcoming is found at a later stage, the material shall be liable for rejection.

AP(S/S) E.E.(S/S) S.E.(S/S)
Office of EDICE(Transmission), CSPDCL, Raipur

DRAWING NO. 5427PK069-JDP-E-SYD-ARR-1002



- CL LA
- CL BPI
- CL CVT
- CL WT
- CL ISO 1 E/S
- CL TOWER
- CL ROAD
- CL REACTOR
- CL LA
- CL CB
- CL ISO 1 E/S
- CL TOWER
- CL BPI
- CL BPI
- CL ISO 1 E/S
- CL TOWER
- CL CB
- CL CT
- CL ISO 1 E/S
- CL TOWER
- CL ISO 2 E/S
- CL CT
- CL ROAD
- CL CB
- CL TOWER
- CL ISO 1 E/S
- CL CT
- CL ROAD
- CL CB
- CL TOWER
- CL ISO 1 E/S
- CL BPI
- CL BPI
- CL TOWER
- CL ISO 1 E/S
- CL LA
- CL BPI
- TRANSFORMER
- CL 220KV LA
- CL ROAD (5500 mm WIDE ROAD)
- CL 220KV TOWER

SCHEDULE OF 400KV GANTRY COLUMN

SL. NO.	COLUMN TYPE	DETAIL	QTY.
1.	4T2	22.3 M + 7.5 M EARTH PEAK WITH PROVISIONS FOR 2 BEAMS AT 22.3 M. (SUPPORTING 4B2)	16
2.	4T3	22.3 M + 7.5 M EARTH PEAK WITH PROVISIONS FOR 3 BEAMS, TWO AT 22.3 M. & ANOTHER AT 15.3 M. (SUPPORTING 4B1 & 4B2)	06
3.	4T5	15.3 M W/O EARTH PEAK AND 1 BEAM AT 15.3M (SUPPORTING 4B1)	06

SCHEDULE OF 220KV GANTRY COLUMN

SL. NO.	COLUMN TYPE	DETAIL	QTY.
1.	2T1	22.5 M + 5 M EARTH PEAK WITH PROVISIONS FOR 2 BEAMS, ONE AT 22.5 M (2B2) & ANOTHER AT 11.7 M (2B1) WITH CONDUCTOR TENSION AT PERPENDICULAR DIRECTION.	02
2.	2T2	11.7 M. W/O EARTH PEAK AND 1 BEAM AT 11.7 M (2B1).	10
3.	2T3	22.5 M + 5 M EARTH PEAK WITH PROVISIONS FOR 2 BEAMS, ONE AT 22.5 M (2B2) & ANOTHER AT 16.2 M (2B2) WITH CONDUCTOR TENSION AT SAME DIRECTION.	03
4.	2T4	16.2 M + 5 M EARTH PEAK WITH PROVISIONS FOR 3 BEAMS, ONE AT 16.2 M (2B2), ONE AT 16.2 M (2B1) & ANOTHER AT 11.7 M (2B1) WITH CONDUCTOR TENSION AT PERPENDICULAR DIRECTION.	03
5.	2T5	16.2 M. + 5 M. EARTH PEAK WITH PROVISION FOR 1 BEAM AT 11.7 M (2B1).	03
6.	2T6	16.2 M. + 5 M. EARTH PEAK WITH PROVISION FOR 2 BEAMS AT 16.2 M (2B2) WITH CONDUCTOR TENSION AT SAME DIRECTION.	18
7.	2T7	11.7 M. W/O EARTH PEAK AND 1 BEAM AT 11.7 M (2B2).	08
8.	2T8	22.5 M + 5 M EARTH PEAK WITH PROVISIONS FOR 3 BEAMS, ONE AT 16.2 M (2B2) & ANOTHER AT 22.5 M (2B2) WITH CONDUCTOR TENSION AT SAME DIRECTION.	03
9.	2T9	22.5 M + 5 M EARTH PEAK WITH PROVISIONS FOR 3 BEAMS, ONE AT 16.2 M (2B2), ONE AT 16.2 M (2B1) & ANOTHER AT 22.5 M (2B2) WITH CONDUCTOR TENSION AT SAME DIRECTION.	03
10.	2T10	16.2 M + 5 M EARTH PEAK WITH PROVISIONS FOR 2 BEAMS, ONE AT 16.2 M (2B2) & ANOTHER AT 16.2 M (2B1) WITH CONDUCTOR TENSION AT SAME DIRECTION.	03
11.	2T11	22.5 M + 5 M EARTH PEAK WITH PROVISIONS FOR 4 BEAMS, TWO AT 16.2 M (2B1), ONE AT 22.5 M (2B2) & ANOTHER AT 11.7 M (2B1) WITH CONDUCTOR TENSION AT PERPENDICULAR DIRECTION.	02
12.	2T12	16.2 M. + 5 M. EARTH PEAK WITH PROVISION FOR 1 BEAM AT 11.7 M (2B2)	02

SCHEDULE OF 400KV GANTRY BEAM

SL. NO.	BEAM TYPE	DETAIL	ANCHORING DISTANCE	QTY.	NO. OF ANCHORING POINT ON BEAM FOR TENSION INSULATOR	NO. OF ANCHORING POINT ON BEAM FOR SUSPENSION INSULATOR
1.	4B1	BEAM AT 15.3 M HEIGHT, SPAN 24 M.	FOR TENSION: 6000 6000 6000 6000 FOR SUSPENSION: 6000 6000 6000 6000	06	2 Nos./PHASE	1 Nos./PHASE
2.	4B2	BEAM AT 22.3 M HEIGHT, SPAN 24 M.	FOR TENSION: 6000 6000 6000 6000 FOR SUSPENSION: 6000 6000 6000 6000	10	2 Nos./PHASE	1 Nos./PHASE

SCHEDULE OF 220KV GANTRY BEAM

SL. NO.	BEAM TYPE	DETAIL	ANCHORING DISTANCE	QTY.	NO. OF ANCHORING POINT ON BEAM FOR TENSION INSULATOR	NO. OF ANCHORING POINT ON BEAM FOR SUSPENSION INSULATOR
1.	2B1	BEAM AT 11.7 M & 16.2 M HEIGHT, SPAN 26 M & 47(5.77) FORCE	FOR TENSION: 4000 4000 4000 4000 FOR SUSPENSION: 4000 4000 4000 4000	13	2 Nos./PHASE	1 Nos./PHASE
2.	2B2	BEAM AT 11.7 M, 16.2 M & 22.5 M. HEIGHT, SPAN 16 M & 27(3.57) FORCE	FOR TENSION: 4000 4000 4000 4000 FOR SUSPENSION: 4000 4000 4000 4000	35	2 Nos./PHASE	1 Nos./PHASE

- GENERAL NOTES :-**
- FORCE SHOWN WITHIN BRACKET IS SHORT CIRCUIT FORCE AND OUTSIDE BRACKET IS NORMAL FORCE.
 - ALL DIMENSIONS ARE IN 'MM' UNLESS NOTED OTHERWISE.
 - THE EARTH WIRE TENSION SHALL BE CONSIDERED AS 0.8T FOR DESIGN PURPOSE.
- REFERENCE DRAWING :-**
- 400/220 KV LAND UTILIZATION PLAN 5427PK069-JDP-E-SYD-ARR-0004 REV.-2
 - 400 KV ELECTRICAL PLAN LAYOUT & SECTION 5427PK069-JDP-E-SYD-ARR-0001 REV.-2
 - 220 KV ELECTRICAL PLAN LAYOUT & SECTION 5427PK069-JDP-E-SYD-ARR-0002 REV.-2
 - 400KV & 220KV CLEARANCE DIAGRAM 5427PK069-JDP-E-SYD-ARR-0003 REV.-2

<p>LEGEND:-</p> <ul style="list-style-type: none"> DOUBLE TENSION DOUBLE ANCHORING SINGLE TENSION SINGLE ANCHORING 		<p>PRESENT SCOPE</p> <p>FUTURE SCOPE</p>		<p>TOWER WITHOUT PEAK</p> <p>TOWER WITH PEAK</p> <p>TOWER WITH FUTURE SCOPE</p>	
<p>REVISION</p> <p>NO.</p> <p>DESCRIPTION</p> <p>DATE</p>	<p>APPROVAL</p> <p>NAME</p> <p>DATE</p>	<p>NO.</p> <p>DESCRIPTION</p> <p>DATE</p>	<p>APPROVAL</p> <p>NAME</p> <p>DATE</p>	<p>NO.</p> <p>DESCRIPTION</p> <p>DATE</p>	<p>APPROVAL</p> <p>NAME</p> <p>DATE</p>

CLIENT: CHATTISHGARH STATE POWER TRANSMISSION CO. LTD.

PROJECT: 400/220 kv SUBSTATION AT JAGDALPUR

LOAD No. 02-04/78-11/22-Order/Supply/Chd/ETAC 050/060/061 dt 04-Apr-2012

DRAWING TITLE: STRUCTURAL LAYOUT PLAN FOR 400/220 KV

DRAWING NO. 5427PK069-JDP-E-SYD-ARR-1002

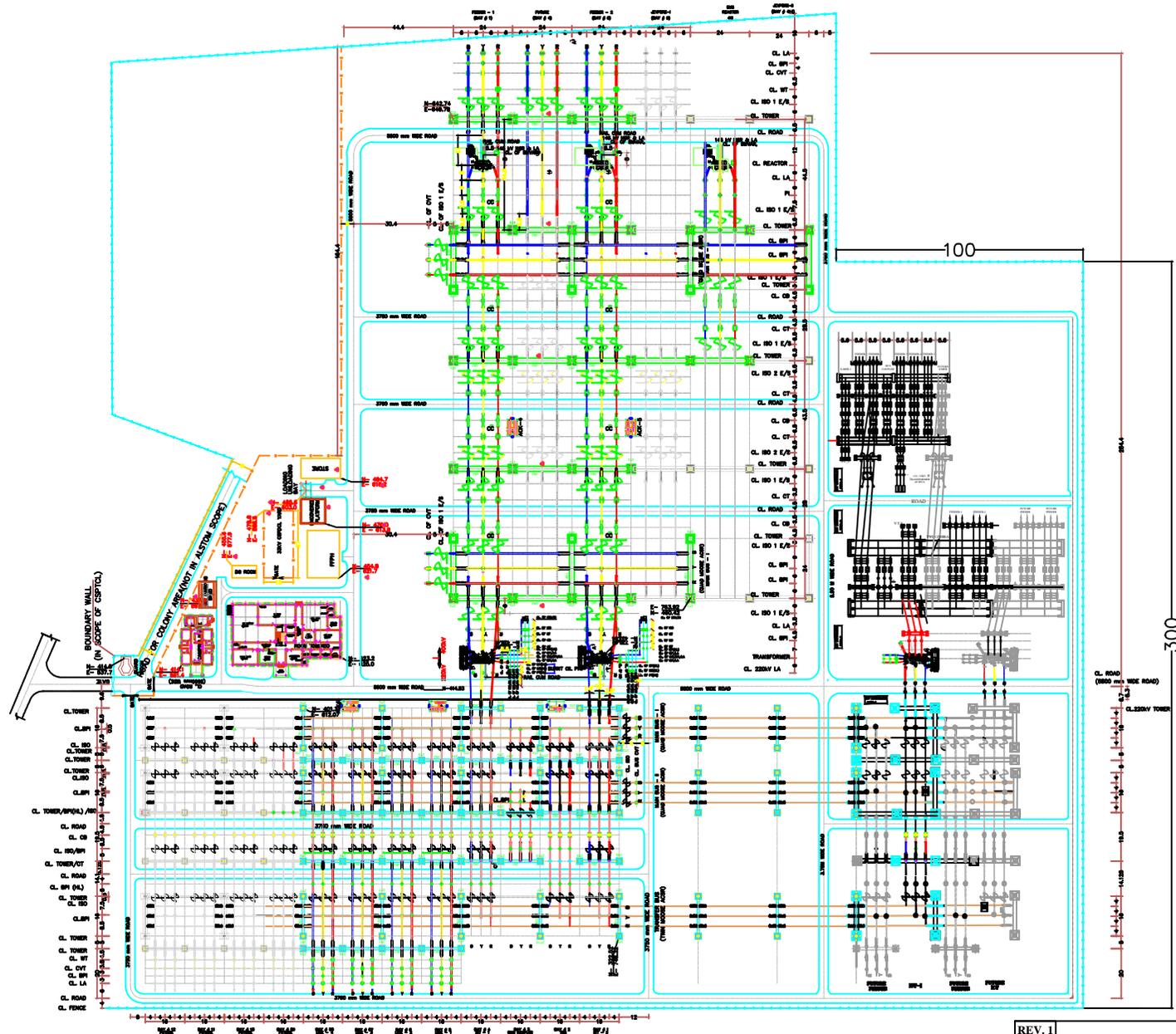
SCALE: 1:100

DATE: 15 JUN 2015

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**400 kV Substation Layout – Bay Marking for
Jeypore - Jagdalpur 400kV D/c line**



REV. 1
 INSTALL. OF 1X125 MVA 3
 PHASE 400 KV BUS REACTOR
 MARKED ON DTD. 22.11.2022

THE CHIEF ENGINEER (P&P)
 C.S.P.T.C.L.RAIPUR.

PROPOSED 400/220/132/33 KV SUB STATION AT JAGDALPUR (TENTATIVE)	DRN.	
	CKD.	
	APR.	
	DT.	10.06.2016

SCALE
 DRG. NO. :- CE/TR/SS/

SE(S/S-1)

**System Architecture for
400/220/33kV Sub-Station
at Jagdalpur**

GRID

ALSTOM

**SYSTEM ARCHITECTURE FOR 400/220/33kV SUB-STATION AT JAGDALPUR,
FOR CSPTL**

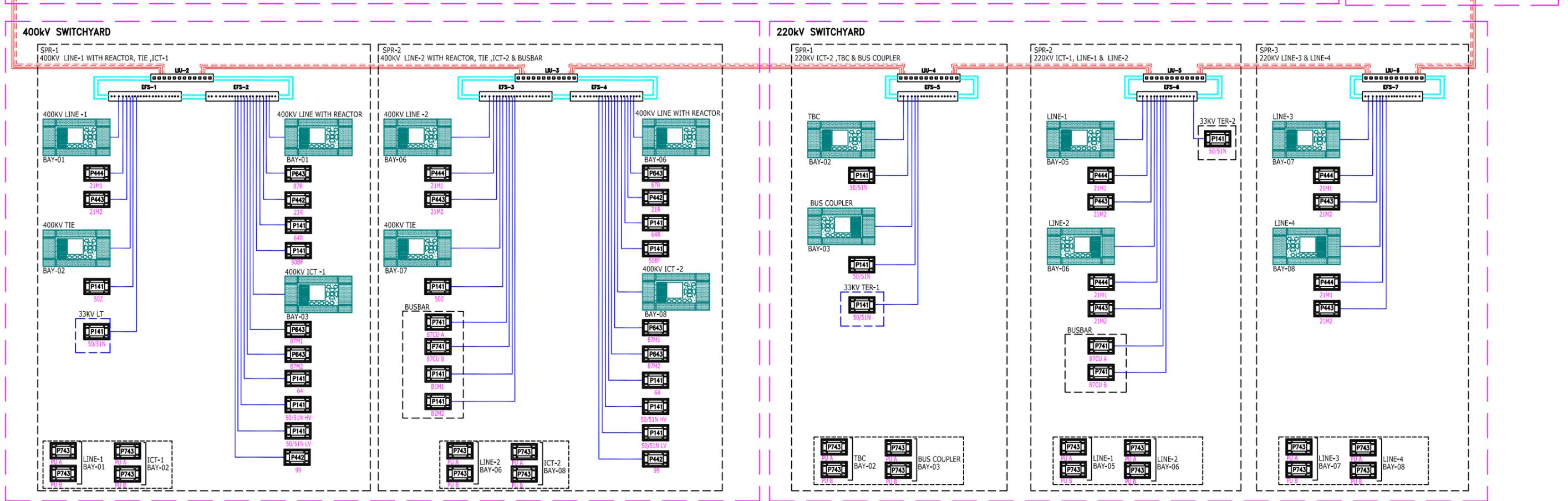
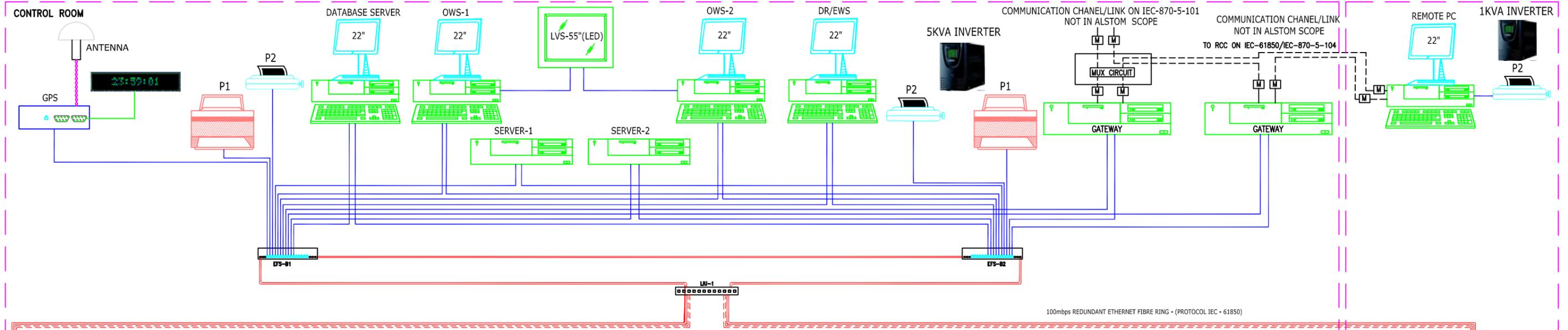
CUSTOMER	: CHATTISHGARH STATE POWER TRANSMISSION CO. LTD.
PROJECT	: CRP AND SAS FOR 400/220/33kV SUB-STATION JAGDALPUR
DOCUMENT NO.	: KR86-SA
REVISION	: A
DATE	: 20.01.2016
LOA No. & Date	: 5427-4500793242, dated: 22.06.2015

PREPARED BY:
AM

CHECKED BY:
VVS

APPROVED BY:
SSS

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S.NO.	DESCRIPTION	QTY.	HARDWARE/SOFTWARE SPEC.
1	OWS	2	AS PER APPROVED GTP
2	DR/EWS PC	1	AS PER APPROVED GTP
3	MONITOR 22"	5	AS PER APPROVED GTP
4	55" (LED) LARGE VISUAL DISPLAY	1	AS PER APPROVED GTP
5	SERVER	2	AS PER APPROVED GTP
6	REMOTE PC	1	AS PER APPROVED GTP
7	GATEWAY PC	2	AS PER APPROVED GTP
8	DATABASE SERVER PC	1	AS PER APPROVED GTP
9	BCU (BAY CONTROL UNIT)	14	AS PER APPROVED GTP
10	DOT MATRIX PRINTER-A3 (P2)	2	AS PER APPROVED GTP
11	LASER JET PRINTER-A4 (P1)	2	AS PER APPROVED GTP
12	MODEM	8	AS PER APPROVED GTP
13	5KVA INVERTER	1	AS PER APPROVED GTP
14	1KVA INVERTER	1	AS PER APPROVED GTP
15	LIU (LINE INTERFACE UNIT)	6	AS PER APPROVED GTP
16	EFS	9	AS PER APPROVED GTP

LEGEND:-

- 100 MBPS FIRST FIBER OPTIC TCP/IP RING(MULTI MODE)
- - - - - 100 MBPS SECOND FIBER OPTIC TCP/IP RING(MULTI MODE)
- 100 MBPS FIRST FIBER OPTIC(MULTI MODE)
- 100 MBPS UTP CABLE RJ45, ETHERNET LINK
- COAXIAL CABLE (GPS LINK)

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED	STATUS
A	FIRST ISSUE					PA

CUSTOMER: **CHATTISHGARH STATE POWER TRANSMISSION CO. LTD**

PROJECT: **CRP AND SAS FOR 400/220/33kV SUB-STATION JAGDALPUR**

PO NO.: **5427-4500793242, dated: 22.06.2015**

ALSTOM SYSTEM ARCHITECTURE FOR 400/220/33KV JAGDALPUR S/S

MODA-801801 DRAWING NO. **KR86-SA**

400/220/33kV CRP + SAS



ALSTOM T&D INDIA Limited Automation SAS Pallavaram - Chennai 43



400/220/33kV CRP + SAS, CSPTL, JAGDALPUR

CUSTOMER : CSPTCL

CONTRACTOR: ALSTOM T &D INDIA LTD

PROJECT : 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR

PO NO : 5427-4500793242 dtd 22.06.2015

400KV BUS BAR



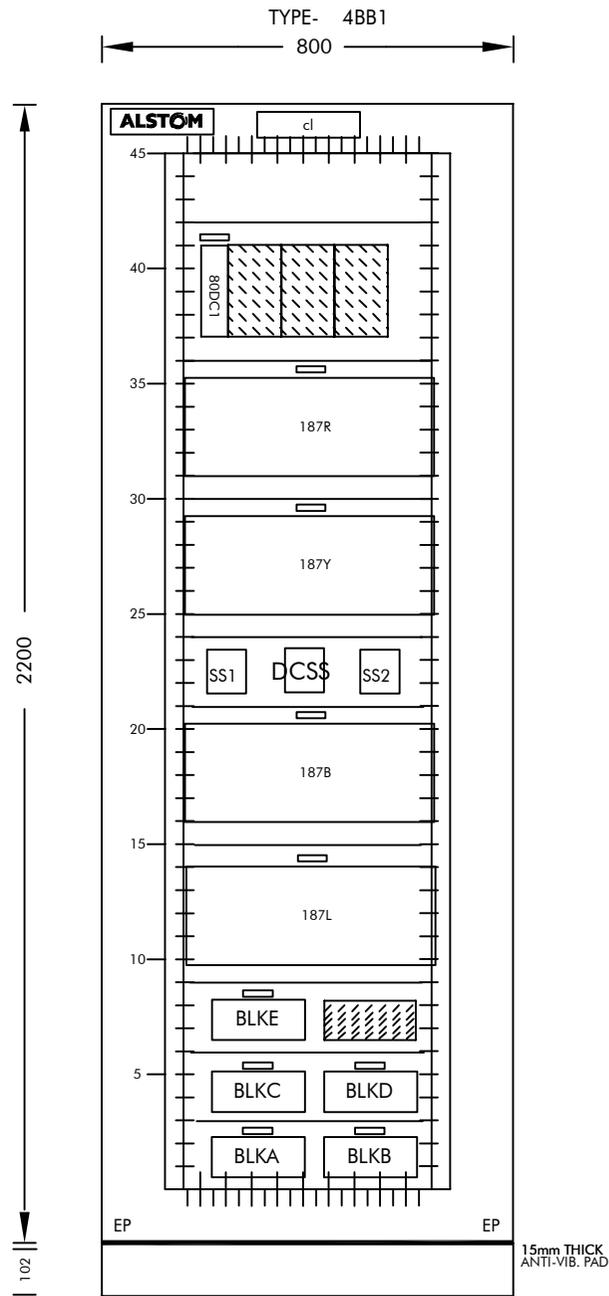
JOB REF : KR86

ENGINEER : SJ



LIST OF DOCUMENTS SUBMITTED

S.NO.	DESCRIPTION	DRAWING NO.	ISSUE
1	General arrangement drawing	CPG KR86 4BB1 (F)	B-08.04.2016
2	Legend	CPG KR86 4BB1 (L)	B-08.04.2016
3	General arrangement drawing	CPG KR86 4BB2 (F)	B-08.04.2016
4	Legend	CPG KR86 4BB2 (L)	B-08.04.2016
5	Schematic drawing	CPD KR86 SC04	B-08.04.2016



NOTE: EFS & LIU TO BE MOUNTED AS PER SYSTEM ARCHITECTURE

SCHEME REF.: DR8604	ENGG.REF.NO.: KR86
NETWORK NO.: -	
FINISHED GOOD: -	
SALES ORDER ITEM: 3260020730	

CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM

ALSTOM T&D India Limited - AUTOMATION SAS
PALLAVARAM CHENNAI 600043

GENERAL ARRANGEMENT DRAWING (FRONT VIEW)
PANEL TYPE: 4BB1 PHANTOM: CPKR864BB1 FILE: KR864BB1
TITLE: 400KV BUSBAR PROTECTION

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: 1:15 IN A4
DRG NO : CRG KR86 4BB1 / (1) SHT 1 OF 1	

DEV REF.	MATERIAL NAME	MAKE	DESCRIPTION
187B	B90	GE	'BUS BAR PROTN RELAY, AUX:125/250 V AC/DC, CT/VT: STANDARD 24CT, DIGITAL I/O: 20 DIGITAL INPUTS 20 OUTPUTS- WITH PRP B90-UC6-AKH-F8N-H6D-L8N-N6H-S8N-U4L-W7A- BBM -1 - B PH
187R	B90	GE	'BUS BAR PROTN RELAY, AUX:125/250 V AC/DC, CT/VT: STANDARD 24CT, DIGITAL I/O: 20 DIGITAL INPUTS 20 OUTPUTS-WITH PRP B90-UC6-AKH-F8N-H6D-L8N-N6H-S8N-U4L-W7A- BBM -1 - R PH
187Y	B90	GE	'BUS BAR PROTN RELAY, AUX:125/250 V AC/DC, CT/VT: STANDARD 24CT, DIGITAL I/O: 20 DIGITAL INPUTS 20 OUTPUTS- WITH PRP B90-UC6-AKH-F8N-H6D-L8N-N6H-S8N-U4L-W7A- BBM -1 - Y PH
187L	B90	GE	'BUS BAR PROTN RELAY LOGICAL BOX, AUX:125/250 V AC/DC, DIGITAL I/O: 96 DIGITAL INPUTS WITH PRP B90-UC6-AKH-F6D-H6D-L6D-N6D-S6D-U6D-W7H- BUS BAR LOGICAL UNIT
80DC1	MVAAM11B1CJ1015A	ALSTOM	DC SUPPLY SUPERVISION RELAY 4B SR : FLAG-REV : 220-250V DC : 80-120 mS TDDO WD:Z1MVAAM11009SHT1
BLKA	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB -1 PROTECTION STANDARD TEST BLOCK
BLKB	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB -1 PROTECTION STANDARD TEST BLOCK
BLKC	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB -1 PROTECTION STANDARD TEST BLOCK
BLKD	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB -1 PROTECTION STANDARD TEST BLOCK
BLKE	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB -1 PROTECTION STANDARD TEST BLOCK
DCSS	S06N90SPPM102	ALSTOM	SELECTOR SWITCH "SOURCE-1/SOURCE-2" SELECTOR SWITCH 6 WAY NON-LOCK STAYPUT
SS1	S08LF90SPPM102	ALSTOM	SELECTOR SWITCH - BBM1 IN/OUT SWITCH-Z1 SELECTOR SWITCH 8 WAY LOCKABLE STAYPUT
SS2	S08LF90SPPM102	ALSTOM	SELECTOR SWITCH - BBM1 IN/OUT SWITCH-Z2 SELECTOR SWITCH 8 WAY LOCKABLE STAYPUT

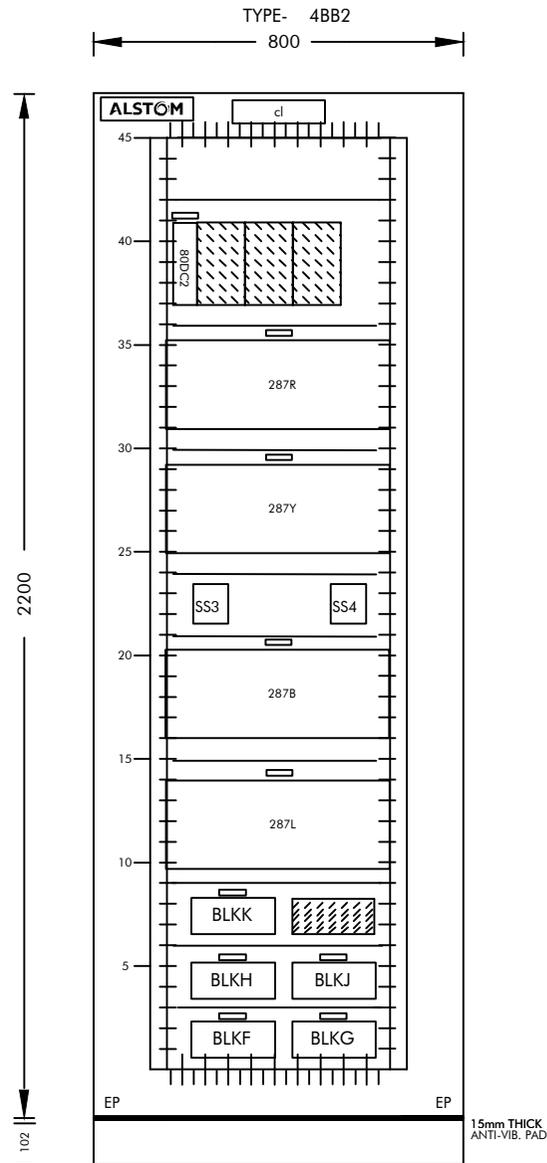
SCHEME REF:	ENGG.REF.NO KR86	CUSTOMER: ALSTOM T&D INDIA LTD	 ALSTOM T&D India Limited - AUTOMATION SAS PALLAVARAM CHENNAI 600043	LEGEND TO GA DRAWING	PREPARED BY: SJ	REVISION: B
NETWORK NO.: -	PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR	PANEL TYPE: 4BB1		FILE: KR864BB1	CHECKED BY: PSK	DATE: 08.04.2016
FINISHED GOOD: -	P.O.NO.: 5427-4500793242	TITLE: 400KV BUSBAR PROTECTION		APPROVED BY: SSS	SCALE: NIL	
SALES ORDER-ITEM: 3269020739	Dated 22.06.15				DRG. NO.: CPG KR86 4BB1 (L) SHT 1 OF 2	

DEV REF.	MATERIAL NAME	MAKE	DESCRIPTION
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INTERNALLY MOUNTED EQUIPMENTS

CIL	GBCPE0000600	IMTECH/COMPAC/S.S	CUBICLE ILLUMINATION LAMP
HS	GBCPF0500901	SWITRON	HEATER SWITCH
HT	GBCPA0178101	SOFIA/S.P.M	230V,60 WATTS HEATER
MCB1	'GBCMB7215100	LEGRAND	'MCB DOUBLE POLE 110/250V DC 16A; 1NO + 1NC
MCB11	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB12	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB13	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB14	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB15	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB16	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB17	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB18	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB19	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB20	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB21	'GBCMB7212100	LEGRAND	'MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB91	GBCMB7225100	LEGRAND	'MCB DOUBLE POLE 110/240V AC 16A; 1NO + 1NC
PS	GBCPE0000344	ANCHOR	15/5A SOCKET 3 PIN 240V AC
TH	GBCPE0000612	APT	THERMOSTAT

SCHEME REF:	ENGG.REF.NO KR86	CUSTOMER: ALSTOM T&D INDIA LTD	 ALSTOM T&D India Limited - AUTOMATION SAS PALLAVARAM CHENNAI 600043	LEGEND TO GA DRAWING	PREPARED BY: SJ	REVISION: B	
NETWORK NO.: -	PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR			PANEL TYPE: 4BB1	FILE: KR864BB1	CHECKED BY: PSK	DATE: 08.04.2016
FINISHED GOOD: -	P.O.NO.: 5427-4500793242			TITLE: 400KV BUSBAR PROTECTION		APPROVED BY: SSS	SCALE: NIL
SALES ORDER-ITEM: 3269020739	Dated 22.06.15					DRG. NO.: CPG KR86 4BB1 (L) SHT 2 OF 2	



SCHEME REF.: DR8604	ENGG.REF.NO.: KR86
NETWORK NO.: -	
FINISHED GOOD: -	
SALES ORDER-ITEM: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM

ALSTOM T&D India Limited - AUTOMATION SAS

PALLAVARAM CHENNAI 600043

GENERAL ARRANGEMENT DRAWING (FRONT VIEW)
PANEL TYPE: 4BB2 PHANTOM: CPKR864BB2 FILE: KR864BB2
TITLE: 400KV BUSBAR PROTECTION

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: 1:15 IN A4
DRG. NO.: CPG KR86 4BB2 (F) SHT 1 OF 1	

DEV REF.	MATERIAL NAME	MAKE	DESCRIPTION
287B	B90	GE	"BUS BAR PROTN RELAY, AUX:125/250 V AC/DC, CT/VT: STANDARD 24CT, DIGITAL I/O: 20 DIGITAL INPUTS 20 OUTPUTS- WITH PRP B90-UC6-AKH-F8N-H6D-L8N-N6H-S8N-U4L-W7A- BBM -2 - B PH
287R	B90	GE	"BUS BAR PROTN RELAY, AUX:125/250 V AC/DC, CT/VT: STANDARD 24CT, DIGITAL I/O: 20 DIGITAL INPUTS 20 OUTPUTS- WITH PRP B90-UC6-AKH-F8N-H6D-L8N-N6H-S8N-U4L-W7A- BBM -2 - R PH
287Y	B90	GE	"BUS BAR PROTN RELAY, AUX:125/250 V AC/DC, CT/VT: STANDARD 24CT, DIGITAL I/O: 20 DIGITAL INPUTS 20 OUTPUTS- WITH PRP B90-UC6-AKH-F8N-H6D-L8N-N6H-S8N-U4L-W7A- BBM -2 - Y PH
287L	B90	GE	"BUS BAR PROTN RELAY LOGICAL BOX, AUX:125/250 V AC/DC, DIGITAL I/O: 96 DIGITAL INPUTS WITH PRP B90-UC6-AKH-F6D-H6D-L6D-N6D-S6D-U6D-W7H- BUS BAR LOGICAL UNIT
80DC2	MVAAM11B1CJ1015A	ALSTOM	DC SUPPLY SUPERVISION RELAY 4B SR : FLAG-REV : 220-250V DC : 80-120 mS TDDO WD:Z1MVAAM11009SHT1
BLKF	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB-2 PROTECTION STANDARD TEST BLOCK
BLKG	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB-2 PROTECTION STANDARD TEST BLOCK
BLKH	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB-2 PROTECTION STANDARD TEST BLOCK
BLKJ	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB-2 PROTECTION STANDARD TEST BLOCK
BLKK	MPGTESTBLOCK	ALSTOM	TEST BLOCK BB-2 PROTECTION STANDARD TEST BLOCK
SS3	S08LF90SPPM102	ALSTOM	SELECTOR SWITCH - BBM2 IN/OUT SWITCH-Z1 SELECTOR SWITCH 8 WAY LOCKABLE STAYPUT
SS4	S08LF90SPPM102	ALSTOM	SELECTOR SWITCH - BBM2 IN/OUT SWITCH-Z2 SELECTOR SWITCH 8 WAY LOCKABLE STAYPUT

SCHEME REF:	ENGG.REF.NO KR86	CUSTOMER: ALSTOM T&D INDIA LTD	 ALSTOM T&D India Limited - AUTOMATION SAS PALLAVARAM CHENNAI 600043	LEGEND TO GA DRAWING	PREPARED BY: SJ	REVISION: B
NETWORK NO.: -	PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR	PANEL TYPE: 4BB2		FILE: KR864BB2	CHECKED BY: PSK	DATE: 08.04.2016
FINISHED GOOD: -	P.O.NO.: 5427-4500793242	TITLE: 400KV BUSBAR PROTECTION		APPROVED BY: SSS	SCALE: NIL	
SALES ORDER-ITEM: 3269020739	Dated 22.06.15				DRG. NO.: CPG KR86 4BB2 (L) SHT 1 OF 2	

DEV REF.	MATERIAL NAME	MAKE	DESCRIPTION
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INTERNALLY MOUNTED EQUIPMENTS

CIL	GBCPE0000600	IMTECH/COMPAC/S.S	CUBICLE ILLUMINATION LAMP
HS	GBCPF0500901	SWITRON	HEATER SWITCH
HT	GBCPA0178101	SOFIA/S.P.M	230V,60 WATTS HEATER
MCB2	"GBCMB7215100	LEGRAND	"MCB DOUBLE POLE 110/250V DC 16A; 1NO + 1NC
MCB22	"GBCMB7212100	LEGRAND	"MCB DOUBLE POLE WITH AUX CONTACT: 1 CHANGE OVER ; 110/220V DC 4A
MCB92	'GBCMB7225100	LEGRAND	"MCB DOUBLE POLE 110/240V AC 16A; 1NO + 1NC
PS	GBCPE0000344	ANCHOR	15/5A SOCKET 3 PIN 240V AC
TH	GBCPE0000612	APT	THERMOSTAT

SCHEME REF:	ENGG.REF.NO KR86	CUSTOMER: ALSTOM T&D INDIA LTD	 ALSTOM T&D India Limited - AUTOMATION SAS PALLAVARAM CHENNAI 600043	LEGEND TO GA DRAWING	PREPARED BY: SJ	REVISION: B
NETWORK NO.: -	PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR	PANEL TYPE: 4BB2		FILE: KR864BB2	CHECKED BY: PSK	DATE: 08.04.2016
FINISHED GOOD: -	P.O.NO.: 5427-4500793242	TITLE: 400KV BUSBAR PROTECTION		APPROVED BY: SSS	SCALE: NIL	
SALES ORDER-ITEM: 3269020739	Dated 22.06.15				DRG. NO.: CPG KR86 4BB2 (L) SHT 2 OF 2	

SCHEMATIC DRAWING
400kV BUSBAR PROTECTION
PANEL TYPES: 4BB1 4BB2

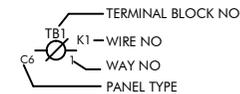
1	LIST OF STD SCHEMATIC SYMBOLS	31	B/B PROTN-2 - INPUT CKT
2	SINGLE LINE DIAGAM	32	B/B PROTN-2 - INPUT CKT
3	AC SUPPLY DISTRIBUTION	33	B/B PROTN-2 - INPUT CKT
4	DC DISTRIBUTION & SUPERVISION	34	B/B PROTN-2 - OUTPUT CKT
5	DC DISTRIBUTION & SUPERVISION	35	B/B PROTN-2 - OUTPUT CKT
6	B/B PROTN-1 - CT CKT	36	B/B PROTN-2 - OUTPUT CKT
7	B/B PROTN-1 - CT CKT	37	B/B PROTN-2 - OUTPUT CKT
8	B/B PROTN-1 - CT CKT	38	B/B PROTN-2 - OUTPUT CKT
9	B/B PROTN-1 - CT CKT	39	B/B PROTN-2 - LOGIC INPUT CKT
10	INDICATION MAIN-1 CIRCUIT	40	B/B PROTN-2 - LOGIC INPUT CKT
11	B/B PROTN-1 - INPUT CKT	41	B/B PROTN-2 - LOGIC INPUT CKT
12	B/B PROTN-1 - INPUT CKT	42	B/B PROTN-2 - LOGIC INPUT CKT
13	B/B PROTN-1 - INPUT CKT	43	SWITCH CONTACT DISTRIBUTION
14	B/B PROTN-1 - INPUT CKT		
15	B/B PROTN-1 - OUTPUT CKT		
16	B/B PROTN-1 - OUTPUT CKT		
17	B/B PROTN-1 - OUTPUT CKT		
18	B/B PROTN-1 - OUTPUT CKT		
19	B/B PROTN-1 - OUTPUT CKT		
20	B/B PROTN-1 - LOGIC INPUT CKT		
21	B/B PROTN-1 - LOGIC INPUT CKT		
22	B/B PROTN-1 - LOGIC INPUT CKT		
23	B/B PROTN-1 - LOGIC INPUT CKT		
24	SWITCH CONTACT DISTRIBUTION		
25	B/B PROTN-2 - CT CKT		
26	B/B PROTN-2 - CT CKT		
27	B/B PROTN-2 - CT CKT		
28	B/B PROTN-2 - CT CKT		
29	INDICATION MAIN-2 CIRCUIT		
30	B/B PROTN-2 - INPUT CKT		

FOR ALSTOM REF:	ENGG.REF.NO.: KR86	CUSTOMER: ALSTOM T&D INDIA LTD PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR P.O.NO.: 5427-4500793242 Dated 22.06.15	 ALSTOM T&D India Limited - AUTOMATION SAS PALLAVARAM CHENNAI 600043	SCHEMATIC DRAWING PANEL TYPES: 4BB1 4BB2 TITLE: 400KV BUSBAR PROTECTION LIST OF DRAWINGS	FILE: DR860400	PREPARED BY: SJ	REVISION: B
SCHEME TYPE: BUSBAR					CHECKED BY: PSK	DATE: 08.04.2016	
BASE FILE:					APPROVED BY: SSS	SCALE: --	
SALES ORDER: 3269020739					DRG. NO.: CPD KR86 SC04 SHT 00 OF 43		

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MAKE CONTACT		RELAY COIL - GENERAL SYMBOL		CUB. ILLUMN. LAMP WITH D/S
	MAKE CONTACT - DELAYED PICKUP		RELAY COIL - SLOW RELEASING		HEATER
	MAKE CONTACT - DELAYED DROP OFF				HEATER SWITCH
	MAKE CONTACT WITH BLOWOUT MAGNET		RELAY COIL - SLOW OPERATING		POWER SOCKET
	MAKE CONTACT - HAND RESET				THERMOSTAT
	MAKE CONTACT - THYRISTOR		FLASHER RELAY		FUSE
	BREAK CONTACT				LINK
	BREAK CONTACT - DELAYED PICKUP		RELAY COIL - HAND RESET		TEST BLOCK - MPG
	BREAK CONTACT - DELAYED DROP OFF				RESISTOR
	BREAK CONTACT WITH BLOWOUT MAGNET		FLAG INDICATOR		STABILISING RESISTOR
	BREAK CONTACT - HAND RESET		DISCONNECTING TB AT C&R PANLES		METROSIL SURGE DIVERTOR
			TERMINAL BOARD AT C&R PANLES		CONTROL/SEL SW.-TYPE ODS
			TERMINAL BOARD AT CT/VT KIOSK / PLCC PANEL		INDICATING LAMP
	CHANGE OVER CONTACT		TERMINAL BOARD AT CIRCUIT BREAKER		SEMAPHORE INDICATOR
	CHANGE OVER CONTACT - HAND RESET		TERMINAL BOARD AT BAY MASHALLING KIOSK		ELECTRIC BELL
	CHANGE OVER CONTACT - DELAYED PICKUP		TERMINAL BOARD AT ISOLATOR		ELECTRIC HOOTER
	CHANGE OVER CONTACT - DELAYED DROP OFF				BUSWIRE

FERRULE NUMBERING STANDARDS

- FERRULE - "A" : CT CIRCUIT - MAIN PROTECTION
- FERRULE - "B" : CT CIRCUIT - BUSBAR PROTECTION
- FERRULE - "C" : CT CIRCUIT - BACKUP PROTECTION
- FERRULE - "D" : CT CIRCUIT - METERING
- FERRULE - "E" : VT CIRCUIT - PROTECTION/METERING
- FERRULE - "G" : VT CIRCUIT - SYNCHRONISING
- FERRULE - "H" : AUXILIARY AC CIRCUIT
- FERRULE - "J" : AUXILIARY DC CIRCUIT
- FERRULE - "K" : CONTROL CIRCUITS
- FERRULE - "L" : INDICATION & ALARM CIRCUITS
- FERRULE - "P" : BUSBAR PROTECTION DC CIRCUITS
- FERRULE - "U" : SPARE CONTACTS

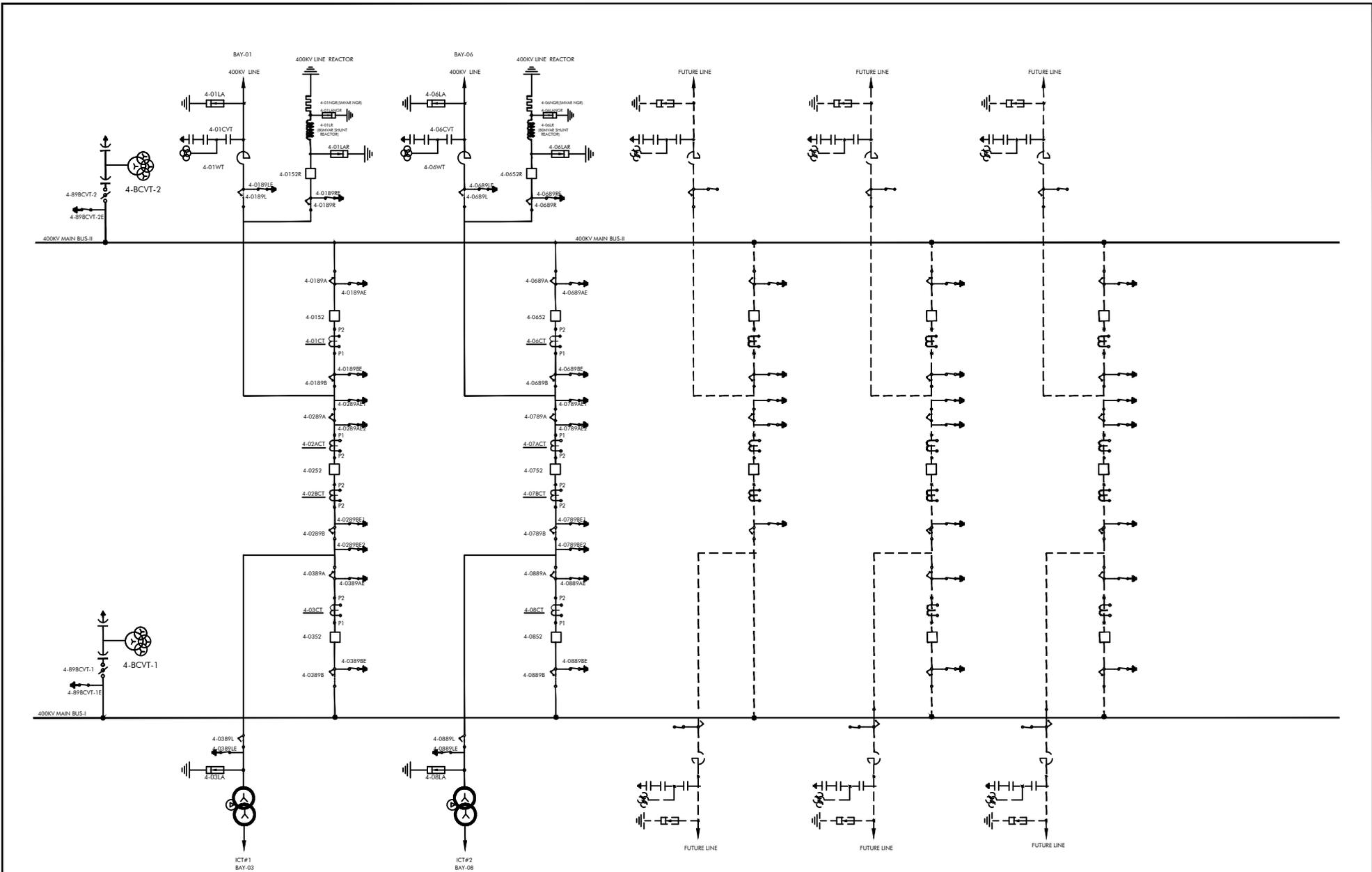


WIRE CROSS REFERENCE STANDARDS



SHT NO. REPRESENTATION OF CROSS REFERENCES BETWEEN SHEETS.

FOR ALSTOM REF:	ENGG. REF. NO.: KR86	CUSTOMER: ALSTOM T&D INDIA LTD	 ALSTOM T&D India Limited - AUTOMATION SAS PALLAVARAM CHENNAI 600043	SCHEMATIC DRAWING	PREPARED BY: SJ	REVISION: B	
SCHEME TYPE: BUSBAR		PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR		PANEL TYPES: 4BB1 4BB2	FILE: DR860401	CHECKED BY: PSK	DATE: 08.04.2016
SALES ORDER: 3269020739		P.O. NO.: 5427-4500793242 Dated 22.06.15		TITLE: 400KV BUSBAR PROTECTION SINGLE LINE DIAGAM	APPROVED BY: SSS	SCALE: --	
DRG. NO.: CPD KR86 SC04 SHT 01 OF 43							



FOR ALSTOM REF:	ENGG. REF. NO.: KR86
SCHEME TYPE: BUSBAR	
SALES ORDER: 3269020739	

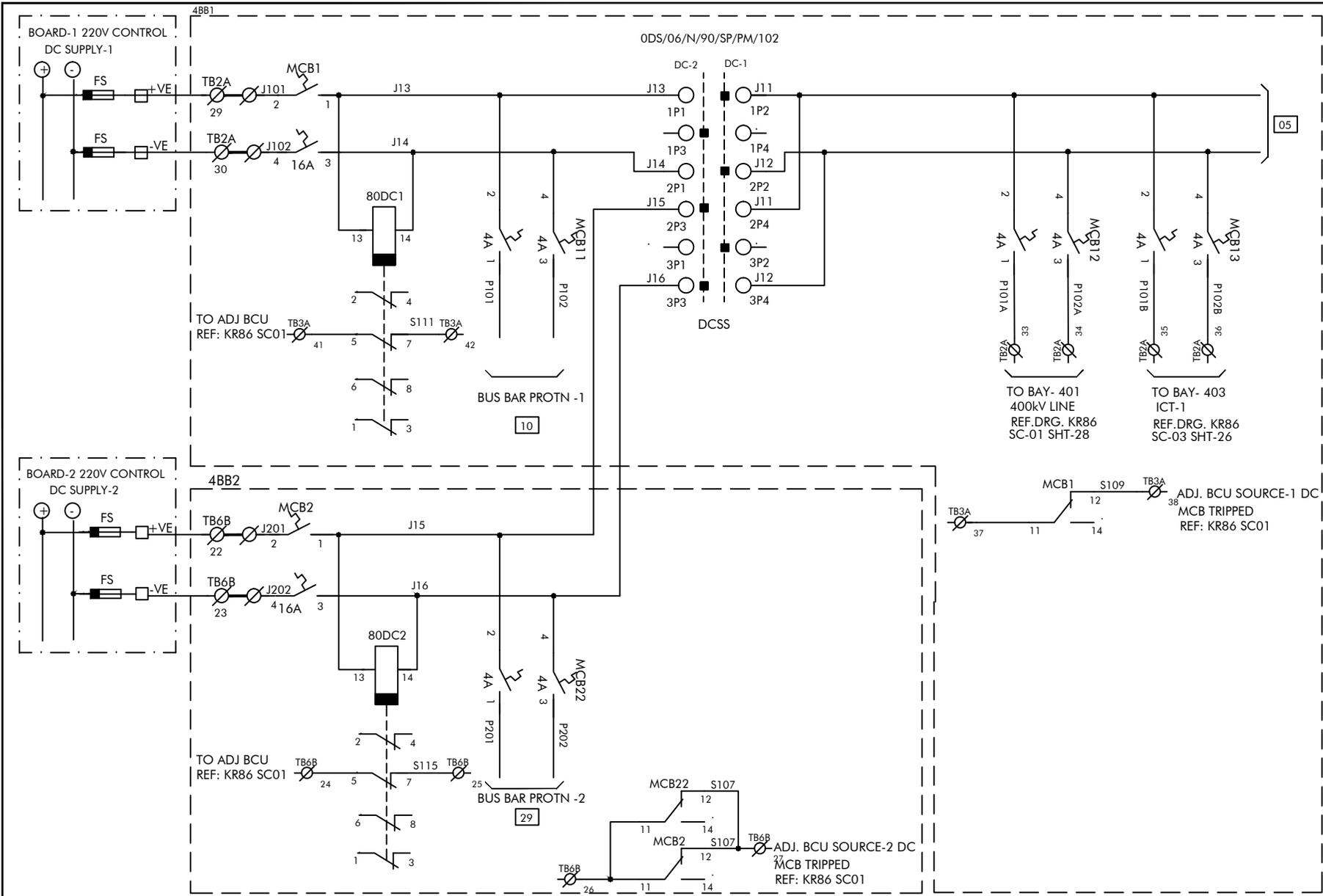
CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O. NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
 ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
TITLE: 400KV BUSBAR PROTECTION SINGLE LINE DIAGRAM
 FILE: DR860402

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 02 OF 43	

EQPT	80DC1, 2
TYPE	MVAAM11
LOC	4BB1



FOR ALSTOM REF:	ENGG. REF. NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

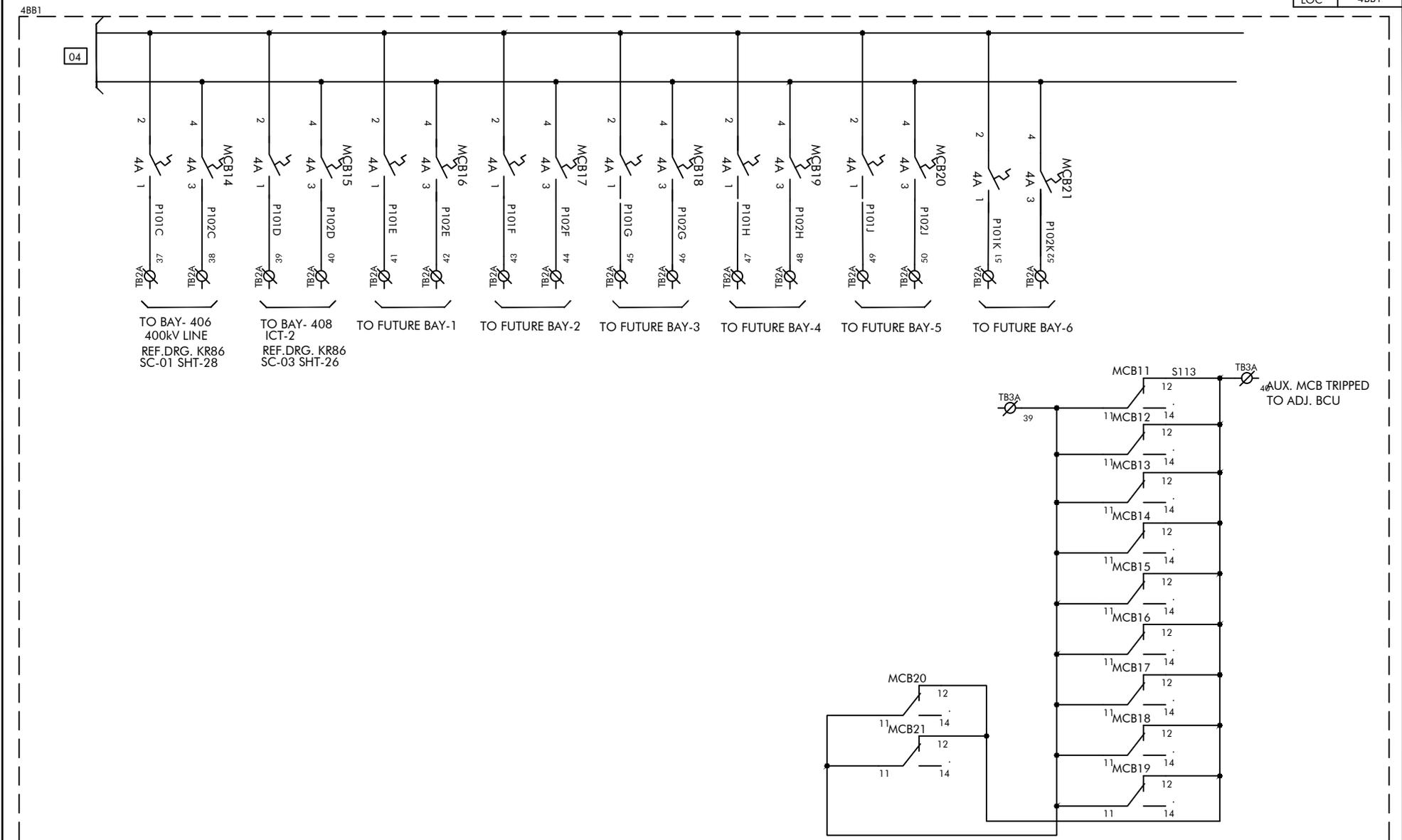
CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O. NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860404
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION DC DISTRIBUTION & SUPERVISION	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 04 OF 43	

EQPT	80DC1, 2
TYPE	MVAAM11
LOC	4BB1



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

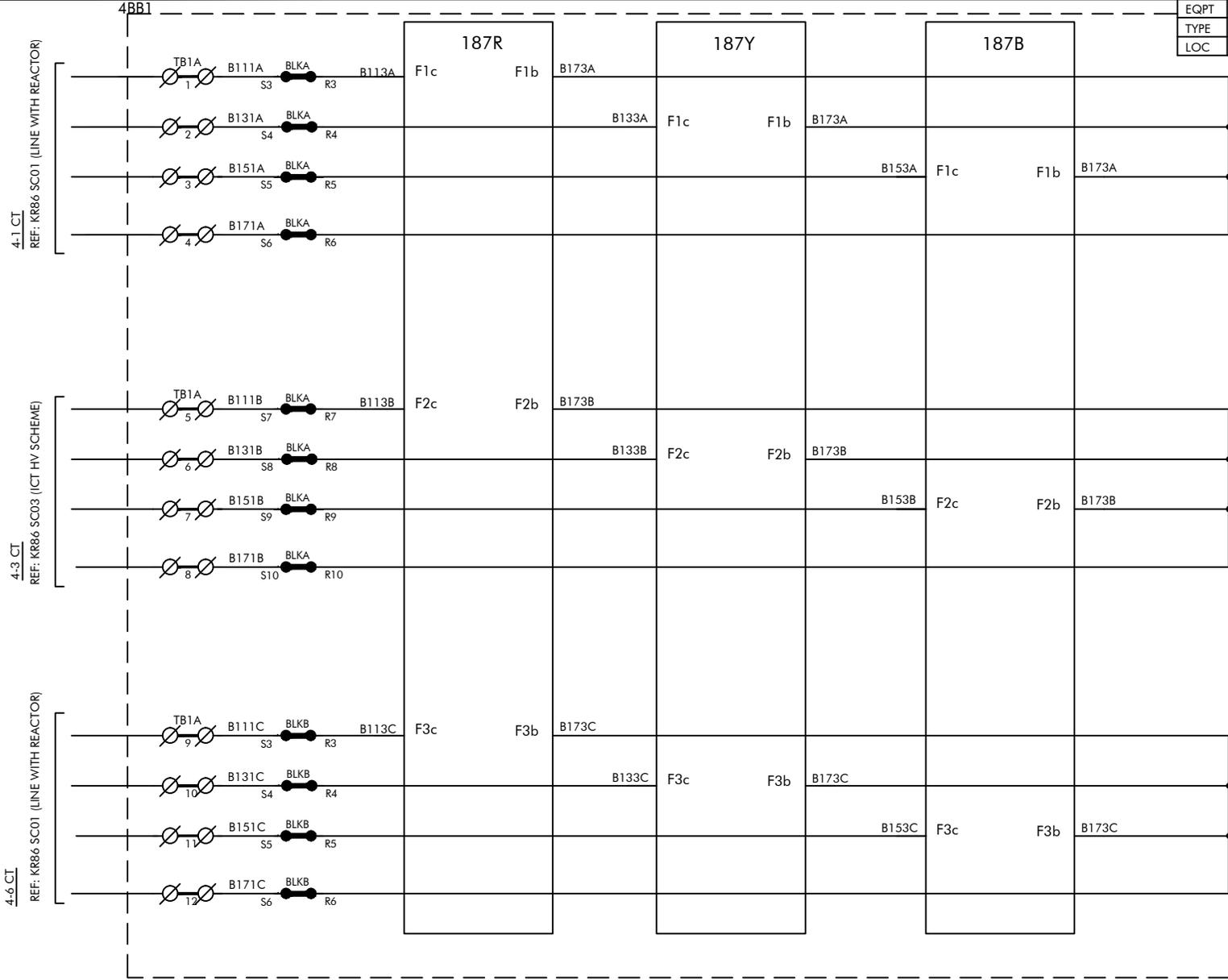
CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860405
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
DC DISTRIBUTION & SUPERVISION	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 05 OF 43	

EQPT	187R, Y, B
TYPE	B90
LOC	4BB1



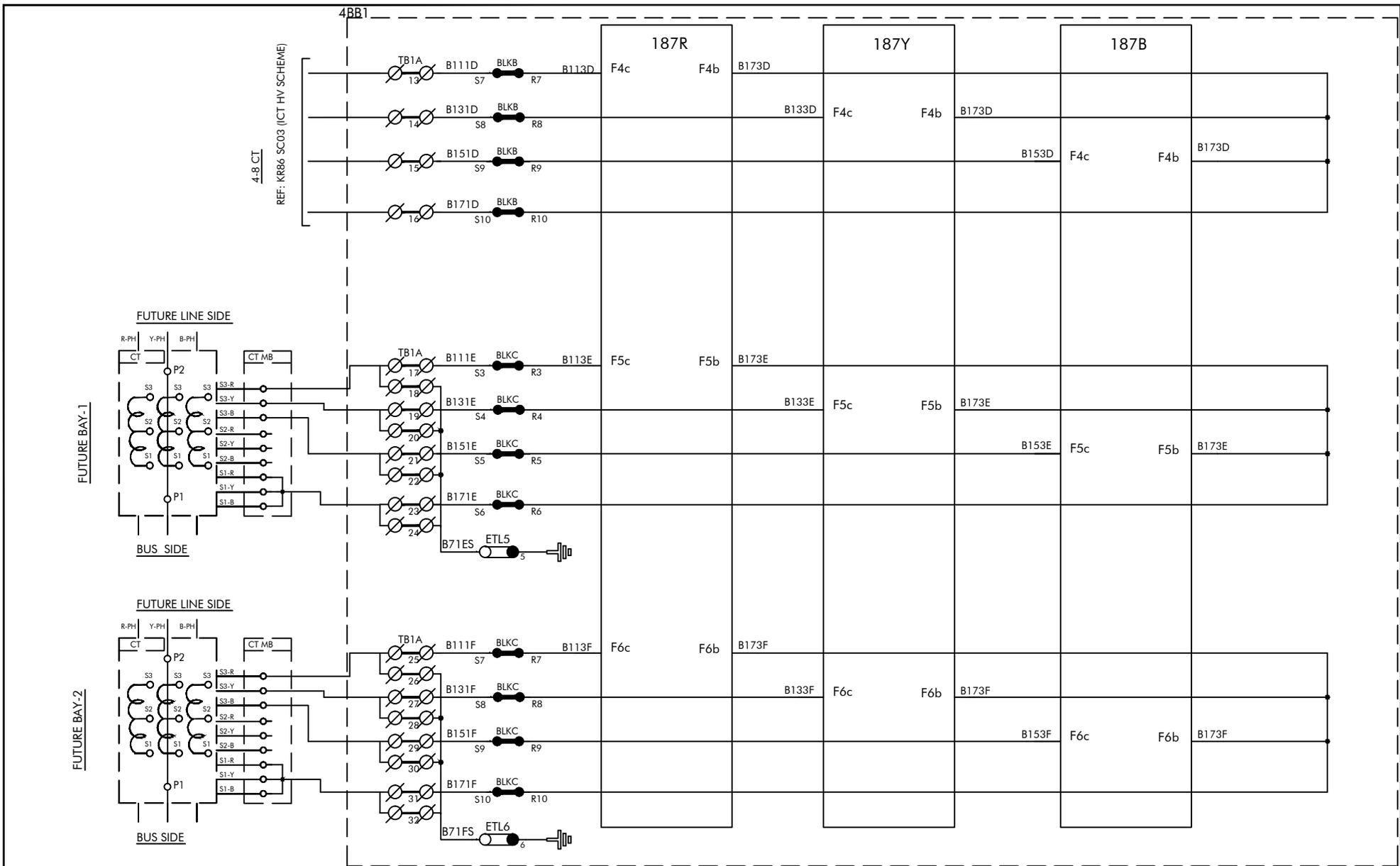
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BASE FILE:	
SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15



SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
 FILE: DR860406
TITLE: 400KV BUSBAR PROTECTION
 B/B PROTN-1 - CT CKT

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 06 OF 43	



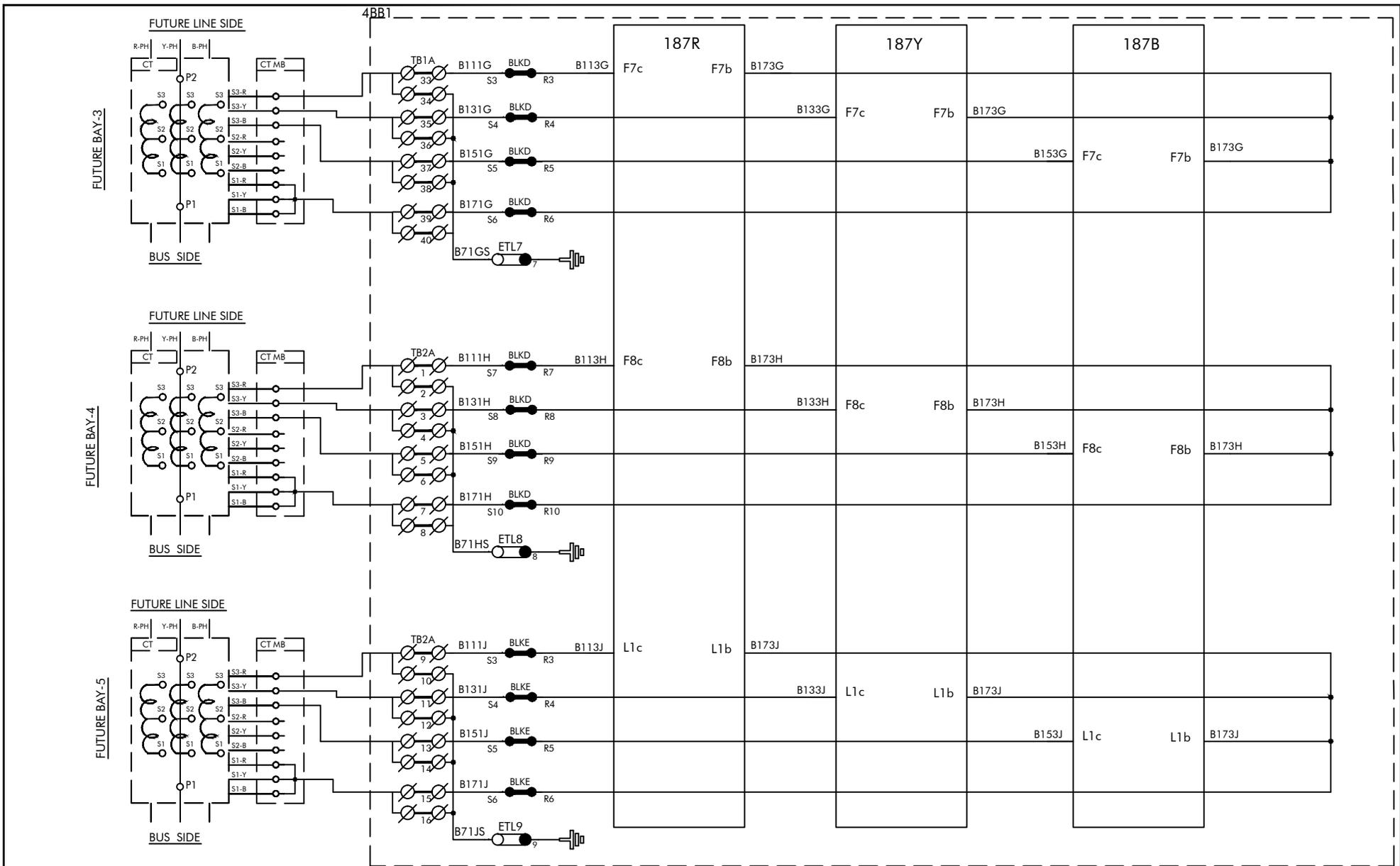
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 BASE FILE:
 SALES ORDER: 3269020739

CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
 ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
 TITLE: 400KV BUSBAR PROTECTION
 B/B PROTN-1 - CT CKT
 FILE: DR860407

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 07 OF 43	



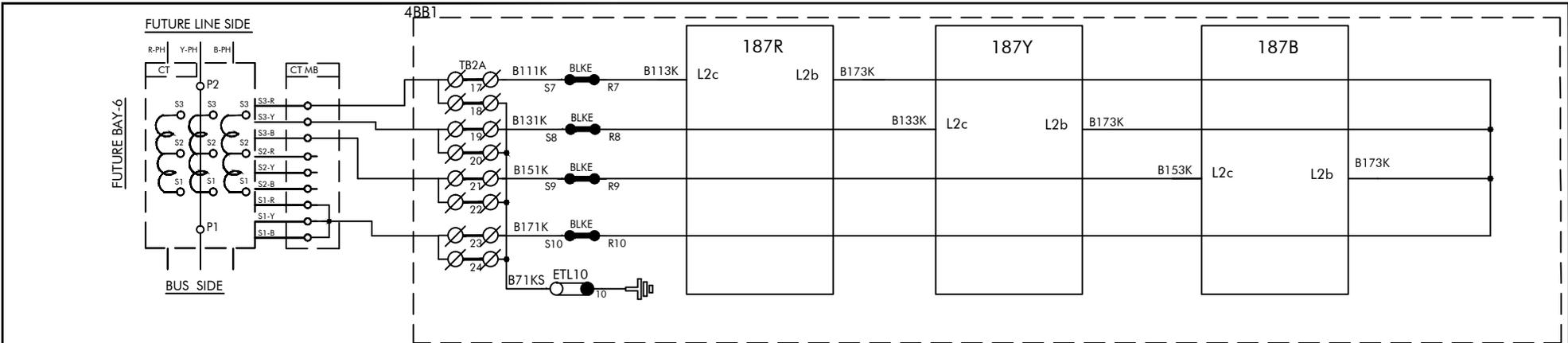
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 BASE FILE:
 SALES ORDER: 3269020739

CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
 ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
 FILE: DR860408
TITLE: 400KV BUSBAR PROTECTION
 B/B PROTN-1 - CT CKT

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 08 OF 43	



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
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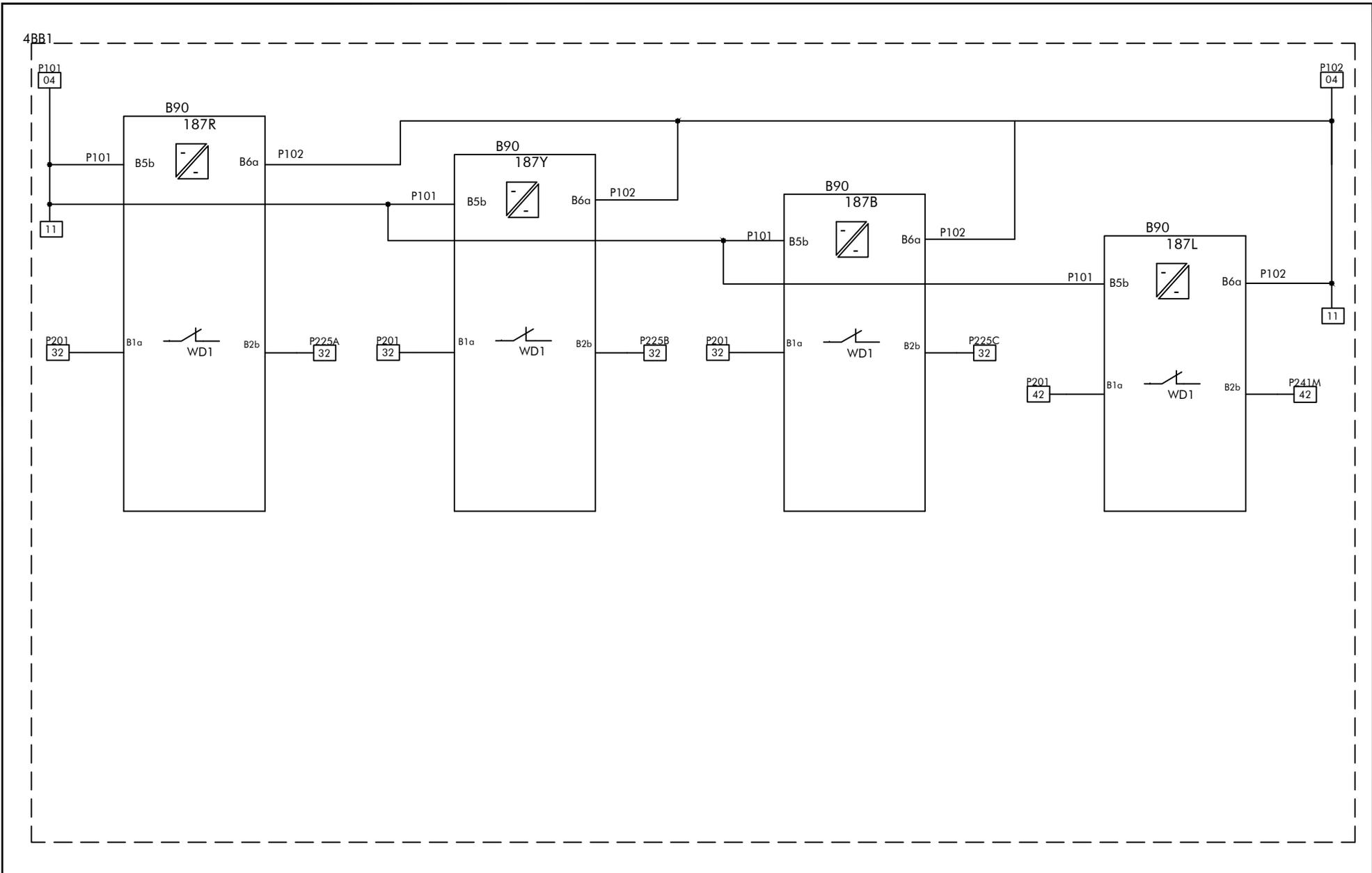
CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
 ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

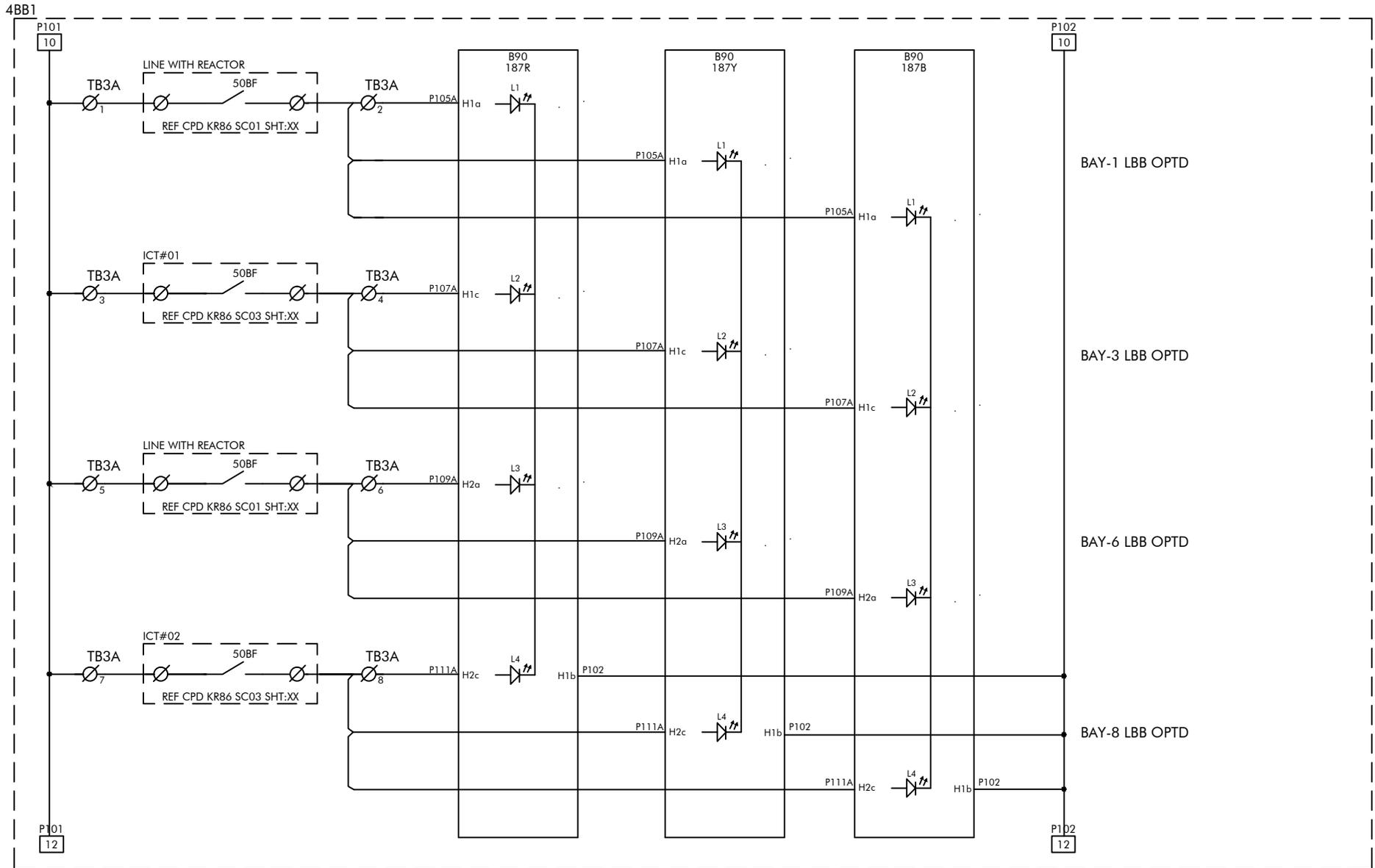
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 PANEL TYPES: 4BB1 4BB2
 TITLE: 400KV BUSBAR PROTECTION
 B/B PROTN-1 - CT CKT

FILE: DR860409

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 09 OF 43	



FOR ALSTOM REF:	ENGG.REF.NO.: KR86	CUSTOMER: ALSTOM T&D INDIA LTD	 ALSTOM T&D India Limited - AUTOMATION SAS PALLAVARAM CHENNAI 600043	SCHEMATIC DRAWING	PREPARED BY: SJ	REVISION: B	
SCHEME TYPE: BUSBAR		PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR		PANEL TYPES: 4BB1 4BB2	FILE: DR860410	CHECKED BY: PSK	DATE: 08.04.2016
BASE FILE:		P.O.NO.: 5427-4500793242		TITLE: 400KV BUSBAR PROTECTION INDICATION MAIN-1 CIRCUIT		APPROVED BY: SSS	SCALE: --
SALES ORDER: 3269020739		Dated 22.06.15			DRG. NO.: CPD KR86 SC04 SHT 10 OF 43		



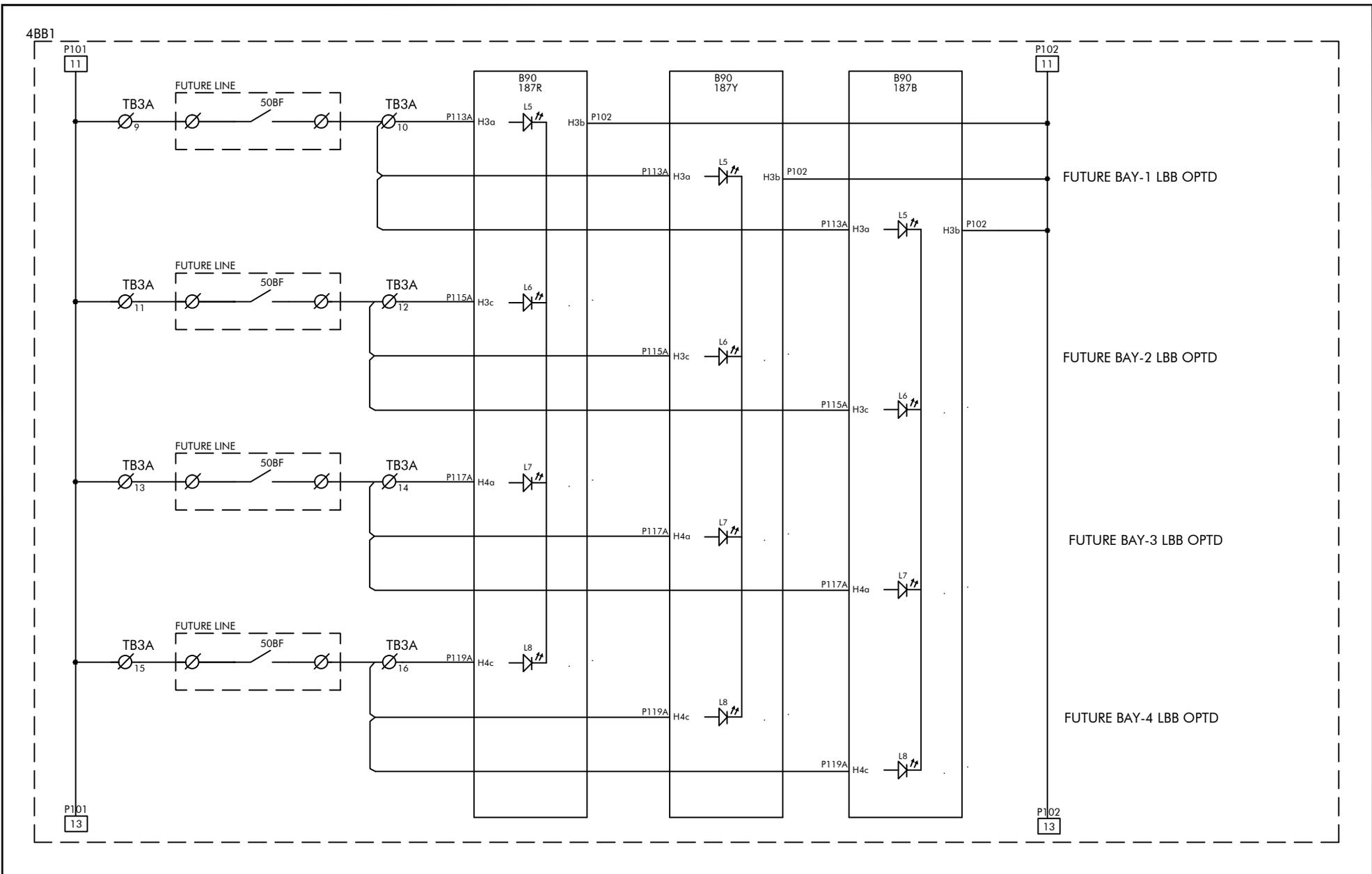
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SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860411
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTN-1 - INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 11 OF 43	



FOR ALSTOM REF:	ENGG. REF. NO.: KR86
SCHEME TYPE: BUSBAR	
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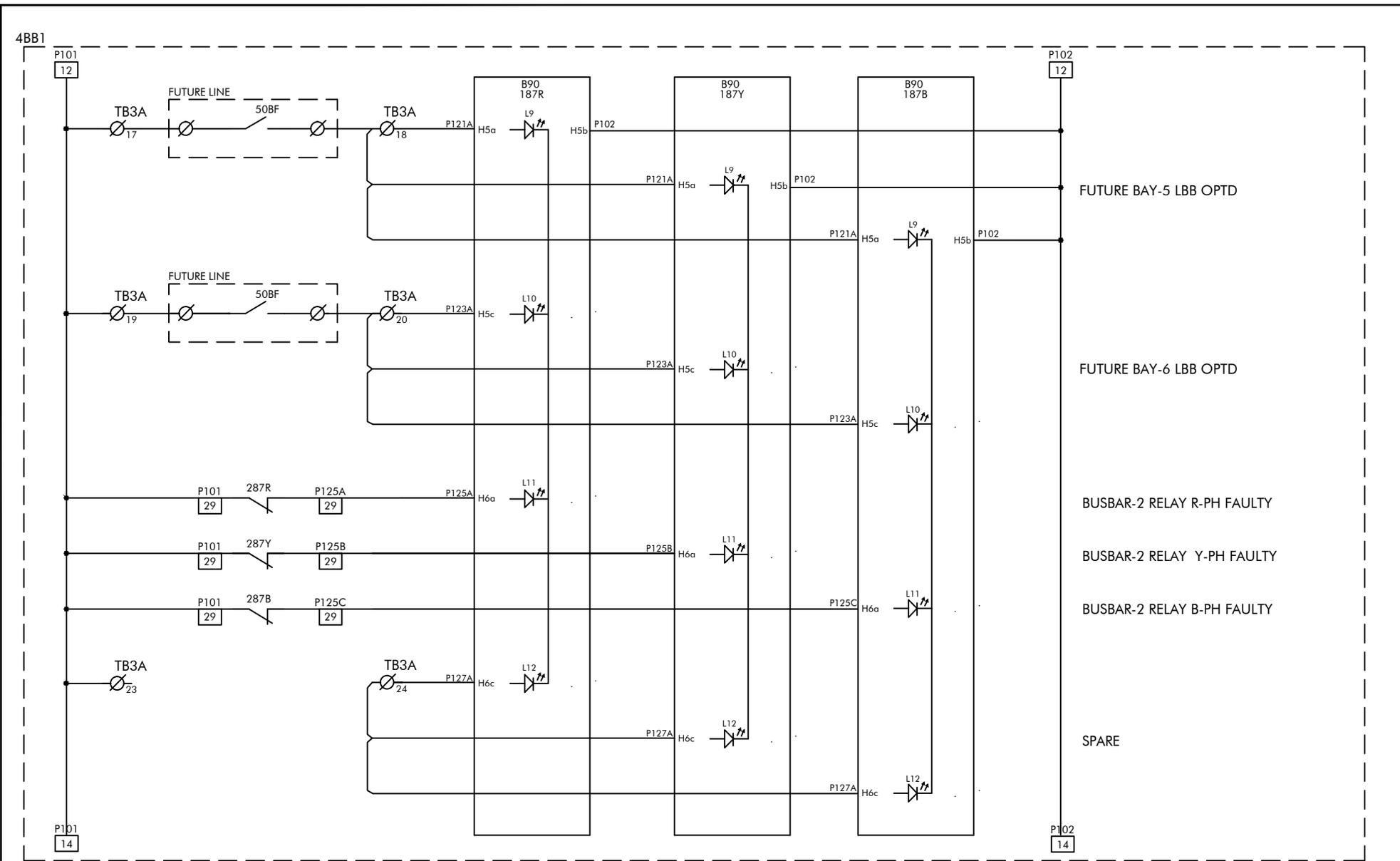
CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O. NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
TITLE: 400KV BUSBAR PROTECTION
 B/B PROTIN-1 - INPUT CKT

FILE: DR860412

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 12 OF 43	



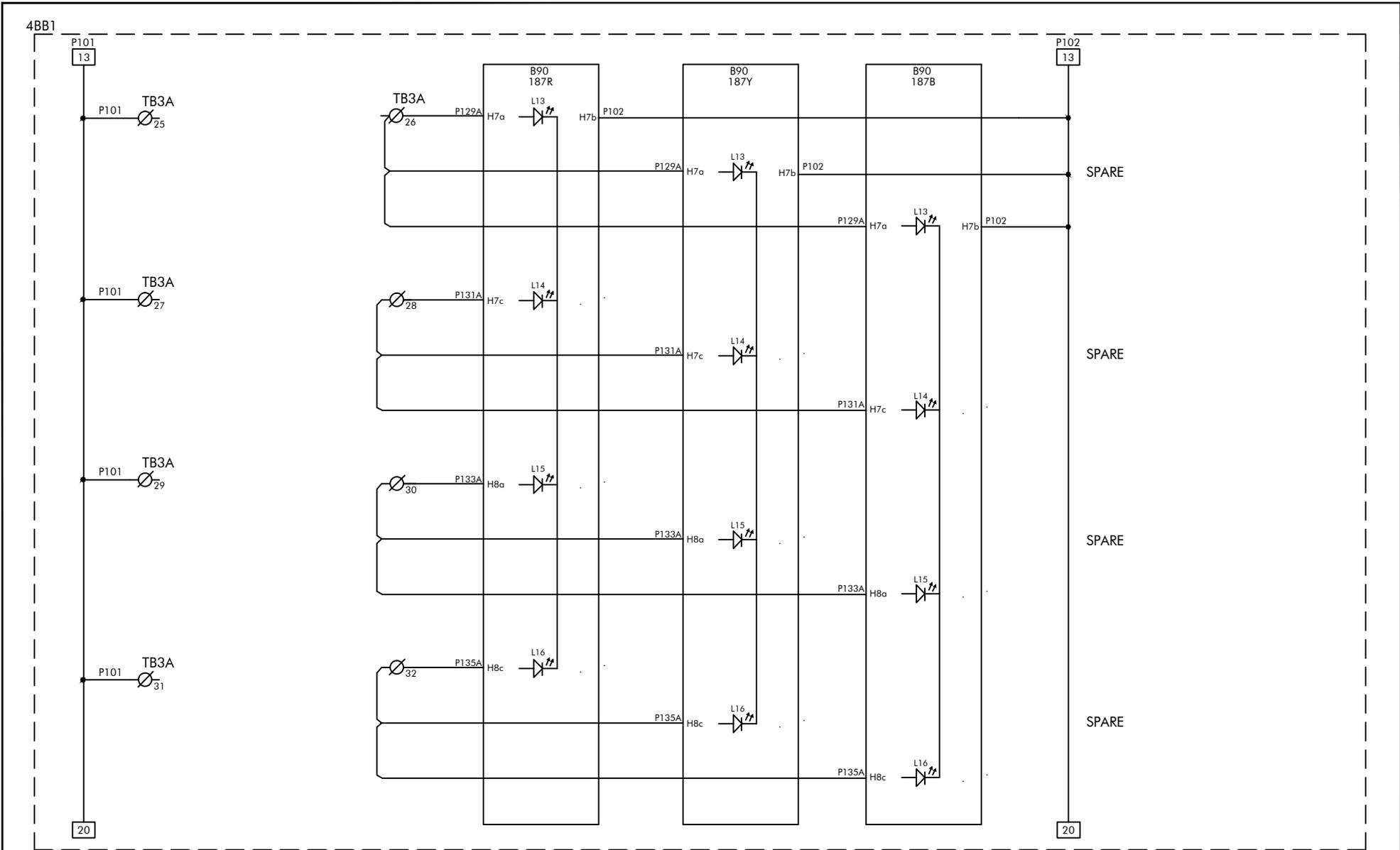
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SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O. NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860413
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTIN-1 - INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 13 OF 43	



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
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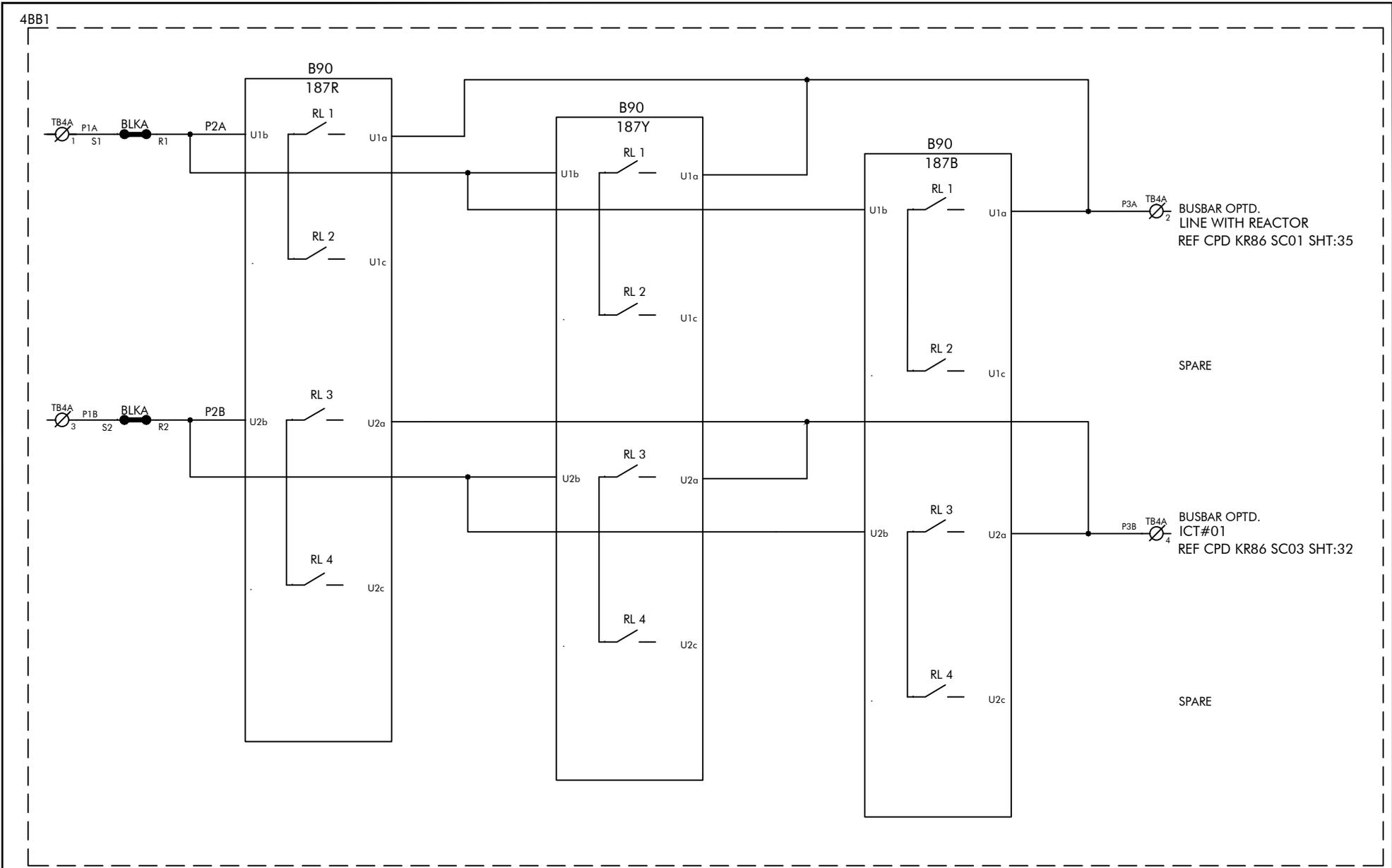
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 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
TITLE: 400KV BUSBAR PROTECTION
B/B PROTIN-1 - INPUT CKT

FILE: DR860414

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 14 OF 43	



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
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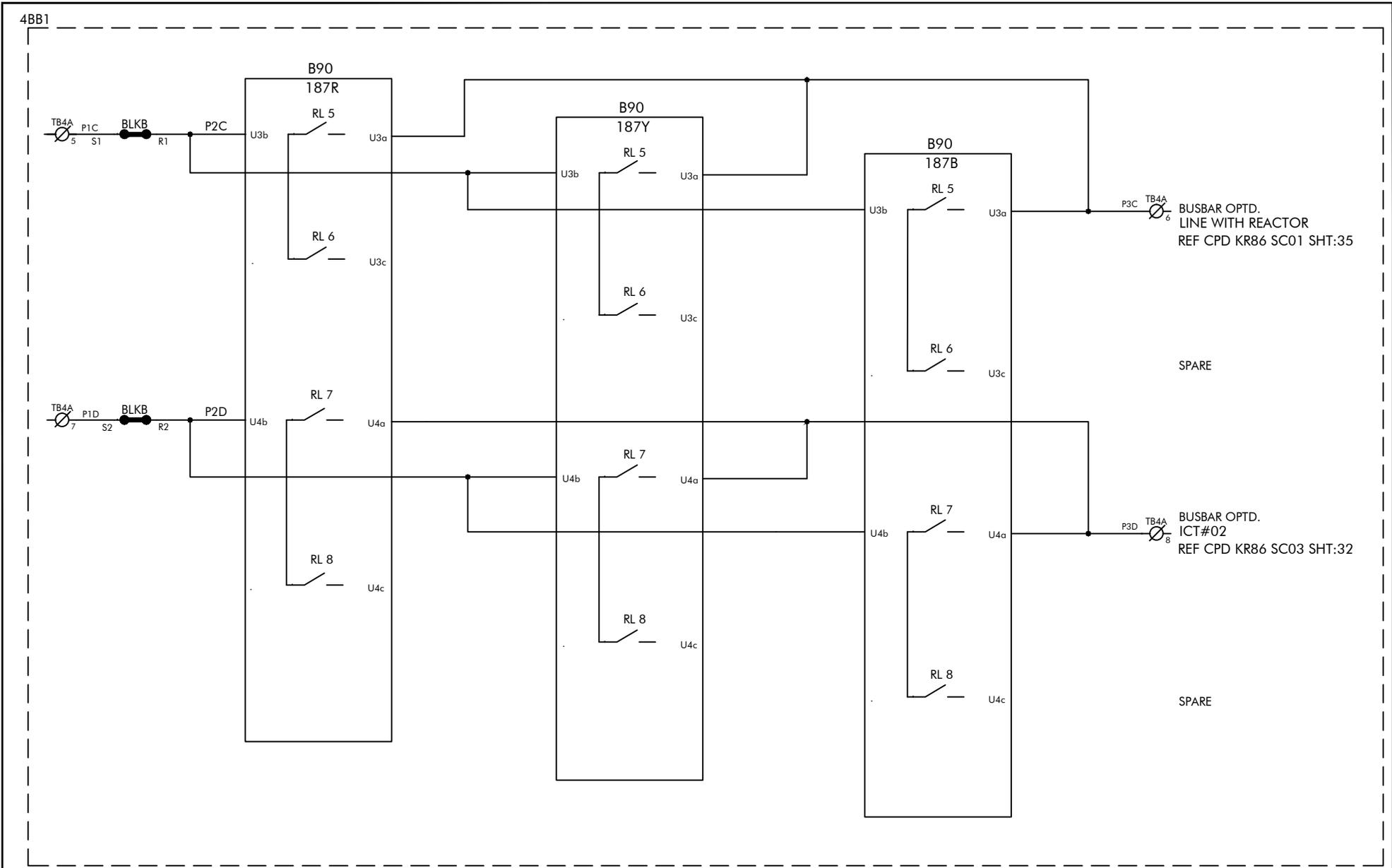
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 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
TITLE: 400KV BUSBAR PROTECTION
B/B PROTIN-1 - OUTPUT CKT

FILE: DR860415

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 15 OF 43	



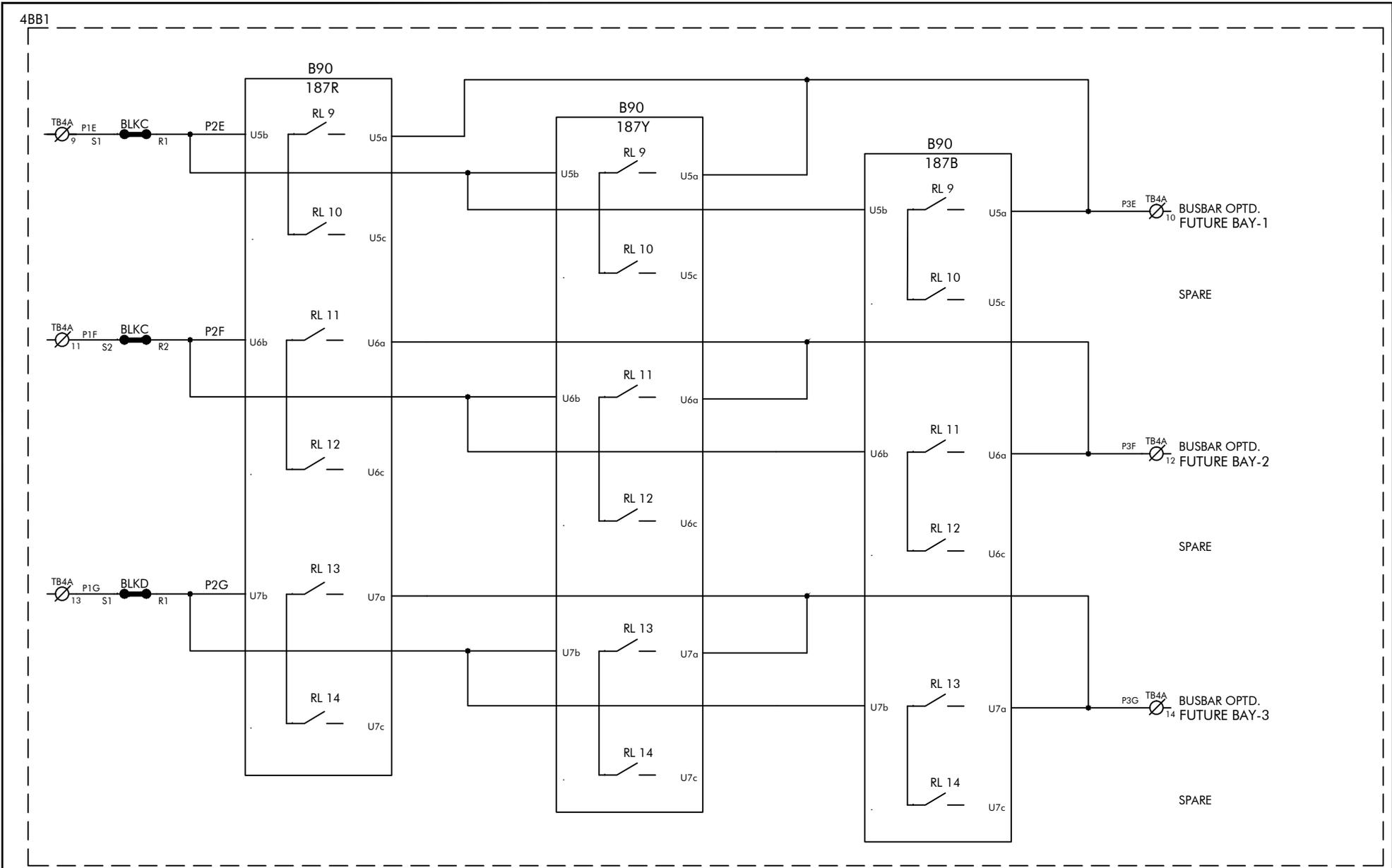
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SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860416
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTIN-1 - OUTPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 16 OF 43	



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

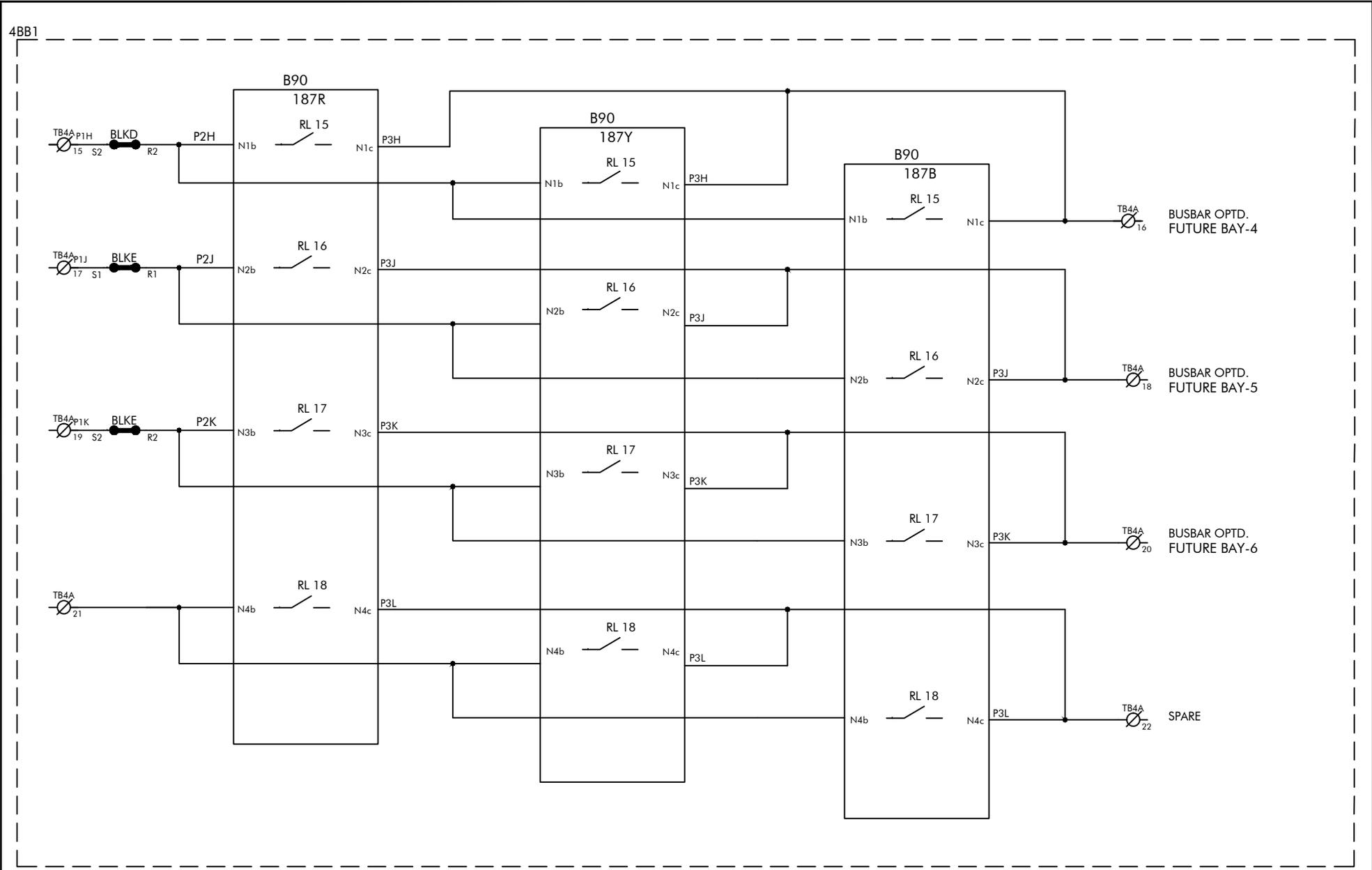
CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
TITLE: 400KV BUSBAR PROTECTION
 B/B PROT N-1 - OUTPUT CKT

FILE: DR860417

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 17 OF 43	



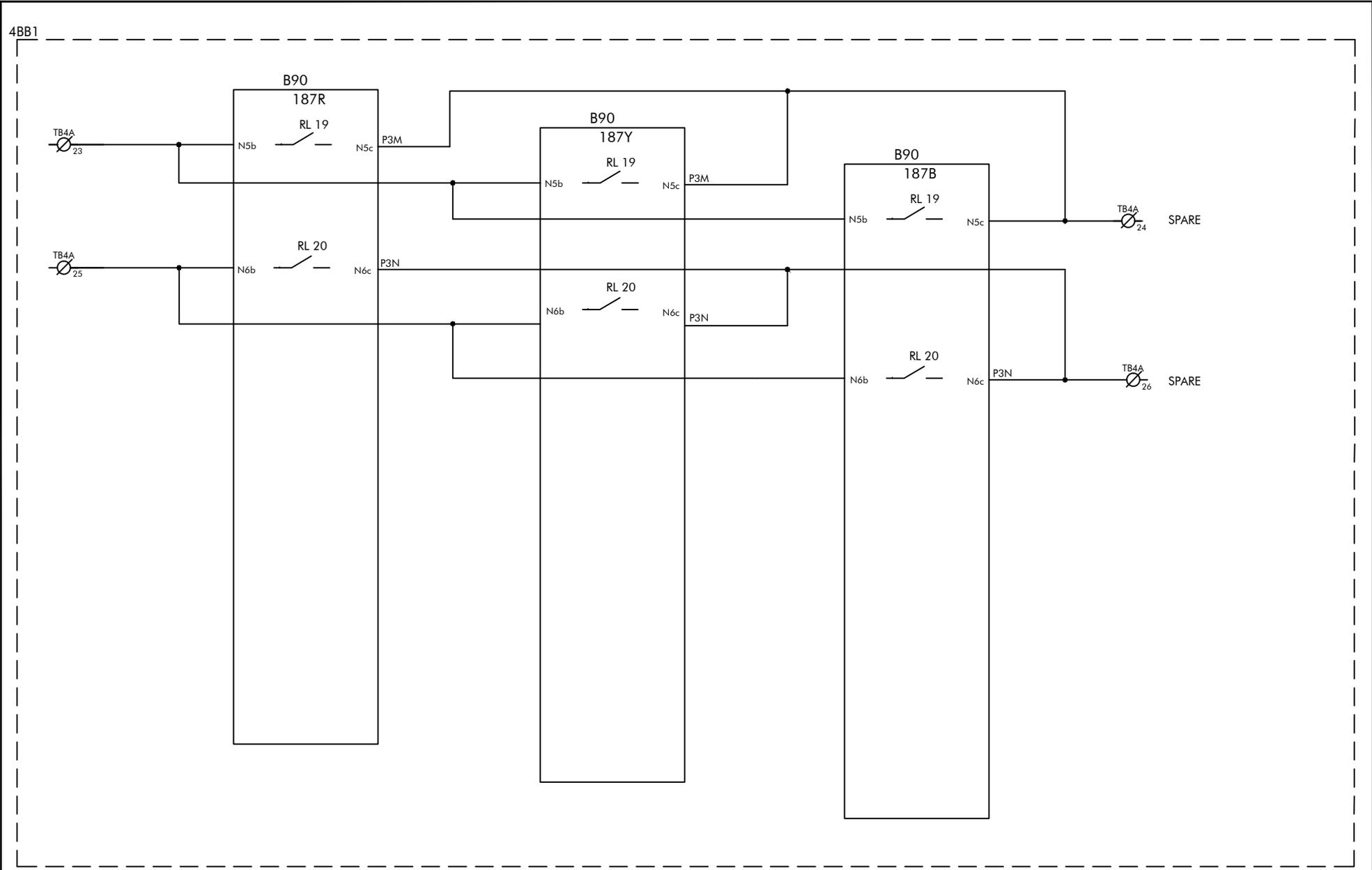
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BASE FILE:	
SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O. NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860418
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROT-N-1 - OUTPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 18 OF 43	



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

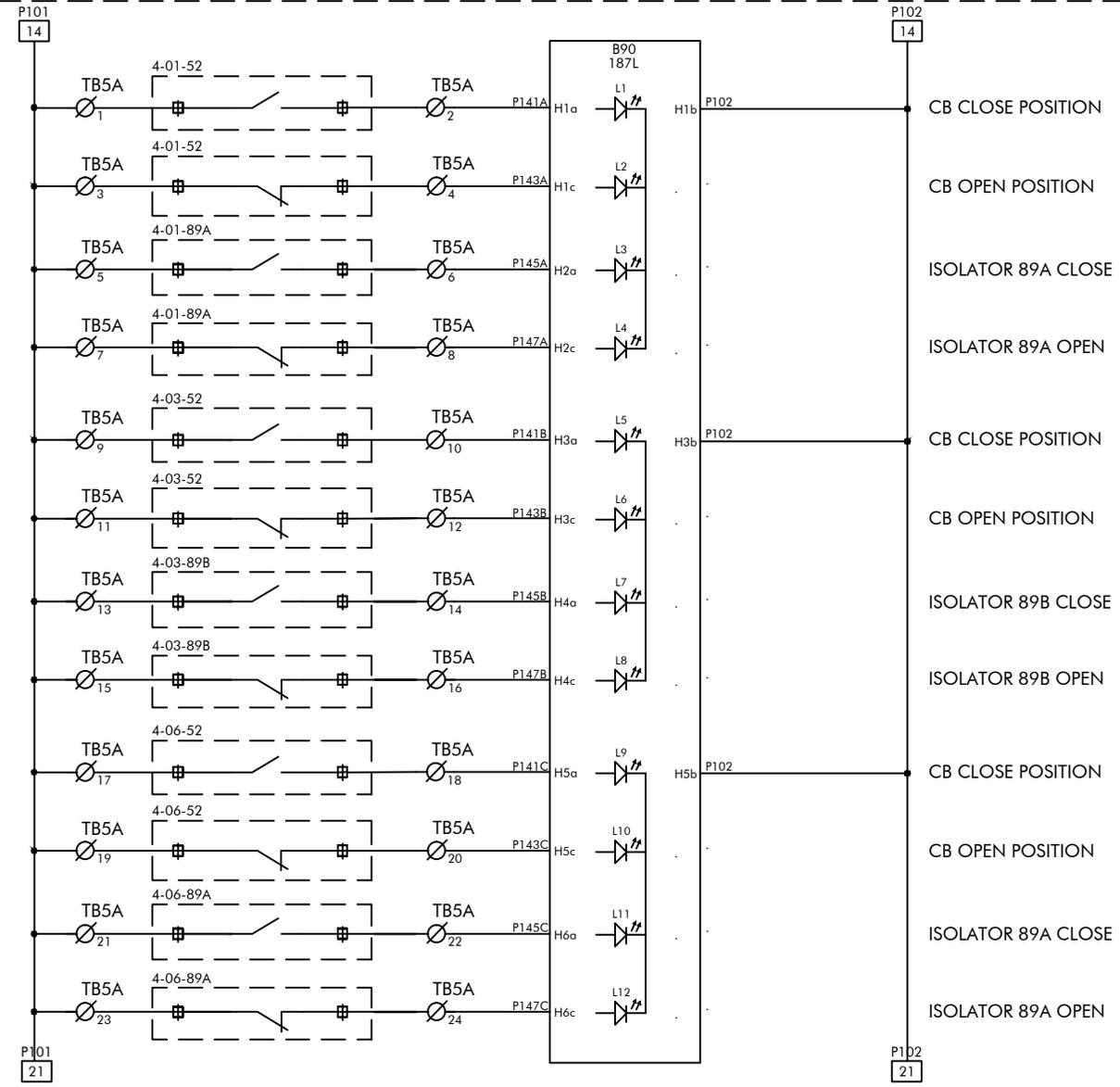


SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
TITLE: 400KV BUSBAR PROTECTION
 B/B PROTN-1 - OUTPUT CKT

FILE: DR860419

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 19 OF 43	

4BB1



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
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BASE FILE:	
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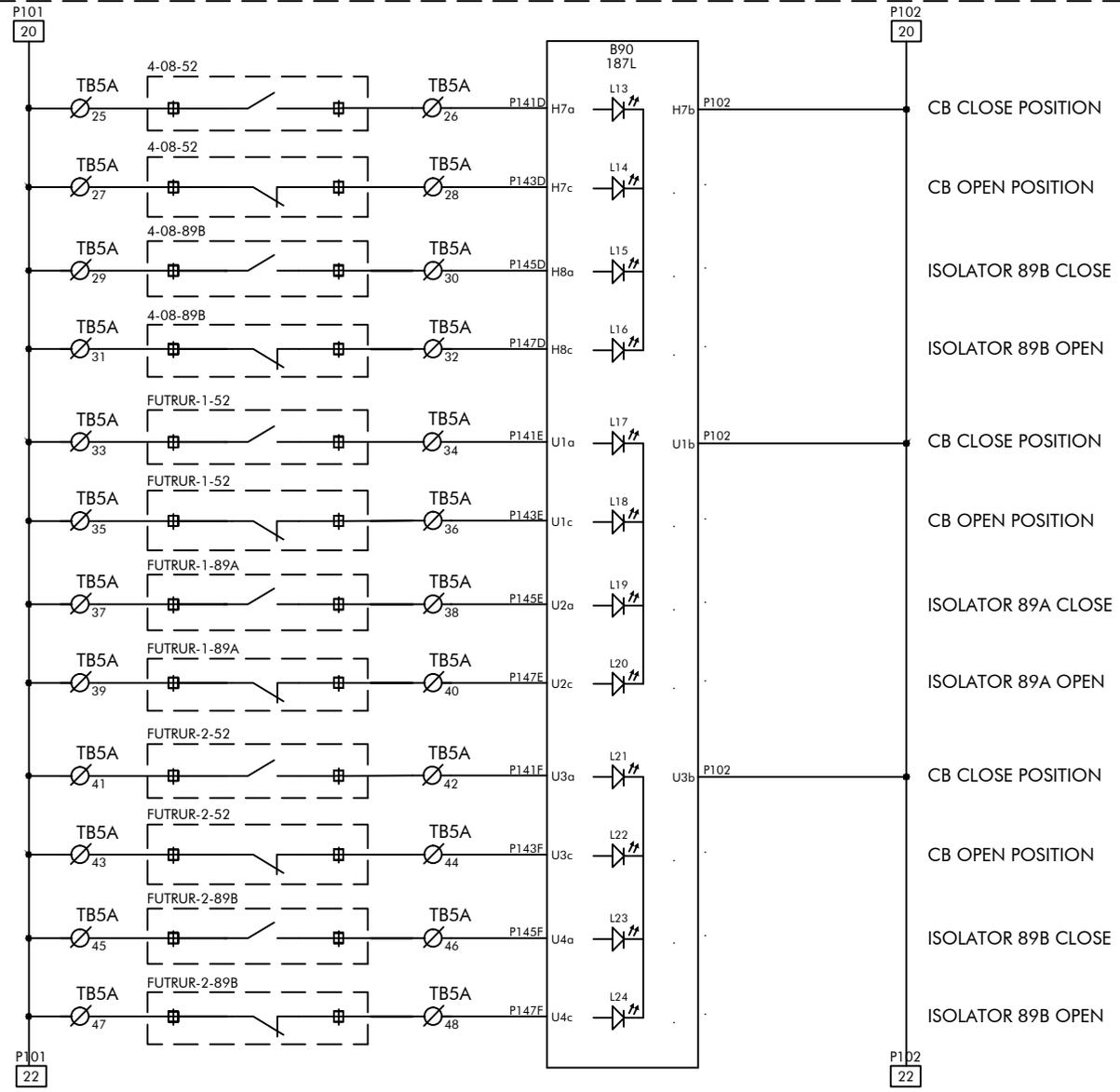
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PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

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ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860420
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTIN-1 - LOGIC INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 20 OF 43	

4BB1



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
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BASE FILE:	
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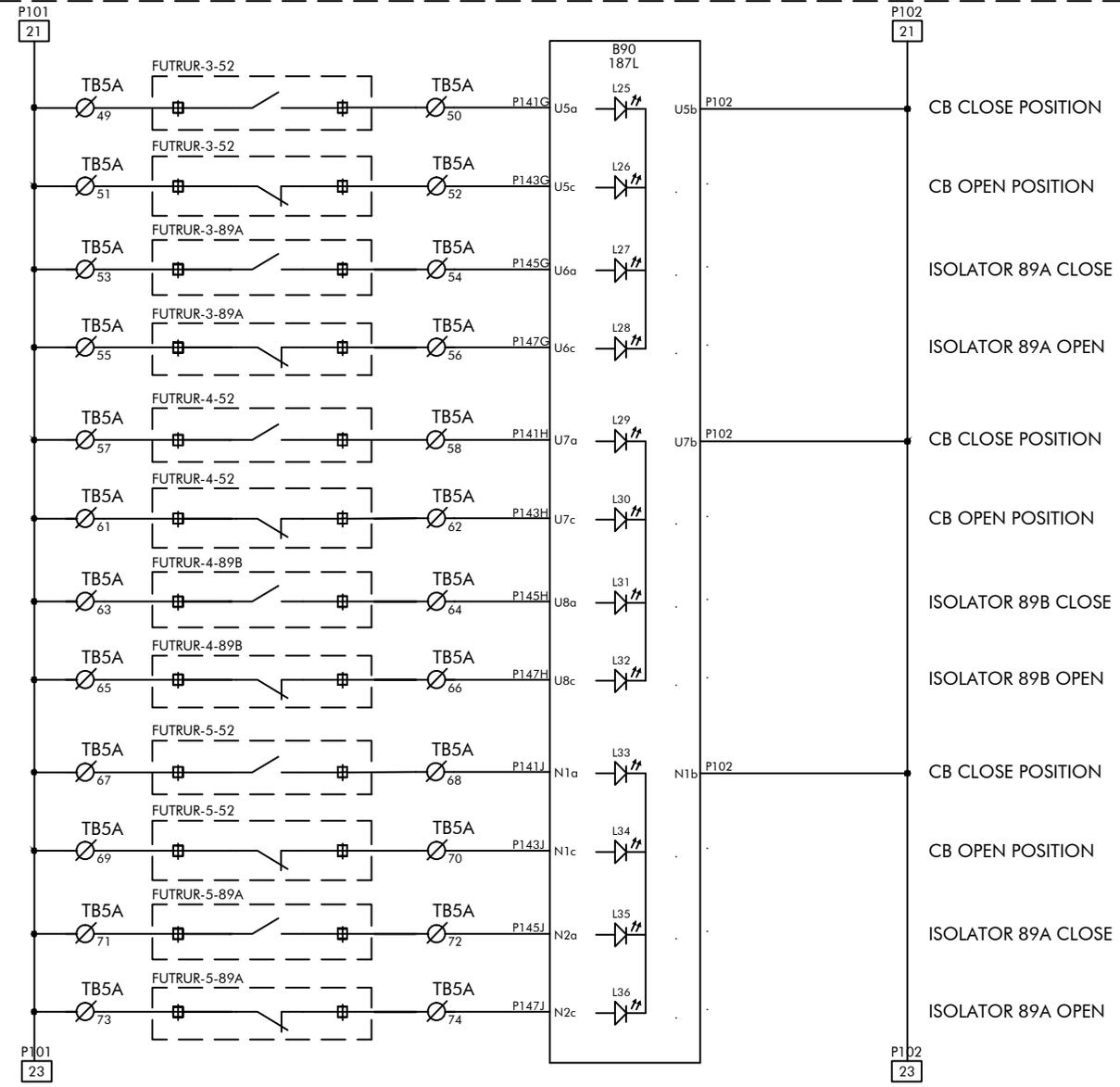
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PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860421
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTIN-1 - LOGIC INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 21 OF 43	

4BB1



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
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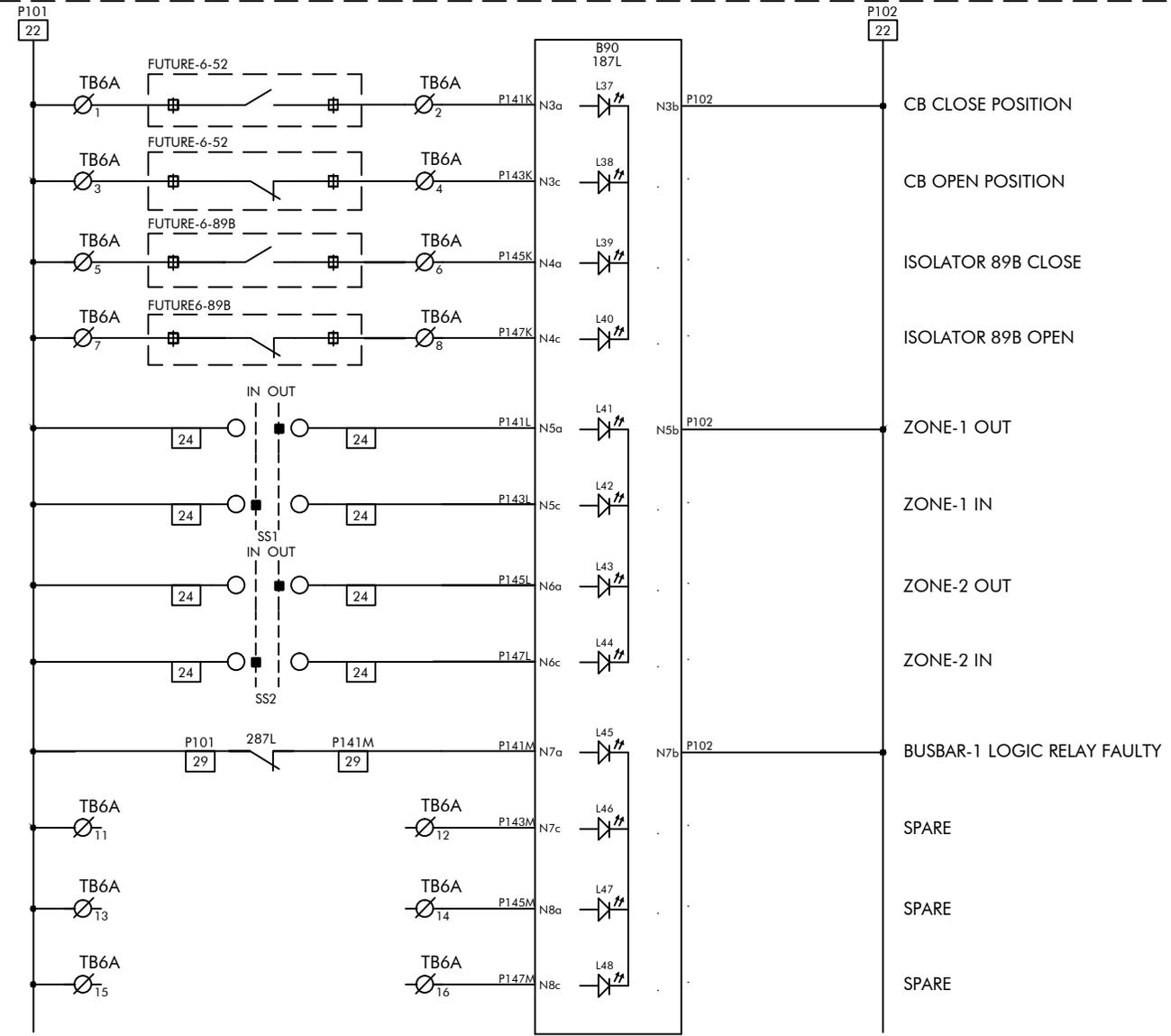
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PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860422
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTN-1 - LOGIC INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 22 OF 43	

4BB1



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

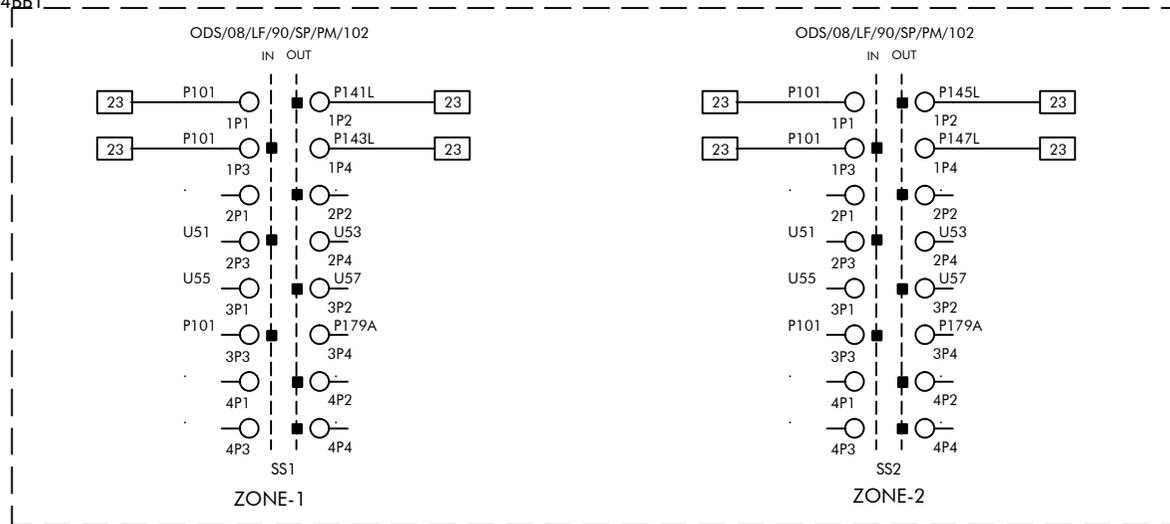
CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860423
PANEL TYPES: 4BB1 4BB2	
TITLE: 400kV BUSBAR PROTECTION	
B/B PROTN-1 - LOGIC INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 23 OF 43	

4BB1



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
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BASE FILE:	
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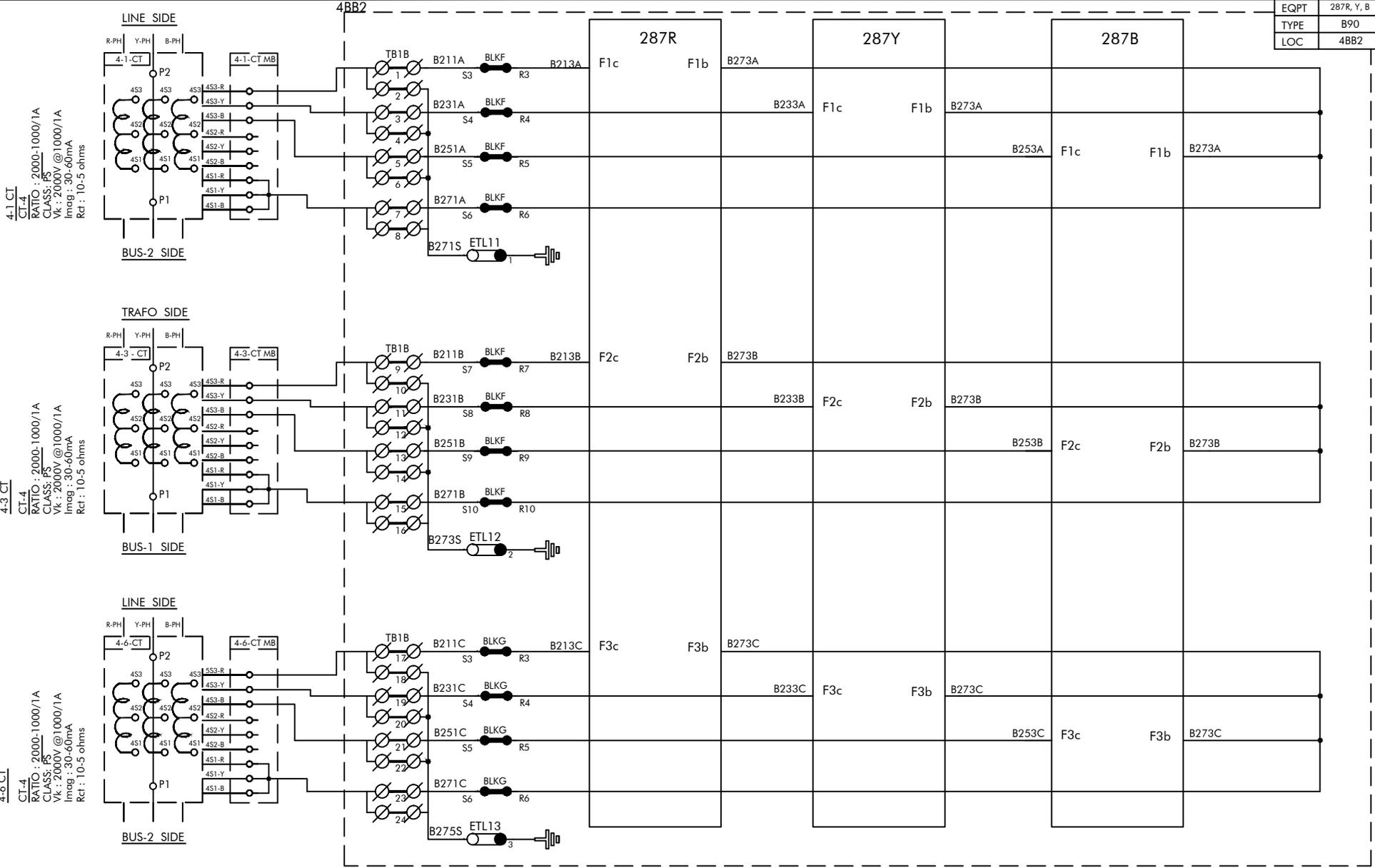
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PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860424
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION SWITCH CONTACT DISTRIBUTION	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 24 OF 43	

EQPT	287R, Y, B
TYPE	B90
LOC	4BB2



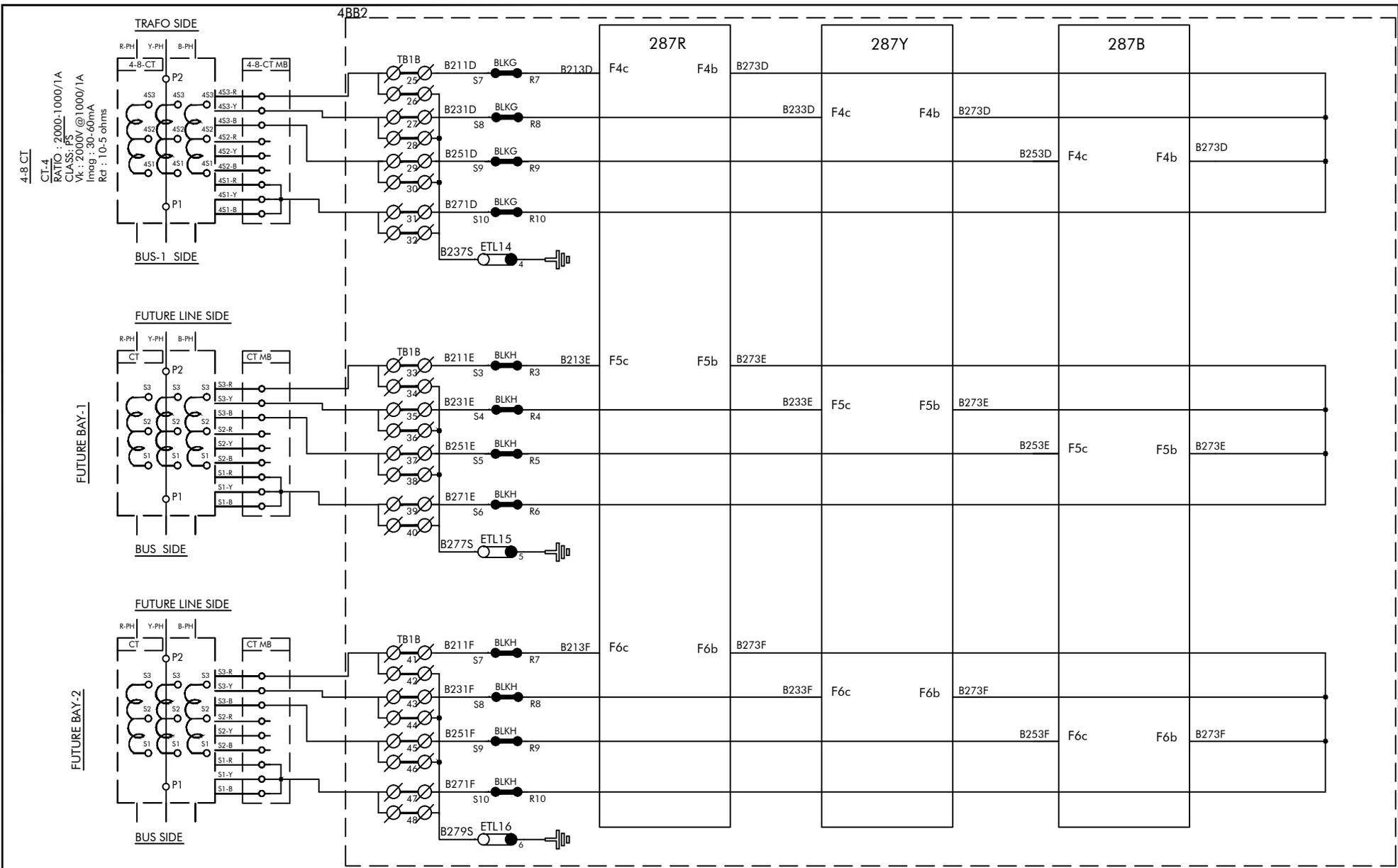
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BASE FILE:	
SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
 ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
 FILE: DR860425
TITLE: 400KV BUSBAR PROTECTION
 B/B PROT-N-2 - CT CKT

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 25 OF 43	



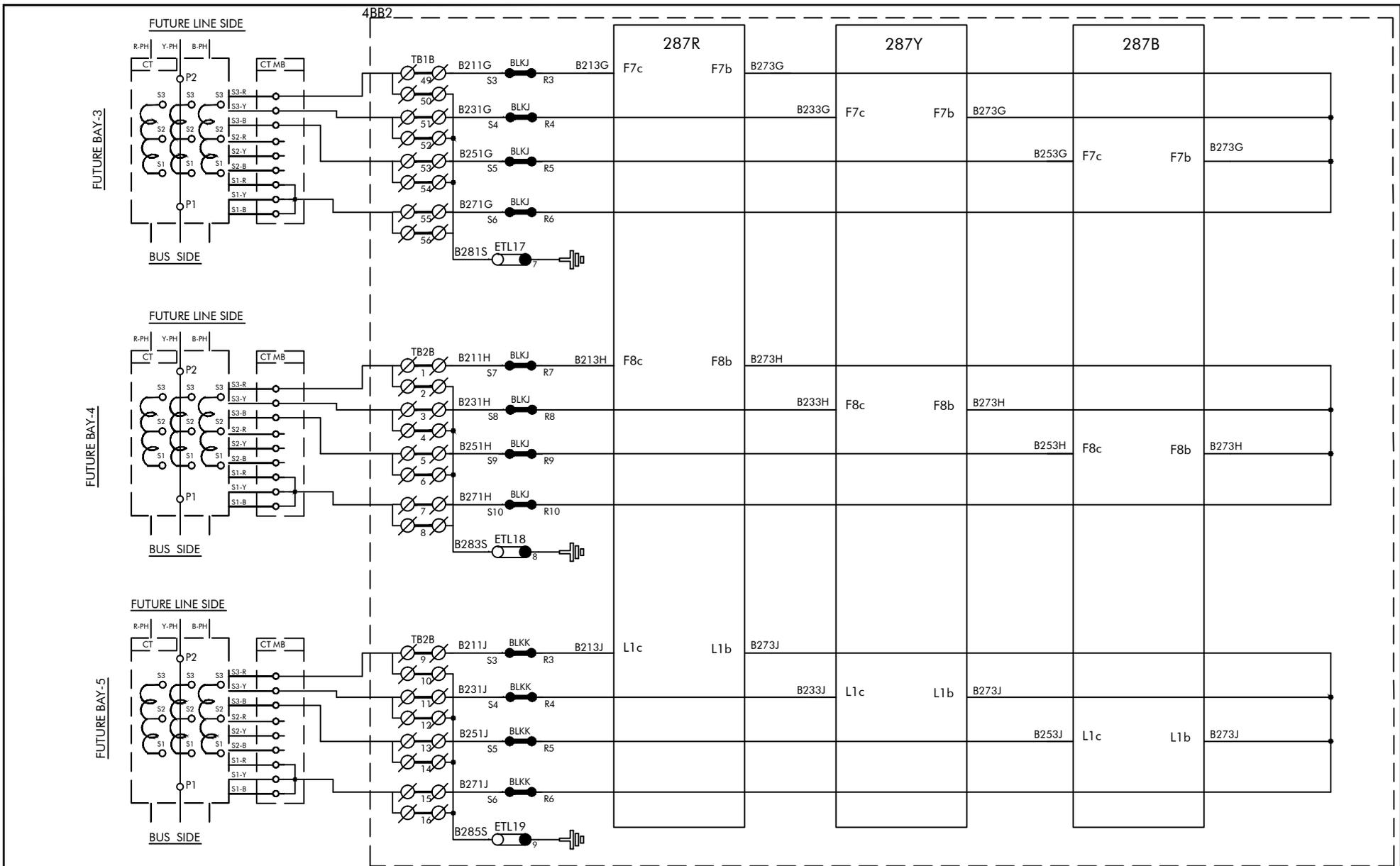
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 SALES ORDER: 3269020739

CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15



SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
TITLE: 400KV BUSBAR PROTECTION
 B/B PROT-N-2 - CT CKT
 FILE: DR860426

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 26 OF 43	



FOR ALSTOM REF: ENGG.REF.NO.: KR86
 SCHEME TYPE: BUSBAR
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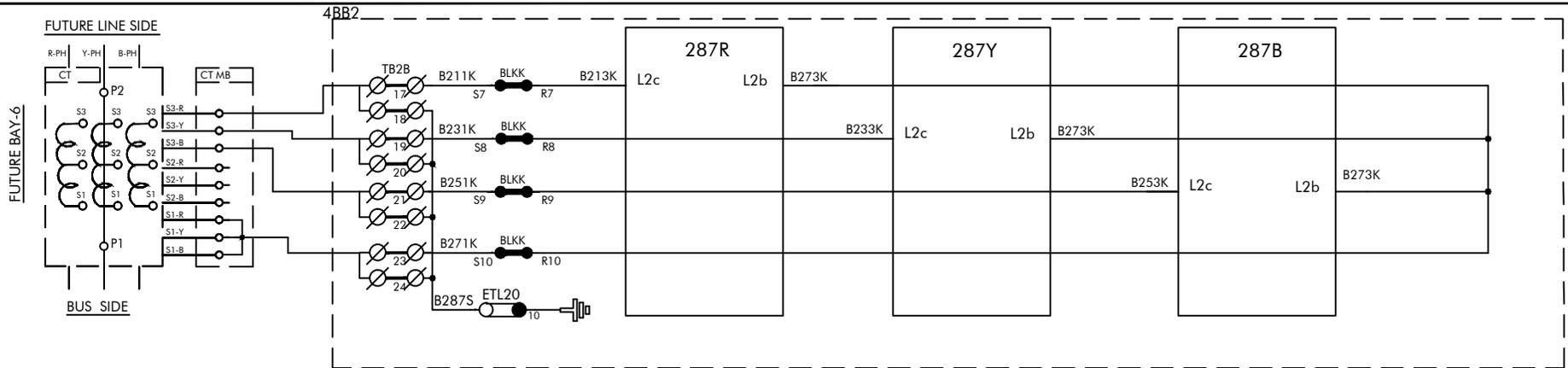
CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

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 ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
 TITLE: 400KV BUSBAR PROTECTION
 B/B PROTIN-2 - CT CKT

FILE: DR860427

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 27 OF 43	



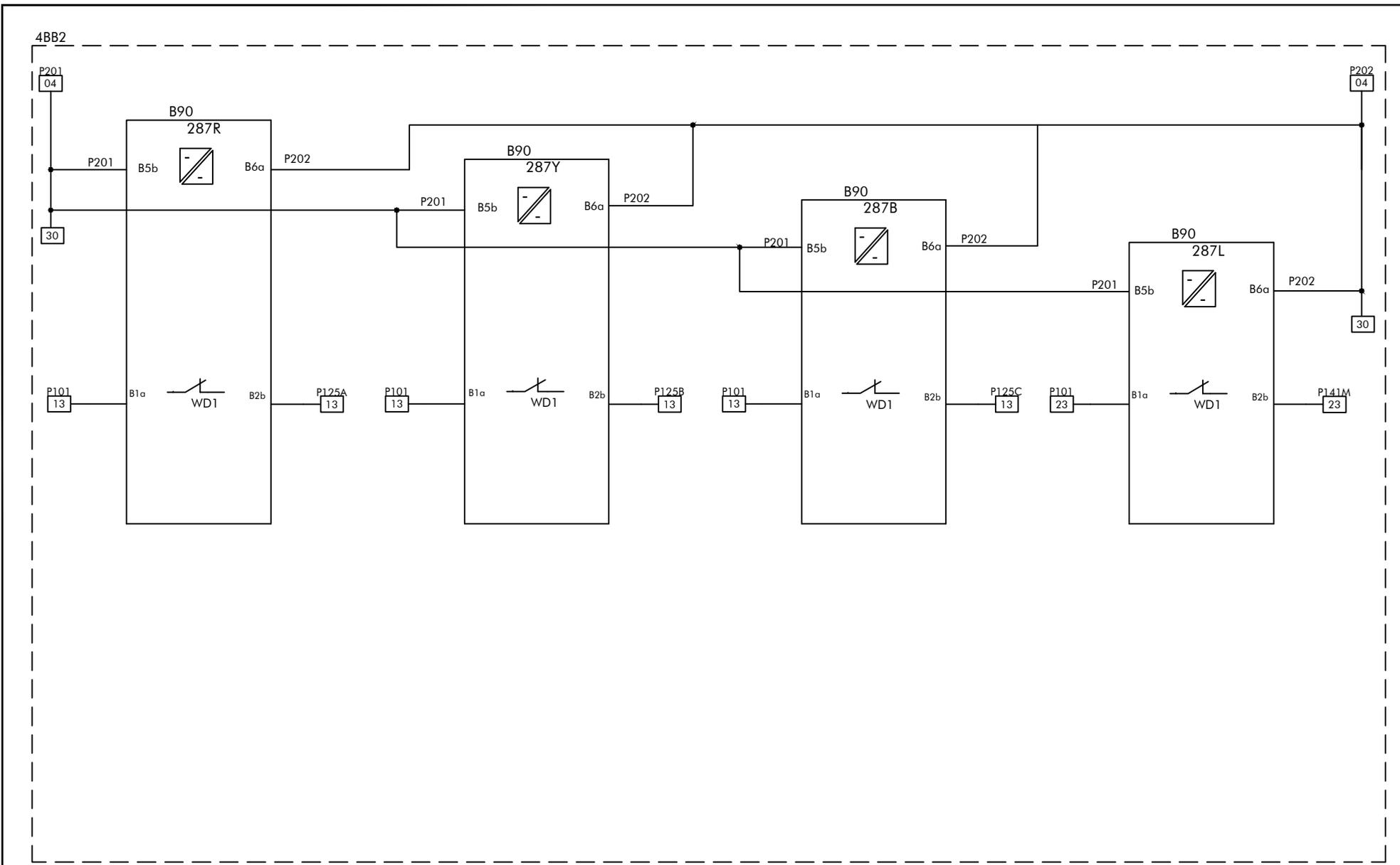
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BASE FILE:	
SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15


ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860428
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTN-2 - CT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 28 OF 43	



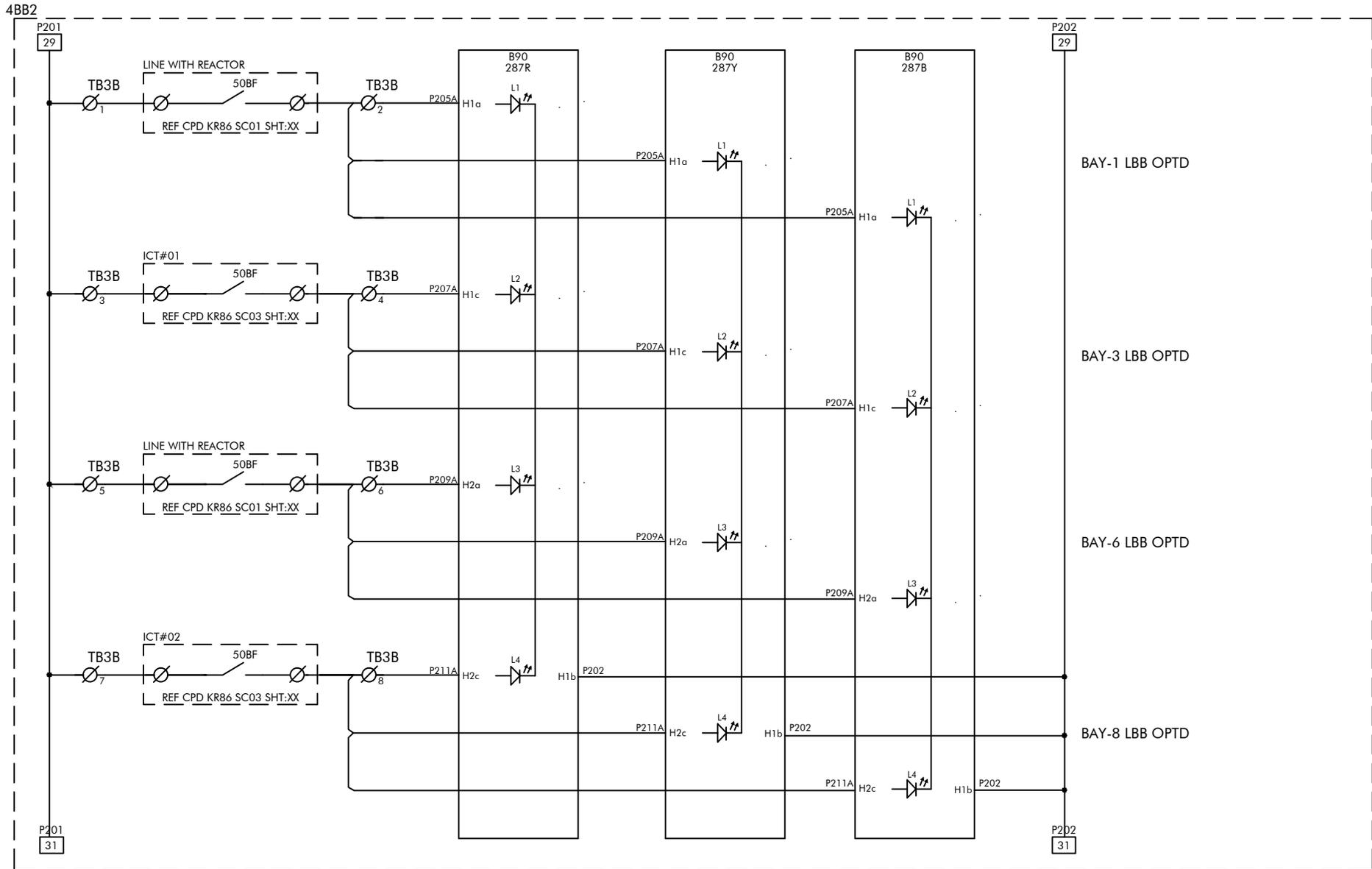
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 SALES ORDER: 3269020739

CUSTOMER: ALSTOM T&D INDIA LTD
 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

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ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
 TITLE: 400KV BUSBAR PROTECTION INDICATION MAIN-2 CIRCUIT
 FILE: DR860429

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 29 OF 43	



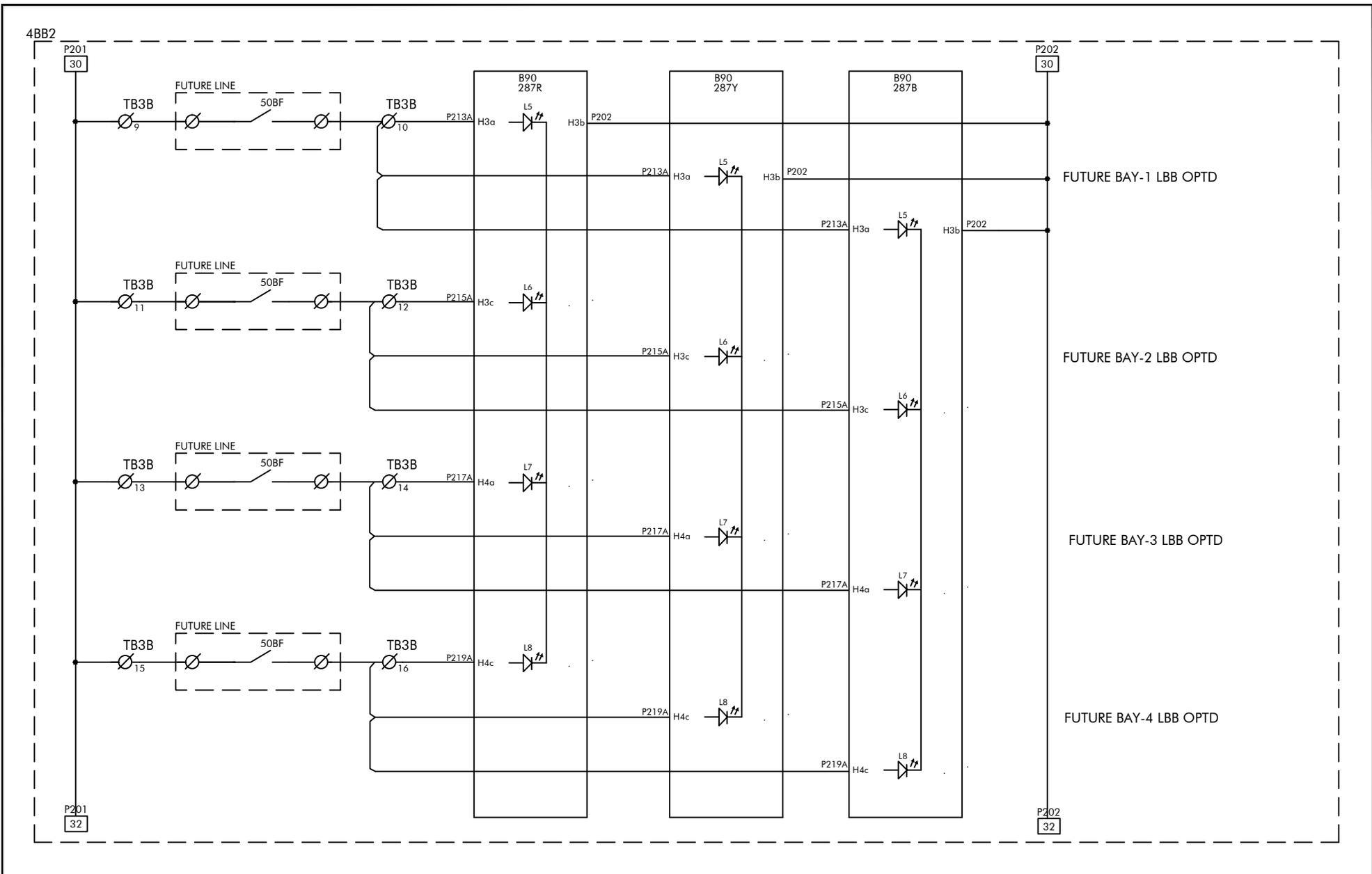
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SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O. NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860430
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTIN-2 - INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 30 OF 43	



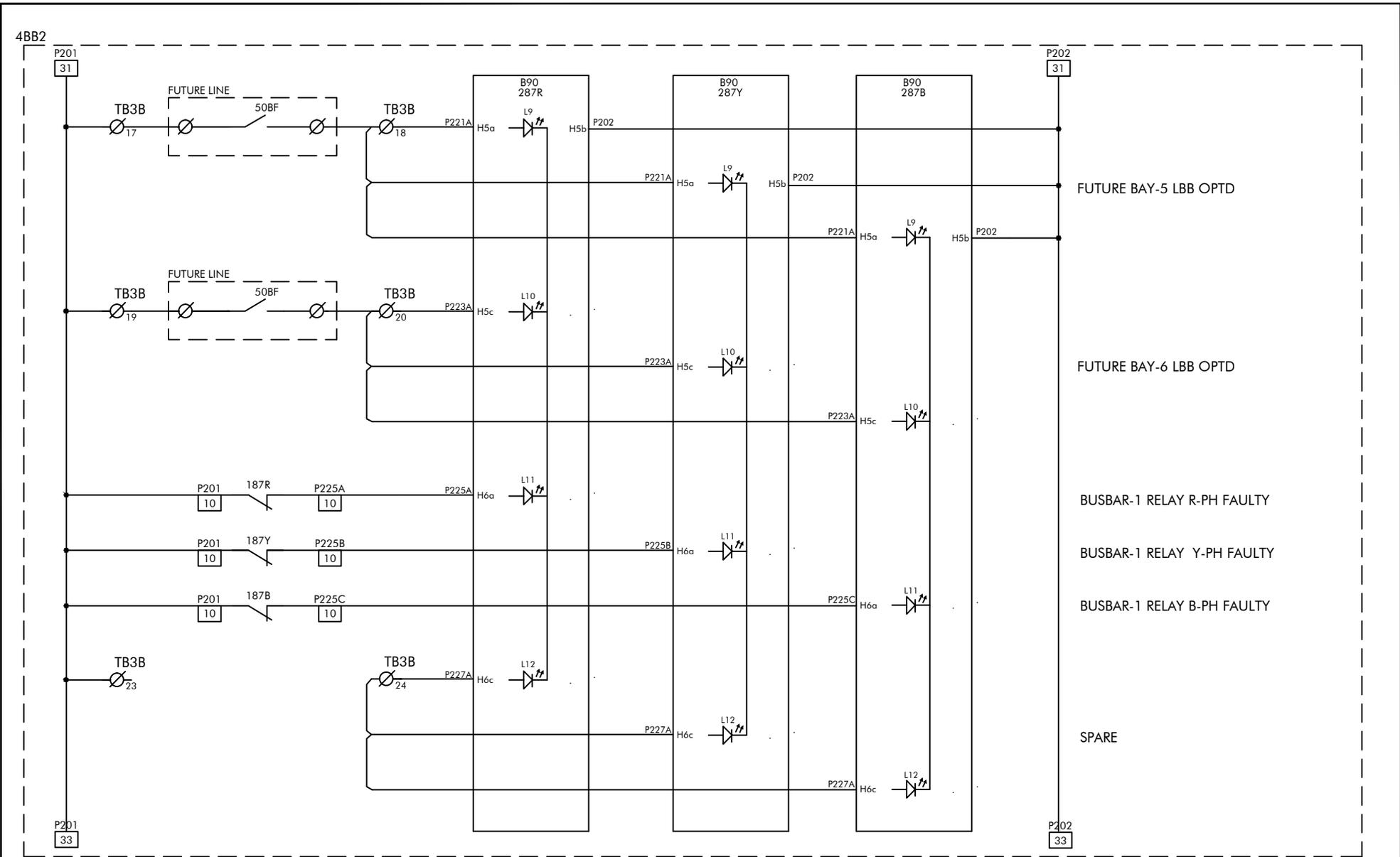
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BASE FILE:	
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CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860431
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTIN-2 - INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 31 OF 43	



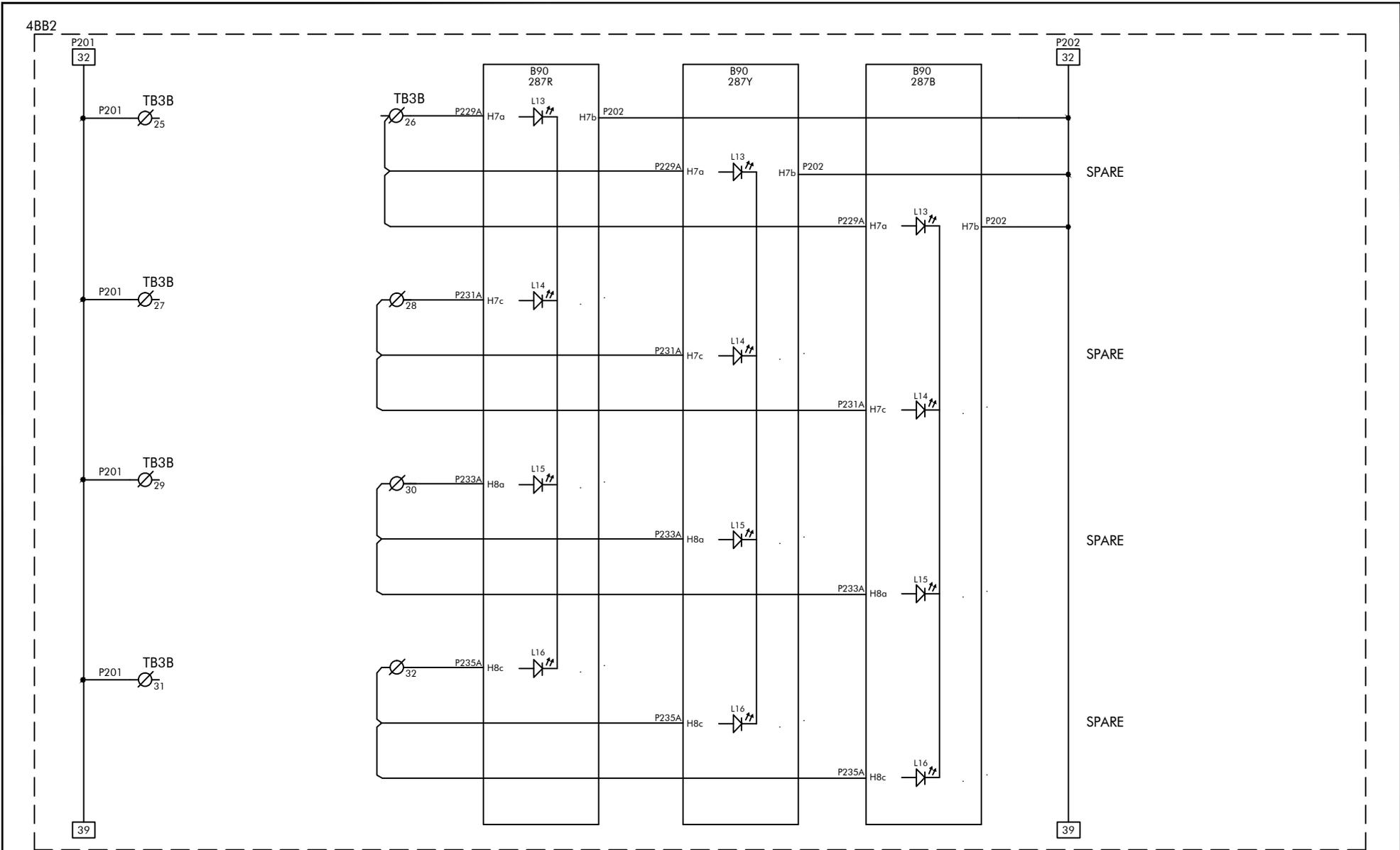
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CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860432
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTN-2 - INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 32 OF 43	



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
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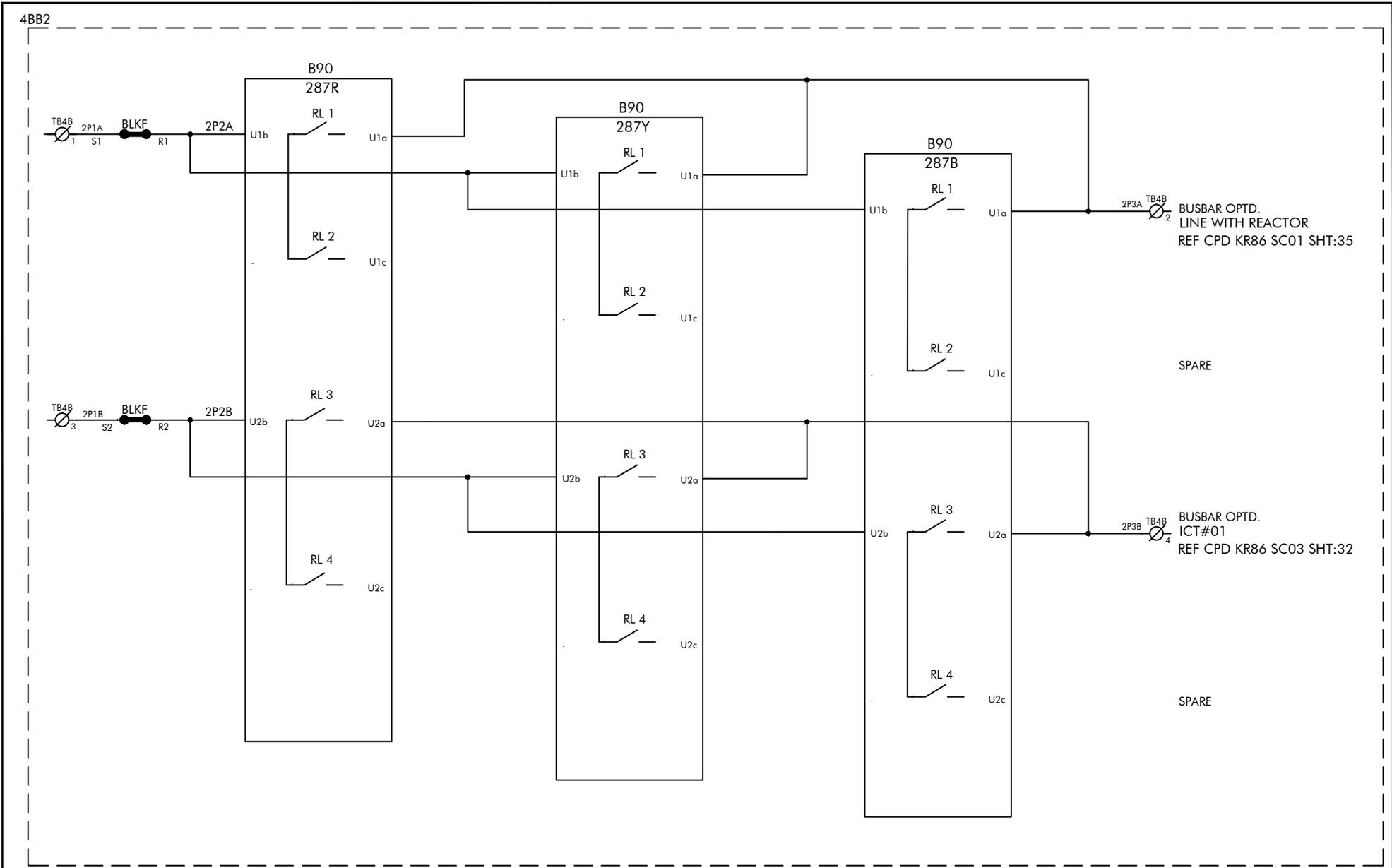
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 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

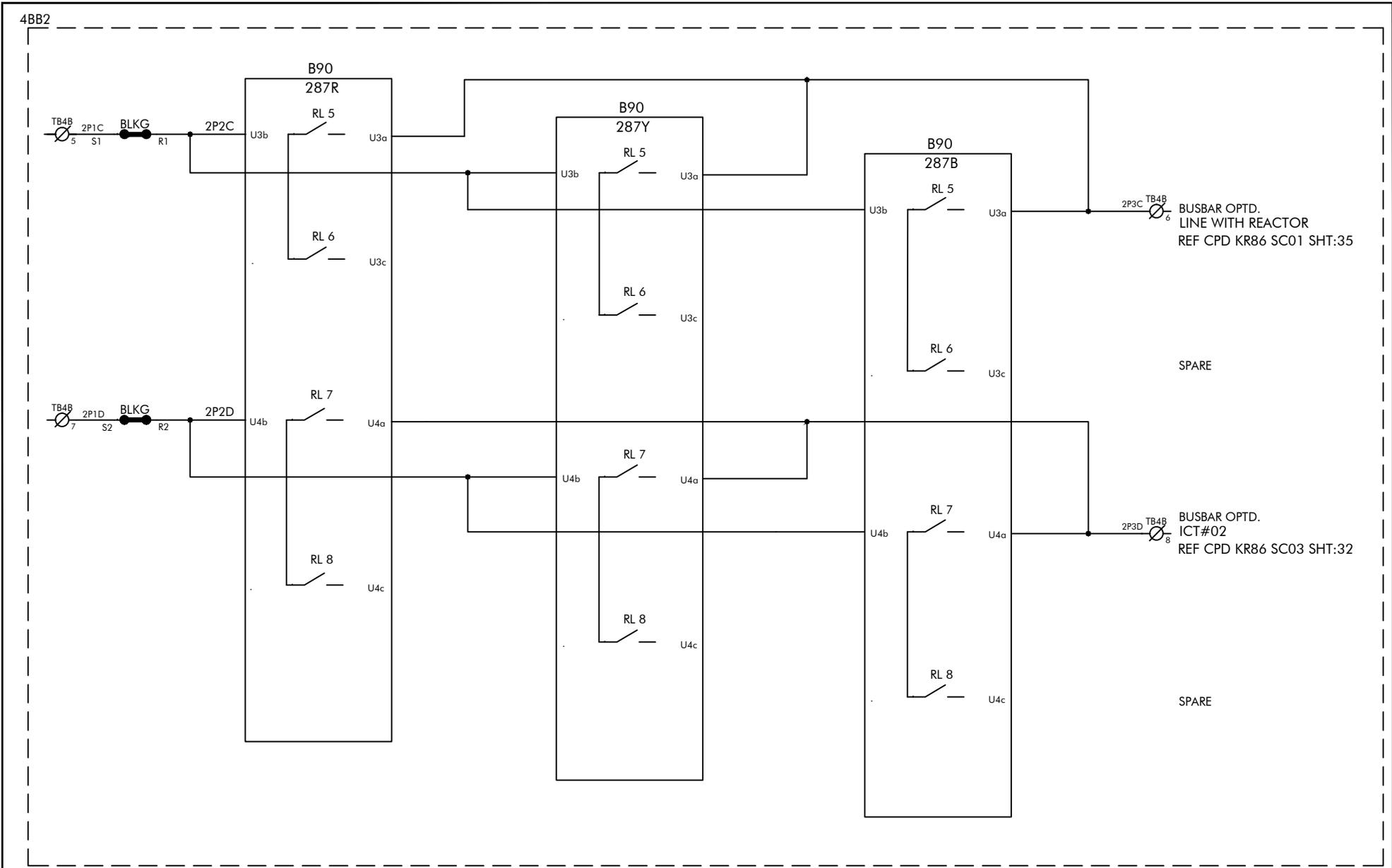
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B/B PROTIN-2 - INPUT CKT

FILE: DR860433

PREPARED BY: SJ	REVISION: B
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APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 33 OF 43	



FOR ALSTOM REF:	ENGG.REF.NO.: KR86	CUSTOMER: ALSTOM T&D INDIA LTD	ALSTOM ALSTOM T&D India Limited - AUTOMATION SAS PALLAVARAM CHENNAI 600043	SCHEMATIC DRAWING	PREPARED BY: SJ	REVISION: B
SCHEME TYPE: BUSBAR	PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR	PANEL TYPES: 4BB1 4BB2		FILE: DR860434	CHECKED BY: PSK	DATE: 08.04.2016
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FOR ALSTOM REF:	ENGG.REF.NO.: KR86
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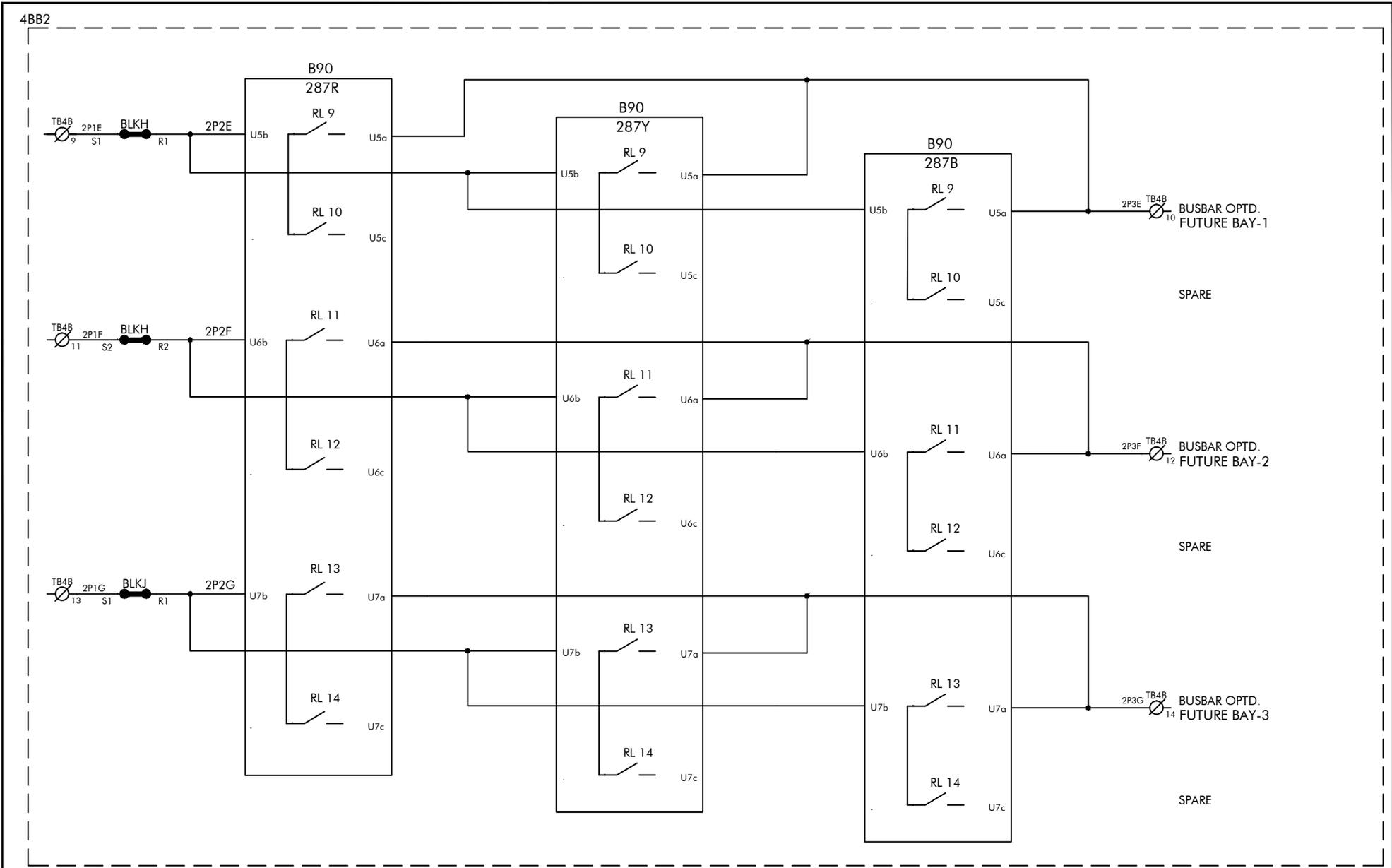
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 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

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 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
TITLE: 400KV BUSBAR PROTECTION
 B/B PROTIN-2 - OUTPUT CKT

FILE: DR860435

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 35 OF 43	



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
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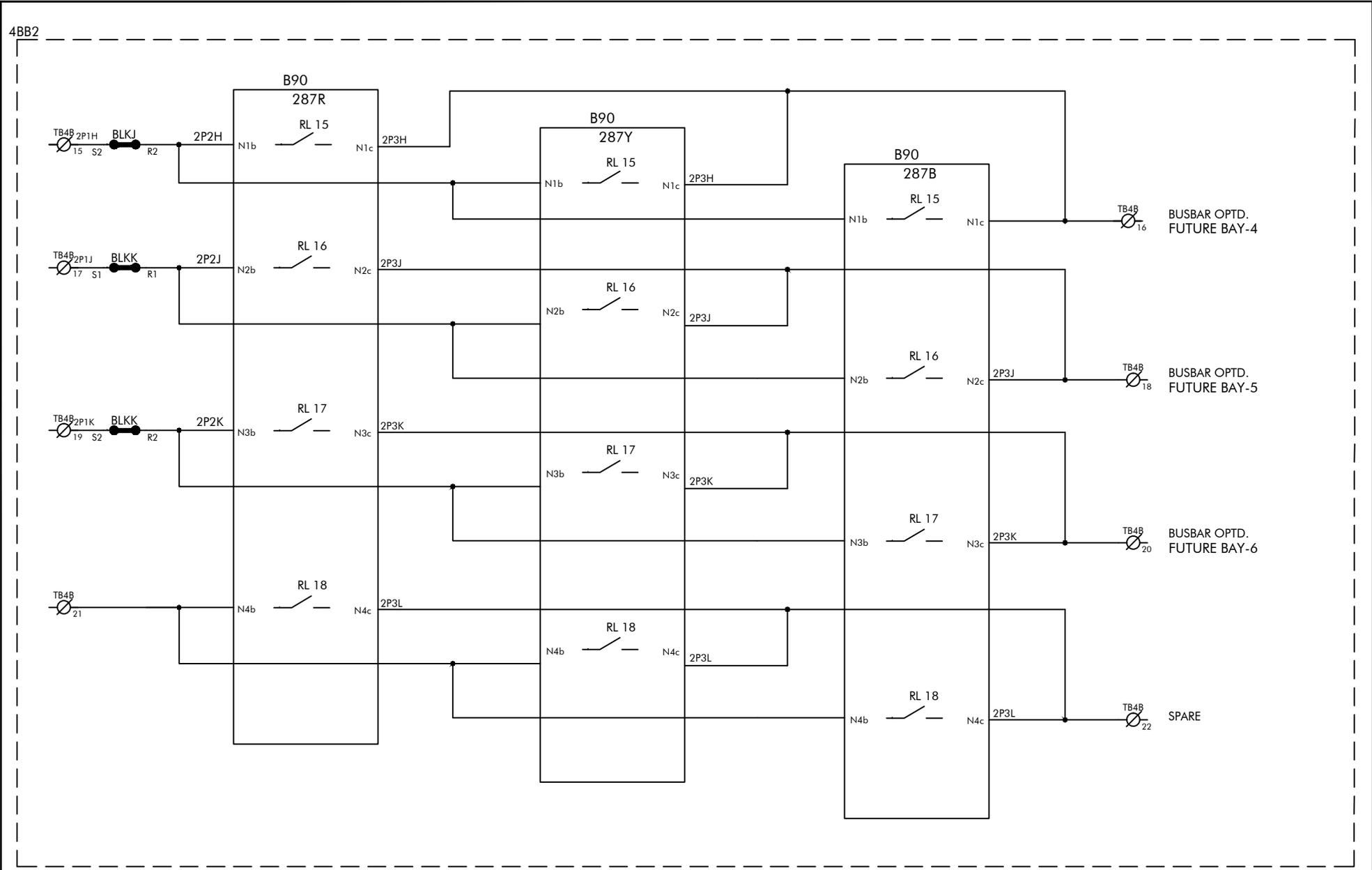
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 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
TITLE: 400KV BUSBAR PROTECTION
 B/B PROTIN-2 - OUTPUT CKT

FILE: DR860436

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 36 OF 43	



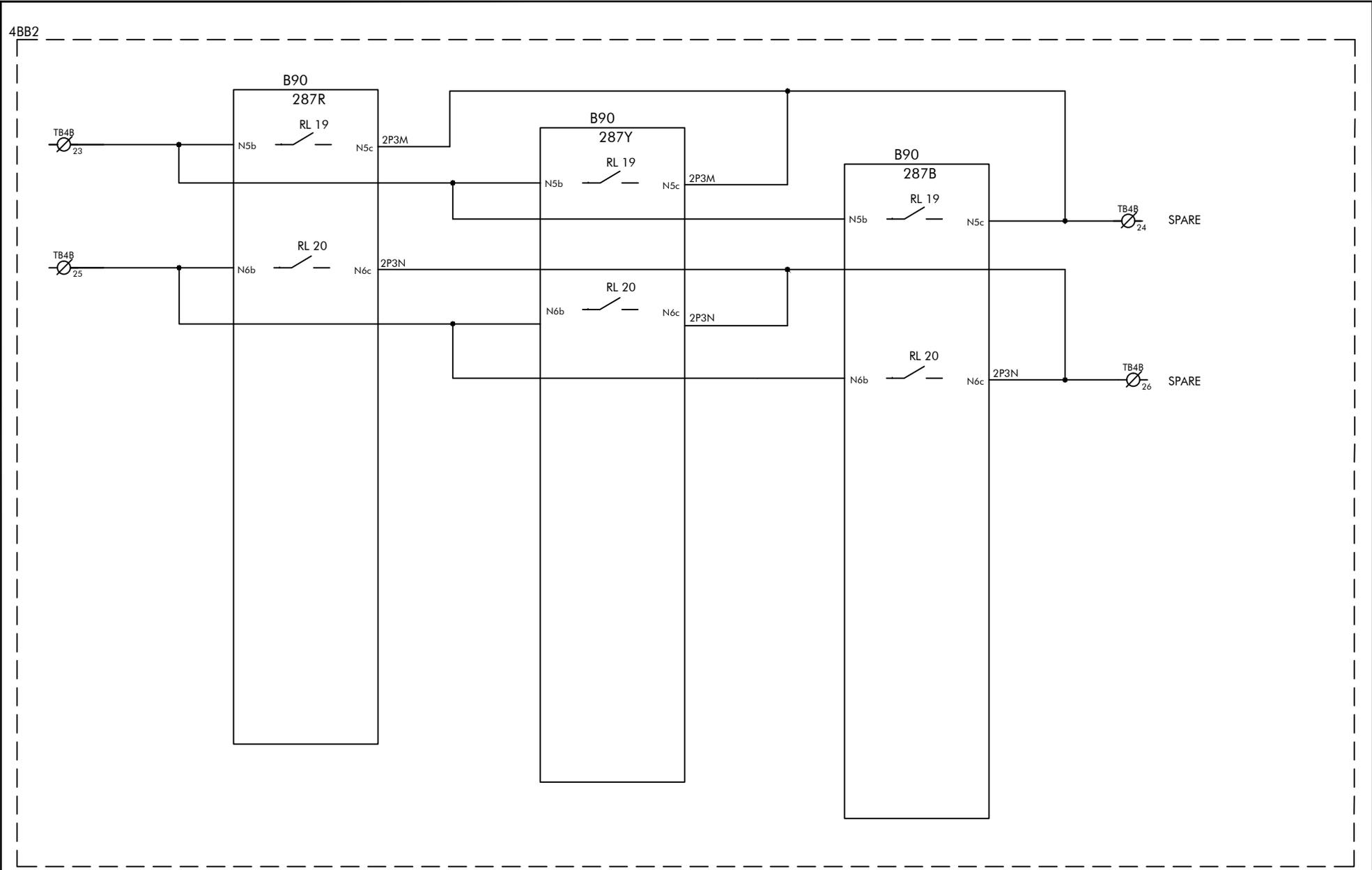
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CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O. NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860437
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROT-2 - OUTPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 37 OF 43	



FOR ALSTOM REF: ENGG.REF.NO.: KR86
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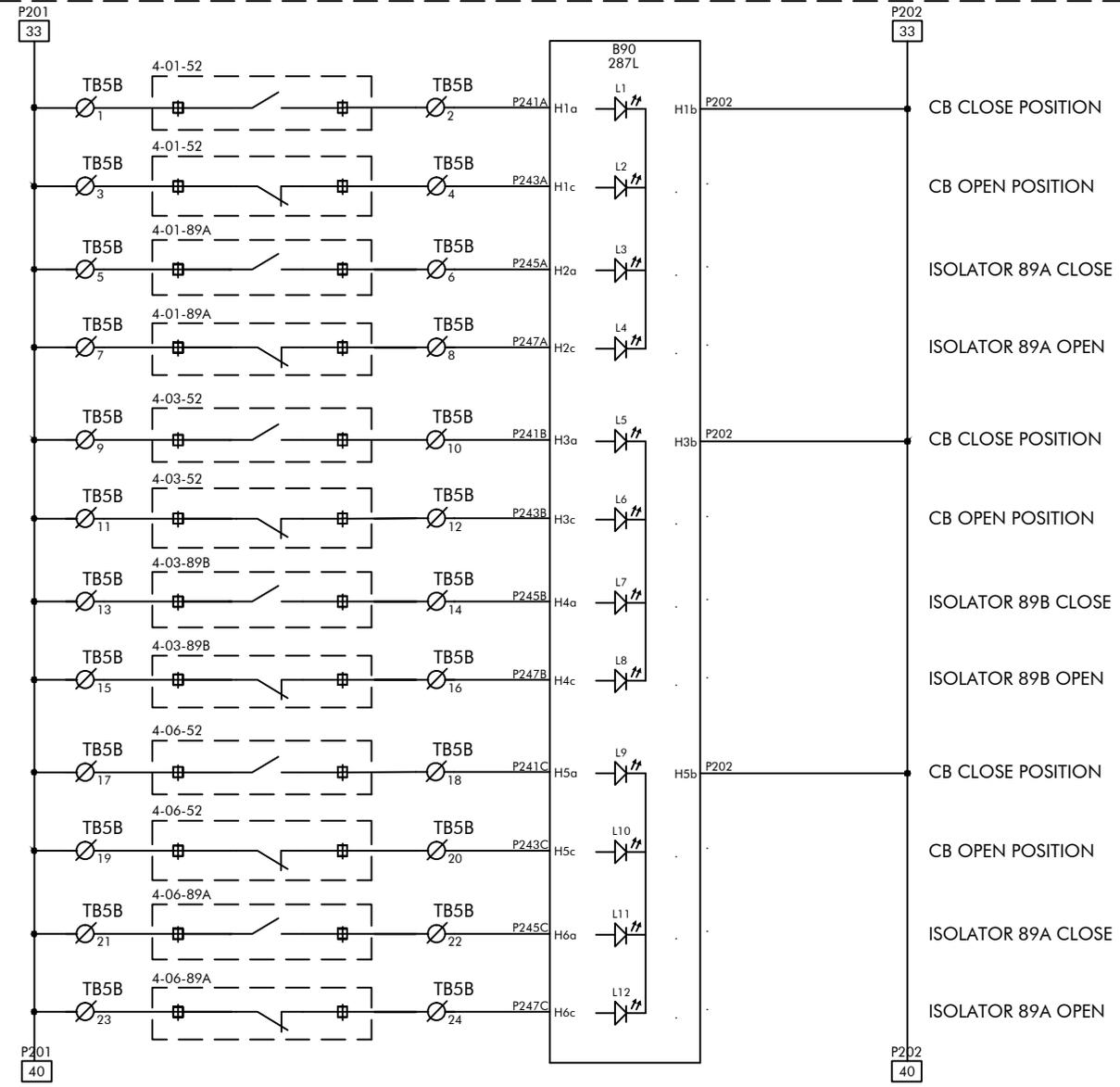
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 PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
 P.O.NO.: 5427-4500793242
 Dated 22.06.15

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 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING
 PANEL TYPES: 4BB1 4BB2
 FILE: DR860438
TITLE: 400KV BUSBAR PROTECTION
 B/B PROT-N-2 - OUTPUT CKT

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 38 OF 43	

4BB2



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
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BASE FILE:	
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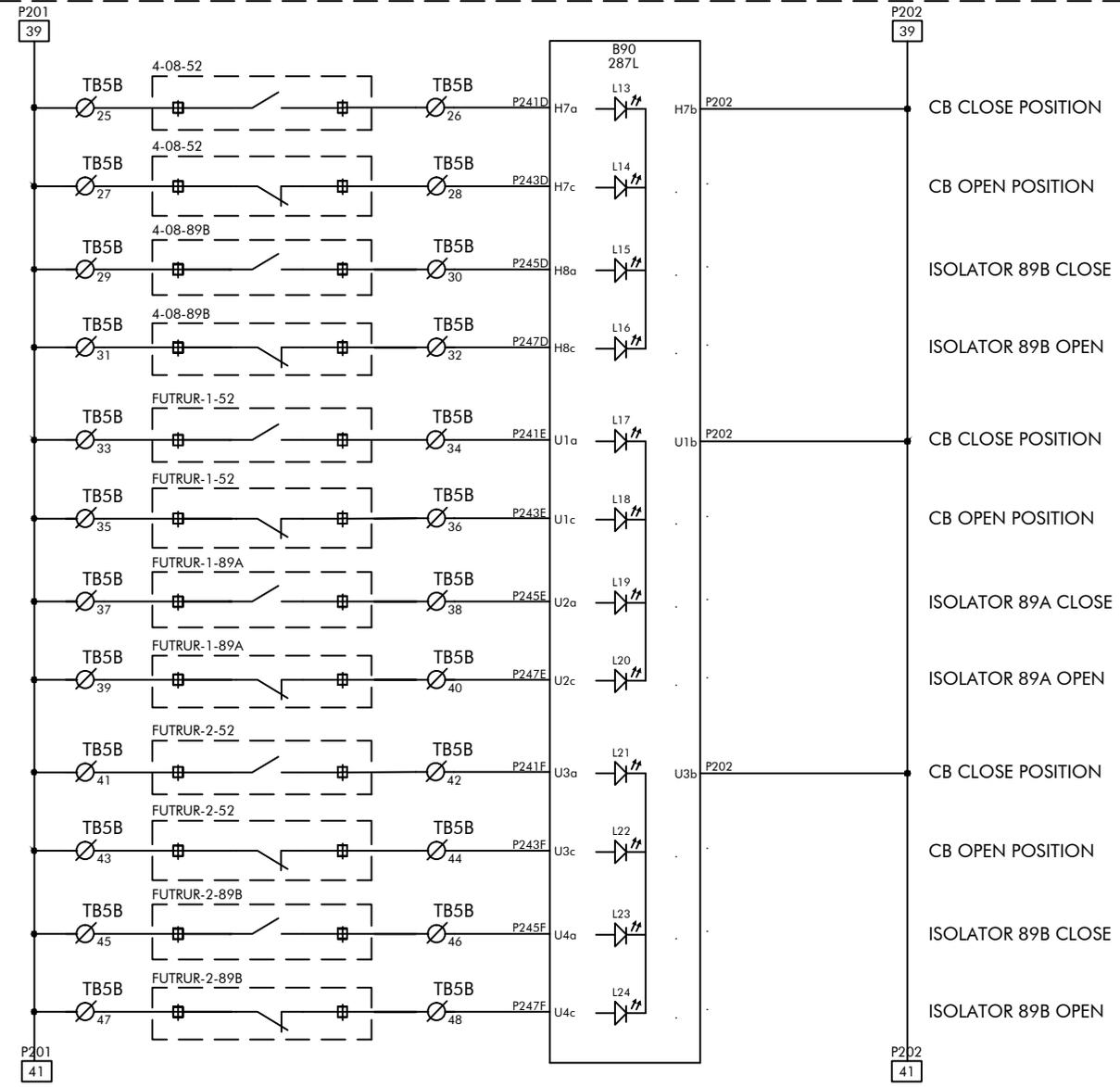
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PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860439
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTIN-2 - LOGIC INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 39 OF 43	

4BB2



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
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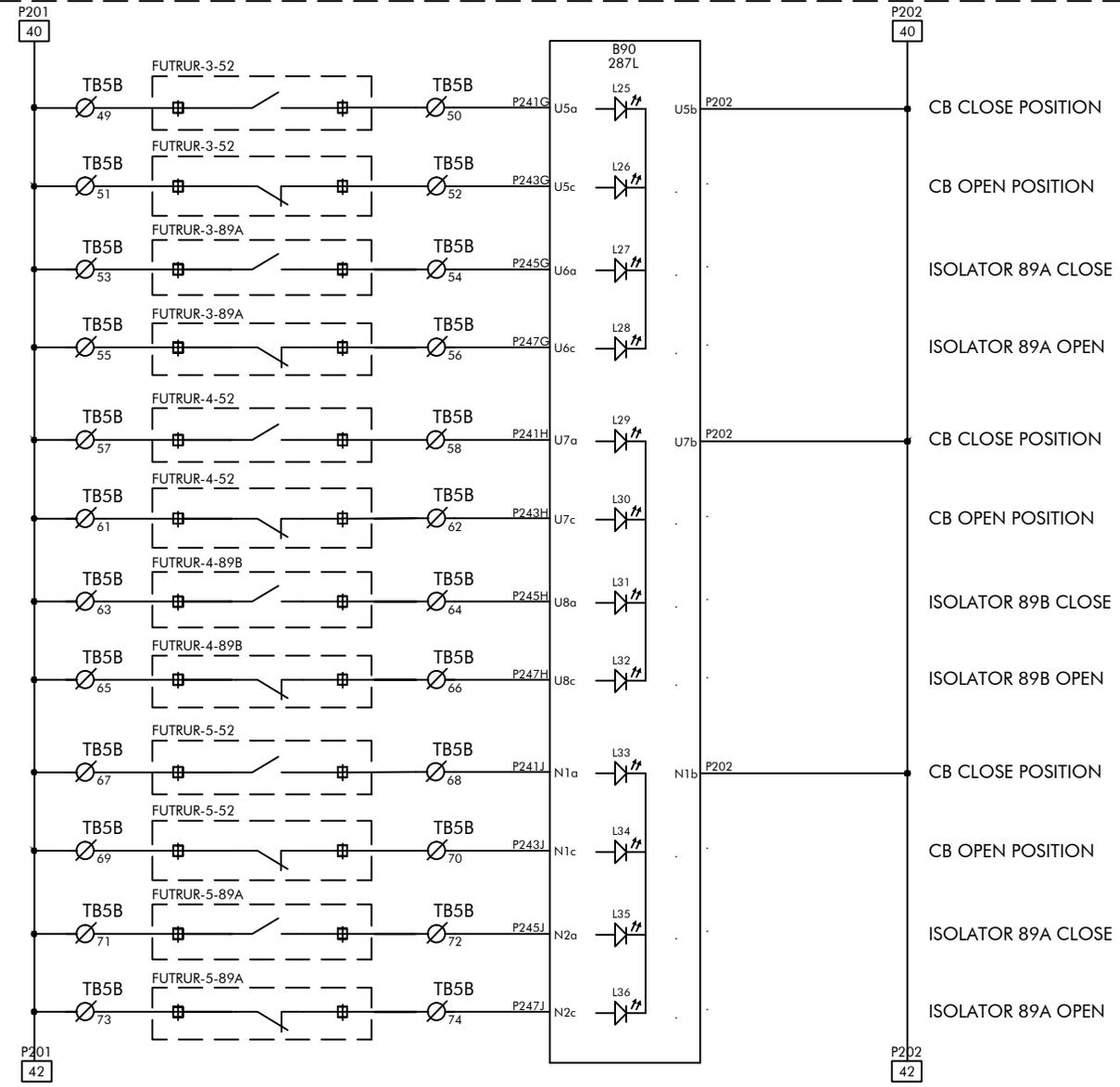
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PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

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ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860440
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTN-2 - LOGIC INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 40 OF 43	

4BB2



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

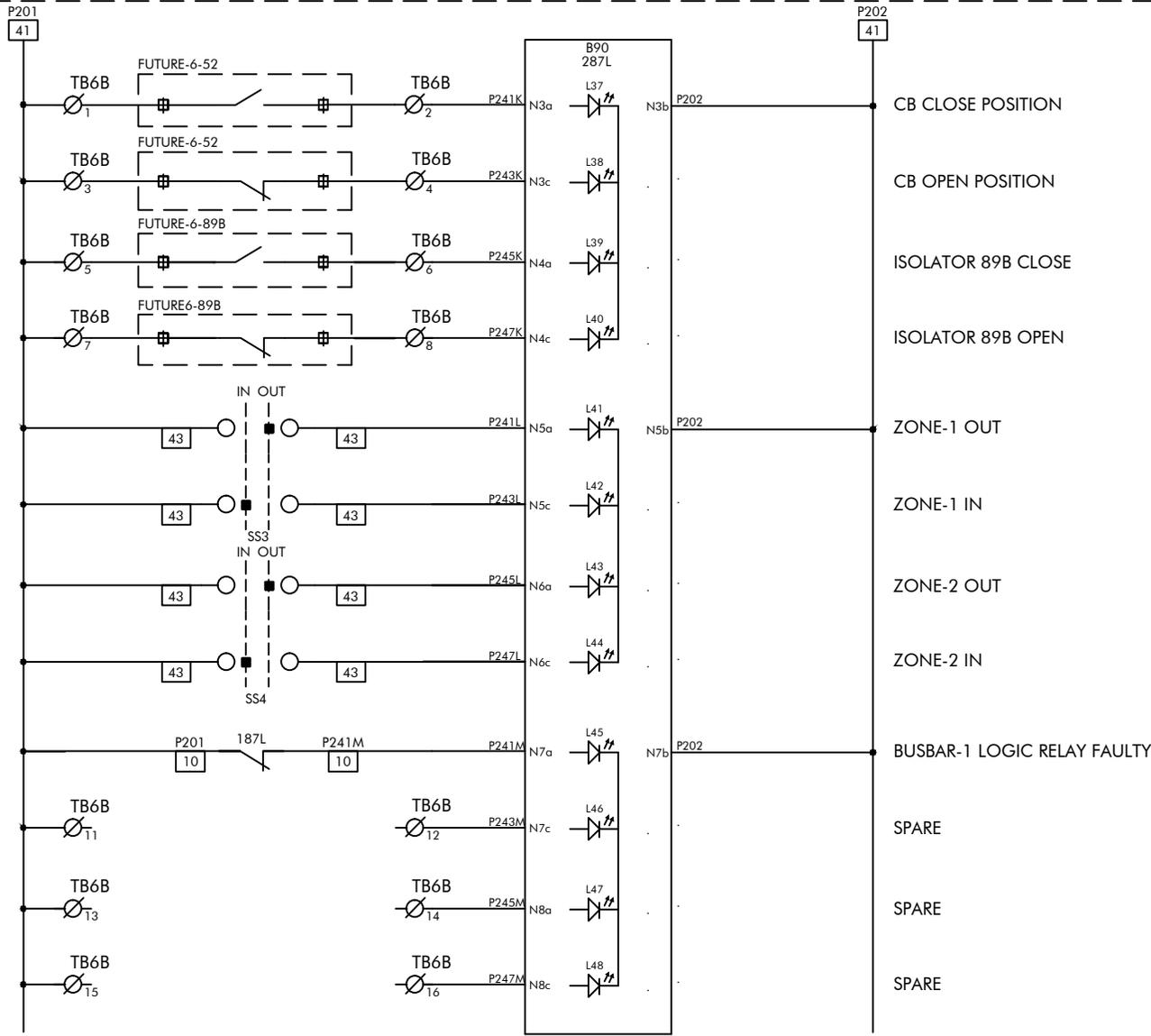
CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860441
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTN-2 - LOGIC INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 41 OF 43	

4BB2



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

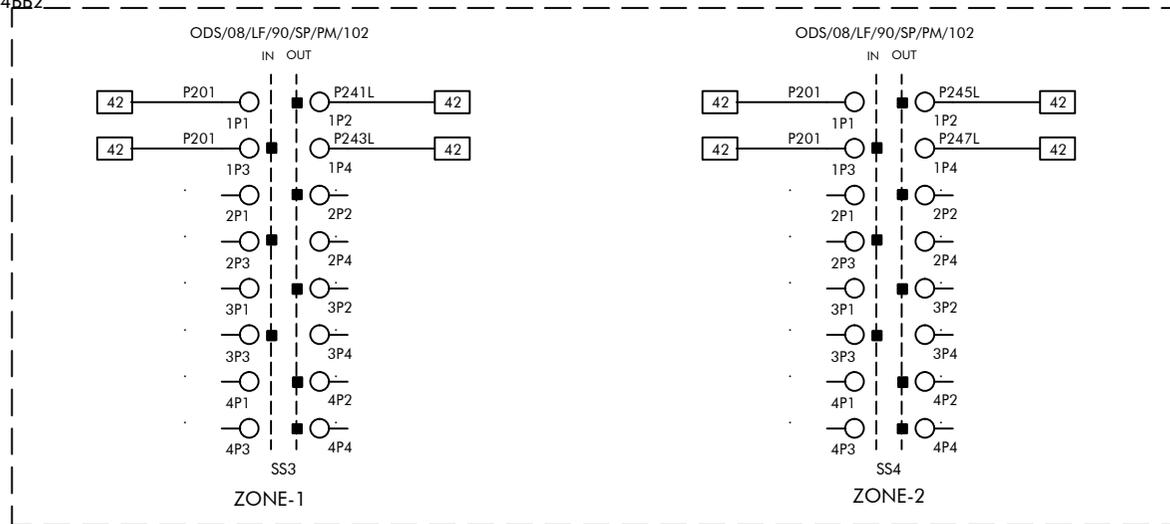
CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM
ALSTOM T&D India Limited - AUTOMATION SAS
 PALLAVARAM CHENNAI 600043

SCHEMATIC DRAWING	FILE: DR860442
PANEL TYPES: 4BB1 4BB2	
TITLE: 400KV BUSBAR PROTECTION	
B/B PROTIN-2 - LOGIC INPUT CKT	

PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 42 OF 43	

4BB2



FOR ALSTOM REF:	ENGG.REF.NO.: KR86
SCHEME TYPE: BUSBAR	
BASE FILE:	
SALES ORDER: 3269020739	

CUSTOMER: ALSTOM T&D INDIA LTD
PROJECT: 400/220/33kV CRP + SAS, CSPTL, JAGDALPUR
P.O.NO.: 5427-4500793242
Dated 22.06.15

ALSTOM

ALSTOM T&D India Limited - AUTOMATION SAS

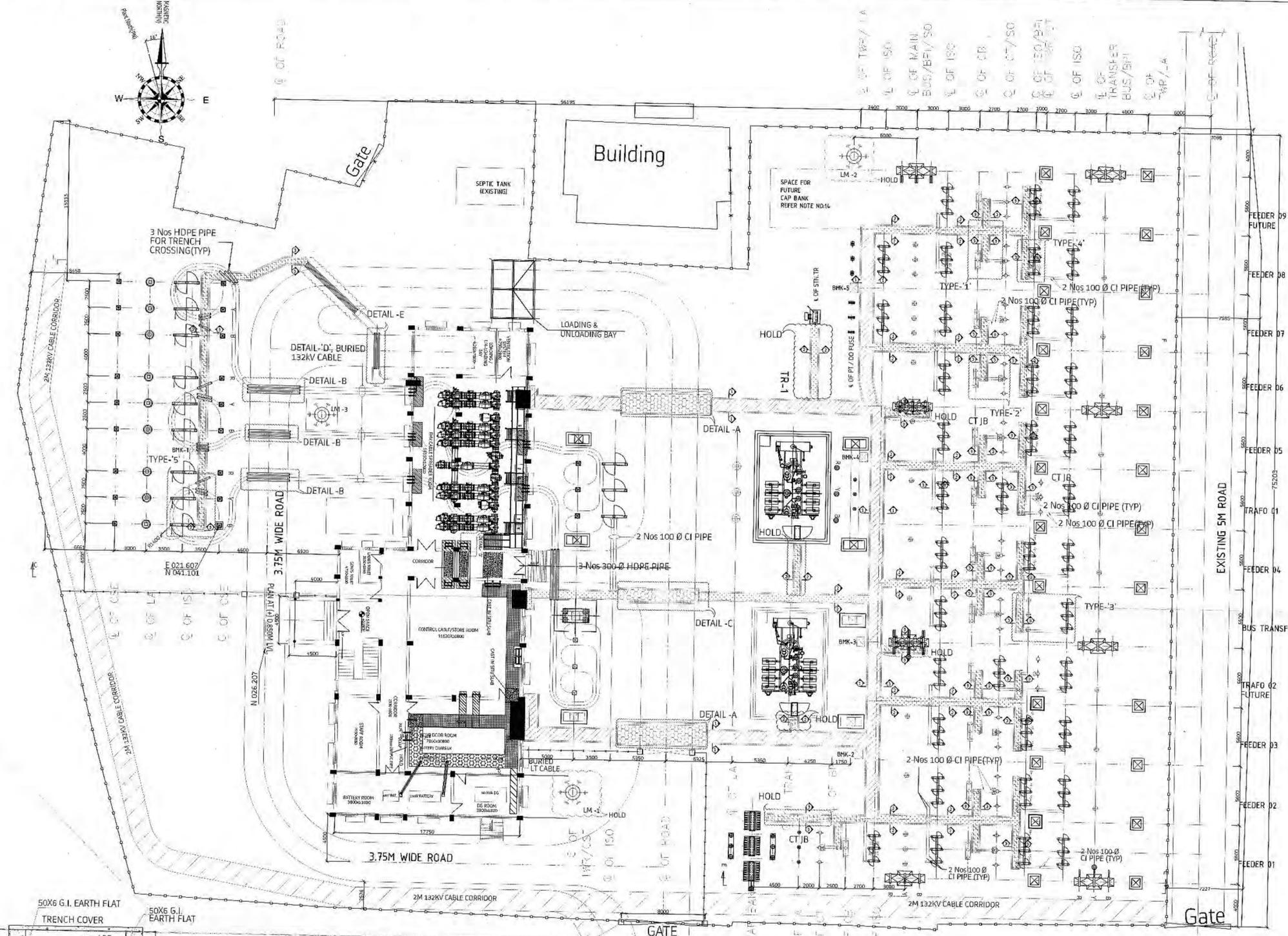
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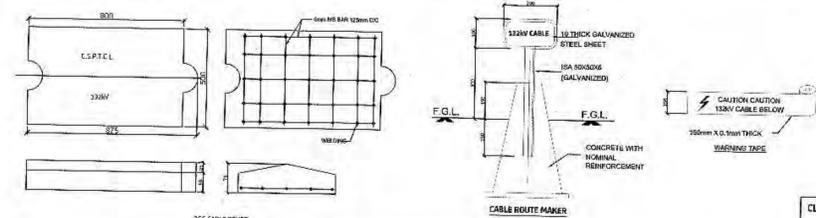
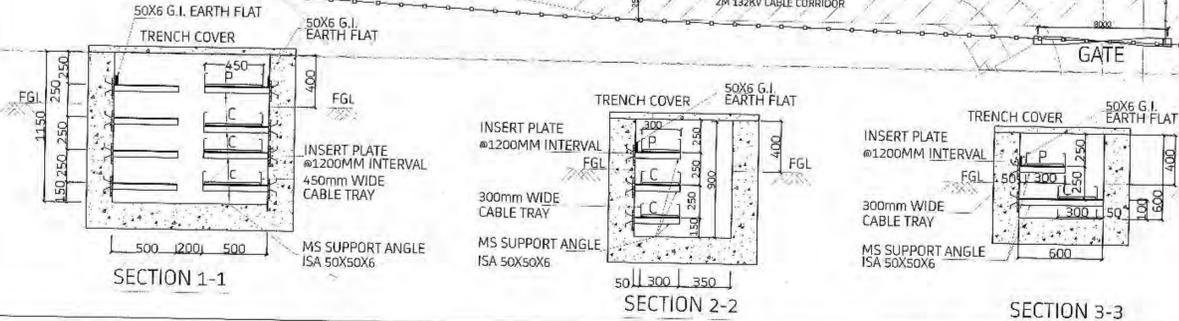
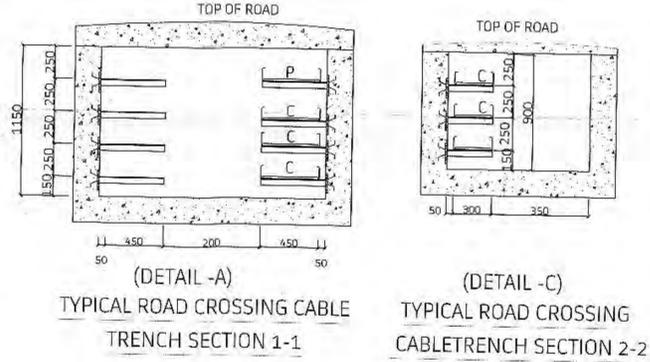
PREPARED BY: SJ	REVISION: B
CHECKED BY: PSK	DATE: 08.04.2016
APPROVED BY: SSS	SCALE: --
DRG. NO.: CPD KR86 SC04 SHT 43 OF 43	

Outdoor Cable Trench Layout

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- NOTES:-**
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
 - THIS DRG. HAS TO BE REFERRED FOR CABLE TRENCH ROUTING LAYOUT ONLY. FOR CONSTRUCTION DETAILS RELATED TO CIVIL WORK REFER RELEVANT CIVIL DRGS.
 - SEPARATE PIPES SHALL BE PROVIDED FOR POWER & CONTROL CABLES.
 - WHILE ROUTING CABLE TRENCH/PIPE NEAR ISOLATORS, SPACE FOR AUX. EARTH MAT BELOW MOM FOR MAIN AND EARTH BLADE TO BE ENSURED. REROUTING IF ANY SHALL BE DONE ACCORDINGLY.
 - POWER & CONTROL CABLES IN THE CABLE TRENCH SHALL BE LAID IN SEPARATE TIERS. THE ORDER OF LAYING OF VARIOUS CABLE SHALL BE AS FOLLOWS, FOR CABLES OTHER THAN DIRECTLY BURIED.
 - POWER CABLES ON TOP TIERS. (Max. 1 LAYER)
 - CONTROL, INSTRUMENTATION & OTHER SERVICE CABLES IN BOTTOM TIERS (2-LAYERS).
 - CABLE ENTRY TO THE BMK AND LIGHTING PANEL SHALL BE DECIDED AFTER FINALIZATION OF VENDOR DRG.
 - THE CABLE TRENCH ROUTES SHALL BE MODIFIED AT SITE (RE-ROUTED), IF FOULING WITH TOWER/EQUIPMENT FOUNDATION BASED ON FOUNDATION LAYOUT.
 - CABLES SHALL BE LAID ON CABLE TRAYS. THE DISTANCE BETWEEN SUPPORT ANGLES SHALL BE 1200MM(max).
 - DETAILS CABLE TRENCH ENTRY INTO CONTROL BUILDING IS SHOWN IN DRG. NO. 5427PK090-RAW-E-SYD-SYS-0011-GA.
 - DIMENSION OF BMK ARE TENTATIVE & OPENING OF BMK IN TRENCH IS UNDER HOLD.
 - AT CABLE BENDS/TEE OFFS SHARP CORNERS TO BE CHAMFERED.
 - FOR SLOPE OF CABLE TRENCH REFER RELEVANT CIVIL DRAWING.
 - ALL SUPPORT ANGLE SHALL BE L 50 X 50 X 6.
 - BURIED TRENCH SHALL BE USED FOR LIGHTING CABLES WHEREVER MAIN TRENCH SHALL NOT BE AVAILABLE. AND SHALL BE SHOWN SEPARATELY IN LIGHTING LAYOUT.
 - THIS LAYOUT IS APPLICABLE FOR OUTDOOR TRENCH ONLY. INDOOR TRENCH SHOWN HERE IS INDICATIVE ONLY. FOR DETAIL INDOOR CABLE TRENCH LAYOUT PLEASE REFER DRG NO:5427PK090-RAW-E-SYD-SYS-0011-GA.
 - SUITABLE NO & DIA OF HOLES SHALL BE KEPT AT TRENCH WALL FOR ENTRY OF CABLE FROM EQUIPMENT TO TRENCH.
 - DETAIL TRENCH SECTION AT /NEAR CONTROL ROOM ENTRY WILL BE FURNISHED SEPARATELY IN RELEVANT CIVIL DRAWING.
 - SUITABLE CABLE CLEATS SHALL BE USED INSIDE CONTROL ROOM BUILDING FOR LAYING OF HT CABLE IN THE GROUND FLOOR.



LEGEND

	CABLE TRENCH SECTION 1-1
	CABLE TRENCH SECTION 2-2
	CABLE TRENCH SECTION 3-3

REV. No.	DESCRIPTION	DATE	DRAWN	ELE.	CIVIL	MECH.	APPROVED	STATUS
3	CABLE ROUTING REVISED AS PER C.S.P.T.C.L OBSERVATION AT SITE DTD. 08.12.15	08.12.15	AC	RSB		BM		FOR INFORMATION
1	REVISED AS PER DISCUSSION WITH CSP.T.C.L ON 28.11.2014	05.12.14	DS	RSB		BM		FOR APPROVAL
0	FIRST SUBMISSION	04.11.14	DS	RSB		BM		FOR APPROVAL

CLIENT:- CHATTISHGARH STATE POWER TRANSMISSION CO. LTD.

PROJECT:- CONSTRUCTION OF 132/33KV GIS SUBSTATION, RAWANBHATA (RAIPUR)

LOA NO:- 02-04/SS/RT/10-11/11/SUPPLY/ASD DT 04/09/14
02-04/SS/RT/10-11/11/ASST DT 04/09/14
02-04/SS/RT/10-11/11/ETC/4622 DT 04/09/14

TITLE:- OUT DOOR CABLE TRENCH LAYOUT

ALSTOM
ALSTOM T & D INDIA LTD
Office of EDC/CE(Transmission), CSP.T.C.L., Raipur

DRAWING NO. 5427PK090-RAW-E-SYD-SYS-0012-CN

TOTAL SH. 2 SH. NO. REV. 2
SCALE NTS 1:02 3

This drawing is provided for on-going work. It is subject to revision of 132/33 KV GIS substation, Rawanbhata, sub-station to condition (as per) of the T.O. letter No. 3051 dtd. 28/12/15. Further, conveying approval of the drawing. Further, following conditions shall also be applicable: Approval of the drawing does not absolve the contractor/supplier from responsibility of providing material as per our tender specification & or deviation shall be allowed. If any shortcoming is found at a later stage, the material shall be liable for rejection.

Signature: E.E(SIS)
Office of EDC/CE(Transmission), CSP.T.C.L., Raipur

Hydrant Layout for Outdoor Switchyard

Soil Testing Report Part 1

CSPTCL

छत्तीसगढ़ स्टेट पावर ट्रांसमिशन कंपनी लिमिटेड

छत्तीसगढ़ स्टेट पावर ट्रांसमिशन कंपनी लिमिटेड**CHHATTISGARH STATE POWER TRANSMISSION CO. LTD.**(A SUCCESSOR COMPANY OF CSEB) (A GOVT. OF CHHATTISGARH UNDERTAKING)
(CIN - U40108CT2003SGC015820)**OFFICE OF THE CHIEF ENGINEER (CIVIL)**

No. -04-01/ C-Trans/ 3380

To,

✓ The A.C.E. (P&P),
q/o E.D.(P&P),
C.S.P.T.C.L., Raipur (C.G.)

Raipur, Dated - 30/11/22

Sub:- Selection of Transmission service provider to establish transmission system for "Inter-regional ER-WR Interconnection" through Tariff Based Competitive Bidding (TBCB) process; Construction of 400 KV DCDS PGCIL Jeypore (Orissa)-Jagdalpur (Parchanpal) line under ISTS scheme- Requisition of soil test report of 400 KV S/s. Jagdalpur (Parchanpal) thereof.

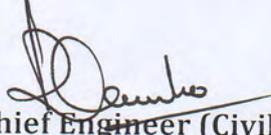
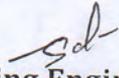
Ref:- Your office letter No.-2128, dated. 29.11.2022.

This is in context to the letter under reference, the desired soil test report of 400 KV S/s., Jagdalpur is enclosed herewith.

Encl:- Soil Test Report.

No. -04-01/ C-Trans/
Copy To:-

1. The S.E., O/o M.D., CSPTCL, Raipur.


Chief Engineer (Civil)
C.S.P.T.C.L., Raipur
Raipur, Dated -
Superintending Engineer (Civil)
O/o Chief Engineer (Civil),
C.S.P.T.C.L.; RaipurOFFICE OF THE
E. D. (P & P)
CSPTCL, RAIPUR.

Receipt No. 3374

Date.....30 NOV 2022

EE-I
KX
30/11/22

Registered Office - 3rd Floor, Vidyut Sewa Bhawan, Danganiya, Raipur, 492013, Chhattisgarh
Address - Shed No. 5, Daganiya, Raipur, Chhattisgarh - 492013, Ph. No. +91-771-2574581
Fax. +91-771-2574145, Email ID - ceciviltrans.raipur@cspc.co.in

**A
REPORT ON
SUB SOIL INVESTIGATION WORK FOR PROPOSED
400/220 KV SUBSTATION AT JAGDALPUR IN
CHATTISGARH.**

**CLIENT :
ALSTOM T & D INDIA LIMITED**

DLF IT PARK,PLOT :8

TOWER :C,BLOCK:AF

RAJARHAT,KOLKATA-156

**SOIL INVESTIGATION WORK EXECUTED AND REPORT PREPARED BY :
M. K. KAYAL & ASSOCIATES**

Year:2014

Business Address:
Fatepur,Falta
24,Pargonus (South)

Phone: 9474007359

E-mail: m.kayal25@yahoo.com



ANNEXURE
FOR

BOREHOLE
LOCATION PLAN

GENERALISED
SUBSOIL
PROFILE

BOREHOLE LOG
& TEST RESULTS

GRAPHICAL
PRESENTATION



EXECUTIVE SUMMARY:-

Purpose of Study

The overall purposes of this study are to investigate the stratigraphy at the site, and to develop geotechnical recommendations for design and construction of the foundations of the proposed Sub Station at Jagdalpur in the state of Chattisgarh.

To accomplish these purposes, the study was conducted in the following phases:

- i) Explored total 6 nos borehole up to maximum termination depth of 8.0m below EGL, in order to evaluate the stratigraphy at the site, and to collect soil samples for laboratory testing;
- ii) Testing selected soil samples in the laboratory to determine their pertinent index and engineering properties.

Sub-Soil Characteristics:-

Based on the findings of field and laboratory test results, judicious interpretation of the same with many established correlation and considered opinion, the sub-soil deposit has been classified in different stratum. The said sub-soil stratification along with respective relevant soil parameters are described in borehole log data & test result sheet in this report. The average sub-soil profile, laboratory test results, generalized sub-soil deposit with design soil Parameters and Comments on sub-soil properties have been described in detail subsequently.

Due to the seasonal variation Ground Water Table (GWT) has been considered to be located at Existing Ground Level (EGL) for all practical purposes.

Type Of Foundation With Safe Load:-

SHALLOW FOUNDATION:

Considering the total load likely to be imposed on the foundation and soil strata encountered at the site Shallow foundation has been suggested.

The Safe bearing Capacity has been calculated as per IS 6403-1981 and Settlement has been calculated as Per IS 8009 (Part-I).



PREFACE

M/s Alstom T & D India Limited, DLF IT Park, Plot No.8,Rajarhat,Kolkata-156 entrusted us for the work of Soil Investigation and Preparation of Report for proposed Construction of 400/220 KV Substation at Jagdalpur in Chattisgarh.

Objective of the investigation was to determine sub-soil characteristics at site and evaluate soil parameters for design and construction of foundation.

This report has been prepared after careful study of all field and laboratory test data and it deals with the Geo-technical properties of sub-soil. Chapter- I to IV of this report covers the field work, laboratory tests and discussion of foundation recommendation thereon while Annexure contains Borehole Log & Laboratory test result Sheet, Borehole location plan, Sub-soil stratification and Graphical presentation.



CHAPTER-I**DESCRIPTION OF THE PROJECT AND SITE**

It is understood that the proposed superstructure to be constructed at this exploratory site would be a of R.C.C. framed construction of light to moderate loading.

The exploratory site is located at Jagdalpur in the state of Chattisgarh.

The site is traversed more or less regular and even.

DETAILS OF BORE HOLES:-

Borehole No	Termination depth (m)	Bore Hole Level,EGL (m)	Static Ground Water (m)	Remarks
1	6.00	100.0	Not met	Nearest Road Level 100m assumed.
2	6.00	-do-	Not met	
3	6.00	-do-	Not met	
4	8.00	-do-	Not met	
5	6.00	-do-	Not met	
6	6.00	98.50	Not met	



CHAPTER-II

BRIEF DESCRIPTION OF FIELD AND LABORATORY WORK:

FIELD WORK:-

A brief description of method of boring, field tests, collection of samples etc. and type of equipment used are given below:-

Boring was carried out by auger and rotary mud circulation method as per IS 1892-1979 to sink nominal Sx/Nx diameter bore holes to desired depths and operated by a team of experienced technicians. Flush jointed seamless casings were used to stabilize the bore holes and prevent caving of the soil inside the bore holes. The casing pipes were advanced by turning in order to minimize the disturbance. Undisturbed/Disturbed soil samples were collected at suitable intervals or at change of strata whichever is met earlier by open drive sampling method since it was intended to ascertain the sub-soil characteristics.

Ground water table was recorded inside the boreholes 24 hours after the boring operation was completed.

Standard Penetration Tests were conducted inside the boreholes generally at 1.5m intervals or wherever change in strata as per IS 2131:1981. Split spoon sampler 50.8mm OD and 35mm ID with an open length of 450mm was used. The weight of the dropping hammer was 63.5kg falling freely through a height of 75cm.

COLLECTION OF SAMPLES :-

Samples were of one type :

Disturbed samples: These were taken by methods, which modify or destroy the natural structure of the materials. These samples were collected frequently from auger, split spoon sampler of standard penetrometer / cutting shoe of undisturbed sampling assembly to maintain as continuous records of strata encountered. All the samples were labeled and placed in airtight polythene bags and shifted to the laboratory for identification and testing purposes.

During field investigation it was observed that the sub soil strata at this site mostly non cohesive and very hard hence undisturbed sampling not possible.



STANDARD PENETRATION TESTS :-

Standard penetration tests were conducted in each bore hole at suitable intervals of depth particularly at every change in stratum. The tests were done with the standard split spoon sampler conforming to IS 9640 and as per IS 2131. The 'N' values were obtained by counting the number of blows required to drive the spoon from 15 cm. to 45 cm. With the help of 63.5 kg. hammer having a free fall of 75 cm.

While establishing the various parameters from N-values, dilatancy corrections and correction for overburden pressures have been considered wherever required as per the provision of relevant IS Code IS 2131-1981:-

1) Correction due to overburden pressure $N_1 = N_{obs} \times \text{correction factor as obtained from the graph/figure 1 of IS 2131-1981.}$

2) Dilatancy Correction $N_{II} = 15 + 0.5 (N_1 - 15)$

LABORATORY TEST :-

The programme of the laboratory testing was consisted of the followings :-

- i) Determination of Natural Moisture Content (N.M.C.) of soil sample
- ii) Bulk density of soil sample
- iii) Mechanical Analysis (Hydrometer & Sieve Analysis) of soil sample
- iv) Determination of Atterberg Limits (Liquid Limit & Plastic Limit) of soil sample
- v) Specific Gravity Test of soil sample
- vi) Triaxial / Direct Shear Test on remolded soil sample
- vii) UCC test on remolded sample
- viii) Consolidation test on remolded sample
- ix) Differential free swell Index (DFS)

The entire test conducted as per available books & relevant IS code and practice.

BRIEF DESCRIPTION OF SOME LABORATORY TESTS:-

- i) NATURAL MOISTURE CONTENT

It is the ratio of the weight of water to the dry weight of soil determined by oven drying.



ii) BULK DENSITY

The bulk density γ is defined as the total weight W of a soil mass per unit of its total volume V .

iii) MECHANICAL ANALYSISa) Sieve Analysis

The complete sieve analysis can be divided into two parts, i.e., the coarse analysis and fine analysis. An oven dried samples of soil is separated into two fractions by sieving it through a 4.75 mm IS sieve. The portion retained of it (+4.75mm size) is termed as the gravel fraction and is kept for the coarse analysis, while the portion passing through it (-4.75mm size) is subjected to fine sieve analysis.

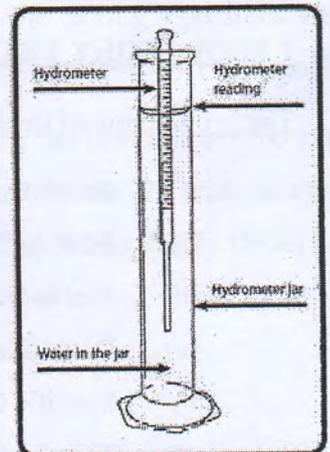
b) HYDROMETER ANALYSIS

In the wet method of mechanical analysis or sedimentation analysis, the soil fraction, finer than 75 micron size is kept in suspension in a liquid (usually water) medium. The analysis is based on stoke's law, according to which the velocity at which grains settle out of suspension, all other factor being equal, is depended upon the shape, weight and size of the particles/grains.

The procedure depends of stoke's equation for the terminal velocity of falling sphere. The effective diameter, D , can be computed from the equation.

$$D = \sqrt{18\mu / (\gamma_s - \gamma_w)} \times \sqrt{Z_r / t}$$

- Where
- μ = Viscosity of water at the test temperature.
 - γ_w = Unit wt. of water at test temperature.
 - γ_s = Unit wt. of soil solids.
 - Z_r = Distance from the surface of suspension to the centre of volume of the hydrometer
 - t = Total elapsed time.



iv) ATTERBERG LIMITS

These are arbitrary moisture contents to determine the instant at which the soil is on the verge of being viscous liquid (Liquid limit) or non-plastic /Plastic limit. Liquid limits determined with the help of a liquid limit apparatus. Plastic limit is the water content at which the soil begins to crumble when rolled out into a thin thread of 3mm.

Divided soil cake before test

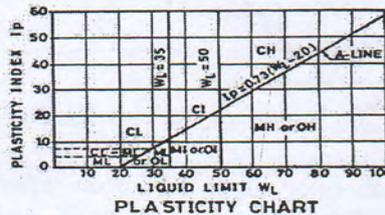


Divided soil cake after test



Diagram illustrating Liquid limit test

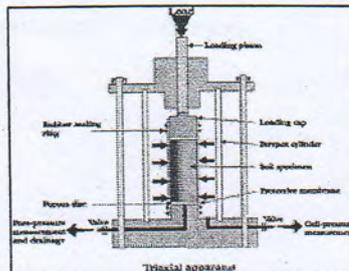
This test is of considerable interest to foundation engineers because the liquid limit and plastic limit of soils are correlated to their engineering properties. It has been observed from experiences that the OMC (Optimum Moisture Content) is found to be close to the plastic limit of cohesive soil. This may be very useful information required while compacting such soil. Cohesive Soil Classification has been done on the basis of Atterberg Limits.



v) SPECIFIC GRAVITY

It is the ratio of unit weight of soil solids to that of water.

vi) TRI-AXIAL SHEAR TEST



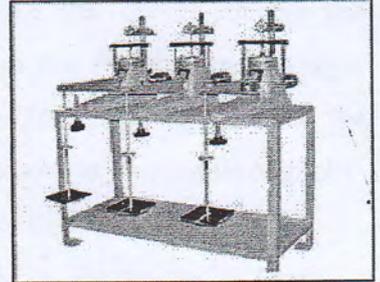
Tri-axial test is conducted on mixed type of soils (C-Ø soil) like sandy clayey silt/silty clay and other cohesive soil. The sample, in this test, are subjected to different lateral stress, (e.g. 0.50,1.0,1.50 kg/sq cm etc.) i.e, cell/confining pressure as well as vertical



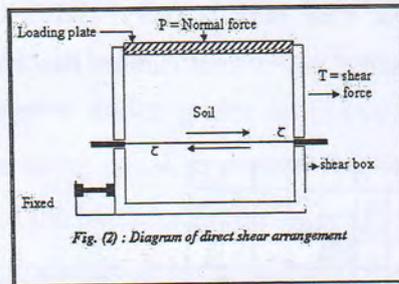
stress and tested up to a maximum axial strain of 20% under a quick condition at a ratio of 1.25 mm/min. The lateral stress on the sample is kept constant when the test continuous.

vii) CONSOLIDATION TEST

This test is necessary to estimate the settlement characteristics of cohesive soils. In the consolidometer ring of 6.25 cm dia and 2 cm high. A sample is taken with porous stones on top and bottom. After saturation a compressive load is applied and maintained for 24 hours. The compression of the sample is measured at regular intervals by a dial gauge. From the results obtained, e-log P curve drawn to estimate the compression index (Cc) from the straight portion of the curve.



viii) DIRECT SHEAR TEST



Under such test soil sample under an applied normal load is stressed to failure by moving one section of the soil container (Shear Box) relative to the other.

The result of all the laboratory tests have been reflected in a borehole log and test result data sheet enclosed at the annex. Graphical and pictorial presentations of test observations wherever relevant were also reflected and enclosed at the annex for their better appreciation.



CHAPTER-III**SUB-SOIL CONDITION**

Soil investigation was carried out at the site for the proposed construction of 400/220 KV Sub Station during the year 2014 by conduction of 6 nos. Sx/Nx diameter of maximum 8.0m deep vertical boreholes. The soil properties were determined from in-situ standard penetration tests within boreholes and from laboratory tests on disturbed/ undisturbed soil samples collected from boreholes.

The engineering properties of the individual strata summarized below briefly:

Layer Details				Field N-Value	Plasticity Characteristics	Shear strength Parameters
Stratum No.	Description	Average thickness of strata (m)				
		From	To			
I	Top surface followed by medium to dense reddish brown moorum. Ferruginous particles observed intermittently.	0.0	2.75	24 to more than 100	Non Cohesive	$\phi = 32$ to 34 degree.
II	Very Stiff to too hard, deep red with grey lamination, cementitious silty clay with kankar./Red clay. Ferruginous particles observed intermittently.	2.75	Terminating Depth	29 to more than 100	Cohesive	$C=8.0$ to 20.0 t/m^2

From above description it is observed that up to about 2.75m depth from existing borehole level consisting Moorum soil. The strata exist in dense to very dense consistency indication moderate to high degree of shear strength parameters. Then cohesive clayey deposit i.e. typical red soil encountered. The stratum exists in very stiff to hard consistency indicating high degree of shear strength parameters and low range of compressibility values. It is believed that the strata are tropical residual deposit with low to moderate swelling properties.

From the above description it is felt that overall impression of the strata at the site is very good with respect to shear and settlement parameters.



CHAPTER-IV**RECOMMENDATION**

An extensive programme of soil investigation work was undertaken for the **Construction of Proposed Sub Station at Jagdalpur** to assess the load carrying capacity and other characteristics of the sub-soil deposit at the said exploratory site and subsequently to recommend various parameters having due relevance and importance of the designing of a suitable foundation system for supporting the proposed structure.

Based on the field and laboratory test data, their careful analysis and judicious interpretation of the same we recommend the following:-

RECOMMENDATION :-**⇒ SHALLOW FOUNDATION**

It is understood that low to moderately loaded superstructure would be constructed at this exploratory site. The characteristics of sub-soil deposit at shallow depth as revealed from the detail soil investigation work are dense to very dense moorum deposit. Then very hard strata encountered. The strata exist in over consolidated state hence no long term settlement would be anticipated during the service span of the proposed superstructure.

Therefore in view of load intensity and settlement characteristics of the strata at shallow depth it is prudent to suggest shallow foundation at this exploratory site and hence recommended.

Accordingly, to estimate the bearing capacity and settlement following methods has been adopted:-

- ❖ Bearing Capacity From Shear Failure Criteria in soil strata (Ref: IS 6403-1981) :

$$Q_{ult} = q(N_q - 1) S_q d_q i_q + 0.5 B \gamma N_{\gamma} s_{\gamma} d_{\gamma} i_{\gamma} W'$$

Factor of Safety has been considered 2.50

- ❖ Settlement for shallow foundation has been calculated as per Figure -9 of IS 8009-Part -I



Bearing Capacities for shallow are presented below:

Type of foundation	Depth of foundation from EGL (m)	Size of footing (m)	Net Safe Bearing Capacity (t/m ²)
Square Foundation	1.00	1.50x1.50	13.40
		2.00x2.00	14.90
		3.00x3.00	18.00
	1.50	1.50x1.50	18.30
		2.00x2.00	19.50
		3.00x3.00	22.30
	2.00	1.50x1.50	23.60
		2.00x2.00	24.50
		3.00x3.00	26.90
	2.50	1.50x1.50	29.30
		2.00x2.00	29.60
		3.00x3.00	31.70
Rectangular Foundation	1.00	3.00x2.00	13.60
		4.00x3.00	15.80
	1.50	3.00x2.00	18.40
		4.00x3.00	20.00
	2.00	3.00x2.00	23.80
		4.00x3.00	24.60
	2.50	3.00x2.00	29.90
		4.00x3.00	29.70

Note: Permissible settlement 50mm considered.



⇒ **LIMITATION**

While interpreting and subsequently ascertaining the test results, observation and safe allowable bearing capacity or load carrying capacity obtained thereof, due consideration should be attributed towards capriciousness of the soil properties, restricted no. of boreholes and their locations, various limitations and constraints usually associated with such sub-soil exploration work and many simplifying assumptions made during subsequent analysis. **If during execution of foundation, local sub-soil variations with respect to the condition revealed at the present boring location were noticed, then the load capacity values must be modified accordingly and the recommendations to be reviewed in the right perspective.**

We appreciate the opportunity to perform this investigation for you and have pleasure in submitting this report. Please contact us when we can be of further service to you.

For M.K.KAYAL & ASSOCIATES



CALCULATION OF BEARING CAPACITY AND SETTLEMENT (Ref IS 6403-1981 & IS 8009-I)

Square Foundation (BxL)= 1.50mx1.50m . Depth of foundation :1.00m below EGL.

Design data of sub soil:-

$$C=0, \phi=32.0^\circ, \gamma_{\text{sub}}=(1.91-1)=0.91 \text{ t/m}^3$$

Since the Density Index of moorum 47% and void ratio 0.61, condition is medium hence The Ultimate net bearing Capacity is calculated as per IS 6403:1981, Cl.5.2.2.1, Sl.No.iii as under

Considering full submergence.i.e.water table at EGL(worst condition)

General Shear Failure Condition:-

$$\text{Net Ultimate Bearing capacity} = [q (N_q - 1) s_q d_q i_q + 0.5 B \gamma N_\gamma s_\gamma d_\gamma i_\gamma W']$$

Where C=0

$$q=1.0 \times (1.91-1)=0.91 \text{ t/m}^2$$

$$\text{For } \phi = 32.0^\circ, N_q = 24.36, N_\gamma = 32.65$$

$$s_q=1.20, d_q=1.12, i_q=1.0,$$

$$s_\gamma=0.80, d_\gamma=1.12, i_\gamma=1.0,$$

} Bearing capacity factors

$$W'=0.50$$

Now, Net Ultimate Bearing Capacity =

$$[0.91 \times (24.36-1) \times 1.20 \times 1.12 \times 1 + 0.50 \times 1.50 \times 1.91 \times 32.65 \times 0.80 \times 1.12 \times 1 \times 0.50] = 49.52 \text{ t/m}^2$$

Local Shear Failure Condition:-

$$\phi' = \tan^{-1}[2/3 \tan \phi] = 23^\circ, N_q' = 8.96, N_\gamma' = 8.68, d_q' = d_\gamma' = 1.101$$

$$\text{Now, Net Ultimate Bearing Capacity} = 15.04 \text{ t/m}^2$$

On interpolation, net ultimate bearing capacity

$$= 15.04 + \{(49.52-15.04)/(70-20)\} \times (47-20) = 33.66 \text{ t/m}^2 \text{ (Where Density Index = 47\%)}$$

$$\text{Hence, Allowable bearing capacity} = 33.66 / 2.50 = 13.46 \text{ t/m}^2 \text{ (FOS = 2.50)}$$

BEARING CAPACITY CHECK FOR SETTLEMENT(Ref :IS 8009-I):-

Average corrected "N" value within the influence zone of footing = 23

Settlement read from the Fig.9 of IS 8009 (Part -I)-1976 = 11.0mm for width of footing

1.50m. under net pressure intensity of 10t/m²

Then, settlement corrected for water table = 11/0.85 = 12.94mm

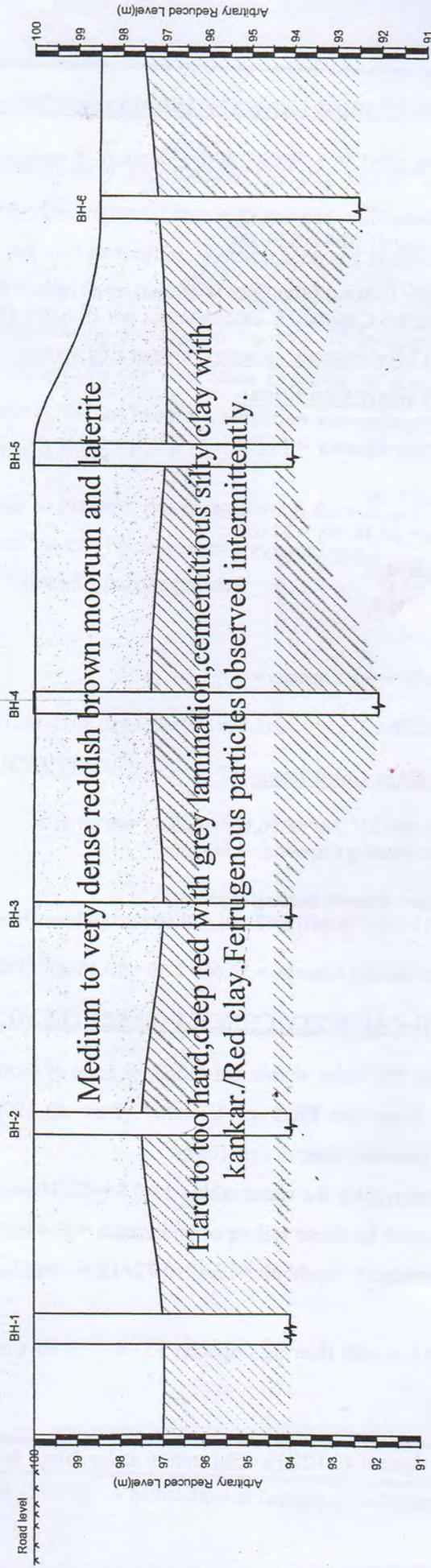
Therefore, settlement for shear failure consideration = 13.46 x 12.94 / 10 = 17.42mm

Corrected net settlement for depth = 17.42 x 0.72 = 12.54 mm i.e. within permissible limit as per IS 1904.

Hence suggested Net safe Bearing Capacity 13.46 ≈ 13.40 t/m² (say) is OK.



Project : Sub soil investigation work for proposed 400/220 kv Substation at Jagdalpur in Chattisgarh.



Soil Testing Report Part II

M.K.KAYAL & ASSOCIATES
D.H.Road,24 Fgs (S)

Project : Sub soil investigation work for proposed 400/220 kv Substation at Jagdalpur in Chhatisgarh.

Borehole Log & Test Result

Site : Jagdalpur
Bore Hole No: 3(Three)
R.L. of BH (m): 100.00
(Road level 100.0m assumed)

Date of starting:
Date of completion:
Method of boring : Shot & Auger, Rotary mud circulation

Termination Depth of Borehole : 6.0m
Static Ground Water Table: Not met

Notation	
DS	:Disturbed Sample
UDS	:Undisturbed sample
SL	:Slipped
TS	:Triaxial test (TU)
DFS	:Differential Free Swell ratio
CS	:Core sample
RQD	:Rock Quality Designation
CR	:Core Recovery
DT	:Direct Shear test

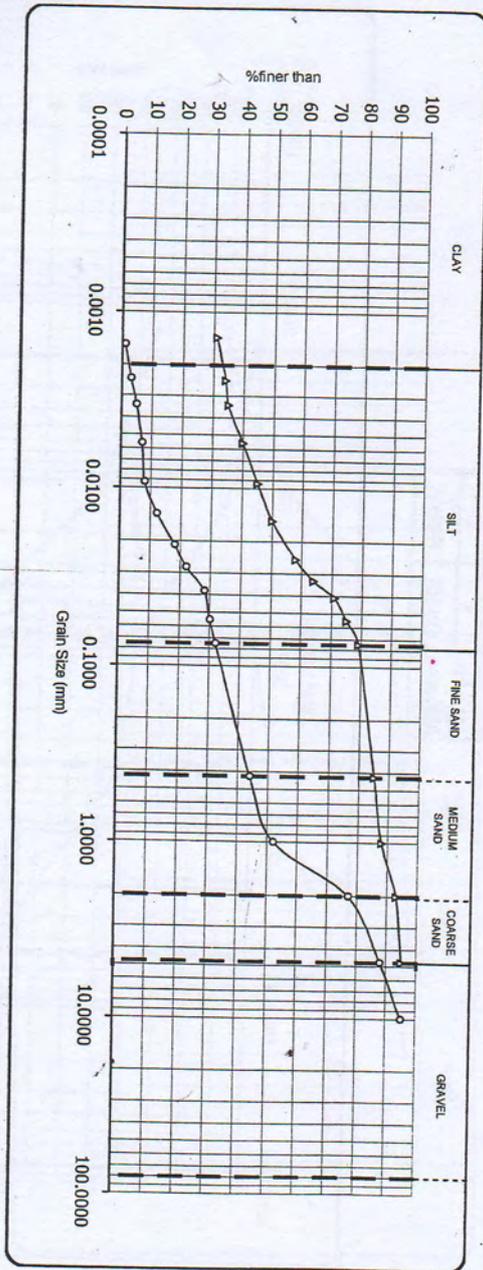
Depth below EGL (m)	Type of sampling	Depth of sample /Run	Depth in meter	SPT		CR (%)	R Q D (%)	Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				DFS (%)	Natural Moisture Content/WA (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Type of test	Cohesion (kg/cm ²)	φ (degree)	UCC (kg/cm ²)	Consolidation Characteristic							
				"N" Value	"N" Value							% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)					Cc	e _v						
0.00	DS	0.50	1.00	53	53				Top surface followed by dense reddish brown moorum Ferruginous particles observed intermittently.	0.00	SM	18	44	36	2	0.0	13.0	1.96	1.73	2.69	-	-	NP	DT	0.09	34.0	-	-	-						
0.50	DS	1.0-1.45	1.00	35	35				Top hard deep red with grey lamination, cementitious silty clay with kankar./Red clay. Ferruginous particles observed intermittently.	3.00	GM	31	29	36	4	0.0	-	-	-	-	-	55	30	25	-	-	-	-	-	-					
1.00	DS	2.0-2.45	2.00	51	51					3.00																									
1.50	DS	3.0-3.45	3.00																																
2.00	DS	4.0-4.45	4.00																																
2.50	DS	5.0-5.45	5.00																																
3.00	DS	6.0-6.45	6.00																																
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M.K.KAYAL & ASSOCIATES

Project : Sub soil Investigation work for proposed 400/220 kv Substation at Jagdalpur in Chattisgarh.

GRAIN SIZE DISTRIBUTION CURVE



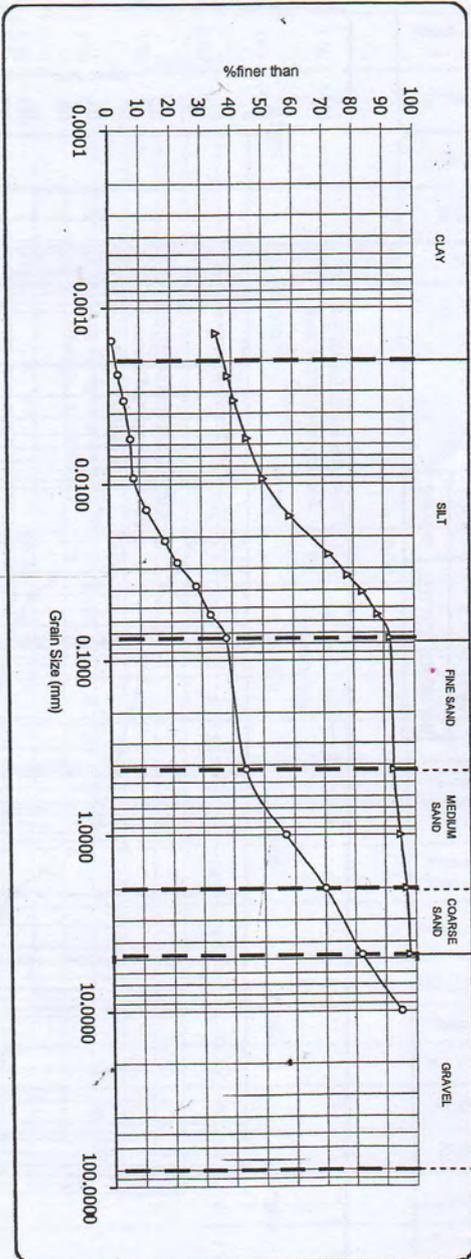
Symbol	BH NO	Depth (m)
○	1	1.00
▲	2	3.50



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GRAIN SIZE DISTRIBUTION CURVE



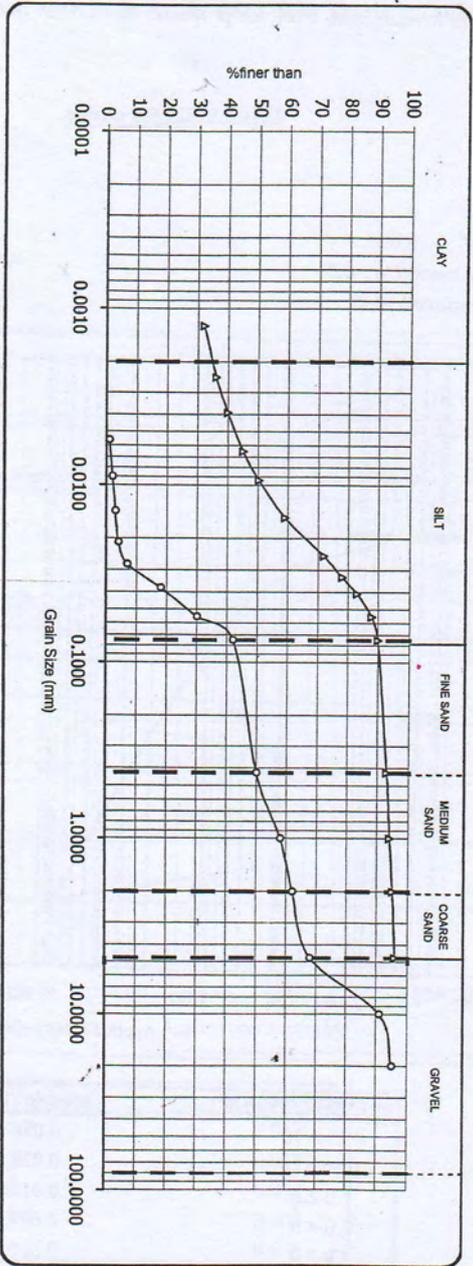
Symbol	BH NO	Depth (m)
○	3	1.00
▲	4	3.00



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GRAIN SIZE DISTRIBUTION CURVE

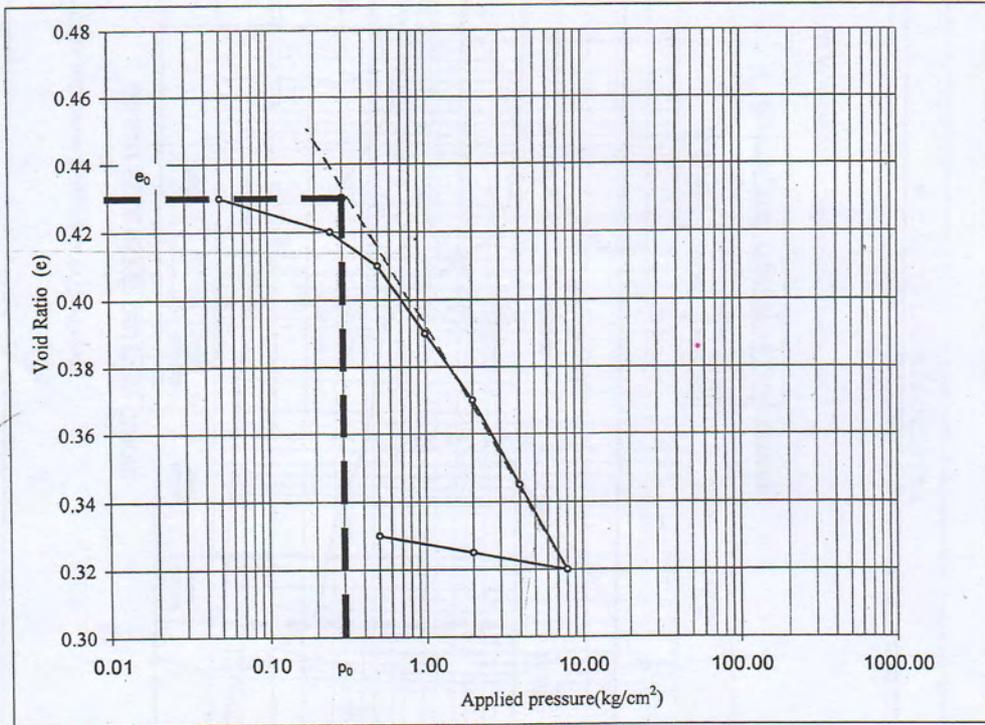


Symbol	BH NO	Depth (m)
○	5	2.50
▲	6	3.00

Project : Sub soil investigation work for proposed 400/220 kv Substation at Jagdalpur in Chattisgarh.

e log p curve

BH No : 4
 Depth : 3.00m
 Compression Index (Cc) = 0.08
 Initial void ratio (e₀) = 0.43



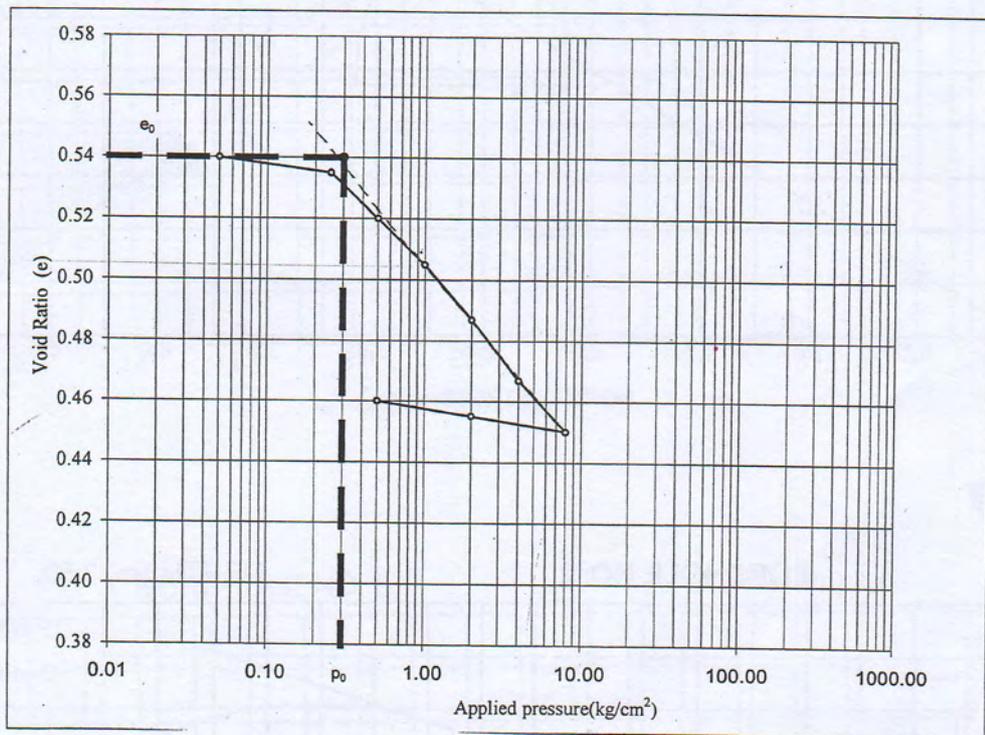
PRESSURE (kg/cm ²)	Mv (cm ² /kg)
0.25-0.50	0.028
0.50-1.0	0.028
1.0-2.0	0.014
2.0-4.0	0.009
4.0-8.0	0.005



Project : Sub soil investigation work for proposed 400/220 kv Substation at Jagdalpur in Chattisgarh.

e log p curve

BH No : 6
 Depth : 3.00m
 Compression Index (Cc) = 0.06
 Initial void ratio (e₀) = 0.54



PRESSURE (kg/cm ²)	Mv (cm ² /kg)
0.25-0.50	0.039
0.50-1.0	0.020
1.0-2.0	0.012
2.0-4.0	0.007
4.0-8.0	0.003

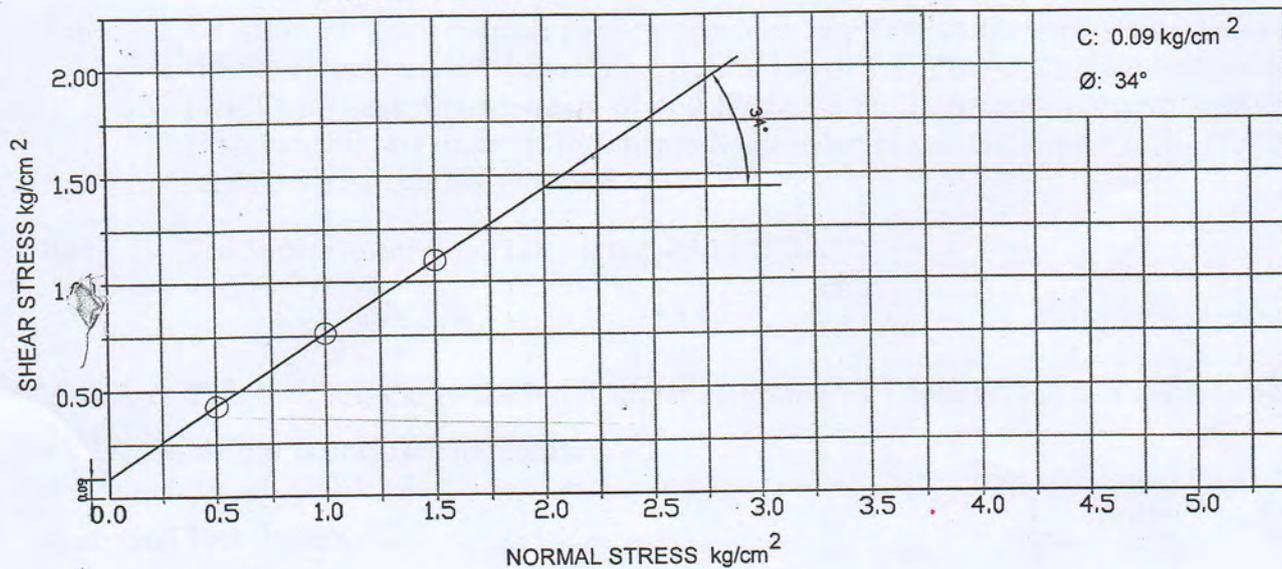


Project: Sub soil investigation work for proposed 400/220 kv Substation at Jagdalpur in Chattisgarh.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO:3

DEPTH (m): 1.0



BOREHOLE NO: 5

DEPTH (m): 1.0

