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PREPARED BY:

مونenco ایران

Monenco Iran



E	ACC. TO BID CLARIFICATION DATED:18 MAY 2025	NIL	STT	AKS	HMT	26.05.2025	DESIGNED BY	NIL	SIGNATURE
D	ACC. TO CLIENT COMMENT SHEET DATED:04 MAR 2021	NIL	AZM	AKS	JVN	03.06.2021	DRAWN BY	AZM	
C	ACC. TO CLIENT COMMENT SHEET DATED:03 FEB 2021	NIL	AZM	AKS	JVN	09.02.2021	CHECKED BY	AKS	
B	ACC. TO CLIENT COMMENT SHEET DATED:22 DEC 2020	NIL	AZM	AKS	JVN	22.12.2020	APPROVED BY	JVN	
0	FIRST ISSUE	NIL	AZM	AKS	JVN	21.11.2020	DATE:	21.11.2020	(DD.MM.YYYY)
REV	DESCRIPTION	DESIGN	DRAW	HEAD	APPR.	DATE	SCALE:	SIZE:	

PROJECT:

KIMUKA

400/220KV SUBSTATION

DWG. TITLE:


220kV PROTECTION SINGLE LINE DIAGRAM

COVER

DWG. NO.: MT-TLD-KETCO-5393-BD-02-SJ-252


SHEET: 1 OF: 5

CLIENT:



KETRACO

Kenya Electricity Transmission Co. Ltd.



THE WORLD BANK

IBRD . IDA | WORLD BANK GROUP

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KIMUKA

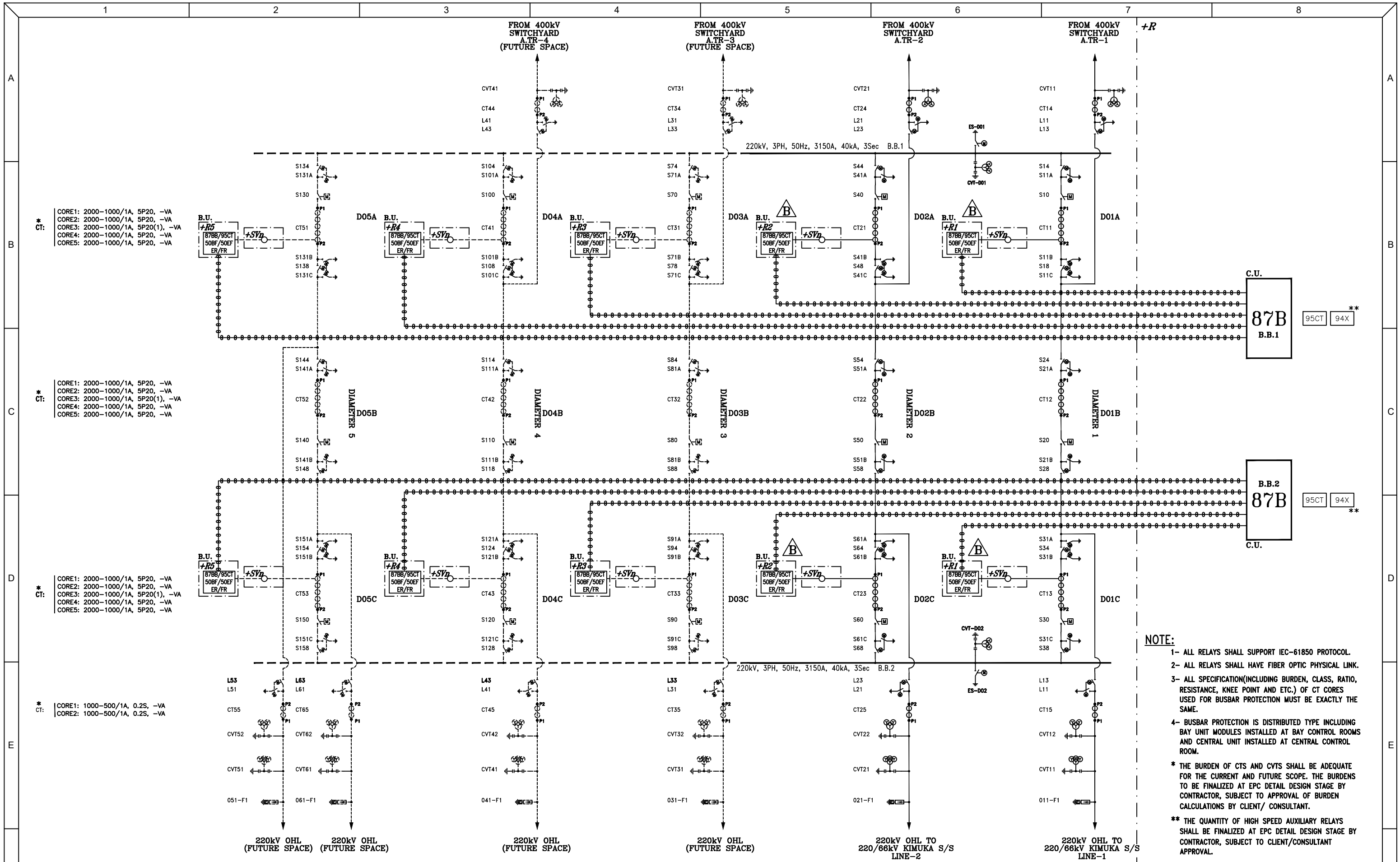
400/220KV SUBSTATION

220kV PROTECTION SINGLE LINE DIAGRAM






	1	2	3	4	5	6	7	8																																																																																																													
A	<div>2</div> TIME DELAY RELAY		<div>87B</div> BUSBAR DIFFERENTIAL PROTECTION		<div>ER</div> EVENT RECORDER		<div></div> ACTIVE ENERGY METER (BOTH DIRECTIONS) (MULTI TARRIF,CLASS 0.2)		A																																																																																																												
	<div>21/21N</div> DISTANCE RELAY WITH THREE ZONES		<div>87L</div> LINE DIFFERENTIAL PROTECTION		<div>FR</div> FAULT RECORDER		<div></div> REACTIVE ENERGY METER (BOTH DIRECTIONS) (MULTI TARRIF,CLASS 0.2)																																																																																																														
	<div>24</div> OVER FLUX RELAY		<div>87NT</div> RESTRICTED EARTH FAULT PROTECTION RELAY FOR TRANSFORMER		<div>F.F.</div> FUSE FAILURE RELAY		<div>C.U.</div> CENTRAL UNIT																																																																																																														
B	<div>25</div> SYNCHRO—CHECK RELAY		<div>87NR</div> RESTRICTED EARTH FAULT PROTECTION RELAY FOR REACTOR		<div>F.L</div> FAULT LOCATOR		<div>B.U.</div> BAY UNIT																																																																																																														
	<div>27</div> UNDER(ZERO) VOLTAGE RELAY		<div>87NTV</div> RESTRICTED EARTH FAULT PROTECTION RELAY FOR EARTHING TRANSFORMER		<div>PD</div> POLE DISCORDANCE		<div>BCPU</div> BAY CONTROL AND PROTECTION UNIT																																																																																																														
	<div>46BC</div> UNBALANCY PROTECTION / BROKEN CONDUCTOR		<div>87T</div> TRANS. DIFFERENTIAL PROT.(BIASED DIFF.)		<div>PSB</div> POWER SWING BLOCKING		<div>POW</div> POINT ON WAVE SWITCH																																																																																																														
	<div>49</div> THERMAL OVER LOAD PROTECTION		<div>87R</div> REACTOR DIFFERENTIAL PROTECTION RELAY		<div>50EF</div> END FAULT / SHORT ZONE PROTECTION		<div>BCR</div> BAY CONTROL ROOM																																																																																																														
	<div>50</div> INSTANTANEOUS OVER CURRENT RELAY		<div>87HVC</div> TRANSFORMER HV CIRCUIT DIFFERENTIAL PROTECTION		<div>SOTF</div> SWITCH ON TO FAULT		<div>PMU</div> PHASOR MEASUREMENT UNIT 		B																																																																																																												
C	<div>50BF</div> CIRCUIT BREAKER FAILURE RELAY(WITH 2—STAGE)		<div>87LVC</div> TRANSFORMER LV CIRCUIT DIFFERENTIAL PROTECTION		<div>STUB</div> STUB PROTECTION		<div><b>PANELS</b></div>																																																																																																														
	<div>50NS</div> INSTANTANEOUS SENSITIVE EARTH FAULT RELAY		<div>94</div> TRIP RELAY		<div>TCS</div> TRIP CIRCUIT SUPERVISION RELAY		<div>+RW</div> CONTROL AND PROTECTION PANEL																																																																																																														
	<div>50/51</div> INSTANTANEOUS AND INVERSE TIME OVER CURRENT RELAY		<div>94X</div> AUX. TRIP RELAY WITH HIGH SPEED CONTACT		<div>CCS</div> CLOSE CIRCUIT SUPERVISION RELAY		<div>+W</div> CONTROL PANEL																																																																																																														
	<div>50N/51N</div> INSTANTANEOUS AND INVERSE EARTH FAULT RELAY		<div>94Y</div> AUX. TRIP RELAY WITH FLAG		<div>VSL</div> VOLTAGE SELECTION LOGIC		<div>+SV</div> MARSHALING CUBICLE																																																																																																														
D	<div>51</div> INVERSE TIME OVER CURRENT RELAY		<div>95CT</div> CT SUPERVISION		<div>SBEF</div> STANDBY EARTH FAULT PROTECTION		<div>+M</div> MEASUREMENT PANEL																																																																																																														
	<div>59</div> OVER VOLTAGE RELAY		<div>95VT</div> VOLTAGE SUPERVISION		<div>VTS</div> VOLTAGE TRANSFORMER SUPERVISION		<div>+BCU</div> BAY CONTROL UNIT PANEL																																																																																																														
	<div>67</div> DIRECTIONAL OVER CURRENT RELAY WITH INVERSE TIME CHARACTRISTIC		<div>97</div> FUSE FAILURE (IN DISTANCE RELAY)		<div>CTS</div> CURRENT TRANSFORMER SUPERVISION		<div>+PMU</div> PHASOR MEASUREMENT UNIT PANEL 		C																																																																																																												
	<div>67N</div> DIRECTIONAL EARTH FAULT RELAY		<div>2/MECH</div> TRANSFORMER MECHANICAL PROTECTION				<div><del>— 8 8 8 —</del></div> FIBER OPTIC CABLE																																																																																																														
	<div>79</div> AUTO RECLOSE RELAY SINGLE SHOT 1&3 PHASE		<div>BCU</div> BAY CONTROL UNIT				<div></div> MINIATURE CIRCUIT BREAKER																																																																																																														
E	<div>85</div> CARRIER INTERFACE/REMOTE TRIP		<div>C.R</div> CLOSE RELAY				<div></div> REVISION MARK																																																																																																														
	<div>86</div> LOCKOUT RELAY		<div>DTT</div> DIRECT TRANSFER TRIP						D																																																																																																												
F	<table><tr><td colspan="2">PREPARED BY:</td><td>E</td><td colspan="2">ACC. TO BID CLARIFICATION DATED:18 MAY 2025</td><td>NIL</td><td>STT</td><td>AKS</td><td>BHA</td><td>26.05.2025</td><td>DESIGNED BY</td><td>NIL</td><td>SIGNATURE</td><td>PROJECT:</td><td colspan="2">DWG. TITLE:</td><td>CLIENT:</td></tr><tr><td colspan="2"></td><td>D</td><td colspan="2">ACC. TO CLIENT COMMENT SHEET DATED:04 MAR 2021</td><td>NIL</td><td>AZM</td><td>AKS</td><td>JVN</td><td>03.06.2021</td><td>DRAWN BY</td><td>AZM</td><td></td><td rowspan="5"><div>KIMUKA</div><div>400/220KV SUBSTATION</div></td><td colspan="2">220kV PROTECTION SINGLE LINE DIAGRAM</td><td rowspan="5"><div>KETRACO<div>Kenya Electricity Transmission Co. Ltd.</div></div><div>THE WORLD BANK IBRD . IDA   WORLD BANK GROUP</div></td></tr><tr><td colspan="2"></td><td>C</td><td colspan="2">ACC. TO CLIENT COMMENT SHEET DATED:03 FEB 2021</td><td>NIL</td><td>AZM</td><td>AKS</td><td>JVN</td><td>09.02.2021</td><td>CHECKED BY</td><td>AKS</td><td></td><td colspan="3">LEGEND</td></tr><tr><td colspan="2"></td><td>B</td><td colspan="2">ACC. TO CLIENT COMMENT SHEET DATED:22 DEC 2020</td><td>NIL</td><td>AZM</td><td>AKS</td><td>JVN</td><td>22.12.2020</td><td>APPROVED BY</td><td>JVN</td><td></td><td colspan="3"></td></tr><tr><td colspan="2"></td><td>0</td><td colspan="2">FIRST ISSUE</td><td>NIL</td><td>AZM</td><td>AKS</td><td>JVN</td><td>21.11.2020</td><td>DATE:</td><td colspan="3">21.11.2020 (DD.MM.YYYY)</td><td>DWG. NO.: MT—TLD—KETCO—5393—BD—02—SJ—252</td><td>SHEET: 3 OF: 5</td></tr><tr><td colspan="2"></td><td>REV</td><td colspan="2">DESCRIPTION</td><td>DESIGN</td><td>DRAW</td><td>HEAD</td><td>APPR.</td><td>DATE</td><td>SCALE:</td><td colspan="3">SIZE:</td><td colspan="3"></td></tr></table>																	PREPARED BY:		E	ACC. TO BID CLARIFICATION DATED:18 MAY 2025		NIL	STT	AKS	BHA	26.05.2025	DESIGNED BY	NIL	SIGNATURE	PROJECT:	DWG. TITLE:		CLIENT:			D	ACC. TO CLIENT COMMENT SHEET DATED:04 MAR 2021		NIL	AZM	AKS	JVN	03.06.2021	DRAWN BY	AZM		<div>KIMUKA</div> <div>400/220KV SUBSTATION</div>	220kV PROTECTION SINGLE LINE DIAGRAM		<div>KETRACO<div>Kenya Electricity Transmission Co. Ltd.</div></div> <div>THE WORLD BANK IBRD . IDA   WORLD BANK GROUP</div>			C	ACC. TO CLIENT COMMENT SHEET DATED:03 FEB 2021		NIL	AZM	AKS	JVN	09.02.2021	CHECKED BY	AKS		LEGEND					B	ACC. TO CLIENT COMMENT SHEET DATED:22 DEC 2020		NIL	AZM	AKS	JVN	22.12.2020	APPROVED BY	JVN							0	FIRST ISSUE		NIL	AZM	AKS	JVN	21.11.2020	DATE:	21.11.2020 (DD.MM.YYYY)			DWG. NO.: MT—TLD—KETCO—5393—BD—02—SJ—252	SHEET: 3 OF: 5			REV	DESCRIPTION		DESIGN	DRAW	HEAD	APPR.	DATE	SCALE:	SIZE:						F
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**NOTE:**

- 1- ALL RELAYS SHALL SUPPORT IEC-61850 PROTOCOL.
- 2- ALL RELAYS SHALL HAVE FIBER OPTIC PHYSICAL LINK.
- 3- ALL SPECIFICATION(INCLUDING BURDEN, CLASS, RATIO, RESISTANCE, KNEE POINT AND ETC.) OF CT CORES USED FOR BUSBAR PROTECTION MUST BE EXACTLY THE SAME.
- 4- BUSBAR PROTECTION IS DISTRIBUTED TYPE INCLUDING BAY UNIT MODULES INSTALLED AT BAY CONTROL ROOMS AND CENTRAL UNIT INSTALLED AT CENTRAL CONTROL ROOM.
- \* THE BURDEN OF CTS AND CVTS SHALL BE ADEQUATE FOR THE CURRENT AND FUTURE SCOPE. THE BURDENS TO BE FINALIZED AT EPC DETAIL DESIGN STAGE BY CONTRACTOR, SUBJECT TO APPROVAL OF BURDEN CALCULATIONS BY CLIENT/ CONSULTANT.
- \*\* THE QUANTITY OF HIGH SPEED AUXILIARY RELAYS SHALL BE FINALIZED AT EPC DETAIL DESIGN STAGE BY CONTRACTOR, SUBJECT TO CLIENT/CONSULTANT APPROVAL.

F	<div>PREPARED BY:</div> <div><div>موندکو ایران Monenco Iran</div></div>								DESIGNED BY	NIL	SIGNATURE	PROJECT: <div>KIMUKA 400/220KV SUBSTATION</div>	DWG. TITLE: <div>220kV PROTECTION SINGLE LINE DIAGRAM 220KV BUSBAR PROTECTION</div>		CLIENT: <div><div>KETRACO Kerem Electricity Transmission Co. Ltd.</div><div>THE WORLD BANK IBRD · IDA   WORLD BANK GROUP</div></div>	
									DRAWN BY	AZM						
			B	ACC. TO CLIENT COMMENT SHEET DATED:04 MAR 2021	NIL	AZM	AKS	JVN	03.06.2021	CHECKED BY	AKS					
			A	DESIGN PROGRESS	NIL	AZM	AKS	JVN	31.01.2021	APPROVED BY	JVN					
			0	FIRST ISSUE	NIL	AZM	AKS	JVN	21.11.2020	DATE: 21.11.2020 (DD.MM.YYYY)						
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