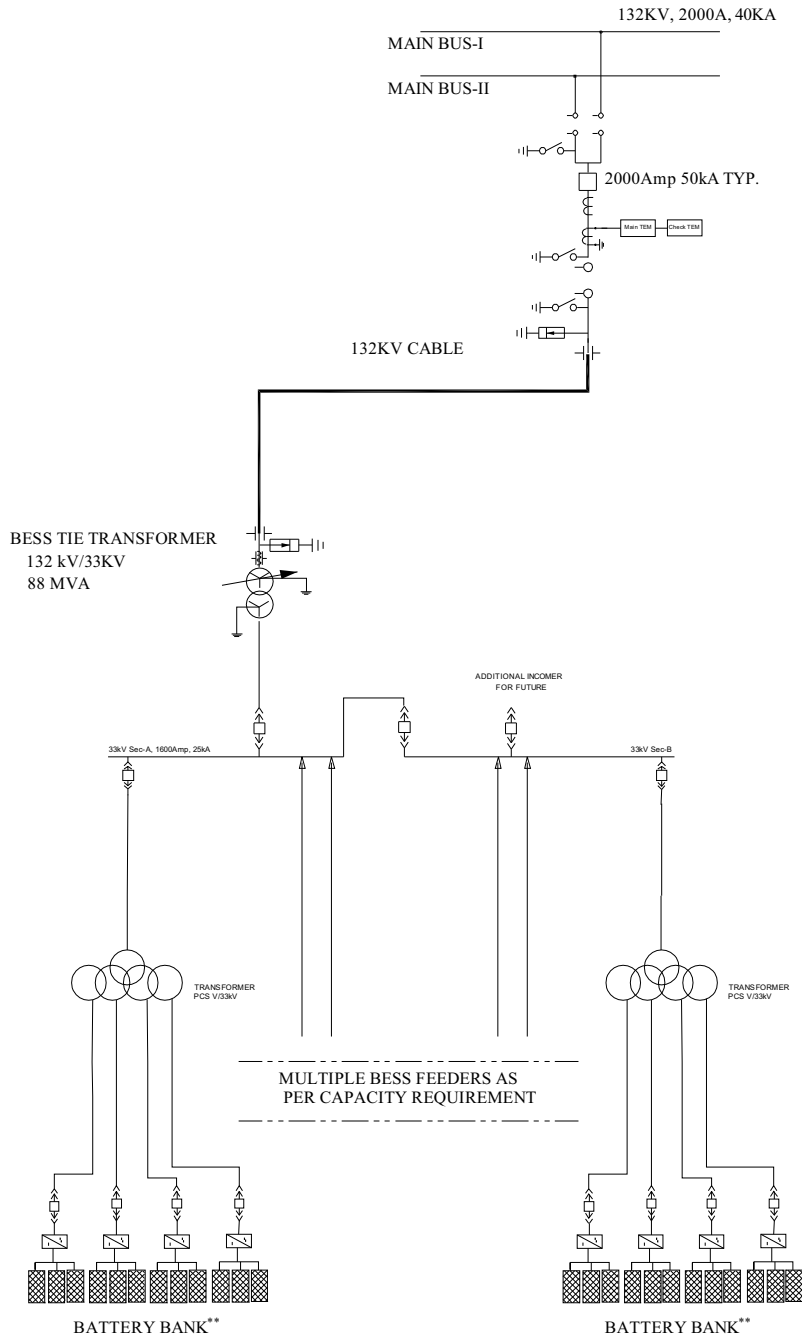


	<p>PART-E</p> <p>TENDER DRAWINGS</p>

**ELECTRICAL
SINGLE LINE DIAGRAM**

--	--



NOTES:-

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TECHNICAL SPECIFICATION.
2. NUMBER OF BESS FEEDERS SHOWN ARE INDICATIVE. SAME SHALL BE PROVIDED AS PER PROJECT REQUIREMENT.
3. SUITABLE METERING ARRANGEMENT AND FACILITY FOR INTERFACE METERING AS PER CEA MEERTING REGULATION SHALL BE PROVIDED AT POINT OF INTERCONNECTION
4. BIDDER ARE ADVISED TO VISIT RESPECTIVE STATIONS BEFORE SUBMISSION OF BID FOR ASSESSING BAY AVAILABILITY, SCOPE OF WORK RELATED TO SWITCHYARD AND EHV CABLE ROUTE FROM BESS TIE TRF TO SWITCHYARD
5. ADDITIONAL INCOMER FEEDERS SHOWN IN SLD IN 33KV POOLING SWGR SHALL HAVE RATING EQUAL TO THE BESS TIE TRANSFORMER FEEDER. SPARE SHALL BE PROVIDED IN EACH SECTION OF SWITCHGEAR AS PER TECHNICAL SPECIFICATIONS.
6. INDICATIVE SLD FOR AUX POWER SUPPLY ARRANGEMENT IS INDICATED IN SEPARATE SHEET.

LEGEND:

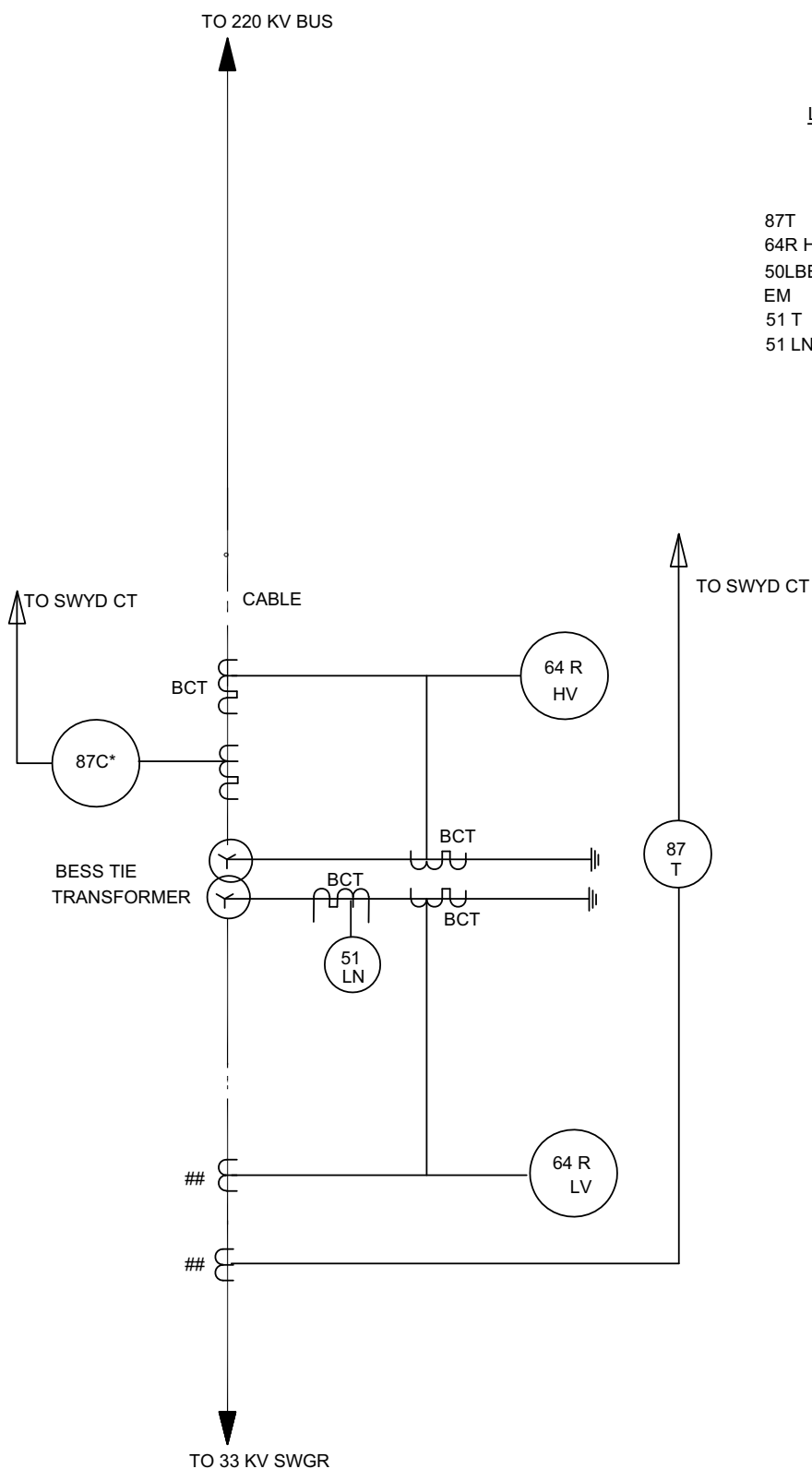
	LIGHTNING ARESTOR
	VT
	EARTH SWITCH
	CT
	CIRCUIT BREAKER
	DISCONNECTOR
	BUSHING CT
	DOUBLE BREAK LINE ISOLATORS
	CIRCUIT BREAKER DRAWOUT TYPE
	TRANSFORMER

										ENGINEERING DEPARTMENT	
										PROJECT	
										75MW/150MWH BATTERY ENERGY STORAGE SYSTEM (BESS) AT SOLAPUR STPP	
										TITLE	
										SINGLE LINE DIAGRAM	
										DATE	
										07-11-24	
										SIZE	
										A1	
										SCALE	
										NTS	
										DRG. NO.	
										9999-000-POE-A-001-8	
										REV. NO.	
										A	
										CLEAR BY	

	<div data-bbox="568 886 1151 1060" data-label="Section-Header"><h1>BESS PROTECTION SINGLE LINE DIAGRAM</h1></div>		
<div data-bbox="215 1904 620 1986" data-label="Page-Footer"><p>EPC PACKAGE FOR BESS IMPLEMENTATION AT NTPC THERMAL POWER STATIONS (LOT-2)</p></div>	<div data-bbox="678 1917 969 1976" data-label="Page-Footer"><p>TECHNICAL SPECIFICATION PART-E</p></div>		

LEGEND:

- 87T - TRANSF. DIFFERENTIAL PROT.
64R HV/LV- RESTRICTED E/F PROT.
50LBB - BREAKER FAILURE PROTECTION.
EM - ENERGY METER ABT TYPE
51 T - TRANSF. BACK UP O/C PROT.
51 LN - TRANSF. BACK UP E/F PROT.



* Wherever Cable is applicable

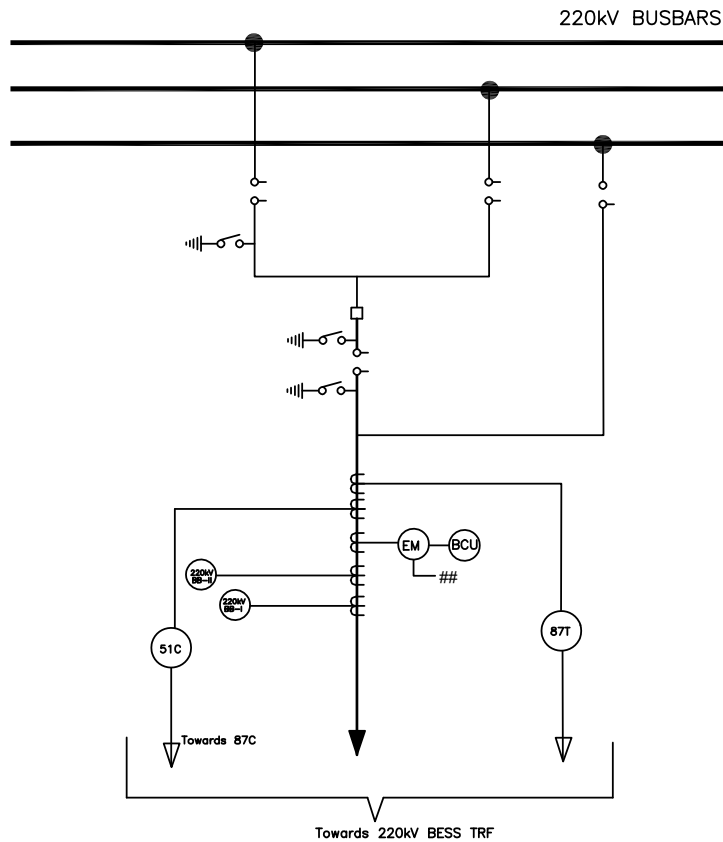
FOR TENDER PURPOSE ONLY

<div>FOR TENDER PURPOSE ONLY</div>							<div>OWNER<div><div>एन टी पी सी</div><div>NTPC</div></div><div>NTPC Ltd. (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION</div></div>					
							TITLE	PROTECTION S.L.D. FOR BESS TIE TRF				
REV.NO.					DESIGN	CHKD.	APPD	DATE	SIZE	SCALE	DRAWING NO	REV. NO.
	DESCRIPTION								A4	N.T.S.	9999-000-POE-J-001	0

BUS BAR arrangemnet shown is indicative only.For actual arrangement please refer key tender SLD.

NOTE-

1. REF CTs SHALL BE OF SAME MAKE AND CHARACTERISTICS (RATIO, KNEE POINT & RESISTANCE).
2. EPC VENDOR TO COORDINATE MATCHING OF REF CTs AT TRANSFORMER AND SWITCHGEAR END.



LEGEND:-

- 50/51 - BACKUP OVERCURRENT PROTECTION
50N/51N - BACKUP EARTH FAULT PROTECTION
87BB-I }
87BB-II } - BUSBAR DIFFERENTIAL PROTECTION
BCU - BAY CONTROL UNIT
EM - ABT COMPLIANT ENERGY METER
87ST - ST DIFFERENTIAL PROTECTION
87C - CABLE DIFFERENTIAL PROTECTION
64RHV - ST HV REF PROTECTION
64RLV - ST LV REF PROTECTION

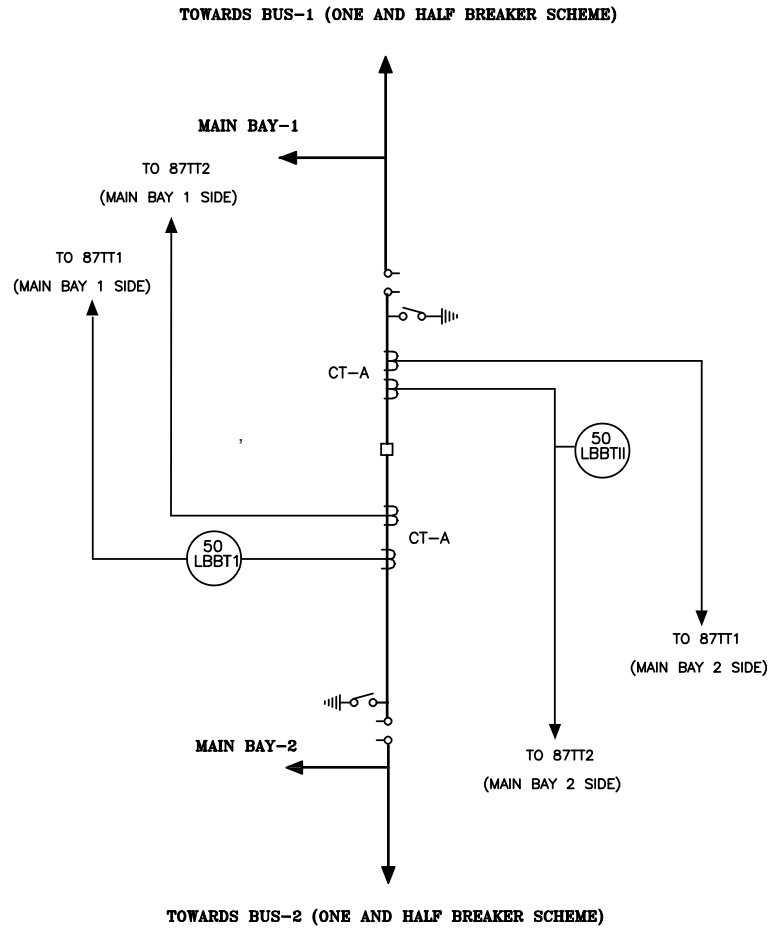
NOTE:

- ## - Voltage input
* - To be provided by owner
** - Breaker with CSD

FOR TENDER PURPOSE ONLY

OWNER						NTPC Ltd. (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION			
TITLE						PROTECTION S.L.D. FOR 220kV TRF BAY (DADRI/BARAUNI)			
REV.NO.	DESCRIPTION	DESIGN	CHKD.	APPD	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
						A4	N.T.S.	9999-000-POE-J-002	0

BUS BAR arrangement shown is indicative only. For actual arrangement please refer Switchyard tender SLD.



LEGEND:-

50/51 - BACKUP OVERCURRENT PROTECTION
50N/51N - BACKUP EARTH FAULT PROTECTION
50LBB - BREAKER FAILURE PROTECTION
50LBBT - BREAKER FAILURE PROTECTION FOR TIE BAY CB
87TT-I }
87TT-II } - "TEE" DIFFERENTIAL PROTECTION
BCU - BAY CONTROL UNIT
EM - ABT COMPLIANT ENERGY METER

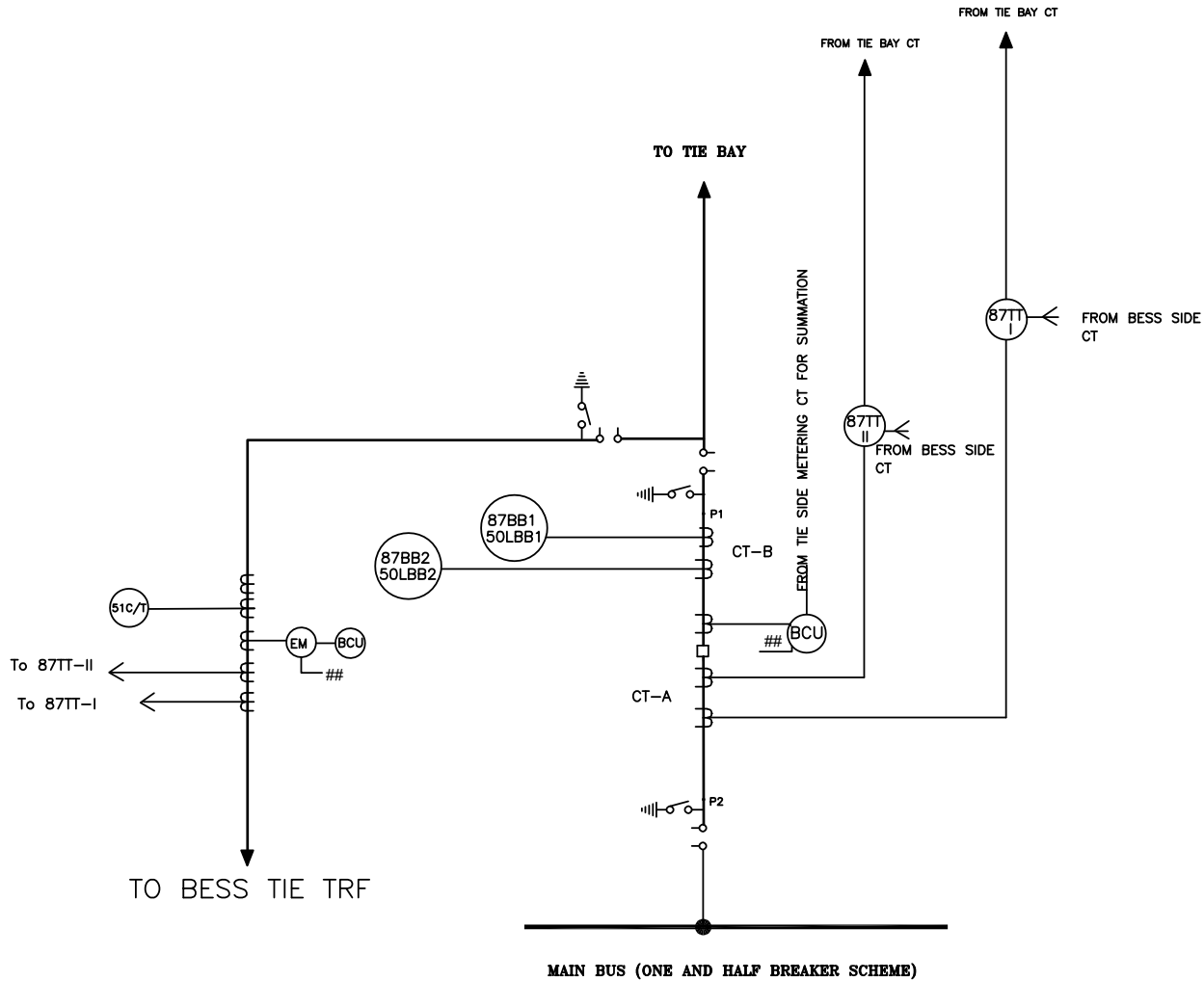
NOTE:

- Voltage from selected CVT
* - To be provided by owner

FOR TENDER PURPOSE ONLY

OWNER						NTPC Ltd. (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION			
TITLE						PROTECTION S.L.D. FOR TIE BAY (FOR ONE & HALF BAY)			
REV.NO.	DESCRIPTION	DESIGN	CHKD.	APPD.	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
						A4	N.T.S.	9999-000-POE-J-004A	0

BUS BAR arrangement shown is indicative only. For actual arrangement please refer Switchyard tender SLD.



LEGEND:-

50/51 - BACKUP OVERCURRENT PROTECTION
 50N/51N - BACKUP EARTH FAULT PROTECTION
 50LBB - BREAKER FAILURE PROTECTION
 50LBBT - BREAKER FAILURE PROTECTION FOR TIE BAY CB
 87TT-I } - "TEE" DIFFERENTIAL PROTECTION
 87TT-II }
 BCU - BAY CONTROL UNIT
 EM - ABT COMPLIANT ENERGY METER

NOTE:

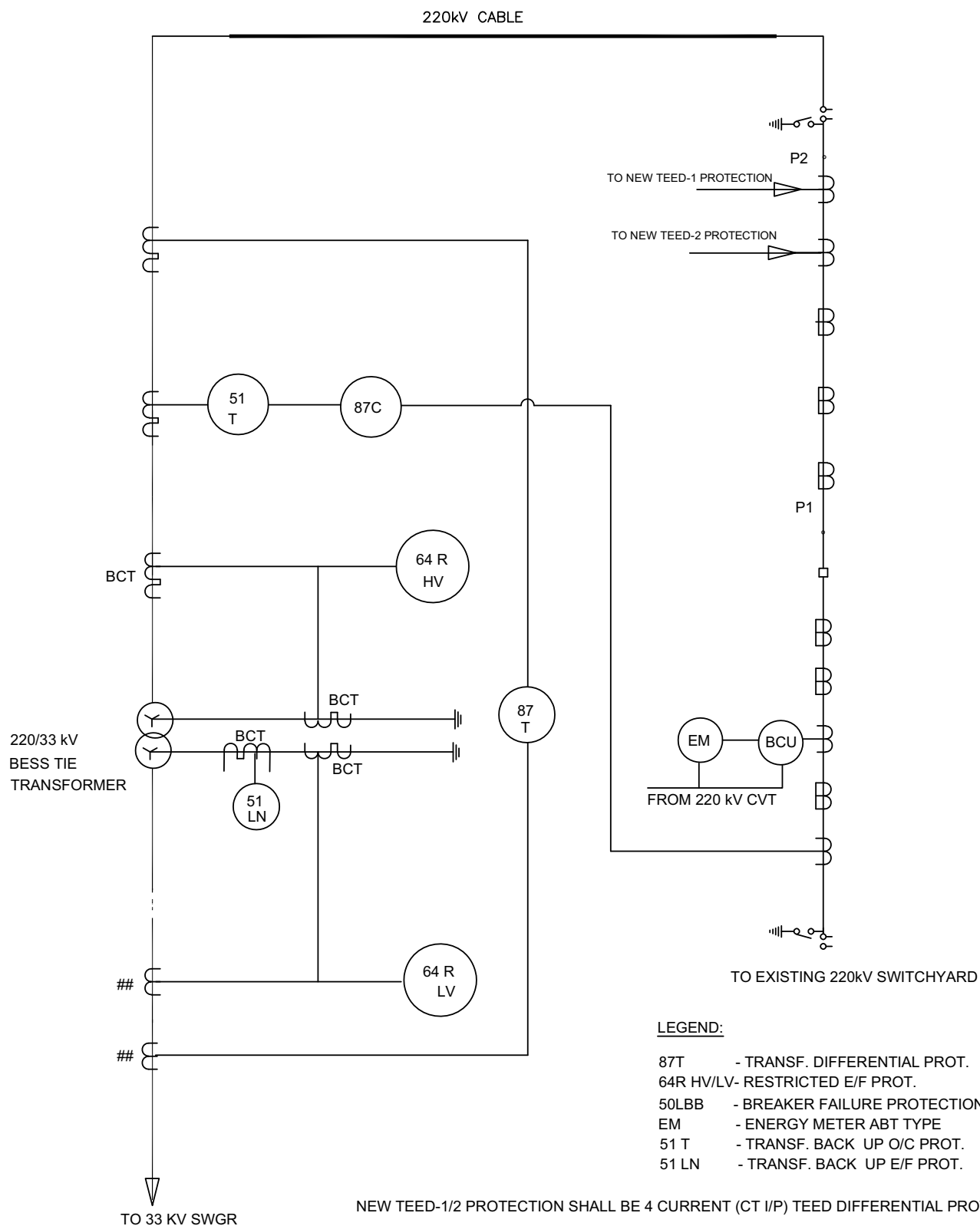
- Voltage from selected CVT
 * - To be provided by owner
 ** - Breaker with CSD

FOR TENDER PURPOSE ONLY

OWNER						NTPC Ltd. (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION			
TITLE						PROTECTION S.L.D. FOR ONE & HALF BAY			
REV.NO.	DESCRIPTION	DESIGN	CHKD.	APPD.	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
						A4	N.T.S.	9999-000-POE-J-004B	0

NOTE—

1. REF CTs SHALL BE OF SAME MAKE AND CHARACTERISTICS (RATIO, KNEE POINT & RESISTANCE).
2. EPC VENDOR TO COORDINATE MATCHING OF REF CTs AT TRANSFORMER AND SWITCHGEAR END.



NOTE:

CTs LOCATED IN 33 KV SWGR

FOR TENDER PURPOSE ONLY

<div>FOR TENDER PURPOSE ONLY</div>							OWNER		<div><div><div>एन टी पी सी</div><div>NTPC</div></div><div><div>NTPC Ltd.</div><div>(A GOVERNMENT OF INDIA ENTERPRISE)</div><div>ENGINEERING DIVISION</div></div></div>			
							TITLE		PROTECTION S.L.D. FOR 220kV/33kV BESS TIE TRF (TANDA-II)			
REV.NO.					DESIGN	CHKD.	APPD	DATE	SIZE	SCALE	DRAWING NO	REV. NO.
	DESCRIPTION								A4	N.T.S.	9999-000-POE-J-005	0

SWITCH GEAR

CLAUSE NO.

TECHNICAL REQUIREMENT



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LEGEND DESCRIPTION

- 52 CIRCUIT BREAKER
- 53 CONTACTOR
- 54 SURGE ARRESTOR
- 55 CURRENT TRANSFORMER
- 56 CORE BALANCE CURRENT TRANSFORMER
- 57 VOLTAGE TRANSFORMER
- 58 TRIPLE POLE IDMTL/DMT O/G PROTECTION
- 59 TRIPLE POLE INSTANTANEOUS O/G PROTECTION
- 60 IDMTL/DMT SENSITIVE/F PROTECTION
- 61 INSTANTANEOUS E/F PROTECTION
- 62 THREE PHASE THERMAL O/L PROTN.WITH O/L ALARM & RESTART INHIBITE FUNCTION
- 63 STALLING/LOCKED ROTOR PROTECTION
- 64 THREE PHASE NEGATIVE PHASE SEQUENCE PROTECTION
- 65 NUMBER OF START LIMITATION /REPATIVE START PROTECTION
- 66 THE DELAY PROTECTION
- 67 FUSE FAILURE PROTECTION
- 68 3 PHASE MOTOR DIFFERENTIAL PROTECTION
- 69 MCB
- 70 MPOB

LEGEND DESCRIPTION

- 648 RESTRICTED EARTH FAULT PROTECTION
- 649 STAND BY EARTH FAULT PROTECTION
- 650 3 PHASE UNDER VOLTAGE TRANSFORMER DIFFERENTIAL PROTECTION
- 651 3 PHASE UNDER VOLTAGE TRANSFORMER FOR MOTOR TRIPPING
- 652 3 PHASE BUS UNDER VOLTAGE
- 653 NO VOLT PROTECTION FOR BUS
- 654 CIRCUIT BREAKER FAILURE PROTECTION
- 655 LOCKOUT FUNCTION
- 656 3 PHASE CURRENT MEASUREMENT
- 657 NEUTRAL CURRENT MEASUREMENT
- 658 3 PHASE VOLTAGE MEASUREMENT
- 659 RESIDUAL VOLTAGE MEASUREMENT
- 660 ACTIVE POWER MEASUREMENT
- 661 REACTIVE POWER MEASUREMENT
- 662 ENERGY MEASUREMENT
- 663 POWER FACTOR MEASUREMENT
- 664 FREQUENCY MEASUREMENT
- 665 HOUR RUN METER
- 666 MCOB

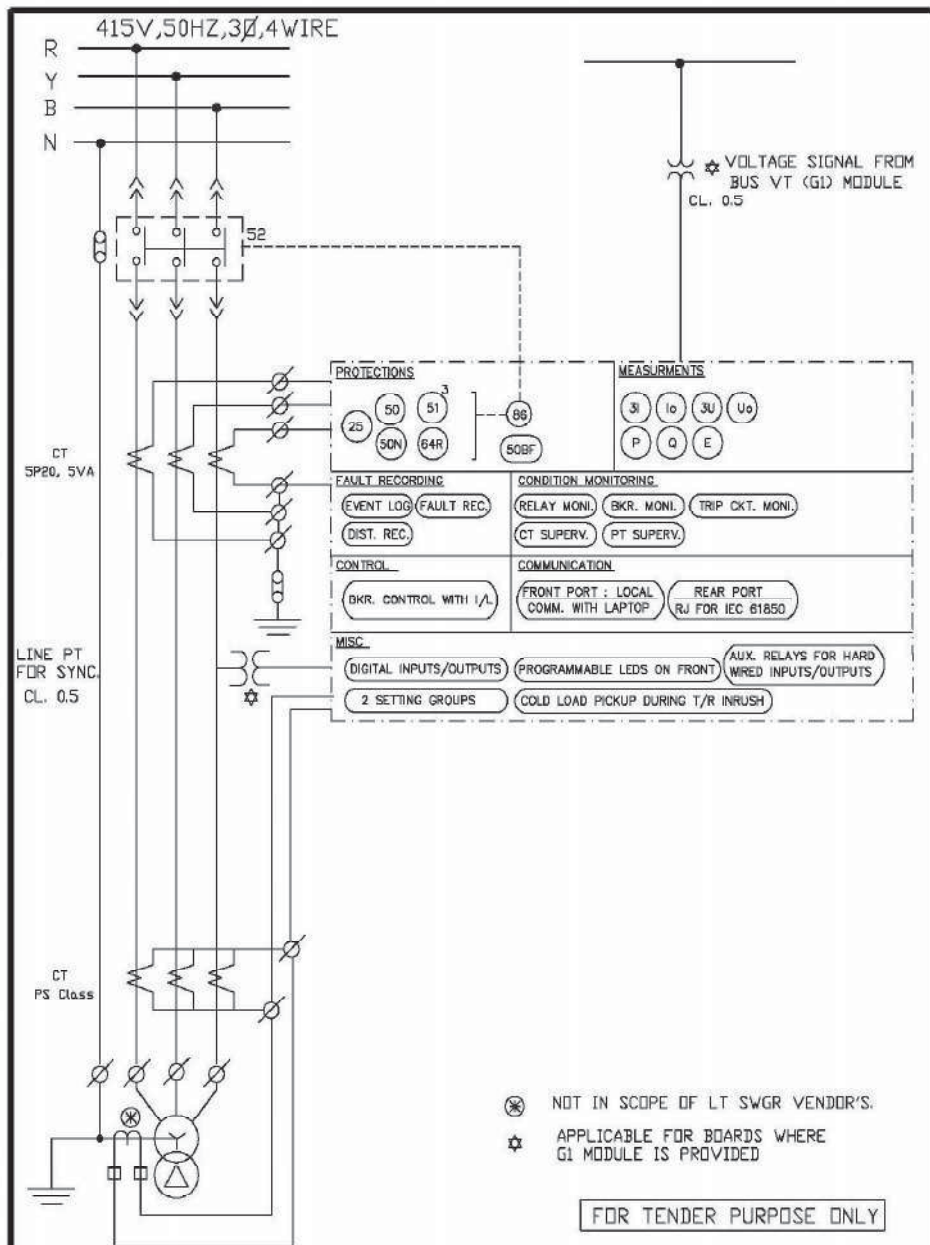
FOR TENDER PURPOSE ONLY

		एन टी पी सी लिमिटेड NTPC Limited (A MEMBER OF NDA ENTERPRISES)	
CLEARED BY		PROJECT	
C	E	M	ES
		TITLE	
		LEGEND DETAIL	
DRN	CON	CHPD	APPC
DATE		SCALE	DRAWING No.
18/05/18		0000-2016-PDE-A-003	
REV		A	

LEGEND DRAWING

A3 420X397

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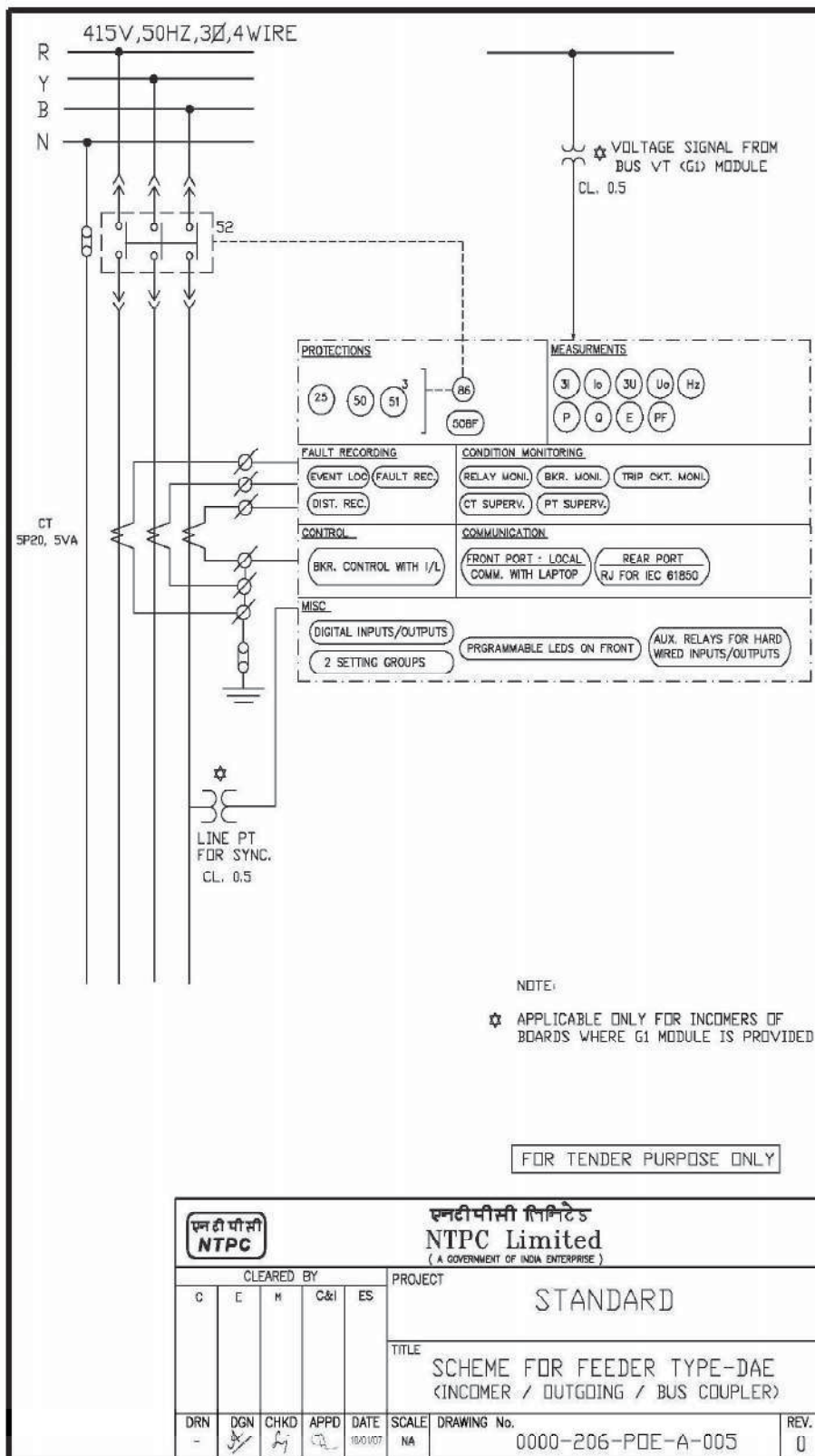


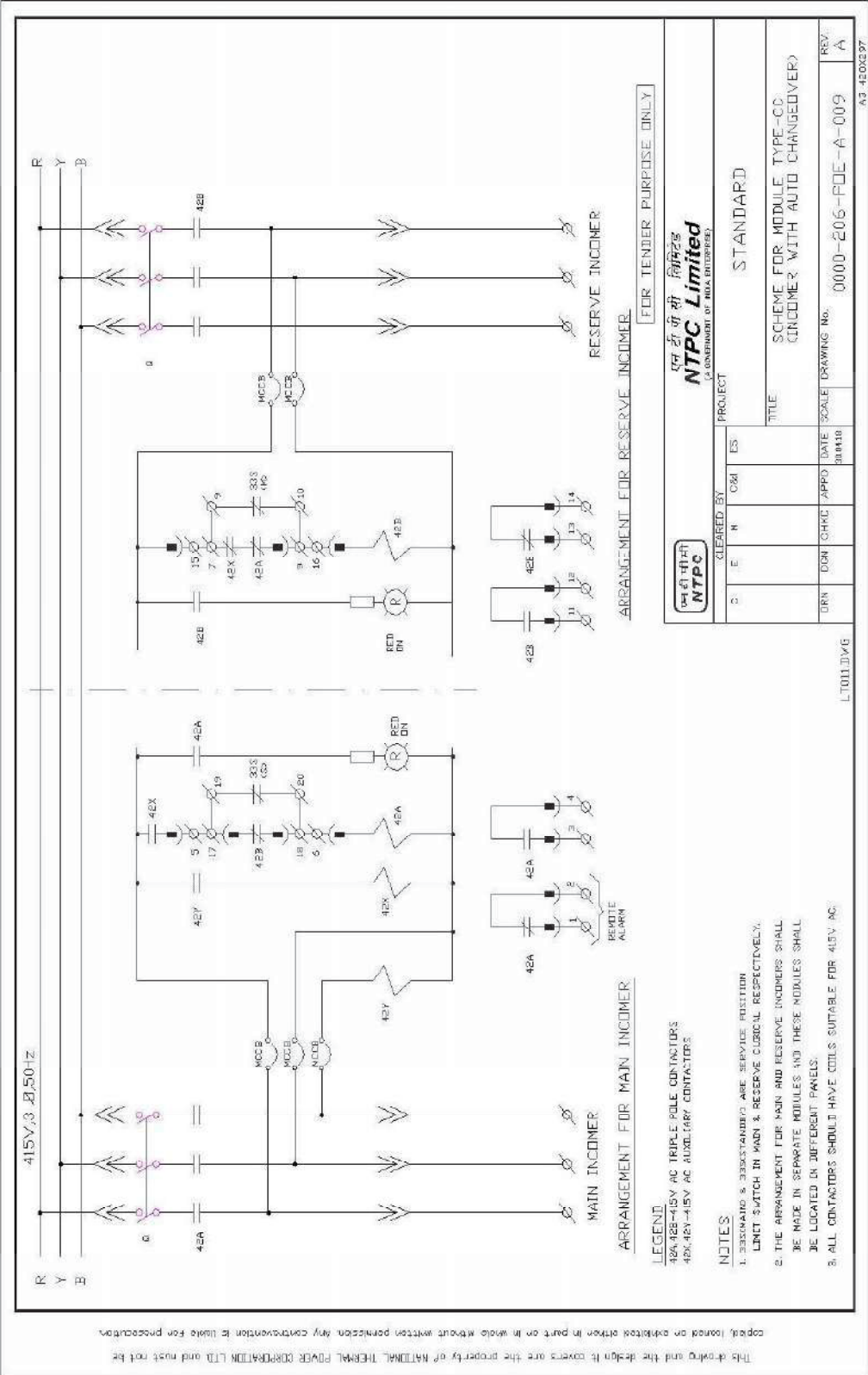
एन टी पी सी
NTPC

एन टी पी सी लिमिटेड
NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)

CLEARED BY					PROJECT	
C	E	M	C&I	ES	STANDARD	
					TITLE	
					SCHEME FOR FEEDER TYPE-DAET (INCOMER FROM TRANSFORMER)	
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.
-				10.10.1977	NA	0000-206-PDE-A-004
						REV.
						0

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This drawing and the design it covers are the property of NATIONAL THERMAL POWER CORPORATION LTD and must not be copied, loaned or exhibited other in part or in whole without written permission. Any contravention is liable for prosecution.

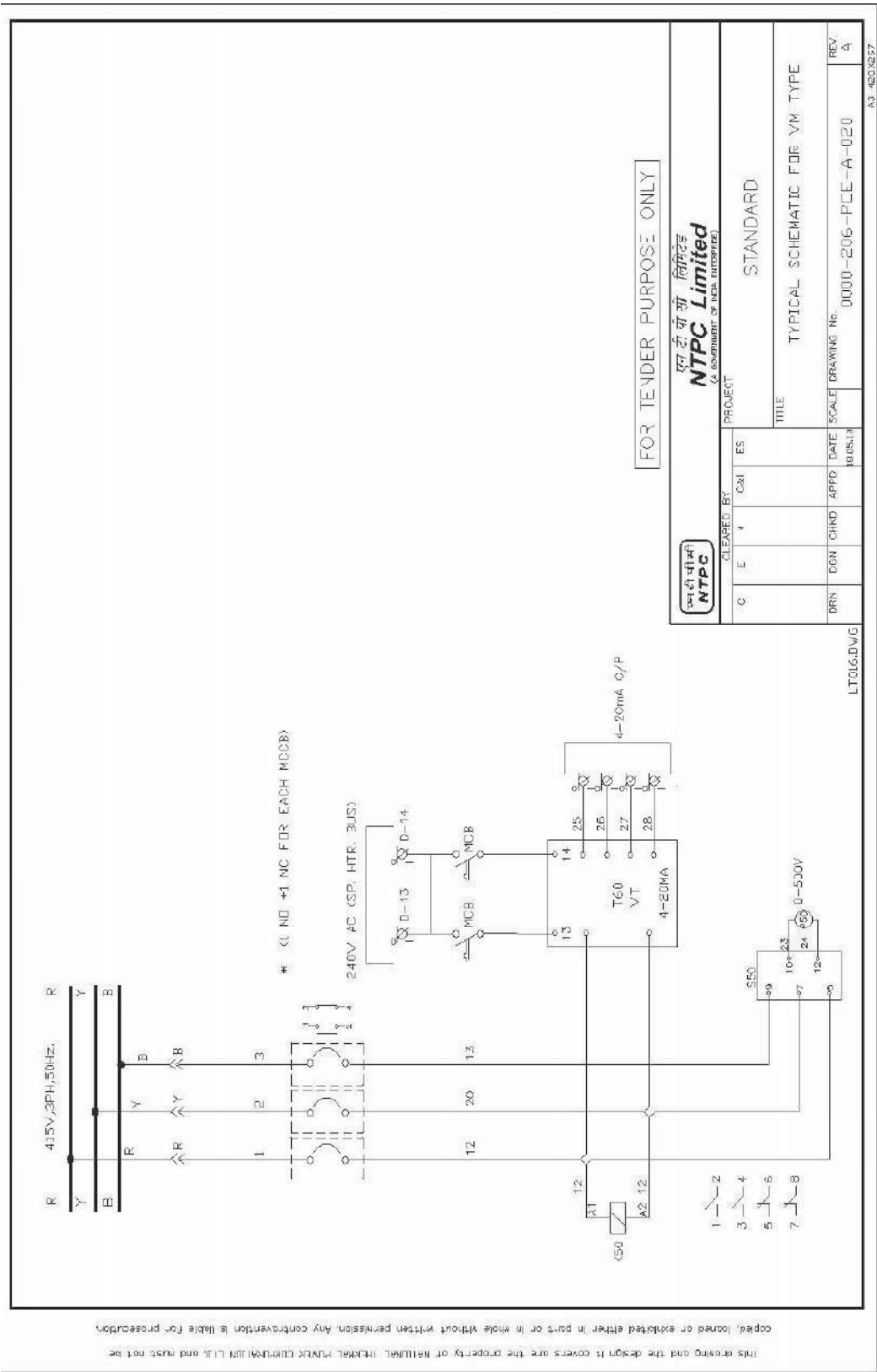
The diagram illustrates the AC Monitoring System for Bus Section-A. It features a 415/110V transformer connected to a busbar with R, Y, B, and N lines. The system includes two AC Monitoring Relays (A2 and B2), two Selector Switches (A and B), and two Control Supply Switches (A and B). The relays are connected to the busbar through the selector switches and control supply switches. The diagram also shows the internal wiring of the relays, including the control supply and the monitoring relays.

FOR TENDER PURPOSE ONLY

CLEARED BY C E M C M ES				PROJECT STANDARD			
DRN DGN CHD APPD DATE SCALE DRAWING NO.				TITLE SCHEME FOR MODULE TYPE-CS (CONTROL SUPPLY MODULE)			
0000-2006-FDE-A-010				REV A			

LT012.DWG

A3 420 K257

[illegible][illegible][illegible]

(M)

415V, 3PH, 4-WIRE, 50Hz.

R Y B N

Q

NRK

(M1)

415V, 3PH, 4-WIRE, 50Hz.

R Y B N

Q

NRK

(M2)

415V, 3PH, 4-WIRE, 50Hz.

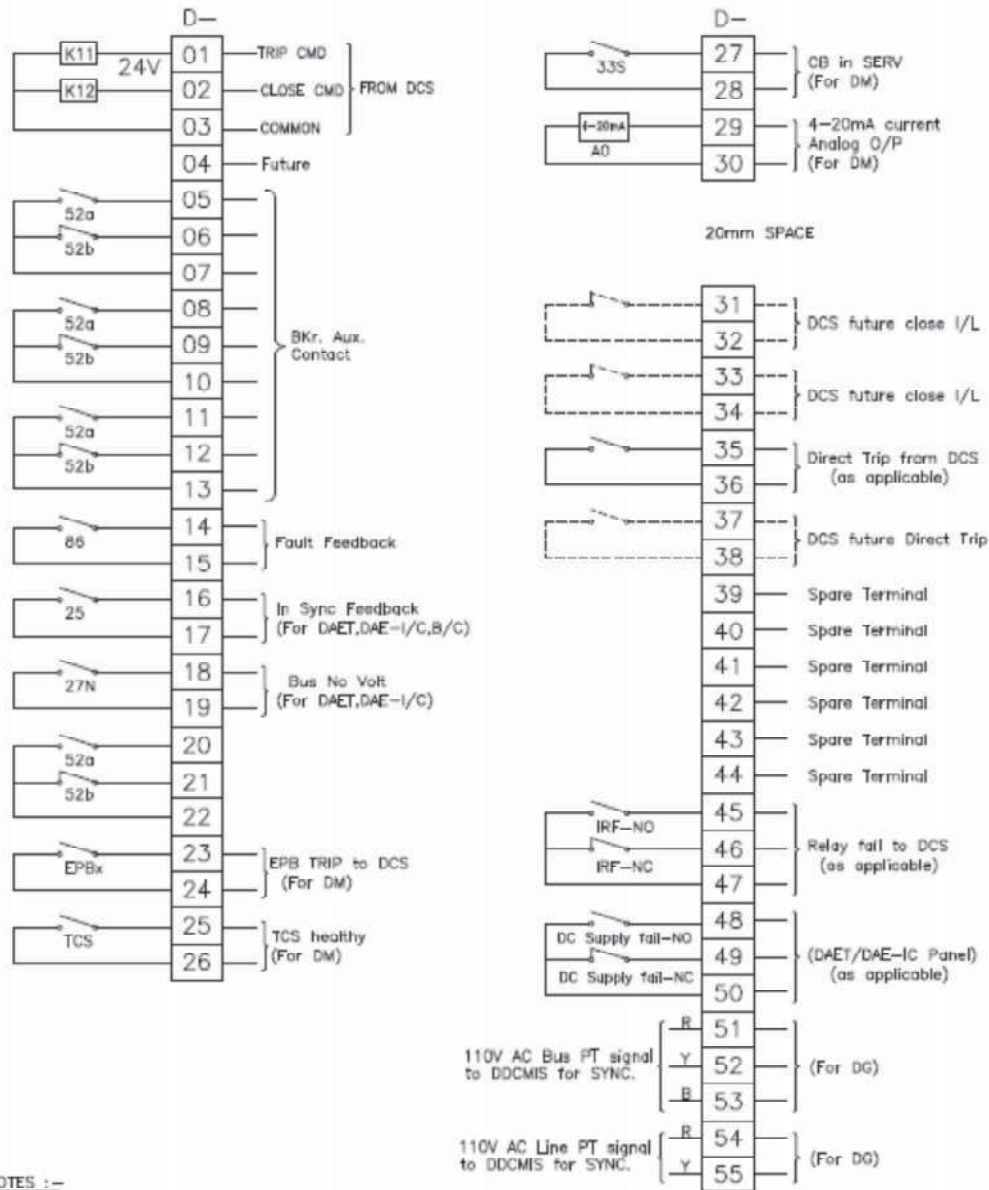
R Y B N

Q

NRK

F

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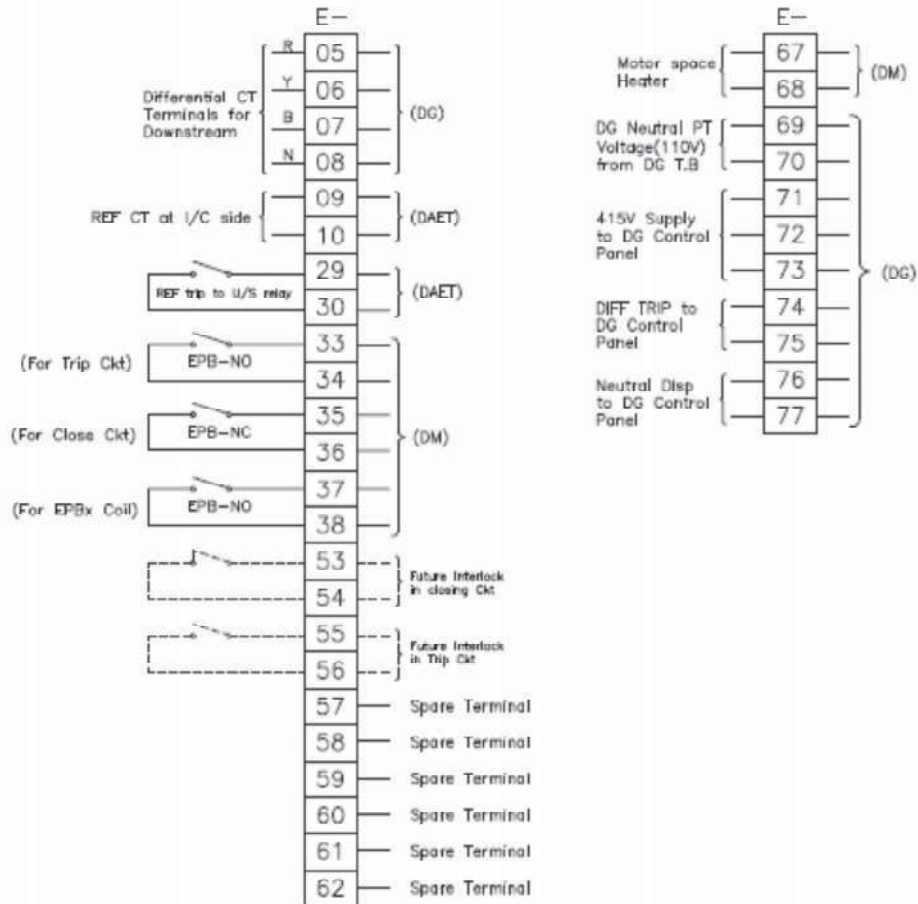
NOTES :-

1. 52a & 52b shown above are breaker aux. contacts when breaker is in Service position.
2. If any signal (except 52a & 52b signals, future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
3. If any new signal not covered in this list is required to be wired to DCS during detail engg, new terminal nos as per above philosophy shall be assigned.

FOR TENDER PURPOSE ONLY

		एनटीपीसी लिमिटेड NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)	
PROJECT		STANDARD	
TITLE		STANDARD "D" TERMINALS (FOR CABLING BETWEEN SWGR & DCS) FOR LT SWGR	
DRN	DON	CHD	APPD
DATE	SCALE	DRAWING No.	REV.
20.06.18	NA	0000-206-POE-A-022	A

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NOTES :-

1. 52a & 52b shown above are breaker aux. contacts when breaker is in Service position.
2. If any signal (except 52a & 52b signals, future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
3. If any new signal not covered in this list is required to be wired to any other external equipment during detail engg, new terminal nos as per above philosophy shall be assigned.

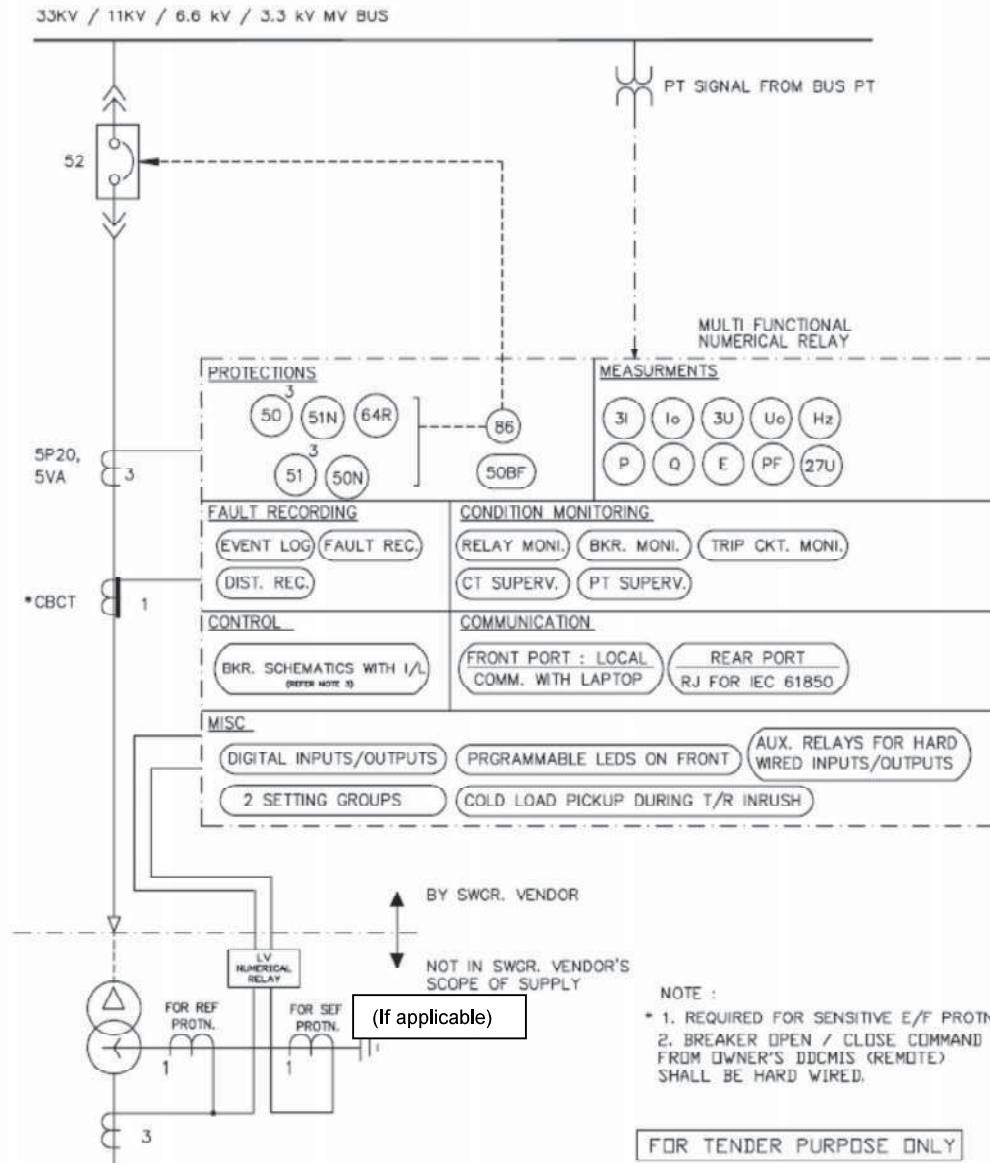
FOR TENDER PURPOSE ONLY



NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)

CLEARED BY					PROJECT	
C	E	M	CM	ES	STANDARD	
					TITLE STANDARD 'E' TERMINALS (FOR CABLING BETWEEN SWGR TO MOTOR, SWGR TO TRF & INTERBOARD CABLING) FOR LT SWGR	
DRN	DDN	CHKD	APPD	DATE	SCALE	DRAWING No.
-				20.06.19	NA	0000-206-POE-A-023
						REV. A

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					एनटीपीसी लिमिटेड NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)				
Cleared By					PROJECT				
C	E	M	C&I	ES	STANDARD				
TITLE					SCHEME FOR MV SWGR FEEDER TYPE-DB (TRANSFORMER)				
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.		
-	✓	✓	✓	10/01/07	NA	0000-205-PDE-A-006	0		

DB.DWG

A4 210X297

33KV / 11KV / 6.6 kV / 3.3 kV MV BUS

PT SIGNAL FROM BUS PT

MULTI FUNCTIONAL NUMERICAL RELAY

PROTECTIONS

MEASUREMENTS

FAULT RECORDING

CONDITION MONITORING

CONTROL

COMMUNICATION

MISC

BY SWGR. VENDOR

NOT IN SWGR. VENDOR'S SCOPE OF SUPPLY

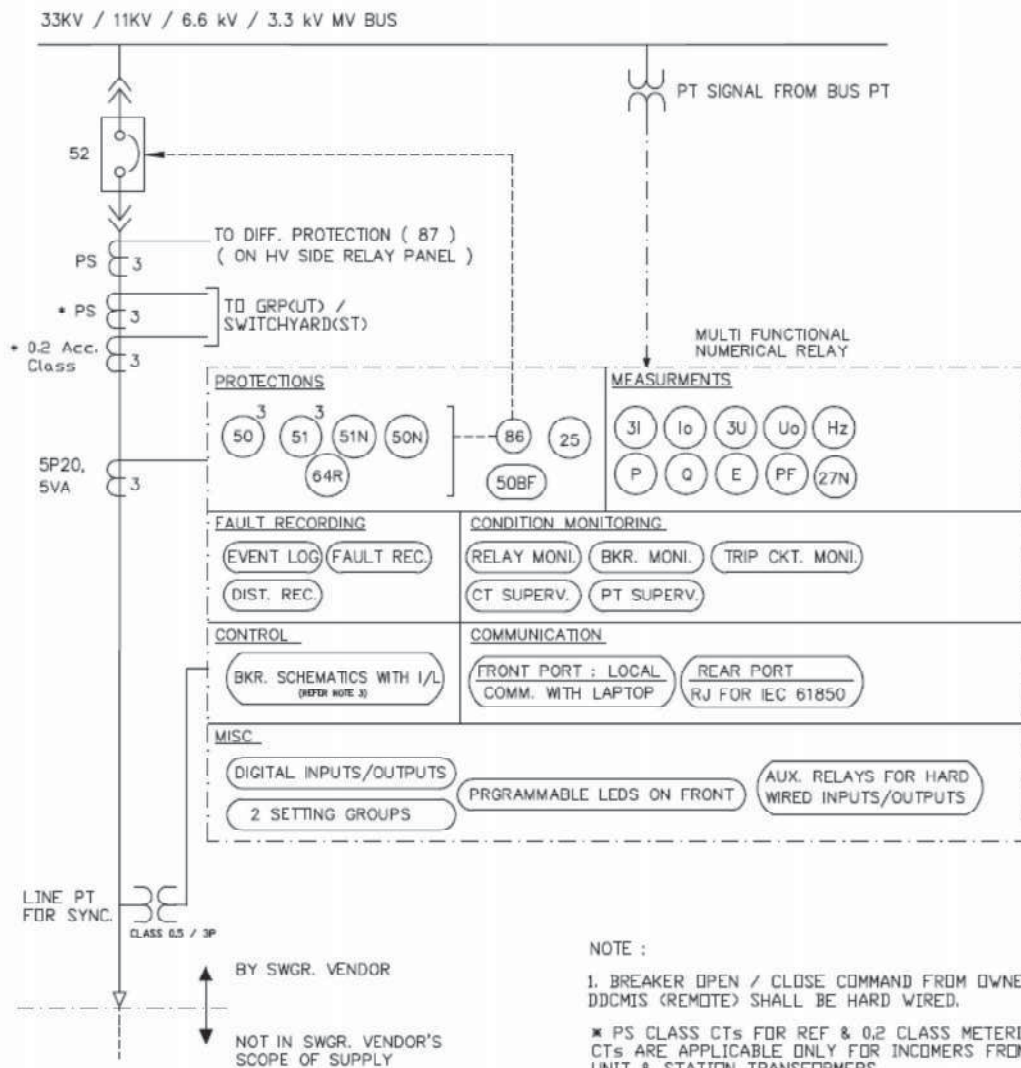
NOTE :

* 1. REQUIRED FOR SENSITIVE E/F PROTIN.


2. BREAKER OPEN / CLOSE COMMAND FROM OWNER'S DDCMS (REMOTE) SHALL BE HARD WIRED.

FOR TENDER PURPOSE ONLY

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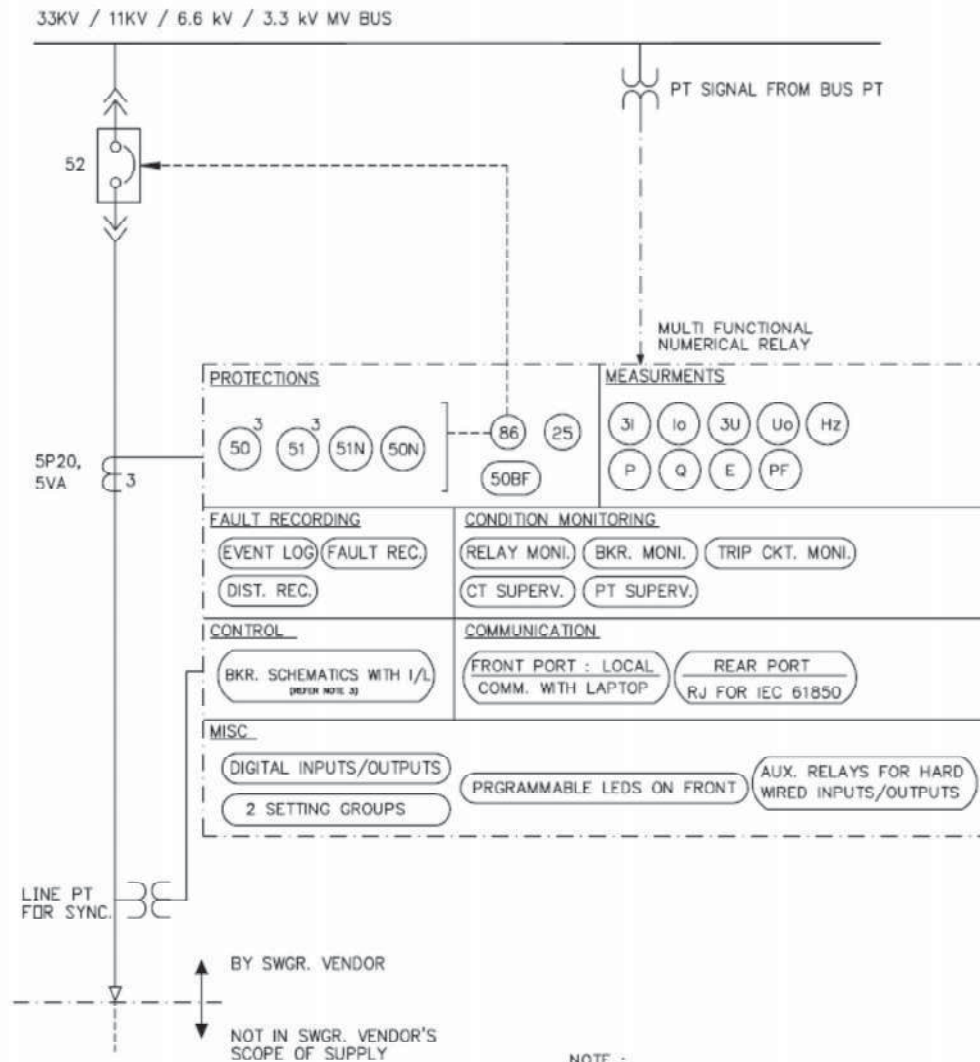
FOR TENDER PURPOSE ONLY

		<p>एनटीपीसी लिमिटेड</p> <p>NTPC Limited</p> <p>(A GOVERNMENT OF INDIA ENTERPRISE)</p>											
<p>CLEARED BY</p> <table border="1"> <tr> <td>C</td> <td>E</td> <td>M</td> <td>C&I</td> <td>ES</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		C	E	M	C&I	ES						<p>PROJECT</p> <p>STANDARD</p>	
C	E	M	C&I	ES									
<p>TITLE</p> <p>SCHEME FOR MV SWGR FEEDER TYPE-DC (INCOMER)</p>		<p>DRAWING No.</p> <p>0000-205-PDE-A-008</p>											
<p>DRN</p> <p>-</p>	<p>DGN</p> <p>by</p>	<p>CHKD</p> <p>by</p>	<p>APPD</p> <p>by</p>										
<p>DATE</p> <p>10/01/07</p>	<p>SCALE</p> <p>NA</p>	<p>REV.</p> <p>0</p>											

DC.DWG

A4 210X297

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NOTE :
1. BREAKER OPEN / CLOSE COMMAND FROM OWNER'S DDCMIS (REMOTE) SHALL BE HARD WIRED.

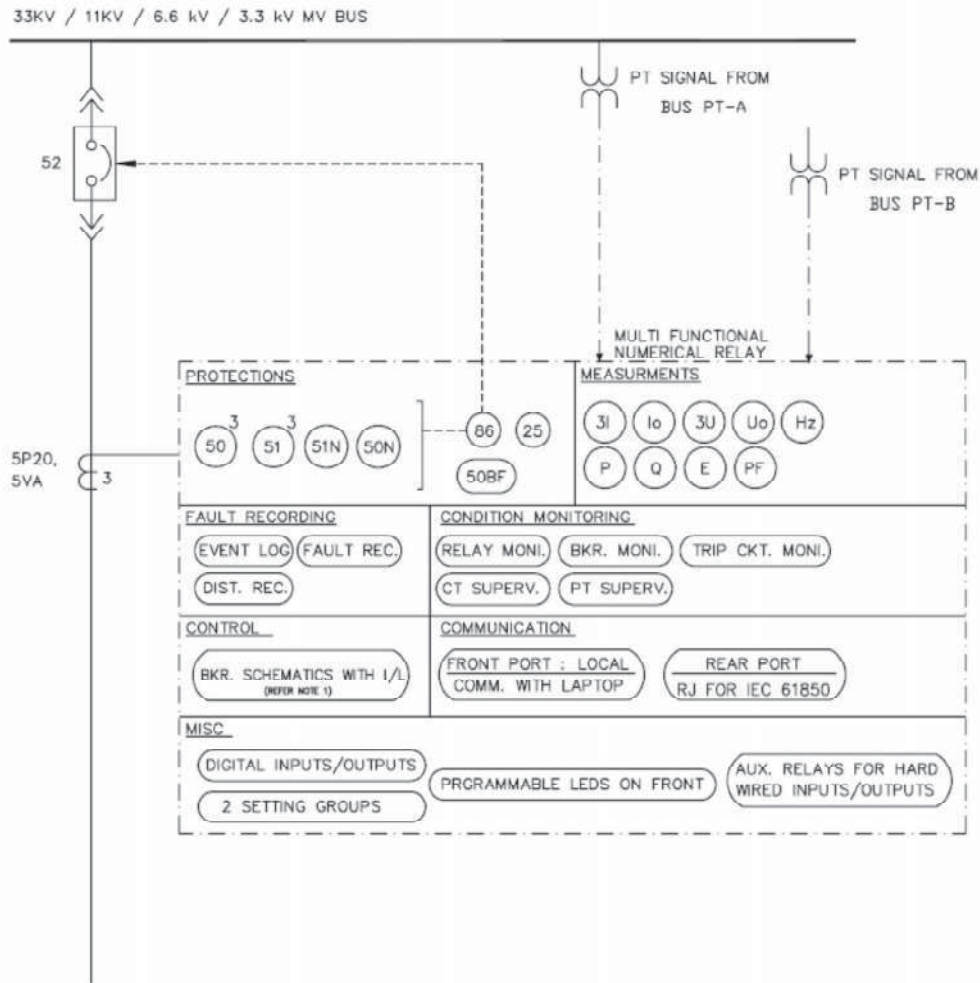
FOR TENDER PURPOSE ONLY

<div style="display: flex; justify-content: space-between;"> <div> <p>एन टी सी लिमिटेड</p> <p>NTPC</p> </div> <div> <p>एन टी सी लिमिटेड</p> <p>NTPC Limited</p> <p>(A GOVERNMENT OF INDIA ENTERPRISE)</p> </div> </div>						
Cleared By					PROJECT	
C	E	M	C&I	ES	STANDARD	
					TITLE	
					SCHEME FOR MV SWGR FEEDER TYPE-DE (TIE FEEDER)	
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.
-				10.01.07	NA	0000-205-PDE-A-009
						REV.
						0

DE.DWG

A4 210X297


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NOTE :

1. BREAKER OPEN / CLOSE COMMAND FROM OWNER'S DDCMIS (REMOTE) SHALL BE HARD WIRED.

FOR TENDER PURPOSE ONLY

					एनटीपीसी लिमिटेड NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)				
CLEARED BY C E M C&I ES					PROJECT STANDARD				
DRN -					TITLE SCHEME FOR MV SWGR FEEDER TYPE-DD (BUS COUPLER)				
DCN Jy					SCALE NA				
CHKD H					DRAWING No. 0000-205-PDE-A-010				
APPD CL					REV. 0				
DATE 10/11/07									

DD.DWG

A4 210X297

एन टी पी सी
NTPC

एनटीपीसी लिमिटेड
NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)

CLEARED BY

PROJECT

STANDARD

TITLE

SCHEME FOR MV SWITCHGEAR MODULE TYPE - G
(BUS PT)

DRN

DGN

CHKD

APPENDIX

DATE	
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	SCA
--	-----

E	DRA
---	-----

AWING M

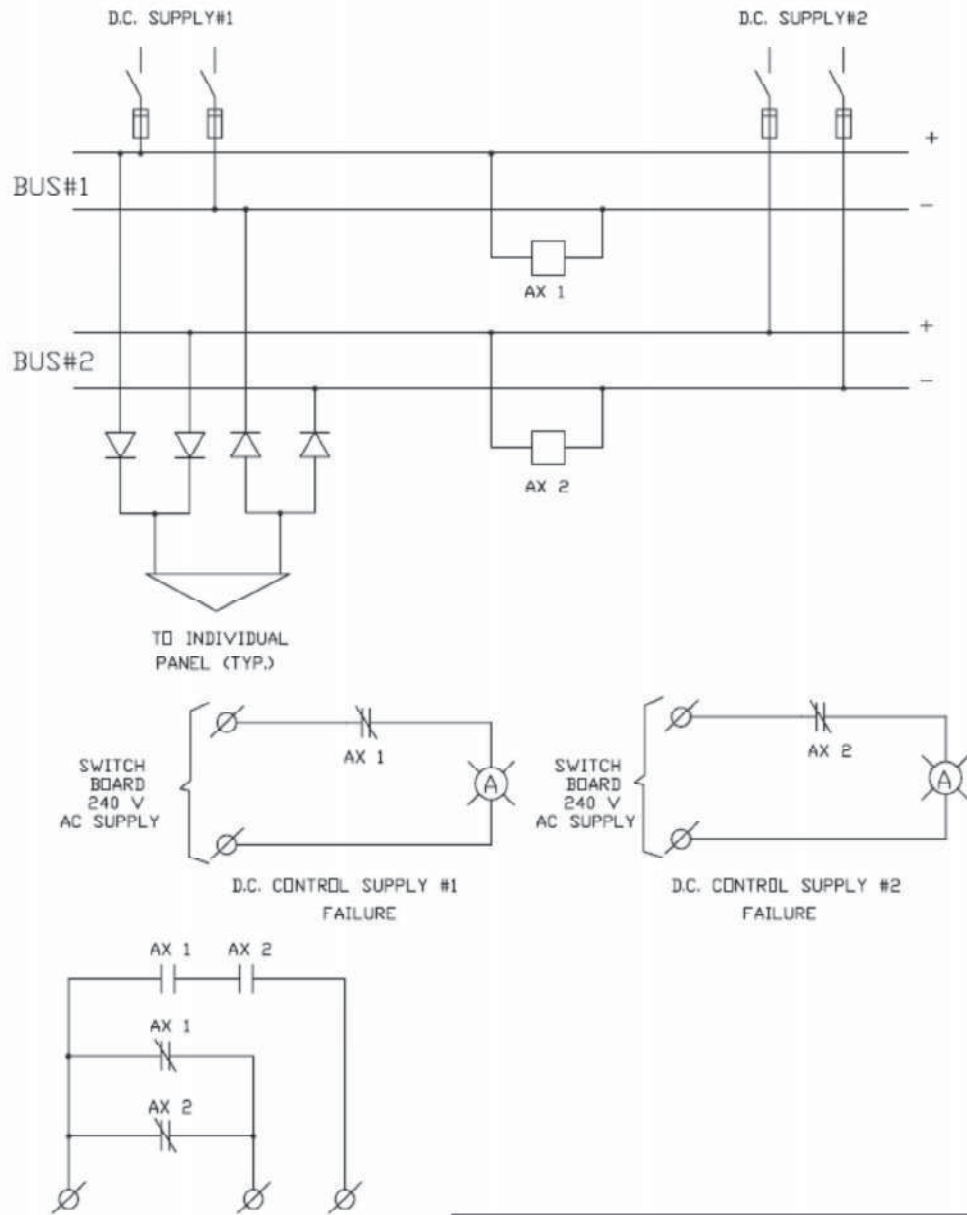
No.

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REV.

A4 210X297

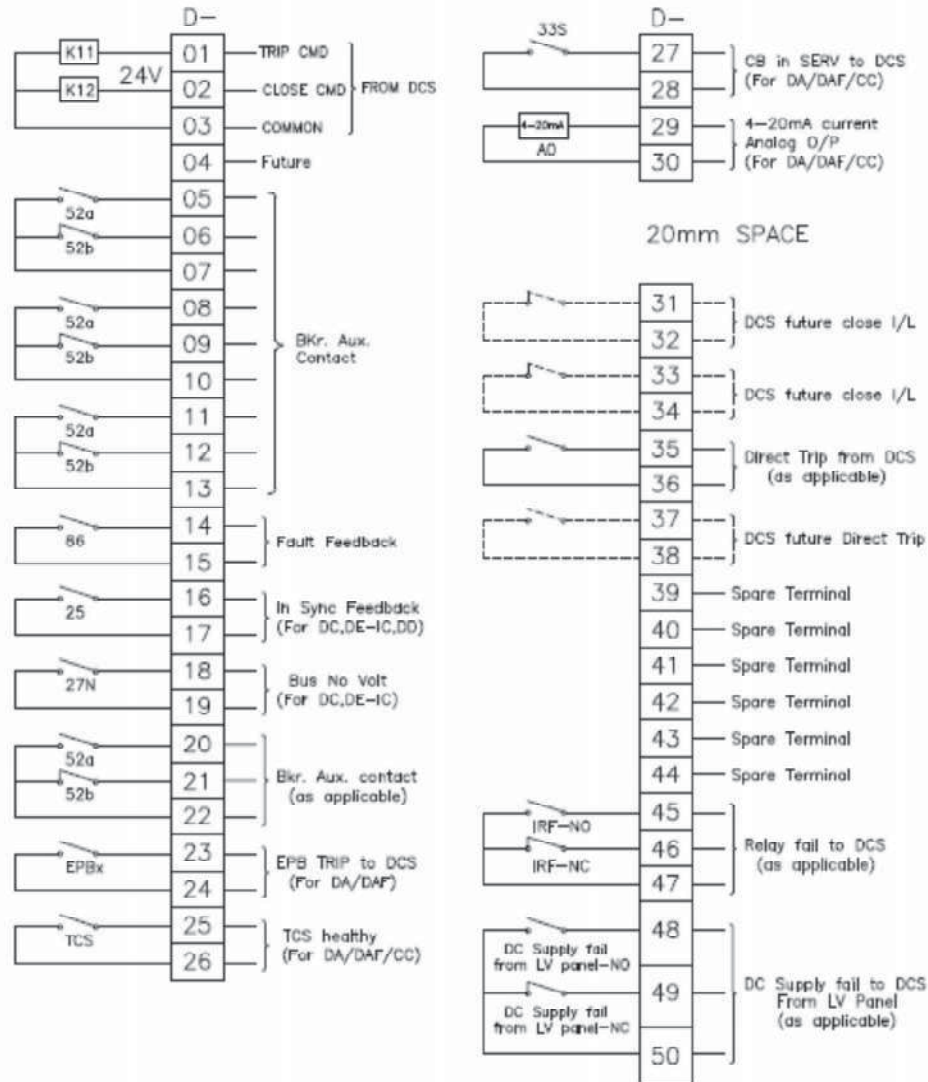
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FOR TENDER PURPOSE ONLY

<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;"> एन टी पी सी NTPC </div> <div> नैशनल थर्मल पावर कॉर्पोरेशन लिमिटेड National Thermal Power Corporation Ltd. (A GOVERNMENT OF INDIA ENTERPRISE) </div> </div>						
Cleared By					PROJECT	
C	E	M	C&I	ES	STANDARD	
					TITLE	
					TYPICAL CONTROL SUPPLY SCHEME FOR MV SWITCHGEAR PANELS	
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.
-	✓	✓	✓	10/01/07	NA	0000-205-PDE-A-013
						REV.
						0

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NOTES :-

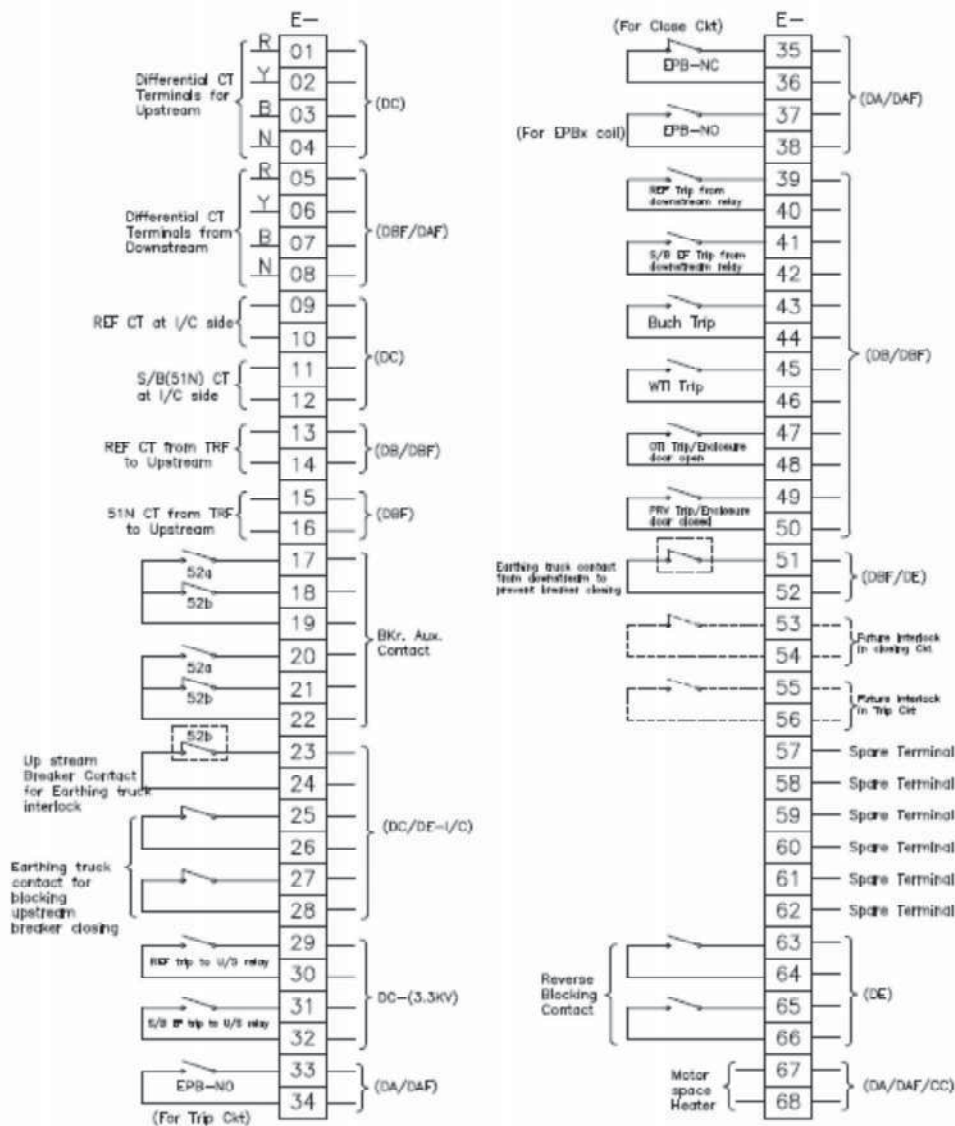
- 52a & 52b shown above are breaker aux. contacts when breaker is in Service position.
- If any signal (except 52a & 52b signals @ D terminal block, future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
- If any new signal not covered in this list is required to be wired to DCS during detail engg, new terminal nos as per above philosophy shall be assigned.

FOR TENDER PURPOSE ONLY

<div style="display: flex; justify-content: space-between;"> <div> <p>एन टी पी सी</p> <p>NTPC</p> </div> <div> <p>एन टी पी सी लिमिटेड</p> <p>NTPC Limited</p> <p>(A GOVERNMENT OF INDIA ENTERPRISE)</p> </div> </div>														
<div style="display: flex; justify-content: space-between;"> <div> <p>CLEARED BY</p> <table border="1"> <tr> <td>C</td> <td>E</td> <td>M</td> <td>CM</td> <td>ES</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table> </div> <div> <p>PROJECT</p> <p>STANDARD</p> </div> </div>					C	E	M	CM	ES					
C	E	M	CM	ES										
<p>TITLE STANDARD "D" TERMINALS (FOR CABLING BETWEEN SWGR & DCS) FOR MV SWGR</p>														
DRN	DGN	GRD	APPD	DATE										
-	-	-	-	28.06.16										
SCALE	HA	DRAWING No.	0000-205-POE-A-017											
REV.	0													

AA 210X297

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NOTES :-

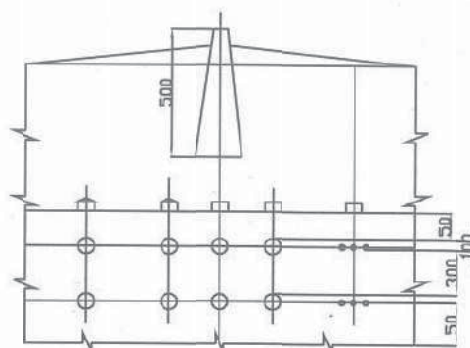
1. 52a & 52b shown above are breaker aux. contacts when breaker is in Service position.
2. If any signal (except 52a & 52b signals @ D terminal block/future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
3. If any new signal not covered in this list is required to be wired to any other external equipment during detail engineering terminal nos as per above nomenclature shall be assigned.

FOR TENDER PURPOSE ONLY									
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">NTPC</div> <div> एन टी सी लिमिटेड NTPC Limited <small>(A COMPANY OF NDA GROUP)</small> </div> </div>					PROJECT: STANDARD				
TITLE: STANDARD 68 TERMINALS (FOR CABLES BETWEEN SWITCH TO MOTOR, SWITCH TO TRF & INTERLOCKED CABLES) FOR MV SWGR									
DRAWN: -		DCN:		CHKD:		APPD:		DATE: 28.08.24	
SCALE: NA		DRAWING No: 0000-205-POE-A-018						REV: 0	

	<div><div><div><div><div><div></div></div></div><div><div><div>BURIED CABLE</div></div></div></div></div></div>
	<div><div></div><div></div></div>

The diagram illustrates a cable tray layout with the following dimensions and features:

- Overall Width:** 150 (TYP) on each side, totaling 300.
- Tray Depth:** 100.
- Tray Spacing:** 150 (TYP) between the centerlines of the trays.
- Tray Height:** 350.
- Ground Level:** Indicated by a line and the text "GRD LEVEL".
- Cable Arrangement:** Cables are shown in a single layer within the tray, with a spacing of 100 between them.
- Labels:**
 - ①: Top of the tray.
 - ②: Side of the tray.
 - ③: Bottom of the tray.
 - ④: Cable.
 - ⑤: Tray.
- Notes:**
 - "TOP OF CABLE" points to the top of the cable.
 - "W. TO SUIT NO. OF CABLES" indicates the width should be adjusted based on the number of cables.



DIRECTLY BURIED CABLES IN TWO LAYER

- ① — CABLE ROUTE MARKER
- ② — EARTH BACK FILLED & RAMMED
- ③ — PROTECTIVE COVERS
 - a) BRICKS FOR LOW VOLTAGE CABLES
 - b) RCC FOR HIGH VOLTAGE CABLES WITH HOLE AT EACH END TO TIE EACH OTHER WITH G.S. WIRE
- ④ — ARMoured POWER CABLE
- ⑤ — ARMoured CONTROL CABLE
- ⑥ — FINE SAND/RIDDLED SOIL COMPACTED

DIMENSION MIN.	1100V GRADE CABLES	FOR 3.3 KV TO 11KV	ABOVE 11KV & UPTO 33KV
D1	750	900	1050
S = 300MM BETWEEN CABLES OF DEFT CLASS = 400MM BETWEEN 1/C POWER CABLE AND COMMUNICATION CABLE. = 300MM BETWEEN MULTICORE POWER CABLE & COMMUNICATION CABLE.	= d BETWEEN CABLES OF SAME CLASS		
	= 300MM BETWEEN CABLES OF DEFT CLASS		
	= 400MM BETWEEN 1/C POWER CABLE AND COMMUNICATION CABLE.		
	= 300MM BETWEEN MULTICORE POWER CABLE & COMMUNICATION CABLE.		

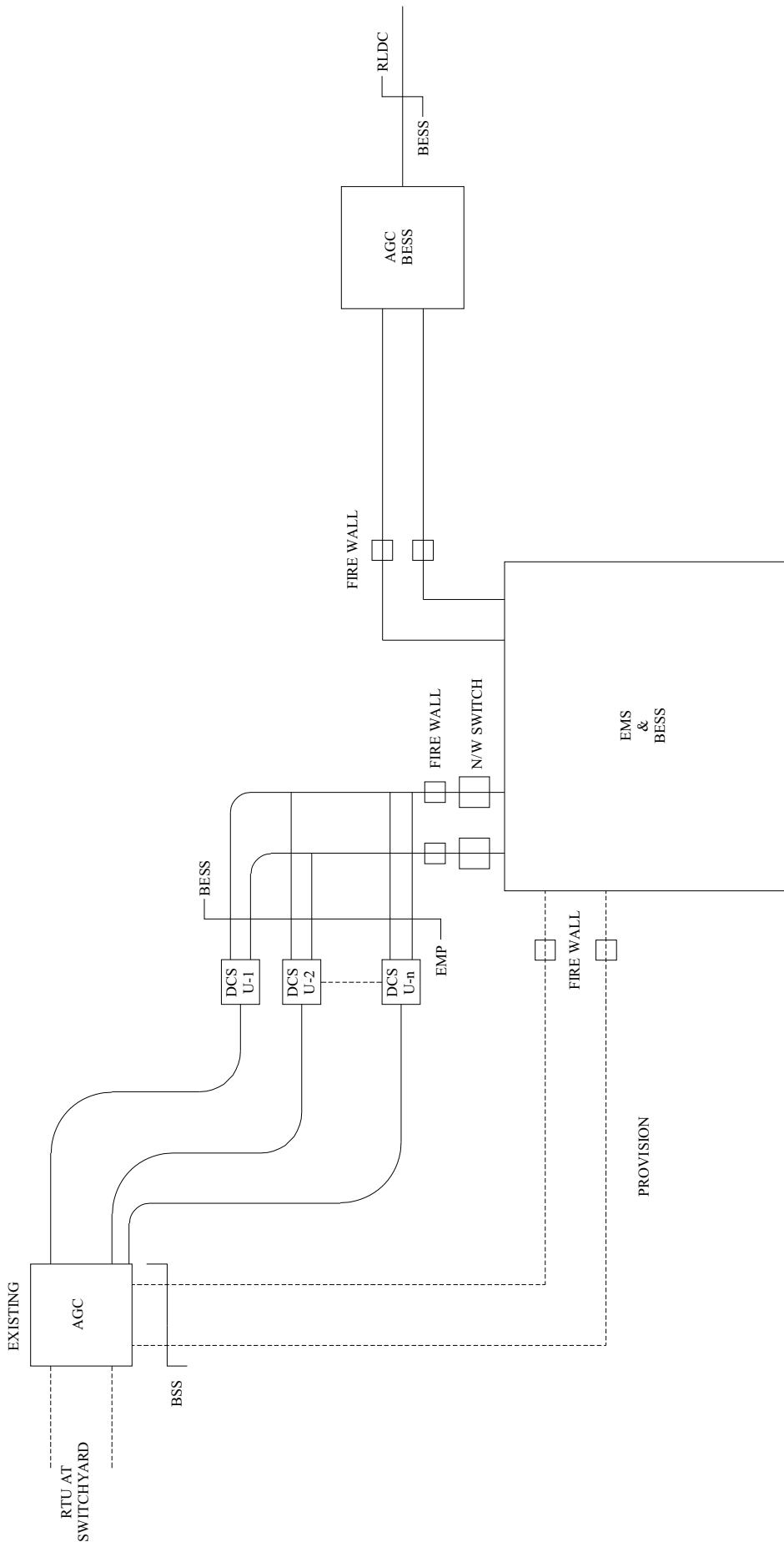
DI - MINIMUM DEPTH OF LAYING FROM GROUND SURFACE TO TOP OF CABLES.

1. SINGLE CORE CABLES SHALL BE RUN IN TREFOIL FORMATION AND SHALL BE BOUND BY SELFLOCKING CABLE TIES AT EVERY 750 MM.
2. CABLE IDENTIFICATION TAG SHALL BE TIED AT BOTH ENDS OF THE CABLE.
3. IF THE MINIMUM CLEARANCE AS INDICATED THE ABOVE TABLE FOR CABLES OF DIFFERENT CLASSES ARE NOT FEASIBLE BRICK BARRIERS SHALL BE USED BETWEEN ADJACENT CABLES.
4. G.I./HUME/HDPE. PIPES SHALL BE PROVIDED FOR ROAD CROSSING AT A MINIMUM DEPTH OF 600 FROM THE GRADE LEVEL AS DECIDED BY NTPC.
5. ALL DIMENSIONS ARE IN mm.

[illegible]

	<div>TYPICAL INTERFACE OF BESS WITH EXISTING SYSTEM</div>		

TYPICAL INTERFACE OF BESS WITH EXISTING SYSTEM



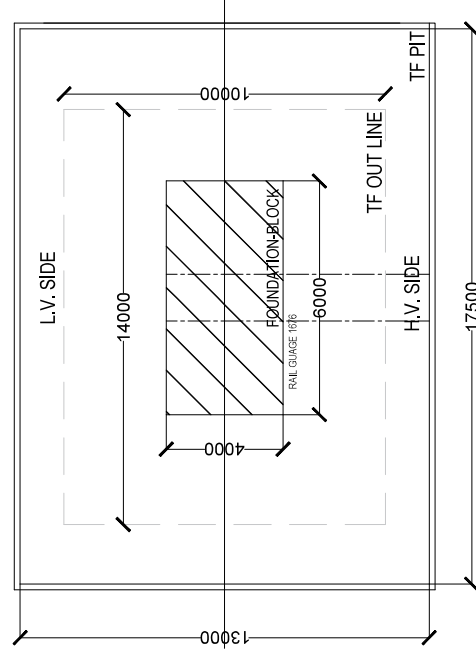
NOTES:-

1. TERMINAL POINT FOR DCS CONNECTIVITY SHALL BE EMPLOYER'S DCS/EXISTING AGC SWITCH/CONTROL PANEL.
2. ONE OWS OF EMS SYSTEM SHALL BE PLACED AT UNIT CCR EXACT DETAILS SHALL BE FINALIZED DURING DETAILS EGG.

TYPICAL INTER CONNECTION OF BESS WITH EXISTING SYSTEM

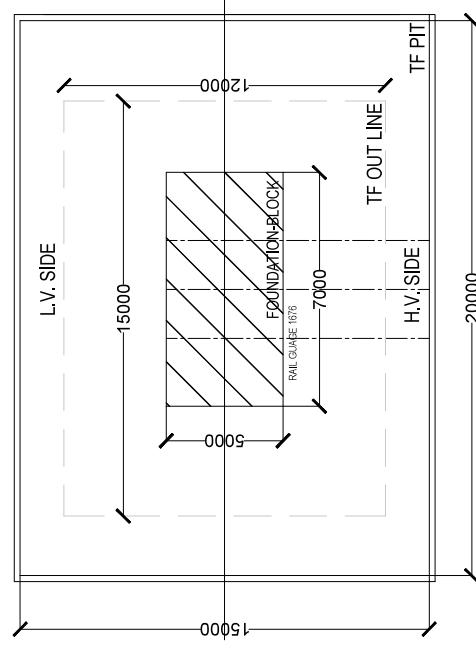
	<div>FOUNDATION BLOCK FOR BESS TIE TRANSFORMERS</div>		

FOUNDATION BLOCK FOR BEST TIE TRANSFORMERS



132 OR 220kV 80-150 MVA

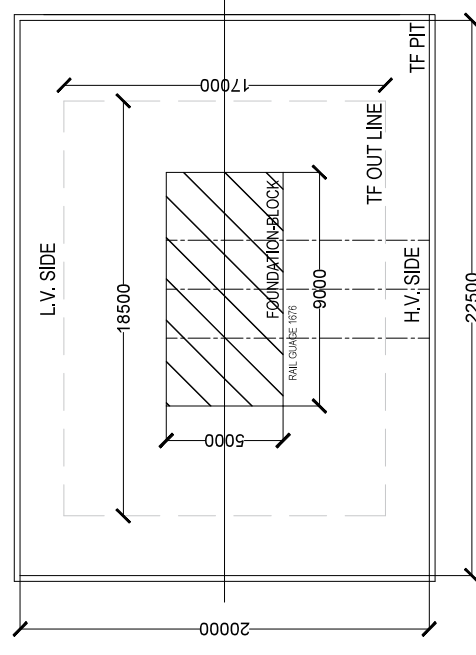
Fire wall Height for 132kv: 9500mm
Fire wall Height for 220kv: 11000mm
Weight : 200T including Oil 55KI



220KV ABOVE 150 TO 200 MVA

400KV ABOVE 80 TO 200 MVA

Fire wall Height for 220kv: 11000mm
Fire wall Height for 400kv: 12500mm
Weight : 275T including Oil 65Kl



400kV 315MVA

Fire wall Height for 400kv: 13000mm
Weight : 400T including Oil 120KI

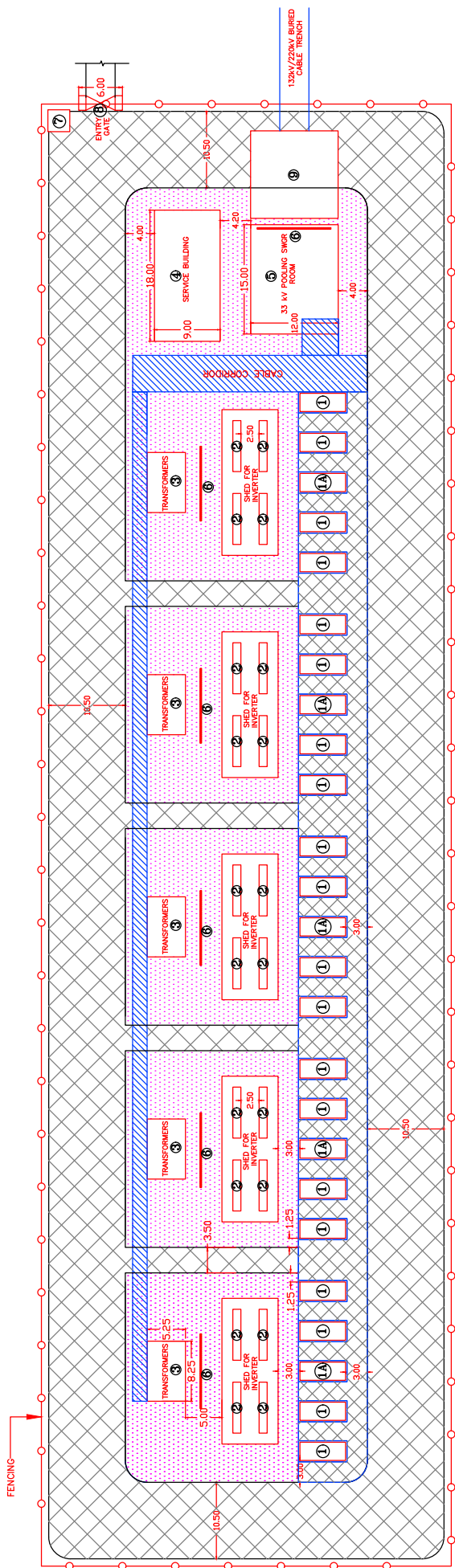
Note:

1. THE FOUNDATION BLOCK SHALL BE DESIGNED TO WITHSTAND JACKING LOADS AT ANY POINT, WITH A MINIMUM CAPACITY OF ONE-THIRD OF THE TRANSFORMER WEIGHT.
2. ROLLER LOCKING POCKETS SHALL BE PROVIDED DURING THE CASTING OF THE FOUNDATION BLOCK. DETAILS OF THESE POCKETS, ALONG WITH THE ORIENTATION OF RAIL TRACKS REQUIRED, WILL BE SHARED DURING THE DETAILED ENGINEERING.
3. A SUITABLE FOUNDATION BLOCK SHALL BE CAST ABOVE THE PIT UP TO RAIL LEVEL FOR SUPPORTING THE TRANSFORMER RADIATOR AND ITS SUPPORT ARRANGEMENT, CABLE BOX, M. BOX/CCC, ONLINE MOISTURE REMOVAL SYSTEM, FIREFIGHTING SUPPORT SYSTEMS, AND ANY OTHER ASSOCIATED EQUIPMENT. EACH COMPONENT/EQUIPMENT LOCATED IN THE TRANSFORMER PIT SHALL BE DESIGNED TO SUPPORT APPROX LOAD OF UP TO 2 T. EXACT FOUNDATION DETAILS--INCLUDING LOAD, POCKETS, AND DIMENSIONS--WILL BE PROVIDED DURING DETAILED ENGINEERING.
4. THE TRANSFORMER FOUNDATION, PIT, FIRE WALL, EARTHING ARRANGEMENT, ETC., SHALL BE DESIGNED AND CONSTRUCTED IN COMPLIANCE WITH STATUTORY REQUIREMENTS AND THE APPLICABLE TECHNICAL SPECIFICATIONS.

[illegible]

	<div>TYPICAL LAYOUT FOR BESS PLANT</div>		

TYPICAL LAYOUT FOR BESS PLANT (50 MW, 100 MWh)
(2.75 ACRE)



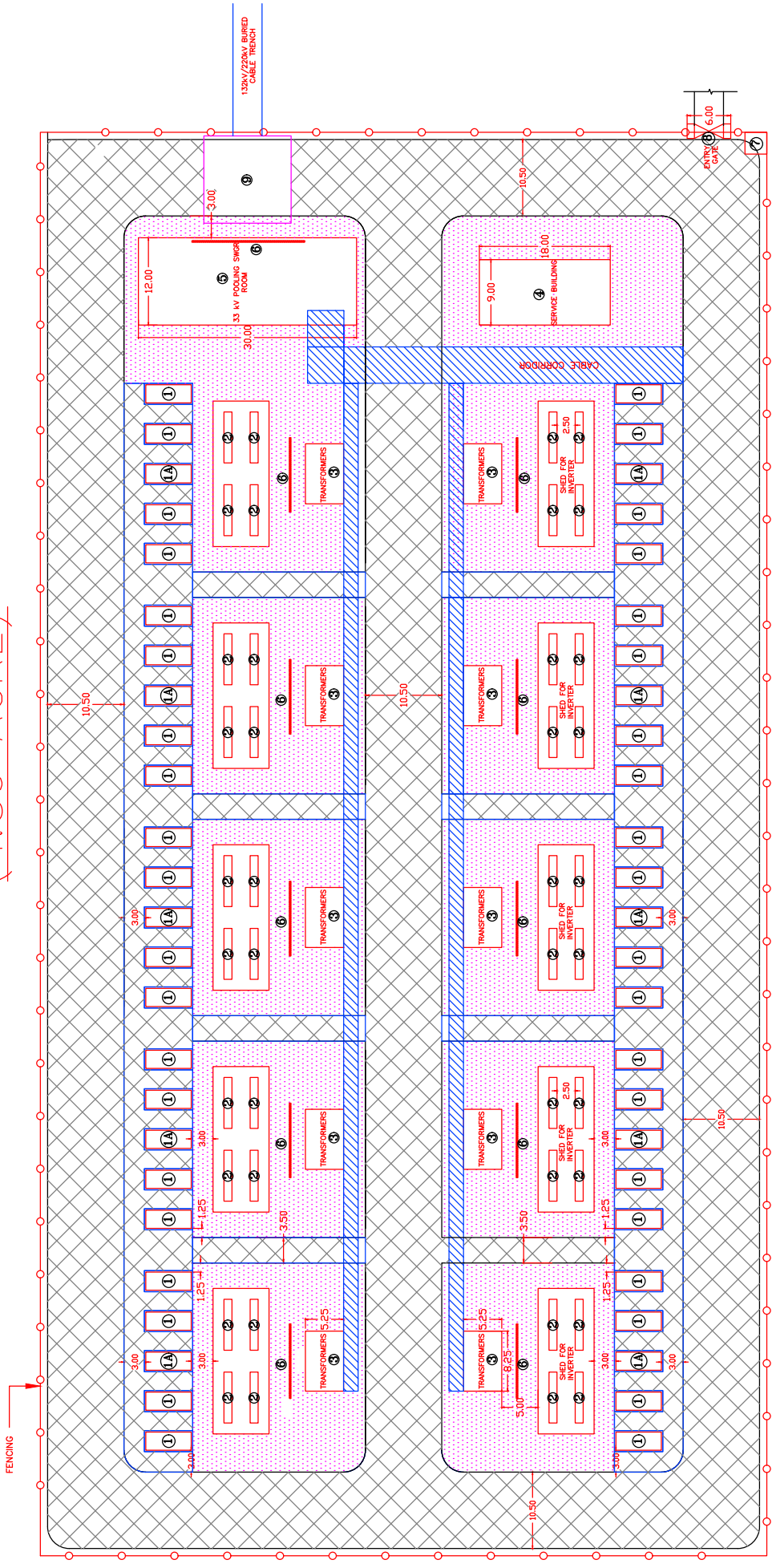
- NOTES:-**
1. APPROACH TO AREA IDENTIFIED FOR BESS TO BE PROVIDED FROM NEAREST EXISTING ROAD.
 2. THE CABLE ROUTE SHOWN IS INDICATIVE AND TO BE FINALIZED AS PER SITE CONDITION.
 3. NIPFS IS CONSIDERED FOR FIRE PROTECTION OF INVERTER TRF & BESS TIE TRF.
 4. FIRE WALL TYPICAL IS SHOWN, DETAILS WILL BE SITE SPECIFIC.
 5. ONE (1) 33 kV POOLING SWGR ROOM PER BLOCK UPTO 240 MW/480 MWh.
 6. FINISHED FLOOR LEVELS / TOP OF FOUNDATION / TOP OF RAIL WILL BE 500MM (MINIMUM) ABOVE THE FINISHED GROUND LEVEL.

- LEGEND:**
- 1. HEAVY DUTY PAVING FOR VEHICULAR MOVEMENT - 6133 SQM
 - 2. LIGHT DUTY PAVING - 2806 SQM
 - 3. CABLE CORRIDOR

1	BATTERY CONTAINER(20X8 FEET)
1A	ADDITIONAL CONTAINER
3	INVERTER (PCS)
3	TRANSFORMERS
4	SERVICE BUILDING
5	33 kV POOLING SWGR ROOM
6	FIRE WALL
7	SECURITY CABIN
8	ENTRY GATE
9	BESS TIE TRANSFORMER

FOR TENDER PROPOSE

TYPICAL LAYOUT FOR BESS PLANT (100 MW, 200 MWh) (4.80 ACRE)



- NOTES:-**
1. APPROACH TO AREA IDENTIFIED FOR BESS TO BE PROVIDED FROM NEAREST EXISTING ROAD.
 2. THE CABLE ROUTE SHOWN IS INDICATIVE AND TO BE FINALIZED AS PER SITE CONDITION.
 3. NIFPS IS CONSIDERED FOR FIRE PROTECTION OF INVERTER TRF & BESS TIE TRF.
 4. FIRE WALL TYPICAL IS SHOWN, DETAILS WILL BE SITE SPECIFIC.
 5. ONE (1) 33 kV POOLING SWGR ROOM PER BLOCK UPTO 240 MW/480 MWh.
 6. FINISHED FLOOR LEVELS / TOP OF FOUNDATION / TOP OF RAIL WILL BE 500MM (MINIMUM) ABOVE THE FINISHED GROUND LEVEL.

LEGEND:

1. HEAVY DUTY PAVING FOR VEHICULAR MOVEMENT — 8165 SQM
2. LIGHT DUTY PAVING — 5641 SQM
3. CABLE CORRIDOR

BATTERY	
1	CONTAINER(20X8 FEET) (2.5MW/5MWh)
1A	ADDITIONAL CONTAINER
3	INVERTER (PCS)
3	TRANSFORMERS
4	SERVICE BUILDING
5	33 kV POOLING SWGR ROOM
6	FIRE WALL
7	SECURITY CABIN
8	ENTRY GATE
9	BESS TIE TRANSFORMER

FOR TENDER PROPOSE

NTPC Limited
POWER CORPORATION OF INDIA LIMITED

BATTERY ENERGY STORAGE SYSTEM

TYPICAL LAYOUT FOR BESS PLANT (100 MW, 200 MWh)

NO.	FOR TENDER PROPOSE	DESCRIPTION	QUANTITY	UNIT	AMOUNT	DATE	BY	REMARKS
1								

TECHNICAL DATA SHEET

A. BATTERY ENERGY STORAGE SYSTEM (BESS)

SN	Parameters	
1	Battery Technology	
2	BESS Footprint (Sq.m)	
3	Net dispatchable energy (available at Point of Interconnection) at rated DoD as per battery design over entire design life of 12 years (Year wise Minimum Dispatchable Energy capacity during start of the year and end of the year shall be provided in a tabular form)	
4	Annual Degradation	
5	Rated AC power at Point of Interconnection	
6	Gross BESS capacity	
7	Depth of Discharge	
8	Design Life/Cycle Life	
9	Battery Round Trip ac-dc-ac efficiency at metering point	
10	Response time	
11	Charging/ discharge Rate	
12	Minimum Battery Protection Features of Module and BMS	
13	Minimum metering and monitoring of module/tray BMS	
14	Minimum metering and monitoring functions of BMS	
15	Data Communication	
16	Ventilation System inside the Container	
17	Power Factor range at POI/metering point (minimum)	

B. INVERTER

SN	Parameters	
1	Maximum Input Voltage DC	
2	Nominal output voltage frequency	
3	Continuous operating frequency range	
4	AC Voltage Range	
5	Euro efficiency	
6	Number of MPPT	
7	Operating power factor range	

8	Current harmonics	
9	Current THD value	
10	Operating ambient temperature	
11	Humidity	
12	PCU designed DC fault current level	
13	PCU designed AC fault current level	
14	Whether following functions/protections provided in PCU: (YES/NO)	
	Shut Down on Over Voltage both at input & output Automatic,	
	Automatic protection against over Frequency,	
	Automatic protection against Surge voltage induced at output due to external source,	
	Short Circuit Protection by Circuit Breaker and Electronics protection against sustained fault.	
	Automatic Protection against the lightening fault.	
	protection against DC reverse polarity in the inverter.	
	Anti-islanding protection	
	Synchronization feature	
C. INVERTER DUTY TRANSFORMER		
SN	Parameters	
1	Rating (MVA)	
2	Vector Group	