

**BILL OF QUANTITY**

LEGEND	DESCRIPTION
	BALL VALVE
	Y-STRAINER
	EXPANSION VALVE
	PILOT OPERATED SOL. VALVE
	AIRSTAT
	GYSERSTAT
	RH. SENSOR & TEMP. SENSOR
	DIFFERENTIAL PRESSURE SWITCH
	PRESSURE SWITCH
	TEMPERATURE TRANSMITTER
	MOTORIZED FIRE DAMPER
	NON RETURN DAMPER
	FINE FILTER
	VOLUME CONTROL DAMPER
	PER FILTER
	STRIP HEATER

**NOTES**

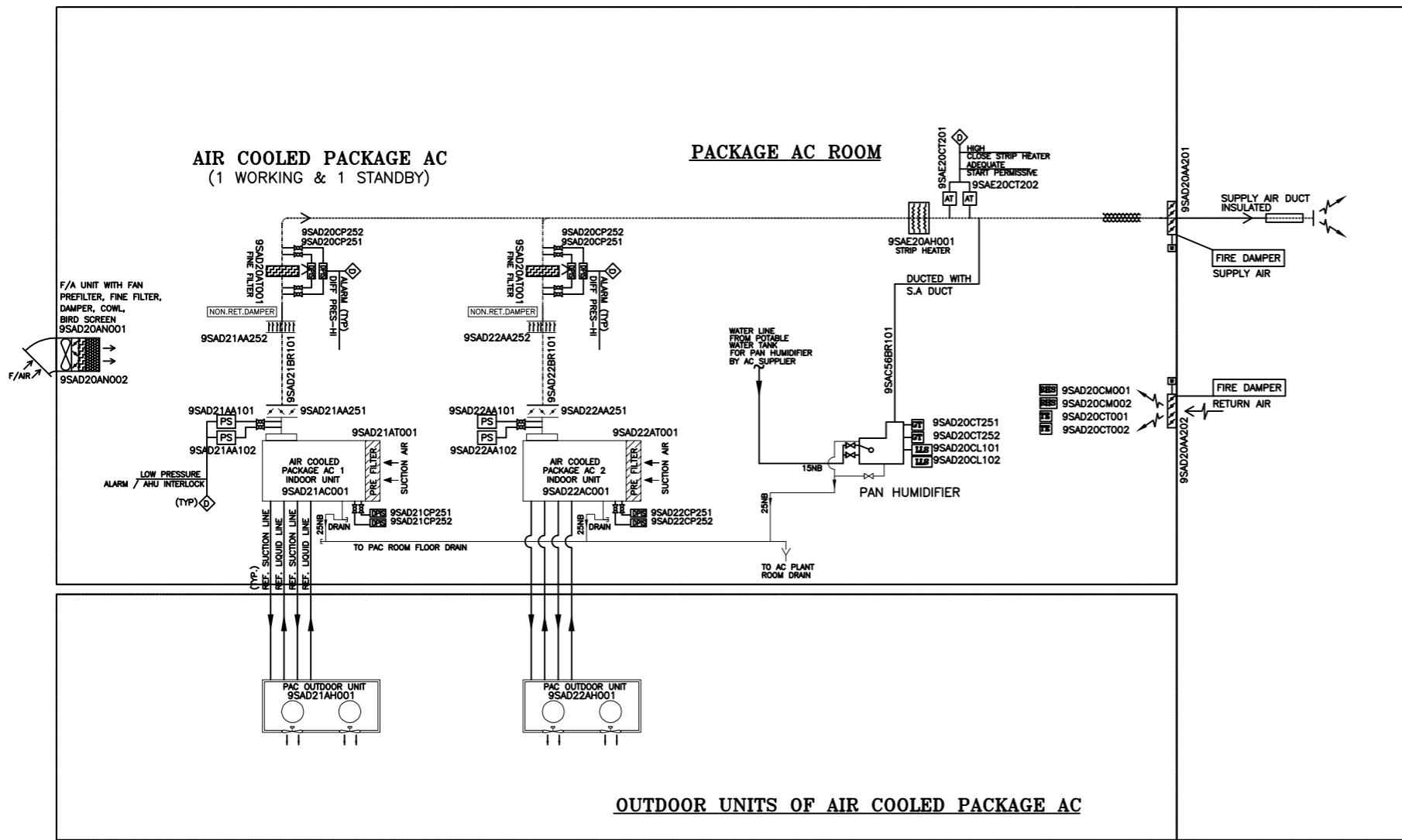
1. ALL PIPES SHALL BE AS PER TECHNICAL SPECIFICATION.
2. SUCTION & LIQUID LINES INSULATION AS PER SPECIFICATION.
3. ALL INSTRUMENT AND TEST POINT SHALL BE PROVIDED WITH ISOLATING ROOT VALVE.
4. TEMP. SENSOR(TS) ALONG WITH TEMP. TRANSMITTERS & RELATIVE HUMIDITY SENSOR(RHS) SHALL BE PROVIDED IN EACH AHU ROOM.
5. AIR RELEASE VALVE SHALL BE PROVIDED AS PER SYSTEM REQUIREMENT AT SUITABLE LOCATION.
6. BIDDER TO NOTE THAT THE P&ID SHOWS ONLY THE BARE MINIMUM REQUIREMENT OF VALVES AND INSTRUMENTS. ANY INSTRUMENTATION & VALVES AS REQUIRED FOR THE COMPLETION OF THE SYSTEM IN LINE WITH TECHNICAL SPECIFICATION SHALL BE PROVIDED BY BIDDER DURING DETAILED ENGINEERING WITHOUT ANY COMMERCIAL IMPLICATION.

TYP P&ID FOR EACH CONTROL ROOM

OWNER:	<b>NTPC Limited</b> ( A GOVT. OF INDIA ENTERPRISE ) ENGINEERING DIVISION		
PROJECT:	KAHALGAON STPP (FGD System Package)		
CONTRACTOR:	<b>BHARAT HEAVY ELECTRICALS LTD</b> POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA		
PACKAGE:			
DESIGNED		TITLE :	<b>P &amp; I DIAGRAM FOR AIR COOLED CONDENSING UNIT (DX- TYPE)</b>  SCALE= NTS.
DRAWN			
CHECKED			
APPROVED			
DATE			
			SHEET
			REV.

FOR TENDER PURPOSE ONLY

# P & I DIAGRAM FOR AC SYSTEM AIR COOLED PACKAGE AC



LEGEND					
SYMBOL	DESCRIPTION	TAG	SYMBOL	DESCRIPTION	TAG
	TEMPERATURE GAUGE	TI		NON RETURN VALVE	NRV
	PRESSURE GAUGE	PI		Y-STRAINER	YSTR
	BALANCING VALVE	BV		GATE VALVE	GV
	MOTORISED BUTTERFLY VALVE	MBF		NON RETURN DAMPER	NRD
	3-WAY MOTORISED MIXING VALVE	3MV		FIRE DAMPER (MOTOR OPERATED)	FD
	PUMP	P		VOLUME CONTROL DAMPER	VCD
	VENT VALVE	-		LEVEL SWITCH (LOW/HIGH)	LS
	PURGE VALVE	-		DESCALING TEE	-
	WATER FLOW SWITCH	WFS		AIRSTAT	AT
	PRE FILTER	-		FIRE DAMPER (MOTOR OPERATED)	FD
	FINE FILTER	-		FINNED TYPE STRIP HEATER	-
	HEPA FILTER	-		GEYSERS THERMOSTAT	GT
	ELECTRICAL LINE	E		HIGH LEVEL SWITCH	HLS
	PAN HUMIDIFIER	PH		PRESSURE TEST POINT	PX
	LOW LEVEL SWITCH	LLS		TEMPERATURE ELEMENT	TE
	TEMP. TEST POINT	TX		HUMIDITY SENSOR	RHS
	DIFFERENTIAL PRESSURE SWITCH	DPS		WATER LINE PRESSURE SWITCH	WPS
	TEMPERATURE SENSOR	TS		AIR LINE PRESSURE SWITCH	PS
	POT STRAINER	-		HIGH LEVEL SWITCH	HLS
	PRESSURE TRANSMITTER	PT		SIGNAL TO DCS	D
	TEMPERATURE ELEMENT	TE		NON CHEMICAL WATER TREAT. EQ.	-
	FLOW METER	FM			
	ORIFICE PLATE	-			
----- SUPPLY AND RETURN AIR DUCT					

**NOTES:**

1. ALL SUPPLY & RETURN DUCT SHALL BE INSULATED AS PER SPECIFICATION.
2. ALL PIPING AND VALVES OF SIZE 50NB & BELOW SHALL BE PROVIDED AS PER SYSTEM REQUIREMENT
3. ALL PRESSURE GAUGES, PRESSURE SWITCHES, DIFFERENTIAL PRESSURE SWITCHES SHALL BE PROVIDED WITH ISOLATION VALVE.
4. TEMPERATURE SENSOR (TE) & RELATIVE HUMIDITY SENSOR (RHS) SHALL BE PROVIDED IN EACH PAC ROOM.
5. ALL INSTRUMENT AND TEST POINTS SHALL BE PROVIDED WITH ISOLATING ROOT VALVE
6. MOTORISED VALVES, IF ANY, SHALL BE PROVIDED WITH SPECTACLE BLIND WITH COUNTER FLANGE FOR LINE ISOLATION.
7. ALL EQUIPMENT DRAIN SHALL BE CONNECTED TO NEAREST BUILDING / PLANT ROOM DRAIN.
8. ONE NO. DRY BULB & WET BULB THERMOMETER WITH PSYCHOMETRIC CHART SHALL BE PROVIDED IN EACH AIR CONDITIONED ROOM.
9. ALL VALVES SHALL BE LOCATED AT GRADE / MAN APPROACHABLE HEIGHT. METALLIC STOOL / LADDER TO BE PROVIDED BY AC SUPPLIER FOR ACCESSING VALVES / EQUIPMENTS.
10. NUMBER AND SIZE OF REFRIGERANT LINES BETWEEN INDDOR AND OUTDOOR UNIT OF AIR COOLED PACKAGE AC SHALL BE AS PER MANUFACTURER GA DRAWING.
11. EQUIPMENT / VALVES / INSTRUMENTS IN THE REFRIGERANT LINES BETWEEN INDOOR AND OUTDOOR UNIT OF AIR COOLED PACKAGE AC SHALL BE AS PER MANUFACTURER GA DRAWING.

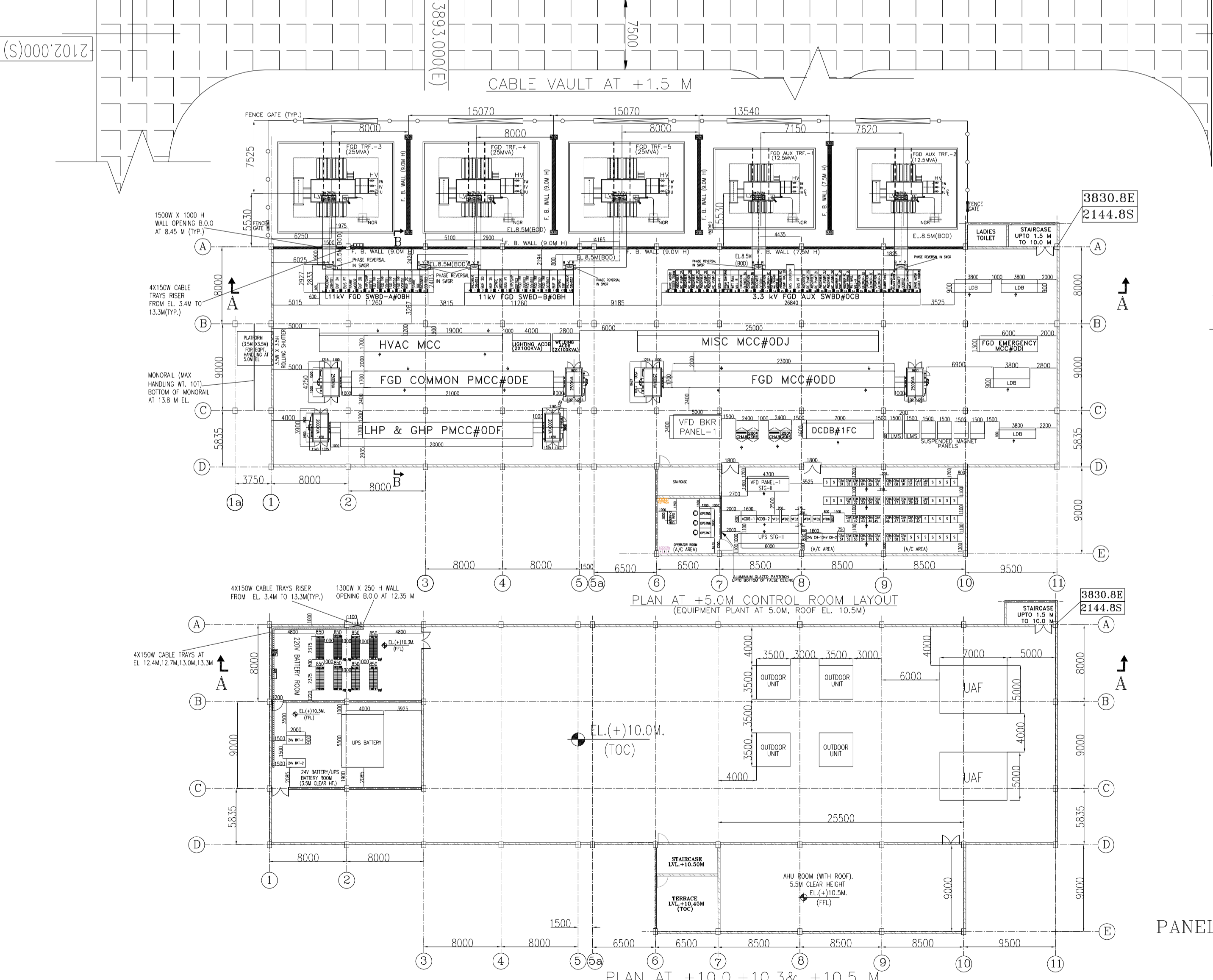
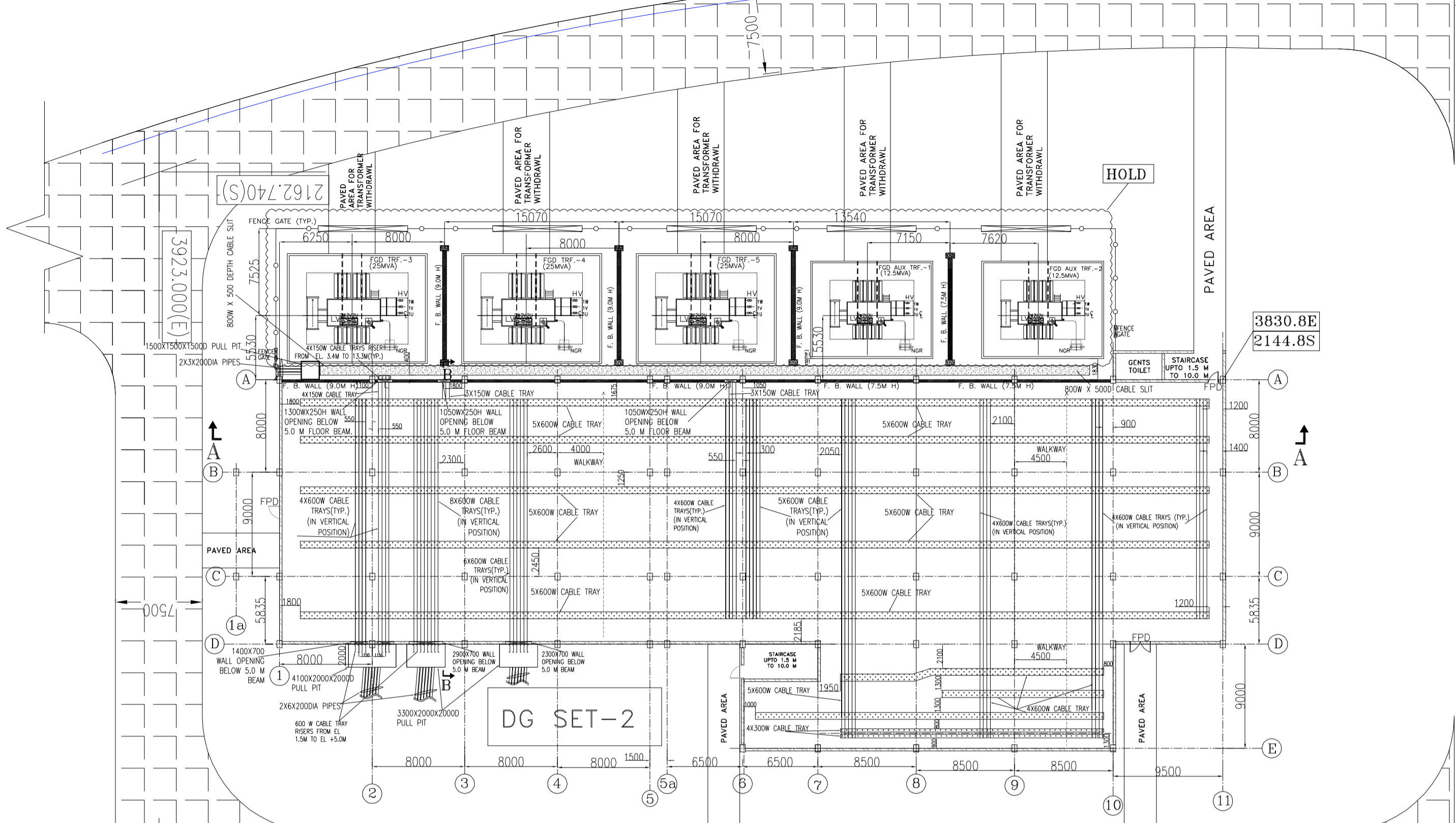
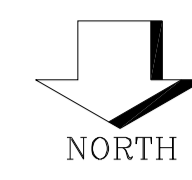
**FOR TENDER PURPOSE ONLY**

CUSTOMER	NTPC																					
CONSULTANT	NTPC																					
AIR CONDITIONING SYSTEM.																						
PROJECT	4 X 210MW + 3X 500MW KAHALGAON STPP - FGD SYSTEM																					
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TITLE	PROCESS & INSTRUMENTAION DIAGRAM FOR AC SYSTEM AIR COOLED PACKAGE AC																					
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<table border="1"> <tr> <td>PROJECT NO.</td> <td>PE-DG-STD-571-A101</td> </tr> <tr> <td>REVISION</td> <td>REV 01 OF 01</td> </tr> </table>		PROJECT NO.	PE-DG-STD-571-A101	REVISION	REV 01 OF 01																	
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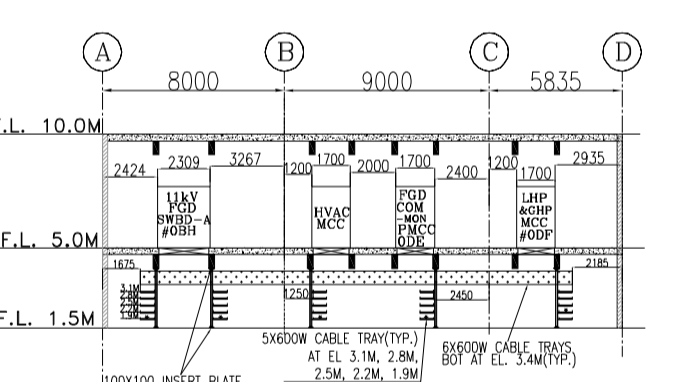
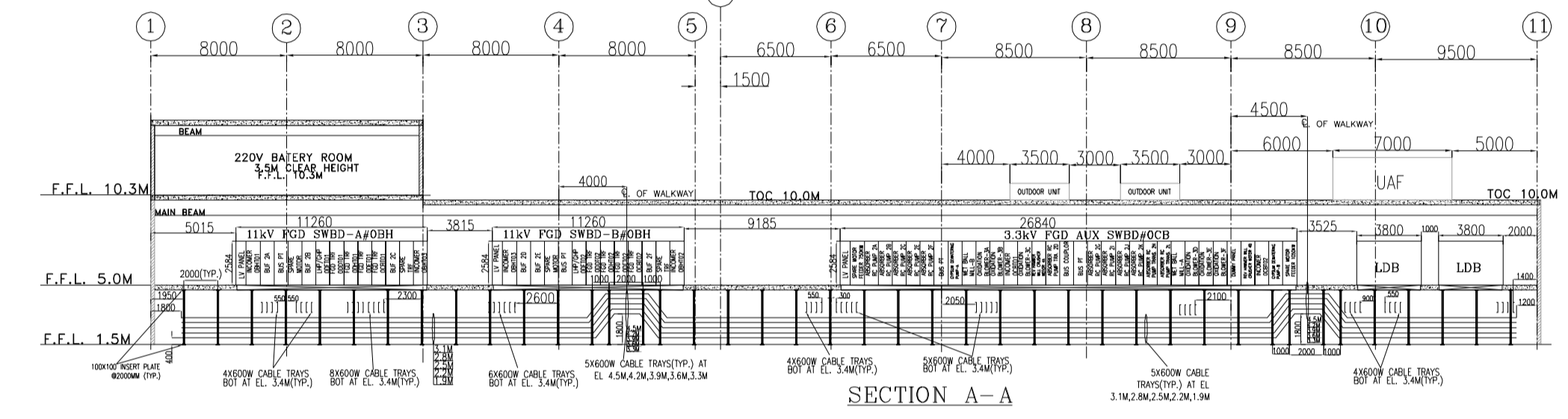
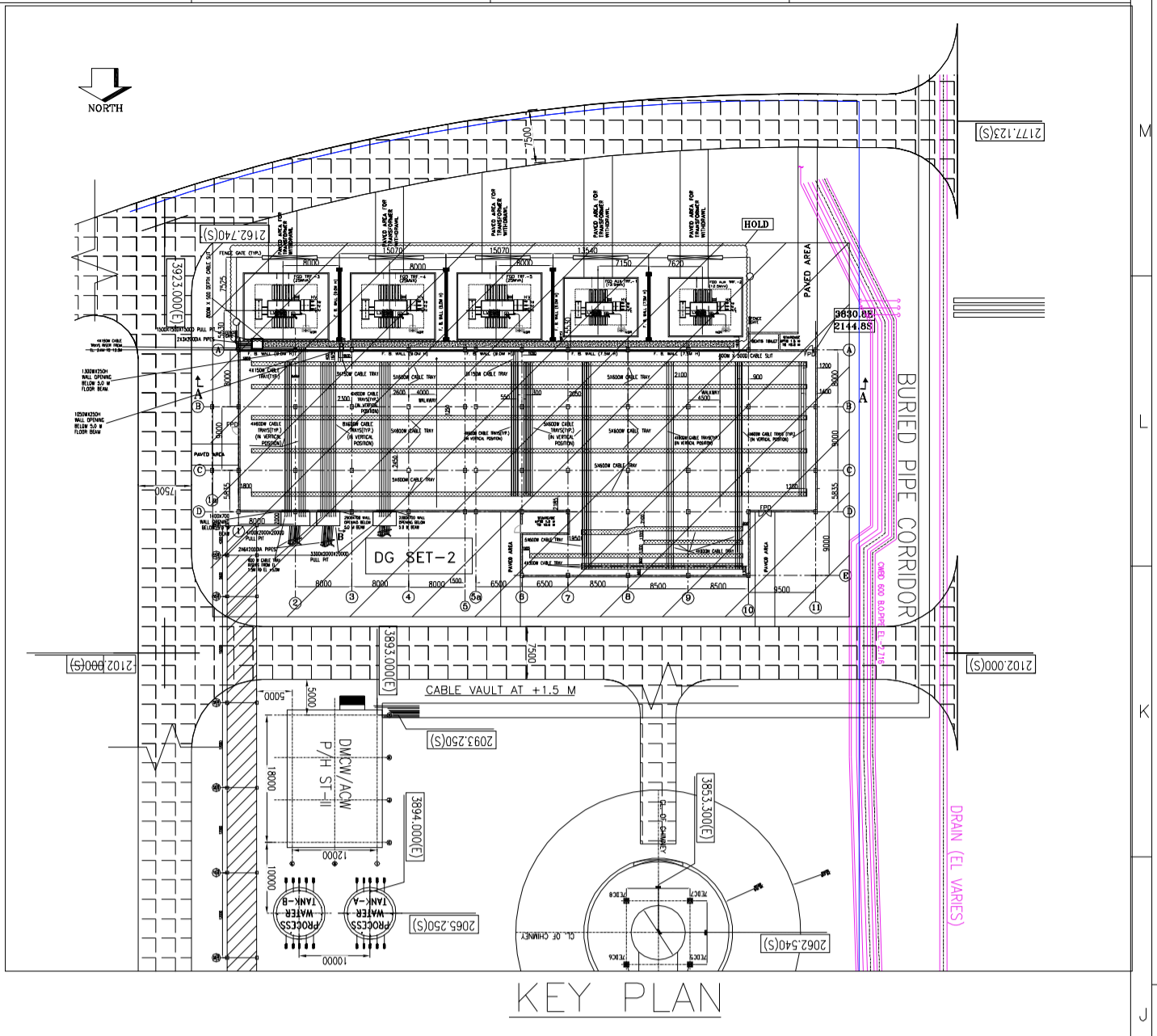






**REFERENCE DRAWINGS :**

S.NO.	TITLE	DRAWING NO.
01.	LAYOUT OF FGD SYSTEM	4200-109-001-RPT-PVM-B-010A
02.	ELECTRICAL SLD FOR FGD SYSTEM	4200-109-PEM-PVE-W-672
03.	OGA OF 2500 KVA TRANSFORMERS	-----
04.	OGA OF 2000 KVA TRANSFORMERS	-----
05.	OGA OF 11kV FGD SWBD-A#0BH	-----
06.	OGA OF 11kV FGD SWBD-B#0BH	-----
07.	OGA OF 3.3 kV FGD AUX SWBD#0CB	-----
08.	OGA OF HVAC MCC	-----
09.	OGA OF MISC MCC#ODJ	-----
10.	OGA OF FGD EMERGENCY MCC#ODI	-----
11.	OGA OF FGD COMMON PMCC#ODE	-----
12.	OGA OF FGD MCC#ODD	-----
13.	OGA OF LHP & GHP PMCC#ODF	-----
14.	OGA OF VFD BKR PANEL	-----
15.	OGA OF DCDB#1FC	-----
16.	OGA OF LDB	-----
17.	OGA OF LIGHTING ACDB (2X100KVA)	-----
18.	OGA OF WELDING ACDB (2X100KVA)	-----
19.	OGA OF 220V CHARGERS	-----
20.	OGA OF IIMS	-----
21.	OGA OF SUSPENDED MAGNET PANELS	-----



**LEGEND**

	OPERATING FRONT OF THE PANEL		FB WALL
	DOUBLE LEAF DOOR (1800Wx2100H)		WALL CUTOUT
	FIRE PROOF DOOR (1800Wx2100H)		EYE WASH BASIN
	SINGLE LEAF DOOR (1200Wx2100H)		FENCE WALL
	SINGLE LEAF FIRE PROOF DOOR (1200Wx2100H)		CABLE TRENCH
	3.5W X 3.5H ROLLING SHUTTER		BRICK WALL

**NOTE :**

- ALL ELEVATIONS ARE WITH RESPECT TO MAIN POWER HOUSE BUILDING GROUND FLOOR LEVEL AS EL.(+0)0.00 M. WHICH CORRESPONDS TO R.L. (+)35.00M.
- ALL DIMENSIONS ARE IN MM AND ELEVATIONS IN METRES UNLESS STATED OTHERWISE.
- THE DIMENSIONS OF EQUIPMENTS INDICATED IN DRAWING ARE TENTATIVE AND ARE SHOWN FOR DEVELOPING CONCEPTUAL LAYOUT.
- THIS DRAWING IS TO BE REFERRED FOR DETAILS OF ELECTRICAL EQUIPMENT AND CABLING LAYOUT ONLY. LAYOUT SHOWN FOR FACILITIES SUCH AS AC & VENTILATION SYSTEM IS INDICATIVE & FOR INTERFACE PURPOSE. FOR EXACT LAYOUT OF OTHER SYSTEMS, RELEVANT DISCIPLINE DRAWINGS SHALL BE REFERRED.
- ALL AREAS SHOWN IN THIS DRAWING ARE NON A/C UNLESS STATED OTHERWISE.
- BOTTOM MOST/OUTERMOST TRAY OF ALL RUNS SHALL BE PERFORATED TYPE.
- BOTH SWITCHGEAR ROOM & CABLE VAULT ROOM SHALL BE VENTILATED.
- DOORS IN CABLE VAULT SHALL BE FIRE PROOF.
- FIRE BARRIER WALLS WILL BE 355 MM THICK BRICKWORK OR 200 MM THICK CONCRETE, AS PER CIVIL DETAILING AND WILL PROJECT MINIMUM 600 MM BEYOND THE OIL CONTAINING PART OF THE TRANSFORMER.
- FOLLOWING CIVIL DETAILS FROM Pt. a to d SHALL BE DECIDED SEPARATELY BY CIVIL.
  - a) SOAK PIT INVERT LEVEL OF TRANSFORMERS, FOUNDATIONS FOR TRANSFORMERS/ RAIL TRACKS/ RADIATORS/ COOLERS AS PER TRANSFORMER FOUNDATION FOUNDATION PLANS AND OTHER PIPE SUPPORT ARRANGEMENT. INVERT LEVEL OF SOAK PIT SHALL BE FIXED IN LINE WITH TRANSFORMER OIL QUANTITY AND QUANTITY OF WATER SPRAY (TO BE INDICATED SEPARATELY BY FIRE FIGHTING SYSTEM ENGINEER).
  - b) FENCING DETAILS.
- APPROX. TOTAL QUANTITY OF OIL AND APPROX. TOTAL WEIGHT OF EACH TRANSFORMER SHALL BE INDICATED AFTER RECEIPT OF OGA.
- ALL PANELS ARE PROVIDED WITH BOTTOM ENTRY FOR CABLES.
- AFTER ERECTION OF PANELS THE TRENCH GAP/FLOOR CUT-OUT SHALL BE SUITABLY COVERED WITH CHEQUERED PLATE.
- FALSE CEILING SHALL BE PROVIDED AT 3.6M EL FROM FFL IN A/C AREA.
- EARTHING FLATS SHALL BE RUN IN THE CABLE VAULT ALONG WITH THE CABLE TRAYS.
- THE CABLE TRAY EXIT SHALL BE SEALED PROPERLY SO THAT RAIN WATER AND DUST SHALL NOT ENTER INSIDE THE ROOM/TRENCH.
- WEIGHT OF THE PANELS :
  - PLC = 400 KG./PLC PANEL(APPROX)
  - COMMON MCC = 25000 KG/MCC PANEL.(APPROX)
  - FGD MCC = 20000 KG/PCC PANEL.(APPROX)
  - ACDB/DCDB = 1000 KG/ACDB/DCDB PANEL.(APPROX)
  - LDB = 1000 KG/LDB PANEL.(APPROX)
  - LHP MCC & GHP MCC = 20000 KG/PANEL.(APPROX)
  - HVAC MCC = 20000 KG/PANEL.(APPROX)
- CARE SHALL BE TAKEN WHILE DESIGNING CIVIL CONSTRUCTION, SO THAT BEAMS SHALL NOT FOUL WITH CABLE TRAY ROUTING/PANEL CABLE TERMINATION.
- FLOOR OPENING FOR CABLING OF ELECTRICAL & C&I EQUIPMENTS SHALL BE UNDER HOLD UPTO FINALISATION/ RECEIPT OF OGA DRAWING FROM EQUIPMENT MANUFACTURER.

PANELS/TRANSFORMERS LIFTING DETAIL

CUSTOMER: **NTPC LIMITED.**  
KHALGOAN STAGE I & II (4x210MW + 3x500MW)

POWER SECTOR  
PROJECT ENGINEERING MANAGEMENT  
NOIDA

DEPT: **BHARAT HEAVY ELECTRICALS LTD**

STATUS: **CONTRACT**

DISTRIBUTION

DATE: 16.07.22

DRY TYPE LT TRANSFORMER

13.8M EL. BOTTOM OF MONORAIL

10.0M EL. FLOOR

5.0M EL. FLOOR

1.5M EL.

12100

1800

3000

1800

1800

10000 INVERT PLATE 8000MM (TP)

11000 INVERT PLATE 8000MM (TP)

SECTION B-B

F.F.L. 10.0M

F.F.L. 5.0M

F.F.L. 1.5M

SECTION A-A

LEGEND

OPERATING FRONT OF THE PANEL

DOUBLE LEAF DOOR (1800Wx2100H)

FIRE PROOF DOOR (1800Wx2100H)

SINGLE LEAF DOOR (1200Wx2100H)

SINGLE LEAF FIRE PROOF DOOR (1200Wx2100H)

3.5W X 3.5H ROLLING SHUTTER

FB WALL

WALL CUTOUT

EYE WASH BASIN

FENCE WALL

CABLE TRENCH

BRICK WALL

NOTE :

1. ALL ELEVATIONS ARE WITH RESPECT TO MAIN POWER HOUSE BUILDING GROUND FLOOR LEVEL AS EL.(+0)0.00 M. WHICH CORRESPONDS TO R.L. (+)35.00M.

2. ALL DIMENSIONS ARE IN MM AND ELEVATIONS IN METRES UNLESS STATED OTHERWISE.

3. THE DIMENSIONS OF EQUIPMENTS INDICATED IN DRAWING ARE TENTATIVE AND ARE SHOWN FOR DEVELOPING CONCEPTUAL LAYOUT.

4. THIS DRAWING IS TO BE REFERRED FOR DETAILS OF ELECTRICAL EQUIPMENT AND CABLING LAYOUT ONLY. LAYOUT SHOWN FOR FACILITIES SUCH AS AC & VENTILATION SYSTEM IS INDICATIVE & FOR INTERFACE PURPOSE. FOR EXACT LAYOUT OF OTHER SYSTEMS, RELEVANT DISCIPLINE DRAWINGS SHALL BE REFERRED.

5. ALL AREAS SHOWN IN THIS DRAWING ARE NON A/C UNLESS STATED OTHERWISE.

6. BOTTOM MOST/OUTERMOST TRAY OF ALL RUNS SHALL BE PERFORATED TYPE.

7. BOTH SWITCHGEAR ROOM & CABLE VAULT ROOM SHALL BE VENTILATED.

8. DOORS IN CABLE VAULT SHALL BE FIRE PROOF.

9. FIRE BARRIER WALLS WILL BE 355 MM THICK BRICKWORK OR 200 MM THICK CONCRETE, AS PER CIVIL DETAILING AND WILL PROJECT MINIMUM 600 MM BEYOND THE OIL CONTAINING PART OF THE TRANSFORMER.

10. FOLLOWING CIVIL DETAILS FROM Pt. a to d SHALL BE DECIDED SEPARATELY BY CIVIL.

a) SOAK PIT INVERT LEVEL OF TRANSFORMERS, FOUNDATIONS FOR TRANSFORMERS/ RAIL TRACKS/ RADIATORS/ COOLERS AS PER TRANSFORMER FOUNDATION FOUNDATION PLANS AND OTHER PIPE SUPPORT ARRANGEMENT. INVERT LEVEL OF SOAK PIT SHALL BE FIXED IN LINE WITH TRANSFORMER OIL QUANTITY AND QUANTITY OF WATER SPRAY (TO BE INDICATED SEPARATELY BY FIRE FIGHTING SYSTEM ENGINEER).

b) FENCING DETAILS.

11. APPROX. TOTAL QUANTITY OF OIL AND APPROX. TOTAL WEIGHT OF EACH TRANSFORMER SHALL BE INDICATED AFTER RECEIPT OF OGA.

12. ALL PANELS ARE PROVIDED WITH BOTTOM ENTRY FOR CABLES.

13. AFTER ERECTION OF PANELS THE TRENCH GAP/FLOOR CUT-OUT SHALL BE SUITABLY COVERED WITH CHEQUERED PLATE.

14. FALSE CEILING SHALL BE PROVIDED AT 3.6M EL FROM FFL IN A/C AREA.

15. EARTHING FLATS SHALL BE RUN IN THE CABLE VAULT ALONG WITH THE CABLE TRAYS.

16. THE CABLE TRAY EXIT SHALL BE SEALED PROPERLY SO THAT RAIN WATER AND DUST SHALL NOT ENTER INSIDE THE ROOM/TRENCH.

17. WEIGHT OF THE PANELS :

PLC = 400 KG./PLC PANEL(APPROX)

COMMON MCC = 25000 KG/MCC PANEL.(APPROX)

FGD MCC = 20000 KG/PCC PANEL.(APPROX)

ACDB/DCDB = 1000 KG/ACDB/DCDB PANEL.(APPROX)

LDB = 1000 KG/LDB PANEL.(APPROX)

LHP MCC & GHP MCC = 20000 KG/PANEL.(APPROX)

HVAC MCC = 20000 KG/PANEL.(APPROX)

18. CARE SHALL BE TAKEN WHILE DESIGNING CIVIL CONSTRUCTION, SO THAT BEAMS SHALL NOT FOUL WITH CABLE TRAY ROUTING/PANEL CABLE TERMINATION.

19. FLOOR OPENING FOR CABLING OF ELECTRICAL & C&I EQUIPMENTS SHALL BE UNDER HOLD UPTO FINALISATION/ RECEIPT OF OGA DRAWING FROM EQUIPMENT MANUFACTURER.

REVISIONS:

REV.	DATE	ALT.	CHD.	APPD.	TITLE
1	16.07.22	CG/AV	CHD	APPD	DRY TYPE LT TRANSFORMER

DRAWING REVISIONS AS PER LATEST INPUT

DEPT: **BHARAT HEAVY ELECTRICALS LTD**

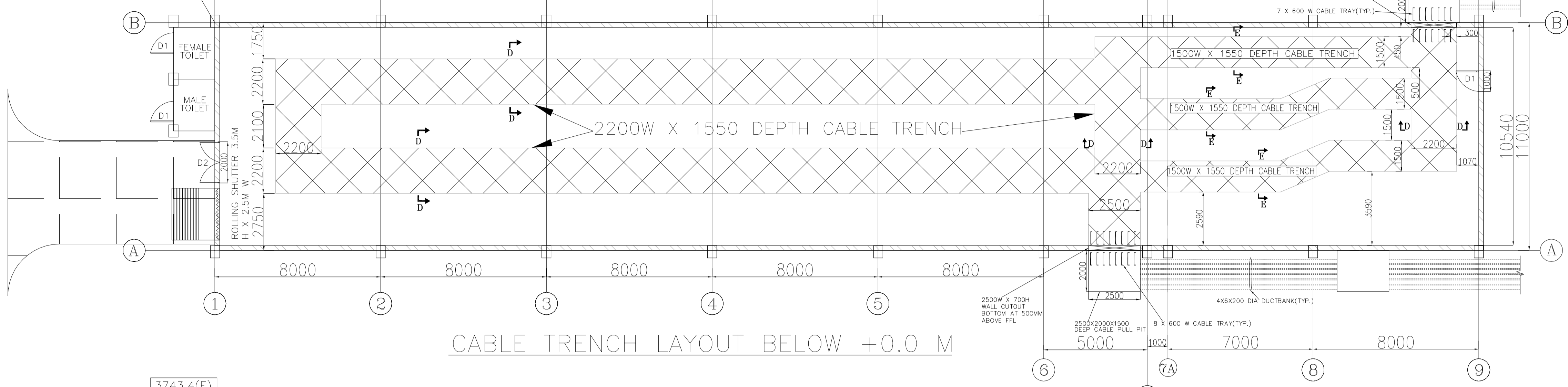
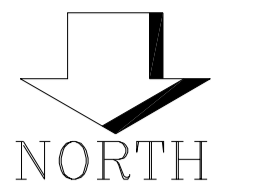
SCALE: **AS SHOWN**

DRAWING NO. **4200-109-PEM-PVE-L-676A**

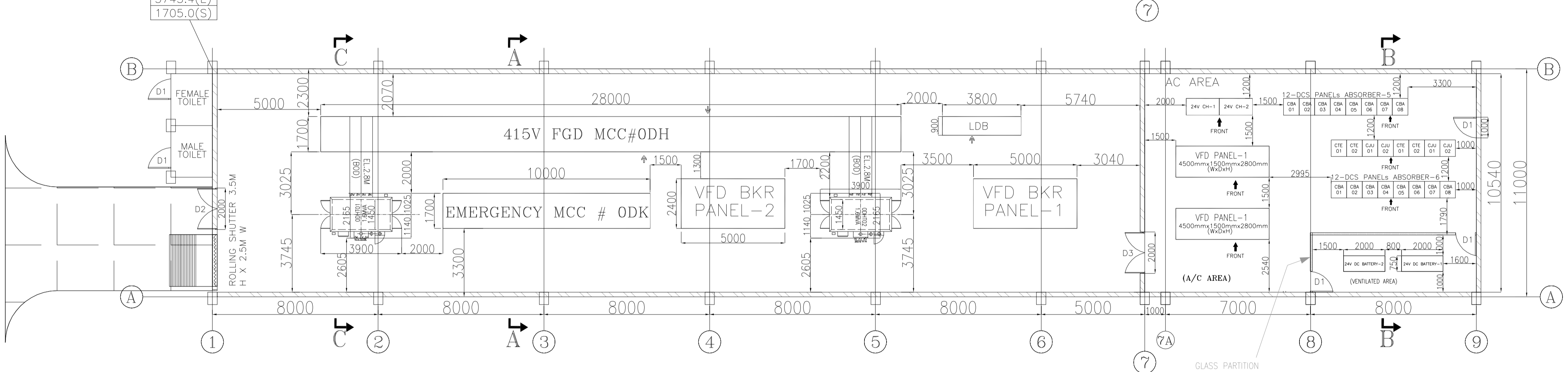
SHEET 01 OF 01

REV. 01

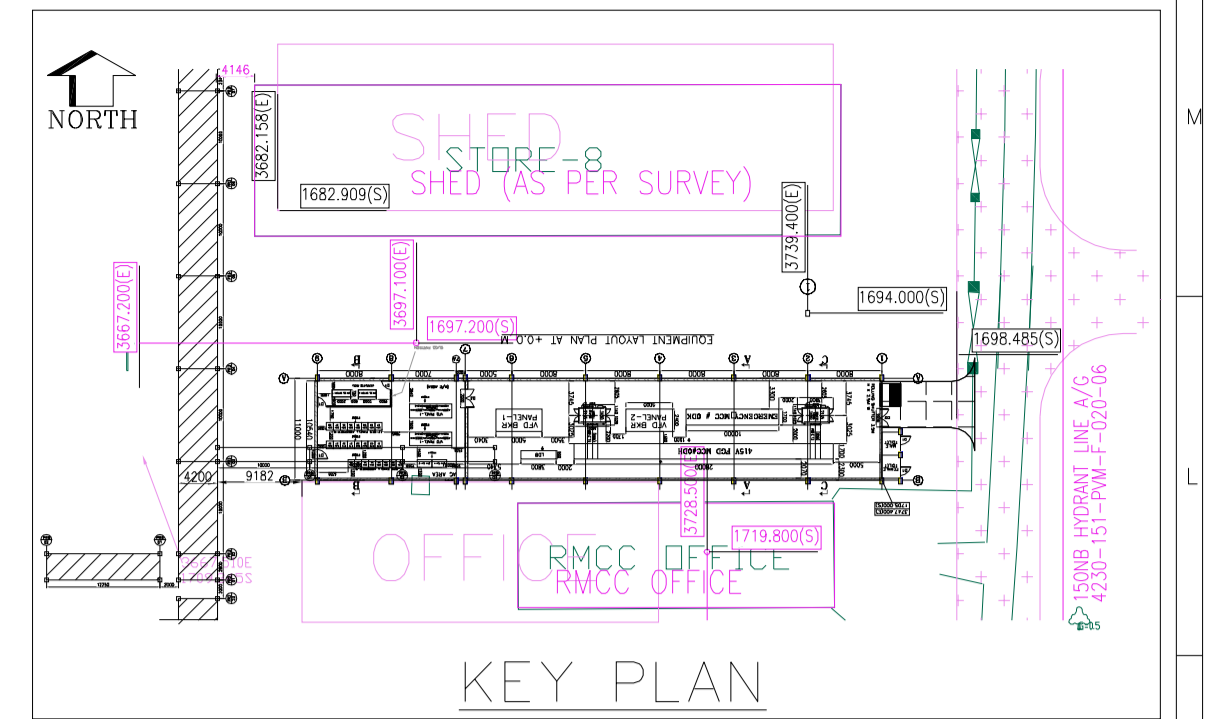
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CABLE TRENCH LAYOUT BELOW +0.0 M



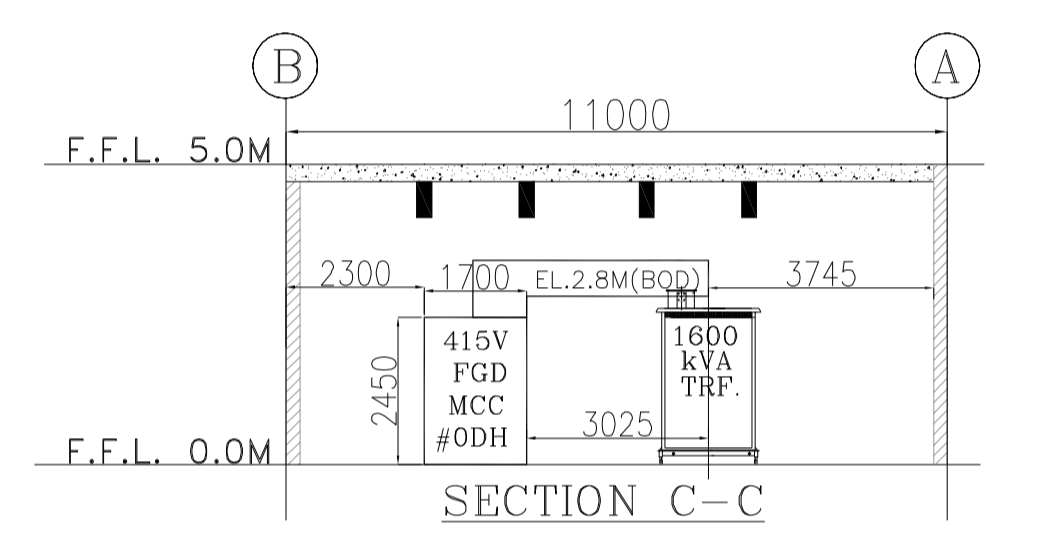
EQUIPMENT LAYOUT PLAN AT +0.0 M



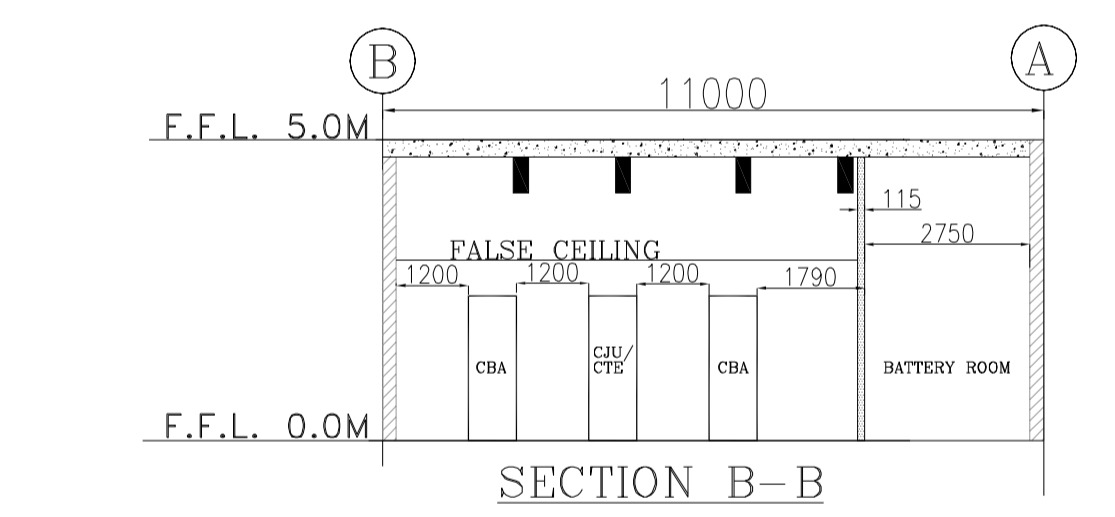
KEY PLAN

LEGEND:

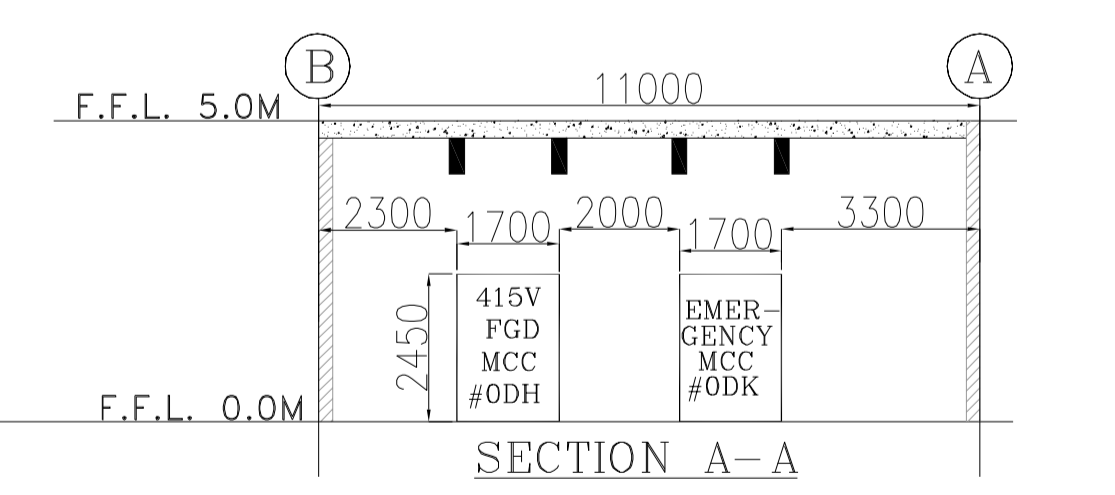
- BRICK WALL
- DOUBLE LEAF DOOR, 2000W X 2100H
- SINGLE LEAF DOOR, 1000W X 2100H
- CABLE TRENCH
- DOUBLE LEAF DOOR, 2000W X 3000H(2100H+900H)



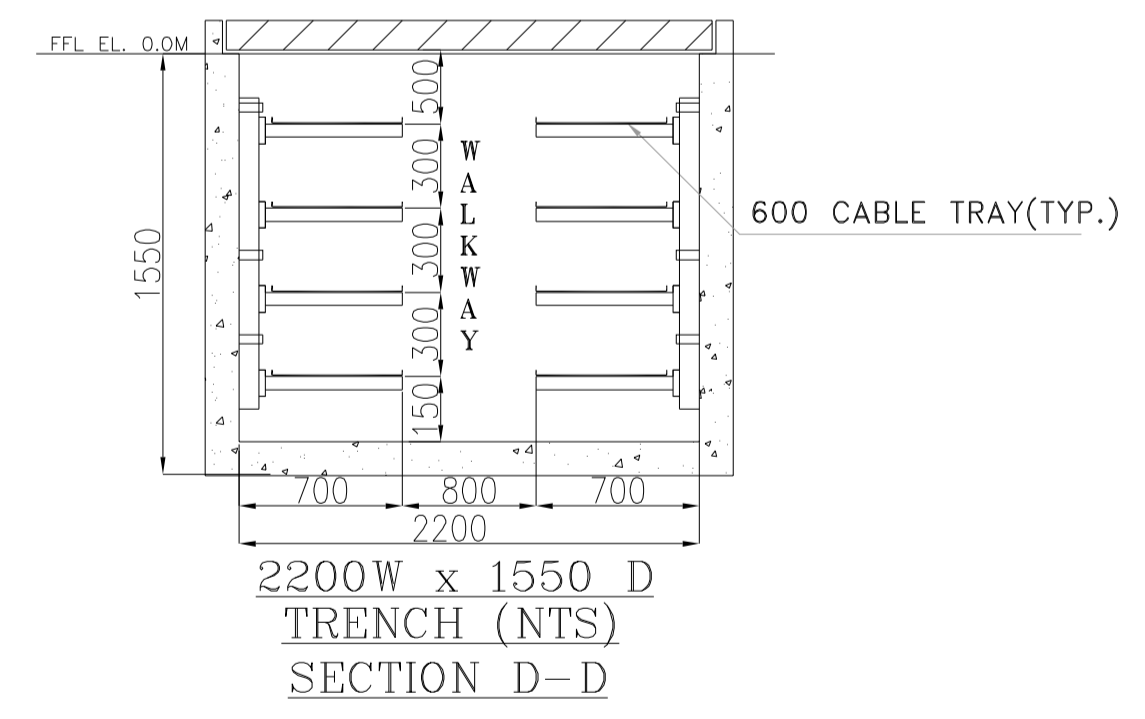
SECTION C-C



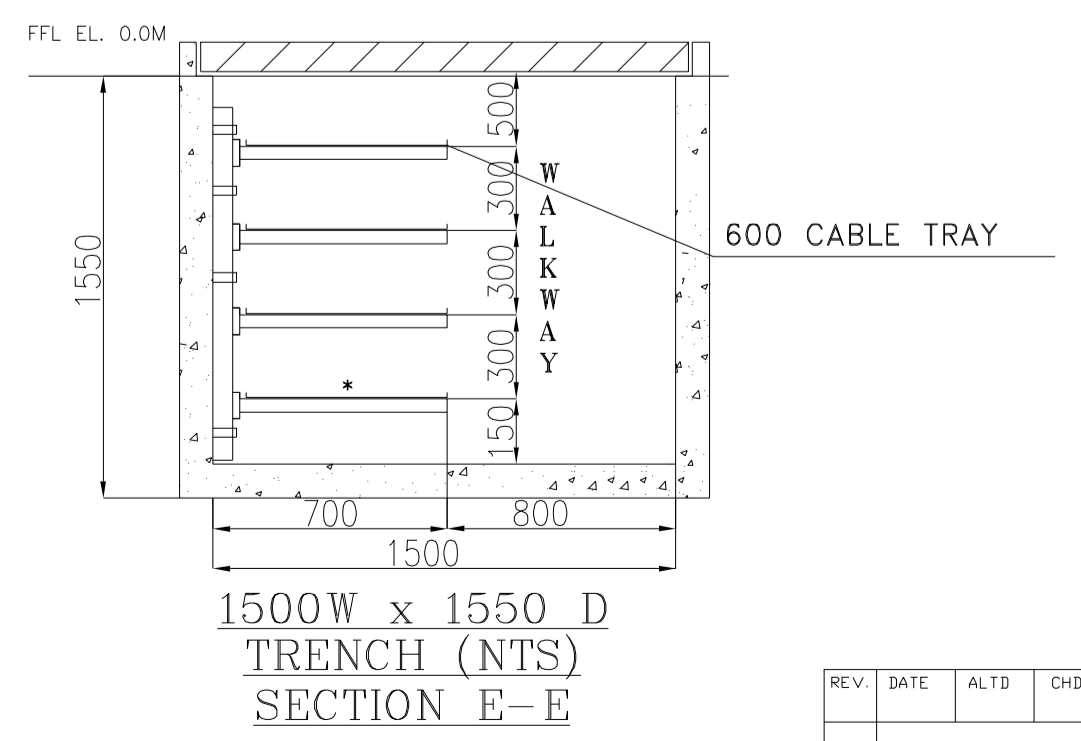
SECTION B-B



SECTION A-A



2200W x 1550 D TRENCH (NTS) SECTION D-D



1500W x 1550 D TRENCH (NTS) SECTION E-E

NOTE :

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4. ALL AREAS SHOWN IN THIS DRAWING ARE NON A/C UNLESS STATED OTHERWISE.
5. BOTTOM MOST/OUTERMOST TRAY OF ALL RUNS SHALL BE PERFORATED TYPE.
6. SWITCHGEAR ROOM SHALL BE VENTILATED.
7. ALL PANELS ARE PROVIDED WITH BOTTOM ENTRY FOR CABLES.
8. DIMENSION INDICATED FOR EQUIPMENTS ARE TENTATIVE AND FOR ESTIMATION PURPOSE ONLY.
9. AFTER ERECTION OF PANELS THE TRENCH GAP/FLOOR CUT-OUT SHALL BE SUITABLY COVERED WITH CHEQUERED PLATE.
10. FALSE CEILING SHALL BE PROVIDED AT 3M EL IN A/C AREA.
11. EARTHING FLATS SHALL BE RUN IN THE CABLE VAULT ALONG WITH THE CABLE TRAYS.
12. THE CABLE TRAY EXIT SHALL BE SEALED PROPERLY SO THAT RAIN WATER AND DUST SHALL NOT ENTER INSIDE THE ROOM/TRENCH.
13. CARE SHALL BE TAKEN WHILE DESIGNING CIVIL CONSTRUCTION,SO THAT BEAMS SHALL NOT FOUL WITH CABLE TRAY ROUTING/PANEL CABLE TERMINATION.

CUSTOMER: **NTPC LIMITED.**  
KAHALGOAN STAGE I & II  
(4x210MW + 3x500MW)

DEPT: POWER SECTOR  
PROJECT: ENGINEERING MANAGEMENT  
NOIDA

BHARAT HEAVY ELECTRICALS LTD  
PROJECT ENGINEERING MANAGEMENT  
NOIDA

JOB NO: 481  
STATUS: CONTRACT  
DISTRIBUTION

REVISIONS:

REV.	DATE	ALT.	CHD.	APPD.

TITLE: ELECTRICAL EQUIPMENT & CABLING LAYOUT IN FGD SWITCHGEAR ROOM NEAR ABSORBER ROOM S&O

DEPT: SCALE: DRAWING NO. 4200-109-PEM-PVE-L-676E  
SIGN: SHEET 01 OF 01 REV. 0  
DATE: 04.06.2022

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ELECTRONIC FILE NAME:

