



Bharat Heavy Electricals Limited
Boiler Auxiliaries Plant
Ranipet - 632 406
Tamil Nadu, India

CIVIL FACTORY AND DESIGNS

Phone: 04172- 212026/254694 Fax : 04172 -241102: e-mail ccdurai@bhelrpt.co.in

BAP: CF&D:16 / 3768

October 21, 2009

To

Dear Sir(s),

Sub: Engineering consultancy for design and drawing for Civil structures and Architectural finish for Flue gas De-sulphurization system project for M/s NTPC, Bongaigaon - Reg.

Ref: Tender Notice No .BAP: CF: 23 / 2009 – 2010 Dt 21.10.2009

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We herewith enclose the document for the above work. You are required to submit most competitive offer in a sealed cover so as to reach the office of Sr DGM (Civil Projects & Services) before 15.00 Hrs. **The tender shall be opened at 15.00 Hrs. on the same day.**

|              |                                                                                                                                                                            |                 |                   |                    |                 |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|--------------------|-----------------|
| Name of work | <b>Engineering consultancy for design and drawing for Civil structures and Architectural finish for Flue gas De-sulphurization system project for M/s NTPC, Bongaigaon</b> |                 |                   |                    |                 |
| EMD amount   | <b>NIL</b>                                                                                                                                                                 | Date of Opening | <b>31.10.2009</b> | Period of Contract | <b>One Year</b> |

**THE SUCCESSFUL TENDERER IS REQUIRED TO START THE WORK IMMEDIATELY AND COMPLETE THE WORK WITHIN THE STIPULATED TIME. UNDER ANY CIRCUMSTANCES NO EXTENSION OF TIME WILL BE GRANTED. ANY DELAY BEYOND THE DUE DATE OF COMPLETION WILL BE SUBJECTED TO LIQUIDATED DAMAGES.**

- **The successful tenderer has to remit Security Deposit as mentioned in the Page –2.**

- We hope to receive your offer on the due date of opening and in case you are not interested to quote, then you please state the reasons and return back the documents.
- Increasing the rates subsequent to opening of tender is not admissible and the tender is liable for cancellation / forfeiture of EMD if any. The rates quoted in the tender shall remain valid for a period of Three Months from the date of opening the tender.
- No deviations to the tender conditions will normally be accepted.

Thanking you,

Yours faithfully,  
For and on behalf of BHEL,

(V.DHINAKHAR)  
Dy Manager (Civil Project & Services)

**Encl.: Tender Document**

**(Contd.....2)**



- 2 -

**Security Deposit : (Clause 8.2)**

(i) The rate of security deposit will be as below (w.r.t. Total contract value):

- Up to Rs 10 lakhs : **10%**
- Above Rs 10 Lakhs Up to Rs 50 lakhs : **Rs 1 Lakh + 7.50% of the amount exceeding Rs 10 Lakhs**
- Above Rs 50 Lakhs : **Rs 4 lakhs + 5.00% of the amount exceeding Rs 50 Lakhs**

(ii) 50% of SD should be deposited before start of the work. Balance SD will be recovered at the rate of 10% from running bills. Anyhow the contract value not exceeding Rs 10 Lakhs can be started before SD is collected, provided the payment can be released only after collection / recovery of initial 50% SD.

(iii) The SD shall not carry any interest.

(iv) SD may be furnished in any one of the following forms :

- Cash (as permissible under Incom tax Act)
- Pay order or Demand draft drawn in favour of, BHEL / RANIPET – 6 payable at SBI / BHEL Project, Mukundapuram (Bank Code No : 7013).
- Local cheques of scheduled banks, subject to realization.
- Securities available from post offices such as National Savings Certificates, Kisan Vikas patras etc., (Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back)
- Bank guarantee from scheduled banks / Public financial institutions as defined in the Companies act. The Bank guarantee format should have the approval of BHEL.
- Fixed Deposit Receipt issued by scheduled banks / Public financial institutions as defined in the Companies act. The FDR should be in the name of the contractor, A/c BHEL, duly discharged on the back.

(v) Refund of SD : 50% of SD may be refunded to the contractor in respect of all contract on satisfactory completion of work and after payment of final bill and the balance 50% on expiry of the maintenance period, provided that the

contractor shall have rendered a “ No Demand” certificate. In case of work where maintenance period is not involved 100% of the SD may be refunded after payment or final bill provided that the contractor shall have rendered a “ No Demand” certificate.

**Electronic Fund Transfer (EFT Form) : (as per CVC guide lines)**

- The enclosed EFT form should be duly filled and submitted along with tender documents. Without EFT form your tender will not be considered and will be rejected.
- **Suppose if you already submitted the EFT form to BHEL(Ranipet) this may be ignored.**

**Advance payment :**

- No advance payment shall be paid to the contractor.

(Contd.....3)



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**CIVIL FACTORY AND DESIGNS**

Phone: 04172- 212026/254694 Fax : 04172 -241102: e-mail [ccdurai@bhelrpt.co.in](mailto:ccdurai@bhelrpt.co.in)

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- 3 -

**General :**

- The envelop / cover containing duly filledin tender documents along with necessary enclosures should neatly be indicated the following :
  - a. Name of work : To be mentioned in the left hand side top corner of the envelop in first line.
  - b. Tender Notice No : To be mentioned in the left hand top corner of the envelop
  - c. To be addressed to : **Sri V.Rajendran, - To be mentioned in the right side  
Manager, middle or bottom of the envelop  
Civil Projects & Services,  
BHEL / BAP / Ranipet – 632 406.  
Vellore Dist., / Tamil Nadu.**
  - d. From / self address : To be mentioned in the left hand side bottom corner of the envelop.

**Encl :** (i) Scope of works (ii) Bill of Quantities (Rate schedule) & (iii) Drawings (6 Nos)

## Scopes of Work for Wet Lime Stone Flue Gas Desulphurization System for NTPC Bongaigaon 3 x 250MW

| Sl.No. | Description.                | Reference GA Drawing     | Particulars (Estm Approx.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Civil scope of Work                                                                                                                                                       | No. of Items.                            |
|--------|-----------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| 01     | Gypsum Dewatering Building. | 0-FW-000-00025<br>Rev 01 | <p>Dim: 30m x 50m x 26.5m.</p> <p>It's a 3-storied structure. Equipments are to be mounted on the floors. Dynamic analysis of the building has to be made, if required. One MCC room of size 30m x 5.5m x6.0m is also there inside the building. (The building dimension given is inclusive of this also)</p> <p>Architectural Details such as Doors, Windows Ventilators etc. has to be finalized in discussion with BHEL. 3.0T monorail has to be provided as specified in the reference GA drawing. Adequate staircases, approaches are to be provided. Provision has to be made for the machine supports on the floors.</p> | RCC structure. All relevant drawings/documents have to be submitted. It includes design reports, architectural drawings, foundation drawings, reinforcement drawings etc. | One building common for All three units. |

|    |                          |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       |
|----|--------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 02 | Ball Mill Building       | 0-FW-000-00024<br>Rev 00 | <p>Dim: 30m x 35.5m x 26.5m.</p> <p>It's a 2-storied structure. Equipments are to be mounted on the floors. Dynamic analysis of the building has to be made. Architectural Details such as Doors, Windows Ventilators etc. has to be finalized in discussion with BHEL. Adequate staircases, approaches are to be provided. Provisions for 2no.s of 10.0T crane shall be made in the locations shown in reference GA drawing One MCC room of size 30m x 5.5m x6.0m is attached to this the building.(The building dimension given is inclusive of this also). Provision has to be made for the machine supports on the floors.</p> | <p>RCC structure. All relevant drawings/documents have to be submitted. It includes design reports, architectural drawings, foundation drawings, reinforcement drawings etc.</p> <p>The first floor is of Steel Structure. All relevant drawings/documents have to be submitted. It includes design reports, architectural drawings, foundation drawings, Fabrication drawings etc.</p> | One building common for All three units.                                              |
| 03 | Recirculation Pump House | 1-FW-000-00023<br>Rev 00 | <p>Dim 30m x 12m x 12m</p> <p>It's single storied Building. Architectural Details such as Doors, Windows Ventilators etc. has to be finalized in discussion with BHEL. Provisions shall be made for providing one 5.0T crane as specified in the reference GA drawing.</p>                                                                                                                                                                                                                                                                                                                                                         | RCC structure. All relevant drawings/documents have to be submitted. It includes design reports, architectural drawings, foundation drawings, reinforcement drawings etc.                                                                                                                                                                                                               | One building for each unit.(Total three buildings) All these buildings are identical. |

|    |                                      |                          |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                        |                                                                                             |
|----|--------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| 04 | FGD Control Room                     | 2-FW-000-00156<br>Rev -- | Dim: 38.0m x 13m x 16m<br><br>It's a four storied building. Two of its floors are only for cable vaults.<br><br>Architectural Details such as Doors, Windows Ventilators etc. has to be finalized in discussion with BHEL. | RCC structure.<br>** The analysis of this building will be done by BHEL. Also the foundation design and release of foundation drawings for this building will be done by BHEL.<br><br>The scope of work includes All relevant drawings/documents have to be submitted. It includes design reports, architectural drawings, reinforcement drawings etc. | One building common for All three units.                                                    |
| 05 | Foundations for Ball Milling Machine | 0-FW-000-00024<br>Rev 00 | Dynamic analysis of the foundations has to be done.                                                                                                                                                                        | All relevant drawings/documents have to be submitted. It includes design reports, foundation drawings, reinforcement drawings etc.                                                                                                                                                                                                                     | 2nos. inside Ball Mill Building. Both are identical machines.                               |
| 06 | Foundation for Blowers               | 1-FW-000-00023<br>Rev 00 | Dynamic analysis of the foundations has to be done.                                                                                                                                                                        | All relevant drawings/documents have to be submitted. It includes design reports, foundation drawings, reinforcement drawings etc.                                                                                                                                                                                                                     | 2nos. inside each Recirculation Pump House. All are identical machines.(Total 6 machines)   |
| 07 | Foundation for Recirculation Pumps.  | 1-FW-000-00023<br>Rev 00 | Dynamic analysis of the foundations has to be done.                                                                                                                                                                        | All relevant drawings/documents have to be submitted. It includes design reports, foundation drawings, reinforcement drawings etc.                                                                                                                                                                                                                     | 4nos. inside each Recirculation Pump House. All are identical machines. (Total 12 machines) |

**The following are bidder's scope**

1. Three Dimensional STAAD Modeling for above Structures
2. Analysis of structure as per Site-specific Seismic spectra.
3. Analysis of structure for Wind load as per Relevant Indian Standard codes
4. Design of Super-Structure as per Indian Standard codes
5. Design of Piling/Foundations for Item No.1 to 7 except Item 06.
6. Design of Pile-Cap for Item No.1 to 7 except Item 06 (if necessary).
7. Design of RCC Stairs
8. Design of Monorails.
9. Design of fire walls for transformer area and its supports.
10. All Steel Platforms and its supports, if necessary.
11. Design of proper supports to the machines which are coming on the floors.
12. Preparation of Design Detailed Drawings.
13. Preparation of Architectural Plans. This shall include adequate architectural features.
14. Preparation of two-dimensional Architectural Elevations as per general practice; Architectural Elevations for all sides if the elevations are not same in parallel faces. This shall include adequate architectural features.
15. Preparation of Fabrication Drawings for Steel Structures wherever applicable.

**Following are NOT bidder's Scope:**

1. All Equipment & Transformer Foundations and details except those mentioned in the Items 5 to 7.
2. Design of Steel Structures , except for Enclosure for Mill-Hydro clone(First Floor) in ball Mill Building
3. All Tanks, Silos, Conveyors, Ducting, Pipe & cable racks etc.
4. Preparation of Bar-Bending schedules.

**Notes:**

1. The consultant has to incorporate the technical specification requirements in the drawings.
2. The consultant has to incorporate all the changes/corrections indicated by the customer/approved consultant till the final approval and distribution.
3. The consultant has to issue the working drawings which are understandable by the construction site personnel.
4. For the approval of design and drawings from customer/customer consultant, the designer may have to visit their office for direct interaction /across the table approval etc. Expenses towards the journey, boarding & lodging are to be borne by consultant.
5. The customer/customer consultant office is at Noida (NTPC Engg. Building).
6. All drawings can be sent as soft copies to BHEL, which is to be submitted for customer approval.
7. At the end of contract, all the 'as built' drawings shall be submitted as soft copy.

## RATE SCHEDULE (BOQ)

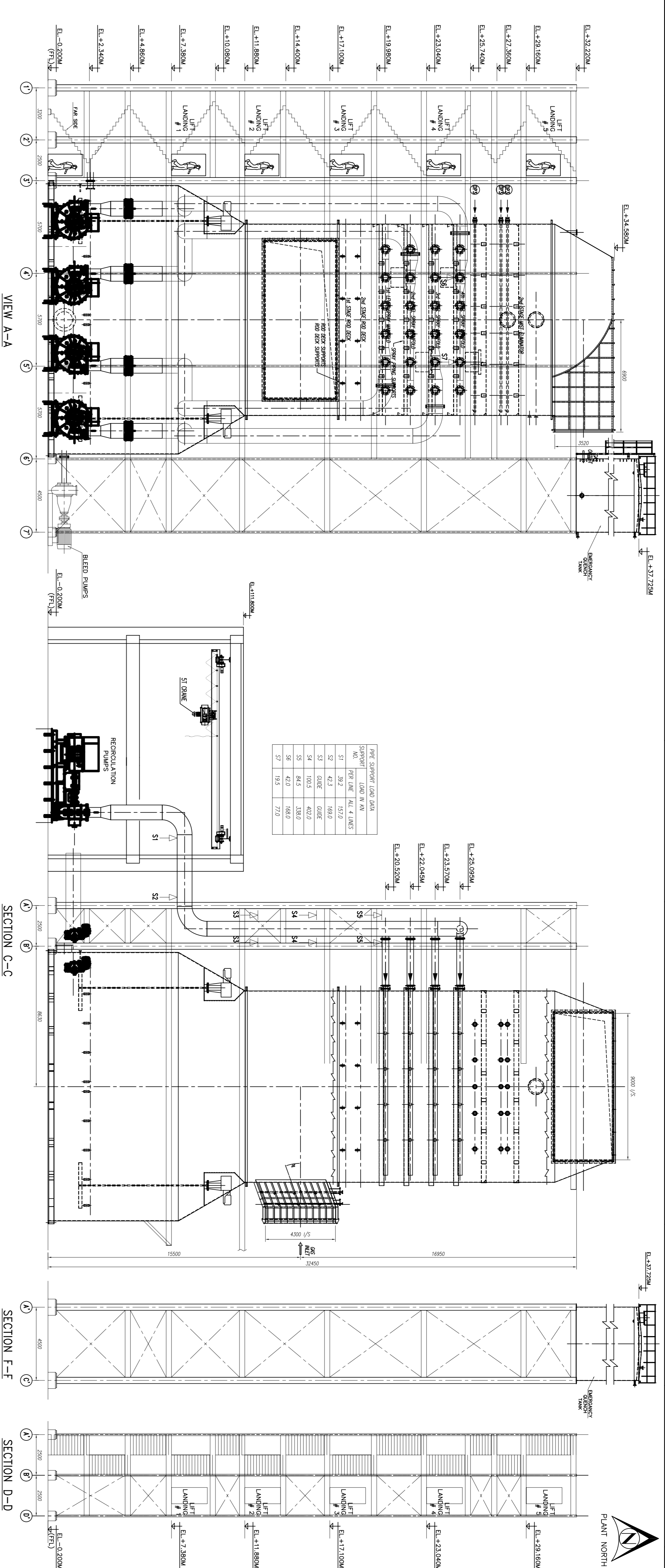
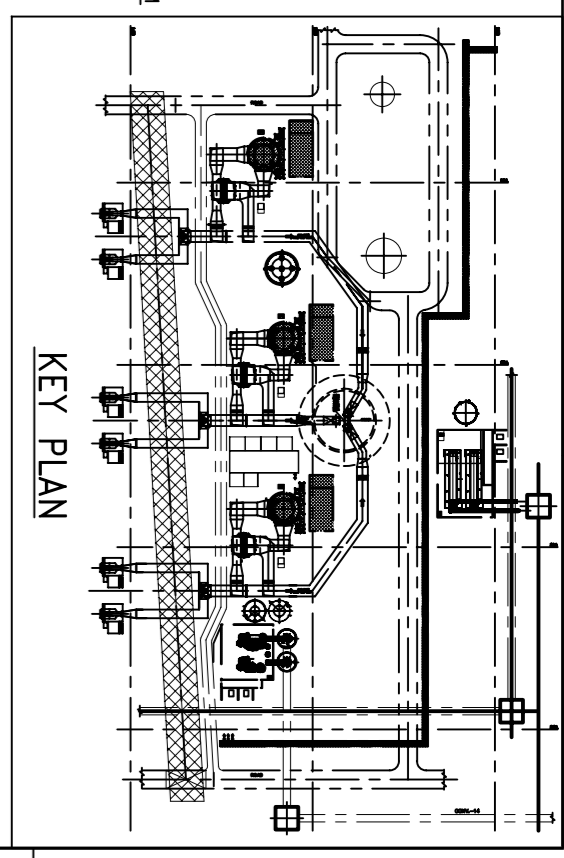
| Item. No. | Description                          | Amount(Rs.) |
|-----------|--------------------------------------|-------------|
| 01        | Gypsum Dewatering Building.          |             |
| 02        | Ball Mill Building                   |             |
| 03        | Recirculation Pump House             |             |
| 04        | FGD Control Room                     |             |
| 05        | Foundations for Ball Milling Machine |             |
| 06        | Foundation for Blowers               |             |
| 07        | Foundation for Recirculation Pumps.  |             |
|           | Sub Total                            |             |
|           | Service Tax                          |             |
|           | Other Taxes                          |             |
|           | <b>Total Consultancy Charge</b>      |             |
|           | (Amount in Words)                    |             |

Note: Tenderer is requested to quote for individual items.

Signature of Tenderer

Signature of Accepting Officer





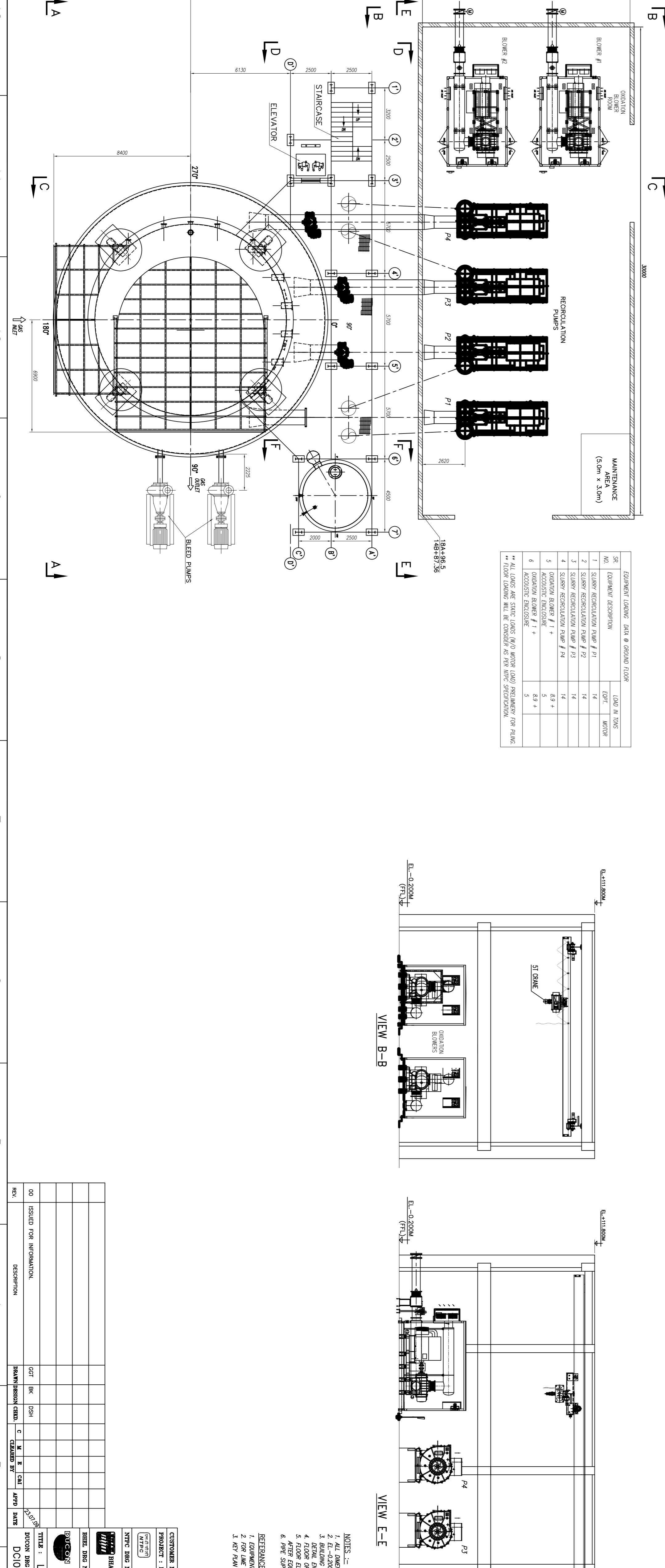
PIPE SUPPORT LOAD DATA

| SUPPORT NO. | FEED LINE | ALL 4 LINES |
|-------------|-----------|-------------|
| S1          | 42.3      | 167.0       |
| S3          | 100.5     | 402.0       |
| S5          | 84.5      | 188.0       |
| S6          | 47.0      | 188.0       |
| S7          | 19.3      | 77.0        |

EQUIPMENT LOADING DATA @ GROUND FLOOR

| S/E NO. | EQUIPMENT DESCRIPTION               | LOAD IN TONS |
|---------|-------------------------------------|--------------|
| 1       | SUBMERGIBLE RECIRCULATION PUMP # P1 | 14           |
| 2       | SUBMERGIBLE RECIRCULATION PUMP # P2 | 14           |
| 3       | SUBMERGIBLE RECIRCULATION PUMP # P3 | 14           |
| 4       | SUBMERGIBLE RECIRCULATION PUMP # P4 | 14           |
| 5       | ACCOUSTIC ENCLOSURE                 | 8.9 +        |
| 6       | ACCOUSTIC ENCLOSURE                 | 8.9 +        |

\*\* ALL LOADS ARE SPREAD LOADS FROM MOTOR LOAD PRESUMING THE PUMP IS IN OPERATION.  
 \*\* COLUMN LOADINGS WILL BE CONSIDERED AS PER DESIGN SPECIFICATION.



**NOTES:-**

- ALL DIMENSIONS ARE IN METERS AND LENGTHS ARE IN METERS.
- EL. +0.200 M CORRESPONDS TO RL (+) 50.72 M.
- BUILDING SIZE SHOWN WERE INDICATIVE ONLY. WILL BE FINALISED DURING DESIGN DEVELOPMENT.
- PIPE SUPPORTING CROSSING WILL BE CONSIDERED DURING DETAIL ENGINEERING.
- FLOOR ELEVATION TO BE CONSIDERED AS PRELIMINARY. FINAL LEVEL WILL BE FIXED AFTER EQUIPMENT FINALISATION.
- PIPE SUPPORTS MARKED AS S1 TO S7 ARE TYPICAL FOR ALL SUBMERGIBLE PUMPS.

**REFERENCE DRAWINGS:-**

- EL. +0.200 M TO EL. +0.200 M. NO. 4419-200-004-E-001-001-1.
- FOR THE AIR AND GROSS CONCRETE. DRG. NO. 4419-100-004-001-001-001-0.
- KEY PLAN OF NET LIQUEFIED GAS SYSTEM. DRG. NO. 10009-0038-ME-01-001.

**CUSTOMER NO.:** \_\_\_\_\_  
**PROJECT:** BONGALUAN-KESKIDAN-PTUB GAS DESULFURIZATION SYSTEM  
**CLIENT:** PTUB  
**DATE:** 23.07.2023  
**SCALE:** 1:100  
**SHEET 01 OF 01**

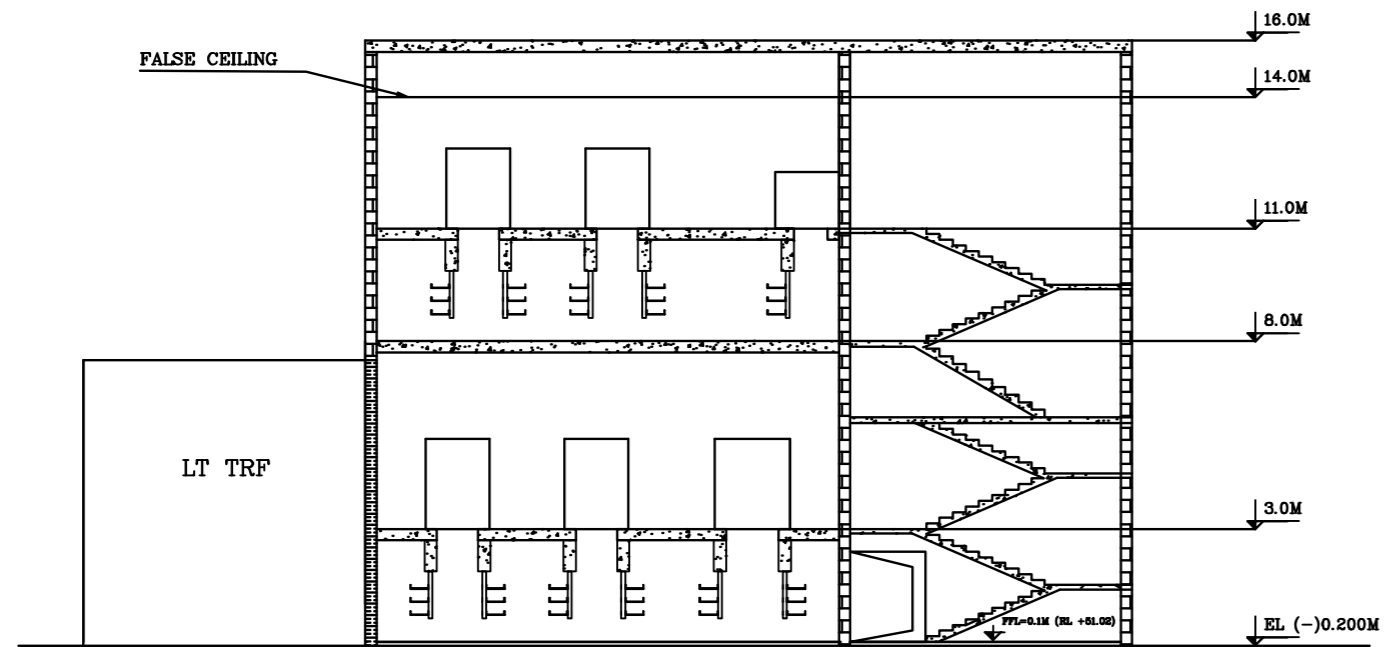
REVISIONS

| REV. | DESCRIPTION            | DATE       | BY | CHKD. |
|------|------------------------|------------|----|-------|
| 00   | ISSUED FOR INFORMATION | 04/01/2023 | BR | DSH   |

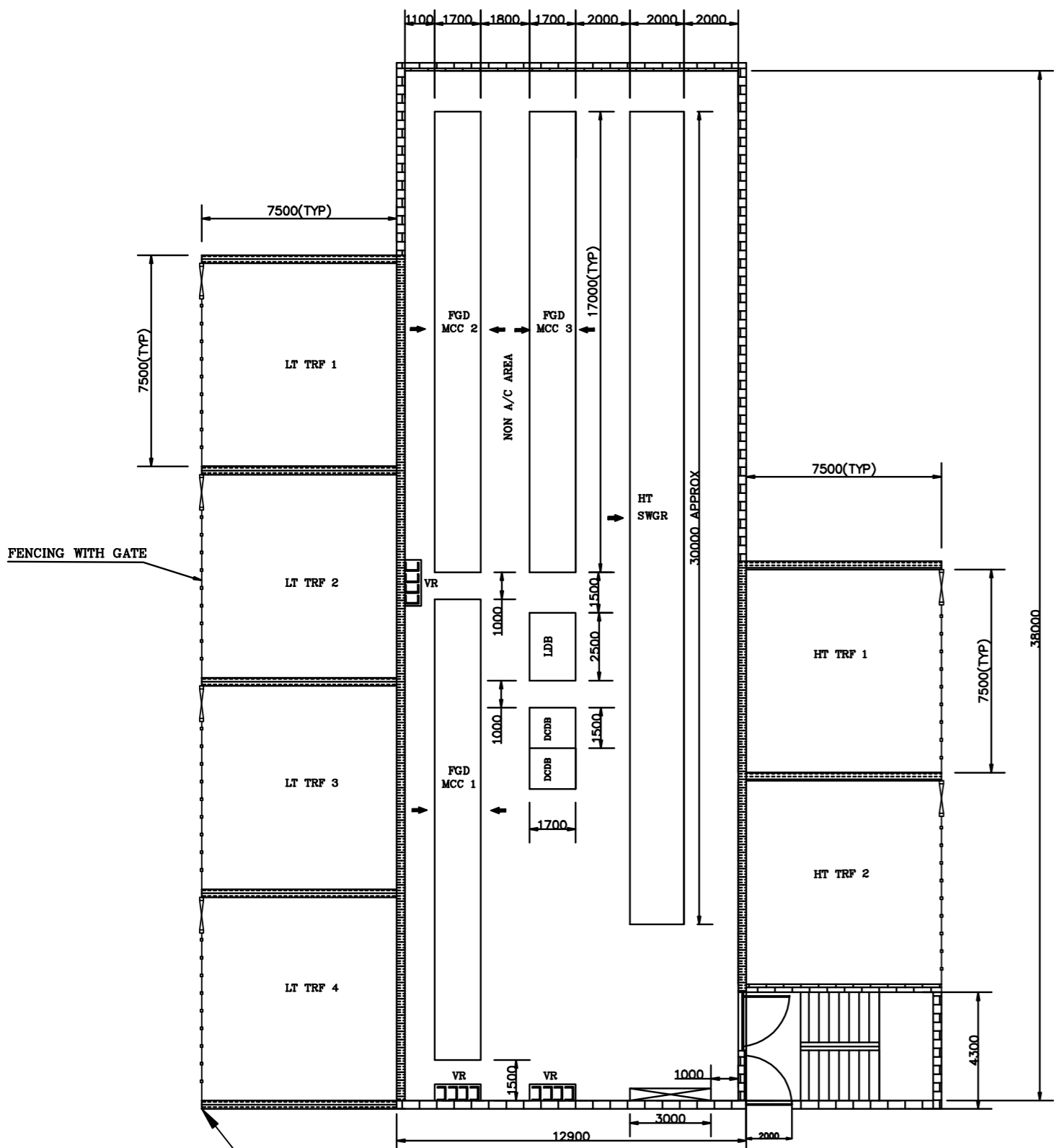
PROJECT INFORMATION

|             |                    |
|-------------|--------------------|
| PROJECT NO. | 4610-101-01W-F-019 |
| CLIENT      | PTUB               |
| DESIGNER    | PTUB               |
| DATE        | 23.07.2023         |
| SCALE       | 1:100              |
| SHEET NO.   | 01 OF 01           |

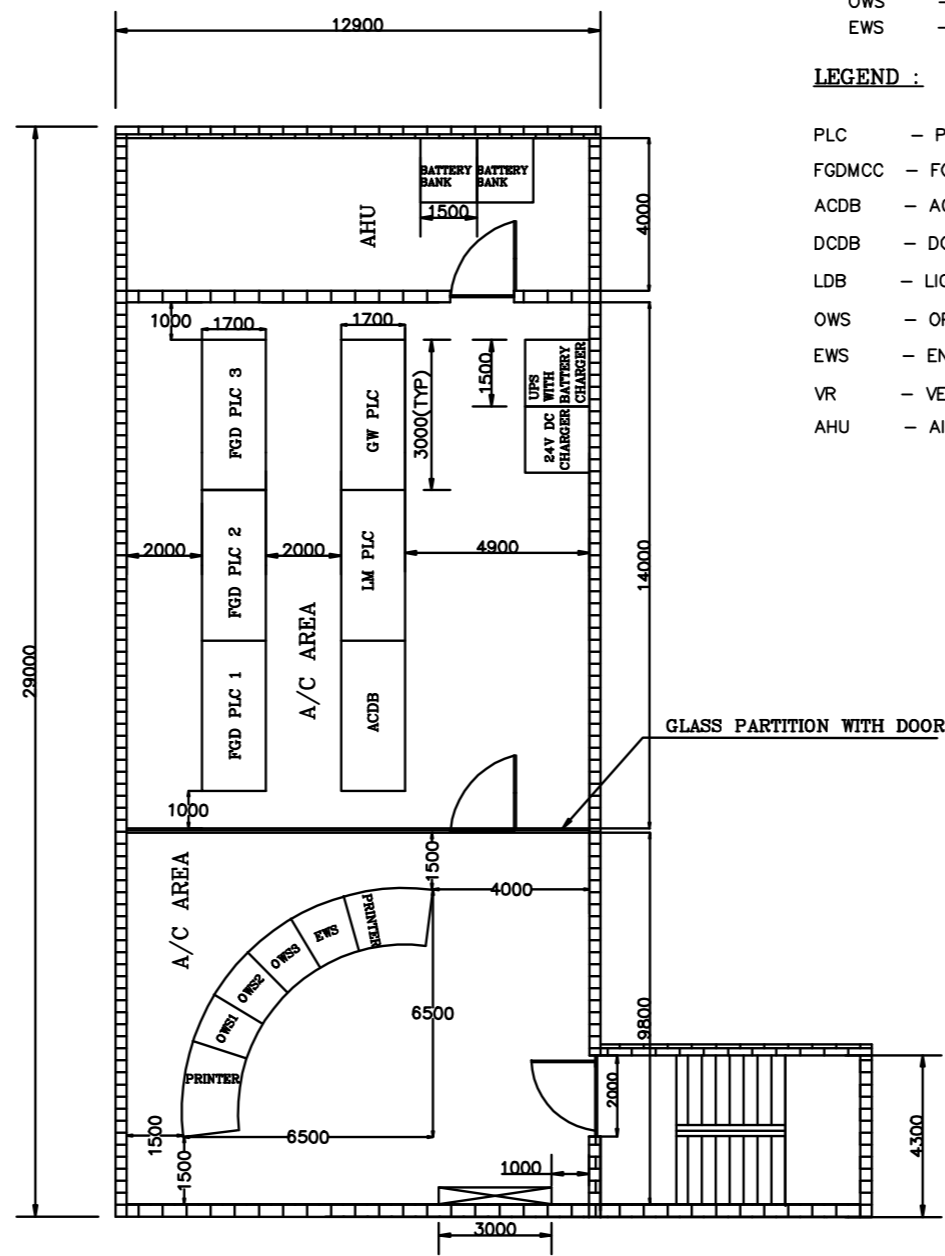
12 11 10 9 8 7 6 5 4 3 2 1



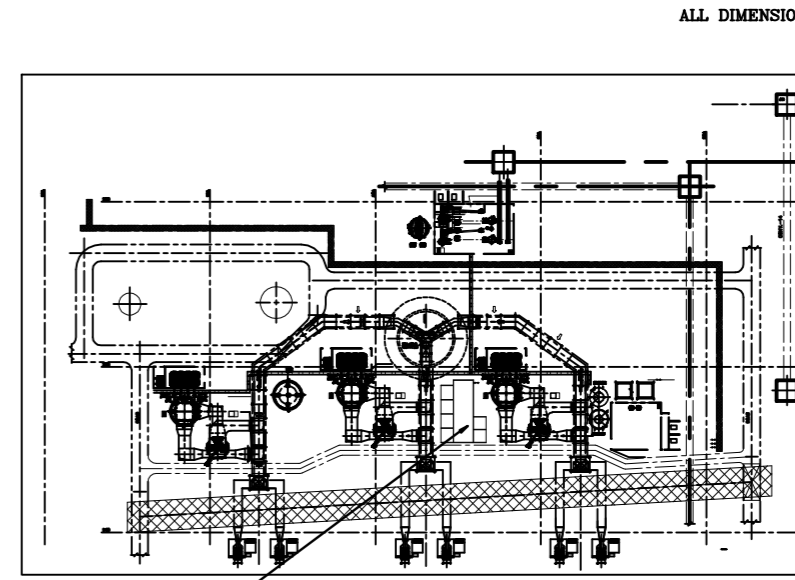
ELEVATION



PLAN AT FIRST FLOOR (NON A/C AREA) (3.0M EL.)

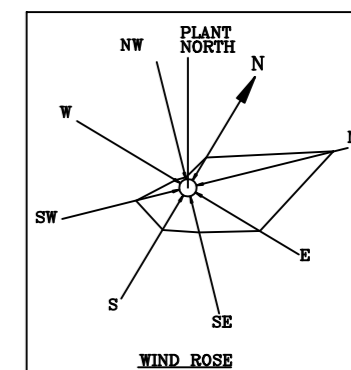


PLAN AT THIRD FLOOR (A/C AREA) (+11M EL.)



FGD CONTROL ROOM

KEY-PLAN



RECOMMENDATION [NOT IN BHEL(R) SCOPE]

- 01. NECESSARY FIRE EXTINGUISHER SHALL BE LOCATED INSIDE THE CONTROL ROOM
- 02. PLC AREA SHOULD BE AIR-CONDITIONED AND THE RECOMMENDED ROOM TEMPERATURE : 24 ±1°C.
- 03. HEAT LOSS/PANEL :  
 PLC - 0.5KW/PLC PANEL (APPROX.)  
 PRINTER - 0.2KW/PRINTER (APPROX.)  
 OWS - 0.5KW/WS(APPROX.)  
 EWS - 0.5KW/WS(APPROX.)

LEGEND :

- PLC - PROGRAMMABLE LOGIC CONTROLLER
- FGDMCC - FGD MOTOR CONTROL CENTRE
- ACDB - AC DISTRIBUTION BOARD
- DCDB - DC DISTRIBUTION BOARD
- LDB - LIGHTING DISTRIBUTION BOARD
- OWS - OPERATOR WORKSTATION
- EWS - ENGINEERING WORKSTATION
- VR - VERTICAL RISER
- AHU - AIR HAULING UNIT

NOTE :

- 01. ALL PANELS ARE PROVIDED WITH BOTTOM ENTRY FOR CABLES.
- 02. DIMENSION INDICATED FOR EQUIPMENTS ARE PROVISIONAL. PANEL DIMENSION/FOUNDATION DETAILS WILL BE FURNISHED ON RECEIPT OF SUB-VENDOR DRAWINGS.
- 03. AFTER ERECTION OF PANELS THE TRENCH GAP/FLOOR CUT-OUT SHALL BE SUITABLY COVERED WITH CHEQUERED PLATE.
- 04. 600MM WIDE RUBBER MAT OF SUITABLE LENGTH SHALL BE PROVIDED BEFORE ALL PANELS.
- 05. ILLUMINATION LEVEL SHALL BE 300 LUX.
- 06. FALSE CEILING SHALL BE PROVIDED AT 3 M ELEVATION IN A/C AREA.
- 07. EARTHING FLATS SHALL BE RUN IN THE CABLE VAULT ALONG WITH THE CABLE TRAYS.
- 08. THE CABLE TRAY EXIT SHALL BE SEALED PROPERLY SO THAT RAIN WATER AND DUST SHALL NOT ENTER INSIDE THE ROOM/TRENCH.
- 09. WEIGHT OF THE PANELS :  
 PLC = 400 KG./PLC PANEL (APPROX)  
 FGD MCC = 15000 KG./FGD MCC PANEL (APPROX)  
 ACDB/DCDB = 1000 KG./ACDB/DCDB PANEL (APPROX)  
 LDB = 1000 KG./LDB PANEL (APPROX)
- 10. NECESSARY CABLE RAISER SHALL BE PROVIDED TO TAKE CABLES FROM GROUND FLOOR TO CABLE VAULT.
- 11. CARE SHALL BE TAKEN WHILE DESIGNING CIVIL CONSTRUCTION, SO THAT BEAMS SHALL NOT FOUL WITH CABLE TRAY ROUTING/PANEL CABLE TERMINATION.
- 12. DCFB WILL BE FLOOR/WALL MOUNTED
- 13. ALL DOORS WILL BE 2.0M WIDE
- 14. SHUTTERS WILL BE 3.0 WIDE
- 15. SUPPLY & ERECTION OF HTMCC IS IN NTPC SCOPE
- 16. SUITABLE DOORS SHALL BE PROVIDED IN GROUND FLOOR & SECOND FLOOR CABLE VAULT AREA
- 17. WEIGHT OF HTMCC TO BE PROVIDED BY NTPC
- 18. SUITABLE OUTLET FOR CABLE SHALL BE PROVIDED IN CABLE VAULT AREA
- 19. VR IS PROVIDED FOR BRINGING CABLES FROM GROUND FLOOR CABLE VAULT AREA TO SECOND FLOOR CABLE VAULT AREA
- 20. THIS DRAWING HAS TO BE REFERRED WITH NTPC DRG NO:4610-101-03RP-PVM-F-018 REV 06 FOR ROAD ,CO-ORDINATES
- 21. 220V INPUT SOURCE TO DCDB IS IN NTPC SCOPE
- 22. EL 0.0M CORRESPONDENCE TO RL(+50.92M.
- 23. THE TOP OF PAVING IN FGD AREA IS EL(-)0.200M
- 24. FOR DETAILS OF COLUMN LOCATION PLEASE REFER DRG NO: 4610-101-03RP-PVC-V-087
- 25. CIVIL DETAILS SHALL BE SUBMITTED TO NTPC BY BHEL IN SEPARATE CIVIL DRAWING
- 26. THE HATCHED WALL SHOWN AS [Hatched Pattern] SHALL BE OF FIREWALL 355 BRICK OR 250 RCC FIREWALL HEIGHT TO BE GIVEN BY NTPC

CUSTOMER NO. : R321,R322,R323  
 PROJECT : BONGAIGOAN-3X250MW-FLUE GAS DESULPHURIZATION SYSTEM

|                                                                                      |                 |
|--------------------------------------------------------------------------------------|-----------------|
| NTPC Limited<br>A GOVERNMENT OF INDIA UNDERTAKING<br>INDUSTRIAL DIVISION, NOIDA U.P. |                 |
| NTPC DRG NO. 4610-101-03RP-PVM-F-133                                                 | REV. 00         |
| DRWN N.SRIDHAR                                                                       | DATE 09.07.2009 |
| CHKD MJM                                                                             | DATE 09.07.2009 |
| APPD K.RAJAVEL                                                                       | DATE 09.07.2009 |

|                                                                                                                                        |                 |                 |
|----------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|
| BHEL DRG NO. 2-FW-000-00156                                                                                                            |                 | REV. 04         |
| DUCON TECHNOLOGIES, INC.<br>SERVING THE INDUSTRY SINCE 1987<br>PARMINDALE, NEW YORK 11735, U.S.A.<br>(831) 894-1700 FAX (831) 480-4885 |                 | DATE 00.00.2009 |
| DRWN ---                                                                                                                               | DATE 00.00.2009 |                 |
| CHKD ---                                                                                                                               | DATE 00.00.2009 |                 |
| APPD ---                                                                                                                               | DATE 00.00.2009 |                 |

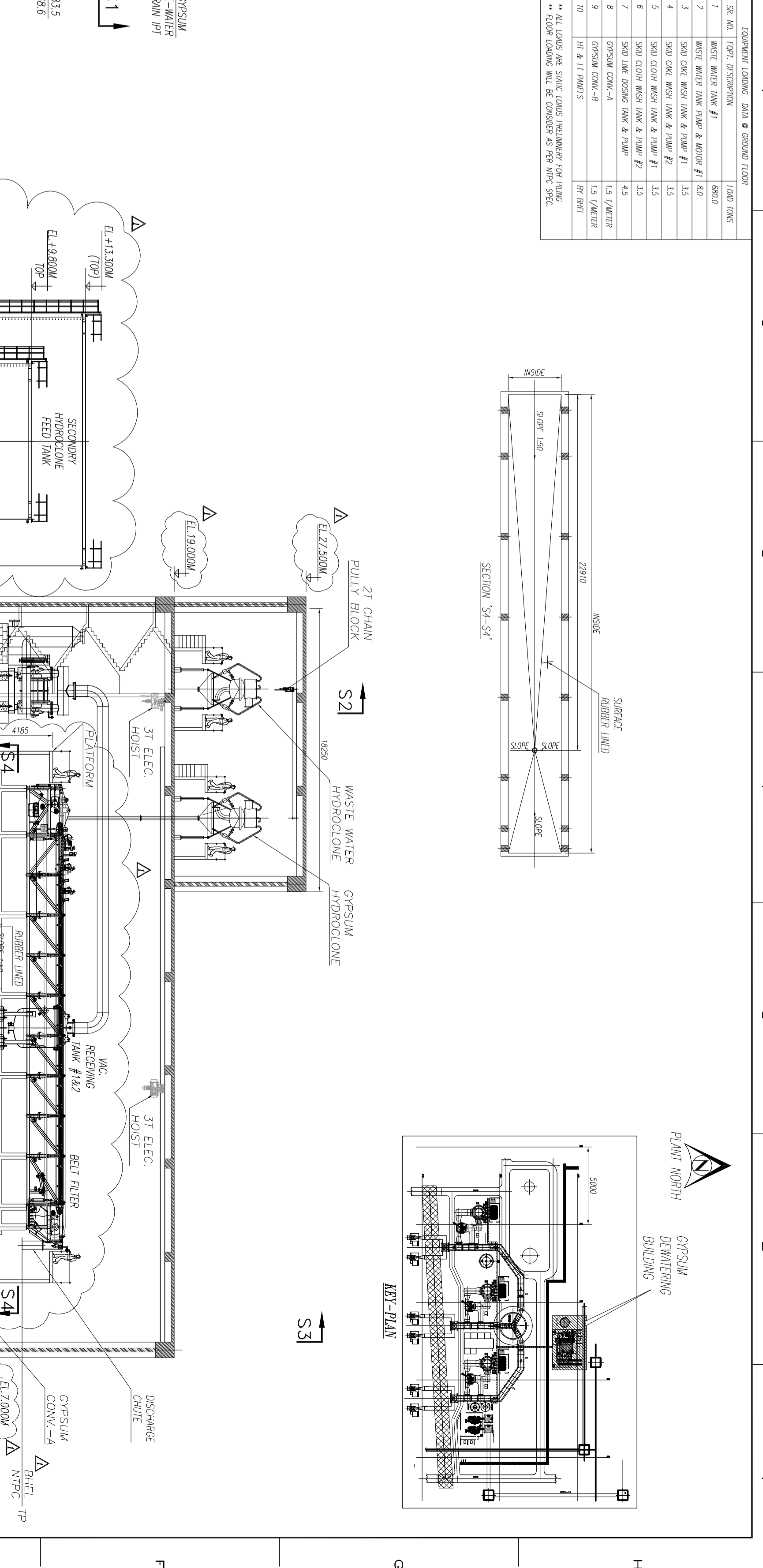
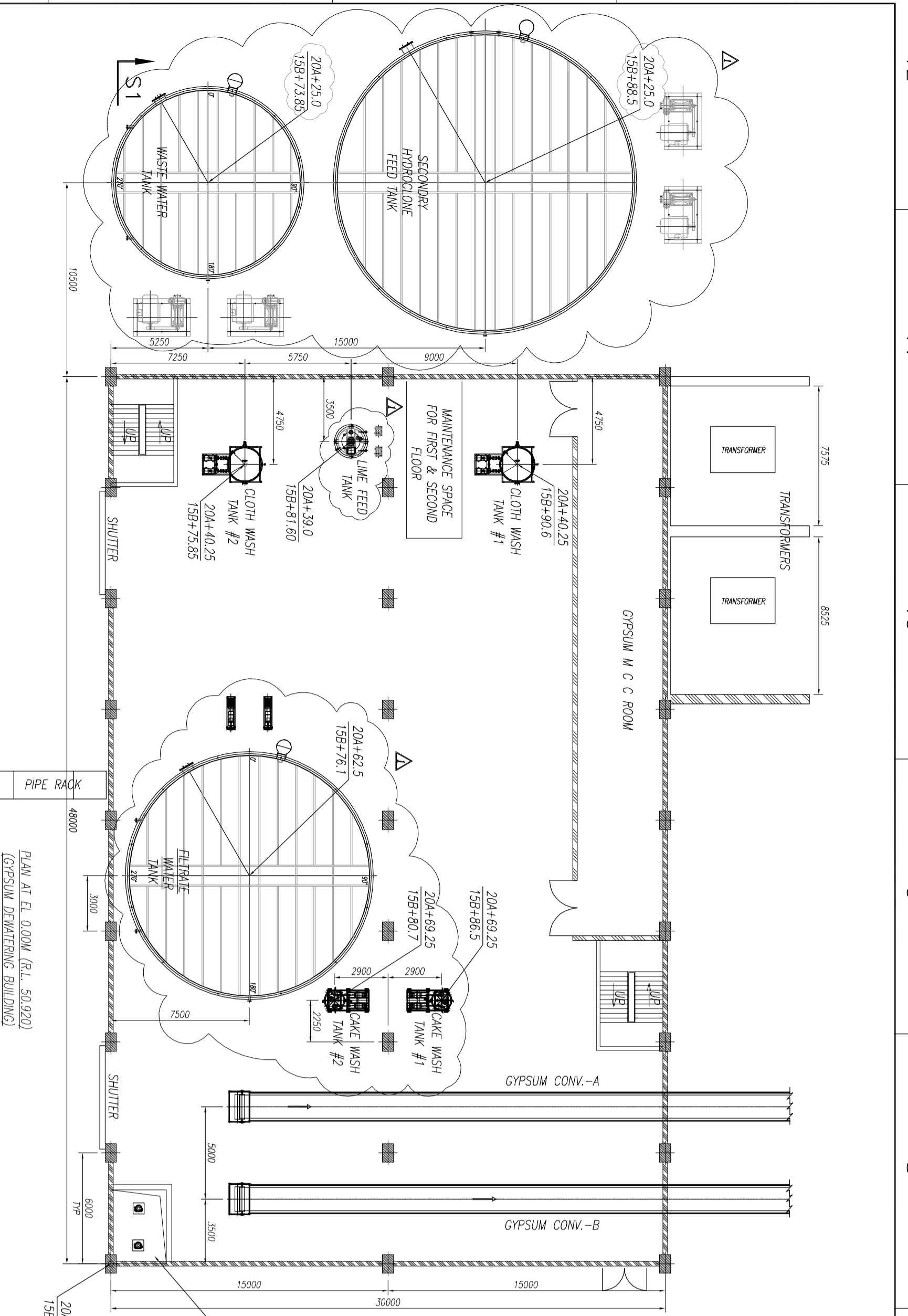
TITLE : LAYOUT OF FGD CONTROL ROOM  
 DUCON DRG NO. ---  
 SCALE : 1: 200  
 SHEET 01 OF 01

| REV. | DESCRIPTION                                     | DRAWN | DESIGN | CHKD. | C | M | E | C&I | APPD | DATE     |
|------|-------------------------------------------------|-------|--------|-------|---|---|---|-----|------|----------|
| 04   | REVISED BASED ON NTPC COMMENTS DATED 26 09 09   | NS    | MJM    | KR    |   |   |   |     |      | 26.09.09 |
| 03   | REVISED BASED ON NTPC COMMENTS DATED 26 08 09   | NS    | MJM    | KR    |   |   |   |     |      | 26.08.09 |
| 02   | REVISED BASED ON NTPC COMMENTS DATED 07 08 09   | NS    | MJM    | KR    |   |   |   |     |      | 07.08.09 |
| 01   | REVISED AS PER NTPC COMMENTS AND KEY PLAN ADDED | NS    | MJM    | KR    |   |   |   |     |      |          |

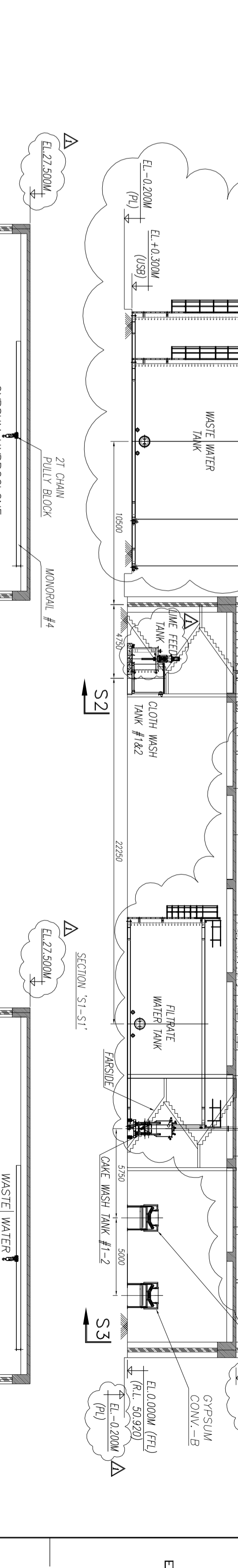
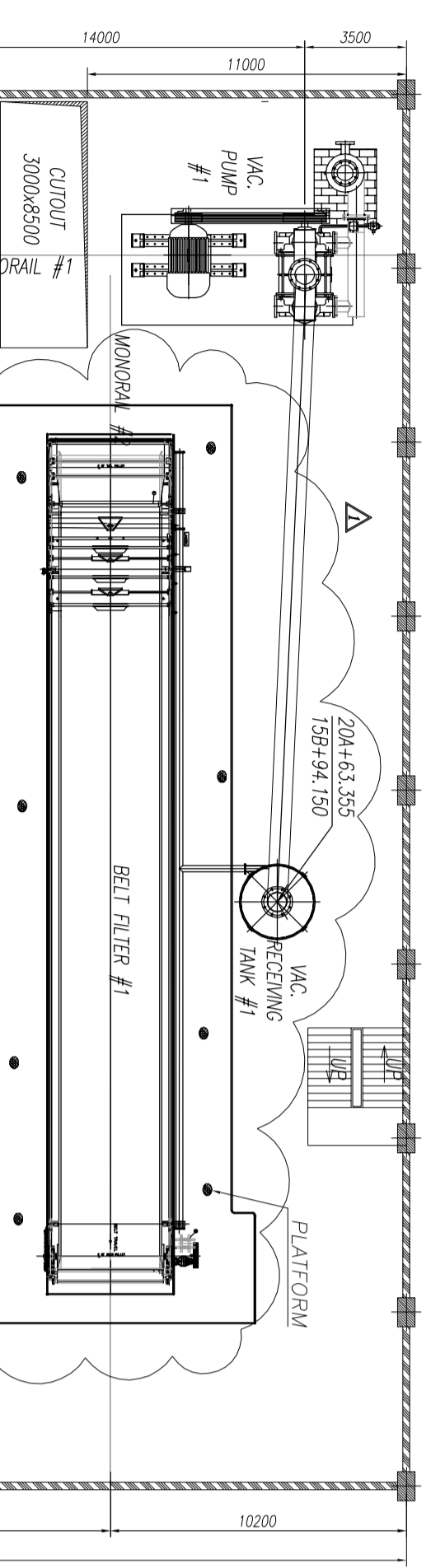
12 11 10 9 8 7 6 5 4 3 2 1

| SP. NO. | EQPT. DESCRIPTION              | LOAD DWS |
|---------|--------------------------------|----------|
| 1       | WASTE WATER TANK #1            | 680.0    |
| 2       | WASTE WATER TANK #2            | 680.0    |
| 3       | SAID CLOTH WASH TANK & PUMP #1 | 1.3      |
| 4       | SAID CLOTH WASH TANK & PUMP #2 | 1.3      |
| 5       | SAID CLOTH WASH TANK & PUMP #3 | 1.3      |
| 6       | SAID CLOTH WASH TANK & PUMP #4 | 1.3      |
| 7       | SAID CLOTH WASH TANK & PUMP #5 | 1.3      |
| 8       | SAID CLOTH WASH TANK & PUMP #6 | 1.3      |
| 9       | GYPSUM CONV.-A                 | 1.3      |
| 10      | GYPSUM CONV.-B                 | 1.3      |
| 11      | HT & LT TRAYS                  | 1.3      |
| 12      | HT & LT TRAYS                  | 1.3      |
| 13      | HT & LT TRAYS                  | 1.3      |
| 14      | HT & LT TRAYS                  | 1.3      |
| 15      | HT & LT TRAYS                  | 1.3      |
| 16      | HT & LT TRAYS                  | 1.3      |
| 17      | HT & LT TRAYS                  | 1.3      |
| 18      | HT & LT TRAYS                  | 1.3      |
| 19      | HT & LT TRAYS                  | 1.3      |
| 20      | HT & LT TRAYS                  | 1.3      |

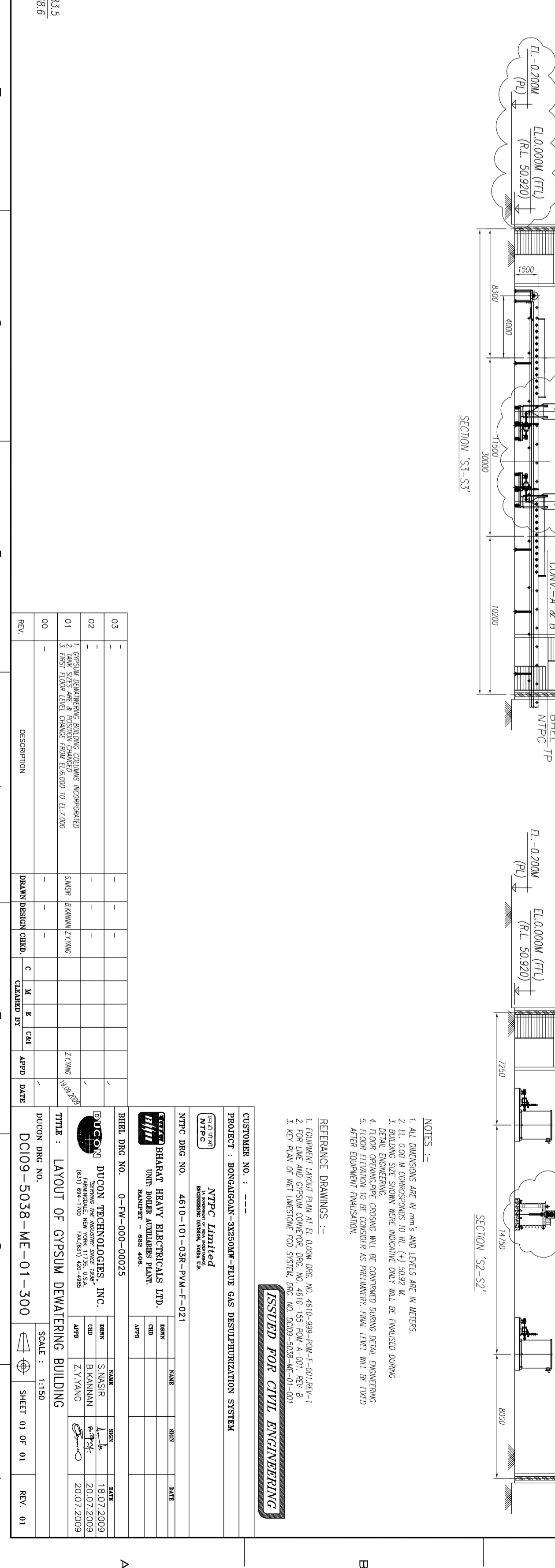
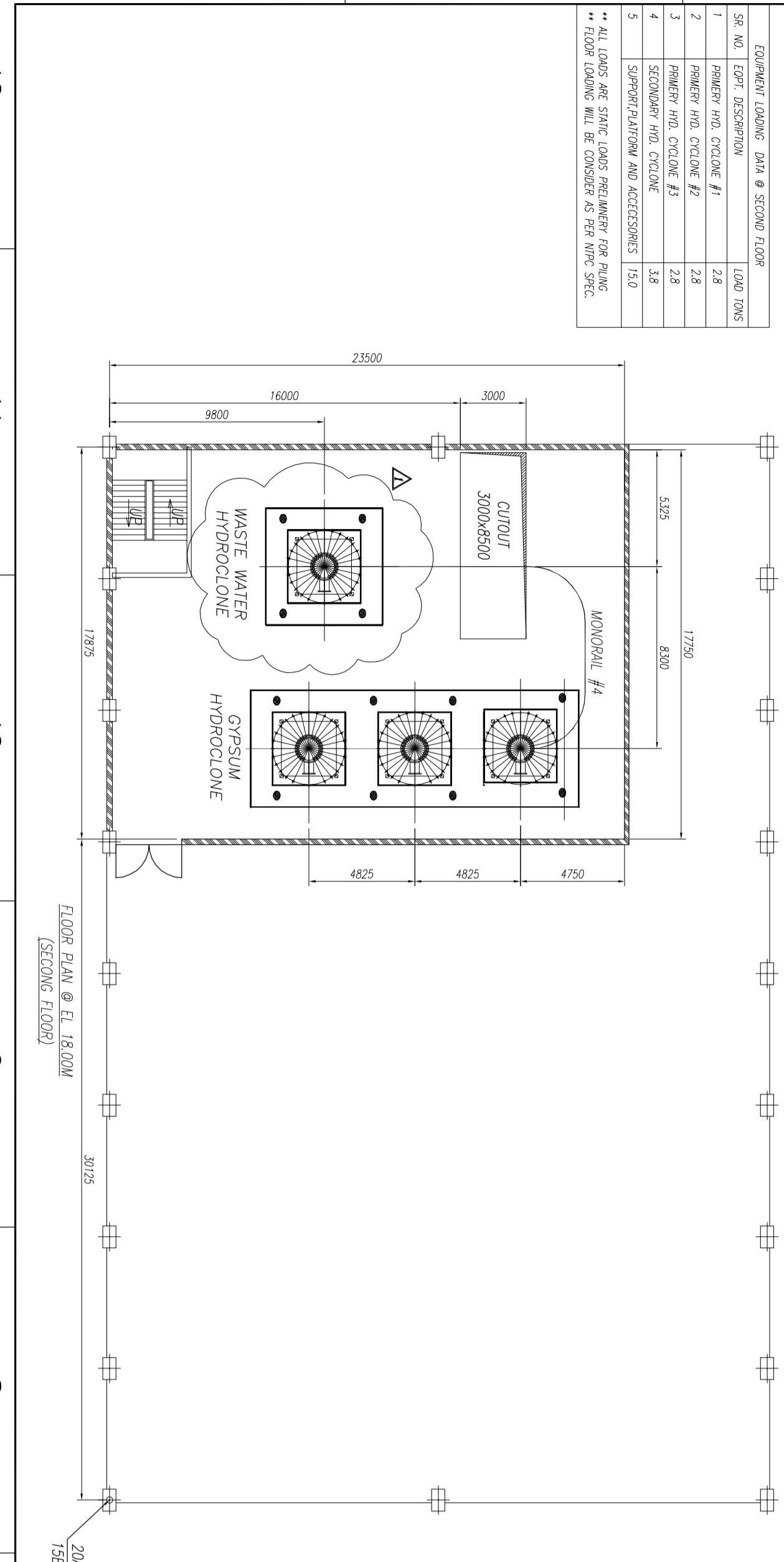
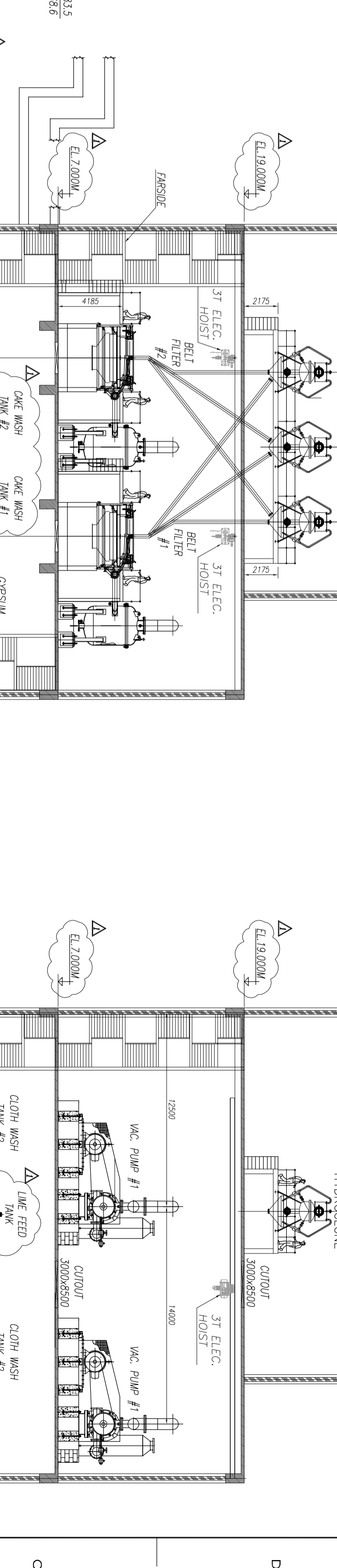
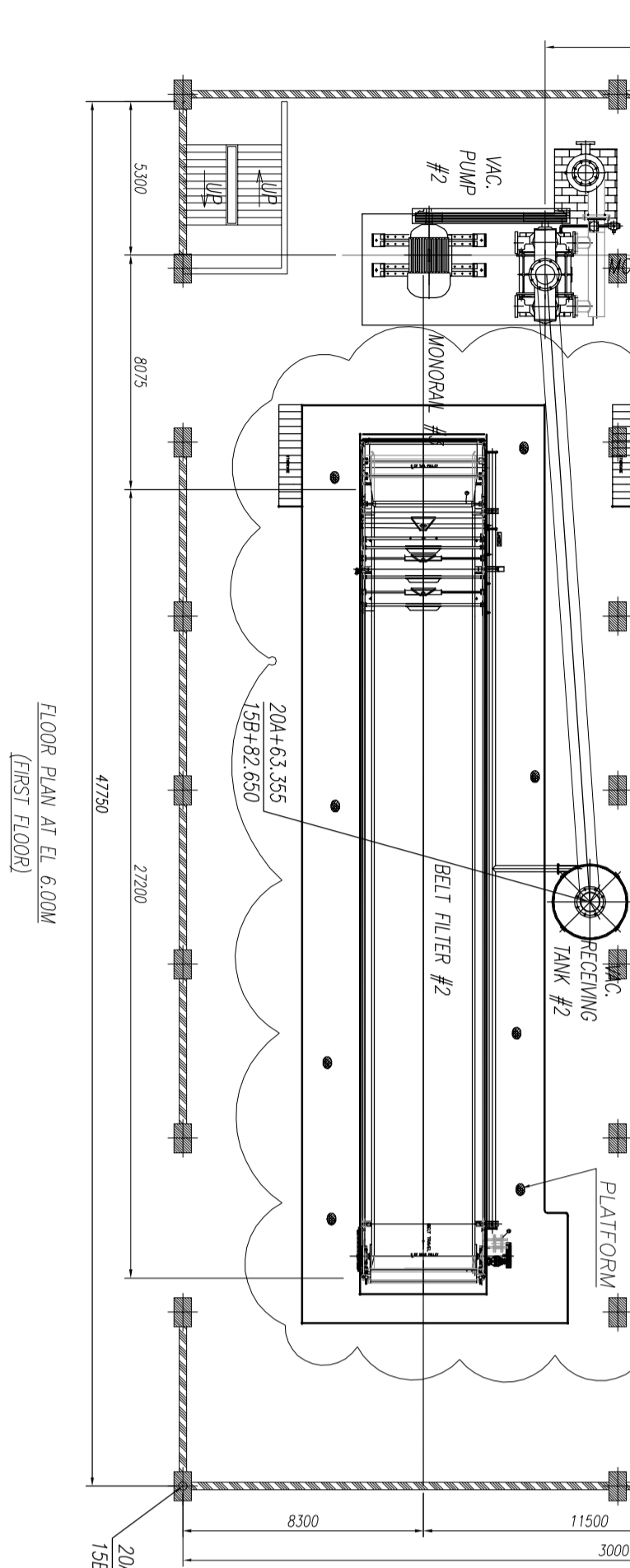
NOTE: ALL LOADS ARE STATIC LOADS PRELIMINARY FOR PLUMBING. FLOOR LOADS WILL BE CONSIDERED AS PER WHS SPEC.



| SP. NO. | EQPT. DESCRIPTION              | LOAD DWS |
|---------|--------------------------------|----------|
| 1       | WASTE WATER TANK #1            | 680.0    |
| 2       | WASTE WATER TANK #2            | 680.0    |
| 3       | SAID CLOTH WASH TANK & PUMP #1 | 1.3      |
| 4       | SAID CLOTH WASH TANK & PUMP #2 | 1.3      |
| 5       | SAID CLOTH WASH TANK & PUMP #3 | 1.3      |
| 6       | SAID CLOTH WASH TANK & PUMP #4 | 1.3      |
| 7       | SAID CLOTH WASH TANK & PUMP #5 | 1.3      |
| 8       | SAID CLOTH WASH TANK & PUMP #6 | 1.3      |
| 9       | GYPSUM CONV.-A                 | 1.3      |
| 10      | GYPSUM CONV.-B                 | 1.3      |
| 11      | HT & LT TRAYS                  | 1.3      |
| 12      | HT & LT TRAYS                  | 1.3      |
| 13      | HT & LT TRAYS                  | 1.3      |
| 14      | HT & LT TRAYS                  | 1.3      |
| 15      | HT & LT TRAYS                  | 1.3      |
| 16      | HT & LT TRAYS                  | 1.3      |
| 17      | HT & LT TRAYS                  | 1.3      |
| 18      | HT & LT TRAYS                  | 1.3      |
| 19      | HT & LT TRAYS                  | 1.3      |
| 20      | HT & LT TRAYS                  | 1.3      |



| SP. NO. | EQPT. DESCRIPTION              | LOAD DWS |
|---------|--------------------------------|----------|
| 1       | PRIMARY HD. CYCLONE #1         | 1.2      |
| 2       | PRIMARY HD. CYCLONE #2         | 1.2      |
| 3       | SECONDARY HD. CYCLONE #1       | 1.2      |
| 4       | SECONDARY HD. CYCLONE #2       | 1.2      |
| 5       | SUPERPLATATION AND ACCESSORIES | 1.50     |



**NOTES:**

- ALL DIMENSIONS ARE IN METERS AND LEVELS ARE IN METERS.
- EL. 0.00 M CORRESPONDS TO RL. (+) 50.02 M.
- LEVEL CHANGING: WORK PROVISIONS SHALL BE FINISHED DURING CONSTRUCTION.
- IF ANY DIMENSIONS ARE NOT SHOWN, THEY SHALL BE AS PER WHS SPEC.
- IF ANY DIMENSIONS ARE NOT SHOWN, THEY SHALL BE AS PER WHS SPEC.

**REFERENCE DRAWINGS:**

- EQUIPMENT LAYOUT PLAN AT EL. 0.00M (REL. 50.02M) - F-001-REV-1
- GENERAL LAYOUT PLAN AT EL. 0.00M (REL. 50.02M) - F-001-REV-1
- GENERAL LAYOUT PLAN AT EL. 0.00M (REL. 50.02M) - F-001-REV-1

**CUSTOMER NO.:** -

**PROJECT:** BONGALUON-XYSONUM-PLUM GAS DESULFURIZATION SYSTEM

**CLIENT:** NTPC Limited

**TYPE:** MECHANICAL

**DATE:** 4810-01-03B-PLM-F-021

**DESIGNER:** SHARAT HEAVY ELECTRICALS LTD.

**SCALE:** 1:150

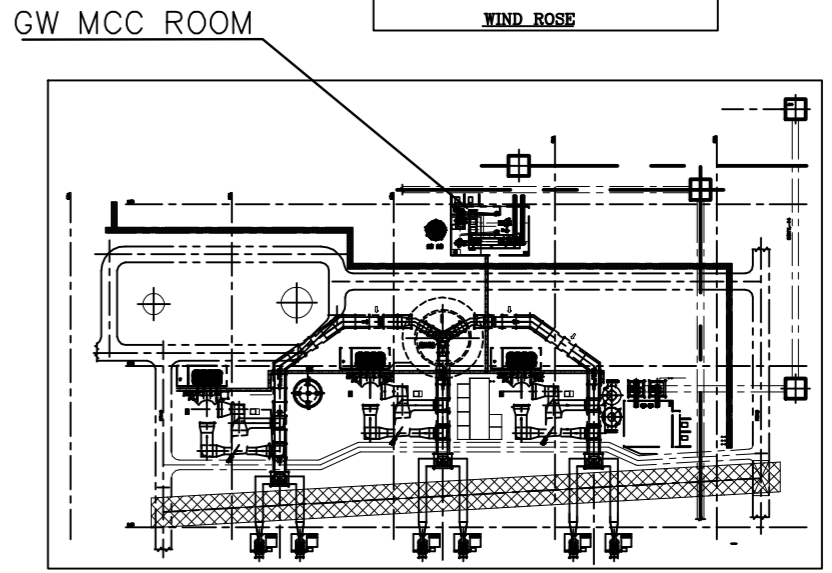
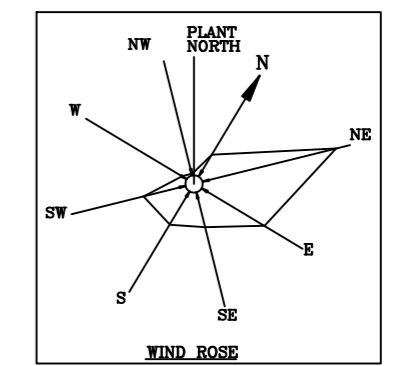
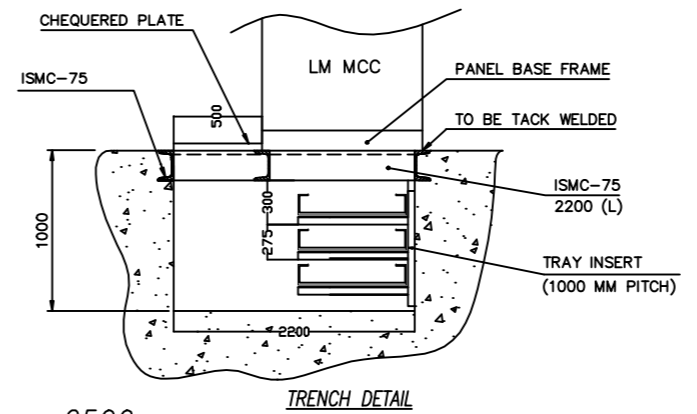
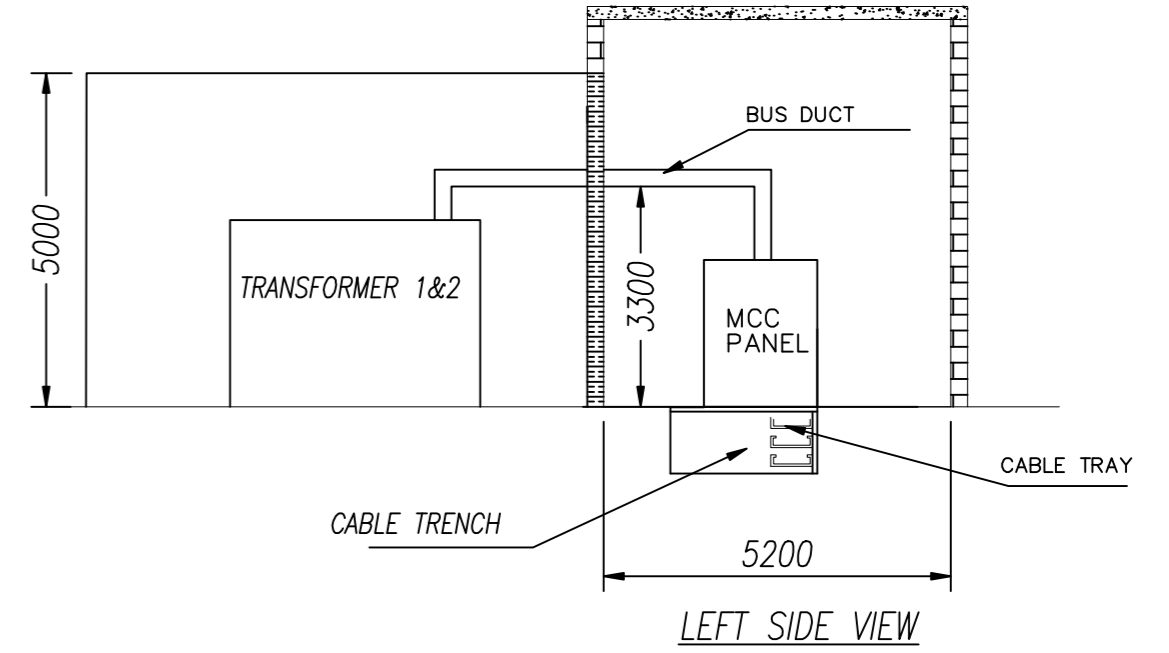
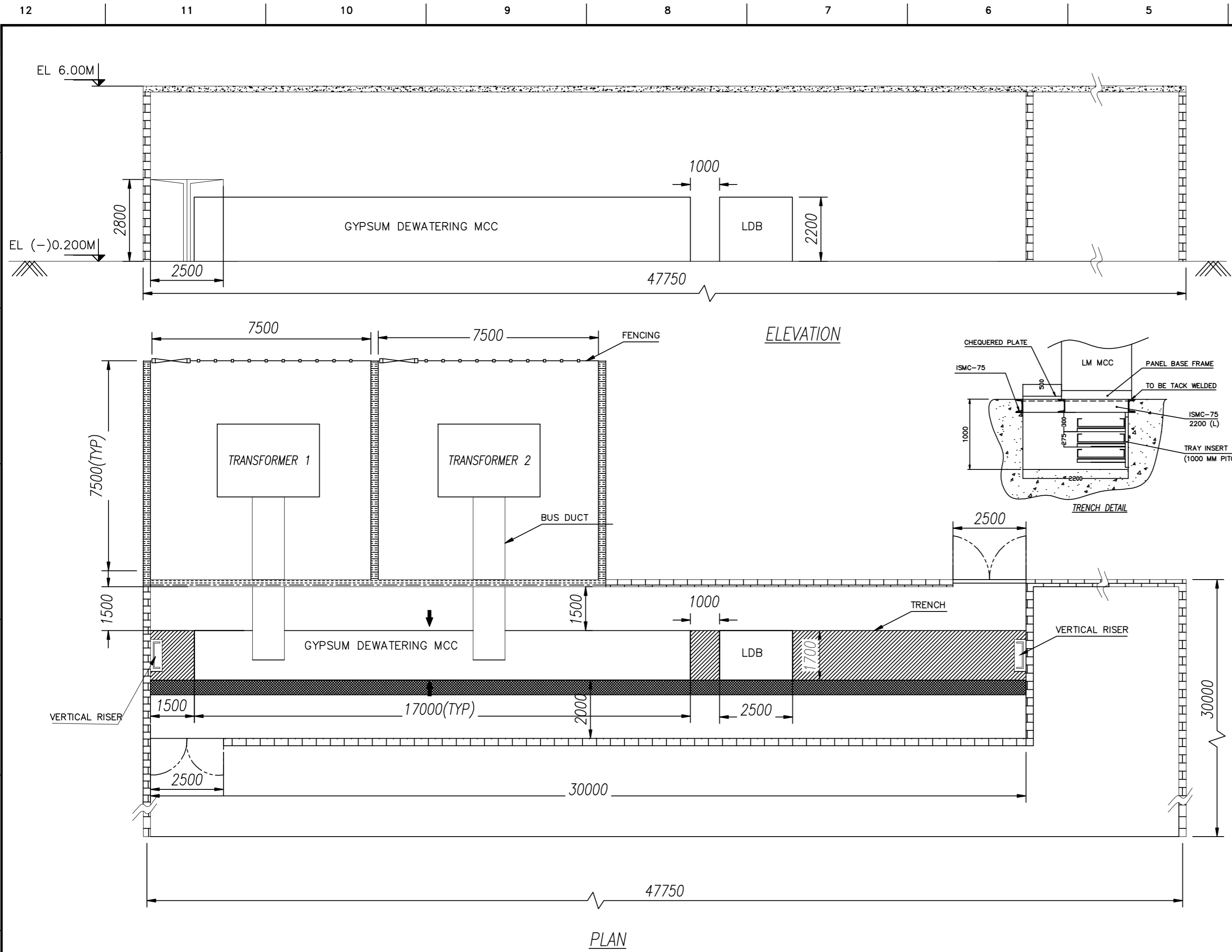
**TITLE:** LAYOUT OF GYPSUM DEWATERING BUILDING

**REGION:** DCIO9-5038-ME-01-300

**SCALE:** 1:150

**SHEET:** 01 OF 01

**REV.:** 01



**NOTE :**

01. ALL PANELS ARE PROVIDED WITH BOTTOM ENTRY FOR CABLES.
02. DIMENSION INDICATED FOR EQUIPMENTS ARE PROVISIONAL-PANEL DIMENSION/FOUNDATION DETAILS WILL BE FURNISHED ON RECEIPT OF SUB-VENDOR DRAWINGS.
03. AFTER ERECTION OF PANELS THE TRENCH GAP/FLOOR CUT-OUT SHALL BE SUITABLY COVERED WITH CHEQUERED PLATE.
04. 600MM WIDE RUBBER MAT OF SUITABLE LENGTH SHALL BE PROVIDED BEFORE ALL PANELS.
05. ILLUMINATION LEVEL SHALL BE 300 LUX.
07. EARTHING FLATS SHALL BE RUN IN THE CABLE VAULT ALONG WITH THE CABLE TRAYS.
08. THE CABLE TRAY EXIT SHALL BE SEALED PROPERLY SO THAT RAIN WATER AND DUST SHALL NOT ENTER INSIDE THE ROOM/TRENCH.
09. WEIGHT OF THE PANELS :  
 GDMCC = 15000 KG/GDMCC PANEL (APPROX)  
 LDB = 1000 KG/LDB PANEL (APPROX)

10. NECESSARY CABLE RAISER SHALL BE PROVIDED TO TAKE CABLES FROM GROUND FLOOR TO FIRST FLOOR & SECOND FLOOR
11. CARE SHALL BE TAKEN WHILE DESIGNING CIVIL CONSTRUCTION, SO THAT BEAMS SHALL NOT FOUL WITH CABLE TRAY ROUTING/PANEL CABLE TERMINATION.
19. VR IS PROVIDED FOR BRINGING CABLES FROM GROUND FLOOR CABLE VAULT AREA TO SECOND FLOOR CABLE VAULT AREA
20. THIS DRAWING HAS TO BE REFERRED WITH NTPC DRG NO: 4610-101-03RP-PVM-F-021
20. SUITABLE CUTOUT FOR BUSDUCT ENTRY SHALL BE PROVIDED AT 3.3M ELEVATION
20. SIZE FOR BUSDUCT CUTOUT SHALL BE GIVEN BY NTPC
21. TOP OF PAVING IN FGD AREA IS EL (-)0.200M
22. EL 0.0M CORRESPONDENCE TO RL(+ )50.92M
23. CIVIL DETAILS SHALL BE SUBMITTED TO NTPC BY BHEL IN SEPARATE ARCHITECTURAL DRAWING
24. THE HATCHED WALL SHOWN AS SHALL BE OF FIREWALL 355 BRICK OR 250 RCC. FIREWALL HEIGHT TO BE GIVEN BY NTPC

**RECOMMENDATION [NOT IN BHEL(R) SCOPE]**

01. NECESSARY FIRE EXTINGUISHER SHALL BE LOCATED INSIDE THE CONTROL ROOM

**LEGEND :**

- GDMCC - GYPSUM DEWATERING MOTOR CONTROL CENTRE
- LDB - LIGHTING DISTRIBUTION BOARD
- VR - VERTICAL RISER

| REV. | DESCRIPTION                                   | DRAWN | DESIGN | CHKD. | C | M | E | C&I | APPD | DATE     |
|------|-----------------------------------------------|-------|--------|-------|---|---|---|-----|------|----------|
| 01   | REVISED BASED ON NTPC COMMENTS DATED 22.09.09 | NS    | MJM    | MJM   |   |   |   |     |      | 22.09.09 |

CUSTOMER NO. : R321,R322,R323  
 PROJECT : BONGAIGOAN-3X250MW-FLUE GAS DESULPHURIZATION SYSTEM

**NTPC Limited**  
 (A GOVERNMENT OF INDIA UNDERTAKING)  
 ENGINEERING DIVISION, NOIDA U.P.

NTPC DRG NO. 4610-101-03RP-PVC-B-007

| NAME           | SIGN | DATE       |
|----------------|------|------------|
| DRWN N.SRIDHAR |      | 01.08.2009 |
| CHKD MJM       |      | 01.08.2009 |
| APPD K.RAJAVEL |      | 01.08.2009 |

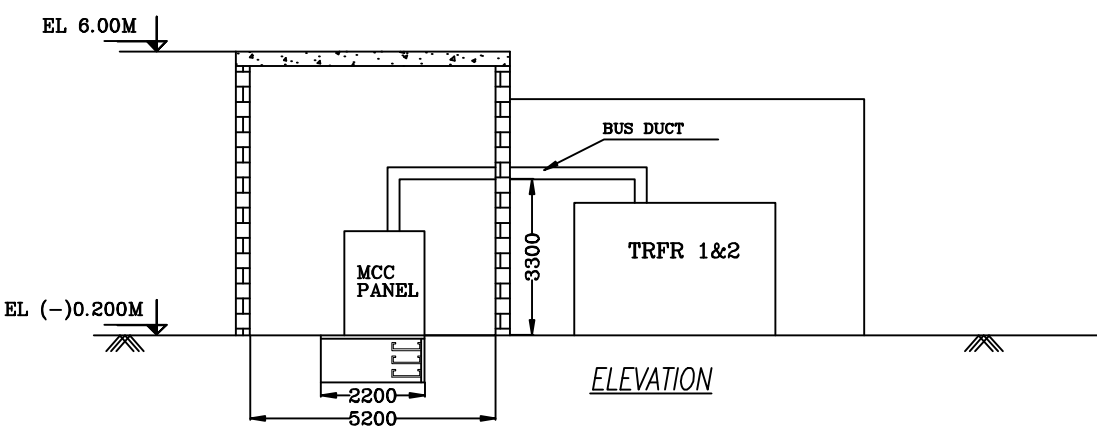
BHEL DRG NO. 4-FW-000-00091

| NAME     | SIGN | DATE       |
|----------|------|------------|
| DRWN --- |      | 00.00.2009 |
| CHKD --- |      | 00.00.2009 |
| APPD --- |      | 00.00.2009 |

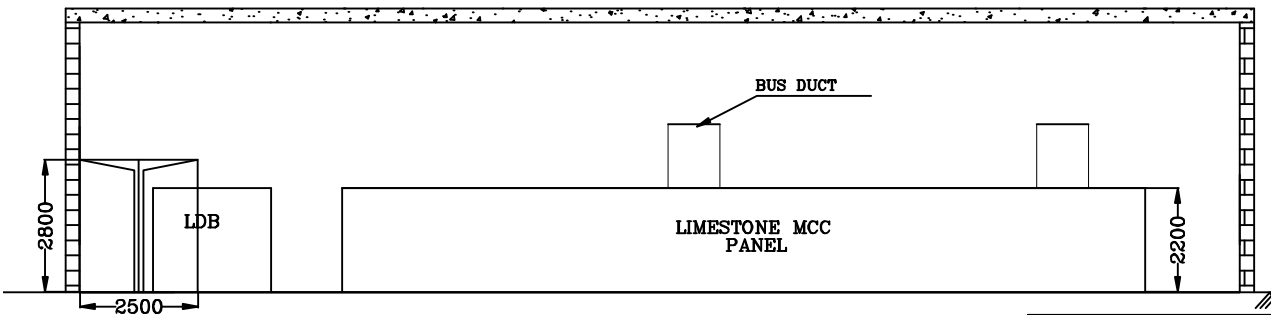
**DUCON TECHNOLOGIES, INC.**  
 "SERVING THE INDUSTRY SINCE 1987"  
 FARMINGDALE, NEW YORK 11735, U.S.A.  
 (813) 894-1700 FAX (813) 420-4985

TITLE : LAYOUT OF GYPSUM DEWATERING MCC ROOM  
 DUCON DRG NO. DC109-5038-CL-01-010  
 SCALE : 1: 200  
 SHEET 01 OF 01 REV. 01

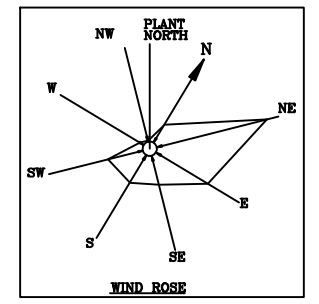
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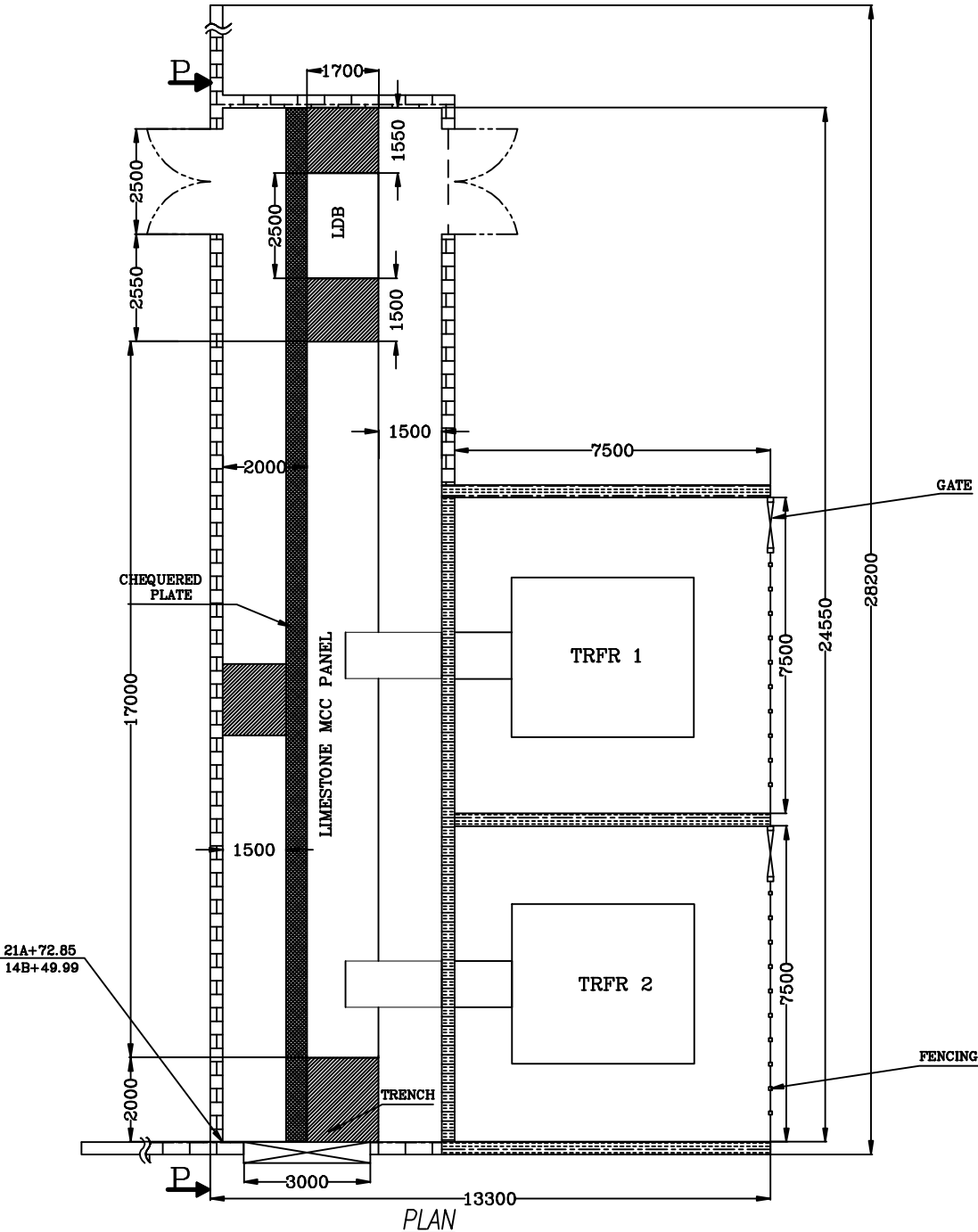
ELEVATION



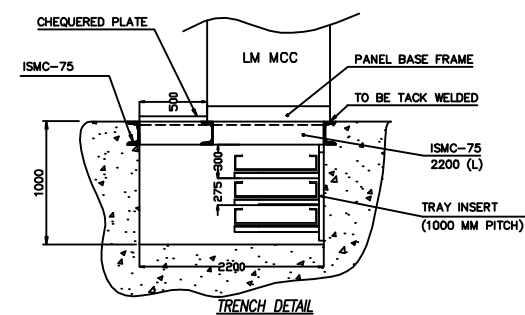
PP VIEW



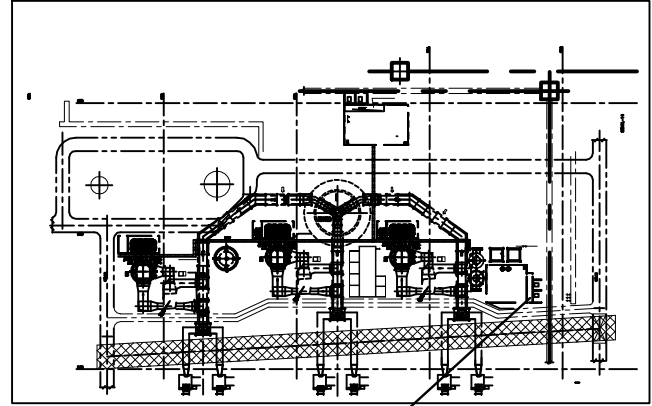
ALL DIMENSIONS ARE IN MILLIMETRES



PLAN



TRENCH DETAIL



LM MCC ROOM KEY-PLAN

**RECOMMENDATION [NOT IN BHEL(R) SCOPE]**

- 01. NECESSARY FIRE EXTINGUISHER SHALL BE LOCATED INSIDE THE CONTROL ROOM

**LEGEND :**

- LMCC - LIMESTONE MOTOR CONTROL CENTRE
- LDB - LIGHTING DISTRIBUTION BOARD

**NOTE :**

- 01. ALL PANELS ARE PROVIDED WITH BOTTOM ENTRY FOR CABLES.
- 02. DIMENSION INDICATED FOR EQUIPMENTS ARE PROVISIONAL. PANEL DIMENSION/FOUNDATION DETAILS WILL BE FURNISHED ON RECEIPT OF SUB-VENDOR DRAWINGS.
- 03. AFTER ERECTION OF PANELS THE TRENCH GAP/FLOOR CUT-OUT SHALL BE SUITABLY COVERED WITH CHEQUERED PLATE.
- 04. 600MM WIDE RUBBER MAT OF SUITABLE LENGTH SHALL BE PROVIDED BEFORE ALL PANELS.
- 05. ILLUMINATION LEVEL SHALL BE 300 LUX.
- 06. EARTHING FLATS SHALL BE RUN IN THE CABLE VAULT ALONG WITH THE CABLE TRAYS.
- 07. THE CABLE TRAY EXIT SHALL BE SEALED PROPERLY SO THAT RAIN WATER AND DUST SHALL NOT ENTER INSIDE THE ROOM/TRENCH.
- 08. WEIGHT OF THE PANELS :  
LMCC = 15000 KG/GDWMCC PANEL.(APPROX)  
LDB = 1000 KG/LDB PANEL.(APPROX)

- 09. NECESSARY CABLE RAISER SHALL BE PROVIDED TO TAKE CABLES FROM GROUND FLOOR TO FIRST FLOOR & SECOND FLOOR
- 10. CARE SHALL BE TAKEN WHILE DESIGNING CIVIL CONSTRUCTION, SO THAT BEAMS SHALL NOT FOUL WITH CABLE TRAY ROUTING/PANEL CABLE TERMINATION.
- 11. THIS DRAWING HAS TO BE REFERRED WITH NTPC DRG NO: 4610-101-03RP-PVM-F-020
- 12. SUITABLE CUTOUT FOR BUSDUCT ENTRY SHALL BE PROVIDED AT 3.3M ELEVATION
- 13. SIZE FOR BUSDUCT CUTOUT SHALL BE GIVEN BY NTPC
- 14. TOP OF PAVING IN FGD AREA IS EL (-)0.200M
- 15. EL 0.0M CORRESPONDENCE TO RL(+)-50.92M
- 16. ARCHITECTURAL DETAILS SHALL BE SUBMITTED TO NTPC BY BHEL IN SEPARATE ARCHITECTURAL DRAWING
- 17. THE HATCHED WALL SHOWN AS [Hatched Pattern] SHALL BE OF FIREWALL 355 BRICK OR 250 RCC FIREWALL HEIGHT TO BE GIVEN BY NTPC

| REV. | DESCRIPTION                                   | DRAWN | DESIGN | CHKD. | C | M | E | CAI | APPD | DATE     |
|------|-----------------------------------------------|-------|--------|-------|---|---|---|-----|------|----------|
| 01   | REVISED BASED ON NTPC COMMENTS DATED 22.09.09 | NS    | MM     | KB    |   |   |   |     |      | 22.09.09 |

|                                                               |  |               |  |
|---------------------------------------------------------------|--|---------------|--|
| CUSTOMER NO. : E321.R322.R323                                 |  |               |  |
| PROJECT : BONGAIGOAN-SX250MW-FLUE GAS DESULPHURIZATION SYSTEM |  |               |  |
|                                                               |  |               |  |
| NTPC DRG NO. 4610-101-03RP-PVC-B-005                          |  |               |  |
|                                                               |  |               |  |
| BHEL DRG NO. 4-FW-000-00088                                   |  |               |  |
| DUCON TECHNOLOGIES, INC.                                      |  |               |  |
| DUCON DRG NO. DC109-5038-CL-01-007                            |  |               |  |
| TITLE : LIMESTONE MCC ROOM                                    |  | SCALE : 1:160 |  |
| SHEET 01 OF 01                                                |  | REV. 01       |  |

12 11 10 9 8 7 6 5 4 3 2 1