

Chhattisgarh State Power Generation Company Limited (CSPGCL)

**HASDEO THERMAL POWER STATION
KORBA WEST, PH - I & PH - II (2x210 MW + 2x210 MW)
(RENOVATION & RETROFITTING OF ESP PACKAGE)**

TECHNICAL SPECIFICATION

FOR

SUPPLY & SERVICES OF

AIR-CONDITIONING & VENTILATION SYSTEM

SPECIFICATION NO.: PE-TS-454-571-15000A-A001 (REV-00)



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR- PROJECT ENGINEERING MANAGEMENT
POWER PROJECTS ENGINEERING INSTITUTE
PLOT NO. 25, SECTOR-16A, NOIDA-201301 (U.P.), INDIA**



TITLE:
**TECHNICAL SPECIFICATION FOR
HVAC SYSTEM OF
CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION

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SECTION-I

SUB-SECTION-A

INTENT OF SPECIFICATION



**CSPGCL, HTPS, KORBA WEST, PH I & II
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1.0 INTENT OF SPECIFICATION

- 1.1 The specification covers design (i.e. preparation and submission of drawings/documents including “As Built” drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable) fill of lubricants & consumables, spares for erection, start-up and commissioning as required, forwarding, proper packing, shipment and delivery at site, handling, in-site transportation, assembly, erection & commissioning, minor civil work, trial run at site and carrying out Demonstration tests at site (As applicable), training of customer/client and handover in flawless condition of the package to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order for New ESP Control Room at **CSPGCL, HTPS, KORBA WEST, PH I & II, (2x210MW + 2x210MW) (RENOVATION & RETROFITTING OF ESP PACKAGE)**, in Korba District, Chhattisgarh.
- 1.2 The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve the contractor of the responsibility of providing such facilities to complete the supply, erection and commissioning, performance and demonstration testing of **HVAC SYSTEM**.
- 1.3 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to highest standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.
- 1.4 The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing. Similarly, the extent of supply also includes all items required for completion of the system and notwithstanding they may have been omitted in drawings / specifications or schedules.
- 1.5 The general term and conditions, instructions to tenderers and other attachment referred to elsewhere are made part of the tender specification. The equipment materials and works covered by this specification is subject to compliance to all attachments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.
- 1.6 While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information, ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to



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seek any clarification on specification requirement in the format enclosed under Sub-section-4 of Section-II of this specification **within 10 days of receipt of tender documents**. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of Purchaser / Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by Purchaser/ Customer as and when brought to their notice either by the bidder or by purchaser/customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

- 1.7 The bidder's offer shall not carry any sections like clarification, interpretations and /or assumptions.
- 1.8 Deviations, if any, should be very clearly brought out clause by clause along with cost of withdrawal in the format attached with GCC as per Sub-section-5 of Section-II of this specification 'Deviation sheet (Cost of withdrawal)', otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification.
- 1.9 In the event of any conflict between the requirements of two clauses of this specification documents or requirements of different codes and standards specified, Sub-section-C1 of Section-I of this specification shall prevail over others, however more stringent requirement as per the interpretation of the owner shall apply.
- 1.10 In case all above requirements are not complied with, the offer may be considered as incomplete and would be liable for rejection.
- 1.11 For definition of words like Contractor, bidder, supplier, vendor, Customer/ Purchaser Employer, consultant, please referred relevant clause(s) of NIT.



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PROJECT INFORMATION



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1. PROJECT INFORMATION

The HASDEO Thermal Power Project of CSPGCL located in Korba district in Chhattisgarh comprising of 2 units of 210 MW (PH - I) BHEL Make Boiler and 2 units of 210 MW (PH-II) ABL Make Boiler commissioned in 1983-84 and 1985-86 respectively.

The details of project site HTPS Korba West TPS are as under:

- HTPS Korba West site is located on the bank of Hasdeo River at Korba West in Korba district, Chhattisgarh State .
- The nearest railway station is Korba , 12 km away / Champa 40 KM/ Bilaspur 100 KM. The station has siding facilities. The railway track is broad gauge.
- Champa is located between Howrah –Mumbai Rail Route via Nagpur.
- Nearest Airport is Raipur at the distance of about 220 KM.
- Nearest Sea Port are Vishakhapatnam

2. The current work involves renovation of the ESPs at Site which is being executed by BHEL. The bidder's scope pertains to the supply and erection & commissioning of the air-conditioning and ventilation system for the new control room for the renovated ESP for Phase-II as per the details specified elsewhere in the specification.



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TECHNICAL SPECIFICATION



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**HVAC SYSTEM
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SPECIFIC TECHNICAL REQUIREMENT



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**HVAC SYSTEM
SPECIFIC TECHNICAL REQUIREMENT**

FUNCTION

1. The purpose of the specification is to provide HVAC system for CSPGCL Korba West 2x210 MW Phase-II (Unit #3&4) for New ESP Control Room, under the scope of this tender.

SYSTEM DESCRIPTION

2.1 SCOPE OF SUPPLY & SERVICES

Design, manufacturing, supply, handling of supplied material at site from BHEL store to work place, erection, testing and commissioning of the air-conditioning and ventilation system as per the scope listed below:

- 2.1.1 Split Air-Conditioners (AC) of 2 Ton Capacity each, maximum available BEE rating along with indoor and outdoor units, piping, insulation, cabling, etc. for the Air-Conditioned (AC) area (Control panel area). Each AC shall be provided with a dedicated remote control and mounting stand on wall.
- 2.1.2 Industrial type ventilation fans for the Non AC Area (Switchgear Room) complete with starter unit, cowl and bird/insect protection, pre-filters & fine filters as applicable as per latest industry practices. The total exhaust fans capacity should be minimum 70% of supply fan capacity. The no. of fans should be selected as per manufacturer's standard fulfilling the required capacity as mentioned above.
- 2.1.3 Required power and control cables as required for the above ACs and ventilation fans. This also includes incoming power cable required from incoming single source (100 Amps) to required power distribution board for the AC and ventilation fans. Power distribution board is in scope of supply of bidder. The incoming single source of power supply (100 amps) which will be provided by BHEL, is placed in New ESP Control room.
- 2.1.4 Other accessories as mentioned in the specification and as required for completion of the AC and Ventilation system.
- 2.1.5 Make for various items will be subjected to BHEL/CSPGCL approval. Refer make list (Annexure-I of Sub-Section-E of Section-I) which should be adhered strictly.
- 2.1.6 Commissioning spares as per the list provided shall be supplied by the bidder along with main equipment.
- 2.1.7 Minor civil works, as required at site, will be in the scope of bidder.
- 2.1.8 Bidders are required to submit the Datasheets, GA drawings, QAP etc., as applicable; for approval by BHEL/CSPGCL. Refer Annexure-III & IV of Sub-Section-E of Section-I)

2.2 DESIGN CONDITIONS/DESIGN PHILOSOPHY CONSIDERED

2.2.1 AIR CONDITIONING SYSTEM

2.2.1.1 Ambient Condition of Korba

1.	Avg. Temperature (Dry Bulb)	
A.	Summer (° C)	44
B.	Monsoon (° C)	27
C.	Winter (° C)	11



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2.	Relative Humidity (Average)	
A.	Summer (%)	38
B.	Monsoon (%)	85
C.	Winter (%)	82

2.2.1.2 The internal design conditions to be maintained are as follows:

✚ Temperature : $22 \pm 1^{\circ}\text{C}$

✚ 4 nos. persons considered present inside the control room AC area at a time, for design purpose.

Bidder shall demonstrate the above parameters before handing over the equipments to BHEL

2.2.2 VENTILATION SYSTEM

2.2.2.1 The number of air charges per hour in mechanically ventilated areas considered:

Non air conditioned MCC & Control Room	20 Times per Hour
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2.2.2.2 The temperature is also the criterion which is as follows:

Inside temperature shall be maximum 3°C above the design ambient temperature during summer for mechanically ventilated areas.

2.2.2.3 All mechanically ventilated areas are to be positively ventilated by means of supply air fans fitted with filters and gravity operated back draft dampers and wall mounted/roof mounted exhaust fans. Supply air fans catering for electrical switch gear/MCC rooms shall be fitted with both pre-filters and fine filters, whereas for other areas supply air fan shall be fitted with pre-filters only. The ventilation system shall be provided by wall mounted supply air fans and exhaust fans.

3. GENERAL DESIGN PHILOSOPHY CONSIDERED (AC & VENTILATION SYSTEM) TO BE FOLLOWED BY BIDDER

3.1 All the equipment of air-conditioning & ventilation system shall be designed for continuous duty.

3.2 Noise level within the air conditioned space shall be restricted to 35-45 NC level with suitable acoustic attenuation (with duct silencer, acoustic insulation).

3.4 All GI sheets used under AC & Ventilation system shall be galvanized to grade 350 of IS:277.

3.5 The fan capacity considered is at static pressure of **40 mmWC** for supply and **10 mmWC** for exhaust.



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4. STANDARDS AND OTHER REQUIREMENTS

Design, manufacture, inspection and testing of the equipment covered by the specification shall unless otherwise specified conform to the latest edition of the standards and codes mentioned elsewhere in this specification.

Relevant IS published by the Bureau of Indian Standards shall be followed. Where suitable Indian Standards are not available, equipment shall conform to generally accepted codes & practices.

All items of equipment shall comply with the stipulations of Inspectorate of Factories and other statutory bodies of Government of India and Chief Electrical Inspectorate of the State in which the plant site is located, wherever applicable. Wherever required, the successful Bidder has to obtain the necessary approvals from statutory authorities and other concerned agencies. All cost on these accounts shall be borne by the successful Bidder.

5. TECHNICAL SPECIFICATION

5.1 SPLIT AIR-CONDITIONER

Split Air-Conditioner (A/C) units shall be planned for all the Control Panel Areas/ AC Areas marked in the drawings. All the split A/C units shall be provided with dedicated condenser unit (Outdoor unit). The Bidder shall submit necessary layout drawings for all the systems showing equipment's marked.

DX type Air cooled Split Air Conditioning units consisting of:

- Hermetic Compressor with Air cooled condenser
- Evaporator Cooling coil, blower unit and refrigerant circuit
- Refrigerant pipeline with insulation
- Drain pipeline
- Power and control cables
- Suitable capacity stabilizer
- MCB/PDB
- Hand-held remote with remote holder

The split A/C unit shall have one condenser (outdoor) unit and one Evaporator (indoor) unit to suit the control rooms. The capacity (TR) of the indoor unit shall be the actual capacity (100%) as the split units are intended to be used.

Outdoor units shall comprise of compressor, cooling fan, condenser. Indoor unit comprising of blower, filter, cooling coil shall be mounted in attractive, corrosion resistant enclosures.

The compressor shall be of hermetic scroll/rotary type. The contractor shall indicate the safety measures provided for the compressor and motor.

The condenser shall be air cooled copper coil with Aluminium fins type with ample condensing surface.

The cooling coil shall be of direct expansion type with copper tubes and mechanically bonded aluminium fins; it shall be sufficiently deep for effective cooling.

The refrigerant circuit between (outdoor) Condenser unit and (indoor) Evaporator unit shall be carried out as per site conditions. The circuit shall include thermostatic expansion valve/ linear expansion valve, filter drier and liquid line shut off valve. It shall be protected by Hi-Lo pressure start.

Fan shall be provided to handle the conditioned air. The fan shall be dynamically balanced and its operation shall be smooth and quiet. It shall be complete with direct drive motor. The bearings shall be self-lubricating type.



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The air filter in the indoor unit shall be of dry type. It shall have large surface area and good dust holding capacity. The cleaning efficiency of the filter shall be more than 90% down to 10 microns.

The filter shall be of easily replaceable and washable type. A selector switch with “RESET” position shall be provided for running the fan alone with cooling as required. Thermostat shall be provided for control of temperature as per the designed inside conditions.

The split A/C unit shall conform to IS 1391-1992, Part-II and have maximum available BEE rating.

5.2 VENTILATION FANS

5.2.1 AXIAL FLOW FANS

- a) These fans shall have single piece cast aluminium impeller with blades of aero foil design. It shall be finished all over and balanced dynamically as per AMCA standard. Impeller shall be mounted directly on the motor shaft.
- b) The fan casing shall be of heavy gauge construction, properly reinforced for rigidity. It shall be provided with suitable supports. Access door shall be provided in the casing for easy access to motor and impeller. Suitable arrangement for mounting the motor shall be provided.
- c) Rain protection cowls will be designed to suit wall mounted air supply fans for protecting fans/motors from rain. It shall be provided with bird screen.
- d) Inlet cone or bell & outlet cone shall be provided.
- e) Accessories such as bird protection screen, inlet louvers vibration, isolators, back draft dampers etc. shall be provided as per requirement.
- f) Motors shall be totally enclosed type, complying with the electrical specification (sub-section C2 of Section-I).
- g) The speed of the fan shall not exceed 960 rpm for fan with impeller diameter above 450 mm and 1440 rpm for fan with impeller diameter 450 mm and less. However, for fans having static pressure of 30 mm WC or above the speed of the fan shall not exceed 1440 rpm for fan with impeller dia. above 450 mm and 2800 rpm for fan with impeller diameter 450 mm and less. The first critical speed of rotating assembly shall be at least 25% (percent) above rated speed.

6. LIST OF DRAWINGS AND DOCUMENTS (MINIMUM REQUIREMENT)

The successful Bidder shall prepare and submit the drawings and documents as per schedule mentioned in the Annexure-III & IV of Sub-Section-E of Section-I:

7. START-UP AND COMMISSIONING

The start-up of the system shall be carried out by the supplier to establish satisfactory functioning of the system as a whole and of each equipment as part of the system.

During commissioning all the equipment pertaining to the AC and Ventilation system shall be put into operation in an integrated manner. All parameters shall be checked with respect to approved documents/ tender spec and shall be recorded. All arrangement of commissioning shall be made by the Bidder. During commissioning, the Bidder should depute their competent person along with technical / commissioning team for co-ordination and solving the commissioning problems, if any.



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8. TAKING OVER OF AC & VENTILATION SYSTEM

Bidder shall submit the following documents in English language only before handing over the equipments (6 sets of Hardcopies with along with softcopy):

- a) AS-BUILT drawings
- b) Operation, maintenance & service manual including periodic maintenance schedule
- c) Safety instructions.
- d) List of tools & tackles.
- e) Demonstration test results copy.

In case, BHEL's Customer demands additional copies and/or in a different format, the same shall be furnished by the bidder.

9. TERMINAL POINTS

1. Single Electrical incomer source.
2. For Electrical scope, refer Electrical specification (Sub-section- C2 of Section-I).

10. LIST OF REFERENCE DRAWINGS BY BHEL

The drawings specified in Sub-section-6 of Section-II are being provided along with the tender specification for estimation and calculation purpose of the bidder for Korba West TPS – PH-II (2x210 MW), Unit-3 & 4 – 1 nos. new control room.

11. PAINTS /PAINTING

The Supplier's scope of work includes painting of all equipments and structures. Bidder shall follow BHEL/CSPGCL painting philosophy wherever specified. However, for components where no specific requirement is stipulated, the bidder shall follow its standard practice. The quality and finish of paints shall be as per standards of BIS or equivalent.

A reference painting schedule, is enclosed at Annexure-V of Sub-Section-E of Section-I. It will be finalised during detail engineering.

12. CONSUMMABLES FOR THE FIRST FILL & ONE YEAR OF OPERATION

The Supplier's scope of work includes the supply of all applicable first fill and one year's operating requirements of consumables such as refrigerants/oils/greases/chemicals etc. required for completeness of all the equipments covered herein.

13. EXCLUSIONS

Items of works listed below are excluded from scope of the HVAC system supplier.

- a) False ceiling, drop ceiling.
- b) Slab/wall cut out for cables, grilles/dampers, AC & Fans. However minor civil work like, sealing of wall opening, grouting of foundation bolts including special type of grouting like GPX2 etc. are in the scope of the supplier.

14. PACKING

Supplier shall ensure proper packing for Site storage and preservation. The equipment supplied should be packed to avoid transit damage.



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SPECIFIC TECHNICAL REQUIREMENT
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Scope includes design engineering, manufacturing/supply, testing, inspection at vendor's works, transportation to site, erection & successful commissioning of electrical items at site of AC & Ventilation System.

Bidder shall consider all required electrics including distribution board, cabling, controls, isolation, etc., as per the requirement. Purchaser shall provide two (2) nos. 415V AC +/- 10%, 50Hz +/- 5%, 3 Phase, 4 wire power supply feeder of 100 AMPS rating from his LT MCC located at a route distance of **30 meters (approx.)** for each room. Bidder shall consider in his scope required distribution boards, cabling between the Purchaser's power supply source to distribution board. Also, cables between distribution board to Fans & AC is in the bidder's scope.

Minimum 2 Nos. of wall mounted Distribution Boards to be provided for the AC & Ventilation System by the bidder.

Each DB shall be provided with suitably rated SFU I/C and suitable no. of O/G SFU Feeders with 10% spares in each DB. Local motor starter for all ventilation fans are in bidder scope.

All the motors under this package is in bidder scope. motors shall comply with latest revision of IS: 325 and IE3 Efficiency class as per IS-12615 and motors shall be 3 phase squirrel cage induction motors, unless otherwise specified /required. Motor shall be adequately rated and suitable for operation on power supply system with the voltage and frequency variations as specified.

Earthing provision for motor shall be as per relevant IS and required material shall in the scope of bidder.

All the motors provided shall have output 10% higher than the equipment power required in its entire range of operation (including that of drive if any) and shall be suitable for operation at 50 °C ambient.

1100 V copper conductor, XLPE insulated, extruded PVC inner and outer PVC sheathed armored cables of required size and length shall be provided by bidders between Distribution board to Loads. Cable shall conform to IS 7098-I. The cross section of the cable selected shall be as per the requirement. Use of the joints in cables are not permitted.

Cable from BHEL source to distribution board is in bidder's scope and conductor of this cable can be Aluminum/Copper, 1100 V, XLPE insulated, extruded PVC inner and outer PVC sheathed armoured as per IS-7098-I.

Any other special cable if required shall be part of bidder's scope.

Local cabling from nearby main route cable tray (BHEL scope) to equipment terminal (vendor's scope) is in bidder scope and shall be through 100/ 50 mm cable trays/ conduits/ Galvanised steel cable troughs.

Cable glands and cable lugs shall be correctly selected depending upon the overall diameter of cables and conductor type and size respectively. All cabling accessories like supports, cable lugs/glands, cable tags, clamps, etc., shall be provided by the bidder.

Technical particulars/GA Drawings any other engineering drawings are to be submitted by successful bidder during detail engineering for BHEL/customer approval.

Complete BOQ of Electrical items required for system completion shall be submitted to BHEL.

Any other item required for successful commissioning and trouble free operation weather specifically mentioned as a part of specification or not shall be part of bidder's scope.



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HVAC SYSTEM
STANDARD TECHNICAL SPECIFICATIONS

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STANDARD TECHNICAL SPECIFICATIONS



TITLE

**STANDARD TECHNICAL SPECIFICATION
SPLIT AIR CONDITIONING UNIT**

SPECIFICATION NO. PE-TS-360-553-A001-KW

VOLUME

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SPECIFICATION FOR AIR-CONDITIONING SPLIT UNIT

1. SPLIT AC

Split AC shall be complete in all accessories like Hand operated remote, Local Distribution Boards containing Switch / MCB, suitable rating voltage stabiliser, angle frame to support split AC, suitable length of refrigerant piping with insulation as per site condition, suitable length of drain piping, suitable length of cable for Electrical connection, Control and interlocks as per manufacturer's standard practice, environmental friendly refrigerant as per latest environment norms. Split AC shall be best efficient available rating as per BEE. Control and interlocks for these type of units shall be as per manufacturer's standard practice

Single phase electrical feeders of following ratings shall be provided for split units. Bidder to ensure the suitability as per these feeder requirements.

Capacity of Split AC	Single phase supply feeder
1.5 TR	32 Amp
2 TR	

2. CONSTRUCTION DETAIL

2.1 General

Body shall be as per OEM standard. The unit shall have compressor and cross flow type blower. The indoor unit shall be mounted on wall inside the room. The indoor unit consists of the evaporator coil, inbuilt control panel, air filter. Outdoor unit shall be mounted on outside wall, terrace or floor on frame as per site condition.

2.2 Louver

The louvers shall be oscillating type leading to even air distribution.

2.3 Compressors

The outdoor unit consists of reputed make compressor suitable for continuous operation. Type of compressor shall be as per OEM standard.

2.4 Cooling coil

Cooling coil of condenser shall be of the fin and tube type having copper fins firmly bonded to copper tubes. Capacity of coil shall be as required.

2.5 Evaporator coil

Evaporator coil shall be of the fin and tube type having copper fins firmly bonded to copper tubes. Capacity of coil shall be as required.

2.6 Supply Air Fan

Fan shall be of suitable type, cross flow type with forward curve blades.



TITLE

STANDARD TECHNICAL SPECIFICATION
VENTILATION FAN
(AXIAL FLOW TYPE)

SPECIFICATION NO. PES-554-03-KW

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STANDARD TECHNICAL SPECIFICATION FOR VENTILATION FANS

1.0 GENERAL

This specification covers the design, manufacture, testing of performance at manufacturer's/sub-contractors works, delivery at site, handling at site, erection and commissioning of ventilation fans.

2.0 CODES AND STANDARDS

The design, manufacture and performance of equipment shall comply with all currently applicable statutes, regulations and safety codes in the locality where it is to be installed. The equipment shall conform to latest edition of applicable Indian Standards or their equivalent standards. Nothing in this specification shall be construed to relieve the vendor of this responsibility. In particular, the equipment shall conform to the latest editions of the Following standards.

In particular, the packaged air-conditioning Unit shall conform to the latest editions of the following standards:

- 2.1 I.S.3588 - Electric Axial Flow fans
- 2.2 B.S.848 - Method of performance test for fans.
- 2.3 AMCA publication 99 standards handbook
- 2.4 AMCA standard 210, Test code for air moving devices

3.0 DESIGN AND CONSTRUCTIONAL REQUIREMENTS

- 3.1 The enclosed data sheet a gives the necessary details for Axial fans.
- 3.2 Welding process and welders employed for fabrication shall be Qualified as per ASME Sec. IX

Shell and tube type water cooled condenser or air cooled condenser with adequate area shall be provided as specified in Data Sheet-A. The condenser shall be complete with multi-pass heads and shall be fitted with the following:

3.3 CASING

- 3.3.1 The axial flow casing for supply fans/roof extractors shall be of heavy gauge construction (min 3 mm) properly reinforced for rigidity and shall be complete with suitable supports. Access doors with suitable locking arrangement shall be provided in the casing for easy access to the motor and impeller. External junction box/Terminal box on casing with IP 55 protection shall be provided, if required. Wiring for motor from external junction box/ Terminal box shall be through flexible conduit.
- 3.3.2 Suitable motor brackets designed for rigid mounting of motors, shall be provided for wall mounted exhaust/ supply fans.

3.4 IMPELLERS

The axial fan impeller shall be of high efficiency aerofoil design. The blades shall be mounted on a streamlined hub and the impeller shall be mounted directly on the motor shaft. Impeller shall be in one piece however; fabricated blades will be acceptable up to 450 mm impeller diameter.



TITLE

STANDARD TECHNICAL SPECIFICATION**VENTILATION FAN
(AXIAL FLOW TYPE)**

SPECIFICATION NO. PES-554-03-KW

VOLUME

SECTION D

REV 0

DATE

SHEET 2 OF 3

3.5 GUIDE VANES

In case of vane axial fans, guide vanes shall be provided on discharge side.

3.6 COWL

Rain protection cowls shall be designed to suit wall exhausters/supply fans for protecting fans from rain. The cowls shall be provided with bird screen of heavy gauge expanded metal netting.

3.7 SPEED

The speed of axial flow fans/roof ventilators shall not exceed 960 RPM for impeller dia exceeding 450 mm and shall not be greater than 1440 with impeller dia less than 450 mm.

4. MOTORS

Drive motors shall be of totally enclosed type, suitable for horizontal/vertical mounting as applicable and shall comply with the requirements of the specifications furnished elsewhere for motors.

5. ACCESSORIES

Accessories as specified in Data sheet A and as required for satisfactory trouble free & safe operation of fans shall be provided.

6. TESTING AND INSPECTION

List of TCs arranged as per Approved Quality Plan shall be furnished along with copy of TCs at the time of inspection by BHEL:

- Visual inspection of sheets/plates, angles, channels etc. - Pitting, lamination in sheets/plates, angles and channels shall be avoided. visual inspection by main contractor of BHEL.
- Sheets/ Plates Test certificate shall be furnished for physical and chemical properties for sheets / plates for review by BHEL
- Shaft: Mechanical and chemical - review by BHEL
- Motors (of approved make): Routine TC, FLP TC if applicable
- Workmanship and dimensional check as per manufacturing drg. and approved drgs. by main contractor of BHEL. Shall be checked by BHEL/ Customer during final inspection.
- Balancing of impellers Dynamic balancing certificates shall be furnished -grade 6.3 or better to ISO 1940. Balancing weights shall be positively locked/ welded to avoid loosening- witness by manufacturer. TC to be furnished for review by BHEL (consisting of weight of impeller, radius of correction and balancing rpm). For spare impellers Dynamic Balancing shall be witnessed by BHEL.
- Performance test of one Centrifugal fan or Axial Fan /per type/per size as per applicable standard - by BHEL.

Axial fans 100% run tested by main contractor of BHEL. Run test by BHEL/Customer may be at random or 100% Vibration shall be within satisfactory zone of VDI 2056 (group G) machines when measured on bearing housing and noise level <85 dB(A) at 1 metre distance. Max. Temp. on bearing housing 40 degrees Centigrade + ambient



TITLE

STANDARD TECHNICAL SPECIFICATION**VENTILATION FAN
(AXIAL FLOW TYPE)**

SPECIFICATION NO. PES-554-03-KW

VOLUME

SECTION D

REV 0

DATE

SHEET 3 OF 3

Data Sheet

Sl No.	Particulars	Data
	General Information	
1	Designation	Supply/Exhaust Fans
2	Nos. required	Refer schedule of Ventilation system in section-C under specific technical requirement
3	Service Air	To exhaust warm air/to supply fresh air.
4	Location	Wall mounted.
5	Area	Same as above in 2.
	Design Data	
6	Type	Axial fans suitable for 415V/3 phase supply for Motor.
7	Air delivery capacity	As per schedule of ventilation System
8	Fluid	Atmospheric Air
9	Temperature	Refer Section of specific technical requirement
10	Static Pressure required	As per schedule of ventilation System
11	Outlet Air Velocity	Not more than 12 m/sec.
	Materials	
12	Casing	M.S. (IS 2062)
13	Impeller	Cast Aluminium. (Alloy A 6M, IS 617)
14	Hub	Al Alloy.
15	Support frame and structure	M.S. of adequate thickness (Galvanized/ Painted) IS 2062.
16	Neoprene rubber pads	As required.
17	Coned inlet for wall exhausters/supply fans	MS (IS 2062)
18	Supporting frame for mounting.	As required.
19	Protective screen at inlet.	Yes (Min 14 SWG Galvanized wire knitted in 1" square mesh.
20	Rain Protection Cowl	Aluminium or hot dip Galvanized after fabrication from M.S.
21	Motor	By Bidder. Motor shall have 15% margin over Duty Point.



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

**HVAC SYSTEM
SITE STORAGE AND PRESERVATION**

SPECIFICATION No.: PE-TS-454-571-15000A-A001

SECTION : I

SUB-SECTION : E (ANNEXURE-I)

REV 00

SECTION-I

SUB-SECTION-E

ANNEXURE-I

LIST OF MAKES OF SUB-VENDOR ITEMS



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

SPECIFICATION No.: PE-TS-454-571-15000A-A001

SECTION : I

SUB-SECTION : E (ANNEXURE-I)

**HVAC SYSTEM
SITE STORAGE AND PRESERVATION**

REV 00

SL. NO.	ITEM DESCRIPTION	NAME OF VENDORS
1.	VENTILATION FAN	HYDERABAD POLLUTION CONTROL, HYDERABAD
		PATEL AIR TEMP, AHMEDABAD
		MARATHON ELECTRIC, KOLKATA
		FLAKT, KOLKATA
		CB DOCTOR, AHMEDABAD
		ALMONARD, CHENNAI
		KHAITAN, KOLKATA
		DUSTVEN, BANGALORE
2	SPLIT AC	VOLTAS
		AMTREX
		CARRIER
		LG
		BLUE STAR
		HITACHI
3	INDICATION LAMPS	VAISHNO
		DSS
		SIEMENS
		GIC
		C&S
		SCHNEIDER
4	TERMINAL BLOCK	CONNECT WELL
		ELMEX
		PHOENIX
5	PAINTS	ASIAN
		SHALIMAR
		BERGER
6	MCB	SIEMENS
		HAVELLS
7	LT POWER CABLE (XLPE)	GEMSCAB
		HVPL
		GUPTA POWER
		HAVELLS
		KEC
		KEI
		POLYCAB WIRES
		RAVIN CABLES
		SUYOG ELECTRICAL
		TORRENT POWER
		UNIVERSAL CABLE
		PARAMOUNT
		RADIANT
		CORDS
		DELTON
		NICCO
		INCAB
		ADVANCE CABLES



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

**HVAC SYSTEM
SITE STORAGE AND PRESERVATION**

SPECIFICATION No.: PE-TS-454-571-15000A-A001

SECTION : I

SUB-SECTION : E (ANNEXURE-I)

REV 00

8	CONTROL AND INSTRUMENTATION & LT POWER (PVC INSULATION)	ELKAY TEELINKS
		GUPTA POWER
		HAVELLS
		KEC
		KEI
		PARAMOUNT
		POLYCAB
		RR KABEL
		SUYOG ELECTRICAL
		UNIVERSAL CABLE
		GEMSCAB
		RALLISON
		RADIANT
		DELTON/
		INCAB
		TORRENT
		HVPL
		NICCO
		CORDS
		ADVANCE CABLES
9	CABLE GLANDS	DOWELLS ELEKTRO WERKE
		CCI
		GLAND MECH IND
		FLAME PROOF CONTROL GEARS
		BALIGA LIGHTING EQUIPMENTS
		COMET
		BRACO

- 1. THE MAKE OF VENTILATION FANS AND SPLIT AC SHOULD BE FROM ABOVE ONLY.**
2. FOR OTHER ITEMS, THE SUB VENDOR LIST IS INDICATIVE ONLY AND IS SUBJECT TO BHEL AND CUSTOMER APPROVAL DURING DETAILED ENGINEERING STAGE WITHOUT ANY COMMERCIAL & DELIVERY IMPLICATION TO BHEL. BIDDER TO PROPOSE SUB-VENDOR WITHIN 4 WEEKS OF PLACEMENT OF LOI. THEREAFTER, NO REQUEST FOR ADDITIONAL SUB-VENDOR SHALL BE ENTERTAINED.
3. THE INSPECTION CATEGORY, IF APPLICABLE, WILL BE INTIMATED AFTER AWARD OF CONTRACT BY BHEL/CUSTOMER. HOWEVER, THE SAME WILL BE ADHERED BY THE BIDDER WITHOUT ANY COMMERCIAL AND DELIVERY IMPLICATION TO BHEL/ CUSTOMER.



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

**HVAC
LIST OF TOOLS & TACKLES**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION: I

SUB-SECTION : E (ANNEXURE-II)

REV 00

ANNEXURE-II

**LIST OF TOOLS & TACKLES
REFER SUGGESTIVE PRICE FORMAT**



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

**HVAC SYSTEM
DRAWINGS / DOCUMENTS SUBMISSION
PROCEDURE**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : I

SUB-SECTION : E (ANNEXURE-III)

REV 00

SHEET 1 OF 2

SECTION-I

SUB-SECTION-E

ANNEXURE-III

DRAWINGS / DOCUMENTS SUBMISSION PROCEDURE



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

**HVAC SYSTEM
DRAWINGS / DOCUMENTS SUBMISSION
PROCEDURE**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : I

SUB-SECTION : E (ANNEXURE-III)

REV 00

SHEET 2 OF 2

After the receipt of the Purchaser's letter of intent, the bidder shall submit for approval of the Purchaser/Customer, the following drawings and technical data:

- i. Dimensional layout of the equipment to be supplied under the contract and the data relating to the design of the foundation structure to enable Purchaser to arrange for the necessary foundations and civil works.
- ii. All information regarding materials in size of Anchor bolts, sleeves, inserts and supports shall have to be furnished in the mounting drawings.
- iii. Dimensional drawing showing individual equipment being supplied under the contract, method and size of connections to the Purchaser's other component/equipment.
- iv. All efficiency and characteristic curves, as required under the specification.
- v. Schematic drawing of all wiring, connections and interlocking diagrams showing the point where the connections have to be made by the Purchaser.
- vi. Necessary structural and other calculations and data required for demonstrating full that all parts of the equipment to be furnished shall confirm to be provisions and intent of the contract.

The Contractor shall submit soft copy of each drawing/document for approval. When prints of drawings have been marked "Approved except noted"; Resubmission required the Contractor shall make necessary corrections and again submit corrected copies for approval as per details stipulated. Further revisions will be shown by number, data and subjects in revisions blocks. Upon receipt of the print which have been marked "Approved" or "Approved except as noted", forward final drawings. The Contractors shall furnish within a reasonable time six of each of the drawing after minor corrections, if any to the Purchaser.

Relevant BHEL drawings are enclosed in this tender. Any manufacturing work in connection with the equipment prior to the understanding/approval of drawings shall be at the bidder's risk. The bidder shall make any changes in the design, with prior approval of the Purchaser, which are necessary to make the equipment conform to the provisions and intent of the contract, without additional cost of the purchase.

Approval of bidder's drawings shall not be held to relieve him of any part of his obligations to meet all the requirements.

All drawings and technical data are to be furnished in English language only. Final drawings and operation manuals shall also be furnished.

Near the completion of the work, the Contractor shall furnish the six (6) complete sets of the prints and one (1) reproducible copy of all drawings of the equipment actually supplied and as erected and installed site.

Mistake in Drawings:

The bidder shall be responsible for and shall pay for any alterations of the works due to any discrepancies, errors or omissions in the drawings or other particulars supplied by him whether such drawings or particulars have been approved by BHEL/Customer or not, provided that such discrepancies, errors or omissions be not due to inaccurate information or particulars furnished to the bidder by the work necessitated by reason of inaccurate information supplied by Purchaser to the bidder. If any dimension(s) figured upon a drawing or a plan differ from those obtained by scaling the drawing or a plan, the dimensions as figured upon the drawing or plan shall be taken as correct.



**2X500 MW NTPC TPP, STAGE-I
(FGD SYSTEM PACKAGE)
HVAC SYSTEM
MASTER DRAWING LIST WITH SCHEDULE
OF SUBMISSION**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : I

SUB-SECTION : E (ANNEXURE-IV)

REV 00

SECTION-I

SUB-SECTION-E

ANNEXURE-IV

MASTER DRAWING LIST WITH SCHEDULE & PROCEDURE OF SUBMISSION



**2X500 MW NTPC TPP, STAGE-I
(FGD SYSTEM PACKAGE)
HVAC SYSTEM
MASTER DRAWING LIST WITH SCHEDULE
OF SUBMISSION**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : I

SUB-SECTION : E (ANNEXURE-IV)

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SL. NO.	DESCRIPTION OF THE DRAWING/DOCUMENT	CATEGORY	SCH. WEEK (FROM DATE OF LOI)
1	TDS AND GENERAL ARRANGEMENT OF SPLIT A-C UNITS	Approval	2
2	TDS & GENERAL ARRANGEMENT OF VENTILATION FANS	Approval	2
3	GA OF DISTRIBUTION PANEL/BOARD	Approval	2
4	LAYOUT OF AC IN CONTROL ROOM	Approval	3
5	LAYOUT OF VENTILATION FANS IN SWITCHGEAR ROOMS	Approval	3
6	INSTALLATION, OPERATION & MAINTENANCE MANUAL	Information	3
7	CABLE SCHEDULE (IN BHEL EXCEL FORMAT) & CABLE INTERCONNECTION DETAILS	Information	3
8	EQUIPMENT MOUNTING DRAWING	Information	4
9	QUALITY ASSURANCE PLAN	Approval	3
10	FIELD QUALITY PLAN	Approval	2
11	INSPECTION AND TESTING WITH STANDARD QUALITY PLAN	Approval	2
12	VENDOR LIST	Approval	4
13	PAINTING SCHEDULE	Approval	2

Notes:

1. The above drawing list is tentative and shall be finalized with the successful bidder after placement of order. While some of the drawings indicated above may not be applicable, some additional drawings may also be required based on scope of work.
2. Drawings shall be prepared in Auto-Cad latest edition. Required no. of hard and soft copies (editable) of the drawings shall be furnished as per requirement specified elsewhere in the specification.
3. Only manual calculation with authentic supporting literature (e.g. extracts of hand Book/ standard/codes) shall be acceptable. All design calculations and drawings shall be in SI system only.
4. All the drawings and documents including general arrangement drawing, data sheet, calculation etc. to be furnished to the customer during detailed engineering stage shall include / indicate the following details for clarity w.r.t. Inspection, construction, erection and maintenance etc.
 - a) All drawings and documents shall indicate the list of all reference drawings including general arrangement.
 - b) All drawings shall include / show plan, elevation, side view, cross - section, skin section, blow - up view; all major self-manufactured and bought out items shall be labeled and included in BOQ / BOM in tabular form.
 - c) Painting schedule shall also be made as a part of general arrangement drawing of each equipment / items indicating at least 3 trade names.

	2X500 MW NTPC TPP, STAGE-I (FGD SYSTEM PACKAGE) HVAC SYSTEM MASTER DRAWING LIST WITH SCHEDULE OF SUBMISSION	SPECIFICATION No: PE-TS-454-571-15000A-A001	
		SECTION : I	
		SUB-SECTION : E (ANNEXURE-IV)	
		REV 00	
d) All the drawings required to be furnished to customer during detailed engineering stage shall include technical parameters, details of paints and lubrication, hardness and BOQ / BOM in tabular form indicating all major components including bought out items and their quantity, material of construction indicating its applicable code / standard, weight, make etc. e) Drawings/ documents to be submitted for purchaser’s review/ approval shall be under Revision A, B, C... etc. while drawings /documents to be submitted thereafter for customer’s approval after purchaser’s approval shall be under R-0, 1, 2, 3 etc. f) Drawings and documents not covered above but required to check safety of machines/ system, shall be submitted during detailed engineering stage without any commercial implication. g) All drawings shall include "B.O.M" and indicate quantity, material of construction, make along with IS/BS No., Technical parameters, dimensions, hardness, machining symbol and tolerance, requirement of radiography and hydraulic tests, painting details, elevation, side view, plan, skin section and blow-up view for clarity. h) All drawings shall be prepared as per BHEL's title block and shall bear BHEL's drawing No. i) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL’s/ Customer’s/ Consultant’s office for across the table resolution of issues and to get documents approved in the stipulated time. j) Bidder to follow the following the drawing submission schedule: k) 1st submission of drawings from date of LOI as per the submission schedule. l) Every revised submission incorporating comments – within 7 days. m) Bidder to submit revised drawings complete in all respects incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder’s account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.			



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

**HVAC SYSTEM
PAINTING & COLOUR SCHEME**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : I

SUB-SECTION : E (ANNEXURE-V)

REV 00

SECTION-I

SUB SECTION E

ANNEXURE-V

PAINTING & COLOUR SCHEME



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

**HVAC SYSTEM
PAINTING & COLOUR SCHEME**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : I

SUB-SECTION : E (ANNEXURE-V)

REV 00

A reference painting scheme is provided as below. Bidder to furnish painting for BHEL/Customer's approval during detail engineering

REFERENCE PAINTING SCHEDULE:

Painting specification for Indoor components such as Fans/Motors/Electrical parts etc.:

Surface preparation: St3 (Power tool cleaning)

Primer : Red Oxide Zinc phosphate - 2 coat, Total DFT 30-35 μm per coat.

Finish Coat: Synthetic enamel paint - 2 coats, Minimum DFT 25-30 μm per coat (Sky blue shade)

Total DFT : 110 - 130 μm



CSPGCL, HTPS, KORBA WEST, PH I & II
(2X210MW + 2X210MW)

HVAC SYSTEM

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION: II

REV. 00

SECTION II



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2X210MW + 2X210MW)**

**HVAC SYSTEM
INSPECTION AND TESTING**

**SPECIFICATION No: PE-TS-454-571-15000A-
A001**

SECTION : II

SUB-SECTION : 1

REV 00

SECTION-II

SUB-SECTION-1

INSPECTION AND TESTING, WITH STANDARD QUALITY PLAN

	CSPGCL, HTPS, KORBA WEST, PH I & II (2X210MW + 2X210MW) HVAC SYSTEM INSPECTION AND TESTING	SPECIFICATION No: PE-TS-454-571-15000A-A001	
		SECTION : II	
		SUB-SECTION : 1	
		REV 00	
1.01.00	Inspection and Tests during Manufacture.		
1.01.01	The method and techniques to be used by the Bidder for the control of quality during manufacture of all equipments shall be agreed with the Owner.		
1.01.02	The Owner's general requirements with respect to quality control and the required shop tests are set out elsewhere in this specification.		
1.01.03	Before any item of plant or equipment leaves its place of manufacture, the Owner shall be given the option of witnessing inspections and tests for compliance with the specification and related standards.		
1.01.04	Advance notice shall be given to the Owner as agreed in the Contract, prior to the stage of manufacture being reached, and the equipment must be held at this stage until the Owner has inspected the same, or has advised in writing that inspection is waived. If having consulted the Owner and given reasonable notice in writing of the date on which the piece of plant will be available for inspection, the Owner does not attend; the Bidder may proceed with manufacture having forwarded to the Owner duly certified copies of his internal inspection and test results. The owner's representative shall have at all reasonable times access to bidder's or his sub-vendor's premises and shall have power to inspect/ examine materials and workmanship or equipment under manufacture. The Bidder shall forthwith forward to the engineer duly certified copies of the Test Certificates in six copies for approval. For electrical equipment, routine tests as per relevant IS standard are to be carried out on all equipment. Type tests are also to be carried out on selected equipment as detailed in the specs of concerned electrical equipment.		
1.01.05	Under no circumstances, any repair or welding of castings be carried out without the consent of the Purchaser. Proof of the effectiveness of each repair by radiographic and/or other non-destructive testing technique, shall be provided to the Engineer.		
1.01.06	All the individual and assembled rotating parts shall be statically and dynamically balanced in the works. Where accurate alignment is necessary for component parts of machinery normally assembled on site, the Bidder shall allow for trial assembly prior to dispatch from place of manufacture.		
1.01.07	All materials used for the manufacture of equipment(s) covered under this specification shall be of tested quality. Relevant test certificates shall be made available to the Purchaser. The certificates shall include tests for mechanical properties and chemical analysis of representative material. Equipment or parts coming under any statutory Regulations shall be certified by a Competent Authority under the regulations in the specified format.		
1.01.08	All pressure parts connected to pumping main shall be subjected to hydraulic testing at a pressure of 150% of shut-off head for a period not less than one hour. Other parts shall be tested for one and half times the maximum operating pressure, for a period not less than one hour.		
1.01.09	All necessary non-destructive examinations shall be performed to meet the applicable code requirements.		
1.01.10	All welding procedures adopted for performing welding work shall be qualified in accordance with the requirements of Section-IX of ASME code or IBR as applicable. All welded joints for pressure parts shall be tested by liquid penetrant examination according to the method outlined in ASME Boiler and Pressure Vessel code. Radiography, magnetic particle examination magnaflux and ultrasonic testing shall be employed wherever necessary/ recommended by the		



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2X210MW + 2X210MW)**

**HVAC SYSTEM
INSPECTION AND TESTING**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : II

SUB-SECTION : 1

REV 00

applicable code. At least 10% of all major but welding joints shall be radiographed unless otherwise stipulated.

Statutory payments in respect of IBR approvals including inspection shall be made by the bidder. Bidder's scope shall include to preparation of all necessary documents, co-ordination and follow-up for above approval. Owner shall only forward assistance/endorsement of documents /design /drawings /reports/records to be submitted for approval as stipulated/ required by Statutory Authorities till registration of the unit and clearance for commercial operation.

1.02.00 Performance/Demonstration Tests at Site.

1.02.01 The full requirements for testing the system shall be agreed between the Owner and the Bidder prior to Award of Contract. The completely erected System shall be tested by the Bidder on site under normal operating conditions. The Bidder shall also ensure the correct performance of the System under abnormal conditions, i.e. the correct working of the various emergency and safety devices, interlocks, etc.

1.02.02 The Bidder shall provide complete details of his normal procedures for testing, for the quality of erection and for the performance of the erected plant. These tests shall include site pressure test on all erected pipe work to demonstrate the quality of the piping and the adequacy of joints made at site.

1.02.03 The Bidder shall furnish the quality procedures to be adopted for assuring quality from the receipt of material at site, during storage, erection, pre-commissioning to tests on completion and commissioning of the complete system/equipment.

1.03.00 For details of specific tests required on individual equipment(s), refer to respective section of this specification.

All Statutory testing / clearance is in Bidder's scope including payment of all fees, etc., as required.

NOTE: Project's specific requirement of inspection and testing shall be furnished in QAP as per the format on the following page for the approval of BHEL/BHEL's Customer.



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2X210MW + 2X210MW)**

HVAC SYSTEM INSPECTION AND TESTING

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : II

SUB-SECTION : 1

REV 00

QAP FORMAT

BHARAT HEAVY ELECTRICALS LIMITED

CORPORATE QUALITY ASSURANCE

PROJECT:

SYSTEM :

VENDOR :

ITEM :

[illegible]



CSPGCL, HTPS, KORBA WEST, PH I & II
(2X210MW + 2X210MW)

HVAC SYSTEM
LIST OF DOCUMENTS TO BE SUBMITTED WITH
THE BID

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : II

SUB-SECTION : 2

REV: 00

SHEET 1 OF 1

Bidder shall submit the signed and stamped copy of the following documents along with the bid:

1. Compliance cum confirmation certificate
2. Un priced format for main package including Commissioning spares and Tools & Tackles (mentioning 'quoted' against each item)
3. Deviation schedule /No deviation certificate in attached format 'Deviation sheet (Cost of withdrawal)'.



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)
(Renovation & Retrofitting of ESP Package)
HVAC SYSTEM
COMPLIANCE CUM CONFIRMATION
CERTIFICATE**

SPECIFICATION No.: PE-TS-454-571-15000A-A001

SECTION : II

SUB-SECTION : 3

REV. NO. 00

SHEET: 1 OF 2

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) and furnish the same along with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions, other than those mentioned under "exclusion and those resolved as per 'Schedule of Deviations', with regard to same.
- b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'
- c) Bidder shall submit QAP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This is within the contracted price without any extra implications to BHEL after award of the contract.
- d) All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.
- e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

- f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
- g) All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
- h) Guarantee for plant/equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions.
- i) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specification. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)
(Renovation & Retrofitting of ESP Package)
HVAC SYSTEM
COMPLIANCE CUM CONFIRMATION
CERTIFICATE**

SPECIFICATION No.: PE-TS-454-571-15000A-A001

SECTION : II

SUB-SECTION : 3

REV. NO. 00

SHEET: 2 OF 2

- j) As-built drawings shall be submitted as and when required during the project execution.
- k) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage, any tempering in the signed copy of this document is noticed; same shall be treated as breach of contract and suitable actions shall be taken against the bidder.
- l) Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
- m) In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.



CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : II

SUB-SECTION : 4

REV. NO. 00

SHEET: 1 OF 1

HVAC SYSTEM
PRE-BID CLARIFICATION SCHEDULE

PRE-BID CLARIFICATION SCHEDULE

SL. NO.	SECTION/CLAUSE/PAGE NO.	STATEMENT OF THE REFERRED CLAUSE	CLARIFICATION REQUIRED

The bidder hereby clarifies that above mentioned are the only clarifications required on the technical specification for the subject package.

Signature: _____

Name: _____

Designation: _____

Company: _____

Date: _____

Company Seal



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

**HVAC SYSTEM
NO DEVIATION CERTIFICATE**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : II

SUB-SECTION : 5

REV: 00

SHEET 1 OF 1

DEVIATION SHEET (COST OF WITHDRAWAL)

**DEVIATION SHEET (COST OF WITHDRAWAL)**

PROJECT:
PACKAGE:
TENDER ENQUIRY REFERENCE:

NAME OF BIDDER:

SL NO.	VOLUME/SECTION	PAGE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWAL	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWAL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWAL OF DEVIATION (POSITIVE/ NEGATIVE)	REASON FOR QUOTING DEVIATION
TECHNICAL DEVIATIONS								
COMMERCIAL DEVIATIONS								

PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE

NAME DESIGNATIONS SIGN & DATE

NOTES:

- 1 For self-manufactured items of bidder, cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.
- 2 For directly dispatchable items, cost of withdrawal of deviation will be applicable on the basic price including taxes, duties & freight.
- 3 All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.
- 4 Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.
- 5 Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable.
- 6 Bidder shall furnish price copy of above format along with price bid.
- 7 The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.
- 8 Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.
- 9 For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawal of deviation shall be taken as NIL.
- 10 Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.
- 11 All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.
- 12 Cost of withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation, else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.
- 13 In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive.
- 14 In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.



CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)

HVAC SYSTEM
LIST OF COMMISSIONING SPARES
(Format)

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : II

SUB-SECTION : 6

REV. NO. 00

SHEET: 1 OF 1

List of Commissioning spares

SL NO.	DESCRIPTION	UNIT	QTY.	REMARKS
1				
2				
3				
4				
5				
6				
(Please add rows if required for more items)				
NOTES				
1. Above is the minimum list. Any other commissioning spare required for the system, shall also be provided by the vendor without any cost implication.				

Signature: _____

Name: _____

Designation: _____

Company: _____

Date: _____

Company Seal



**CSPGCL, HTPS, KORBA WEST, PH I & II
(2x210MW + 2x210MW)**

**HVAC SYSTEM
LIST OF DRAWINGS (BHEL)**

SPECIFICATION No: PE-TS-454-571-15000A-A001

SECTION : II

SUB-SECTION : 7

REV. NO. 00

SHEET: 1 OF 1

The following drawings are enclosed for the reference of bidder:

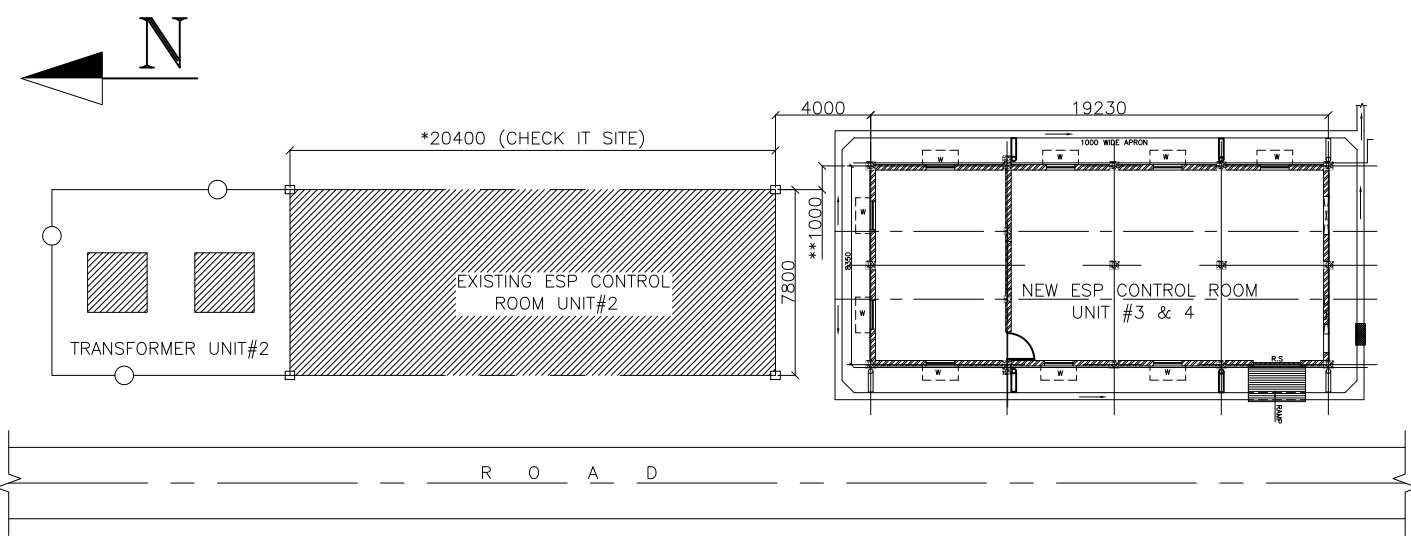
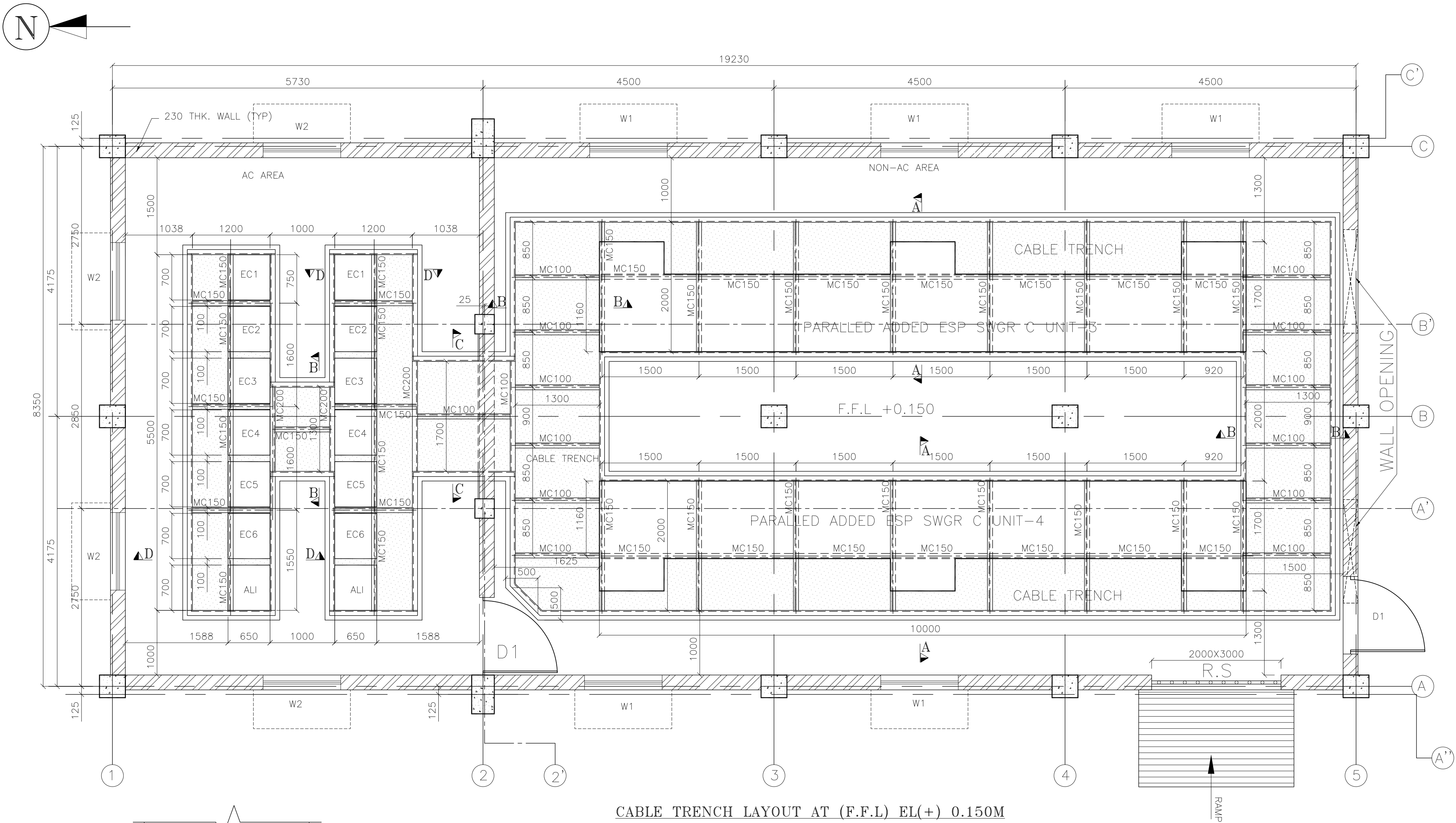
	Drawing Title / Number:
a	RCC Details of Trench for New ESP Control Room, Phase-II, U#3&4 (Drawing No. 1-726-22-55-16, Rev. 01)
b	Architectural Plan for New ESP Control Room, Phase-II, U#3&4 (Drawing No. 1-726-22-55-17, Rev.00)

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

REF.DRG.NO.

SIGN.& DATE

INVENTORY NO.

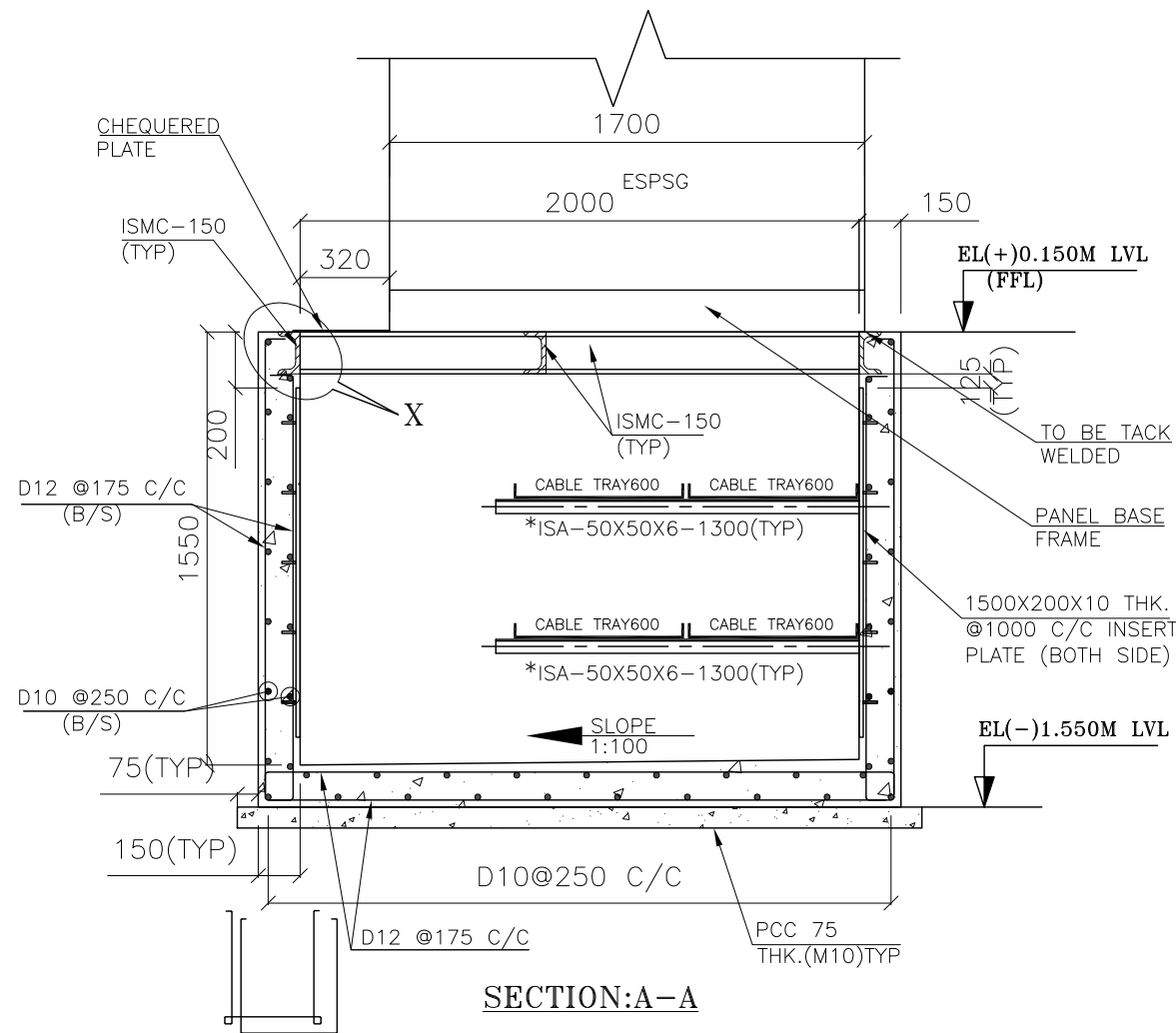


KEY PLAN

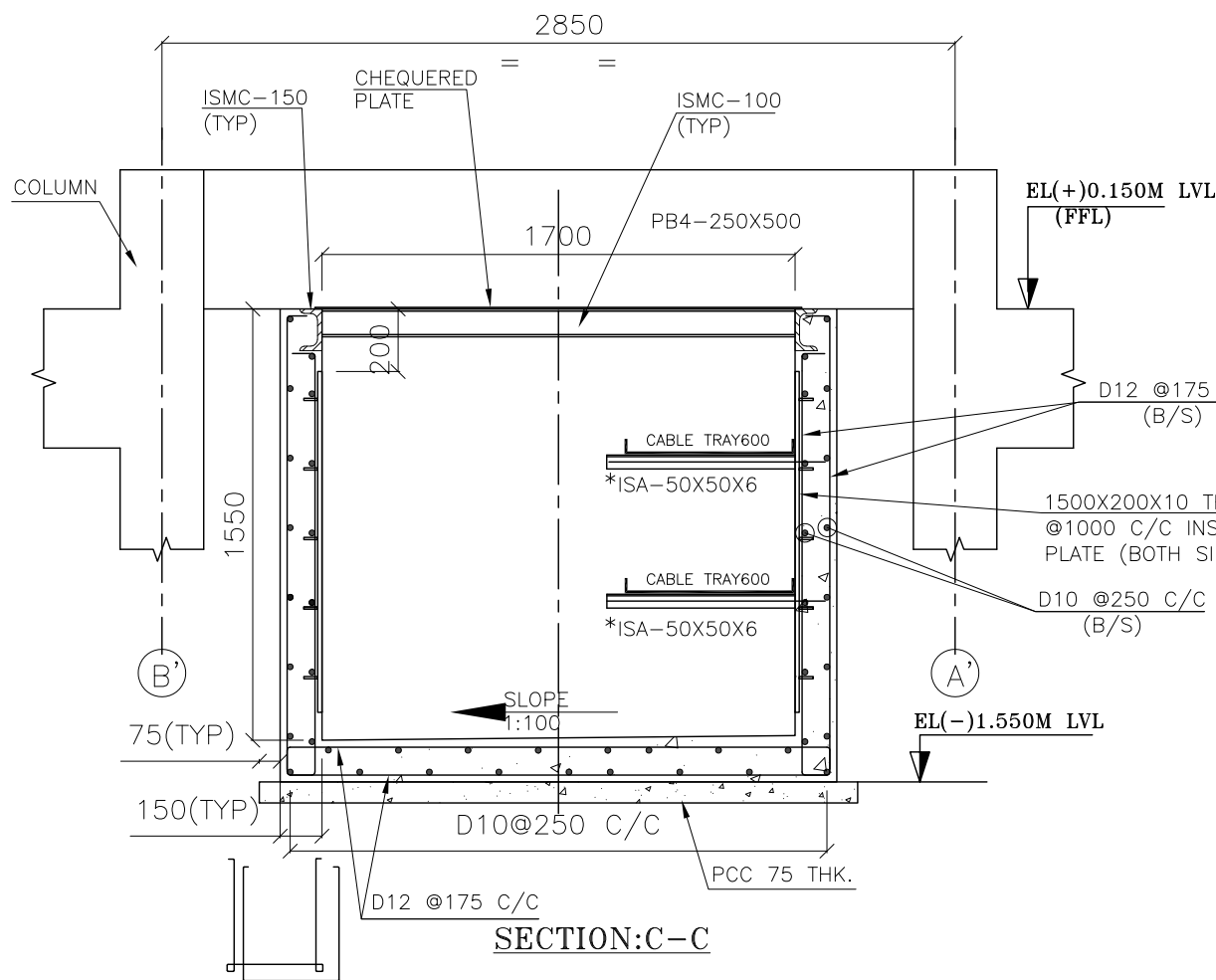
NOTES

- ALL DIMENSIONS AND LEVELS ARE IN MM.
- ALL ELEVATIONS ARE MARKED W.R.T. FFL OF POWER HOUSE BUILDING, WHICH IS EL+0.00M AND IT CORRESPONDS TO R.L292.76M.
- F.F.L OF ESP CONTROL ROOM IS AT +0.150M CORRESPONDS TO R.L292.91.
- F.G.L OF ESP CONTROL ROOM IS AT EL-0.150M CORRESPONDS TO R.L292.61.
- ALL STRUCTURAL CONCRETE SHALL BE DESIGN MIX CONCRETE OF GRADE M-25 UNLESS OTHERWISE NOTED.
- ALL LAPS SHALL CONFORM TO IS-456: 2000
- LAP LENGTH IN BARS SHALL BE 50 TIMES THE DIA OF BAR.
- NET SBC OF SOIL IS CONSIDERED AS 9 T/M2 AT ELEVATION -3.00M LVL.
- BACK FILLING SHALL HAVE TO BE DONE ENSURING PROPER COMPACTION AND STRICTLY AS PER SPECIFICATION.
- EXCAVATED EARTH WHICH IS TO BE USED FOR BACK FILLING SHALL BE STOCKED AS PER SPECIFICATIONS UNLESS PERMITTED OTHERWISE BY ENGINEER AT SITE.
- REINFORCEMENT BARS USED SHALL BE HYSD STEEL BARS OR MINIMUM GRADE Fe500 CONFORMING TO IS:1786-2008
- THE FOUNDATION PITS SHALL BE MAINTAINED DRY DURING THE COMPLETE CONSTRUCTION PERIOD.
- NO FOUNDATION SHALL REST ON LOOSE SOIL . IF LOOSE SOIL IS MET AT THE FOUNDATION LVL, THE SAME SHALL BE REMOVED AND PCC M7.5 GRADE SHALL BE FILLED TO ACHIEVE THE REQUIRED SBC.
- MINIMUM CLEAR COVER TO MAIN REINFORCEMENT SHALL BE AS BELOW AS PER IS:456.

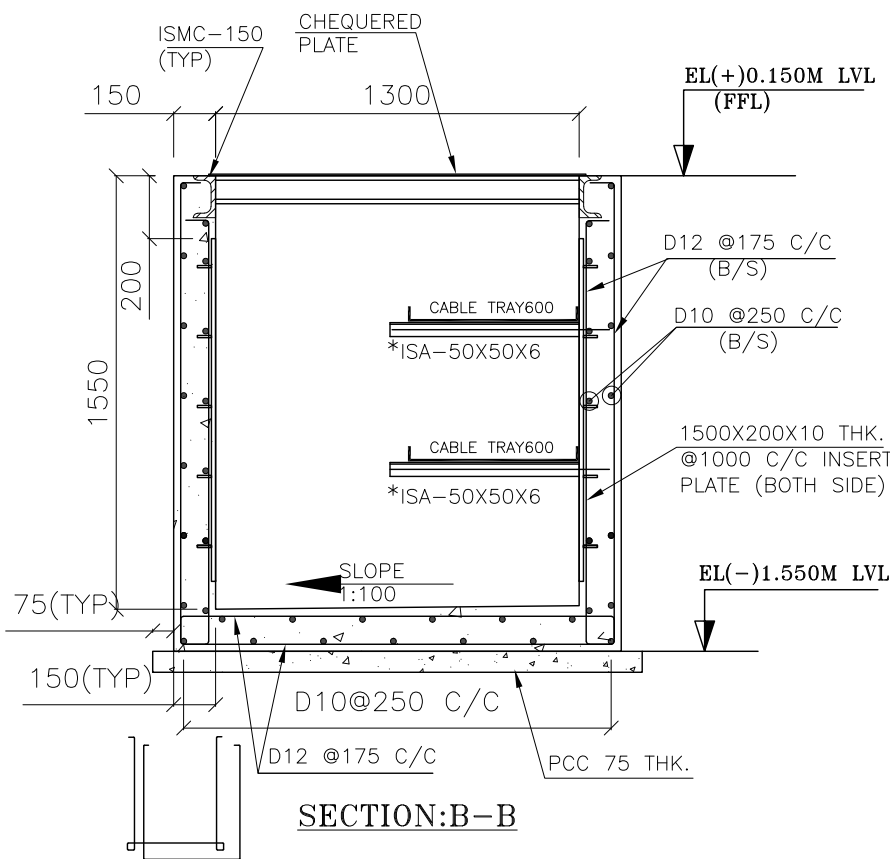
CABLE TRENCH LAYOUT AT (F.F.L) EL(+) 0.150M



SECTION:A-A

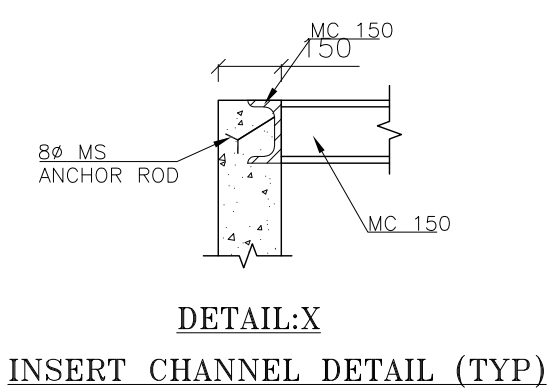


SECTION:C-C

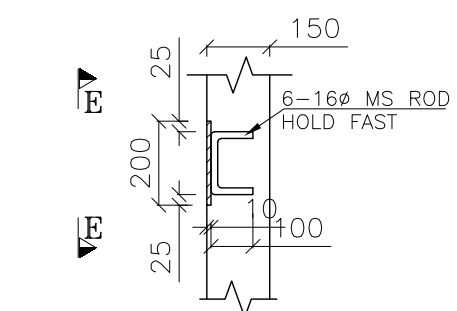


SECTION:B-B

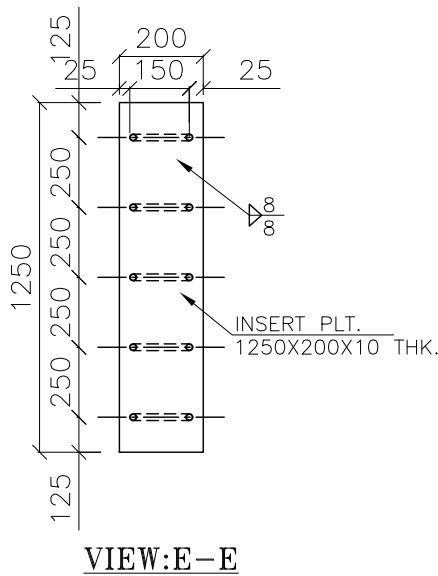
* CABLE TRAY ARRANGEMENT (2TIER/3TIER) IS INDICATIVE ONLY AND SHALL BE DECIDED AT SITE BY BHEL RANIPET



DETAIL:X
INSERT CHANNEL DETAIL (TYP)



INSERT PLATE DETAILS (TYP)



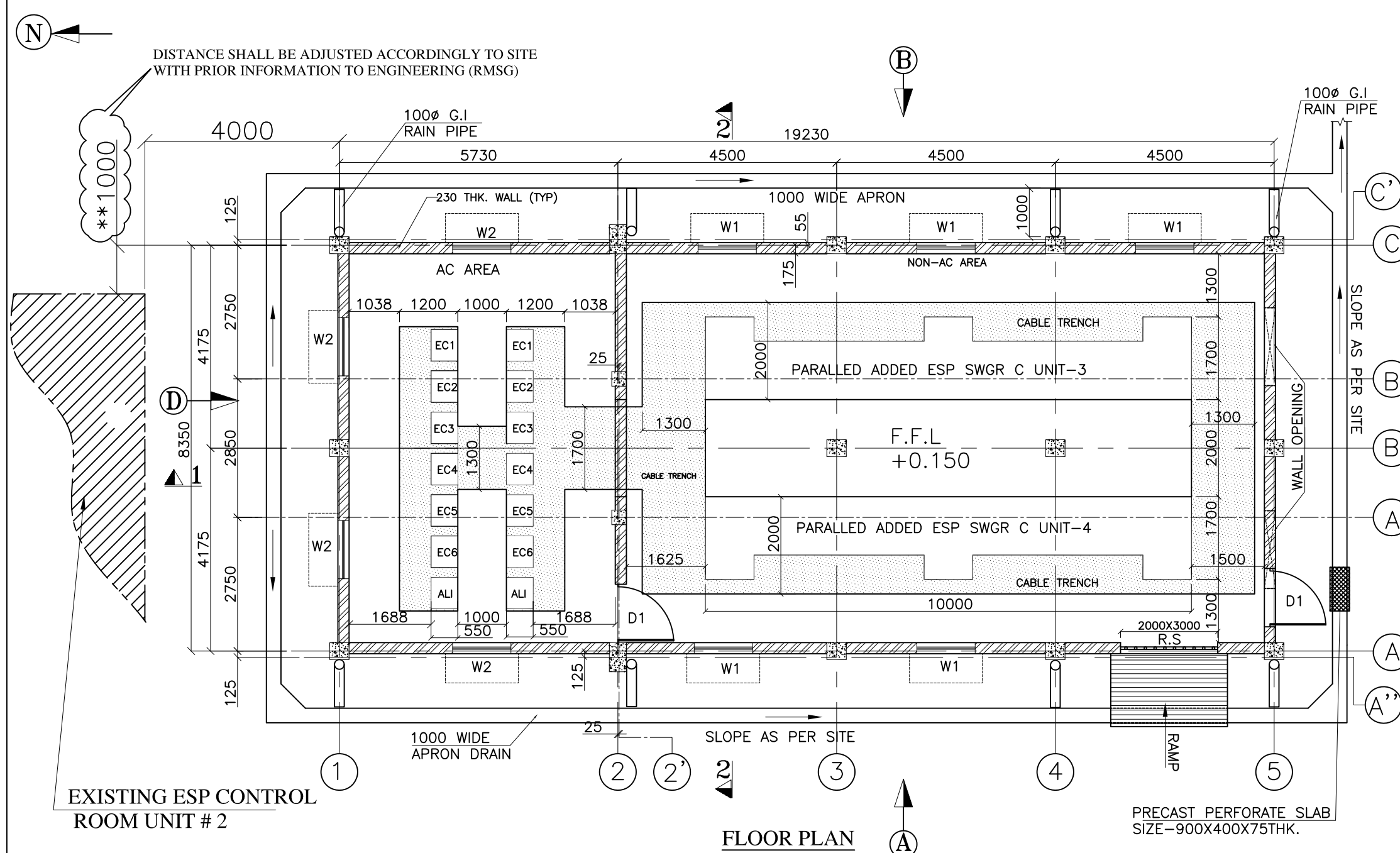
VIEW:E-E

REFERENCE DRAWING:-

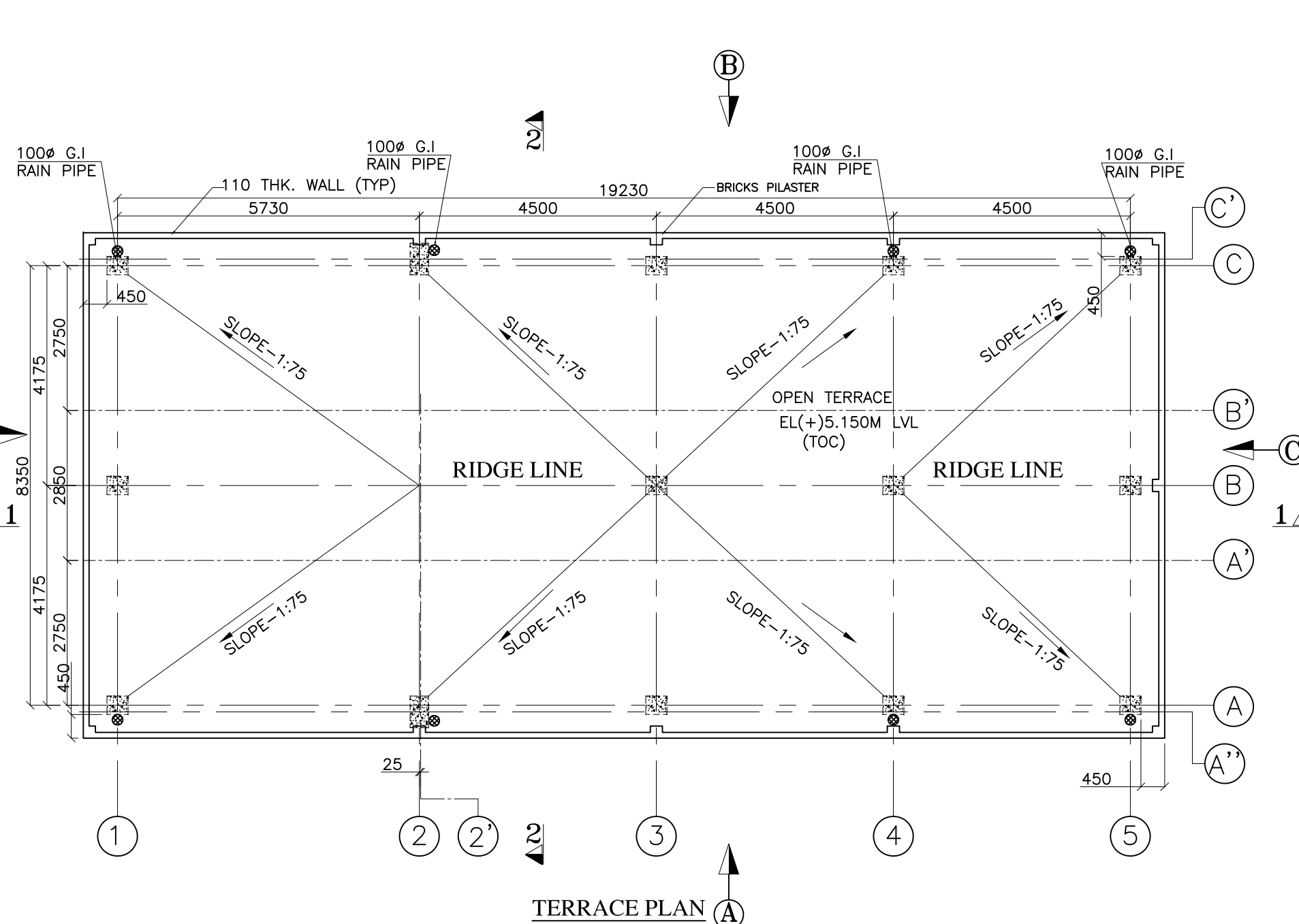
CUSTOMER DRAWING NO.- DC-31,REV01	
BAP RANIPET DRAWING NO.- 2-00-114-30213, REV-01	RECOMMENDED CONTROL ROOM LAYOUT FOR NEW PARALLEL ESP FOR UNIT # 3 & 4

THIS DRAWING MARKED (X) IS RELEASED FOR IF COMMENTS/APPROVAL □ PLANNING/INFORMATION □ CONSTRUCTION STAMP ALL PREVIOUS REVISION AS SUPERSEDED ISSUED BY NAME MP/PIM SIGNATURE DATE 13.03.2018			
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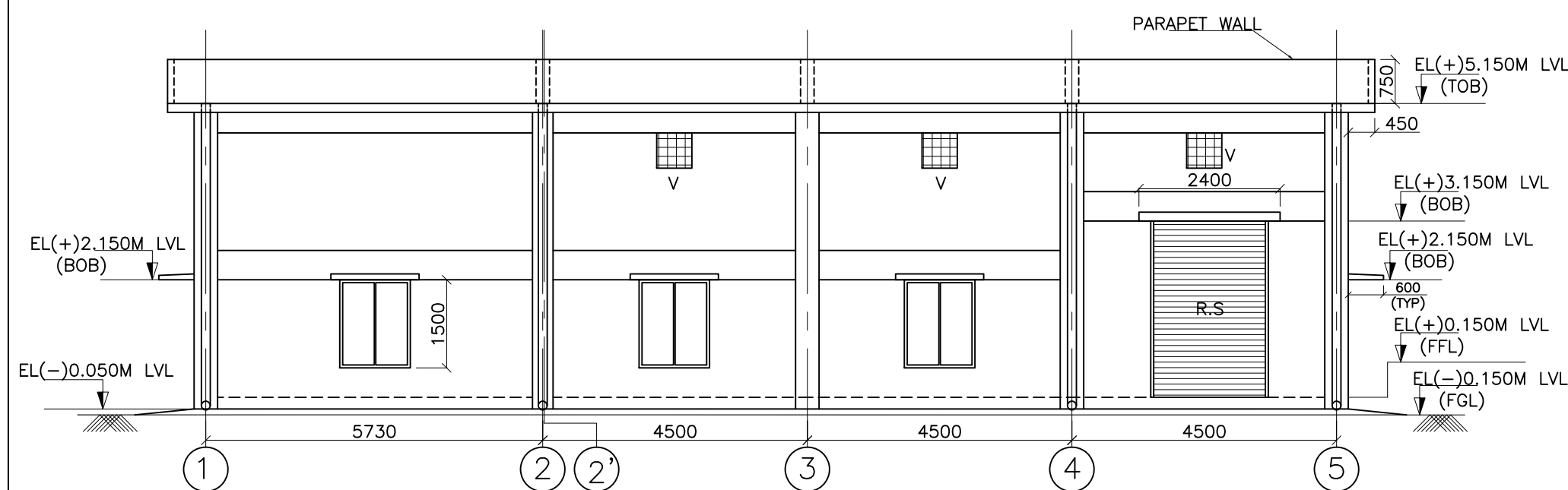
NAME OF PROJECTHTPS KORBA (WEST) 2X210MW, PH-II, UNIT # 3&4 ESP R&M									
NAME OF CUSTOMERM/s CHHATTISGARH STATE POWER GENERATION CO. LTD.									
BHARAT HEAVY ELECTRICALS LIMITED R & M SYSTEM GROUP BHOPAL									
DEPT/CODE	UN. TOL.DIM.GR.	SCALE	WEIGHT (KG.) N.A.		NAME	SIGN	DATE	NO.OF ITEMS	
RMSG/915					DRN	NN	13.03.2018		
					CKD	CP/MP	13.03.2018	REV. 01	
					APPD	PIM	13.03.2018		
					DRG NO			SHEET 1 OF 1	
					RCC DETAILS OF TRENCH FOR NEW ESP CONTROL ROOM, PH-II			1-726-25-55-16	



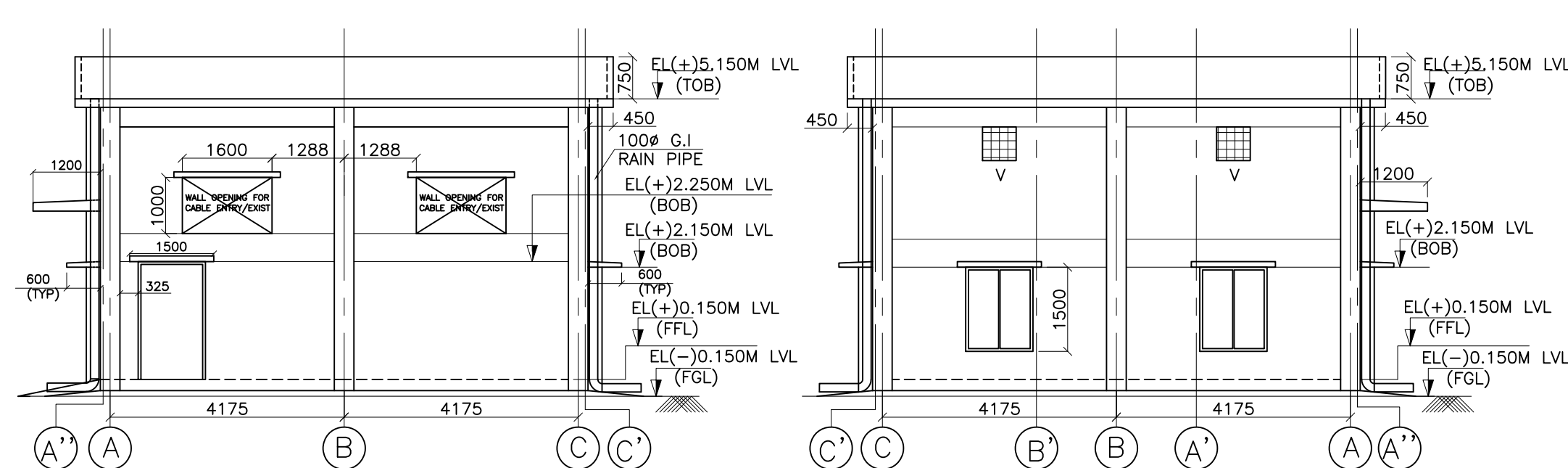
FLOOR PLAN



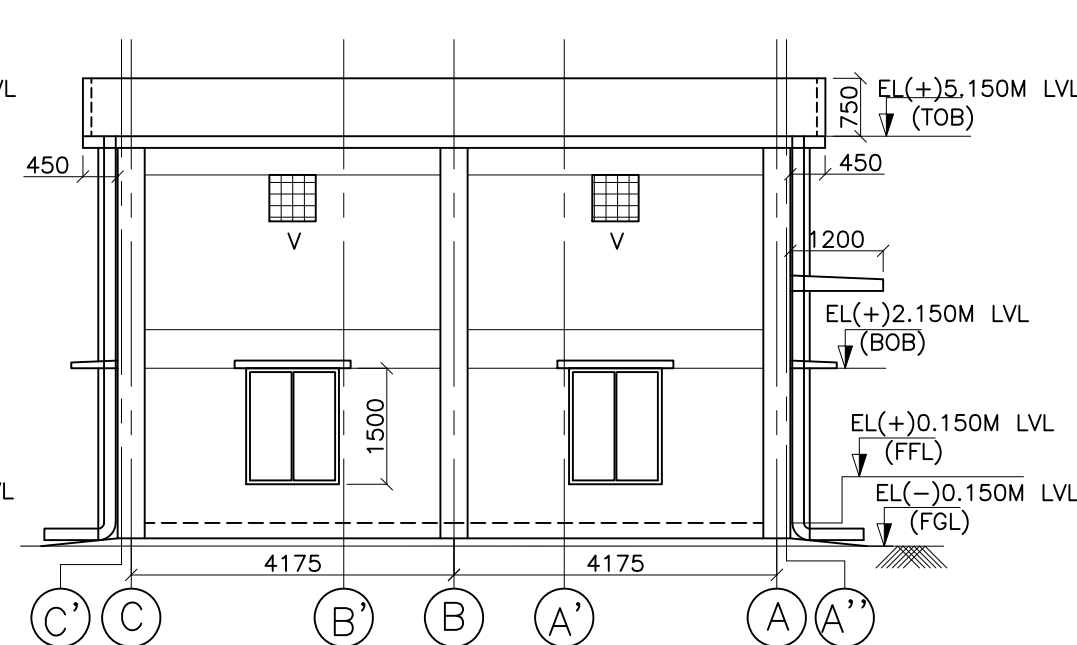
TERRACE PLAN



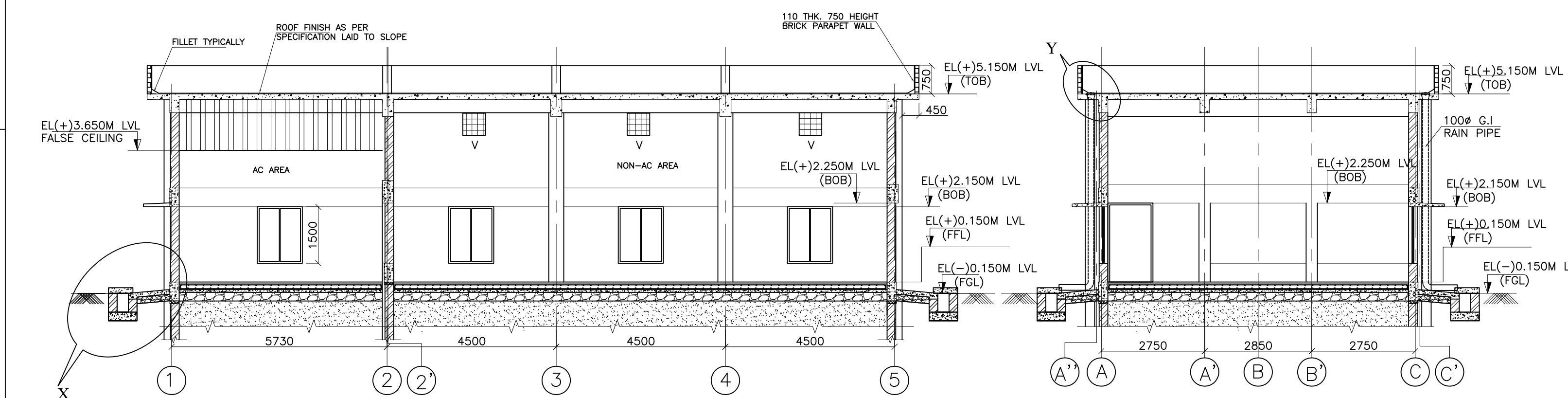
ELEVATION AT-A



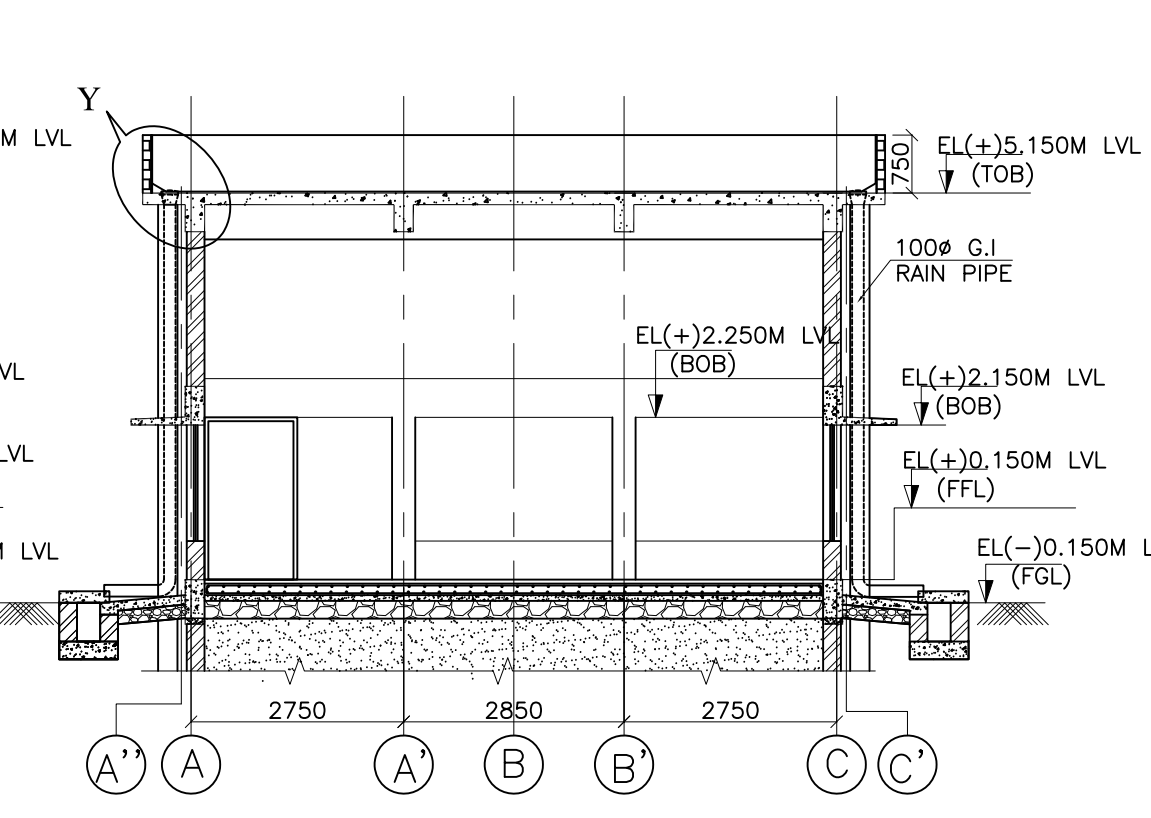
ELEVATION AT-C



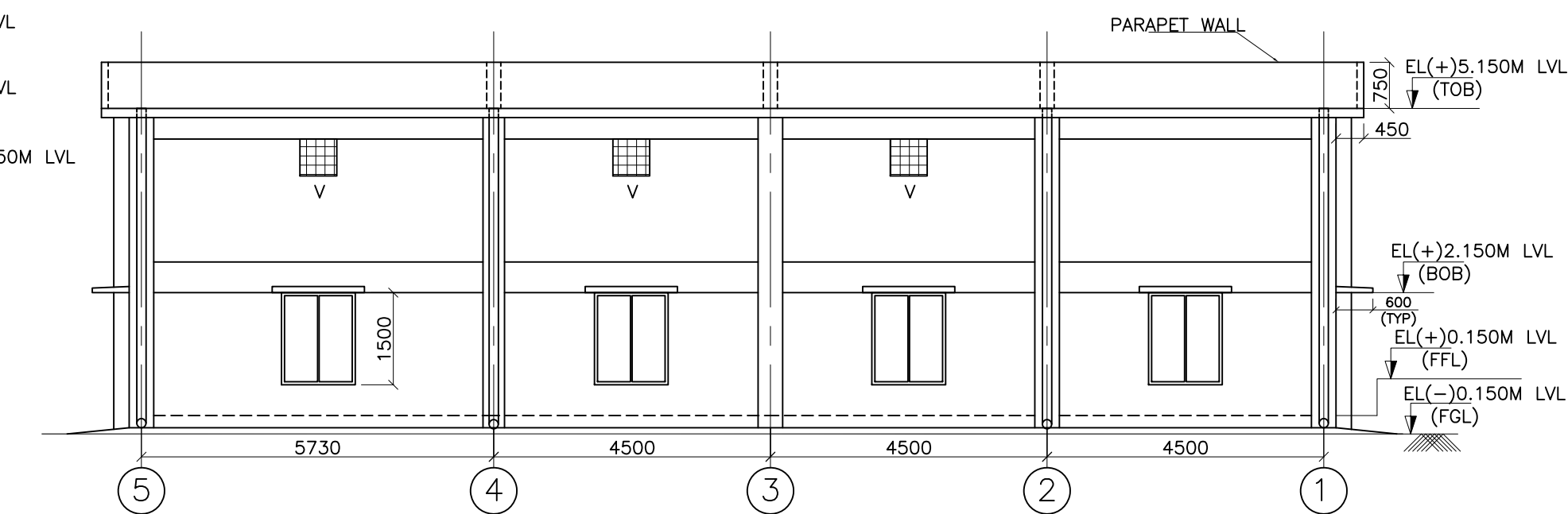
ELEVATION AT-D



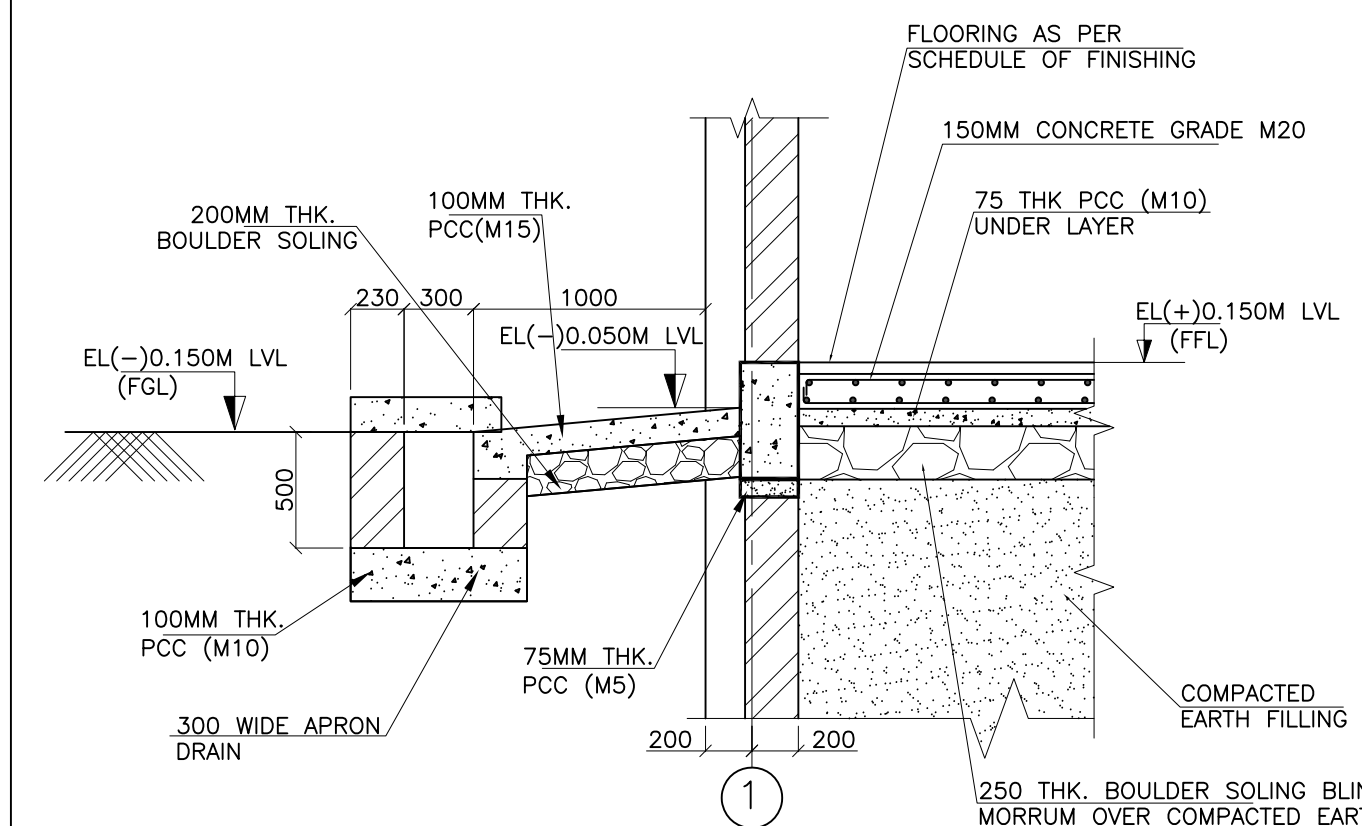
SECTION AT: 1-1



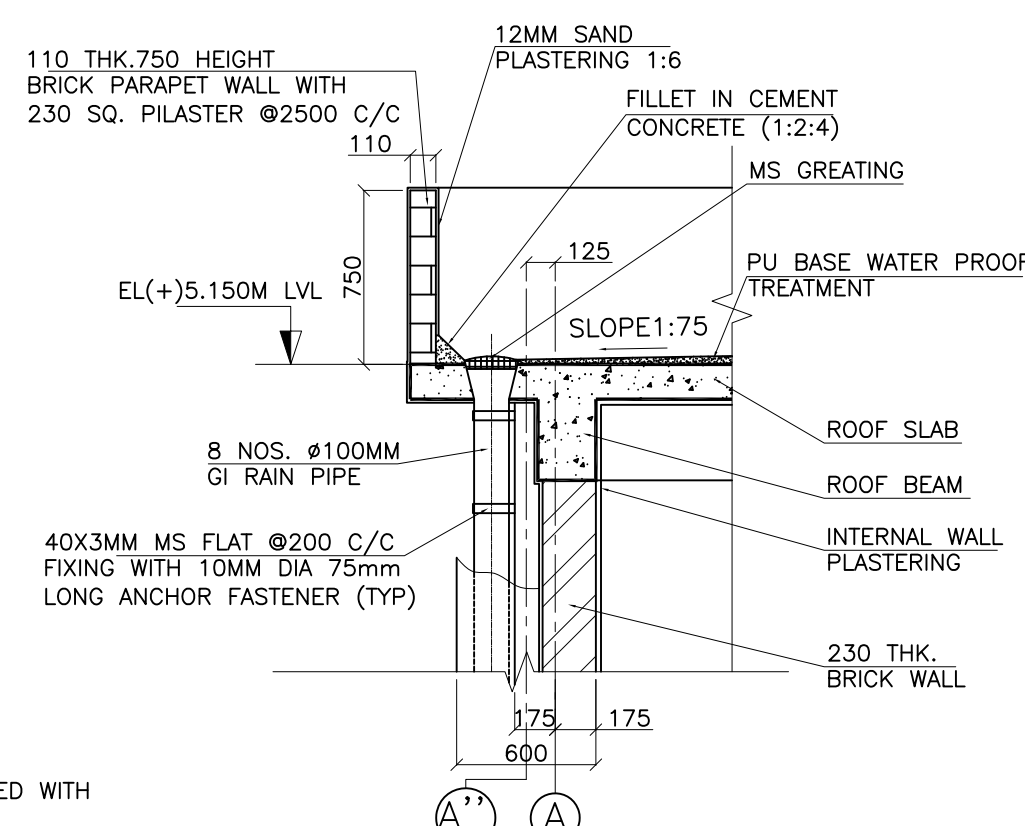
SECTION :2-2



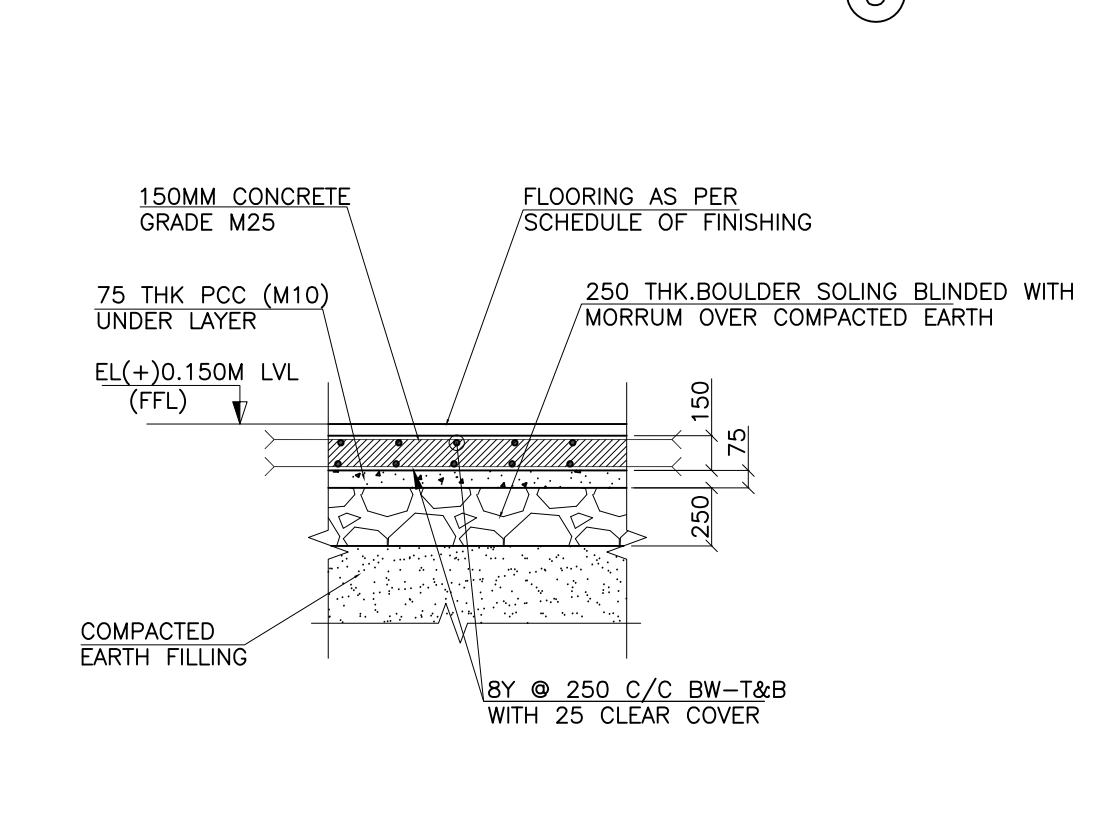
ELEVATION AT-B



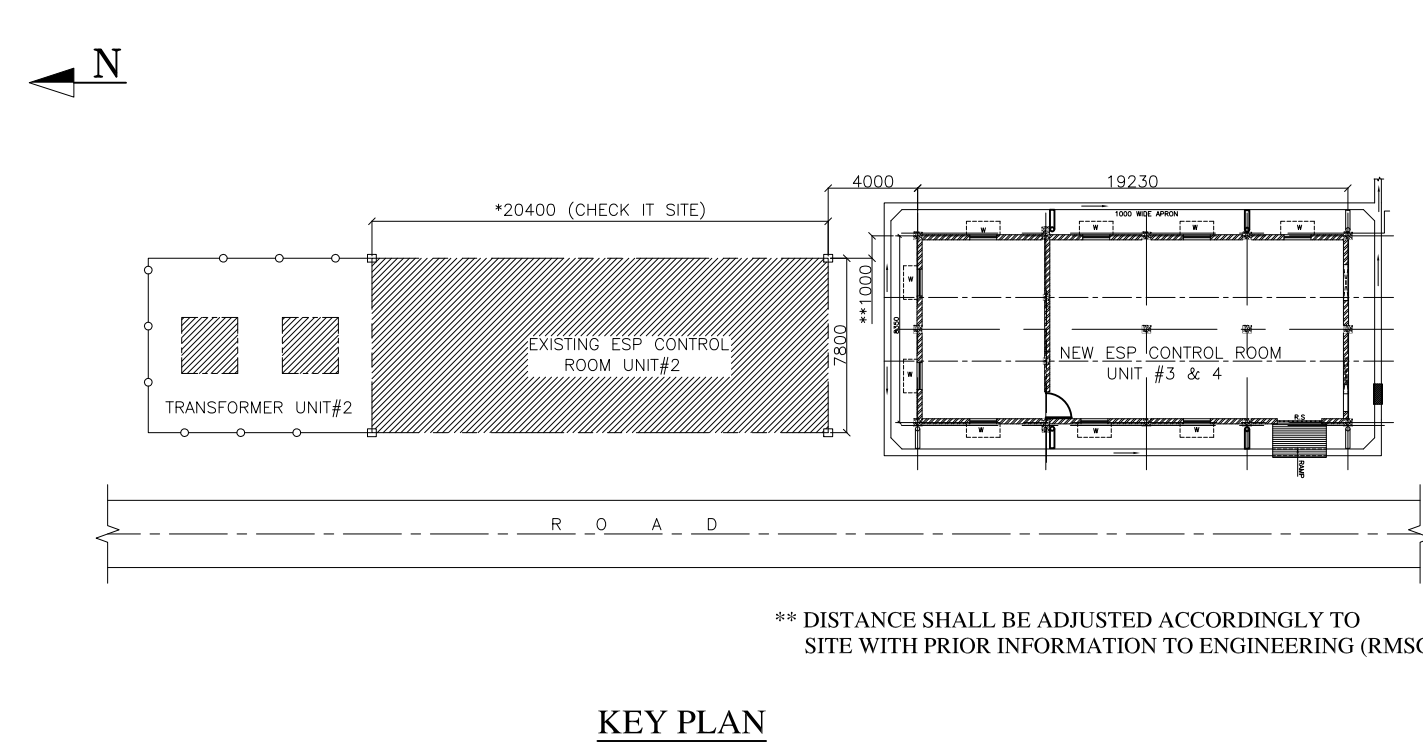
DETAIL-X



DETAIL-Y



GRADE SLAB SECTION DETAIL



KEY PLAN

NOTES

- ALL DIMENSIONS AND LEVELS ARE IN MM.
- ALL ELEVATIONS ARE MARKED W.R.T. F.F.L OF POWER HOUSE BUILDING, WHICH IS EL+0.00M AND IT CORRESPONDS TO R.L. 292.76M.
- F.F.L OF ESP CONTROL ROOM IS AT +0.150M CORRESPONDS TO R.L. 292.91.
- F.G.L OF ESP CONTROL ROOM IS AT EL-0.150M CORRESPONDS TO R.L. 292.61.
- 230 THK. FLY ASH BRICK WORK WITH FIRST CLASS BRICKS HAVING MINIMUM STRENGTH OF 50KG. PER SQCM IN CEMENT MORTAR 1:6 (1 CEMENT : 6 COARSE SAND)
- PROVIDE 18 MM THICK CEMENT PLASTER IN TWO LAYERS EXTERNALLY IN CM 1:6.
- PROVIDE 6 MM THK. CEMENT PLASTER IN MORTAR 1:4 FOR CEILING.
- PROVIDE 12 MM THICK FINISHED CEMENT PLASTER IN MORTAR 1:6 (1 CEMENT: 6 SAND) ON BRICK WORK OR REINFORCED CEMENT CONCRETE SURFACES INTERNALLY.
- WATER PROOF TREATMENT SHALL BE USED OVER CONCRETE ROOF.
- MINIMUM DRAINAGE OF SLOPE LINE 300 FOR STORM WATER DRAIN.
- STEEL WINDOWS, DOORS, ETC. SHALL BE PAINTED WITH TWO COATS OF SYNTHETIC ENAMEL PAINT OVER ONE COAT OF PRIMER.

SCHEDULE OF FINISHING

SL NO.	AREA	FLOORING & SKIRTING	INTERNAL WALL	CEILING
1	SWITCH GEAR ROOM (NON AC)	IPS (CEMENT CON. FLOORING) WITH METALLIC GARDNER TOP.	ACRYLIC DISTEMPER OVER 2MM THK. PLASTER OF PARIS	ACRYLIC DISTEMPER OF APPROVED COLOUR & SHADE
2	CONTROL ROOM (AC AREA)	VITRIFIED CERAMIC TILES 600X600X10THK.	ACRYLIC EMULSION PAINT OF APPROVED COLOUR & SHADE OVER 2MM THK. POP. FINISHING.	12THK. GYPSUM BASED PLAIN FALSE CEILING (WHITE WASH ON CEILING SLAB)

EXTERNAL FINISHING:- WATER PROOF CEMENT OF APPROVED COLOUR AND MAKE

SCHEDULE OF DOORS, WINDOW AND VENTILATORS

TYPE MKD.	SIZE	FROM SILL LVL. (M)	INT. LVL. FROM FFL (M)	QTY.	DESCRIPTION	REMARK
D1	1200 X 2100	+0.150	+2.250	02	FIRE PROOF DOOR	MINIMUM FIRE RATING 2HRS.
W1	1200 X 1500	+0.650	+2.150	05	ALUMINIUM FRAMED WINDOW GLAZED WITH TWO 6MM THK. TOUGHENED GLASS HERMETICALLY SEALED & SEPARATED BY 12MM GAP	
W2	1200 X 1500	+0.650	+2.150	04	STEEL FRAME VENTILATOR GLAZED WITH 4MM THK. FLOAT GLASS AS PER SPEC.	
RS	2000 X 3000	+0.150	+3.150	01	STEEL ROLLING SHUTTER MECHANICALLY OPERATED	
V	600 X 600	+4.050	+4.650	06	STEEL FRAMED FIXED VENTILATOR GLAZED WITH 4MM THK. FLOAT GLASS AS PER SPEC.	

RMSG(CIVIL), BHOPAL/SSBG-BHEL	
THIS DRAWING MARKED (✓) IS RELEASED FOR	
✓ COMMENTS/APPROVAL	
□ PLANNING/INFORMATION	
□ CONSTRUCTION	
STAMP ALL PREVIOUS REVISION AS SUPERSEDED	
ISSUED BY	
NAME	MP/PIM
SIGNATURE	Sd/-
DATE	10.07.2017

REFERENCE DRAWING:-

CUSTOMER DRAWING NO.-	
DC-31,REV01	
BAP RANIPET DRAWING NO.-	
2-00-114-30213, REV-01	
RECOMMENDED CONTROL ROOM LAYOUT FOR NEW PARALLEL ESP FOR UNIT # 3 & 4	

NAME OF PROJECT		HTPS KORBA (WEST) 2X210MW, PH-II, UNIT # 3&4 ESP R&M			
NAME OF CUSTOMER		M/s CHHATTISGARH STATE POWER GENERATION CO. LTD.			
		BHARAT HEAVY ELECTRICALS LIMITED			
		R & M SYSTEM GROUP			
		BHOPAL			
DEPT/CODE	UN. TOL.DIM.GR.	SCALE	WEIGHT (KG.) N.A.	NAME	SIGN
RMSG/915				DRN	NN
TITLE		ARCHITECTURAL PLAN FOR NEW ESP CONTROL ROOM		DATE	10.07.17
		FOR UNIT # 3 & 4		REV.	01
				DRG NO	1-726-25-55-17
				SHEET	1 OF 1