UPS & BATTERY SYSTEM TECHNICAL SPECIFICATIONS

FOR

PROPOSED DATA CENTRE AT

INDIAN INSTITUTE OF TROPICAL METEOROLOGY, PUNE.

CONTENTS

A. GENERAL TERMS AND CONDITIONS

INSTRUCTIONS TO BIDDERS

1. **M/s INDIAN INSTITUTE OF TROPICAL METEOROLOGY.** Wishes to receive Bids for **Design, supply ,installation , testing and commissioning of UPS along with Battery , Battery rack, DC System Cabling etc** as describing in below document. as describing in below document.
2. In case, any clarification is required, the Bidders shall obtain the same from the IITM in writing. All such clarifications shall be binding both on the IITM/Consultant and the Bidder.
3. At any time prior to the deadline for submission of Bids, the IITM/Consultant may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the tender document by amendments.
4. The Bidders shall submit their detailed techno-commercial offer in prescribed format one copy to IITM in sealed envelope.
5. The details regarding the Bidder's experience, detailed catalogue of the equipment offered shall be included in the offer.
6. The prices & rates quoted by the Bidder's shall be valid & shall be kept open for acceptance for a minimum period of thirty (30) days from the date of opening of tender.
7. The offers, with the required copies must be received by IITM / Consultant not later than 17.00 hrs on ------ at following address.

M/s **INDIAN INSTITUTE OF TROPICAL METEOROLOGY, Pune**.
Dr. Homi Bhabha Road, Pashan, Pune-411008, INDIA
Contact person: - Shri Jnanesh S.P.
Contact No: - 02025904355
Email: - jnanesh@tropmet.res.in

8. The acceptance/rejection of the quotation will rest with the IITM, who does not bind himself to accept the lowest quotation or any quotation & reserves to himself the full rights for the following without assigning any reason whatsoever

PROJECT INFORMATION

1.	Project	Proposed Data Centre At INDIAN INSTITUTE OF TROPICAL METEOROLOGY, Pune.
2.	IITM/Owner	M/s **INDIAN INSTITUTE OF TROPICAL METEOROLOGY, PUNE**. Dr. Homi Bhabha Road, Pashan, Pune-411008, INDIA Contact person: - Shri Jnanesh S.P. Contact No: - 02025904355 Email: - jnanesh@tropmet.res.in
3.	Nearest Town/City	Pune
4.	Nearest Rail Station	Pune
5.	Nearest Air Port	Pune
6.	Nearest Highway	NH-4
7.	Site Conditions	Ambient Temperature: Maximum: 45 ^{O}C Minimum: 08 ^{O}C Relative Humidity: Maximum: 90% Minimum: 30% Design Altitude: less than 950m above Mean Sea Level .

B TECHNICAL SPECIFICATIONS

1. ELECTRICAL SYSTEM DETAILS

Design Temp. - 50^0 C.

HT Supply:

LT Supply Input for UPS : 3 Phases – 415V AC, +/- 10%, 1 Phase – 240VAC, +/- 10%, 50Hz+/- 3%

2. STANDARDS

In general the Equipment shall be in line with latest edition of relevant IS / BS / IEE / IEC / JIS.

Some of relevant Indian Standards are listed below:

(i) IS: 3700 - Essential ratings and characteristics of semi-conductor devices.

(ii) IS: 3715 - Letter symbols for semi-conductor devices.

(iii) IS: 4411 - Code of designation of semi-conductor devices.

(iv) IS: 5001 - Guide for preparation of drawings for semi-conductor devices.

(v) IS: 5469 - Code of practice for the use of semi-conductor junction devices.

(vi) IEC 62040-3 (International Electrotechnical Commission) – Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements.

(vii) IEEE 587 (ANSI C62.41) Category A & B (International Electrical and Electronics Engineers) – Recommended practices on surge voltages in low voltage power circuits.

(viii) CISPR 22: FCC Rules and Regulations 47, Part 15, Class A (Federal Communications Commission) – Radio Frequency Devices (prior to Feb 16, 2006).

A. MIL-HDBK-217E (Military Handbook) – Reliability prediction of electronics equipment
   1. ISO 9001, "Quality Management Systems - Requirements." or
   2. ISO 14001, "Environmental Management Systems - Requirements with Guidance for Use."

B. UPS should be certified for LEED credits and/or for sustainable/GREEN product certification

3. DESCRIPTION & SYSTEM OPERATION

The UPS shall consist of Rectifier / Charger, Battery, Inverter, Static Transfer Switch, Maintenance Bypass Switch, Synchronizing Equipment, Protective Device and other Accessories.

The UPS shall provide continuous electric power within specified tolerance, without interruption, to the critical loads.

Normally electric energy from normal plant power source shall be supplied to UPS System.

The solid-state rectifier / charger shall convert incoming AC power to DC power. The rectifier / charger output shall be fed to solid-state inverter. The inverter shall convert the DC power into AC power, which shall supply the load. Upon failure of AC power, input power for inverter shall automatically be supplied from the battery with no interruption / disturbance in inverter output in excess of limits specified herein (in these specifications). At the same time, UPS shall energize an alarm circuit.

The duration for which Battery shall supply A/C power to O/P shall be minimum 15 minutes.

When A/C power is restored, the input power for the inverter and for recharging the battery shall automatically be supplied from rectifier / charger output without interruption/ disturbance in inverter output in excess of limits specified herein (in these specifications).

The solid-state circuitry used for both Rectifier & Inverter shall be IGBT technology.

Intelligent RS-232 Communication shall be possible which will Provide UPS status indications, electrical parameters such as Input & Output Voltage, Load levels etc and unattended shutdown.

User-friendly LCD Display to indicate all important UPS parameters such as Input Voltage, Output Voltage, Battery Level and Load Level shall be provided.

The UPS system shall consist of the following modular architecture

4. ARCHITECTURE

A. Scalable array Infrastructure:

The system power train shall be comprised of 500 kVA power modules and shall be capable of being configured for N+X redundant operation at the rated i.e. 500KVA system load. This 500kVA systems shall be capable of paralleling with similar rating system to form a bus of 1.5 MW. This 1.5MW system should be load bus synchronous to a similar rating bus. These 2 nos. 1.5 MW bus shall form 2 sources (A & B) required. The architecture should have the flexibility of adding this 500KVA power modules without the need of any external cabling of addition of panels.

B. Module Management:

The modular UPS shall offer the ability to scale its capacity and/or redundancy by automatically shifting load to fewer power modules. The UPS shall provide an Module Management System, which will control the UPS to selectively place unnecessary modules in the "mode" based on the sensed output load level. This is in order to drive the load higher on the remaining modules. Therefore, with multiple modules, a UPS shall achieve 2-3% higher efficiencies than conventional operation when loaded less than 50% of system rating.

In case of instantaneous addition of full load on the bus this modules should assume load without any interruption to the total load.

C. EcoMode:

In bypass operation, an even higher operating efficiency may be achieved without sacrificing protection when there are good power conditions. Depending on configuration, efficiency can exceed 99%.The load remains in bypass mode until the input voltage exceeds tolerance levels, and then enters full protection mode. This setting is disabled by default and can be configured using the display. UPS should be capable of operating in ECOMODE even when they are paralleled to form 1MW bus.

D. Concurrent maintenance:

Any redundant internal module can be concurrently isolated and serviced (by factory-trained service engineers) while the other internal module/s continues to provide protected power to the load.

E. Load Test at Site:

UPS should have the ability to perform a full load test in double conversion mode without the connection of a load bank.

5. MODES OF OPERATION :

Each module shall operate as an on-line, fully automatic system in the following modes:

A. 3x 500kVA(N+X) :2 Pairs of 3x500kVA(N+X) Working in N+N

The UPS system shall be made up of 3 identical, parallel-connected Integrated Parallel Units UPS, all having the same power rating. Each Integrated Parallel Unit UPS shall operate in double-conversion mode and shall be of the VFI-type as per standard IEC 62040-2. The system shall include 1 redundant Integrated Parallel Units UPS among the total. Such Two pairs will be working in N+N Mode

B. 2 Nos 100kVA: Working in N+N

The UPS system shall be made up of 2 Standalone UPS, all having the same power rating. Each Standalone Unit UPS shall operate in double-conversion mode and shall be of the VFI-type as per standard IEC 62040-2. The system shall be working in N+N Mode.

Each UPS shall have a rating of 500kVA & 80kVA and shall be made up of the following components, described in detail in this specification:

- rectifier
- battery charger
- inverter
- battery
- automatic bypass (via a static switch)
- user and communications interface
- Individual battery management system.
- any and all other devices required for safe operation and maintenance, including circuit breakers, switches, etc.

- **Battery:**

Upon failure of the commercial AC power, the critical load shall continue to be supplied by the Inverter, which shall obtain power from the batteries without any operator intervention.

There shall be no interruption to the critical load upon failure or restoration of the commercial AC source. Each module or system of 500kVA shall have its own Batteries to meet the autonomy time requirement.

- **Recharge:**
  Upon restoration of the AC source, the Charger shall recharge the batteries and simultaneously the Rectifier shall provide power to the Inverter. This shall be an automatic function and shall cause no interruption to the critical load.

- **Bypass:**
  If the module must be taken out of the standard double conversion mode for overload, load fault, or internal failures, the static bypass switch shall automatically transfer the critical load to the commercial AC power. Return from Bypass mode to Normal mode of operation shall be automatic. No-break transfer to and from Bypass mode shall be capable of being initiated manually from the front panel.

- **Input Current Total Harmonic Distortion:**
  The input current THDI shall be held to less than 5 percent at system load greater than 50 percent while providing conditioned power to the critical load bus, and charging the batteries under steady-state operating conditions. This shall be true while supporting both a linear or non-linear load. This shall be accomplished without the requirement for additional or optional filters, magnetic devices, or other components.

- **Soft-Start Operation:**
  As a standard feature, the UPS shall contain soft-start functionality, capable of limiting the input current from 0 percent to 100 percent of the nominal input over a default 10 second period, when returning to the AC utility source from battery operation. The change in current over the change in time shall take place in a linear manner throughout the entire operation.

- **Magnetization Inrush Current:**
  The UPS shall exhibit zero inrush current.

6. SYSTEM CHARACTIRISTICS:

A. UPS output in standard double conversion mode

1. 400V, 3-phase, 4 wire plus ground. Output wiring configuration is based upon input wiring configuration for systems without internal transformers.
2. Steady-state voltage regulation (in inverter) shall be within +/- 1% average from nominal output voltage.
3. Transient voltage response shall be < +/- 5% from nominal voltage for load step from 10% to 100%.
4. Linear load harmonic distortion capability: Output voltage THD of less than 2% for 100% linear load.

5. Non-linear load harmonic distortion capability: Output voltage THD of less than 5% for 100% non-linear load when tested using the non-linear load described in IEC 62040-3.
6. Manual output voltage adjustment shall be +/- 3% from nominal.
7. Line synchronization range shall be +/- 3Hz, adjustable to +/- 0,5Hz.
8. Frequency regulation shall be +/- 0.1Hz free running.
9. Frequency slew rate shall be adjustable up to 0.7 Hz/second maximum.
10. Phase angle control:

    a) Balanced linear load shall be +/- 1 degree from nominal 120 degrees

    b) Unbalanced linear loads shall less than +/- 3 degrees from average phase voltage for 100% load unbalance.
11. Phase voltage control:

    a) Balanced linear loads shall be +/- 1% from average phase voltage

    b) Unbalanced linear loads shall be less than +/- 5% for 100% load unbalanced
12. Overload current capability (with nominal line and fully charged battery): The unit shall operate with up to 110% of resistive/inductive load for 10 minutes, up to 125% for 30 seconds, and up to 150% for 10 seconds.
13. Fault clearing current capability: 1000% RMS for 20ms., 600% for 50 ms. With bypass intervention. Inverter 200% phase-to-phase for 10 cycles;
14. Static transfer time: No break, completed in less than 4ms.
15. Acoustical noise: Noise generated by the UPS under normal operation shall not exceed 85dbA at one meter from any operator surface, measured at 25 degrees C (77 degrees F) and full load, per ISO7779 standard..
16. EMC Suppression: The UPS shall meet IEC 62040-2, Category C3.
17. Electrostatic discharge (ESD): The UPS shall meet EN61000-4-2 level 3.
18. Efficiency: The UPS efficiency shall be up to 94,5%. If UPS requires input filters for controlling input THD, manufacturer shall state efficiency of UPS with input filters connected.

B. Battery management system:

The UPS shall contain a battery management system which has the following features:

1. The battery management system shall provide battery time remaining while operating in normal mode and battery mode. Battery time available information shall be displayed real-time, even under changing load conditions. Upon commissioning, battery runtime information shall be available.
2. The battery management system shall automatically test the battery string(s) to ensure that the battery is capable of providing greater that 80% of it's rated capacity. Testing the batteries shall not jeopardize the operation of the critical load. Upon detection of the battery string(s) not capable of providing 80%, the UPS system will alarm that the battery needs attention/replacement. The battery test shall be able to detect the following:

Open battery string

Shorted battery string

Battery capacity (runtime) less than 80% of "new" battery capacity

3. The UPS shall communicate battery test and monitoring data to the UPS manufacturer's remote monitoring site. Battery life remaining, capacity, and number of on-battery events shall be provided in a monthly report.

4. An optional temperature sensor shall be available to monitor the ambient temperature internal to the battery cabinet. If the ambient temperature increases, the UPS system charger shall automatically reduce the charging voltage to a level recommended by the battery manufacturer. If the ambient temperature is decreased the UPS shall automatically increase the battery charge voltage to that recommended by the battery manufacturer.UPS MODULE CABINET

The UPS Module Cabinet shall consist of a rectifier / charger, a three-phase inverter, static transfer switch, maintenance bypass switch , logic, synchronizing equipment, protective devices, and accessories as required for proper operation.

7. RECTIFIER / CHARGER UNIT

a) The rectifier / charger unit shall be solid state and shall provide direct current to the inverter unit and for battery charging.

b) An input AC filter shall be incorporated into the rectifier / charger unit. The filter is not to be add-on in front of the rectifier / charger. This filter is to reduce the current harmonics feedback into the input AC line to no more than 10%. The filter is to also improve the input power factor so that it is no more lagging than 0.95.

c) The rectifier / charger unit shall provide for input current limiting whereby the maximum input current shall be limited to 125% of the full input current rating. This current limit shall be in effect, no matter whether the load is connected to the UPS module or the static transfer switch. That is, if the static transfer switch is supplying full rated load, then the rectifier / charger must limit the battery recharging to 25%. Further more, if the load is connected to the maintenance bypass line, the rectifier / charger input current must automatically reduce to 25%.

d) The rectifier / charger unit shall provide features whereby when the AC power is returned after the UPS has been operating on battery power or has been de-energized, the total initial power requirement at the input terminals will not exceed 20% of rated load, and the power will gradually increase to 100% of full rating over the 15 second time interval. The unit shall be provided with an internal switch so that walk-in time can be changed from 2 seconds to 15 seconds.

e) IGBTs in the rectifier / charger shall be fused with fast acting fuses, so that loss of any one power semiconductor will not cause cascading failures. All fuses shall be provided with a blown fuse indicator with an alarm indicator on the control panel.

f) The rectifier / charger unit shall have an output filter to minimize ripple voltage into the battery. Under no conditions shall ripple voltage into the battery exceed 2% RMS. The filter shall be adequate to insure that the DC output of the rectifier/ charger will meet the input requirements of the inverter.

g) The rectifier unit shall be designed to boost charge the completely discharged batteries in 10 to 14 hours. The changeover between boost charger mode and float charge mode shall be affected manually/automatically.. Necessary alarms to

indicate battery discharged and D.C. over voltage conditions shall be provided. Selector switch shall be provided for selecting the float charge or boost charge mode.

h) There shall be DC overvoltage protection so that if the DC voltage rises to the pre-set limit, the UPS module is to shut down automatically and the load is to be transferred to the static bypass line uninterrupted.

i) To prevent battery damage from over-discharging at light load, the rectifier / charger is to automatically raise the shutdown voltage set point as the load is reduced. The shutdown set point is to increase linearly from minimum to 1.75 volts per cell as the discharge time increases from 15 minutes to one hour.

j) The output voltage of the rectifier / charger unit shall be as follows:

Float mode : Variable 115 - 130V DC or 230 - 260V DC
Boost mode : Variable 125 - 145V DC or 250 - 290V DC

8. INVERTER UNIT

a) Advanced PWM Inverter with Precision Control Circuitry using High Performance IGBT Power Stage. The output shall be Pure Sine-wave output with less than 3% THD. Exceptional reliability, superior performance, Quite operation with very high reliability and efficiency shall be the key characteristics.

b) The inverter unit shall be a solid state device capable of accepting the output of the rectifier / charger or the unregulated voltage of the battery and provide regulated rated AC output within specified limits.

c) The output frequency of the inverter shall be controlled by an oscillator. The oscillator shall be temperature compensated and be adjustable $\pm$5% of rated frequency. The oscillator shall hold the inverter output frequency to $\pm$0.1% for both steady state and transient conditions. Drift shall not exceed $\pm$0.1% during a 24 hour period. Total frequency deviation, including short time fluctuations and drift, shall not exceed $\pm$0.1% from the rated frequency.

d) The inverter output shall stay synchronized with the static bypass line provided the static bypass line remains within $\pm$3 Hz of the nominal frequency. If the line frequency goes outside these limits, the inverter is to break sync with the line and run on its internal frequency. When the line frequency returns, within limits, the inverter output is to automatically re-synchronize with the line. The rate of change of frequency is not to exceed 0.1 Hz per second. The unit shall be provided with an internal switch so that the synchronizing frequency range can be changed from $\pm$3 Hz to +1 Hz or to $\pm$0.5 Hz.

e) The inverter shall be able to sustain an overload across its output terminals up to 150% load, while supplying any load within its rating, without reducing the output voltage. Loads greater than 150% shall be transferred to the static bypass line.

f) The inverter, with the static bypass line disabled, shall current limit at 150% rated current at reduced voltage for any loading over 150% rate load. The inverter shall be capable of at least 300% current for short circuit conditions. If the short circuit is sustained, the inverter shall shut down and disconnect automatically from the critical load bus.

g) The inverter unit shall be designed to operate from the rectifier output without use of battery smoothing effect. With the battery connected to the UPS system, a filter shall be provided at the input of inverter unit to reduce the A.C. Feedback from the inverter to the battery to a maximum of 2% of the battery AH capacity.

h) The inverter unit shall be designed to operate with 93V to 145V DC or 186V to 290V DC at the terminals of inverter input filter. The output inverter voltage shall be stabilised to within $\pm$2% of the nominal output voltage with a load variation of 0 - 100% at 0.6 power factor (lagging).

During step loading of 100%. The system voltage dip shall not exceed 15% and output voltage shall recover to within + 3% of the nominal output voltage within 10 cycles (200 m sec.)

i) The inverter voltage regulator is to regulate each phase so that an unbalance loading will not cause the output voltage to go outside the specified voltage unbalance or phase displacement.

j) An output AC filter shall be incorporated in the inverter unit. The filter shall reduce the inverter output voltage harmonics to 5% RMS total and single harmonics to 3% RMS for linear loads.

k) Power semi-conductors in the inverter unit shall be fused with fast acting fuses, so that loss of any one power semiconductor will not cause cascading failures. All fuses shall be provided with a blown fuse indicator with an alarm indicator on the control panel.

9. STATIC TRANSFER SWITCH

a) The Static Transfer Switch, using solid state devices, shall be provided to transfer the load between the UPS module and the static bypass line uninterrupted. Automatic static load transfers are to be initiated when a system overload is greater than specified here, a branch load circuit faults or a fault within the UPS module occurs.

b) For Auto or Manual operation of Static transfer Switch Load should not suffer.

c) If the static transfer was caused by an overload or branch fault and this condition was rectified, then the static transfer switch is to automatically re-transfer the load to the UPS module.

d) The static transfer switch shall be sized to provide 125% rated load continuously. The switch shall also have an overload rating of 2000% rated load for two cycles.

e) Any time the load is on the static bypass line, the control panel shall indicate so. The audible alarm is to sound only after a ten-second delay. If the transfer was due to a momentary overload and automatically re-transferred back to the UPS module after the overload was removed, the alarm and indicator are to automatically reset.

f) This Static Bypass Operation in any Case should not cause any interruption to the load.

10. MAINTENANCE BYPASS SWITCH

a) A manually operated maintenance bypass switch is to be incorporated into the UPS module cabinet that will connect the load to the input AC power source bypassing the rectifier / charger, inverter, and static transfer switch.

b) All energized terminals shall be shielded to ensure that maintenance personnel do not inadvertently come in contact with energized parts or terminals. A means to de-energize the static switch shall be provided when the UPS is in the maintenance bypass mode of operation.

c) While the load is on the maintenance bypass line, it shall be possible to check out the operation of the rectifier / charger, inverter, and static transfer switch. It shall also be possible to check the battery operation.

11. BATTERY

A Battery system shall be furnished for the UPS with sufficient capacity to maintain UPS output at the specified load for a duration of minimum 15 minutes. The type of battery shall Maintenance-free, Valve-regulated type. A minimum of 10 years warranty for performance of declared parameters within permissible limits shall be provided.

12. CONTROLS AND INDICATORS

A. Microprocessor controlled circuitry: The UPS controls shall have the following design and operating characteristics:

1. Fully automatic operation of the UPS shall be provided through the use of microprocessor controlled Digital Signal Processing. DSP shall eliminate variances from component tolerance or drift, and provide consistent operational responses.
2. All operating and protection parameters shall be firmware controlled, thus eliminating a need for manual adjustments. The logic shall include system test capability to facilitate maintenance and troubleshooting. Printed circuit board replacement shall be possible without requiring calibration.
3. Start-up and transfers shall be automatic functions.

B. Digital Front Panel Display: The UPS control panel shall be a digital front panel display that features an 8x40 (8 lines, each with 40 characters) backlit LCD display. The LCD shall display UPS status, metering, battery status, alarm/event queue, active alarms and UPS configurations. The front panel display shall show a system mimic diagram with an outlined power path, current operating mode and event logs.

C. Control Panel Indicators: The UPS control panel shall provide the following monitoring functions with indicator LED's:

NORMAL: This shall indicate that the commercial AC utility or generator source is supplying power to the rectifier and the inverter is supporting the critical load. A text message shall indicate if the bypass line is not within tolerance.

BYPASS: This shall indicate that the UPS has transferred the load to the bypass circuit.

BATTERY: This shall indicate that the commercial AC utility or generator source has failed and the battery is supplying power to the inverter, which is supporting the load. A text message shall indicate if the battery charge is low or if the battery is installed but disconnected.

ALARM: This shall indicate that the UPS detects an alarm condition, outlined in detail in the operator's manual.

D. Control Panel Controls: The UPS control panel shall provide the following functions from front panel push buttons:

EVENTS: Displays the list of Active System Events and a historical log of system events. Historical logs shall include a detailed time stamped list of the latest 128 events.

METERS: Displays performance meters for the system or critical load. When selected, the front display shall show individual screens of input parameters, output parameters or bypass

parameters including; voltage, current and frequency. In addition, the battery display shall show runtime remaining.

CONTROLS: Displays a System Controls screen. Allows selection of operating mode, normal, bypass, charger on/off and Power Module on/off.

SETUP: Allows display contrast, date and time information serial communication port configuration and display of firmware revision numbers.

RETURN: Confirms selection or returns to previous screen.

E. **Interface panel**: The UPS shall be equipped with an interface panel, located behind a protective cover, which provides the following signals and communication features in a Class 2 environment:

Alarm contact: A dry contact for annunciating a summary alarm shall be provided for customer use. This contact shall be Form "C" capable of supplying both N/O and N/C contacts. Contact ratings shall be 5A max at a voltage not to exceed 28VDC or 30VAC.

RS232 (EIA / TIA-232) communications interface: Circuitry shall be provided for one RS232 (EIA / TIA-232) communication port for connection to automated service department diagnostic tools. This port may be used with simple ("dumb") terminals to gain remote access to all unit operation information.

Building alarms: Two inputs shall be provided for monitoring the status of external dry contacts. Building alarms shall be set up through the UPS configuration mode function on the RS232 (EIA / TIA-232) port.

External EPO contacts: Shall be provided to connect an external remote emergency power off switch to shutdown the UPS and de-energize the critical load.

Battery control contacts: Contacts shall be provided to connect the battery shunt trip and auxiliary signals from a battery breaker or battery disconnect switch.

External bypass indicator connection: A connection point shall be provided to acknowledge that an external maintenance bypass has been closed around the UPS, placing the critical load on utility power.

The system shall have options to add four (4) additional building alarms, 384 logged events, 4 additional languages, Mandarin or Russian as a primary language.

13. CABINET

All the cells making up the Battery shall be installed in a free-standing cabinet, that is, of the same constructions as the UPS module cabinet. The cabinets shall be of the same height and depth.

Each cell is to be held in place to prevent movement during seismic motion.

Connectors are to be used so that the battery can be disconnected in no more than 42 volt sections.

14. BATTERY DISCONNECT CIRCUIT BREAKER

The UPS Module shall have a Battery Circuit Breaker. This circuit breaker is to be mounted in the battery cabinet. When open, there shall be no battery voltage present in the UPS

module cabinet. The UPS module shall be automatically disconnected when the battery reaches the minimum discharge voltage level or when signalled by other control functions.

15. MIMIC PANEL

The Mimic Panel is to depict a single line diagram of the UPS. Indicating Lights shall be integrated with the single line diagram to illustrate the status of the UPS power paths. The functions whose status are to be displayed shall include, but not be limited to, the following:

a) Input power available

b) Output power available

c) Normal operation

d) Bypass operation

16. COMMUNICATIONS

A. Communications Bay: The UPS shall be equipped with field configurable communications bays that will accommodate four (4) communication devices.

B. Remote Monitoring:

1. Optional WEB/SNMP communication capabilities will be available for all systems.
2. The UPS shall be able to be monitored remotely via communications devices. UPS manufacturer shall provide optional communications devices capable of communicating via various industry standard protocols such as RS232 and ModBus. Monitoring of UPS status may also be performed through isolated dry contact Form C relays.
3. Remote monitoring of the UPS shall also be possible through status indicators elsewhere in the same facility through a device that replicates these indicators.

The UPS communication capability should be able to integrate into any industry standard Building Management System (BMS) and/or Network Management System (NMS). The UPS must also be able to be monitored via any standard Internet browser (i.e. Internet Explorer and Netscape).

All optional hardware interfaces shall be "Hot-swappable" (UPS maintains power to critical applications while changing interfaces).

C. Shutdown:

1. There shall be a mechanism that provides graceful, orderly, unattended, sequential shutdown of one or multiple computers powered by one UPS. This shutdown shall be performed via in-network or out-of-network means. The order of shutdown shall be user-defined, allowing the maximization of runtime on battery for more critical systems.
2. Shutdown of AS/400 computers shall be possible through open-collector relay contacts or isolated, dry contact, Form-C relays.
3. The UPS shall also be capable of interfacing with an operating system's built-in shutdown routine, e.g. Windows NT. This shall be done through a cable connection to the optional serial port on the UPS.

D. Notification:

1. There shall be a mechanism to send alerts to key personnel via email or SNMP traps. An alarm notification may also be sent by a network message.

2. Dial-out to a computer for alarm notification may be performed. The user may respond by dialing-in to retrieve alarm history and a summary of current meter status.

3. Management: A remote battery test may be performed via an Ethernet network. The UPS shall be tested through invoking a single command.

17. INSTRUMENT, INDICATIONS AND ANNUNCIATIONS

Following along with described above shall be provided on the system

AA) **Charger Panel**

AC Line Voltage (with a selector switch)

AC Line Current (with a selector switch)

Charger Output Voltage (each)

Charger Output Current

Battery Current (charging / discharging current)

BB) **Inverter Panel**

DC Input Current

Standby Transformer Secondary Voltage

UPS Output Voltage

UPS Current

Power Factor Meter

Frequency Meter

Following indications lamps shall be provided

AA) **Charger Panel**

AC mains ON (3 Lamps)

Battery on Float

Battery on Boost

BB) **Inverter Panel**

Battery Output ON

Inverter - I Feeding

Inverter - II Feeding (Only for redundant system)

Standby Supply ON

Load on Bypass

Mains Synchronised

Audio-Visual Alarm shall be provided for the following complete with 'ACCEPT', 'RESET' and 'TEST' facilities.

AA) **Charger Panel**

a) Mains Undervoltage / Single Phasing

b) Charger Failure / SCR Fuse Failure

c) Reverse Polarity on DC Bus

d) Cooling Fan Tripped (common for all fans)

e) Battery Discharged

f) DC Over-Voltage

g) Battery Earth Fault

BB) **Inverter Panel**

a) DC Input Failure

b) Inverter - I Output Trouble

18. CONSTRUCTION

a) Rectifier / Charger and Inverter sections shall be housed in separate panels and shall be complete with all interconnections. The panels shall be fabricated with 1.6/2 mm thick cold rolled sheet steel and structural steel. The panels shall be free-standing. Verminproof fitted with suitable louvers for ventilation and cooling fan. Hinged doors shall be provided at the front and back where required, with dust tight gaskets. Interpanel sheet steel barriers shall be used. The enclosure shall be IP-51 (NEMA-IA).

b) Power cables shall be with aluminium / copper conductor as specified in SLD. Control cables shall be with copper conductors. All Cable connections shall be from bottom and from the front of the panel. At the bottom of the panels, a removable bolted gland plate shall be provided with double compression type cable glands fitted to it for external cable connections. Clamp type terminals shall be used for connection of all wires upto 10 mm^2 and terminals for larger size shall be bolted type suitable for cable lugs.

c) Busbars shall be colour coded and live parts shall be properly shrouded to ensure complete safety to personnel intending routine inspection by opening the panel doors. All equipment inside the panel and on door shall have suitable nameplates and device number as per the schematic diagram.

d) All fuses shall be link type with HRC links and mounted inside the panel. All power and control switches shall be mounted on the door operable externally and shall be rotary type. Space heaters and 100W incandescent lamps shall be provided in each panel. All instruments shall be switchboard type, back connected, 96 x 96 mm square of own manufacturers make. Scale shall have a red mark indicating maximum permissible operating rating. Test terminals shall be provided on a separate rail for measuring and testing of equipment to check the performance.

e) A suitably sized earth bus shall be provided at the bottom of the panels with provision for earth connection at both ends to IITM's main earth grid. Suitable

earthing of potential-free metallic parts of various equipment shall be done to ensure safety.

f) All metal parts shall be treated so as to ensure efficient anti-corrosive protection. Hardware shall be zinc passivated or electro galvanised. Panel enclosure and structure supports shall be thoroughly cleaned and degreased to remove mill scale and rust, etc. External surface shall be prepared for final painting with Manufacturer's standard colour code.

19. MECHANICAL DESIGN

A. Ventilation: The UPS shall be designed for forced-air cooling. Air inlets shall be on the front of the unit. Air outlets shall be on the top. Eighteen inches of clearance over the UPS outlets shall be required for proper air circulation. .

B. No back or side clearance or access shall be required for the system. The back and side enclosure covers shall be capable of being located directly adjacent to a wall.

C. Cable entry: Standard cable entry for the UPS cabinet shall be through either the enclosure bottom or top. A dedicated wireway shall be provided within the UPS cabinet for routing user input and output wiring.

D. Front access: All serviceable subassemblies shall be modular and capable of being replaced from the front of the UPS (front access only required). Side or rear access for installation, service, repair or maintenance of the UPS system shall not be required.

E. Service area requirements: The system shall require no more than 915 mm of front service access room and shall not require side or rear access for service or installation.

20. EQUIPMENT DETAILS

All materials and parts comprising the UPS shall be new, of current manufacture, of a high grade and free from all defects and imperfections and shall not have been in prior service, except as required during factory testing.

All active electronic devices shall be solid state. All semiconductor devices shall be hermetically sealed. All relays shall be dust tight.

The maximum working voltage, current and di/dt of all solid state power components and electronic devices, shall not exceed 75% of the ratings established by their manufacturer. The operating temperature of solid state component cases shall not be greater than 75% of their ratings. Electrolytic capacitors shall be computer grade and be operated at no more than 90% of their voltage rating.

21. WIRING

a) Access holes with cover plates are to be provided on top and bottom of the UPS and battery cabinets for inter-cabinet wiring and customer installation wiring.

b) Wiring practices, materials and coding shall be in accordance with the requirements of the National Electrical Code, OSHA and applicable local codes and standards.

c) All bolted connections of bus bars, lugs and cables shall be in accordance with requirements of the National Electric Code and other applicable standards. All electrical power connections are to be torqued to the required value and marked.

22. VENTILATION

Adequate ventilation shall be provided to insure that all components are operated within their environmental ratings. All fans are to be equipped with wind vane sensors connected to an alarm on the module control panel.

Temperature sensors shall be provided to monitor temperature of critical components. Upon detection of temperatures in excess of component manufacturer's recommended ambient working temperature, the sensors shall cause audible and visual alarms to be sounded on the module control panel.

Forced ventilation if provided by means of fans shall have 100% redundancy.

If redundancy is not provided then it shall be possible to run the system at rated load for half hour and at reduced load (about 75%) continuously without any damage to the system.

23. ENVIRONMENTAL REQUIREMENTS

A. The UPS shall withstand any combination of the following external environmental conditions without operational degradation.

1. Operating Temperature: 0 degrees C to + 40 degrees C (32 degrees F to 104 degrees F) no derating is required within this range (excluding batteries).
2. Storage Temperature: - 25 degrees C to + 60 degrees C (-13 degrees F to 140 degrees F). Prolonged storage above + 40 degrees C (104 degrees F) will cause rapid battery self-discharge.
3. Relative Humidity (operating and storage): 95% maximum non-condensing.
4. Elevation:

(1) Operational: 1000 meters above sea level at 40 C maximum. Above this level altitude de-rating as per EN62040-3.

(2) Transportation: Capable of air transport, excluding batteries.

24. UPS PROTECTION

A. Rectifier/Charger and Bypass protection shall be provided through fusing.

B. Battery protection shall be provided by thermal-magnetic molded-case circuit breakers in each battery cabinet (if standard battery pack is provided) or external protective device for an external battery.

C. Electronic current limiting circuitry and fuses in the Inverter circuit shall provide output protection. To comply with agency safety requirements, the UPS shall not rely upon any disconnect devices outside of the UPS to isolate the battery cabinet from the UPS.

D. To comply with agency safety requirements, the UPS shall not rely upon any disconnect devices outside of the UPS to isolate the battery cabinet from the UPS.

25. SPARES

Vendor shall recommend and provide spare parts needed for start-up and two years operation. Recommended spares should take into account related factors like equipment reliability, effect of equipment downtime upon production and safety, cost of and availability of equipment service facilities.

All spare parts furnished by vendor shall be wrapped and packed so that they will be presented in original as new condition under the normal conditions of storage to be anticipated and shall be properly taped and coded so that later identification as to intended equipment usage will be facilitated. They shall be packaged separately, clearly marked as spare parts and shipped at the same time as the equipment. Packing list shall be furnished so that the parts can be handled without uncrating, if desired.

26. INSPECTION & TESTING

26.1. The Battery shall be subject to inspection by Client's representative. Manufacturer shall furnish to inspectors all requested information concerning the supply.

26.2. Battery shall be tested as per relevant IS and test certificates shall be furnished before despatch.

26.3. The UPS System will be tested in the presence of Client's representative. The following tests shall apply:

26.3.1. Full load heat run for eight hours (unit rate to be furnished separately).

26.3.2. Current forcing test.

26.3.3. Recording of time for mains to inverter changeover and vice-versa.

26.3.4. Recording of 1/2 load change transient.

26.3.5. Recording of full load change transient.

26.3.6. Functional Tests.

26.4. Detailed inspection will be performed to ascertain that the data sheet and other contractual aspect are complied with the earthing system must be inspected for robustness and continuity.

26.5. QAP plan needs to be submitted before inspection for approval .

27. SAFETY

27.1. The UPS shall be compliant with IEC 62040-1.

28. DRAWINGS

28.1. The Manufacturer shall Supply Drawings & documents to the satisfaction of the client in 6 sets. All drawing to be submitted in Auto CAD format only.

29. SUBMITTALS

A. The UPS shall be supplied with sufficient documentation, including the following manuals:

1. Installation and Operation Manual: One copy of the installation and operation manual shall be furnished. It shall possess sufficient detail and clarity to enable the

owner's technicians or representatives to install and operate the UPS equipment and accessories. The manual shall include the following major items:

a) UPS description
b) UPS site planning and unpacking
c) UPS installation
d) Optional accessory installation
e) UPS theory of operation
f) Operating procedures
g) System events
h) UPS maintenance
i) Performance and technical specifications
j) Wiring requirements and recommendations
k) Physical features and requirements

Cabinet dimensions

30. **DATASHEET-** The Manufacturer shall Supply Drawings & documents to the satisfaction of the client in 6 sets.

31. **INSTALLATION**

A. Install in accordance with manufacturer's instructions.

32. COMMISSIONING

A. UPS manufacturer shall offer the following optional services:

1. Pre-energize visit to inspect installation and provide guidance to installers as required.
2. Post-start-up visit for alarm notification configuration, operator training, etc.

B. The following procedures and tests shall be performed by Field Service personnel during the UPS startup:

1. Visual Inspection:
   a) Visually inspect all equipment for signs of damage or foreign materials.
   b) Observe the type of ventilation, the cleanliness of the room, the use of proper signs, and any other safety related factors.
2. Mechanical Inspection:
   a) Check all the power connections for tightness.
   b) Check all the control wiring terminations and plugs for tightness or proper seating.
3. Electrical Pre-check:

a) Check the DC bus for a possible short circuit.

b) Check input and Bypass power for proper voltages and phase rotation.

c) Check all lamp test functions.

4. Initial UPS Startup:

a) Verify that all the alarms are in a "go" condition.

b) Energize the UPS module and verify the proper DC, walkup, and AC phase on.

c) Check the DC link holding voltage, AC output voltages, and output waveforms.

d) Check the final DC link voltage and Inverter AC output. Adjust if required.

e) Check for the proper synchronization.

f) Check for the voltage difference between the Inverter output and the Bypass source.

5. Operational Training: Before leaving the site, the field service engineer shall familiarize responsible personnel with the operation of the UPS. The UPS equipment shall be available for demonstration of the modes of operation.

33. QUALIFICATIONS

A. The UPS manufacturer shall have a minimum of forty years experience in the design, manufacture and testing of solid-state UPS systems.

B. The UPS manufacturer shall have ISO 9001 certification for engineering/R&D, manufacturing facilities and service organization.

C. The UPS manufacturer shall maintain a staffed 7x24x365 call center for technical and emergency support.

D. Field Engineering Support: The UPS manufacturer shall directly employ a nationwide field service department staffed by factory-trained field service engineers dedicated to startup, maintenance, and repair of UPS equipment. The organization shall consist of local offices managed from a central location. Field engineers shall be deployed in key population areas to provide on-site emergency response within 24 hours. A map showing the location of all field service offices must be submitted with the proposal. Third-party maintenance will not be accepted.

E. Spare Parts Support: Parts supplies shall be located in the field to provide 80% of all emergency needs. The factory shall serve as the central stocking facility where a dedicated supply of all parts shall be available within 24 hours.

F. Product Enhancement Program: The UPS manufacturer shall make available feature upgrade service offerings to all users as they are developed. These upgrades shall be available as optional field-installable kits.

G. Maintenance Contracts: A complete range of preventative and corrective maintenance contracts shall be provided and offered with the proposal. Under these contracts, the manufacturer shall maintain the user's equipment to the latest factory revisions.

34. GTP TO BE FILLED BY UPS VENDOR.

Sr. No	Description	Requirement		
			Vendor to Specify for 500KVA	Vendor to Specify for 100KVA
1.0	**MODEL**	please specify		
1.1	TECHNOLOGY	IGBT Rectifier & IGBT Inverter, Microprocessor based, true online double conversion, Online Transformer freeTechnology		
1.2	Inverter	IGBT		
1.3	Rectifier	IGBT		
1.4	Max. Permissible Non-linear loads	100%		
1.5	Max. unbalanced load	100%		
2.0	**PHYSICAL Dimension & Weight**			
2.1	Construction	Compact. Modular design		
2.2	UPS Floor Space	Each UPS Floor space should not exced 1.26 Sq meter		
2.2	Ventilation	Specify		
2.3	UPS Dimension & weight			
	Length in MM	Specify		
	Width in MM	Specify		
	Height in MM	Specify		
	Weight in kgs	Specify		
2.4	Batterty Bank (Dimention and weight)			
	Length in MM	Specify		
	Width in MM	Specify		
	Height in MM	Specify		
	Weight in kgs	Specify		
	Accessibility (front & back with clear Dimension to be specfied)	Specify		
	Cable connection Bottom for Input & Output.	Specify		
	Parallel Configuration upto no of Module .	6 nos		
	DG Set Sizing No of time of UPS Module. & Minimum Size of DG set Required	Specify		

	Minmum Input circuit breaker required to be specified	Specify		
3	**INPUT**			
3.1	Voltage	380V -400V- 415V -433V		
3.2	Voltage range	340 to 460V		
3.3	Frequency	50 Hz		
3.4	Frequency range	+/- 5 Hz		
3.5	Ripple content	<1% with battery connected		
3.7	Input Power Factor			
	100%	0.99		
	75%	0.99		
	50%	0.99		
	25%	0.98		
3.8	Current Harmonic on source			
	100%	<3%		
	75%	<5%		
	50%	<5%		
	25%	<10%		
3.9	Maximum current with out Battery Charging	Amps		
4	**OUTPUT**			
4.1	Voltage	380/ 400/ 415 V		
4.2	KW			
4.3	Voltage regulation			
	Balanced	+/- 1%, 3 Ph. + N		
	Un Balanced	+/- 3%, 3 Ph. + N		
4.4	Power Factor	0.8lag - unity- 0.9 lead (Derating of UPS not acceptable in this range)		
4.5	Frequency	50Hz		
4.6	Frequency range	+/- 0.5 Hz		
4.7	Frequency synch. range	0.25 to 3 Hz		
4.8	Transient output voltage variation for 100% block loading	+/-2%		
4.9	Recovery time for 100% block load	≤ 5 mill second (ms)	-	-
4.11	Wave form	Sinusoidal		
4.12	Total Voltage Distortion out put side			
	Linear load	< 2 %		
	Non-Linear load	< 3 %		
4.13	Crest Factor	3:1		

4.14	Phase Displacement			
	a) Balanced load	120 +/- 0.65°		
	b) 100 % Unbalanced load	120 +/- 2°		
4.15	Inverter Efficiency			
	c) 100 %	Specify		
4.16	Overall Efficiency for UPS			
	b) 50 %	91%		
	c) 75 %	91%		
	d) 100 %	92%		
4.17	Efficiency of UPS in Battery Operations			
	b) 50 %			
	c) 75 %			
	d) 100 %			
4.18	Overload			
	a) 125 %	10 minutes		
	b) 150 %	30 Sec		
4.19	Short circuit Capability	Vendor to Specify		
5	**BUILT IN STATIC BYPASS**	Required		
5.1	Inverter and Static Bypass change over time	Specify		
5.2	Fuse @ static bypass	No as per IEEE standards.		
5.3	Short circuit Capability	Vendor to Specify		
5.4	Overload	Specify		
5.5	Transfer time	Less than 5 milli secs.		
5.6	Manual Bypass inside ups only(input/output)	Required		
6	**DC CHARACTERISTIC**			
	Battery backup to be calculated at .9 pf.			
6.1	VAH	>43200		
6.1	DC bus voltage	Specify		
6.2	DC Current	Specify		
6.3	No. of cells with AH	Specify		
6.4	battery voltage	Specify		
6.5	End. Cell voltage	1.75		
6.6	Float voltage	specify		
6.7	DC current at 100% load	specify		
6.8	Charging current	specify		
6.9	Charging time	10 Hrs. max.		

6.10	True autonomy / measurement	Software on SNMP & UPS monitor panel		
6.11	Temp. compensated charger	Required/ Mandatory		
6.12	Automatic battery load test	Required/ Mandatory		
6.13	Batt. Breaker with protection	Required/ Mandatory		
	Required Battery Back Up	15 Minutes		
7	**PROTECTION**			
7.1	Overload (O/L)	Required		
7.2	Short circuit (SC)	Required		
7.3	Input low voltage	Required		
7.4	Output over voltage	Required		
7.5	Battery over charging	Required		
7.6	Battery over discharging	Required		
7.7	IP Protection			
7.8	DC over current Protection			
8	**ENVIRONMENTAL**			
8.1	Ambient temperature range	0 to 40° C		
8.1	Relative humidity	95 % RH		
8.2	Max. operating altitude	1000 M above MSL		
	without derating			
8.3	Acoustic Noise	65db (Specify)		
9	**AUDIO / VISUAL DISPLAY**			
9.1	Over load	Required		
9.2	Short circuit	Required		
9.3	Input low voltage	Required		
9.4	Input over voltage	Required		
9.5	Battery over discharging	Required		
9.6	Battery on load	Required		
9.7	Battery low	Required		
9.8	Fuse failure	Required		
9.9	Fan failure	Required		
9.10	Inverter failure	Required		
9.11	DC over voltage	Required		
10	**VISUAL DISPLAY**			
10.1	Input/Output voltage	Required		
10.2	Output current .	Required		
10.3	Input/ Output frequency	Required		
10.4	Output power in KVA and KW	Required		
10.5	Output load power factor	Required		
10.6	Output load crest factor	Required		
10.7	battery DC voltage	Required		
10.8	Charging current	Required		
10.9	Dis-Charging Current	Required		
10.1	Autonomy Time	Required		
10.11	Event logs	2500 events mandatory		
11	**OTHERS**			

11.2	Software with LAN connect	Required		
11.3	Auto paging	Required		
11.4	SNMP compatibility	Required		
11.5	Diagnostic system	Required		
11.6	Single line mimic diagram	Required		
11.7	Telemonitoring with software	Required- Mandatory		
11.8	Capablity to parallel 6 similar ups systems	required		
11.9	ventilation	forced air cooling with integral fans		
11.10	Opertating temperature	0-40deg.C		
11.11	Battery management	required		
11.12	Power Transfer Mode	auto systems (during fault condition)		
12	**Colour**			
13	**Online Thermal Disipation in Btu/Hr**			
	at 100 %			
	at 75 %			
	at 50 %			
	at 25 %			

Sr. No.	Function	AI	DI	AO	DO		
	24 Hrs. Operation with 175 TR Chiller 4 Nos. Air-cooled (2 W+ 2SB)						
1	Chiller On / Off command				4	Potential free contact from DDC	
2	Chiller Run Status		4			Potential free contact from DDC	
3	Chiller local / remote status		4			Potential free contact from DDC	
4	Chiller Trip / Fault status		4			Potential free contact from DDC	
5	Chilled water supply header temperature	1				Immersion Temperature sensor by BMS Vendor (Daikin)	
6	Chilled water return header temperature	1				Immersion Temperature sensor by BMS Vendor (Daikin)	
7	Chilled water return header flow rate	1				Flow meters by BMS vendor (VKHVAC)	
8	Chiller isolation valves open / close command				4	Potential free contact from DDC	
9	Chiller out valves open / close status		4			Potential free contact from Valve Actuator	
11	Outside air relative humidity monitoring	1				Outside Air Humidity Sensor to be supplied by BMS vendor	
12	Outside air temp monitoring	1				Outside Air Temperature Sensor to be supplied by BMS vendor	
	Primary Pump						Through Plant manager
1	Pump Start/Stop Command				4	Potential free contact from DDC	
2	Pump Auto/Manual Status		4			Potential free contact from Pump panel	
3	Pump Run Status		4			Potential free contact from Pump panel	
4	Pump Trip Status		4			Potential free contact from Pump panel	
5	Differential Pressure Snsor	4				DP sensor in CHW Line by BMS vendor (VKHVAC and DAIKIN)	
6	VFD Speed Control		4			0-10V DC control Signal form VFD (VKHVAC)	
	Condenser Coil fan Section						
1	Condenser Fan Auto/Manual Status		4			Potential free contact from Pump panel	
2	Condenser Fan Run Status		4			Potential free contact from Pump panel	
3	Condenser Fan Trip Status		4			Potential free contact from Pump panel	
4	Condenser Isolation Valve Command				4	Potential free contact from DDC	
5	Condenser Isolation Valve Open/Close status		4			Potential free contact from Valve Actuator	
6	Condenser Fan VFD Speed Control	4	4	4		0-10V DC control Signal form VFD	
	Valves						
1	Motorized isolation valves for main chiller header		4		4	Potential free contact	
2	**2 way motorized valves**		4		4	Potential free contact	
III	**Comfort AC for Electrical, UPS and BMS room**						
2	Ductable units ON/OFF Command		10		10	Volt Free Contact from BMS to AHU Starter Panel.	
3	Ductable units TRIP STATUS		28			Volt Free Contact from ACB to BMS	
4	Room temperature and RH Sensor	4				Temperature + RH Sensor by BMS	
5	Humidity Sensor	6				Humidity Sensor by BMS	
6	Battery room exhaust fan		2				
C	**Electrical System**						
I	**Main Power Panel HT, Main LT**						
1	Air Circuit Breaker On/Off and Status		30		30	Volt Free Contact from ACB to BMS	
2	Air Circuit Breaker TRIP Status		30			Volt Free Contact from ACB to BMS	
II	**UPS Input Panel 1 & UPS Output Panel 2 and non-IT UPS panel : 4 nos**						
1	Air Circuit Breaker and MCCB On/Off/TRIP Status		30		30	Volt Free Contact from ACB to BMS	
2	ACB/ MCCB TRIP Status		30			Volt Free Contact from MCCB to BMS	
III	**Chiller panels, pump, secondary pump panels**						
1	Air Circuit Breaker On/Off/ Status		30		30	Volt Free Contact from ACB to BMS	
2	ACB /MCCB TRIP Status		30			Volt Free Contact from MCCB to BMS	
III	**PAHU , PAHU fan,lightning, emergency lighting panels**						
1	MCCB On/Off/ and status		10		10	Volt Free Contact from MCCB to BMS	
2	MCCB TRIP Status		10			Volt Free Contact from MCCB to BMS	
	DG Breaker 1 ,2 ,3 4 and 5 in synch Panel		30				

	HT breaker 1 ,2 and 3		18				
	Underground Diesel Storage Tank - Pump 1 W and 1 SB		8		4		
	Level Sensor - HSD	4					
	Transformer 1 and 2		12				
	Miscellaneous						
1	RH and Temp sensors	10				Sensors in BMS vendor scope	
2	CO2 Analysers	2				CO2 analyszers in BMS vendor scope	
7	VFD fans for Battery rooms	3			3		
8	Exhaust fans for Utility room ground floor and first floor (on/0ff/ and trip): 10 fans		5	5			
9	Hydrozen PPM meter integration	2				sensor in BMS vendor scope	
	Total	**44**	**373**	**9**	**141**		
	Spare @20%	**9**	**75**	**2**	**28**		
	Total hardware points	**53**	**448**	**11**	**169**		
D	**Integration**						**Software Points**
1	Integration of Chiller Plant Manager to BMS on MODBUS RTU on RS485					3Nos. Chiller's supplied by HVAC vendor. (105 Points)	105
2	DG 1 ,2 and 3						90
3	DG flow meter 1,2,3 and 4						60
	Load Manager						120
	ATS panel 1 and Panel -2						30
3	Integration of UPS' s on BACNet/IP / MODBUS RTU					8 Static UPS by UPS vendor (160 Points)	160
4	Integration of PAC' s on BACNet/IP / MODBUS RTU					3 Nos. of PAC's by PAC vendor (45 points)	45
5	Integration of PDU's on BACNet/IP / MODBUS RTU					8 Nos. of PDU's by PDU vendor (48 points)	
6	Integration of EA on MODBUS RTU on RS485					60 EA supplied by Electrical vendor (240 points)	240
7							
8	Integration with addressable Fire alarm system					Software level Seamless integration with BMS (200 points)	200
9	Access Control system					Software level Seamless integration with BMS on Same platform. Unlock the main doors in case of emergency.	50
10	WATER LEAK DETECTION					MODBUS inetrface with BMS/ Hardwire Interface thru DDC	50
11	VESDA					MODBUS inetrface with BMS/ Hardwire Interface thru DDC	75
12	Gas supression system status					hardwired	2
13	Rodent repellant					MODBUS inetrface with BMS/ Hardwire Interface thru DDC	20
	Total Software points						1247
	Spare of 20%						249.4
	Total software points						1496

Total Hardwaired Points	680
Total Software Points	1496
Total Hardwired and Softwired Points	2177

Note- DG , Transformer , LT breaker , ATS , HT panels are in the sunstation area . Local PLC panel (I/O Panel) needs to be considered . This data to be bundled and transmit on MOd Bus by TCP /IP / Ethernet to main BMS server by Cat 6 (Armoured) located in ground floor BMS room.Approximate cable length will be 250 meters.

DWG.No.
ITM_137_PD_ELEC_ER_002 R0

LEGENDS

EARTHING STRIP

58 64 71 76 81 J

59 67 72 77 82 K

60 68 75 78 83 L

61 69 74 79 84 M

A A

H H

TAPE LIBRARY

TAPE LIBRARY

SERVICE SHAFT

0.90 0.85 1.51

2.15

PDU

PDU

PAC PAC PAC

BEAM ABOVE

BEAM ABOVE

SERVICE PLATFORM

COLD AISLE

HOT AISLE

I DATAPLEX RACK 2

STORAGE POD

STORAGE POD

STORAGE POD

STORAGE POD

STORAGE POD

IB SWITCH 1 IB SWITCH 1 IB SWITCH 1 IB SWITCH 1

MAINTENANCE RACK

IB SWITCH 1

IB SWITCH 1

BACK UP & SAN

UTILITY RACK

COLD AISLE

HOT AISLE

BEAM ABOVE

PDU PDU PDU PDU

PDU PDU

SERVICE SHAFT

DWG.No.
ITM_137_PD_ELEC_LT_002 R0

LEGENDS

4X14w. SURFACE MOUNTEDLIGHT FIXTURE

58 64 71 76 81 J

59 67 72 77 82 K

60 68 74 78 83 L

61 69 74 79 84 M

75

TAPE LIBRARY

TAPE LIBRARY

PAC

PAC

PAC

0.90

0.85

1.51

SERVICE SHAFT

PDU

PDU

2.15

BEAM ABOVE

BEAM ABOVE

A

H

I DATAPLEX RACK 2

COLD AISLE

HOT AISLE

STORAGE POD

STORAGE POD

STORAGE POD

STORAGE POD

STORAGE POD

STORAGE POD

MAINTENANCE RACK

IB SWITCH 1

IB SWITCH 1

BACK UP & SAN

UTILITY RACK

SERVICE PLATFORM

PDU

PDU

PDU

PDU

PDU

PDU

SERVICE SHAFT

DWG.No.
ITM_137_PD_ELEC_PWR_002 R0

LEGENDS

450X75mm. CABLE TRAY

750X75mm. CABLE TRAY

58 64 71 76 81 J

59 67 72 77 82 K

60 68 73 78 83 L

61 69 74 79 84 M

75

TAPE LIBRARY

TAPE LIBRARY

SERVICE SHAFT

0.90

0.85

1.51

PDU

PDU

2.15

BEAM ABOVE

PAC

PAC

PAC

BEAM ABOVE

2 TIRE 750X75mm.
CABLE TRAY

H

A

SERVICE
PLATFORM

2 TIRE 450X75mm.
CABLE TRAY

COLD AISLE

HOT AISLE

I DATAPLEX RACK 2

STORAGE POD

STORAGE POD

STORAGE POD

STORAGE POD

STORAGE POD

STORAGE POD

MAINTENANCE RACK

IB SWITCH 1

IB SWITCH 1

BACK UP & SAN

UTILITY RACK

IB SWITCH 1

IB SWITCH 1

IB SWITCH 1

IB SWITCH 1

COLD AISLE

HOT AISLE

COLD AISLE

HOT AISLE

BEAM ABOVE

PDU

PDU

PDU

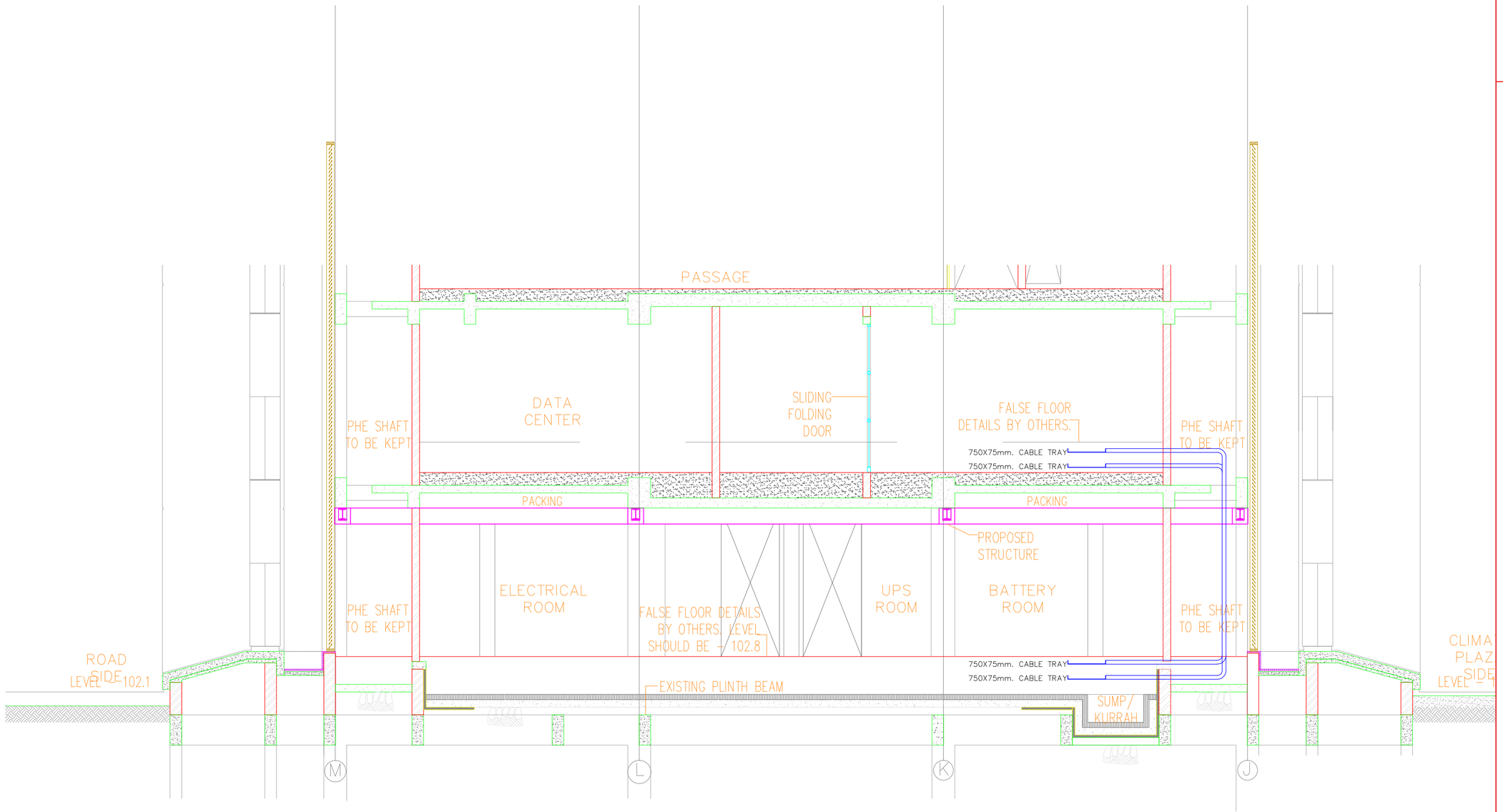
PDU

PDU

SERVICE SHAFT

2 TIRE 750X75mm.
CABLE TRAY

DWG.No.
ITM_137_PD_ELEC_SEC_002 R0

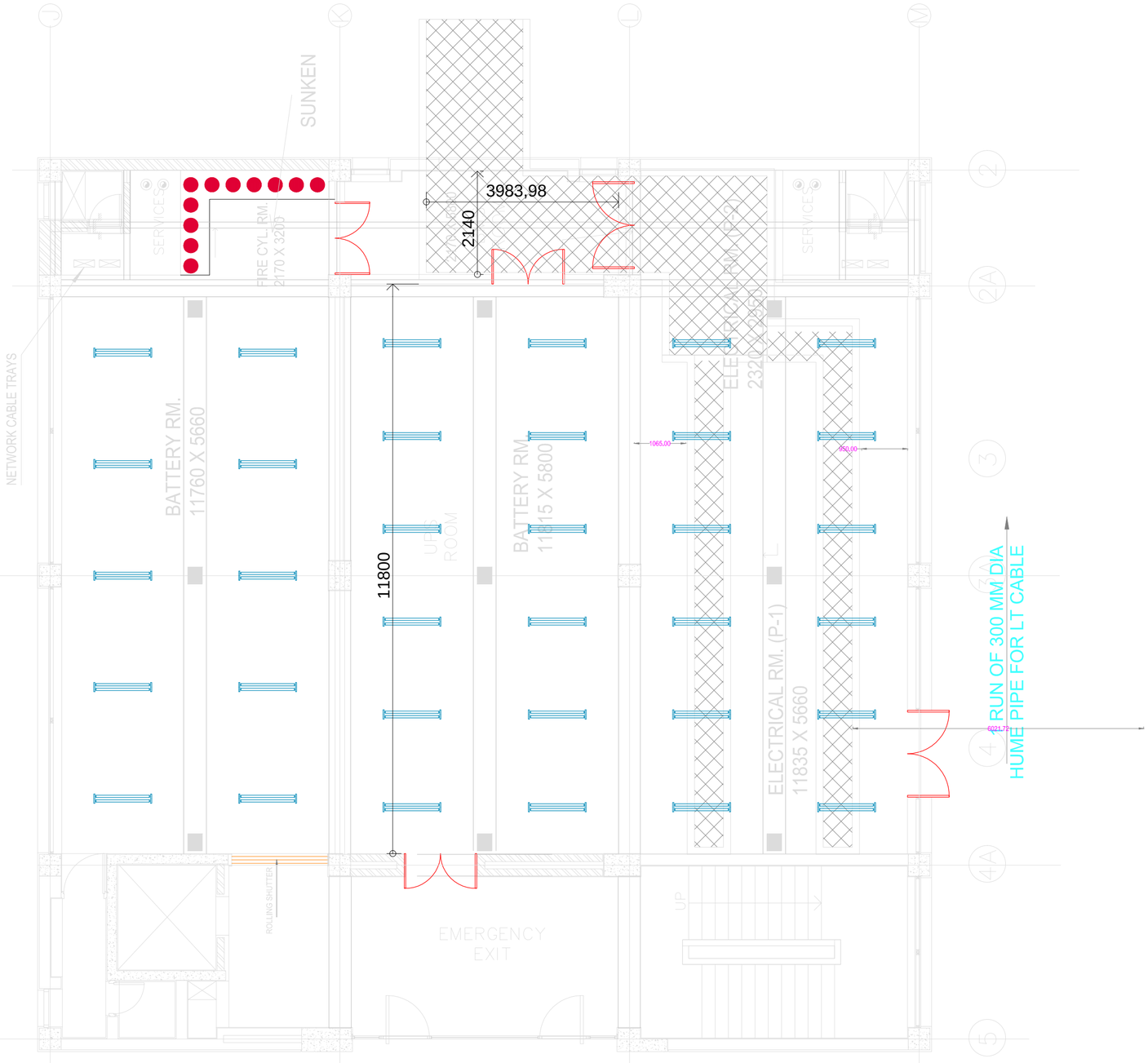


SECTION
JJ'

DWG.No.
ITM_137_PD_ELEC_LTG_001 R0

LEGENDS

2X28w. FIXTURE



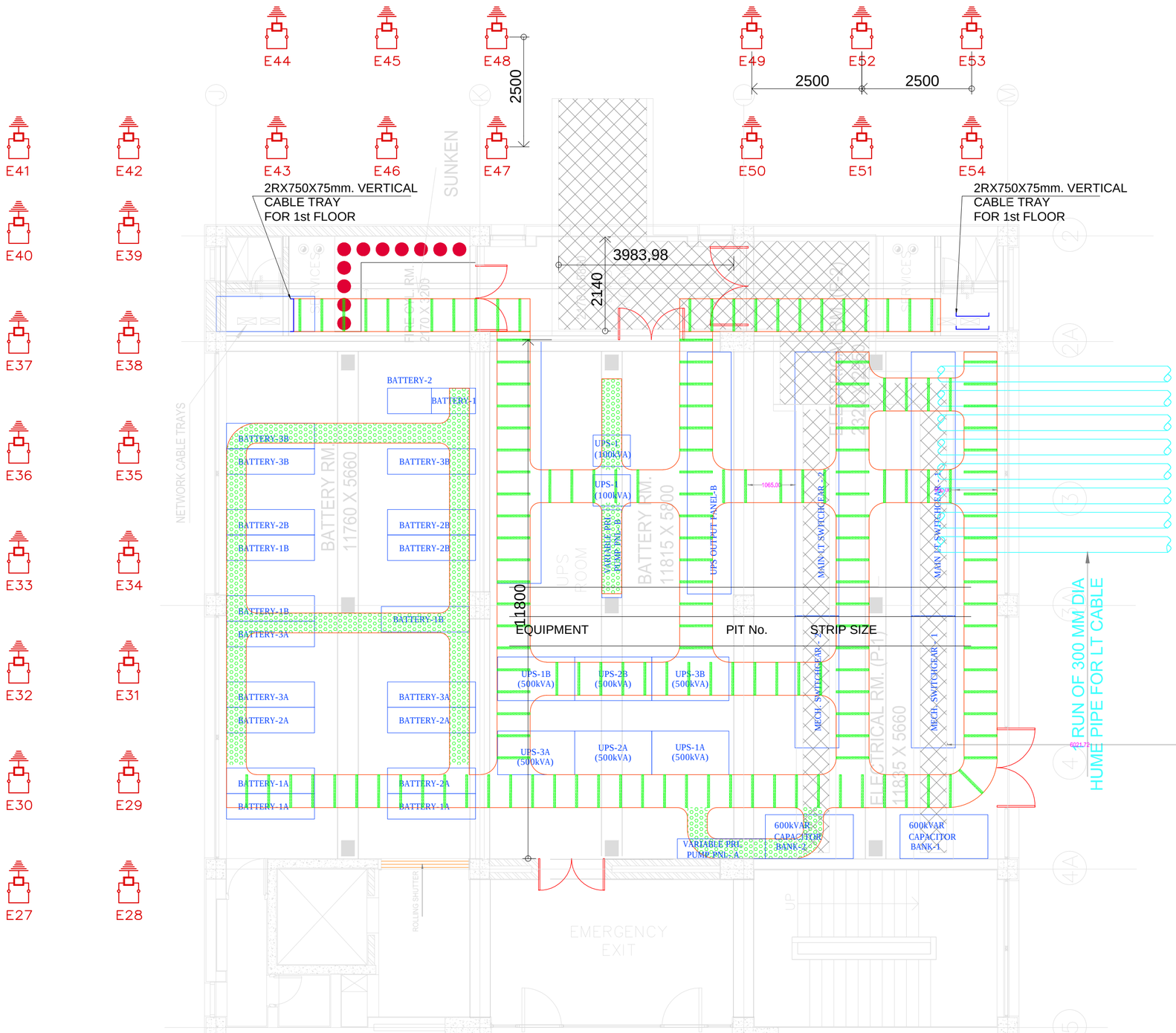
DWG.No.
ITM_137_PD_ELEC_PD_001 R0

LEGENDS

450X75mm. CABLE TRAY

750X75mm. CABLE TRAY

EARTHING PIT



EARTHING SCHEDULE		
EQUIPMENT	PIT No.	STRIP SIZE
500 KVA UPS-01 BODY	27 & 28	25 X 3 mm Cu strip
500 KVA UPS-02 BODY	29 & 30	25 X 3 mm Cu strip
500 KVA UPS-03 BODY	31 & 32	25 X 3 mm Cu strip
500 KVA UPS-04 BODY	33 & 34	25 X 3 mm Cu strip
500 KVA UPS-05 BODY	35 & 36	25 X 3 mm Cu strip
500 KVA UPS-06 BODY	37 & 38	25 X 3 mm Cu strip
100 KVA UPS-01 BODY	39 & 40	25 X 3 mm Cu strip
100 KVA UPS-02 BODY	41 & 42	25 X 3 mm Cu strip
Main LT Panel-01	43 & 44	50 x 10 mm GI Strip
Main LT Panel-02	45 & 46	25 x 3 mm Cu Strip
Chiller Panel-01		32 x 6 mm GI Strip
Chiller Panel-02		32 x 6 mm GI Strip
UPS OUTPUT Panel-01		50 x 6 mm GI Strip
UPS OUTPUT Panel-02		50 x 6 mm GI Strip
Power Distribution Unit -01A	47	25 X 3 mm Cu strip
Power Distribution Unit -02A	48	25 X 3 mm Cu strip
Power Distribution Unit -03A	49	25 X 3 mm Cu strip
Power Distribution Unit -04A	50	25 X 3 mm Cu strip
Power Distribution Unit -01B	51	25 X 3 mm Cu strip
Power Distribution Unit -02B	52	25 X 3 mm Cu strip
Power Distribution Unit -03B	53	25 X 3 mm Cu strip
Power Distribution Unit -04B	54	25 X 3 mm Cu strip

DWG.No.
ITM_137_PD_ELEC_SP_001 R0

LEGENDS
HT CABLE
CABLE CHAMBER
Ø300mm. RCC HUME PIPE

REVISIONS :

NO.	DATE	REMARKS
R0	27.05.13	FOR TENDER

CLIENT:
IITM-PUNE
ADDRESS
TITLE:
EXTERNAL EQUIPMENT LAYOUT

DWG.No.
ITM_137_PD_ELEC_SP_001 R0

JOB NO : ITM-137 | DRAWN BY : UJWAL
SCALE : 1: 200 | CHECKED BY : AMOL
DATE : 27.05.13

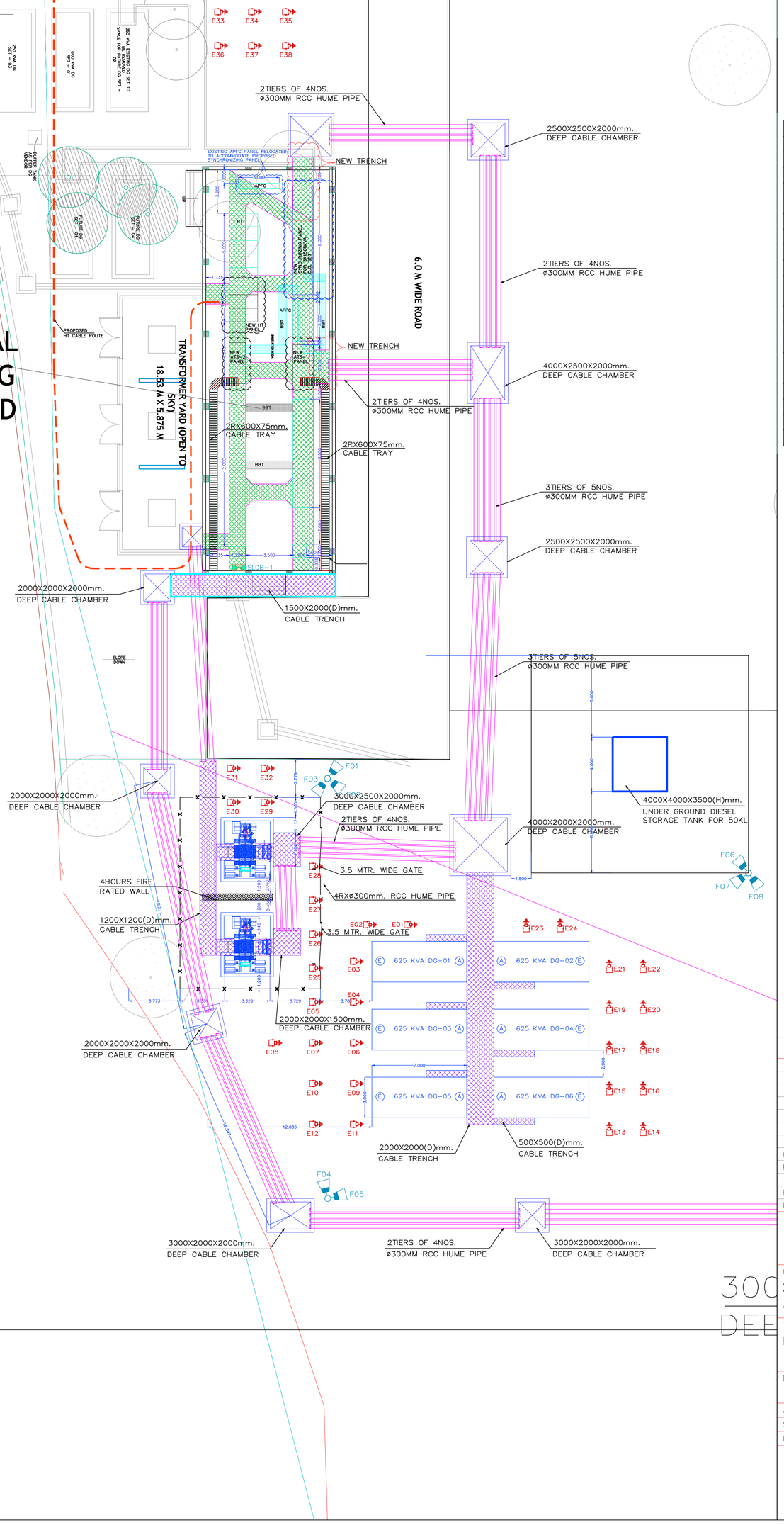
DR. HOMI BHABHA ROAD
6 M WIDE ROAD
AREA UNDER ROAD
OPEN SPACE – 1
OPEN SPACE – 2
OPEN SPACE – 3
AREA UNDER NALA
NALA
IITM MAIN BUILDING G+2
IITM MAIN BUILDING G+2
LIBRARY G+2
EXISTING ROAD
PROPOSED HPC BUILDING G+1
SERVICE ROAD 6M WIDE
OPEN SPACE – 4
PROPOSED CCCR BUILDING G+2
DATA CENTER AREA
PROPOSED 9M WIDE ROAD
3000X2000X2000mm. DEEP CABLE CHAMBER
8RXØ300mm. RCC HUME PIPE
PROPOSED LT CABLE ROUTE
PROPOSED ROAD
PROPOSED 9 M WIDE ROAD
AMINITY SPACE – 3
AMINITY SPACE – 4
EXISTING GARAGE (G)
EXISTING GARAGE (G)
EXISTING WELL & PUMP HOUSE
AMINITY SPACE – 6
EXISTING ROAD 12M WIDE
PROPOSED 6.0 M WIDE ROAD
EXISTING CANTEEN BUILDING (G)
AMINITY SPACE – 5
AMINITY SPACE – 1
KIOSK AREA
AMINITY SPACE – 2
GUEST HOUSE G+2
EXISTING ROAD
PROPOSED CPT & RMU BUILDING
PROPOSED HT CABLE ROUTE
PROPOSED UTILITY BUILDING (G+2)
EXISTING MECHANICAL WORKSHOP (G)
EXISTING ELECTRICAL PANEL ROOM
PROPOSED DG YARD
PROPOSED ELECTRICAL SUBSTATION BUILDING & TRANSFORMER YARD
SUBSTATION AREA
EXISTING STRUCTURE G
EXISTING SITE BOUNDARY

CANTEEN BUILDING (G)

TING ELECTRICAL
PANEL ROOM

OSED DG YARD

POSED ELECTRICAL
STATION BUILDING
RANSFORMER YARD



DWG.No.
ITM_137_PD_ELEC_EQ_001 R3

LEGENDS

- 450X75mm. CABLE TRAY
- 600X75mm. CABLE TRAY
- CABLE CHAMBER
- Ø300mm. RCC HUME PIPE
- EARTHING PIT

EARTHING SCHEDULE

EQUIPMENT	PIT No.	STRIP SIZE
625 kVA DG Set-01 body	1 & 2	32 x 6 mm GI Strip
625 kVA DG Set-01 'N'	3 & 4	32 x 6 mm Cu Strip
625 kVA DG Set-02 body	5 & 6	32 x 6 mm GI Strip
625 kVA DG Set-02 'N'	7 & 8	32 x 6 mm Cu Strip
625 kVA DG Set-03 body	9 & 10	32 x 6 mm GI Strip
625 kVA DG Set-03 'N'	11 & 12	32 x 6 mm Cu Strip
625 kVA DG Set-04 body	13 & 14	32 x 6 mm GI Strip
625 kVA DG Set-04 'N'	15 & 16	32 x 6 mm Cu Strip
625 kVA DG Set-05 body	17 & 18	32 x 6 mm GI Strip
625 kVA DG Set-05 'N'	19 & 20	32 x 6 mm Cu Strip
625 kVA DG Set-06 body	21 & 22	32 x 6 mm GI Strip
625 kVA DG Set-06 'N'	23 & 24	32 x 6 mm Cu Strip
2500 KVA Trafo-1 'N'	25 & 26	50 x 10 mm Cu Strip
2500 KVA Trafo-1 Body	27 & 28	75 x 10 mm GI Strip
2500 KVA Trafo-2 'N'	29 & 30	50 x 10 mm Cu Strip
2500 KVA Trafo-2 Body	31 & 32	75 x 10 mm GI Strip
HT Panel	33 & 34	50 x 10 mm GI Strip
ATS Panel 1	35 & 36	75 x 10 mm GI Strip
ATS Panel 2	37 & 38	75 x 10 mm GI Strip

REVISIONS :

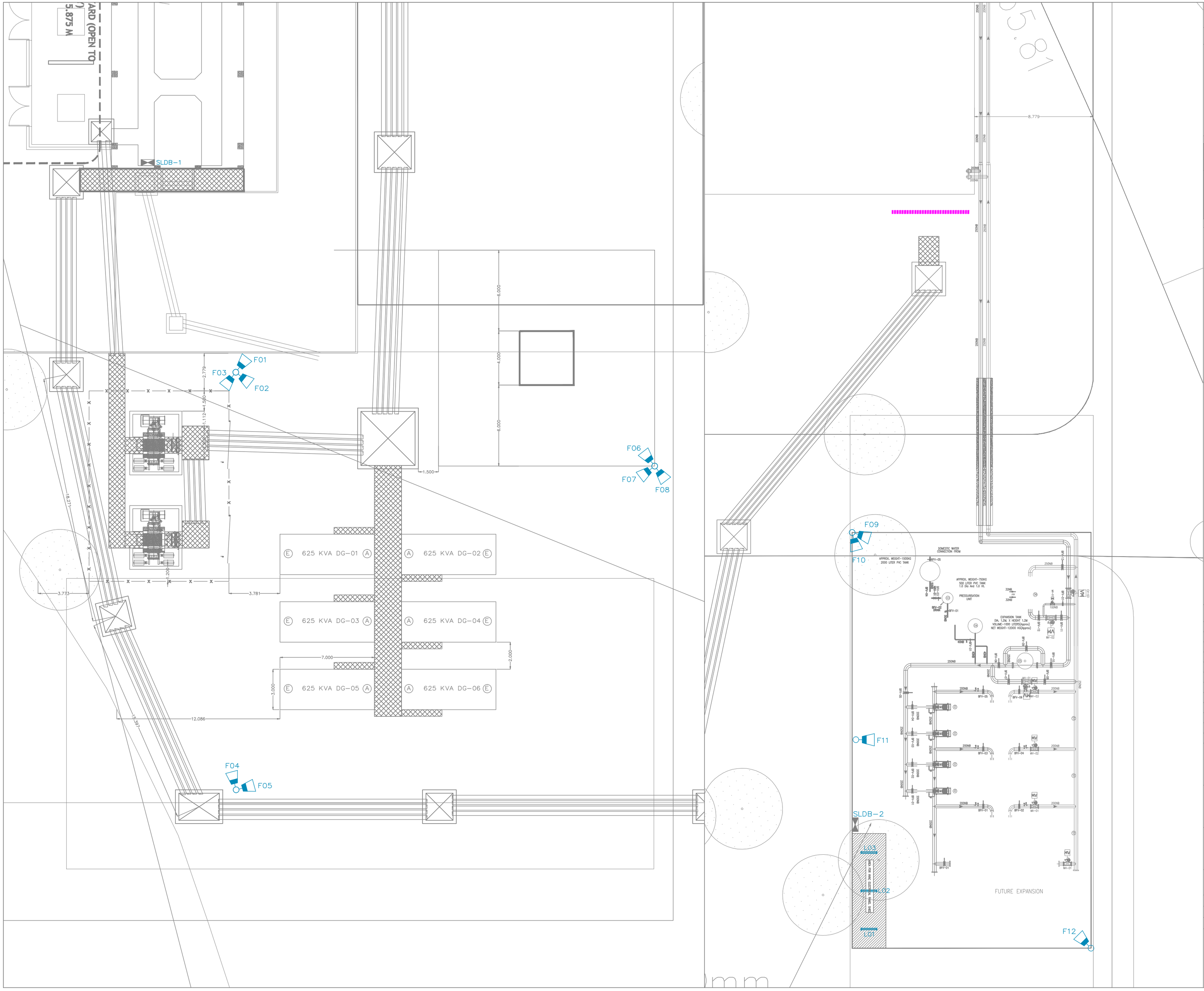
NO.	DATE	REMARKS
R3	29.05.13	D.G. SET REVISED
R2	27.05.13	D.G. SET LOCATION CHANGED
R1	13.05.13	REVISED AS PER MEETING DATED 10.05.13
R0	02.05.13	FIRST ISSUE

CLIENT:
IITM-PUNE
ADDRESS

TITLE:
EQUIPMENT LAYOUT

DWG.No.
ITM_137_PD_ELEC_EQ_001 R2

JOB NO :	ITM-137	DRAWN BY : UJWAL	
SCALE :	1: 200	CHECKED BY : AMOL	
DATE :	02.05.13		



DWG.No.
ITM_137_PD_ELEC_EXLT_001 R0

LEGENDS	QUT
1X250W FLOOD LIGHT FIXTURE ON POLE	12

REVISIONS :

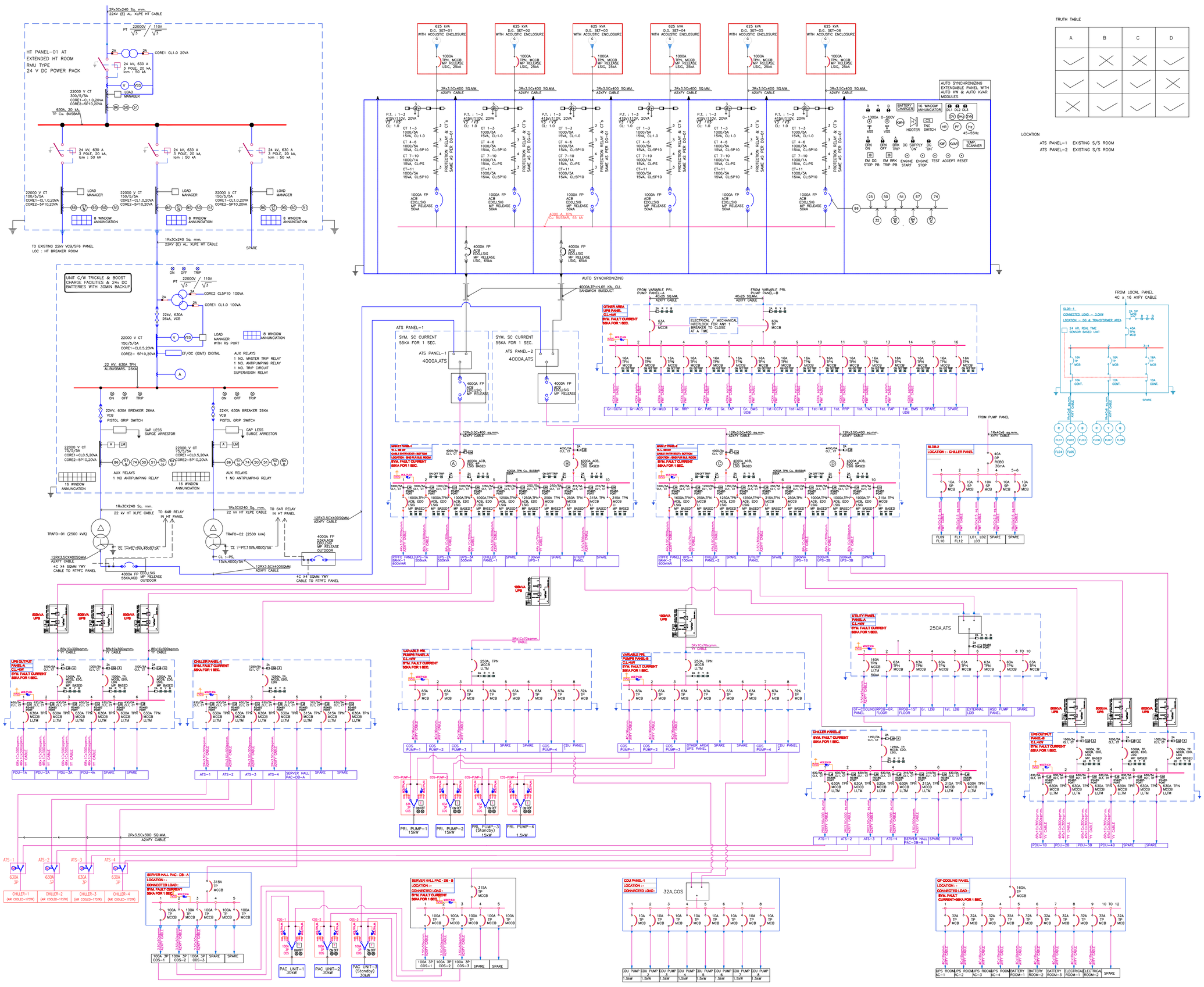
NO.	DATE	REMARKS
R0	.....	.....

CLIENT:
IITM-PUNE
ADDRESS

TITLE:
EXTERNAL LIGHTING LAYOUT

DWG.No.
ITM_137_PD_ELEC_EXLT_001 R0

JOB NO :	ITM–137	DRAWN BY : UJWAL	
SCALE :	1: 200	CHECKED BY : AMOL	
DATE :	02.05.13		



DWG.No.
ITM_137_PD_ELEC_SLD_001 R0

LEGENDS

- ONAN 11KV/433V STEPDOWN TRANSFORMER WITH OLTC
- AIR COOLED K-20 400/400V ISOLATION TRANSFORMER
- UNINTERRUPTED POWER SUPPLY (UPS)
- MOTORISED LOAD BREAK CHANGEOVER SWITCH (ATS)
- ATS

NOTES:

The panels will be built to relevant IEC specification

Unless otherwise stated and or where applicable :

Construction :

1. The panels will be dust and vermin proof with gaskets of the doors Installed on the panel and not on door. The compartmentalized construction is required with extendable bus bars. The entire assembly must go through 7 tank process and will be oven baked .
2. Outdoor installation will be with IP55 enclosure
3. Bus bars will be tinned copper with current density of not more than 800A / Sq. Inches.
4. Base frame of at-least 4" made out of steel sections is to be provided.
5. Panel will have :
   Top Entry Bottom Entry
   Floor Mounted Installation/Wall Mounted Installation
6. Bus bar system supports will be CPRI or equal test laboratory approved.
7. All panel compartments shall have identification etched on Aluminum strip.
8. All MCB DB will have each MCB identification
9. Stands should be provided for the installation of switch board matching to height of the false floor.
10. All VFDs shall have an active-front-end design
11. All UPSs shall have an active-front-end design
12. KVAR Requirement for each transformer is 600 KVAR steps size should be appropriate considering data centre application & to maintain p.f .98 to unity.

Components :

1. MCCBs will be atleast 35 kA or as specified In SLD.
2. MCBs will be atleast 10 kA short circuit withstand of the curve to suit discrimination
3. ALL protections will be coordinated
4. The range of the instruments be such that the readings will shown the mid-range of the instrument.
5. The load manager will be installed with communication port and win95 or similar graphic OS based software.
6. All ACBs will be draw out type with static relays provided for over-curent, earth fault.
   For DG set protection restricted earth fault protection is required.
7. MCCB to have following :
   Shunt trip , fault indications, Electronics trip mechanism.
8. All Panel Should Have Tvss Protection

Earthing :

1. All doors will have flying earth.
2. Copper earth bus is to be installed.
3. Where applicable UPS system, VS system and Raw power earth shall be separate. All the earth bus installed on suitable insulators

Drawings and Tests :

1. Shop drawings are required to be submitted for the review and approval
2. Test certificates for all components and the panel's routine tests are required to be provided in triplicate
3. Panel is required to be tested at site and works

REVISIONS :

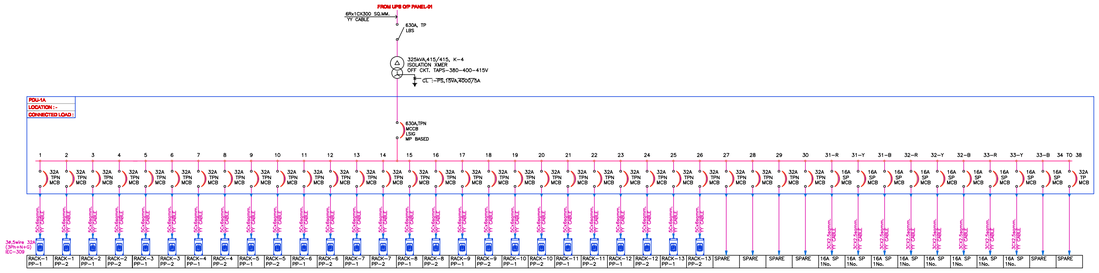
NO.	DATE	REMARKS
R0	.....	.....

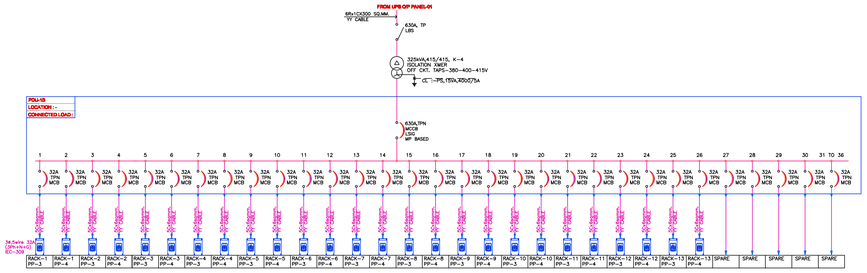
CLIENT:
IITM-PUNE
ADDRESS

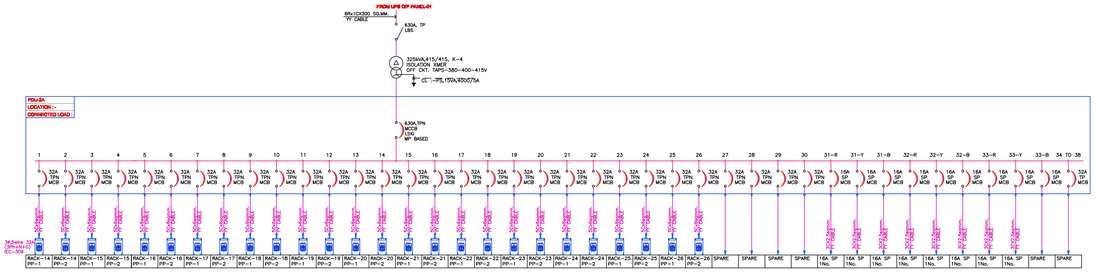
TITLE:
HT & LT PANEL
SINGLE LINE DIAGRAM

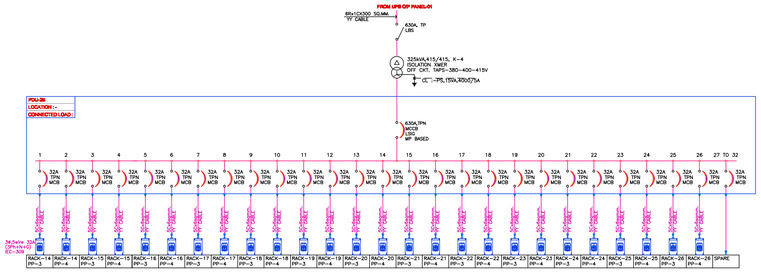
DWG.No.
ITM_137_PD_ELEC_SLD_001 R0

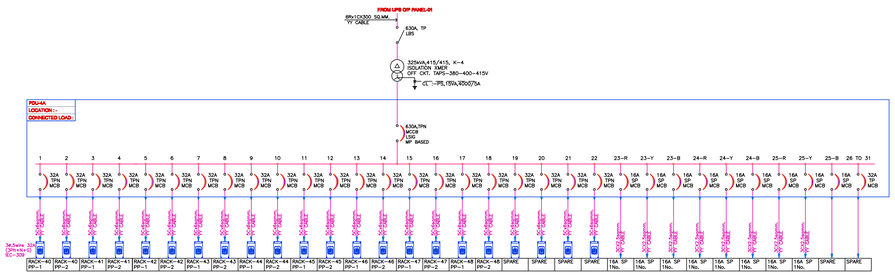
JOB NO :	ITM-137	DRAWN BY :	UJWAL
SCALE :	1: 200	CHECKED BY :	AMOL
DATE :	02.05.13		

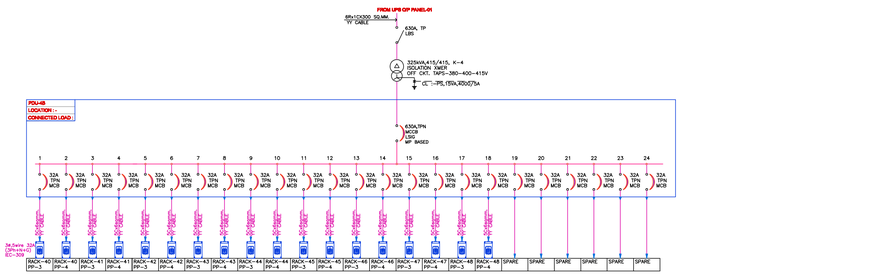












DWG.No.
ITM_137_PD_ELEC_SLD_002 R0

REVISIONS :

NO.	DATE	REMARKS
R0	.....	.....

CLIENT:
IITM-PUNE
ADDRESS

TITLE:
PDU PANEL SINGLE LINE DIAGRAM

DWG.No.
ITM_137_PD_ELEC_SLD_002 R0

JOB NO :	ITM-137	DRAWN BY : UJWAL	
SCALE :	1: 200	CHECKED BY : AMOL	
DATE :	02.05.13		

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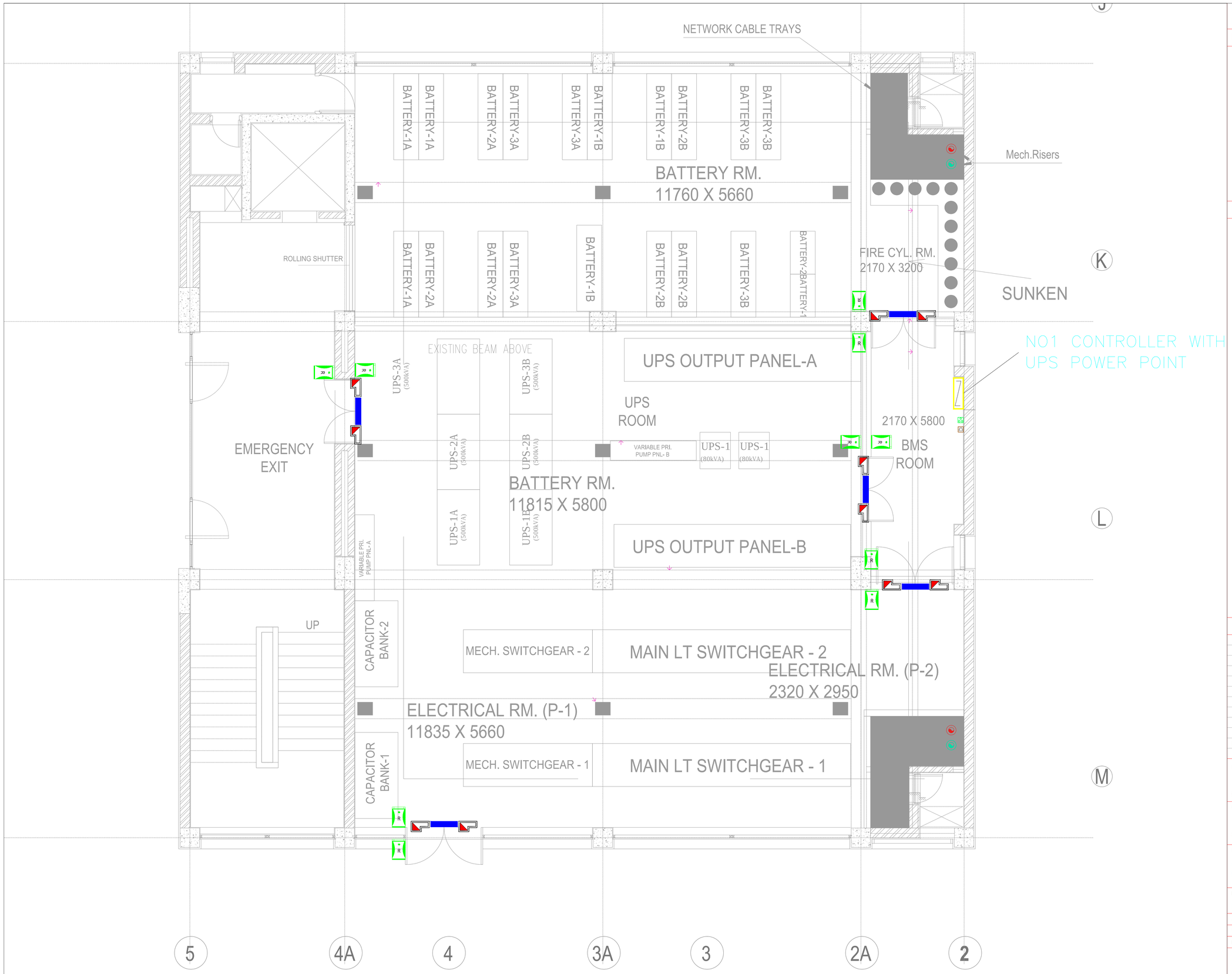
Office No.201&202,Sai Empire, Baner, PUNE-20, MAHARASHTRA,INDIA.
PH.91-20-66294444,460, FAX.91-020-66294699.
www.archivistaindia.com

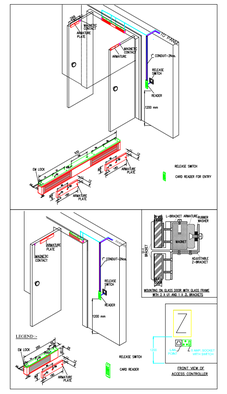


DWG.No.
IITM_DC_ACS_MECH_00 R0

RELEASED FOR TENDER

PROPOSED BUILDING

PROJECT KEY PLAN



INSTALLATION DETAILS

ACCESS CONTROL SYSTEM

	ACCESS CONTROL PANEL AT SERVER ROOM
R	ENTRY READER
	ELECTRO MAGNETIC LOCK FOR SINGLE LEAF DOOR
	ELECTRO MAGNETIC LOCK FOR DOUBLE LEAF DOOR
	MAGNETIC CONTACT
	6C x 1.0 SQ.mm FRLS SCREENED ARMORED CABLE FOR READER
	4C x 1.0 SQ.mm FRLS SCREENED ARMORED CABLE FOR LOCK / MAGNATIC CONTACT
	UPS POWER POINT (230 V. 5 AMP.)
	LAN POINT

REVISIONS :

NO.	DATE	REMARKS
R0	08.05.13	ISSUED FOR TENDER

ARCHITECT SIGN

CLIENT SIGN

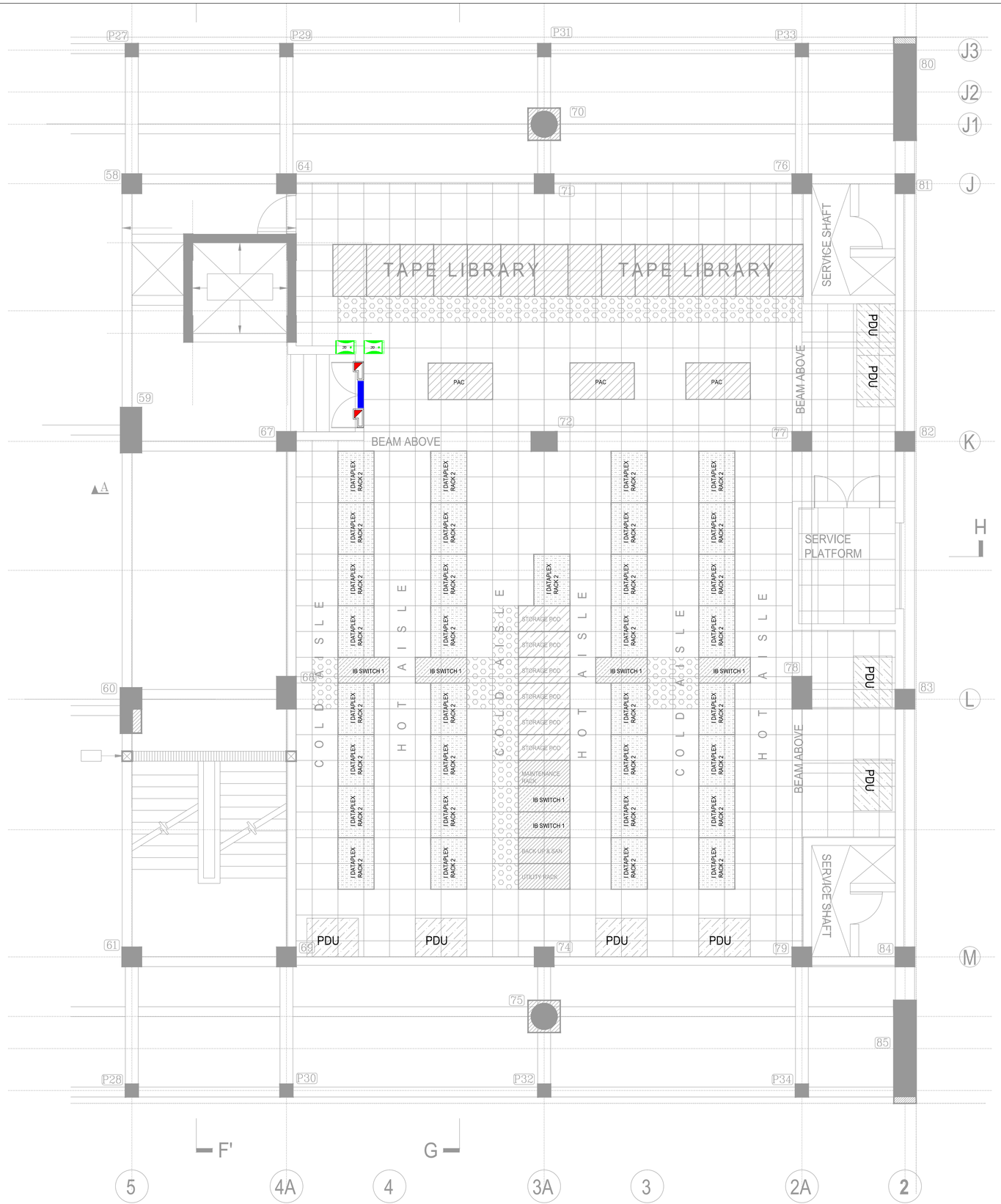
CLIENT:
INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.

ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

TITLE:
ACCESS CONTROL SYSTEM LAYOUT
GROUND FLOOR

DWG.No.
IITM_DC_ACS_MECH_00

JOB NO :	ITM137	DRAWN BY :	SACHIN
SCALE :	–	CHECKED BY :	SUMANT
DATE :	08.05.13		

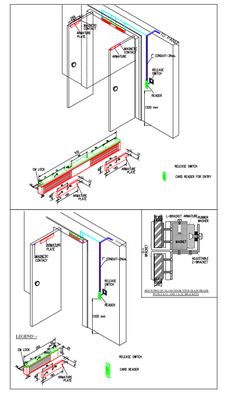


DWG.No.
IITM_DC_ACS_MECH_01 R0

RELEASED FOR TENDER

PROPOSED BUILDING

PROJECT KEY PLAN



INSTALLATION DETAILS

ACCESS CONTROL SYSTEM

	ACCESS CONTROL PANEL AT SERVER ROOM
	ENTRY READER
	ELECTRO MAGNETIC LOCK FOR SINGLE LEAF DOOR
	ELECTRO MAGNETIC LOCK FOR DOUBLE LEAF DOOR
	MAGNETIC CONTACT
	6C x 1.0 SQ.mm FRLS SCREENED ARMORED CABLE FOR READER
	4C x 1.0 SQ.mm FRLS SCREENED ARMORED CABLE FOR LOCK / MAGNATIC CONTACT
	UPS POWER POINT (230 V. 5 AMP.)
	LAN POINT

REVISIONS :

NO.	DATE	REMARKS
R0	08.05.13	ISSUED FOR TENDER

ARCHITECT SIGN

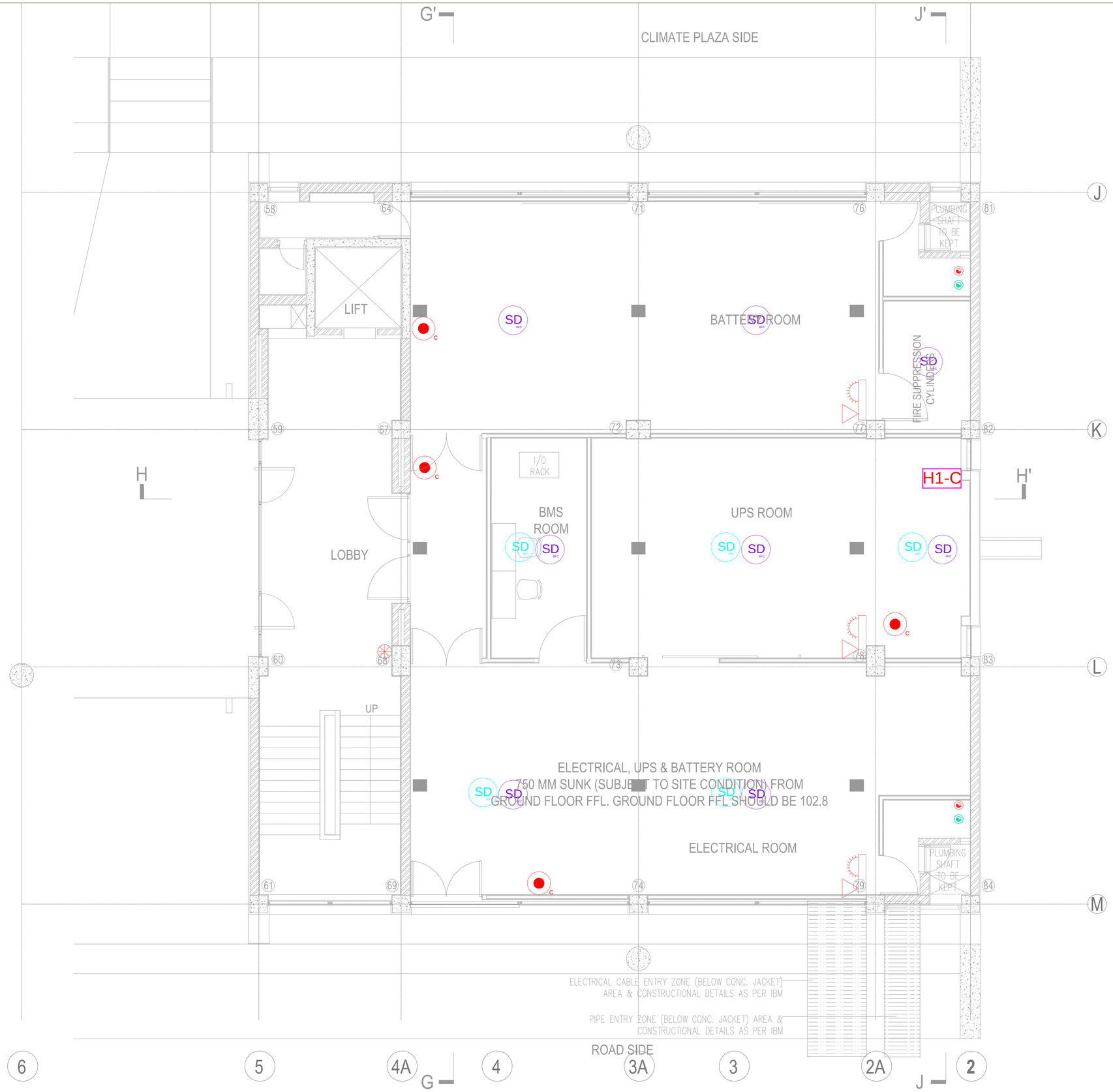
CLIENT SIGN

CLIENT:
INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.
ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

TITLE:
ACCESS CONTROL SYSTEM LAYOUT
FIRST FLOOR

DWG.No.
IITM_DC_ACS_MECH_01

JOB NO :	ITM137	DRAWN BY :	SACHIN
SCALE :	–	CHECKED BY :	SUMANT
DATE :	08.05.13		



NOTES:-

DWG.No.
IITM_DC_FAS_MECH_00 R0

RELEASED FOR TENDER

PROPOSED BUILDING

PROJECT KEY PLAN

NOTES:-

ACTUAL SMOKE DETECTOR SIZE - 100mm DIA

CABLES FROM MAIN CONTROL PANEL TO INDIVIDUAL DEVICE TO BE 2C x 1.5sq mm Cu ARMOURED FRLS MULTISTRANDED

MANUAL CALL POINT TO BE LOCATED AT EVERY DOOR AT 1.2 MTR FROM THE FINISHED FLOOR LEVEL.

ALL MCP's TO BE LOCATED WITHIN 1.5M FROM THE FIRE EXITS.

SUPPLY TO THE FIRE ALARM PANEL TO BE FROM 2 DIFFERENT POWER SOURCES.

ALL THE EQUIPMENTS TO BE UL LISTED.

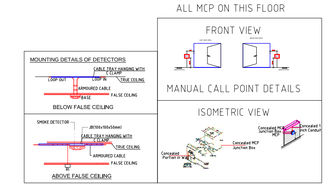
A MINIMUM DISTANCE OF 500mm TO BE KEPT BETWEEN THE FIRE ALARM CABLE & THE POWER CABLE.

JUNCTION BOXES (IF REQUIRED) FOR INSTALLATION OF EQUIPMENTS TO BE CONSIDERED.

LEGEND

SYMBOL	DESCRIPTION	QTY
	MANUAL CALL POINT	04 NOS
	FIRE ALARM SOUNDER WITH STROBE	03 NOS
	FIRE ALARM SIREN	01 NOS
H1-C	FIRE ALARM CENTRAL UNIT	01 NOS
SD	SMOKE DETECTOR (BELOW F/C)	08 NOS
SD	SMOKE DETECTOR (ABOVE F/C)	05 NOS

ALL MCP ON THIS FLOOR



REVISIONS :

NO.	DATE	REMARKS
R0	08.05.13	ISSUED FOR TENDER

ARCHITECT SIGN

CLIENT SIGN

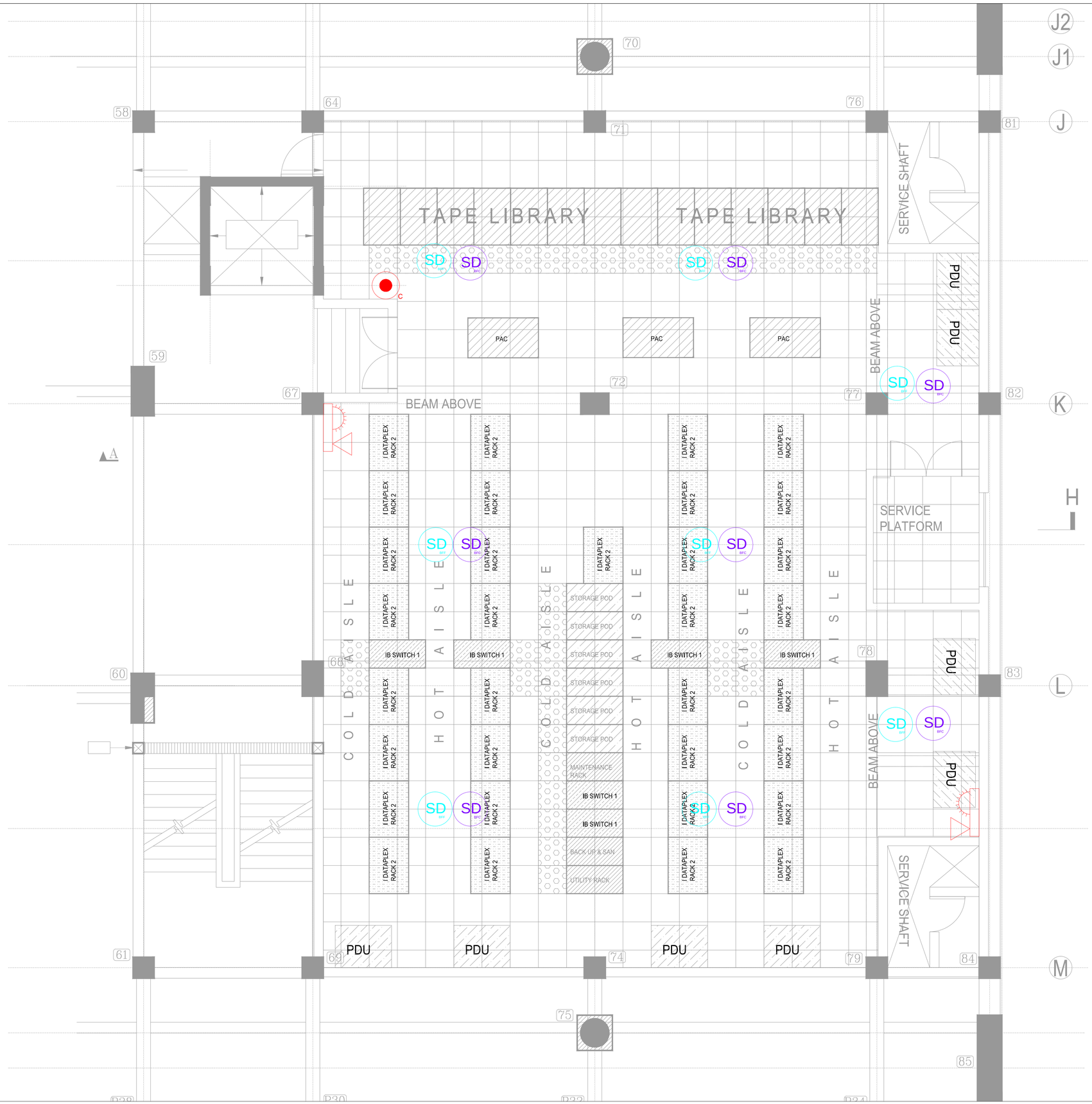
CLIENT: INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.

ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

TITLE: FIRE ALARM SYSTEM GROUND FLOOR

DWG.No.
IITM_DC_FAS_MECH_00 R0

JOB NO :	ITM137	DRAWN BY :	SACHIN
SCALE :	–	CHECKED BY :	SUMANT
DATE :	08.05.13		



DWG.No.
IITM_DC_FAS_MECH_01 R0

RELEASED FOR TENDER

PROPOSED BUILDING

PROJECT KEY PLAN

NOTES:-

ACTUAL SMOKE DETECTOR SIZE - 100mm DIA

CABLES FROM MAIN CONTROL PANEL TO INDIVIDUAL DEVICE TO BE 2C x 1.5sq mm Cu ARMOURED FRLS MULTISTRANDED

MANUAL CALL POINT TO BE LOCATED AT EVERY DOOR AT 1.2 MTR FROM THE FINISHED FLOOR LEVEL.

ALL MCP's TO BE LOCATED WITHIN 1.5M FROM THE FIRE EXITS.

SUPPLY TO THE FIRE ALARM PANEL TO BE FROM 2 DIFFERENT POWER SOURCES.

ALL THE EQUIPMENTS TO BE UL LISTED.

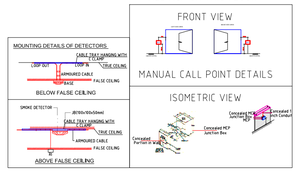
JUNCTION BOXES (IF REQUIRED) FOR INSTALLATION OF EQUIPMENTS TO BE CONSIDERED.

A MINIMUM DISTANCE OF 500mm TO BE KEPT BETWEEN THE FIRE ALARM CABLE & THE POWER CABLE.

LEGEND

SYMBOL	DESCRIPTION	QTY
	MANUAL CALL POINT	01 NOS
	FIRE ALARM SOUNDER WITH STROBE	02 NOS
SD BFF	SMOKE DETECTOR (BELOW F/F)	08 NOS
SD BFC	SMOKE DETECTOR (ABOVE F/C)	08 NOS

ALL MCP ON THIS FLOOR



REVISIONS :

NO.	DATE	REMARKS
R0	08.05.13	ISSUED FOR TENDER

ARCHITECT SIGN

CLIENT SIGN

CLIENT:
INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.

ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

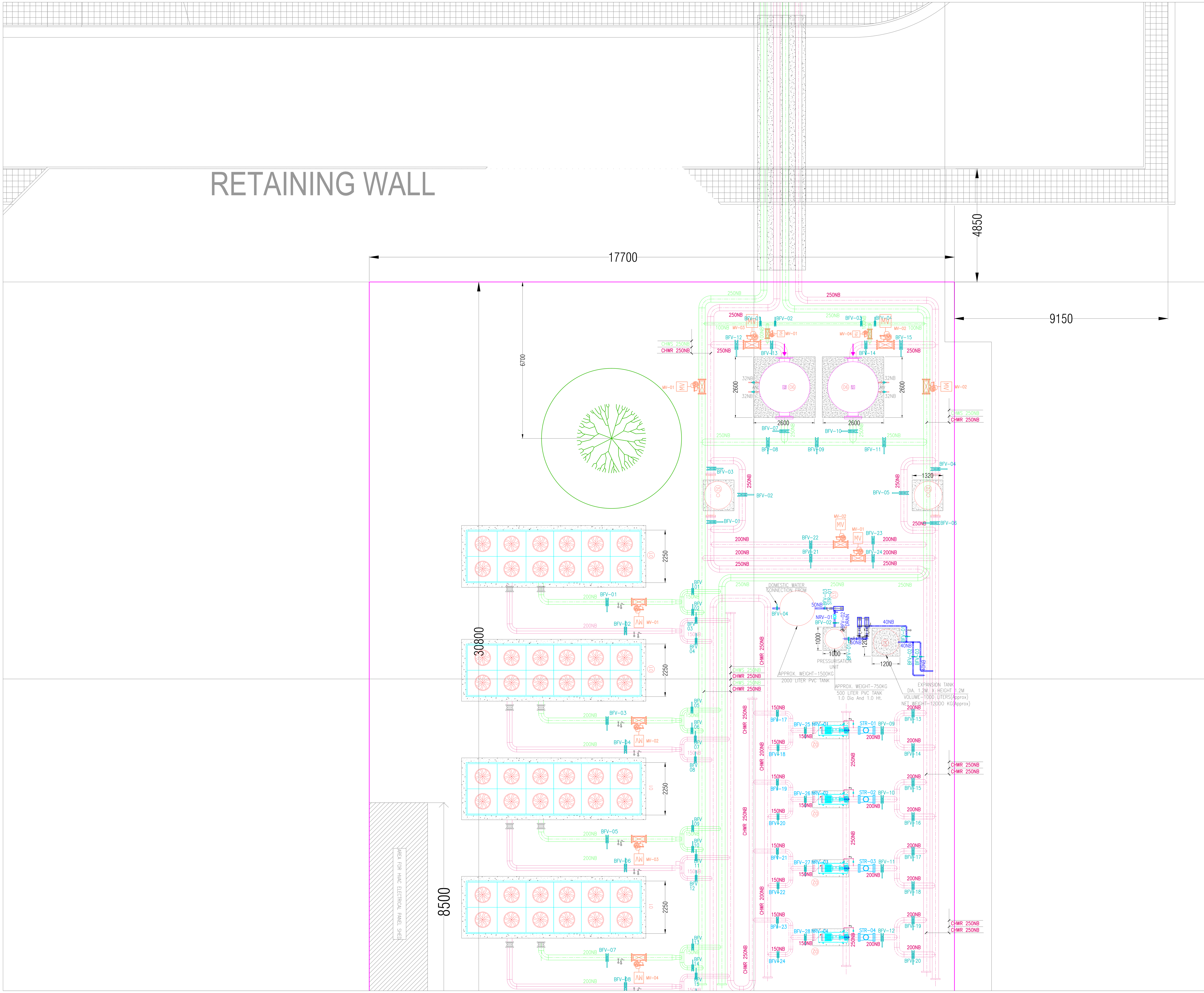
TITLE:
FIRE ALARM SYSTEM FIRST FLOOR

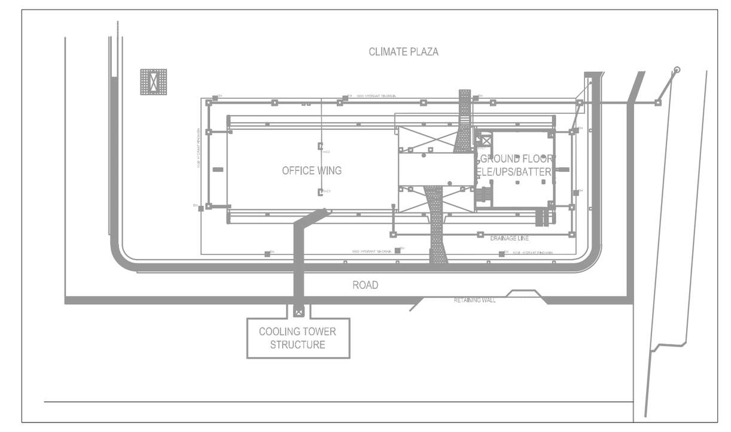
DWG.No.
IITM_DC_FAS_MECH_01 R0

JOB NO :	ITM137	DRAWN BY :	SACHIN
SCALE :	–	CHECKED BY :	SUMANT
DATE :	08.05.13		

DWG.No.
IITM_DC_TD_HVAC_100 R3

RELEASED FOR TENDER





PROJECT KEY PLAN

SYMBOL	DESCRIPTION
	NRV
	BUTTERFLY VALVE
	Y SRAINER
	BALL VALVE
	PRESSURE GAUGE
	TEMPRATURE GAUGE
	2-WAY MOTORIZED VALVE
	CHW-SUPPLY
	CHW-RETURN

REVISIONS :

NO.	DATE	REMARKS
R3	01/06/13	ISSUED FOR TENDER
R2	29/05/13	ISSUED FOR TENDER
R1	27/05/13	ISSUED FOR TENDER
R0	06/05/13	ISSUED FOR TENDER

ENGG. SIGN

CLIENT SIGN

CLIENT:
IITM DATA CENTER.

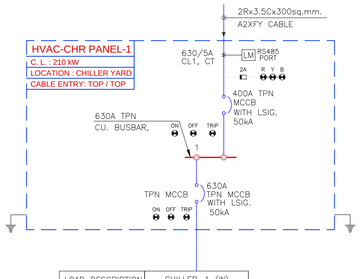
ADDRESS

TITLE:
SITE PLAN.

DWG.No.
IITM_DC_TD_HVAC_100 R3

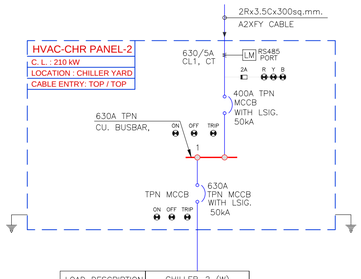
JOB NO :	ITM137	DRAWN BY :	YOGESH
SCALE :	1:150	CHECKED BY :	RAKESH
DATE :	02/05/13		

FROM 630A ATS-1



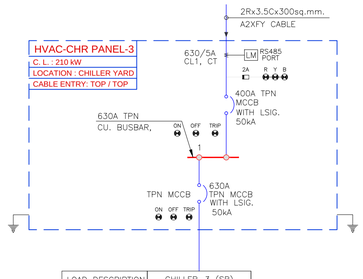
LOAD DESCRIPTION	CHILLER-1 (W)
CONN. LOAD	210 kW
CABLE SIZE	2Rx3.5Cx300 sq.mm A2XFY CABLE

FROM 630A ATS-2



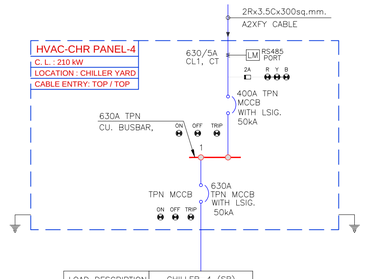
LOAD DESCRIPTION	CHILLER-2 (W)
CONN. LOAD	210 kW
CABLE SIZE	2Rx3.5Cx300 sq.mm A2XFY CABLE

FROM 630A ATS-3



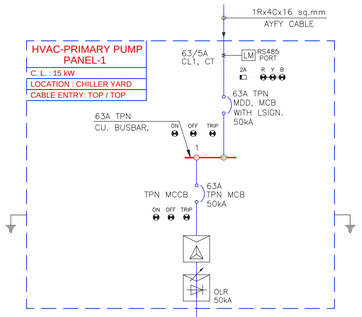
LOAD DESCRIPTION	CHILLER-3 (SB)
CONN. LOAD	210 kW
CABLE SIZE	2Rx3.5Cx300 sq.mm A2XFY CABLE

FROM 630A ATS-4



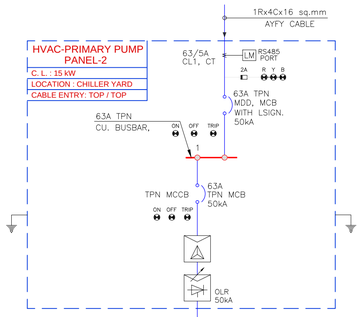
LOAD DESCRIPTION	CHILLER-4 (SB)
CONN. LOAD	210 kW
CABLE SIZE	2Rx3.5Cx300 sq.mm A2XFY CABLE

FROM 63A COS-1



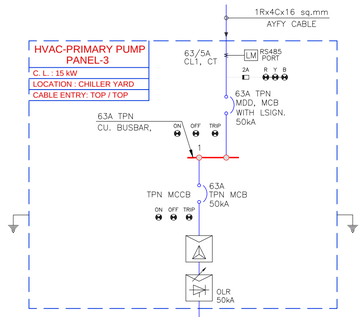
LOAD DESCRIPTION	PUMP-1 (W)
CONN. LOAD	15 kW
CABLE SIZE	1Rx4Cx16 sq.mm AYFY CABLE

FROM 63A COS-2



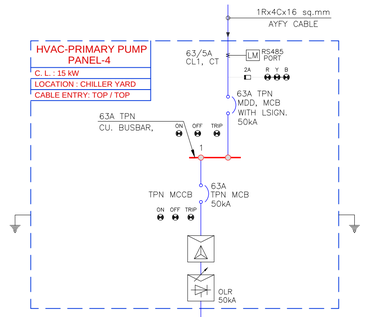
LOAD DESCRIPTION	PUMP-2 (W)
CONN. LOAD	15 kW
CABLE SIZE	1Rx4Cx16 sq.mm AYFY CABLE

FROM 63A COS-3



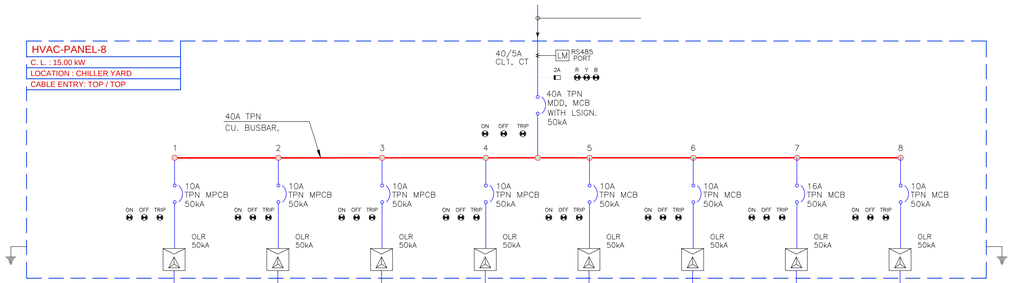
LOAD DESCRIPTION	PUMP-3 (SB)
CONN. LOAD	15 kW
CABLE SIZE	1Rx4Cx16 sq.mm AYFY CABLE

FROM 63A COS-4



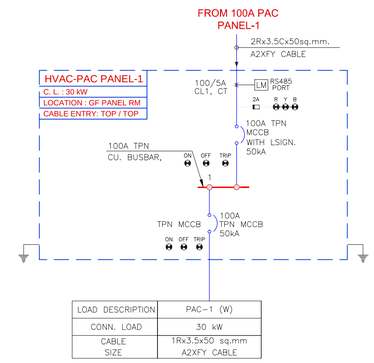
LOAD DESCRIPTION	PUMP-4 (SB)
CONN. LOAD	15 kW
CABLE SIZE	1Rx4Cx16 sq.mm AYFY CABLE

FROM PUMP PANEL



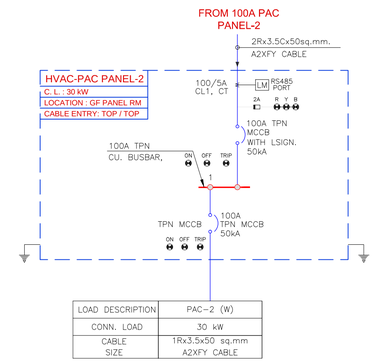
LOAD DESCRIPTION	PREZ. PUMP-1	PREZ. PUMP-1	WATER TREATMENT P-1	WATER TREATMENT P-2	SPARE	SPARE	SPARE	SPARE
CONN. LOAD	1.5 kW (W)	1.5 kW (SB)	1.5 kW (W)	1.5 kW (SB)				
CABLE SIZE	2Rx4Cx2.5 Sq.mm	2Rx4Cx2.5 Sq.mm	2Rx4Cx2.5 Sq.mm	2Rx4Cx2.5 Sq.mm				

FROM 100A PAC PANEL-1



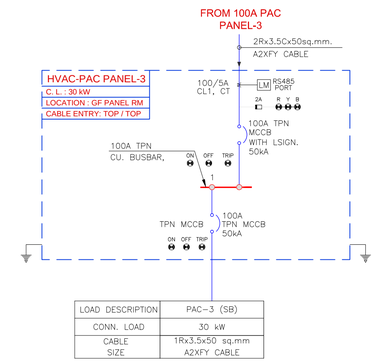
LOAD DESCRIPTION	PAC-1 (W)
CONN. LOAD	30 kW
CABLE SIZE	1Rx3.5x50 sq.mm A2XFY CABLE

FROM 100A PAC PANEL-2



LOAD DESCRIPTION	PAC-2 (W)
CONN. LOAD	30 kW
CABLE SIZE	1Rx3.5x50 sq.mm A2XFY CABLE

FROM 100A PAC PANEL-3



LOAD DESCRIPTION	PAC-3 (SB)
CONN. LOAD	30 kW
CABLE SIZE	1Rx3.5x50 sq.mm A2XFY CABLE

1) ALL THE CAPACITOR PANEL INCOMER SHALL BE INTERLOCKED TO CUT OFF DURING DG SUPPLY.
2) MAIN LT PANEL SHALL HAVE ELECTRICAL & MECHANICAL INTERLOCKING SYSTEM.
3) MCCB'S SHALL BE PROVIDED WITH VARIABLE CURRENT SETTING.
4) PANEL SHALL BE COMPARTMENTAL.
5) BUSBAR RATING MENTIONED IS ASSUMING 50%%% CURRENT SHALL BE CARRIED AT EACH END.
6) ALL ACB's AND MCCB's SHALL BE MP BASED.
7) ALL LOAD MANAGERS SHALL BE WITH COMMUNICATION COMPATIBLE FACILITY.
8) ALL MCCB'S WITH LSIG PROTECTION SHALL HAVE INBUILT GROUND FAULT PROTECTION.
9) DEGREE OF PROTECTION FOR LT PANELS SHALL BE IP 42.
10) ALL TM MCCB SHOULD ADJUSTABLE SHORT CUIRCIT & OVERLOAD CURRENT SETTING
11) ALL OUTGOING ACB & MCCB SHOULD MANUAL DRAW OUT TYPE

LEGEND:-	
SYMBOL	DESCRIPTION
	DOL STARTER
	STAR-DELTA STARTER
	VFD STARTER

DWG.No.
IITM_DC_TD_HVAC_101 R1

RELEASED FOR TENDER

PROJECT KEY PLAN

REVISIONS :

NO.	DATE	REMARKS
R0	06/05/13	ISSUED FOR TENDER

ARCHITECT SIGN

CLIENT SIGN

CLIENT:
INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.
ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

TITLE:
ELECTRICAL SLD

DWG.No.
IITM_DC_TD_HVAC_101 R1

JOB NO :	ITM047	DRAWN BY :	YOGESH
SCALE :	NTS	CHECKED BY :	RAKESH
DATE :	27/04/2013		

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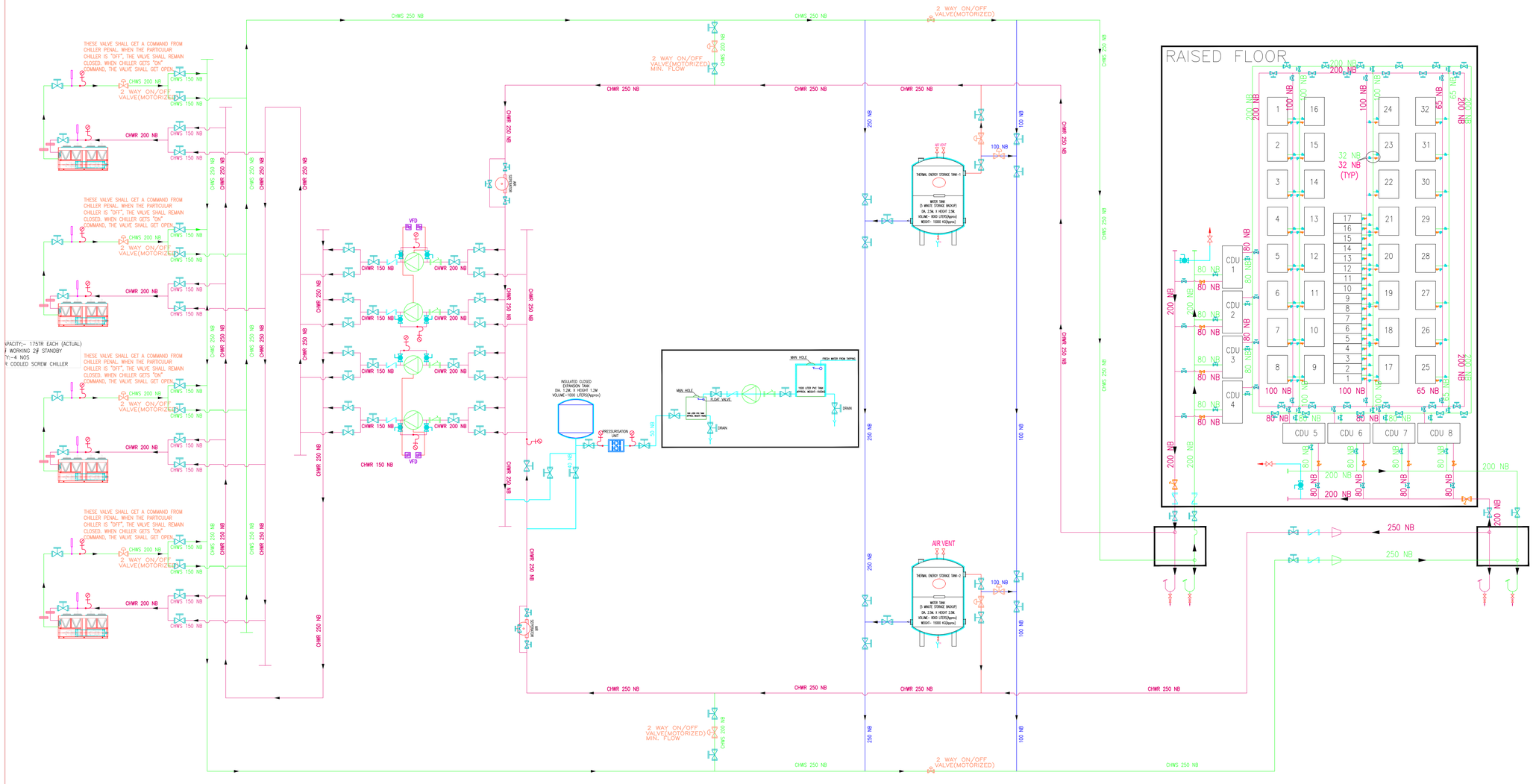
www.archivistaindia.com



APACITY:- 175TR EACH (ACTUAL)
W WORKING 2# STANDBY
TY:-4 NOS
R COOLED SCREW CHILLER

LEGEND

	BALANCING VALVE
	DYNAMIC BALANCING VALVE
	Y-STAINER
	NON-RETURN VALVE
	BUTTERFLY VALVE
	2-WAY MOTORISED ON/OFF VALVE
	FLEXIBLE CONNECTION/BELLOWS
	THERMOMETER
	PRESSURE GAUGE
	AUTO. AIR VENT
	VICTAULIC COUPLING
	BALL VALVE
	3 WAY MODULATING VALVE(MOTORISED)
	REDUCER

TAG	ABBREVIATION
BLV	BALANCING VALVE
BV	BUTTERFLY VALVE
NRV	NON RETURN VALVE
2WMV	2-WAY MOTORISED ON/OFF VALVE
Y-STR	Y STRAINER
T	TEMPERATURE GAUGE
PG	PRESSURE GAUGE

DWG.No.
IITM_DC_TD_HVAC_102 R0

RELEASED FOR TENDER

REVISIONS :

NO.	DATE	REMARKS
R0	06/05/13	ISSUED FOR TENDER

ARCHITECT SIGN

CLIENT SIGN

CLIENT:
INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.
ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

TITLE:
P&ID FOR CHILLED WATER

DWG.No.
IITM_DC_TD_HVAC_102 R0

JOB NO :	ITM137	DRAWN BY :	ROH@N
SCALE :	NTS	CHECKED BY :	RAKESH
DATE :	27/04/2013		

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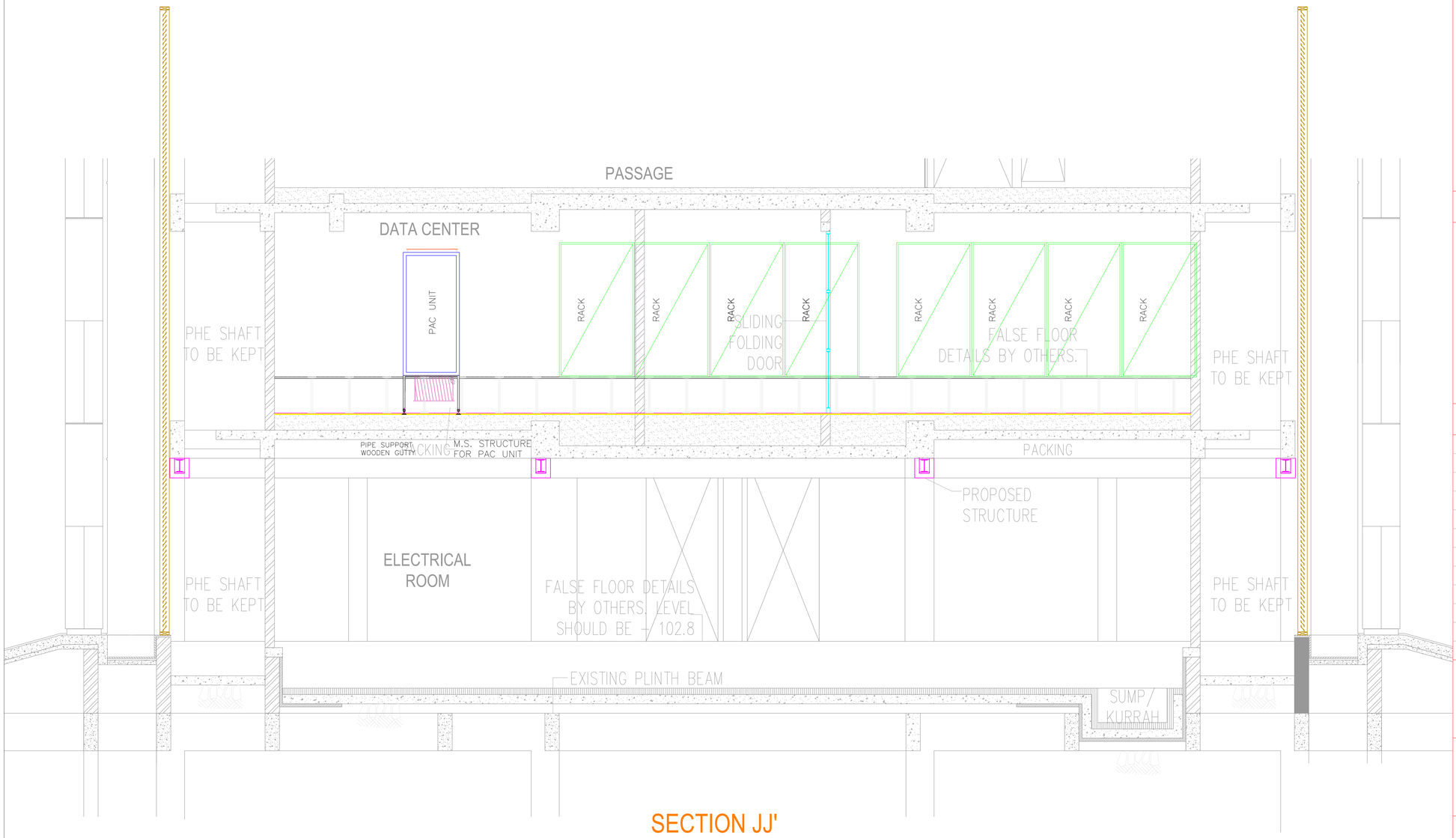
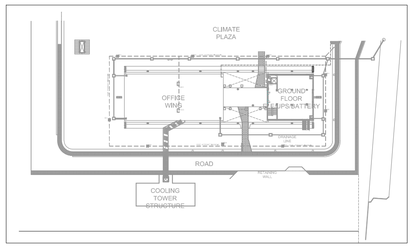


SECTION JJ'

DWG.No.
IITM_DC_TD_HVAC_103 R0

RELEASED FOR TENDER.



PROJECT KEY PLAN

SYMBOL	DESCRIPTION
	SUPPLY AIR GRILL
	HVAC GRILLE WITH BOOSTER FAN
RACK	RACK
	PAC UNIT

REVISIONS :

NO.	DATE	REMARKS
R0	06/05/13	ISSUED FOR TENDER

ENGG. SIGN

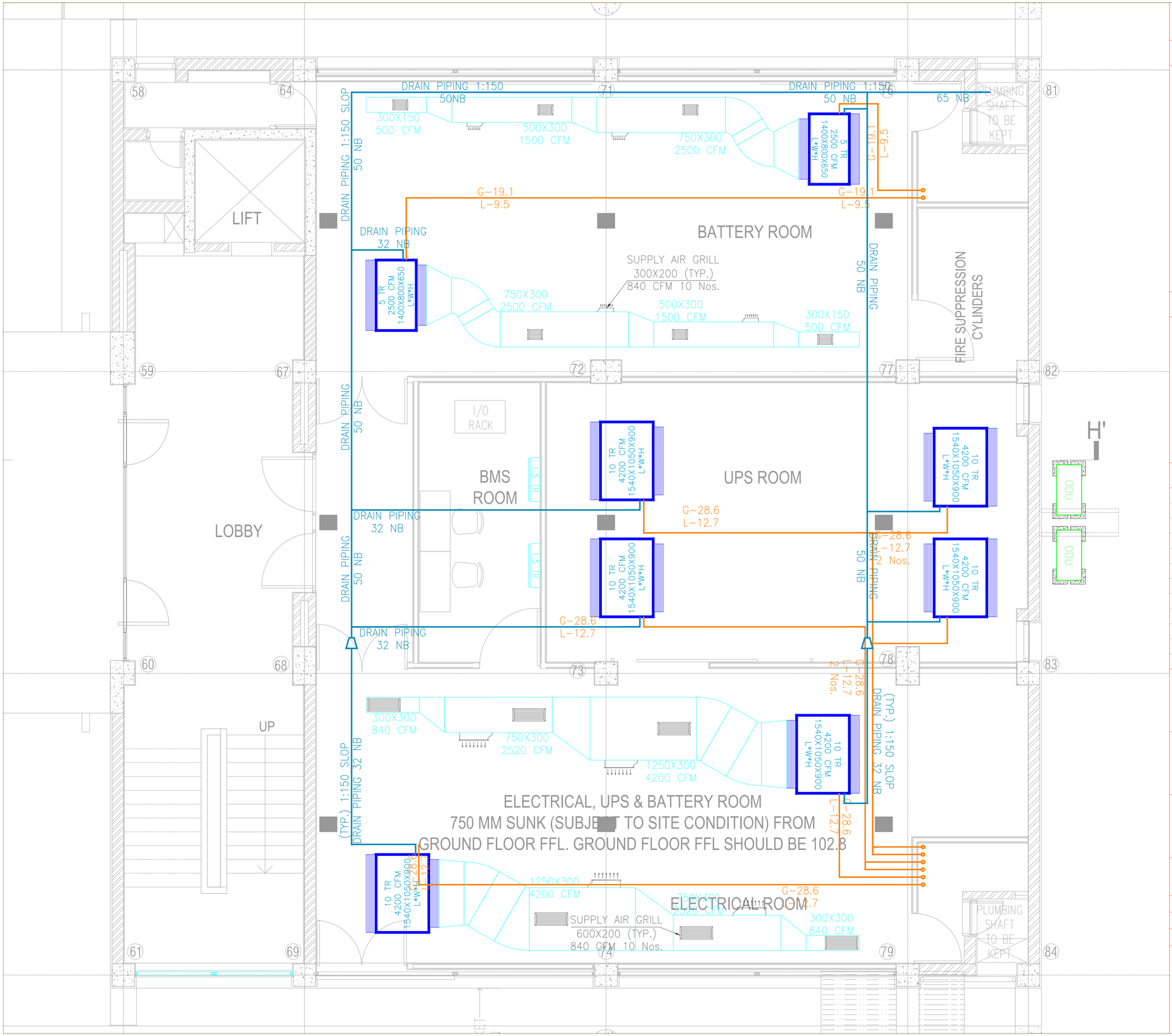
CLIENT SIGN

CLIENT:
INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.
ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

TITLE:
SERVER ROOM SECTION.

DWG.No.
IITM_DC_TD_HVAC_103 R0

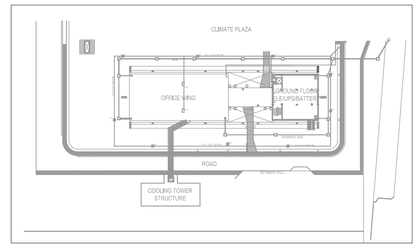
JOB NO :	ITM137	DRAWN BY :	YOGESH
SCALE :	1:50	CHECKED BY :	RAKESH
DATE :	27/04/13		



DWG.No.

IITM_DC_TD_HVAC_FP01 R0

RELEASED FOR TENDER



PROJECT KEY PLAN

REVISIONS :

NO.	DATE	REMARKS
R0	06/05/13	ISSUED FOR TENDER

ARCHITECT SIGN

CLIENT SIGN

CLIENT:
INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.

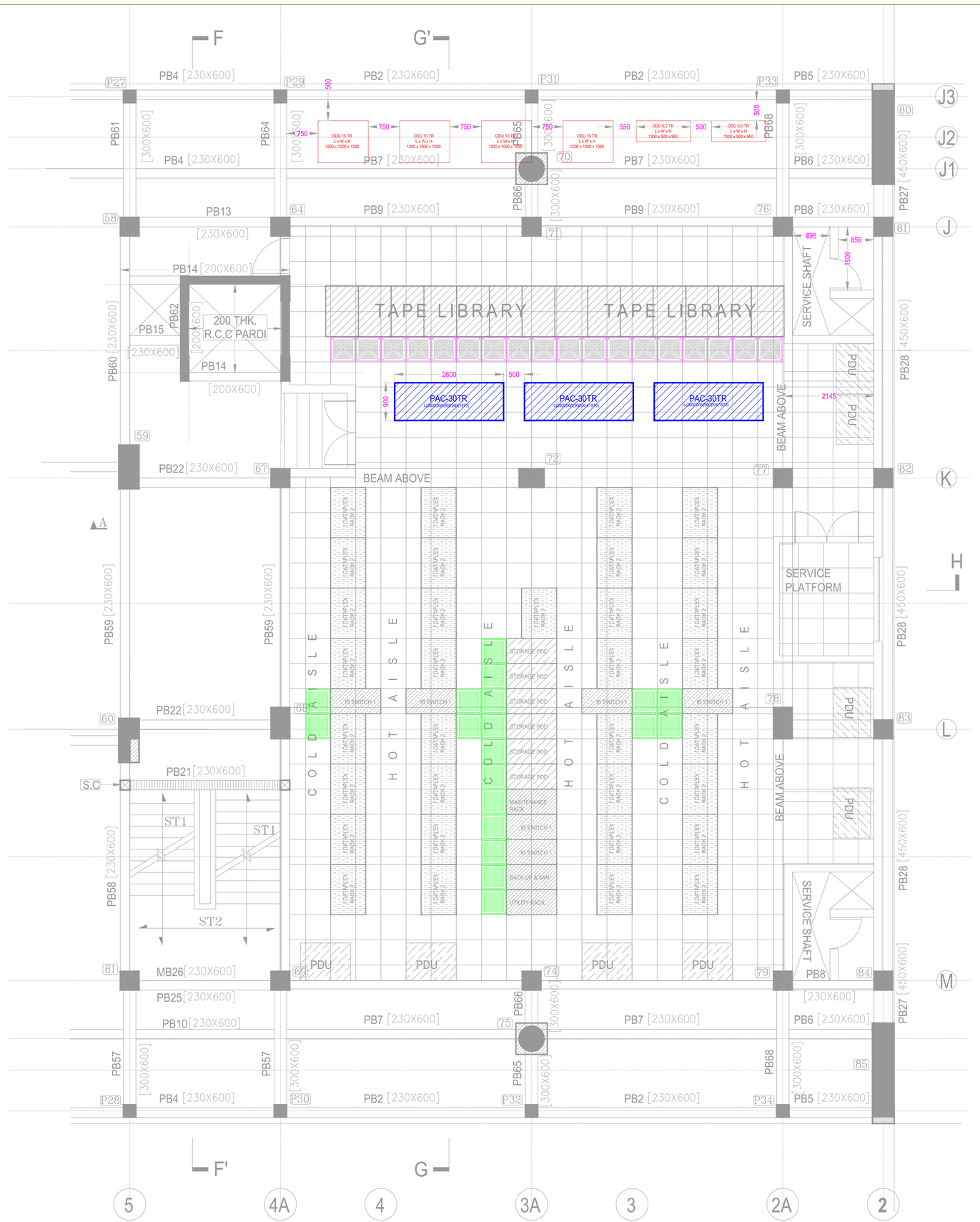
ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

TITLE:
GROUND FLOOR HVAC LAYOUT.

DWG.No.

IITM_DC_TD_HVAC_FP01 R0

JOB NO :	ITM047	DRAWN BY :	ROH@N
SCALE :	1:50	CHECKED BY :	RAKESH
DATE :	27/04/13		



SYMBOL	DESCRIPTION
	SUPPLY AIR GRILL
	HVAC GRILLE WITH BOOSTER FAN
	RACK
	PAC UNIT

REVISIONS :

NO.	DATE	REMARKS
R0	06/05/13	ISSUED FOR TENDER

ENGG. SIGN

CLIENT SIGN

CLIENT:
INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.
ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

TITLE:
FIRST FLOOR HVAC LAYOUT.

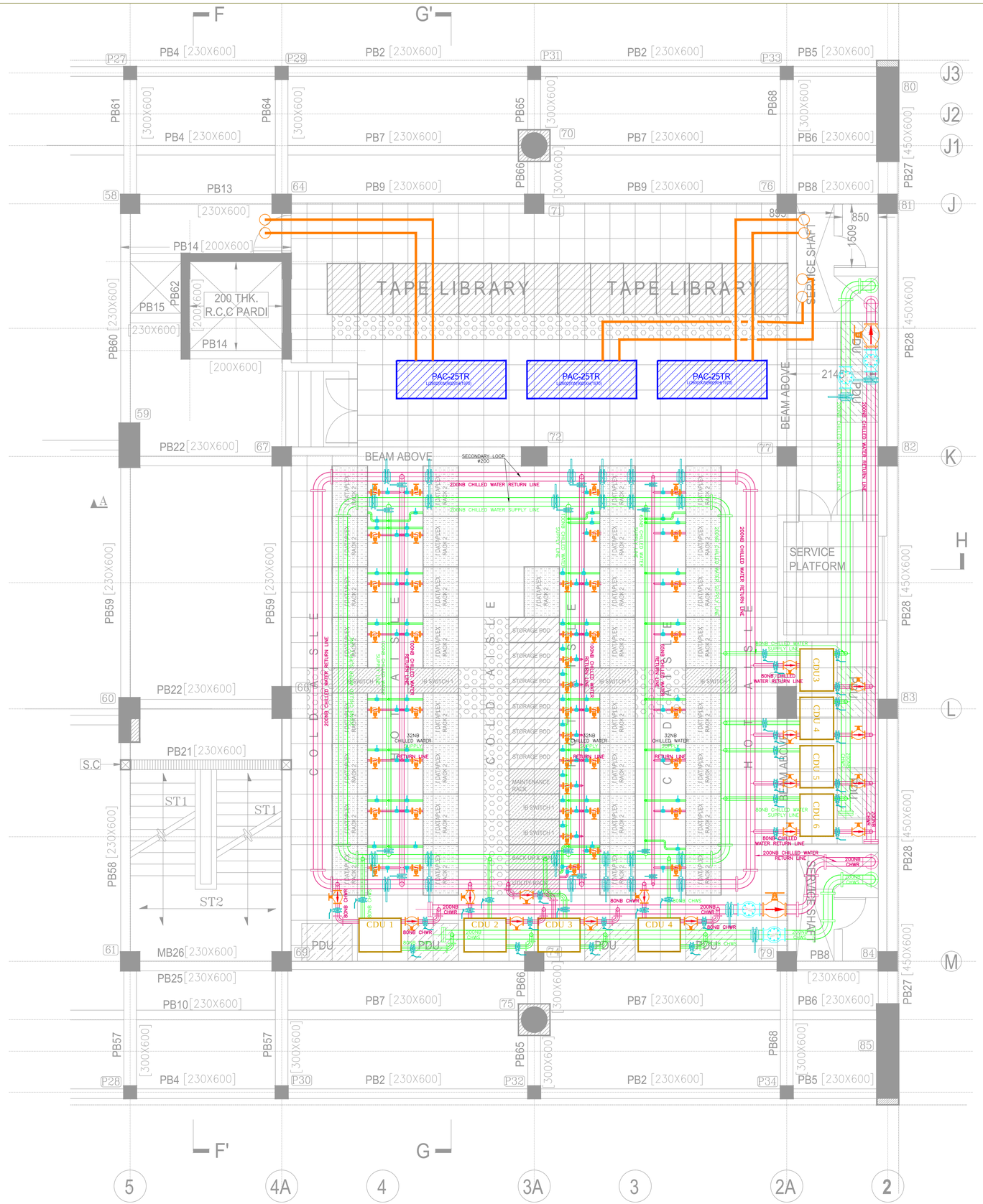
DWG.No.
IITM_DC_TD_HVAC_FP02 R0

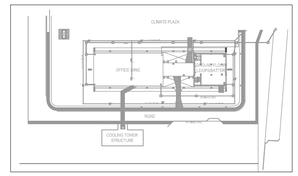
JOB NO :	ITM137	DRAWN BY :	YOGESH
SCALE :	1:50	CHECKED BY :	RAKESH
DATE :	27/04/13		

DWG.No.
IITM_DC_TD_HVAC_FP02 R0

RELEASED FOR TENDER.

PROJECT KEY PLAN





PROJECT KEY PLAN

LEGEND

	BALANCING VALVE
	BUTTERFLY VALVE
	BALL VALVE
	NON-RETURN VALVE
	DYNAMIC BALANCING VALVE
	Y-STAINER
	2-WAY MOTORISED ON/OFF VALVE
	THERMOMETER
	PRESSURE GAUGE
	AUTO. AIR VENT
	VICTAULIC COUPLING
	FLEXIBLE CONNECTION/BELLOWS
	3 WAY MODULATING VALVE(MOTORISED)
	REDUCER

TAG	ABBREVIATION
BLV	BALANCING VALVE
BV	BUTTERFLY VALVE
NRV	NON RETURN VALVE
2WMV	2-WAY MOTORISED ON/OFF VALVE
Y-STR	Y STRAINER
T	TEMPERATURE GAUGE
PG	PRESSURE GAUGE

REVISIONS :

NO.	DATE	REMARKS
R0	06/05/13	ISSUED FOR TENDER

ARCHITECT SIGN

CLIENT SIGN

CLIENT:
INDIAN INSTITUTE OF TROPICAL METEOROLOGY,HPC DATA CENTER.
ADDRESS Dr.HOMI BHABA ROAD,PASHAN PUNE.

TITLE:
UNDER FLOOR PIPING LAYOUT.

DWG.No.
IITM_DC_TD_HVAC_FP02_A R0

JOB NO :	ITM047	DRAWN BY :	YOGESH
SCALE :	1:50	CHECKED BY :	RAKESH
DATE :	27/04/13		

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	SECTION - I : LV Panels & Distribution Boards										
1.0	Supply ,Installation, testing and commissioning of L.T. panel boards Compartmental cubicle type, freestanding with appropriate cable entries, with **Cu** busbars & manufactured based on IS 8623, AEPPL specifications and single line diagrams. Scope shall include unloading, shifting, unpacking, Section assembly from storage place to desired Installation.All required protections will be as per SLD. **(Panels will be supplied by Contractor, M.S. steel angle support fabrication shall be considered separately.)(As per Main SLD No.ITM_137_PD_ELEC_SLD_001)**										
1.1	4000A Outdoor Isolation Panel Consisting of 4000A,ACB,Ics=Icu=60kA & 2 nos CT's of 4000/5A,15VA,CL-PS & 5P20 Resp.,Bottom incoming & top Outgoing	Set	2								
1.2	ATS Panel-01 Consisting of 4000A,ATS & 4000A,ACB,60kA,LSIG Protections	Set	1.00								
1.3	ATS Panel-02 Consisting of 4000A,ATS & 4000A,ACB,60kA,LSIG Protections	Set	1.00								
1.4	Main LT Panel - 01	Set	1.00								
1.5	Main LT Panel - 02	Set	1.00								
1.6	Utility Panel	Set	1.00								
1.7	Chiller Panel-01	Set	1.00								
1.8	Chiller Panel-02	Set	1.00								
1.9	UPS OUTPUT Panel-A	Set	1.00								
1.10	UPS OUTPUT Panel-B	Set	1.00								
1.11	Power Distribution Board -01A **as shown in SLD with 325 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.12	Power Distribution Board -02A as shown in SLD **with 325 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.13	Power Distribution Board -**03A as shown in SLD with 325 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.14	Power Distribution Board -04A as shown in SLD **with 325 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.15	Power Distribution Board -01B **as shown in SLD with 325 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.16	Power Distribution Board -02B as shown in SLD **with 325 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.17	Power Distribution Board -03B as shown in SLD **with 325 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.18	Power Distribution Board -04B as shown in SLD **with 325 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.19	Variable Primary Pump Panel -01	Set	1.00								
1.20	Variable Primary Pump Panel -02	Set	1.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
1.21	Server Area PAC DB-A	Set	1.00								
1.22	Server Area PAC DB-B	Set	1.00								
1.22	Other Area UPS PDB	Set	1.00								
1.23	600 kVAR RTPFC-1 with 7% detuned reactor with Thyristor Switch	Set	1.00								
1.24	600 kVAR RTPFC-2 with 7% detuned reactor with Thyristor Switch	Set	1.00								
1.25	CDU Panel-01	Set	1.00								
1.26	GF Cooling Panel-Wall Mounted Group type Construction	Set	1.00								
1.27	Supply installation,testing & commissioning of 630A 3P,35kA Automatic, Transition,Overlaping Neutral with enclosure ATS Switch	Set	4.00								
1.28	Supply installation,testing & commissioning of 100A 3P,25kA Automatic, Transition,Overlaping Neutral with enclosure Change Over Switch(COS)	Set	3.00								
1.29	Supply installation,testing & commissioning of 70A 3P,25kA Automatic, Transition,Overlaping Neutral with enclosure COS	Set	4.00								
1.30	SLDB-01 As Per SLD(DG & Trafo area)	Set	1.00								
2.00	Supply,Installation, Testing & Commissioning of Copper, indoor/ Outdoor Sandwitch type **busduct** as per location/ specification of busduct. Busduct shall include all horizontal / vertical lengths, bends, phase cross over chamber if necessary, flexible Al./Cu. jumper at Panel/ Trafo. end. Scope shall include unloading, unpacking, section assembly, shifting from storage place to desired location. **(M.S. steel support fabrication shall be considered separately.)(Actual lengths shall be measured at site prior to procurement.)**										
2.1	4000 Amps, 55kA TPN Aluminium, Sandwitch type Busduct Indoor/Outdoor as per datasheet.	Rmtr	50.00								
2.2	PCC end tinned copper flexible	Set	4.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
3.0	Supply, Installation, Testing and Commissioning of double door prefabricated recessed type MCB DB with CRCA sheet fabrication with powder coated body concealed in wall or on support structure. Steel support fabrication shall be considered separately.										
3.1	Phase Segrigated 8 way TPN DB with 40A, TP MCB as Incomer & 40A, 30mA,DP, RCBO as subincomer 3 Nos & 24Nos. of 10-20A SP MCB as O/Gs.**(LDB 1)**	Set	2.00								
3.2	Phase Segrigated 4 way TPN DB with 63A, TP MCB as Incomer & 63A, 30mA,DP, RCBO as subincomer 3 Nos & 12Nos. of 10-20A SP MCB as O/Gs.**(RPDB 1)**	Set	2.00								
3.3	12 way VTPN DB with 100A TP MCCB as incomer & 2 Nos. of 63A TP MCB,5 Nos. of 16A TP MCB & 2 Nos of 32A TP MCBs, & 9 nos. 20A SP MCB as O/Gs. **(ACDB)**	Set	1.00								
3.4	12 Way SPN DB with 25A,DP,30mA,RCCB as incomer & 10Nos 10A SP MCB as O/Gs.(Main **ELDB**)	Set	1.00								
3.5	8 Way SPNDB With 40A DP RCBO,30mA as incomer & 6 Nos of 10A SP MCB as outgoing (**SLDB-02**)										
4.0	Pre-fabricated, **IP 42** enclosure with power sockets, necessary cable glands & spare knockout holes comprising of:-										
4.1	1 No. - 20A 1ø 3 pin Industrial socket + 20A SP MCB.	Set	10.00								
5.0	Supply,Installation,Testing Commissioning of power sockets, necessary cable glands & spare knockout holes comprising of:-										
5.1	Pug & Sockets 32Amps 3Ph + N + G (IEC 309)	Set	215.00								
5.2	Plug & Socket 16 Amps P + N + G (IEC309)	Set	35.00								
	TOTAL : SECTION - I										
	SECTION II : L.V. Cables. (XLPE Insulated)										
1.0	Supply, Installation, Testing and Commissioning of 1100V grade L.T. XLPE/ PVC insulated multistrand Al./ Cu. conductor cables on provided prefabricated trays/ pipe/ in trenches with necessary clamps, identification tag. & all other items required to complete the task. **(Note:-Actual cable lengths shall be measured at site prior to procurement.)**										
1.1	3.5C x 400 Sq.mm. A2XFY Cable.	Rmtr	11000.00								
1.2	3.5C x 300 Sq.mm. A2XFY Cable.	Rmtr	2200.00								
1.3	3.5C x 95 Sq.mm. A2XFY Cable.	Rmtr	70.00								
1.4	3.5C x 50 Sq.mm. A2XFY Cable.	Rmtr	500.00								
1.5	4C x 25 Sq.mm. A2XFY Cable.	Rmtr	130.00								
1.6	4C x 16 Sq.mm. AYFY Cable.	Rmtr	750.00								
1.7	4C x 16 Sq.mm. AYFY FRLS Cable.	Rmtr	300.00								
1.8	4C x 10 Sq.mm. AYFY FRLS Cable.	Rmtr	300.00								
1.9	4C x 6 Sq.mm. YWY FRLS Cable.	Rmtr	110.00								
1.10	4C x 6 Sq.mm. AYFY Cable.	Rmtr	250.00								
1.11	4C x 4 Sq.mm. YWY Cable.	Rmtr	1000.00								
1.12	4C x 2.5 Sq.mm. YWY Cable.	Rmtr	250.00								
1.13	4C x 2.5 Sq.mm. YWY FRLS Cable.	Rmtr	600.00								
1.14	3C x 2.5 Sq.mm. YWY Cable.	Rmtr	900.00								
1.15	3C x 2.5 Sqmm YY FRLS Cable	Rmtr	800.00								
1.16	5C x 6 Sqmm YY FRLS Cable	Rmtr	8500.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
1.17	1C x 300sqmm YY FRLS Cable	Rmtr	10000.00								
1.18	1C x 70 Sqmm YY FRLS Cable	Rmtr	800.00								
1.19	24C x 2.5 Sqmm YWY Cable	Rmtr	250.00								
2.0	Supply & installation of End termination for cables as above with Brass, heavy duty, **Single compression** glands, lugs, other consumable, crimping, gland hole drilling, ferrulling, marking, etc.										
2.1	3.5C x 50 Sq.mm. A2XFY Cable.	Nos.	28.00								
2.2	4C x 25 Sq.mm. A2XFY Cable.	Nos.	4.00								
2.3	4C x 16 Sq.mm. AYFY Cable.	Nos.	26.00								
2.4	4C x 16 Sq.mm. AYFY FRLS Cable.	Nos.	8.00								
2.5	4C x 10 Sq.mm. AYFY FRLS Cable.	Nos.	18.00								
2.6	4C x 6 Sq.mm. YWY FRLS Cable.	Nos.	4.00								
2.7	4C x 6 Sq.mm. AYFY Cable.	Nos.	10.00								
2.8	4C x 4 Sq.mm. YWY Cable.	Nos.	4.00								
2.9	4C x 2.5 Sq.mm. YWY Cable.	Nos.	4.00								
2.10	4C x 2.5 Sq.mm. YWY FRLS Cable.	Nos.	28.00								
2.11	3C x 2.5 Sq.mm. YY Cable.(PG Gland)	Nos.	50.00								
2.12	3C x 2.5 Sq.mm. YWY Cable.	Nos.	20.00								
2.13	5C x 6 Sqmm YY Cable (PG Gland)	Nos.	450.00								
2.14	1C x 300sqmm YY Cable PG Gland Termination	Nos.	376.00								
2.15	1C x 70 Sqmm YY Cable PG Gland Termination	Nos.	40.00								
2.16	24C x 2.5 Sqmm YWY Cable	Nos.	4.00								
3.0	Supply & installation of End termination for cables as above with Brass, heavy duty, **Double compression** glands, lugs, other consumable, crimping, gland hole drilling, ferrulling, marking, etc.										
3.1	3.5C x 400 Sq.mm. A2XFY Cable.	Nos.	148.00								
3.2	3.5C x 300 Sq.mm. A2XFY Cable.	Nos.	88.00								
3.3	3.5C x 95 Sq.mm. A2XFY Cable.	Nos.	2.00								
	TOTAL : SECTION - II										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	SECTION III : Earthing										
1.0	Supply installation of Earthing station as per IS 3043 using SIP/PIP electrode complete**(Eqvt toSGI,JEF,Ashlok T 39)** with watering pipe & suitable GI strip up to chamber, soil treatment with suitable backfill powder/compound, brick inspection chamber with 450x450 mm CI cover, disconnecting link complete including excavation or earth pit, refilling	Nos.	32.00								
2.0	Supply, installation, testing of GI/ Cu. earthing strips & wires in ground at a depth of 600 mm. or in ready made trenches or on ready tray with necessary clamps & bimetallic srips as per specification. (excavation required for this will be ensured separately.) Refer layout & tender spec for various applications										
2.1	75 x 10 mm. GI strip.	Rmtr	400.00								
3.2	50 x 10 mm. Cu strip.	Rmtr	600.00								
3.3	50 x 10 mm. GI strip.	Rmtr	500.00								
3.4	50 x 6 mm. GI strip. (Main Grid+ Cable Tray)	Rmtr	500.00								
3.5	32 x 6 mm. GI strip.	Rmtr	300.00								
3.6	32 x 6 mm. Cu strip.	Rmtr	250.00								
3.7	25 x 3 mm. Cu. strip	Rmtr	2500.00								
3.8	32 x 6 mm. GI strip. Supported on Porcelain insulator/ J bolt at every 1.5 mtr interval for building L.A.	Rmtr	200.00								
3.9	8 SWG GI Wire.	Rmtr	500.00								
3.10	1C X 10 Sqmm YY FRLS Cable	Rmtr	250.00								
4	Supply, installation, testing & commissioning of Transducer type Building lightning arrester "EARLY STREAMER" to cover protection radius of 65.0 mtr. With 3 mtr rod height & with stem and fixing arrangement. (Indelec). Required installation/ mounting details shall be submitted prior to installation.	Nos.	1.00								
5	Supply, installation, testing of disconnecting link box for lightning down conductor at 1 mtr. from GL with SMC insulator and Gunmetal 50 x 6 mm disconnecting link.	Nos.	2.00								
	TOTAL : SECTION III										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	SECTION IV : UPS										
1	Supply, Installation, testing and commissioning of 500 kVA UPS , consisting of following Input 433V 3 Ph + N + E +/-10% 50Hz Output 400V 3 Ph + N + E , -2% 50Hz Unsymmetrical load with SMF battery backup for 15 min. Racks & Intercell connectors suitable for batteries UPS to battery DC cable to be consider Installation & commissioning of Batteries & UPS (Lenghths as per actuals)	Set	6								
2	Supply, Installation, testing and commissioning of 100 kVA UPS consisting of following Input 433V 3 Ph + N + E +/-10% 50Hz Output 400V 3 Ph + N + E , -2% 50Hz Unsymmetrical load with SMF battery backup for 15 min. Racks & Intercell connectors suitable for batteries UPS to battery DC cable to be consider Installation & commissioning of Batteries & UPS (Lenghths as per actuals)	Set	2								
3	As above but 2 x 2.5 + 1 x 1.5 Sq.mm. wires. In provided floor Truff / PVC conduit	Rmtr	500.00								
4	Providing & fixing 2 Nos. modular 5 A socket & switch (on UPS) and 1 no 5A & socket & switch (on Raw Power) with modular plate and box at one place for UPS & mains connections above table top.	Set	10.00								
5	Supply & Installation of MS boxes in flooring made from 16 SWG M.S. sheet with Stainless steel cover of 14 SWG of following sizes										
5.1	Supply and installation of Surface / concealed 25mm dia **PVC Conduit** with spacer saddles for computer and telephone / speaker wiring concealed in office area walls & open other places with pull boxes etc.	Rmtr	200.00								
5.2	Supply and installation of Surface / concealed 25mm dia **GI Conduit** with spacer saddles for transformer area wiring walls & open other places with pull boxes etc.	Rmtr	100.00								
	TOTAL SECTION - IV										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	SECTION V : Point Wiring										
1.0	Surface / concealed point wiring for light / fan call bell / 5 A points with 2 x 2.5 + 1 x 1.5 Sq.mm. multistrand Cu. wires 1100 V gr. in suitable 25mm **PVC conduits** / flexible conduits wherever required as submains and 2 x 1.5 + 1 x 1.5 Sq.mm. **FRLS** wires for each point complete (submains will not be measured separately) with necessary modular switch board, switch plates and Blanking plates & accessories as required etc. to complete the task.. Primary Point shall mean first point wired from switchboard and Secondary point shall mean successive points next to Primary point. **(Areas : Office, canteen, Security cabin, Toilets,Production Shop)**										
	Note:- All conduits in area with false ceiling shall be concealed in wall below false ceiling,**point wiring height will be 3-4 mtr from FFL**										
1.1	Primary Light point wiring with necessary 5 A SP Switch , ceiling rose / Holders compete. (Maximum 2/3 points controlled by one Switch) as reqiured to complete the job.	Pt.	40.00								
1.2	As above but Secondary Light point wiring.	Pt.	50.00								
2.0	Fan point with modular 5 A SP Switch, 5 step Electronic fan Regulator, switch box plate & fan hook box etc. modular, fan box.	Pt.	20.00								
3.0	**Supply, installation,** testing and commissioning of lighting fixtures/ fans/Ex. fans etc. including necessary electronic ballast, lamp, accessories, wiring connection, support arrangement like suspension chain, M.S. conduit drop with ball socket. down drops, etc. All FTL fixtures shall be with triphosphor source										
3.1	2 X 28 Watt TL-5 Weather Proof Luminaire suitable for TL-D and TL5 Lamps. high grade Polycarbonate housing and cover.TCW450 2xTL5-28W EBT	Nos.	50.00								
3.2	4 x 14 Watt high efficiency Surface mounted luminaire suitable for T5 lamp with dimmable balast. (Make:- Philips Cat no.- TPS814 4xTL'5'14W/EBP D8 (4xTL'5'14W) or equivalent.)	Nos.	60.00								
3.3	1x 28 watt Saviour Slim Channel luminaire (Wipro WRF 20128 SGW)	Nos	10.00								
4.0	Supply, installation testing of Ceiling/Exhaust fans with necessary acessories to complete the job.										
4.1	Supply, installation testing of 150mm exhaust fans with mounting frame & louvers.	Nos.	5.00								
5.00	Supply, Installation of Junction Boxes made out of CRCA Sheet (16SWG) with 4way Terminal Strip and appropriate knock out for loop in loop out of cables. (For Lighting)	Nos.	150.00								
6.00	Supply,Installation,Testing & Commissioning of Exit Signages										
6.1	Exit	No	10.00								
6.2	Emergency Exit	No	5.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
7.0	Supply, Installation, testing & comissioning of G.I Street Light Pole having with bottom flange & foundation bolts poles complete with 1600 x 450 x 450 mm foundation with 2 Nos. 40 mm dia pipes bent to shape 1.5 m. long cable loop box with 15A 4 way connector, 15A SP MCB, earthing of pole with 8 SWG wire, painting with 2 coats of primer bottom with blank paint & balance with silver paint.										
7.1	9 Mtr.Tubular Poles with double bracket for mounting Flood Light on the same pole.(9 mtr effective height from Ground level)	No	6.00								
8.0	Supply, Installation, testing & commissioning of street / flood light fixture on above poles with necessary hardware etc. including cable connection box & lamps.										
8.1	Compact IP65 integral floodlight with symmetric beam distribution Wipro WFT 52150or Equivalent	No	12.00								
	TOTAL SECTION - V										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	TOTAL : SECTION VI: Data & Telephone Provisions										
1.0	Supply, installation, testing & commissioning of jelly filled armoured twisted pair 0.51 mm Cu. telephone cable with PVC insulation in ready trenches / trays / pipes etc.										
1.1	20 Pair.	Rmt	100.00								
1.2	2 Pair Unarm. cable	Rmt	500.00								
2.0	Supply and laying of CAT 6 cable for Data points in existing raceways.	Rmt	500.00								
3.0	Supply and installation of 2 mm thickness Aluminium extruded raceway for under floor installation including necessary cutting of floor providing couplers and clamps for raceway fixing as details provided making good the surface of floor complete as per sizes provided.										
3.1	82mm X 38mm deep Al raceways.	Rmt	100.00								
4.0	Supply, installation of following set of modular sockets with box, switch plates for telephone & data cables etc. as required as detailed below.										
4.1	1 No. RJ 45 data socket with modular box & cover plate.	No.	10.00								
4.2	1 No. RJ 11 telephone socket with modular box & cover plate.	Nos.	10.00								
	TOTAL : SECTION VI										
	SECTION VII - CABLE TRAYS & FABRICATIONS										
1.0	Supply and installation of prefabricated (hot dip Galvanised) G.I. ladder/ perforated trays with 50/ 75 mm C channels & Runges at 200mm cc and including prefabricated accessories like Bends, Tee, Right-angles & tray coupling arrangement etc.(Bends fabricated at site will not be allowed.)										
1.1	100mm, 50x50 perforated tray. (16 SWG)	Rmtr	50.00								
1.2	150mm, 50x50 perforated tray. (16 SWG)	Rmtr	60.00								
1.3	300 mm, 50x50 perforated tray. (14 SWG)	Rmtr	100.00								
1.4	450 mm, 75x75 Ladder tray. (14 SWG)	Rmtr	400.00								
1.5	750 mm, 75x75 Ladder tray. (14 SWG)	Rmtr	200.00								
2	Cable Tray Covers suitable for following size trays										
2.1	100mm perforated tray.	Rmtr	60.00								
2.2	150mm perforated tray.	Rmtr	30.00								
2.3	300 mm perforated tray.	Rmtr	50.00								
3.0	Supply, Fabrication, Installation of M.S. angle/ Channel/ Square tube of 3mm thick of 50x50mm size including base plates supports arrangement, fastners, hardware etc. as per requirement (Duly approved by AEPPL and Client) for trays, frames etc. including necessary painting with 2 coats of primer and 2 coats of enamel black paint	Ton	5.00								
	TOTAL : SECTION VII										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	SECTION VIII - ITEMS MAY BE EXECUTED										
	Distribution Boards & Industrial Socket										
1	Supply, Installation, Testing and Commissioning of double door prefabricated recessed type MCB DB with CRCA sheet fabrication with powder coated body concealed in wall or on support structure. Steel support fabrication shall be considered separately.										
1.1	8 way TPN DB with 25A 4P 30mA RCBO as incomer & 18Nos. of 10-20A SP MCB as O/Gs.	Set	1.00								
1.2	8 way VTPN DB with 63A TP MCCB as incomer & 4 Nos. of 10A TP MCB,2 Nos. of 25A TP MCB & 2 Nos of 16A TP MCBs as O/Gs.	Set	1.00								
1.3	8 way VTPN DB with 63A TP MCCB as incomer & 6 Nos. of 10A TP MCB,2 Nos of 16A TP MCBs as O/Gs.	Set	1.00								
1.4	4 way TPN DB with 63A, TPN RCBO 30 mA as incomer & 12Nos. of 20A SP MCB as O/Gs.	Set	1.00								
2	Pre-fabricated, **IP 42** enclosure with power sockets, necessary cable glands & spare knockout holes comprising of:-										
2.1	1 Nos. - 63A 3ø 5 pin Industrial socket + 63A TP MCB.	Set	1.00								
2.2	1 Nos. - 32A 3ø 5 pin Industrial socket + 32A TP MCB.	Set	1.00								
	LT Cables & Termination										
3	Supply, Installation, Testing and Commissioning of 1100V grade L.T. XLPE/ PVC insulated multistrand Al./ Cu. conductor cables on provided prefabricated trays/ pipe/ in trenches with necessary clamps, identification tag. & all other items required to complete the task. **(Note:-Actual cable lengths shall be measured at site prior to procurement.)**										
3.1	3.5C x 240 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.2	3.5C x 185 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.3	3.5C x 150 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.4	3.5C x 120 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.5	3.5C x 70 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.6	3.5C x 35 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.7	4C x 10 Sq.mm. YWY Cable.	Rmtr	1.00								
3.8	4C x 6 Sq.mm. YWY Cable.	Rmtr	1.00								
3.9	4C x 1.5sqmm YWY Cable	Rmtr	1.00								
3.10	3C x 6 Sq.mm. YWY Cable.	Rmtr	1.00								
3.11	3C x 4 Sq.mm. YWY Cable.	Rmtr	1.00								
3.12	1C x 6sqmm YY Cable including Termination	Rmtr	1.00								
3.13	6C x 2.5 Sqmm YWY Cable	Rmtr	1.00								
3.14	8C x 2.5 Sqmm YWY Cable	Rmtr	1.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
4	Supply & installation of End termination for cables as above with Brass, heavy duty, **Single compression** glands, lugs, other consumable, crimping, gland hole drilling, ferrulling, marking, etc.										
4.1	3.5C x 70 Sq.mm. A2XFY Cable.	Nos.	1.00								
4.2	3.5C x 35 Sq.mm. A2XFY Cable.	Nos.	1.00								
4.3	4C x 10 Sq.mm. YWY Cable.	Nos.	1.00								
4.4	4C x 6 Sq.mm. YWY Cable.	Nos.	1.00								
4.5	4C x 1.5 Sqmm. YWY Cable.	Nos.	1.00								
4.6	3C x 6 Sq.mm. YWY Cable.	Nos.	1.00								
4.7	3C x 4 Sq.mm. YWY Cable.	Nos.	1.00								
4.8	1C x 6sqmm YY Cable PG Gland Termination	Nos.	1.00								
4.9	6C x 2.5 Sqmm YWY Cable	Nos.	1.00								
4.10	8C x 2.5 Sqmm YWY Cable	Nos.	1.00								
5	Supply & installation of End termination for cables as above with Brass, heavy duty, **Double compression** glands, lugs, other consumable, crimping, gland hole drilling, ferrulling, marking, etc.										
5.1	3.5C x 240 Sq.mm. A2XFY Cable.	Nos.	1.00								
5.2	3.5C x 185 Sq.mm. A2XFY Cable.	Nos.	1.00								
5.3	3.5C x 150 Sq.mm. A2XFY Cable.	Nos.	1.00								
5.4	3.5C x 120 Sq.mm. A2XFY Cable.	Nos.	1.00								
	Spare ACB's and MCCB's										
6.0	Supply and Installation of Spare Switchgear for modification and alteration work in LT Panels.										
6.1	4000A, 4P, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.2	4000A, TPN, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.3	3200A, 4P, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.4	3200A, TPN, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.5	2500A, 4P, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.6	2500A, TPN, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.7	2000A, 4P, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.8	2000A, TPN, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.9	1600A, 4P, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.10	1600A, TPN, EDO, 55kA, LSIG mp based release ACB.	Set	1.0								
6.11	1250A, 4P, EDO, 55kA, LSIG mp based release ACB.	Set	1.00								
6.12	1250A, TPN, EDO, 55kA, LSIG mp based release ACB.	Set	1.00								
6.13	1000A, 4P, EDO, 55kA, LSIG mp based release ACB.	Set	1.00								
6.14	1000A, TPN, EDO, 55kA, LSIG mp based release ACB.	Set	1.00								
6.15	630A,TPN. 55kA,Thermal Release, MCCB	Set	1.00								
6.16	400A TPN. 55kA,Thermal Release, MCCB	Set	1.00								
6.17	315A TPN. 55kA,Thermal Release, MCCB	Set	1.00								
6.18	250A TPN. 55kA,Thermal Release, MCCB	Set	1.00								
6.19	200A TPN. 55kA,Thermal Release, MCCB	Set	1.00								
6.20	160ATPN. 55kA,Thermal Release, MCCB	Set	1.00								
6.21	125ATPN. 55kA,Thermal Release, MCCB	Set	1.00								
6.22	100A TPN. 55kA,Thermal Release, MCCB	Set	1.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	Earthing System & L.A.										
7.0	Earthing station as per IS 3043 - 1987, using Pipe / plate electrode complete with watering pipe & suitable GI strip up to chamber, soil treatment with charcoal and salt / bentonite powder, brick inspection chamber with 450x450 mm CI cover, disconnecting link etc. And all other work required to complete the task.										
7.1	Earthing station as per IS 3043 - 1987 as above using 600 x 600 x 3 mm. Cu. Plate as electrode and other items required to complete the task.	Nos.	1.00								
7.2	As per IS 3043 - 1987 as above but bore type earthing with 3mtr. long 40 mm. dia. GI pipe as earth electrode treatment with bentonite / earth powder complete including required Boring, earth strip connection to GI pipe electrode shall be with 2nos. GI half round clamps duly welded and bolted at 2 distinct points treatment with bentonite / earth powder complete including required dia Boring.	Nos.	1.00								
8	Supply, installation, testing of GI/ Cu. earthing strips & wires in ground at a depth of 600 mm. or in ready made trenches or on ready tray with necessary clamps & bimetallic srips as per specification. (excavation required for this will be ensured separately.) Refer layout & tender spec for various applications.										
8.1	75 x 10 mm. Cu strip.	Rmtr	1.00								
8.2	75 x 6 mm. GI strip.	Rmtr	1.00								
8.3	50 x 6 mm. Cu strip.	Rmtr	1.00								
8.4	32 x 6 mm. Cu strip.	Rmtr	1.00								
8.5	25 x 6 mm. GI strip.	Rmtr	1.00								
8.6	25 x 3 mm. GI. strip.	Rmtr	1.00								
8.7	25 x 3 mm. GI strip. Supported on Porcelain insulator/ J bolt at every 1.5 mtr interval for building L.A.	Rmtr	1.00								
8.8	4 SWG GI Wire.	Rmtr	1.00								
8.9	12 SWG GI Wire.	Rmtr	1.00								
8.10	10 SWG GI Wire.	Rmtr	1.00								
9	Supply, installation, testing & commissioning of Transducer type Building lightning arrester "EARLY STREAMER" Protection level III to cover protection radius of 75.0 mtr. With 5 mtr rod height & with stem and fixing arrangement. (Indelec or Eqvt.). Required installation/ mounting details shall be submitted prior to installation.	Nos.	1.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
10	Supply, installation, testing & commissioning of Transducer type Building lightning arrester "EARLY STREAMER" Protection Level III to cover protection radius of 95 mtr. With 5 mtr rod height & with stem and fixing arrangement. (Indelec). Required installation/ mounting details shall be submitted prior to installation	Nos.	1.00								
11	Supply, installation, testing & commissioning of 5 Spikes Copper Building lightening arrester to be installed on top most point of building with stem and fixing arrangement etc. complete.	Nos.	1.00								
	Point Wiring & Light Fixtures										
12	Mains Circuit as required										
12.1	2 x 4.0 + 1 x 2.5 Sqmm FRLS Cu wires as above but in provided AL floor Truff / in PVC conduit.	Rmtr	1.00								
12.2	Supply and installation of main for UPS power points in plant area with 2 x 4 + 1 x 2.5 Sq.mm. wires including 25mm PVC Conduits.	Rmtr	1.00								
12.3	As above but 2 x 2.5 + 1 x 1.5 Cu wires in 25mm PVC conduit.	Rmtr	1.00								
13	Supply & Installation of MS boxes in flooring made from 16 SWG M.S. sheet with Stainless steel cover of 14 SWG of following sizes										
13.1	300 x 300 x 50 mm. Floor boxes.	Nos.	1.00								
13.2	150 x 150 x 50 mm. Floor boxes.	Nos.	1.00								
14	**Supply, installation,** testing and commissioning of lighting fixtures/ fans/Ex. fans etc. including necessary electronic ballast, lamp, accessories, wiring connection, support arrangement like suspension chain, M.S. conduit drop with ball socket. down drops, etc. All FTL fixtures shall be with triphosphor source										
14.1	1x 28 watt Decorative luminaire (Wipro WRF 81128 SG)	Nos	1.00								
14.2	1x 18 watt Decorative luminaire (Wipro WRF 21118)	Nos	1.00								
14.3	4 x 14 Watt STELLAR - Recess mounted special geometric MO luminaire(Wipro WVF 20414)	Nos.	1.00								
14.4	2 x 18 Watt Low Depth Recessed downlighter(Wipro WCP 28218)	Nos	1.00								
15.0	Supply, installation testing of Ceiling/Exhaust fans with necessary acessories to complete the job.										
15.1	Supply, installation testing of 1200mm Ceiling fans with 300mm down rod canopies but without regulator.	Nos.	1.00								
15.2	Supply, installation testing of 1400mm Ceiling fans with 300mm down rod canopies but without regulator.	Nos.	1.00								
16.0	Supply, installation testing of wall mounted fans with mounting frame & louvers.	Nos.	1.00								
16.1	Supply, installation testing of 305mm exhaust fans with mounting frame & louvers.	Nos.	1.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
17	Supply,Installation,Testing & Commissioning of Exit Signages										
17.1	Emergency Exit Door	No	1.00								
17.2	Emergency Exit Right from here	No	1.00								
17.3	Emergency Exit Left from here	No	1.00								
17.4	Staire case up or down	No	1.00								
	Data & Telephone										
18.00	Supply & installation of Krone type telephone junction box fabricated and painted as per panel specifications.										
18.1	50 Pair Box.	No.	1.00								
18.2	20 Pair Box.	No.	1.00								
18.3	10 Pair Box.	No.	1.00								
19.0	Supply, installation, testing & commissioning of jelly filled armoured twisted pair 0.51 mm Cu. telephone cable with PVC insulation in ready trenches / trays / pipes etc.										
19.1	50 Pair.	Rmt	1.00								
19.2	10 Pair Unarm. cable.	Rmt	1.00								
20.0	Supply & laying of CAT 5E cable for Data points in existing raceways or in pre laid FRPVC blank conduits.	Rmt	1.00								
	Raceway & J.B.										
21	Supply and installation of 2 mm thickness Aluminium extruded raceway for under floor installation including necessary cutting of floor providing couplers and clamps for raceway fixing as details provided making good the surface of floor complete as per sizes provided.										
21.1	100mm X 45mm deep Al. raceways.	Rmt.	1.00								
21.2	125mm X 25mm deep Al. raceways.	Rmt.	1.00								
22.0	Supply and installation of good quality floor junction boxes of appropriate sizes for raceways with folded frames including counter sunk screw arrangements such that covers are in level with the floor level. The cover will be M.S, power coated & have 4 Nos. 25 / 32 mm Ø holes with rubber grommets at appropriate location.										
22.1	100mm X 100mm X 50mm deep 16SWG junction box with 14 SWG cover.	No.	1.00								
22.2	125mm X 125mm X 50mm deep 16SWG junction box with 14 SWG cover.	No.	1.00								
22.3	225mm X 225mm X 50mm deep 16SWG junction box with 14 SWG cover.	No.	1.00								
22.4	330mm X 330mm X 50mm deep 16SWG junction box with 14 SWG cover.	No.	1.00								
22.5	450mm X 450mm X 50mm deep 16SWG junction box with 14 SWG cover.	No.	1.00								
23.0	Supply, installation of following set of modular sockets with box, switch plates for telephone & data cables etc. as required as detailed below.										
23.1	2 Nos. RJ 45 socket for data with box & cover plate at one place.	No.	1.00								
23.2	3 Nos. RJ 45 for 1 telephone and 2 data socket with boxes & cover plates at one place.	No.	1.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	Cable Tray with Covers & Fabrication										
24	Supply and installation of prefabricated (hot dip Galvanised) G.I. ladder/ perforated trays with 50/ 75 mm C channels & Runges at 200mm cc and including prefabricated accessories like Bends, Tee, Right-angles & tray coupling arrangement etc.(Bends fabricated at site will not be allowed.)										
24.1	50mm, 50x50 perforated tray. (16 SWG)	Rmtr	1.00								
24.2	200mm, 50x50 perforated tray. (16 SWG)	Rmtr	1.00								
24.3	600 mm, 75x75 Ladder tray. (14 SWG)	Rmtr	1.00								
25	Cable Tray Covers suitable for following size trays										
25.1	50mm perforated tray.	Rmtr	1.00								
25.2	200mm, perforated tray.	Rmtr	1.00								
25.3	450 mm perforated tray.	Rmtr	1.00								
26.0	Supply, Fabrication, Installation of M.S. square tube of 3mm thick of 40 x 40mm size. including painting with 2 coats of primer & 2 coats of final enamel black paint as specified. And all other items required to complete the task.	Rmtr	1.00								
	TOTAL : SECTION VIII										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	SECTION-I:-HT SYSTEM										
1	Supply,Erection, Testing and Commissioning of **22 kV / 0.433 kV, 2500 kVA, Dyn 11, 6.25% Impedance, Oil Insulated Transformer with OLTC and all accessories** complete on readymade plinth, Scope shall includes unloading shifting from stores to plinth and BDV test & topping up of fresh transformer oil as per requirement to complete the task.If required filteration of oil .	Set	2.00								
2	Supply,Erection, Testing & Commissioning of Ring Main Unit(RMU) & HT Switchgear equipment including necessary support structure, hardware & testing of the equipment at site after Erection as per specification. All other work to complete the erection of equipment.										
2.1	Supplu,Installation,Testing & Commissioning of 22 kV, 630A, **26kA, Indoor Compact RMU type (Extendable)** including relay and control panel .Consisting of 1 I/C SF6 , 3 O/G SF6,and Metering module Feeders as per SLD.(HT Panel 1).	Set	1.00								
2.2	Supply,Installation,Testing & Commissioning of 22 kV, 630A, 26kA VCB **HT PANEL** 22kV,630A,26kA as incomer & 2nos. 22kV, 630A, 26kA Vacuum Circuit Breaker as outgoing Panel **Extensible type** including Power Pack as per specifications , Data sheet and SLD.	Set	1.00								
2.3	Removing Existing RMU 1 incoming & One out going including cable termination,handover to Client as desired location guide by Client	job	1.00								
3	Supply,Testing, tagging, laying, & commissioning of following **22 kV grade XLPE HT cable** on readymade Trench/Excavation with (sand cushioning of 75mm, laying bricks on both sides of cable) & covering with RCC / PCC tiles or half round hume pipe of 200 mm dia. and refilling of cable trench, leveling of cable trench etc. as required. (Note: Quantity is tentative as Route is tentitively desided). (Only Hard rock excavation shall be measured separately).										
3.1	3C x 240sqmm Al.XLPE HT Cable	Rmtr	700.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
4	Supply, installation, testing & commissioning of heat shrink jointing for **22kV HT cables** of following sizes including necessary accessories, spider supports, plated hardware like lugs / ferrules, insulation tapes etc. complete. Standard make. Scope also includes making suitable cutouts in gland plate & sealing them after connections.										
4.1	Indoor End Termination.	Set	5.00								
4.2	Outdoor End Termination.	Set	2.00								
5	Providing Chainlink Fencing with 10SWG, 1.5" Chainlink jali with 50 x 50 x 6 mm M.S. Angle supports at proper intervals (@2.0m C/C). Fencing height should be 2.4M above Ground Level. The rate shall be inclusive of **2No. 3M wide**, double leaf gate made out of 40mm dia., 2mm thk. MS pipe with proper channel supports and **1Nos. of 1.0M wide** single leaf gate same as above gate etc. complete including painting with 2 coats of red oxide primer & 2 coats of silver paint. The rate shall be inclusive of the required civil work. **(Total perimeter of fencing -- 100M)**.	job	1.00								
6	Supply installation of Earthing station as per IS 3043 using SIP/PIP electrode complete**(Eqvt to Ashlok T 39)** with watering pipe & suitable GI strip up to chamber, soil treatment with suitable backfill powder, brick inspection chamber with 450x450 mm CI cover, disconnecting link complete including excavation or earth pit, refilling.	Nos.	14.00								
7	Statutary Approval from local EB	job	1.00								
8	Supply, installation, material equipment required as per statutory provision & safety.										
8.1	22 kV grade Rubber matting 1000 mm width.	Mtr	4.00								
8.2	22 kV class Hand gloves.	Pair	1.00								
8.3	22 kV Danger boards of appropriate size & marking.	Nos	6.00								
8.4	433 V Danger boards of appropriate size & marking.	Nos	12.00								
8.5	1.1 kV grade Rubber matting 1000 mm width.	Mtr	30.00								
8.6	First Aid Box	Nos	3.00								
8.7	Laminated First aid chart with frame.	Nos	3.00								
8.8	4.5 Kg fire extinguisher ABC type	Nos	5.00								
8.9	9 Kg fire extinguisher ABC type	Nos	5.00								
9.0	Fire Buckets with stand 04 Nos. of Buckets filled with Fine Sand	Nos	4.00								
10.00	HT Cable Route Marker	Nos	50.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	Total Of Section-I										
	SECTION-II ITEM MAY BE EXECUTED										
1	Supply, installation, testing & commissioning of heat shrink jointing for **22kV HT cables** of following sizes including necessary accessories, spider supports, plated hardware like lugs / ferrules, insulation tapes etc. complete. Standard make. Scope also includes making suitable cutouts in gland plate & sealing them after connections.										
1.1	Straight through Joints.	Set	1.00								
2	Excavation of cable trenches upto a depth of 1000mm refilling and reinstating the trenches and removing excess soil after proper 4" sand bedding/ coushioning above & below cables with bricks as per specifications & IS standards.										
2.1	Excavation in soil, soft murm & Hard murm.	M3	1.00								
2.2	Excavation in soft Rock.	M3	1.00								
2.3	Excavation in Hard Rock.	M3	1.00								
3	Supply, laying of following different types of Hume pipes/pipes in trenches for road crossing for electrical, telephone cables etc. complete as required including excavation of trench in all types of strata except hard rock and refilling, leveling of trench, shifting of extra earth or debris to dump yard complete as required.										
3.1	300 mm dia. RCC Pipe.	Mtr	1.00								
3.2	200 mm dia. Half round RCC hume Pipe.	Mtr	1.00								
	Total Of Section-II										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	SECTION-I										
1.0	Design, Supply, Installation, Testing & Commissioning at site 3-phase, 415V, 1500RPM, 50 HZ, Diesel generator set as per DG Technical Document, of **1 x 625 KVA** Prime Rating at 0.8 pf lagging diesel engine with **Radiator cooled** and alternator set mounted on common base frame in Outdoor Type Acoustically Treated Enclosure, with day tank of adequate capacity in liters for backup of 8-10hr running of DG set, battery, battery charger, return fuel color, anti vibration mounting pads including residential silencer, engine alternator safeties with accessories, **1No. of 1000A, 25kA, mp based, LSIG, MCCB Isolator inside acoustic enclosure** as per the attached SLD, engine control panel, ventilation system, inside conopy lighting, etc. as per specification complete as required. DG shall have appropriate Building Management System integration provisions / ports as well as hardwired alarm/ critical monitoring provisions with details of integrationDiesel engine shall conform to IS:10000 and alternator shall be self excited coanding onto the structure. paration of mock up etc. complete. (The density of the foam should be 45 Kg/m3)ms. They make the pipe design and air flow calculation very difficult to predict with any accuracy.. Fuel & oil fill for testing, trial run till handover. All cost of fuel, Oil and operation shall be borne by the the bidder.	Set	**6**								
2.0	Supply, Installation, Testing & Commissioning of Cu. Unarmoured cables of following size from Alternator to 1000A MCCB Isolator Panel inside DG Set.										
2.1	1C X 95 sq.mm. 2XY Cu. UnArm. Cable **(4 Runs/phase + 2 Runs - Neutral)**	Mtrs.	550								
3.0	Cable Termination of above cable										
3.1	1C X 95 sq.mm. 2XY Cu. UnArm. Cable	Nos	72								
4.0	Supply Installation testing Commissioning of Synchronisation cum AMF Panel as per SLD and Technical Document. Synchronizing panel should be incorporated with Auto Load sharing, Load Dependent "Start & Stop".	Set	1								
5.0	**Design Supply, Installation, Commissioing of Exhaust System as per below mentioned**										
5.1	10"M.S.Pipe Class B from Exhaust Bellow to Silencer	Mtrs.	12								
5.2	Supply of 10" MS Class B Exhaust pipe	Mtrs.	50								
5.3	Aluminium Cladding for the Exhaust Pipe	Mtrs.	62								
5.4	Cladding for the Residential Silencers	Nos	6								
5.5	Bends & Flanges 250 mm Dia or required size.	Nos	6								
5.7	Steel for Exhaust Support structure (for 6No. Of D.G.Sets)	Ton	4								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
6.00	SITC of GI ladder and Perforated Cable Trays of following sizes										
a	600mm x 75mm ladder tray.	Mtrs.	60								
b	300mm x 50mm perforated tray.	Mtrs.	20								
7.0	**FUEL PIPING**										
7.1	Supply ,Installation and Commissioning of ASTM Grade, seamless Pipe 40 mm (40NB)	Mtrs.	50								
7.2	Supply ,Installation and Commissioning of ASTM Grade, seamless Pipe 25 mm (25NB)	Mtrs.	60								
7.3	Ball Valve										
a	40NB	Nos	4								
b	25NB	Nos	6								
7.4	Non Return Valves										
a	40NB	Nos	2								
7.5	Y Stainers	Nos	2								
7.6	Solenoid Valves for 25NB tapping lines for auto operation of Fuel pumping system.	Set	6								
7.7	Flow Meter	Nos	6								
7.8	Hardware for fuel piping	Set	1								
8.0	Supply installation of Earthing station as per IS 3043 using SIP/PIP electrode complete (Eqvt to Ashlok T 39) with watering pipe & suitable GI strip up to chamber, soil treatment with suitable backfill powder, brick inspection chamber with 450x450 mm CI cover, disconnecting link complete including excavation or earth pit, refilling.	Nos	26								
9.0	Supply, installation, testing of GI/ Cu. earthing strips & wires in ground at a depth of 600 mm. in trenches or tray with necessary clamps & bimetallic srips as per specification. (excavation required for this to be ensured in the scope.) Refer layout & tender spec for various applications										
9.1	50 x 10 mm. GI strip.	Mtrs.	200								
9.2	50 x 10 mm. Cu strip.	Mtrs.	150								
10.0	Supply, Installation, Testing and Commissioning of Al./Cu. LT XLPE cable for Power/Control cabling as mentioned below. Schedule for the same shall be submitted by the DG Vendor prior execution of the job.										
10.1	3.5C X 400 sq.mm. A2XFY	Mtrs.	1950								
10.2	24C X 2.5 sq.mm. 2XWY	Mtrs.	650								
10.3	2C X 4 sq.mm. 2XWY	Mtrs.	500								
10.4	6C X 2.5 sq.mm. 2XWY	Mtrs.	500								
10.5	3C X 1.5 sq.mm. Cu. Sheilded Cable	Mtrs.	1500								
10.6	2C X 2.5 sq.mm. 2XWY	Mtrs.	200								
11.0	Cable Termination of above cables with glands and lugs.										
11.1	3.5C X 400 sq.mm. A2XFY	Nos	36								
11.2	24C X 2.5 sq.mm. 2XWY	Nos	6								
11.3	2C X 4 sq.mm. 2XWY	Nos	6								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
11.4	6C X 2.5 sq.mm. 2XWY	Nos	6								
11.5	3C X 1.5 sq.mm. Cu. Sheilded Cable	Nos	18								
11.6	2C X 2.5 sq.mm. 2XWY	Nos	2								
13.0	**Approvals**										
13.1	Approvals and registration from Statutory Authorities like pollution control board, electrical inspector etc. necessory to complete the job.	Job	1								
14	Under Ground Diesel Storage Tank (UG Tank)										
15.1	Supply , Installation Testing and commissioning of Under ground Diesel Storage Tank of Capacity 50 KL **including Approval from CCOE**, NOC from various authorities, MPCB, Fire authority approval and any other statutary bodies approval. Necessory civil work along with fencing and gate. In the area of UG tank necessory flame proof light fitting along with lighting poles to be considered. Necessory Pumping arrangement (Electrical Driven) with one working and one stand by pumps, along with Diesel Piping to be considered. Fuel storage pumping system shall be designed to have a trouble-free automated system without manual intervention for auto-filling of Day Tanks for 6No. of DG sets. Level sensors, flow meters to be considered by bidders. Monitoring provision shall be included with Potential free contacts/option to connect Flow Meters inside fuel lines / Underground Level Sensor Provision on tanks etc which shall provide for smooth operation.	Job	1								
	TOTAL Of SECTION-I										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	SECTION-II ITEM MAY BE EXECUTED										
1	**Design Supply, Installation, Commissioing of Exhaust System as per below mentioned**										
1.1	Supply, Installation and Commissioning of Single self supported standalone chimney as common exhaust outlet for 3Nos. Of DG Sets with all related & required accessories, support structure, LA, Aviation lamp etc.	Job	1								
2	SITC of GI ladder and Perforated Cable Trays of following sizes										
2.1	750mm x 75mm ladder tray.	Mtrs.	1								
3	Supply , Installation , Testing and Commissioing external Fuel Tank of suitable capacity 990 lts as per CPCB norms.	Job	1								
4	Supply, Installation, Testing and Commissioning of Earthing station as per IS 3043 using Pipe / plate electrode complete with 50mm dia. watering pipe & suitable GI/Cu strip up to chamber, soil treatment with charcoal and salt / bentonite powder, brick inspection chamber with 450x450 mm CI cover, disconnecting link complete including rate of excavation for earth pit, refilling and any other item required to complete the task.										
4.1	Earthing station as above but using 600 x 600 x 6 mm. GI. Plate as electrode complete.	Nos	1								
4.2	Earthing station as above but using 600 x 600 x 3 mm. Cu. Plate as electrode complete.	Nos	1								
5	Supply, Installation, Testing and Commissioning of Al./Cu. LT XLPE cable for Power/Control cabling as mentioned below. Schedule for the same shall be submitted by the DG Vendor prior execution of the job.										
5.1	10C X 2.5 sq.mm. 2XWY	Mtrs.	1								
5.2	4C X 25 sq.mm.	Mtrs.	1								
5.3	3C X 4 sq.mm. 2XWY	Mtrs.	1								
6	Cable Termination of above cables with glands and lugs.										
6.4	10C X 2.5 sq.mm. 2XWY	Nos	1								
6.5	4C X 25 sq.mm.	Nos	1								
6.6	3C X 4 sq.mm. 2XWY	Nos	1								
	TOTAL Of SECTION-II										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	PRICISION CHILLERS										
1	Supply, installation, testing & commissioning of 175 TR 'TWIN SCREW' type Air-cooled liquid chillers, complete with spring loaded anti vibration mounts, With first charge of Refrigerant Gas, Lubricating oil etc., for the following operating conditions. The chillers shall be complete with screw compressors (Single / Multi Screw), Fin and Tube Air cooled condensers, Flooded evaporator, Drive Motor, Control panel etc., Star delta Starter, stepless capacity control, etc.,as per specifications mentioned in the technical specification sheet. The Chiller shall be capable of opearting in open ambient temperature of local ambient of Pune City, and shall use R-134 a Refrigerant. The Chiller should be installed on Spring Mounted Antivibration mounts.Chiller shall be suitable for 45 deg.C abmient temp.with starting to full load timing as 3.0 min. maximum.	Nos	4								
1.1.	**Cooling Capacity (175 TR x 4 Nos) (2 W + 2 SB)**										
	Chiller Flow rate : 335 US GPM Chiller tubes to be designed for the above flow rate.										
	Fouling Factor : 0.0005 ~ 0.0001										
	IKW/TR : 1.25 ~ 1.36 Kw/TR										
	EWT : 12.00 Deg C										
	LWT : 7.00 ° C										
	EER ratio (To be Furnished with technical bid)										
	OR										

	Supply, installation, testing & commissioning of 175 TR 'TWIN SCREW' type Air-cooled liquid chillers, complete with spring loaded anti vibration mounts, With first charge of Refrigerant Gas, Lubricating oil etc., for the following operating conditions. The chillers shall be complete with screw compressors (Single / Multi Screw), Fin and Tube Air cooled condensers, Flooded evaporator, Drive Motor, Control panel etc., Star delta Starter, stepless capacity control, etc.,as per specifications mentioned in the technical specification sheet. The Chiller shall be capable of opearting in open ambient temperature of local ambient of Pune City, and shall use R-134 a Refrigerant. The Chiller should be installed on Spring Mounted Antivibration mounts.Chiller shall be suitable for 45 deg.C abmient temp.with starting to full load timing as 3.0 min. maximum.	Nos	4								
1.2	**Cooling Capacity (175 TR x 4 Nos) (2 W + 2 SB)**										
	Chiller Flow rate : 335 US GPM Chiller tubes to be designed for the above flow rate.										
	Fouling Factor : 0.0005 ~ 0.0001										
	IKW/TR : 1.25 ~ 1.36 Kw/TR										
	EWT : 20.00 Deg C										
	LWT : 14.00 ° C										
	EER ratio (To be Furnished with technical bid)										
	TOTAL VALUE FOR CHILLERS										
2	**CENTRIFUGAL PUMPS**										

2.1	Supply of Chilled water pump, End Suction Back pull out type horizontal , Single Stage Pumps, running at 2900 rpm bareshaft fitted with drip tight Make mechanical seal with O ring silicone carbide seat retainer. along with accessories like fabricated MS base frame , coupling guard , foundation bolts , flexible spacer coupling & coupled to foot mounted TEFC three phase motor (EFF-1) , Class F insulation & IP 55 protection of suitable rating. The motor shall be compatible with VFD drive as specified in the enquiry document. Pump design parameters to be designed as follows. Flexible bellows at pump inlet and pump outlet as per suction and delivery sizes to be considered in the rate. **Metallurgy:** **Body : Cast Iron (IS 210 FG260), Impeller : LT Bronze (IS 318 Grade LTB2), Shaft : SS 410, Shaft Sleeve : SS 410**										
	Pump design parameters to be designed as follows.										
	Primary chilled water pump module										
	Flow rate : 335 US GPM @ 35 Mtr head required as per site condition. (2W+2SB).	Nos	4								
2.2	Control Panel consisting of Panel + VFD (Common for both pumps) housed in a single enclosure with incomer and two nos outgoing feeder. The terminations shall be suitable as per cable. Please read the control panel logic in technical specification section.	Nos	1								
	TOTAL VALUE FOR PUMPS										
3	**CHILLED WATER SYSTEM**										

3.1	Supply, installation, testing & commissioning of Polyethylene High Density (PE 100) from **+GF+** piping of PN-16 with all necessary **GF Elctronic Fusion welding/Victaulic** Fitting only such as Couplings, Bends, Reducers, T, expanders, flanges etc, supports such as u clamps, threaded rod, pre insulated pedestals, nut and washers as per site condition and 19 thick Closed cell rubber nitrile of Class "O". The insulation of shall be covered with 26 G aluminium cladding with superior workmanship.										
3.1.1	250 mm Dia	RMT	405								
3.1.2	200 mm Dia	RMT	250								
3.1.3	150 mm Dia	RMT	RO								
3.1.4	100 mm Dia	RMT	75								
3.1.5	80 mm Dia	RMT	75								
3.1.7	65 mm Dia	RMT	40								
3.1.8	40 mm Dia	RMT	RO								
3.1.9	32mm Dia	RMT	150								
4.1	Centric Disc Butterfly valve with a single piece Rubber lined body. Short Wafer body. Integrally moulded seat. Rating PN 16. General design and manufacturing as per API 609 category A/BS 5155/MSS SP-67. Flange ANSI 150 , properly insulated with 25 mm rubber nitrile class O closed cell insulation with 26G Al. cladding.										
4.1.1	250 mm Dia	Nos	15								
4.1.2	200 mm Dia	Nos	30								
4.1.3	150 mm Dia	Nos	35								
4.1.4	100 mm Dia	Nos	8								
4.1.5	80 mm Dia	Nos	32								
4.1.6	65 mm Dia	Nos	4								
4.1.7	40 mm Dia	Nos	R.O.								
5	Flow Switch suitable for 200 mm Dia Pipe	Nos	4								
6	Diferential pressure switch suitable for 200 mm Dia Pipe	Nos	2								

7	100 mm dia dial type pressure gages with needle valve & as per specifications mentioned in technical data sheet. Pressure gauge, scale range 0-10 bar. Complete with 3 valves an piping. To be mounted over all pumps. Size 10 DN	Nos	4								
8	100 mm dia dial type pressure gages with needle valve & as per specifications mentioned in technical data sheet.	Nos	8								
9	Dial type industrial type imported thermometer with 100mm dia dial & as per specifications mentioned in technical data sheet	Nos	8								
10	Chiller Inlet & Outlet Rubber Expansion Bellows - 200 mm Dia	Nos	8								
11	Supply, Installation of ball valve CS body SS 304 Ball full three piece design full port end connection socket weld type class # 150.	Nos	6								
11.1	15 mm Dia	Nos	6								
11.2	25 mm Dia	Nos	12								
11.3	32 mm Dia	Nos	92								
12	Balancing valve with measurement points (STA-D). Pressure class PN 16. Made up of AMETAL, Seat seal: Stem with EPDM O-ring Spindle seal: EPDM O-ring Handwheel: Polyamide and TPE.										
12.1	25 mm Dia	Nos	46								
12.2	200 mm Dia	Nos	R.O.								
13	Flanged Balancing Valve With measurement points (STAF - SG). Pressure class PN 16. Body: Ductile iron EN-GJS-400-15. spindle of AMETAL Seat seal: Cone with EPDM ring. Bonnet bolts: Chromed steel.										
13.1	200 mm Dia	Nos	2								
14	SITC of Y-Strainer of following sizes;										
	200 mm Dia	Nos	4								
14	Automatic Air vent of 1/2 "	Nos	8								

15	Closed Expansion Tank with Expansion Vessel and pressurizing Pumps 1 Working + 1 Standby. The tank capacity to be 1000 Ltr . Expansion tank to be of SS 309 with Armaflex / K- Flex Insulation 32 mm thick & 26 Gage Aluminum Cladding with diamond finish and with related piping, Isolating valves , Safety valves , Drains, Overflow and Guages.6.3 thik **Pressurisation unit** with double pump(0.85HP) 230V, 50Hz, single phase) pressure transmitter, IP65 control panel(Remote operation, Duty cycling, Dry-Run protection)	Nos	1								
16	Centrifugal Air Separator for Chilled Water in SS 309 Tank shall be insulated with Armaflex / K Flex insulation 32 mm & 26 Gage Aluminum Cladding with diamond finish and necessary valves etc.suitable for the following flow rates.6.3Thik										
16.1	Suitable to mount on 250 mm Dia pipe	Nos	2								
17	SITC of chemical dosing plant suitable for above system for flushing and treating the water including following 1. 500 Ltr make up water storage tank x 01 nos 2. FIrst charge of Dosing chemicals for the commissioning of the system and chemicals for the 6 months operation. 3. Treated water tank of capacity 2000 Ltr. Interconnecting piping, accessories and valves complete in all respect. 25 mtr of 25 NB size pipe to be considered as interconnecting pipe. 03 Nos of ball velves and 02 nos of ball float vales to be considered in the item.	Lot	1								
18	SITC of SS 309 tank with capacity of 15000 Ltr to be used as thermal storage for 10 mins back up supply. The tank to be of M S Construction and with anti corrosive coating from inside with Armaflex / K- Flex Insulation 32 mm thick & 26 Gage Aluminum Cladding with diamond finish and with related piping, Isolating valves , Safety valves , Drains, Overflow and Guages. 8 mm Shell thickness and 12 mm Dish thickness. The tank shall have necessary ports with flanges Table F	Lot	2								

19	SITC of cooling distribution unit (CDU) to provide cooling water close control and above the dew point. Shall be capable of 150 KW cooling capacity. The CDU shall be approved to work with IBM 'iDataPlex / RDHX' racks. It shall have full run and stand by capabilities with redundant pumps. It shal have internalmanifold with leak free quick release couplings. It shall have a auto fill and bleed off connection. FUll alarm monitoring and connectivity to MODBUS. Complete in all respect.	Nos	8								
20	Structural steel such as Channel, Angles, Plates, I section, Beam section etc with two coats of red oxide and two coats of synthetic enamale quick drying paint. The colour shall be approved by the Architect.	Ton	5								
21	Flanged "Y "Type starainer with SS mesh . Pressure class PN 16. Body: Ductile iron										
	150 mm Dia	Nos	4			0	0				
22	Non return valves										
	100 mm Dia	Nos	4			0	0				
	SITC of Flexible hose made of Ethylene Propylene Diene Monomer (EPDM) rubber - peroxide cured, non-metal oxide material and shall have Fluid quick-connect couplings at each end. the couplings must be compatible with the heat exchanger couplings.										
	Dia 32 mm	Rmt	225								
	TOTAL VALUE FOR CHILLED WATER PIPING										
21	**ELECTRIFICATION WORK**										
21.1	Electrical Panel No 1 - 3 : Chiller panel										

	HVAC Utility Panels comprising of 1 Incoming Feeder (4 Pole ,400 Amp with Overload Earth Fault and Short Circuit protection, MCCB and Outgoing Feeders as per SLD, The Panel shall be IP-55 Protection for Indoor use,duly powder coated by 7 tank painting process & fabrication of 14/16 Gauge CRCA Sheet.Panel kWH meter, R-Y-B indication Lamps, Control Fuses & AL Bus Bar. Feeders complete with MCCB, Push Buttons, ON, OFF, & Trip indication,and BMS connectivity etc. Location: Panel Room, with bottom entry. The panel should be with appropriate cooling/heating arrangement. Supplier to furnish the power/Heat loass calculation. and outgoing feeder as below	NOS	4								
	Outgoing Feeder:- As per SLD										
21.2	Electrical Panel No 4 - 7, Chiller Pump panel										
	HVAC Utility Panels comprising of 1 Incoming Feeder (4 Pole ,40 Amp with Overload Earth Fault and Short Circuit protection, MCCB and Outgoing Feeders as per SLD, The Panel shall be IP-55 Protection for Indoor use,duly powder coated by 7 tank painting process & fabrication of 14/16 Gauge CRCA Sheet.Panel kWH meter, R-Y-B indication Lamps, Control Fuses & AL Bus Bar. Feeders complete with MCCB, Push Buttons, ON, OFF, & Trip indication, BMS connectivity etc. Location: Panel Room, with bottom entry. The panel should be with appropriate cooling/heating arrangement. Supplier to furnish the power/Heat loass calculation. and outgoing feeder as below	NOS	4								
	Outgoing Feeder:- As per SLD										
21.3											
	Electrical Panel No 8, Pump Panel										

	HVAC Utility Panels comprising of 1 Incoming Feeder (4 Pole ,40 Amp with Overload Earth Fault and Short Circuit protection, MCCB and Outgoing Feeders as per SLD, The Panel shall be IP-55 Protection for Indoor use,duly powder coated by 7 tank painting process & fabrication of 14/16 Gauge CRCA Sheet.Panel kWH meter, R-Y-B indication Lamps, Control Fuses & AL Bus Bar. Feeders complete with MCCB, Push Buttons, ON, OFF, & Trip indication etc. Location: Panel Room, with bottom entry. The panel should be with appropriate cooling/heating arrangement. Supplier to furnish the power/Heat loass calculation. and outgoing feeder as below	NOS	1								
	Outgoing Feeder:- As per SLD										
21.4	Electrical Panel No 9-11, PAC panel.										
	HVAC Utility Panels comprising of 1 Incoming Feeder (4 Pole ,100 Amp with Overload Earth Fault and Short Circuit protection, MCCB and Outgoing Feeders as per SLD, The Panel shall be IP-55 Protection for Indoor use,duly powder coated by 7 tank painting process & fabrication of 14/16 Gauge CRCA Sheet.Panel kWH meter, R-Y-B indication Lamps, Control Fuses & AL Bus Bar. Feeders complete with MCCB, Push Buttons, ON, OFF, & Trip indication, BMS connectivity etc. Location: Panel Room, with bottom entry. The panel should be with appropriate cooling/heating arrangement. Supplier to furnish the power/Heat loass calculation. and outgoing feeder as below	NOS	1								
	Outgoing Feeder:- As per SLD										
22	Supply and installation of prefabricated (hot dip Galvanised) G.I. ladder/ perforated trays with 50/ 75 mm C channels & Runges at 200mm cc and including prefabricated accessories like Bends, Tee, Right-angles & tray coupling arrangement etc.(Bends fabricated at site will not be allowed.)										
22.3.1	50mm, 50x50 perforated tray. (16 SWG)	Rmt.			-						
22.3.2	100mm, 50x50 perforated tray. (16 SWG)	Rmt.									
22.3.3	150mm, 50x50 perforated tray. (16 SWG)	Rmt.			-						
22.3.4	200mm, 50x50 perforated tray. (16 SWG)	Rmt.									
22.3.5	300 mm, 50x50 perforated tray. (14 SWG)	Rmt.			-						
22.3.6	450 mm, 50x50 perforated tray. (14 SWG)	Rmt.	65								

22.3.7	600 mm, 50x50 perforated tray. (14 SWG)	Rmt.	50								
22.3.8	450 mm, 75x75 Ladder tray. (14 SWG)	Rmt.			-						
22.3.9	600 mm, 75x75 Ladder tray. (14 SWG)	Rmt.	75								
22.3.10	750 mm, 75x75 Ladder tray. (14 SWG)	Rmt.									
23	Cable Tray Covers suitable for following size trays										
23.4.1	50mm perforated tray.	Rmt.	R.O.								
23.4.2	100mm perforated tray.	Rmt.	R.O.								
23.4.3	150mm perforated tray.	Rmt.	R.O.								
23.4.4	200mm, perforated tray.	Rmt.	R.O.								
23.4.5	300 mm perforated tray.	Rmt.	R.O.								
23.4.6	450 mm perforated tray.	Rmt.	R.O.								
24	Supply, Installation, Testing and Commissioning of 1100V grade L.T. XLPE/ PVC insulated multistrand Al./ Cu. conductor cables on provided prefabricated trays/ pipe/ in trenches with necessary clamps, identification tag. & all other items required to complete the task. **(Actual cable lengths shall be measured at site prior to procurement.)**										
24.6.1	3.5C x 400 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
24.6.2	3.5C x 300 Sq.mm. A2XFY Cable.	Rmt.	600								
24.6.3	3.5C x 240 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
24.6.4	3.5C x 185 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
24.6.5	3.5C x 150 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
24.6.6	3.5C x 120 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
24.6.7	3.5C x 95 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
24.6.8	3.5C x 70 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
24.6.9	3.5C x 50 Sq.mm. A2XFY Cable.	Rmt.	375								
24.6.10	3.5C x 35 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
24.6.11	3.5C x 25 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
24.6.12	4C x 25 Sq.mm. AYFY Cable.	Rmt.	R.O.								
24.6.13	4C x 10 Sq.mm. YWY Cable.	Rmt.	R.O.								
24.6.14	4C x 16 Sq.mm. YWY Cable.	Rmt.	350								
24.6.15	4C x 6 Sq.mm. YWY Cable.	Rmt.	R.O.								
24.6.16	4C x 4 Sq.mm. YWY Cable.	Rmt.	R.O.								
24.6.17	4C x 2.5 Sq.mm. AYFY Cable.	Rmt.	600								
24.6.18	3C x 6 Sq.mm. YWY Cable.	Rmt.	R.O.								
24.6.19	3C x 4 Sq.mm. YWY Cable.	Rmt.	R.O.								
24.6.20	3C x 2.5 Sq.mm. YWY Cable.	Rmt.	R.O.								

25	Supply & installation of End termination for cables as above with Brass, heavy duty, **Single compression** glands, lugs, other consumable, crimping, gland hole drilling, ferrulling, marking, etc.										
25.7.1	3.5C x 70 Sq.mm. A2XFY Cable.	Nos	R.O.								
25.7.2	3.5C x 50 Sq.mm. A2XFY Cable.	Nos	12								
25.7.3	3.5C x 35 Sq.mm. A2XFY Cable.	Nos	R.O.								
25.7.4	3.5C x 25 Sq.mm. A2XFY Cable.	Nos	R.O.								
25.7.5	4C x 16 Sq.mm. AYFY Cable.	Nos	R.O.								
25.7.6	4C x 10 Sq.mm. YWY Cable.	Nos	R.O.								
25.7.7	4C x 16 Sq.mm. YWY Cable.	Nos	8								
25.7.8	4C x 4 Sq.mm. YWY Cable.	Nos	R.O.								
25.7.9	4C x 2.5 Sq.mm. YWY Cable.	Nos	8								
25.7.10	3C x 6 Sq.mm. YWY Cable.	Nos	R.O.								
25.7.11	3C x 4 Sq.mm. YWY Cable.	Nos	R.O.								
25.7.12	3C x 2.5 Sq.mm. YWY Cable.	Nos	R.O.								
26	Supply & installation of End termination for cables as above with Brass, heavy duty, **Double compression** glands, lugs, other consumable, crimping, gland hole drilling, ferrulling, marking, etc.										
26.8.1	3.5C x 400 Sq.mm. A2XFY Cable.	Nos	R.O.								
26.8.2	3.5C x 300 Sq.mm. A2XFY Cable.	Nos	16								
26.8.3	3.5C x 240 Sq.mm. A2XFY Cable.	Nos	R.O.								
26.8.4	3.5C x 185 Sq.mm. A2XFY Cable.	Nos	R.O.								
26.8.5	3.5C x 150 Sq.mm. A2XFY Cable.	Nos	R.O.								
26.8.6	3.5C x 120 Sq.mm. A2XFY Cable.	Nos	R.O.								
26.8.7	3.5C x 95 Sq.mm. A2XFY Cable.	Nos	R.O.								
27	Supply, laying and connection of copper earthing 25mm x 3mm thick copper strip.	Rmt	150		-						
	TOTAL VALUE FOR ELECTRIFICATION WORK										
	SUB TOTAL OF HVAC SYSTEM										

Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
1	Supply of Precision AC as per the technical specification. (2W+1SB)										
1.1	30 TR Net Cooling Capacity	Nos	3								
	EER ratio (To be Furnished with technical bid)										
2	Refrigerant Piping as per manufacturing standard with armaflex 25 mm thk rubber nitrile insulation.Piping shall be routed via suitable size cable try. The distance between the IDU and ODU shall be 20 RMT ea only.	LOT	1								
3	PVC drain piping. Insulated with 13 mm rubber nitrile armaflex insulation. The pipe shall be of finolex make only.										
3.1	40 mm	RMT	80								
4	GI Class B, ERW pipe for fresh water										
4.1	25 NB	RMT	60								
5	Refrigerant gas R 407 C as per manufacturers specification and qua	LOT	3								
6	Deep pleated 4" filters with an ASHRAE 52.2 MERV 8 rating (Spare)	Lot	3								
7	Fan Aided Floor Grills in front of Tape Library (600x600mm). To be used as floor diffuser in powder coated MS construction. The Diffuser shall be able to take a load of 1000 Kg UDL. The top shall have an anti static coating.	Nos	14								
8	SITC of GI Ducting (180 GSM) Factory Fabricated with Duct Mate Flanges as per SMACNA for supply air, with 19 mm insulation of Closed Cell Rubber Nitrile Armaflex/Kflex/Sekisui pilon make.inclussive of supports 10 mm GI Threaded rod and C channel 25x25x25 mm size. As per site condition.										
8.1	18 guage	SQM	R.O								
8.2	20 guage	SQM	R.O.								
8.3	22 guage	SQM	R.O.								
8.4	24 guage	SQM	20								
9	SITC of Aluminum eggcrate powder coated return air grill with aluminum border and grid in in ½ x ½ x ½-inch sizes.										
9.1	600 mm X 600 mm	Nos	R.O.								
	TOTAL VALUE FOR PAC				**TOTAL**						
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	PART-A ' LOW STATIC DUCTABLE SPILT SYSTEM '										
1	The system should be with necessary IDU's & ODU's.Out Door Unit shall be complete with Invertor/ scroll compressor, The system should be with necessary combinations of IDU's & ODU's along with necessary interconnecting refrigerant piping, Cabling, Drain Piping, Drain pumps, Flexible connection of fire retardant type, etc. of followings capacities, The ODU Shall be of Top discharge type.The refrigerat shall be R407 C, R410 Aonly.										
	Supply ,Installation And commissioning of following Ductable Type Low static Split Units including indoor - Outdoor Combination, Refergerant Charge as per piping Insttalation, IDU & ODU Supports (ODU Support with painted MS Channel of suffient size). The unit shall be with necessary corded remote and the holder for the same.										
1.1	10 TR / 4000 CFM Capacity	Nos	4								
	EER ratio (To be Furnished with technical bid)										
2	Refrigerant Piping with 19 mm thick Closed Cell rubber nitrile,Class "O"-armaflex insulation of following sizes- Inclussive of necessary Supports as per standard practices.Piping shall be routed via suitable size cable try										
	Gas Line (inch.) Liquid Line (inch.)										
2.1	41.3 19.1	RMT	R.O.								
2.2	34.9 19.1	RMT	R.O.								
2.3	34.9 15.9	RMT	R.O.								
2.4	28.6 12.7	RMT	R.O.								
2.4	22.2 6.4	RMT	200								
2.5	12.7 6.4	RMT	R.O.								
2.6	15.9 6.4	RMT	R.O.								
3	Interconnecting control cabling between IDU's & ODU's. The cabling shall be well supported / tied up with the ref line.	Rmt.	135								
4	Acoustical insulation with Armaflex/ K flex / Sekisui open cell sound insulation.Armasound/eq.super sileance duct lianer with micro ban, open cell, elastomaric nitrile rubber.	SQM	15								
5	SLC of Drain Piping shall be HARD PVC . Drain Piping shall be insulated 13 mm Armaflex rubber nitrile closed cell insulation. The drain shall be released into the nearest toilets or as instructed by consulting engineer.										
5.1	50 mm dia.	Rmt.	0								
5.2	40 mm dia.	Rmt.	20								
5.3	25 mm dia.	Rmt.	40								

6	SITC of GI Ducting (120 GSM) Factory Fabricated with Duct Mate Flanges as per SMACNA for supply air, with 19 mm insulation of Closed Cell Rubber Nitrile Armaflex/Kflex/Sekisui pilon make.inclussive of supports 10 mm GI Threaded rod and C channel 25x25x25 mm size, As per site condition.										
6.1	18 guage	SQM	R.O								
6.2	20 guage	SQM	R.O.								
6.3	22 guage	SQM	R.O.								
6.4	24 guage	SQM	40								
7	Supply air grille with adjustable horizontal and vertical vanes, made of white painted steel, with mounting frame and air volume damper made of galvanized steel sheet.	SQM	2								
8	Pressure Testing, Nitrogen flushing, gas charging,& commissioning testing of the air conditioning system.	Lot	1								
9	SITC of auto chnageover timer for cyclic operation of ductable units as a combination of 2 W + 2 SB. Each unit shall run for 8 hrs.	Nos	1								
10	Supply ,Installation And commissioning of following Hi-wall Type Split Units including indoor - Outdoor Combination, Refrigerent piping and Interconnecting control cabling of 15 Mtr. length, Refergerant Charge as per piping Insttalation, Automatic Timer of 4 Hrs. Cycle, IDU & ODU Supports as per std. Practice. And must be atleast 5- Star rated	Nos	2								
10.1	1.5 TR High Wall Unit (1W+1 SB) BMS Room										
	TOTAL VALUE FOR AIR CONDITIONING WORK (PART"A")					**0**	**0**				
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	PART-A ' LOW STATIC DUCTABLE SPILT SYSTEM '										
1	The system should be with necessary IDU's & ODU's.Out Door Unit shall be complete with Invertor/ scroll compressor, The system should be with necessary combinations of IDU's & ODU's along with necessary interconnecting refrigerant piping, Cabling, Drain Piping, Drain pumps, Flexible connection of fire retardant type, etc. of followings capacities, The ODU Shall be of Top discharge type.The refrigerat shall be R407 C, R 410 Aonly.										
	Supply ,Installation And commissioning of following Ductable Type Low static Split Units including indoor - Outdoor Combination, Refergerant Charge as per piping Insttalation, IDU & ODU Supports (ODU Support with painted MS Channel of suffient size). The unit shall be with necessary corded remote and the holder for the same										
1.1	5 TR / 2000 CFM Capacity	Nos	2								
	EER ratio (To be Furnished with technical bid)										
2	Refrigerant Piping with 19 mm thick Closed Cell rubber nitrile,Class "O"-armaflex insulation of following sizes- Inclussive of necessary Supports as per standard practices.Piping shall be routed via suitable size cable try										
	Gas Line (inch.) Liquid Line (inch.)										
2.1	41.3 19.1	RMT	R.O.								
2.2	34.9 19.1	RMT	R.O.								
2.3	28.6 15.9	RMT	R.O.								
2.4	28.6 12.7	RMT	R.O.								
2.4	22.2 12.7	RMT	50								
2.5	12.7 6.4	RMT	R.O.								
2.6	15.9 6.4	RMT	R.O.								
3	Interconnecting control cabling between IDU's & ODU's. The cabling shall be well supported / tied up with the ref line.	Rmt.	50								
4	Acoustical insulation with Armaflex/ K flex / Sekisui open cell sound insulation.Armasound/eq.super sileance duct lianer with micro ban, open cell, elastomaric nitrile rubber.	SQM	5								
5	SLC of Drain Piping shall be HARD PVC . Drain Piping shall be insulated 13 mm Armaflex rubber nitrile closed cell insulation. The drain shall be released into the nearest toilets or as instructed by consulting engineer.										
5.1	50 mm dia.	Rmt.	R.O								
5.2	40 mm dia.	Rmt.	20								
5.3	25 mm dia.	Rmt.	R.O								

6	SITC of GI Ducting (120 GSM) Factory Fabricated with Duct Mate Flanges as per SMACNA for supply air, with 19 mm insulation of Closed Cell Rubber Nitrile Armaflex/Kflex/Sekisui pilon make.inclussive of supports 10 mm GI Threaded rod and C channel 25x25x25 mm size, As per site condition.										
6.1	18 guage	SQM	R.O								
6.2	20 guage	SQM	R.O.								
6.3	22 guage	SQM	R.O.								
6.4	24 guage	SQM	15								
7	Door Louver in extruded AL consutruction. The Grill shall be powder coated. The color shall be approved by the architect / consulting engineer before the delivery at site.	SQM	0.5								
8	Supply air grille with adjustable horizontal and vertical vanes, made of white painted steel, with mounting frame and air volume damper made of galvanized steel sheet.	SQM	1								
9	Propeller fan of capacity 500 CFM for exhaust. The fan shall be Industrial type and shall have safety grill at inlet and mesh at outlet to prevent any bird entry. 4 P, 1400 RPM, single phase, Motor IP 54 Protection, F Class insulation, Motor 0.12 KW (For Batery room Exhaust provision)	Nos	1								
10	Pressure Testing, Nitrogen flushing, gas charging,& commissioning testing of the air conditioning system.	Lot	1								
11	SITC of auto chnageover timer for cyclic operation of ductable units as a combination of 1W + 1 SB. Each unit shall run for 8 hrs.	Nos	1								
	TOTAL VALUE FOR AIR CONDITIONING WORK (PART"A")										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	PART-A ' LOW STATIC DUCTABLE SPILT SYSTEM '										
1	The system should be with necessary IDU's & ODU's.Out Door Unit shall be complete with Invertor/ scroll compressor, The system should be with necessary combinations of IDU's & ODU's along with necessary interconnecting refrigerant piping, Cabling, Drain Piping, Drain pumps, Flexible connection of fire retardant type, etc. of followings capacities, The ODU Shall be of Top discharge type.The refrigerat shall be R407 C, R410 A only										
	Supply ,Installation And commissioning of following Ductable Type Low static Split Units including indoor - Outdoor Combination, Refergerant Charge as per piping Insttalation, IDU & ODU Supports (ODU Support with painted MS Channel of suffient size). The unit shall be with necessary corded remote and the holder for the same.										
1.1	10 TR / 4000 CFM Capacity	Nos	2								
	EER ratio (To be Furnished with technical bid)										
2	Refrigerant Piping with 19 mm thick Closed Cell rubber nitrile,Class "O"-armaflex insulation of following sizes- Inclussive of necessary Supports as per standard practices.Piping shall be routed via suitable size cable try										
	Gas Line (inch.) Liquid Line (inch.)										
2.1	41.3 19.1	RMT	R.O.								
2.2	34.9 19.1	RMT	R.O.								
2.3	34.9 15.9	RMT	R.O.								
2.4	28.6 12.7	RMT	R.O.								
2.4	22.2 12.7	RMT	110								
2.5	12.7 6.4	RMT	R.O.								
2.6	15.9 6.4	RMT	R.O.								
3	Interconnecting control cabling between IDU's & ODU's. The cabling shall be well supported / tied up with the ref line.	Rmt.	50								
4	Acoustical insulation with Armaflex/ K flex / Sekisui open cell sound insulation.Armasound/eq.super sileance duct lianer with micro ban, open cell, elastomaric nitrile rubber.	SQM	5								
5	SLC of Drain Piping shall be HARD PVC . Drain Piping shall be insulated 13 mm Armaflex rubber nitrile closed cell insulation. The drain shall be released into the nearest toilets or as instructed by consulting engineer.										
5.1	50 mm dia.	Rmt.	R.O								
5.2	40 mm dia.	Rmt.	20								
5.3	25 mm dia.	Rmt.	R.O								

6	SITC of GI Ducting (120 GSM) Factory Fabricated with Duct Mate Flanges as per SMACNA for supply air, with 19 mm insulation of Closed Cell Rubber Nitrile Armaflex/Kflex/Sekisui pilon make.inclussive of supports 10 mm GI Threaded rod and C channel 25x25x25 mm size, As per site condition.										
6.1	18 guage	SQM	R.O								
6.2	20 guage	SQM	R.O.								
6.3	22 guage	SQM	R.O.								
6.4	24 guage	SQM	20								
7	Door Louver in extruded AL consutruction. The Grill shall be powder coated. The color shall be approved by the architect / consulting engineer before the delivery at site.	SQM	0.5								
8	Supply air grille with adjustable horizontal and vertical vanes, made of white painted steel, with mounting frame and air volume damper made of galvanized steel sheet.	SQM	2								
9	Propeller fan of capacity 250 CFM for Fresh AIr. The fan shall be Industrial type and shall have safety grill at inlet and mesh at outlet to prevent any bird entry. 4 P, 1400 RPM, single phase, Motor IP 54 Protection, F Class insulation, Motor 0.12 KW (For Electrical room FA provision)	Nos	1								
10	Pressure Testing, Nitrogen flushing, gas charging,& commissioning testing of the air conditioning system.	Lot	1								
11	SITC of auto chnageover timer for cyclic operation of ductable units as a combination of 1W + 1 SB. Each unit shall run for 8 hrs.	Nos	1								
	TOTAL VALUE FOR AIR CONDITIONING WORK (PART"A")										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	Fire Alarm System										
1.0	Supply, installation, testing & commissioning of Networkable 1 Single Loop Intelligent Analogue Addressable Fire Alarm Control Panel with minimum 80 characters LCD display including **Bacnet Gateway for Integration with BMS System**, The panel shall have the facility to be networked with other panel.	Nos	1								
2.0	Supply, installation, testing & commissioning of Analogue Addressable Multi-Sensor detectors combined (Optical + thermal) with including detector mounting base & required accessories.	Nos	29								
3.0	Supply, installation, testing & commissioning of Addressable Manual Call Points (**Pull Station Type**). The same shall be square in shape & made of ABS plastic material. Surface / Flush Mounting. It shall have a "Break glass" message embedded on the glass. The addressable module shall be enclosed along with the break glass in a junction box & with required accessories.	Nos	5								
4.0	Supply, installation, testing & commissioning of Conventional **Strobe cum Sounder**. The strobe cum sounder shall be made of ABS plastic material & have the Db level of minimum 90dBs and a multi tone facility, wall / ceiling mounted with mounting base & required accessories.	Nos	5								
5.0	Supply, installation, testing & commissioning of Addressable Monitor Module for Beam Detectors with Surface / wall mounting box & required accessories. (**UL Approved**)	Nos	RO								
6.0	Supply, installation, testing & commissioning of Addressable Control Module with surface/ wall mounting box & required accessories (**for sounders, strobe light & strobe cum sounders**)	Nos	RO								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
7.0	Supply, installation, testing & commissioning of Addressable Control Module with surface/ wall mounting box & required accessories (**for Access triping off**)	Nos	7								
8.0	Supply, installation, testing & commissioning of Addressable Fault / Loop isolator module with Surface mounting backbox & required accessories.	Nos	3								
9.0	Supply, installation, testing & commissioning of Response indicator for Above false ceiling detectors with required acessories.	Nos	10								
10.0	Supply, installation, testing & commissioning of Addressable Relay Module with surface/ wall mounting box & required accessories.	Nos	RO								
11.0	Supply and laying of 2C x 1.5 Sq.mm Copper Armoured Multi stranded FRLS cable on wall / slab or structure with necessary spacer & saddles. scope shall also include required end termination using gland,lugs & required accessories. (**Red in Colour**)	Rmt	500								
12.0	Siren of 3 kms range	Nos	1								
	SUB - TOTAL OF FAS										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

SCHEDULE OF QUANTITIES FOR NOVEC 1230 FIRE SUPPRESSION SYSTEM FOR SERVER ROOM											
Sr. No.	**Description**	**Unit**	**Qnty**	**Supply**				**Installation**			
				Rate	**BASIC COST**	**Duties and Taxes**	**Total**	**Rate**	**BASIC COST**	**Taxes**	**Total**
	Supply,Installation,Testing & Commisioning of :										
1	120 ltrs Seamless Cylinder with valve	7	Nos								
2	Pressure Guage +Low pressure supervisory switch	7	Nos								
3	NOVEC 1230 gas	706	Kgs								
4	Electromagnetic Actuator	1	Nos								
5	Manual Actuator	1	Nos								
6	Pneumatic actuator	7	Nos								
7	Flexible Discharge Hose	7	Nos								
8	Flexible Actuation Hose	7	Nos								
9	Discharge Nozzles	23	Nos.								
10	Check Valve	7	Nos.								
11	Flow Switch	1	Nos.								
12	Manifold	1	Nos.								
10	Wall mount kit	14	Nos								
11	M.S. Seamless pipes as per ASTM A 106 Gr. B, schedule 40 with necessary fittings.	1	Lot								
12	Gas Release panel with release module and battery backu	1	Nos								
13	Manual Release Switch	7	No								
14	Abort Switch	1	No								
15	Room Integrity Test	1	Lot								
	SUBTOTAL										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	Access Control System										
1	Supply, installation, testing & commissioning of **Proximity card readers** having a read range of minimum 3 inches with mounting box, plate & required accessories.	No.	10								
2	Supply of **proximity cards** with the possibility of printing the company details on its facia using dye sublimation method.	LOT	25								
3	Supply, installation, testing & commissioning of TCP / IP based **Two Access Door Controllers** controlling 4 Readers (2 Entry & 2 Exit) with minimum 2 Monitor inputs & 2 Relay outputs, RS232 & RS485 communication port, complete with Encloser, in-built power supply, & Access Control Software. (**controller should have Fire trigger input facility**)	No.	2								
4	Supply, installation, testing & commissioning of TCP / IP based **Four Access Door Controllers** controlling 8 Readers (4 Entry & 4 Exit) with minimum 2 Monitor inputs & 2 Relay outputs, RS232 & RS485 communication port, complete with Encloser, in-built power supply, & Access Control Software. (**controller should have Fire trigger input facility)**	No.	1								
5	Supply, installation, testing & commissioning of surface mounted Electro Magnetic door locks having capacity of holding force of 650 lbs with Armature plate & required accessories with LED Indications.	No.	10								
6	Supply, installation, testing & commissioning of Magnetic door Sensor (Door position sensor) with required accessories.	No.	10								
7	Supply, installation, testing & commissioning of Emergency release switch (Break glass type Green in colour)	No.	5								
8	Supply and laying of 6C x 1.0 Sq.mm multi stranded, Shielded Copper FRLS Armoured cable. (**For Card Reader etc.**)	Rmt.	250								
9	Supply and laying of 4C x 1.0 Sq.mm multi stranded, Shielded Copper FRLS Armoured cable. (**For Magnetic Lock & Door Sensor etc.**)	Rmt.	150								
	SUB - TOTAL OF ACS										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	Water Leak Detection System for Server Room										
1	Supply, installation, testing & commissioning of of 8-32 Zone Water Leak Detection Control Panel with power supply & required accessories.	No.	1								
2	Supply, installation, testing & commissioning of Water Leak Detection Cable with End Connections	Rmt.	70								
3	Supply and installation of Fixing clips (At every 0.5 meter distance)	No.	Lot								
4	Supply and installation of Identification tags (At every 1 meter distance)	No.	Lot								
5	Water Leak Detection Module	No.	20								
6	Supply, installation, testing & commissioning of Sounder / Hooter having minimum 85dB.	No.	1								
	SUB - TOTAL OF WLDS										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	Rodent Repllent System for Server Room										
1	Supply, installation, testing & commissioning of Wall mount type Digital Ultrasonic Rodent Repller Control Panel having facility to connect upto 20 transducer satellites including power supply, cabinet & required accessories. Should have facility of CRMS Software & Features like Adjustment of Wave Speed, Wave Density, Frequency Band Time, Frequency & Transducer Testing. Controller Should be Password Protected.periodic pest control using However; Chemical spray can be done once in 3 months as a contingency measure to effectively fight the pest menace.	No.	1								
2	Supply, installation, testing & commissioning of Transducer Satellite Stations capable of Emitting Ultrasonic sound of frequencies between 20 Khz and 50 Khz & higher, with blinking LED Indication & mounting accessories. The transducer shall capable for covering area of minimum 500 sq.ft for ceiling / Floor void & 500 sq.ft. for room void with accessories	No.	30								
3	Centralise Reporting & Minitoring Software for Redent Repellent System	No.	1								
	SUB - TOTAL OF RODENT REPELLENT SYSTEM										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	BUILDING MANAGEMENT SYSTEM										
	Supply, installation, testing & commissioning of the following controls & BMS equipments										
1	**BMS Server PC & UPS**										
1.1	Central Server with Quad Core Intel E5620 Processor 2.4GHz or better at 12M Cache, 4 GB or more of RAM, DVD RW, optical mouse, keyboard & 1 serial port. Server shall be provided with requisite MS Windows Licensed software Win ser 2008, compatible with the BMS platform	No.	1								
1.2	22" TFT color LCD monitor	No.	1								
1.3	A4 size alarm printer suitable for application with driver software	No.	1								
2	**BMS Client Workstation**										
2.1	Central Work Station **Client** with Intel processor 2 GHz or higher, with minimum 250GB HDD, 2 GB RAM, 52X DVD writer, optical mouse, keyboard & 1 serial port. Work station shall be preloaded with requisite MS Windows Licensed software compatible with the BMS platformwith Database,OS & Firewall softwares.	Nos.	1								
2.2	22" TFT color LCD monitor	Nos.	1								
3	**Graphical interface software**										
3.1	Providing necessary Software for monitoring through serial Modbus, BACnet and LONWORKS interface for the data points for all HVAC/ Electrical/ Other Equipments. The cost shall include 2 station and 2 client license for the BMS. The software shall include seamless integration with FAS / ACS / and CCTV System . The software shall be open system architecture type which facilitates interoperability with other systems supporting BACnet/Modbus protocols. The software shall have minimum 5000 addresses with Future Expansion Capability. The software shall have SMS, pging & email facility for transmitting specified alarms to designated personnel	No.	1								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
4	**Protocol Convertors / Software Integrators for the following systems capable of integrating any Industrially acceptable Communication Protocols including but not limited to : Modbus RTU / Modbus ASCII / BACnet / Lonworks / M Bus / J Bus / C Bus; Made Available either on Serial RS 485 Network or TCP / IP Network. (Quantity & protocol mentioned in IO summary)**										
4.1	Energy meter for electrical panels and integration through Modbus protocol	Lot	1								
4.2	VFD integration through Modbus/BACnet protocol	Lot	1								
5	**System interface unit for connecting database server to DDC controllers. System interface unit should be of native BACnet type with built in BACnet router. External gateway device or proprietary software driver is not acceptable.**	Lot	1								
6	**Portable Operator Terminal (POT)** Capable to be hooked to any DDC controller to monitor & change set points of any parameter	No.	1								
7	**DDC Controller**										
	32 bit microprocessor based programmable DDC controller, expansion module compatible to native BACnet protocol. Controller shall be standalone & networkable type with built in real time clock. Controller shall support peer to peer communication. DDC controller shall be housed in IP 55 rated MS powder coated control panel duly internally wired & tested. Panel should be provided with necessary accessories, relay boards etc. DDC controller & panel quantity will be as per the IO summary for following areas										
7.1	In Substation Room	Lot	1								
7.2	In BMS Room Ground Floor	Lot	1								
8	**Field Devices duly wired to DDC: supply, installation with all necessary fixtures, site calibration with documentation, testing and commissioning.**										
8.1	Level Sesors for HSD Tank	No.	4								
8.2	Outdoor temp sensor	No.	1								
8.3	Out door RH sensor	No	1								
8.4	Diffrential pressure sensor kit with DP sensor for range 1-3.5 bar. Kit shall generate 4-20mA control signal output.	No	2								
8.5	Combined Room type temp & RH sensor	Nos.	6								
8.6	Supply water temp sensor (PT-100) immersion type with thermowell	Nos.	2								
8.7	Return air temp sensor	Nos.	UR								
8.8	Room type temp & RH transmitter	No.	6								
8.9	DPDT relay with 230 VAC, 1A cont rating for fire damper actuators	Nos.	4								
8.10	Battery fumes detector sensor	Nos.	2								
8.11	Level sensors for thermal storage	Nos.	2								
8.12	Temperature sensor for Thermal storage	Nos.	2								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
9	**2 way valves with actuator**										
	Supply, Installation, Testing and Commisioning of globe type 2 way chilled water valves with electric actuators for ON/OFF control for following sizes.										
9.1	DN 32,	Nos.	UR								
9.2	DN 40,	Nos.	UR								
9.3	DN 50,	Nos.	UR								
9.4	DN 65,	Nos.	UR								
9.5	DN 80,	Nos.	1								
9.6	DN 100,	Nos.	UR								
9.7	DN 125,	Nos.	UR								
9.8	DN 150,	Nos.	4								
9.9	DN 200,	Nos.	2								
9.10'	DN 250,	Nos.	UR								
10	**Supply, installation, testing & commissioning following cables**										
10.1	2 core, screened 1 sq mm ATC cable	Lot	1								
10.2	4 core, screened 1 sq mm ATC cable	Lot	1								
10.3	6 core, screened 1 sq mm ATC cable	Lot	1								
10.4	3 core 1.5 sq mm ATC shielded cable for power	Lot	1								
10.5	2 core 1 sq mm ATC shielded cable DDC communication	Lot	1								
10.6	CAT 6 cable for communication between supervisory controller & BMS server	Lot	1								
11	**Supply, installation, testing of following PVC conduits**										
11.1	1" dia	Lot	1								
11.2	1 1/2 " dia	Lot	1								
	SUB - TOTAL OF BMS										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	IP CCTV Surveillance System										
1	Supply, installation, testing & commissioning of 1/3" Progressive Scan CMOS Sensor, 3 MegaPixel Colour Dome Camera with 2.8 ~ 12.0mm Manual Verifocal Auto iris Lens, WDNR, Day & Night function with required accessories. Should be ONVIF Complaint.	No.	11								
2	Supply, installation, testing & commissioning of 16 Channel Embedded Network Video Recorder, having features like Third Party Camera Support, HDD Management & with Redundancy. 8 HDD SATA Capacity. HDMI & VGA Out Put at up to 1920 X 1080 Pixel Resolution. Should have up to 5 Megapixel recording capacity. Should be RAID 0,1,5,10 Supported. Should have minimum 30 days of recording. The system shall have auto back up tape slot for data storage	No.	1								
3	Supply, installation, testing & commissioning of Wall mount 32" High resolution Flat LCD Monitor with wall mount accessories.	No.	1								
4	Supply & installation of 30U wall mount Rack for mounting the DVR	No.	1								
5	Supply, installation, testing & commissioning of DC Power supply pack with battery backup for all Cameras.	No.	1								
6	8 Port POE Network Switch	No.	2								
7	Supply and laying of CAT 6 Shilded Cable in PVC Conduit	RMT	130								
8	SITC of Video Analytic software	Lot	1								
	SUB - TOTAL OF IP CCTV Surveillance System										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	VESDA SYSTEM										
	Supply, installation, testing & commissioning of the following System										
1	**Sampling Unit**										
1.1	Supply, Installation, Testing & Commissioning, calculations of flow and hole sizes in pipe network. Sampling unit shall be prepared for laser chamber or optical smoke detectors. Detected smoke density shall be able to be adjusted between high sensitivity to equal as ordinary smoke detector. Sampling system is connected to loop for ordinary fire alarm via address unit. Operation of sampling unit and status shall be able to display in fire alarm central unit. Sampling unit shall have 4 exits for: 1) Pre-alarm 1 2) Pre-alarm 2 3) Fire 4) Fault 25 mm pipe network shall be connected to sampling system, each unit shall be capable of minimum 1x160 m M-pipe system. Sampling unit shall have indications for operation, fault, prealarm1 and pre-alarm 2. Smoke testing shall be done when commissioning to secure functionality of the system Power supply. 240 volts AC power supply with fault alarm connected too fire alarm system.	No.	20								
2	**Sampling Pipe**										
2.1	ABS piping should be used due to its strength and heat resistant properties. The pipe sections should be glued together using a suitable ABS glue to avoid separation orleaks. If a section of pipe is likely to need to be disconnected for some reason in the future, removable unions should be used instead. Fixings The means of fixing the pipe to the structure will depend on site conditions. The normal methods are pipe clips, saddle clamps or even tie wraps. End Cap The end of the pipe is terminated with an end cap with a hole, typically 6mm diameter in it. If the end cap is not used, then practically no air will be drawn through the side holes. If the end cap does not have a hole then the contributions from the side holes will tend to be very unbalanced. Bends Bends are either 45 or 90 degrees. For the 90-degree bends it is very important that slow radii are used and not a sharp elbow, as this will introduce unacceptable pressure losses, and significantly increase the response times from holes beyond the bend. T Pieces Use of T joints should be avoided as much as possible in these types of low pressure wide bore systems. They make the pipe design and air flow calculation very	Rmt.	250								
	SUB - TOTAL OF VESDA SYSTEM										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	Dry Powder Base Sprinkler system										
1	Automatic Fire Extinguisher with Clean Agent Type - The container shall be made with MIG welded MS body. The upper part shall be with flange. - The extingisher shall be fixed with sprinkler head which shall operate at an temperature of 72 Deg C. - The unit shall be fitted with pressure guage. - The propellent shall be with Nitrogen										
1.1	15 Kg Capacity	No.	47								
	SUB - TOTAL OF Dry Powder Type Sprinkler System										
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note										

PROPOSED CONSTRUCTION OF DATA CENTRE FOR IITM , PASHAN.								
SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidential Charges	Total
1a	**FALSE FLOORING …**							
	Providing and Fixing of Unifloor FS1000H access floor system shall be made from steel cementitious infill and provide for adequate fire properties, acoustic barrier and air leakage resistance. The system shall be able to withstand a UDL of 1670kg. Per sqmt. And a point load of 450 kg. Panels shall be finished with High Performance Anti Static Laminate.							
	Panels shall be made from steel. The bottom of the panel shall be embossed in hemispherical shape to give strength and flexural rigidity. The top sheet shall be plain and resistant welded at various locations after the top and bottom sheets have been degreased and phostated to form a single composit unit. The entire panel shall be quoted with epoxy coating on the exposed surface and then the hollow panel shall have an infill of light weight cementitious material, panel shall remain flat through and stable unaffected by humidity or fluctuation in temp through out its normal working life. Panel shall provide for impact resistance top surfaces minimal deflection, corrosion resistance properties and shall not be combustible or aid surface spread of flame, panels shall be insulated against heat and noise transfer. Panels shall provide qualities of concrete slabs, panels shall be of size 600x600mm and 35mm thick fully interchangeable with each other within the range of a specified lay out. Panels shall be free standing onto the structure.							
	Pedestal - Pedestals installed to support the panel shall be suitable to achieve a specified floor height from the existing floor level and shall be placed 600mm distance in both directions to form a grid of 600x600mm. Pedestal should have GI Base plate of 100 x100 x 2.5mm thk, GI Pipe 22 Dia x 2.2 mm Thk, check nut for level adjustment, 16 mm dia threaded stud with GI pedestal head of size 75 x 75 x 3.5 mm thk, stringe, all scews etc and design shall confirm speedy assembly and removal for relocation and maintenance. Pedestal assembly shall provide for easy adjustment of levelling and accurately align panels to ensure lateral restrain. for prevention of corrosion pedestals are either powder coated or zinc electroplated as required. Pedestal shall support an axial load of 2200kg. without permanent deformation and an ultimate load of 3500kg. The pedestal flat head then shall receive the panel which shall be fastened by screws to the pedestal head to form a rigid grid to achieve FFH of 750mm. Mode of measurement : Cut tiles less than 300mm shall be considered as 300mm and more than300mm shall be considered as 600mm.							
a	High Performance Anti Static Laminate Panels	475.00	SQM					
b	Raised Floor Pedestals includings Stringer for panel support	500.00	SQM					
c	Perforated Panel 26 % with out damper	70.00	NOS					
d	Panel Lifter - Heavy Duty	4.00	NOS					
e	Grommets for cable Access	100.00	NOS					
1b	**Item as Above but for**							
	i) For Height of 300 mm	20.00	SQM					
	ii) For Height of 450 mm	20.00	SQM					
2	**EPOXY FLOORING**	250.00	SQM					
	Providing and laying 'SIKA' make self leveling type 2 mm thick epoxy screed flooring of approved color, over 4mm thick base coat as per manufacturer's instructions including surface preparation, building up the desired thickness with layers, top coat, cleaning, testing complete with 5 years guarantee.							
3	**ALUMINIUM CHEQURED PLATE …**	250.00	SQM					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidential Charges	Total
	Providing fabricating and fixing Aluminium Chequred plate 6 mm thick for platform as per the detailed drawings including fabrication, fixing and placing in position, leveling etc. complete.							
4	**NEOPRENE ACOUSTICAL SHEET…**	250.00	SQM					
	Providing and fixing Neoprene rubber sheets of 5 mm thk for Noise / Vibration Control Underlayed aluminium chequered Plate. Including Fixing and placing in position, leveling etc. complete.							
5	**MODULAR FALSE CEILING…**	500.00	SQM					
	Providing and fixing false ceiling system manufactured by Armstrong or Equivalent make using hot dipped galvanized steel section, rotary stitched main tee of size 15mm x 42 mm web height, having 0.36 mm gauge at every 600 mm centre to centre maximum and rotary stitched cross tee of size 15 mm x 42 mm, having 0.33 mm gauge at every 600 mm. c/c. and wall angle of size 19 x 19 mm., having 0.35 mm gauge fixed to the periphery of the wall. The above grid is suspended at every 600mm c/c. in both directions using 2.0 mm. thick pre-straightened GI wire laying FINE FISSURED MICROLOOK WITH SILHOUETTE GRID(BLACK REVEAL) ceiling tiles manufactured by Armstrong or Equivalent make of size 600mm x 600mm x 15mm having NRC 0.55, Light reflectance of >84% (WT), thermal conductivity k = 0.052-0.057 W/m0K, Humidity Resistance of 99% , having Fire Performance CLASS O / CLASS 1 (BS 476) - 2 hr, surface having 3 coats of white paint with Fine Fissured, back of the tile duly sanded and finished with a coat of protective paint over the formed grid etc. complete							
6	**FIRE RATED PARTITION…**	285.00	SQM					
	Providing and fixing Min. 2 Hour fire rated 132mm thick Gypsteel Ultra™ stud partition which includes two layers of tapered edge 15mm thick Gyproc® Fireline boards (conforming to IS:2095 – 1996-Part-I) is screw fixed with drywall screws of 25mm & 50mm at 300mm centres to either side of 70mm Gypsteel Ultra™ C stud (0.5mm thick having one flange of 34mm and another flange of 36mm made of GI Steel) placed at 610mm centre to centre in 72mm Gypsteel Ultra™ floor and ceiling channel (0.5mm thick have equal flanges of 32mm made of GI steel), which is anchored to the floor & true ceiling using suitable anchor fasteners. The boards are to be fixed to the framework with joints staggered to avoid leakage through joints. A Gypsteel Ultra 70mm Noggin channels has to be provided at the horizontal joints of the outer layer of boards screw fixed to the studs using metal to metal flat head screws.							
	Finally square and tapered edges of the boards are to be jointed and finished so as to have a flush look which includes filling and finishing with Gyproc Jointing compound, Gyproc Joint Paper tape and two coats of Drywall Top Coat (as per recommended practices of Saint- Gobain Gyproc India) . The junction of the partition with masonry & all penetration through the partition has to be treated with a intumescent fire sealant of equivalent fire rating.							
7	**FIRE RATED STEEL DOORS…**							

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidential Charges	Total
	providing and fixing 2 hr fire rated doubble skin steel door constructed from 1.25mm thick galvanized steel sheet formed to provide a 46mm thick fully flush door shell with lock seam joints at stile edges and the internal construction of the door is a specially designed Honey Comb structure with reinforcements at top, bottom and stile surrounds. As per IS 3614 part-1 & part-2 for stability and integrity and Pressed Galvanized steel confirming to IS 277. Fire door should be tested at CBRI or ARAI for maximum rating of 2hrs with vision panel. Vision Glass panel should be 6mm thick clear glass provided in square in standard dimensions of 300mm x 300mm. Door Frame should be produced from 1.6 MM thick galvanized steel sheet formed to double rebate profile of size 143mm X 57mm (+/- 0.3mm) with a maximum bending radius of 1.4mm and fixed as per manufacturers specification. Including all approved type(Dorma Make) heavy duty fastenings and fixtures comprising of :S.S. Ball Bearing Butt hinges 3 mm thk, Mortise Sash Lock with Lever Handles,D handles, Mortise Dead Bolt, Mortise Latch, Door Closer, air seal gaskets between shutter and frame, etc complete.							
	The door frames and door shutters are primed with Zinc-Phosphate Stoving Primer and finished with Polyurethane Aliphatic grade or epoxy paint as per approved manufacturer specifications. (Supplier -Shakti Met-dor or approved equivalent). (Note - Test certificates should be available for vision panels as part of the fire door assembly. Independent glass test certificates will not be accepted. Manufacturer test certificate shall cover doors both single and double leaf and all doors supplied should be within the tested specimen, deviation in specification and sheet thickness other than what is mentioned in the test certificates are not allowed. Proper label confirming the type of door and the hourly rating is mandatory.)							
a	Single Leaf Door - 2 Hr Fire Rated							
	i) 1200 x 2100 with vision panel	1.00	NOS					
	ii) 900 x 2100 without vision panel	10.00	NOS					
b	Doubble Leaf Door - 2 Hr Fire Rated							
	i) 1800 x 2100 with vision panel	4.00	NOS					
	ii) 1800x 2400 without vision panel	1.00	NOS					
c	Doubble Leaf Door - 4 Hr Fire Rated							
	i) 1800 x 2100 with vision panel	1.00	NOS					
8	Item same As Above but for 2 hr fire rated Sliding door with Vision panel							
	i) 1800 x 2100 with vision panel	1.00	NOS					
9	**PANIC BARS …**							
	Supplying and fixing Dorma or Equivalent make panic bar with all fittings etc complete.							
	i) for Single Leaf Door	2.00	NOS					
	i) for Doubble Leaf Door	2.00	NOS					
10	**LUSTER...**	1270.00	SQM					
	Providing and applying Luster of approved make and shade on all surfaces at all heights in three coats including scaffolding, preparing the surface by brushing and brooming down, applying primer two coats and final luster paint applying and levelling the surface with coat of Birla white putty before and after the primer coat and also after the first coat etc. complete. The dry/wet cleaning of floors/pipes/glass etc. after painting is to be carried out, protection of surfaces before painting is included in the item.							
11	**FIRE PAINT…**	200.00	SQM					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidential Charges	Total
	Providing and applying 2 hr fire rated paint of approved make and shade on all surfaces as per manufacturers specifications at all heights including scaffolding, preparing the surface by brushing and brooming down, applying primer coat and top coat, applying and levelling the surface with coat of Birla white putty before primer. The dry/wet cleaning of floors/pipes/glass etc. after painting is to be carried out, protection of surfaces before painting is included in the item. Flat area in horizontal and vertical plane will be measured for payment. No additional payment will be made for grooves, cornices, vatta, moulding etc complete.							
12	**FIRE EXPANDING FOAM…**	5.00	SQM					
	Providing and applying fire Expanding Foam having minimum of 2 hours fire rating when tested in accordance with BS 476 part 20 and UL 1479 for horizontal and vertical openings in RCC slabs, Beams, walls, Brick masonry or Gypsum partitions for passing service shafts. The service lines could be of various types like electrical cables, cable trays or metal pipes etc. The foam shall have Acoustic property as per DIN 4109 and Smoke and Air Seal. The Foam should have the feature of Repenetrability for future maintance or repair activities. item includes scaffolding, finishing, cleaning etc. complete at. all heights, levels & floors. (Make:Hilti CP 620/3M or approved equivalent)							
13	**FIRE BARRIER MORTAR…**	5.00	SQM					
	Providing & applying fire Barrier Mortar having minimum of 2 hours fire rating when tested in accordance with BS 476 part 20 and UL 1479 for horizontal and vertical openings in RCC slabs,beams, walls, Brick masonry or Gypsum partitions for passing service shafts. The mortar shall have minimum hardened density of 0.8 g/cm3 and compressive strength of 2.9N/Sq mm . The service lines could be of various types like electrical cable trays , metal pipes, GI Ducts for AC etc. It should be Smoke & Air Seal. Item include scaffolding, finishing, cleaning etc. complete at. all heights, levels & floors. (Make:Hilti CP 636/3M or approved equivalent)							
14	**WATER SOLUBLE CABLE COATING…**	50.00	RMT					
	Providing & applying water soluble cable coating applied with brush or airless spray to prevent the propagation of fires along internal electrical cables. Should be suitable for protectiing against spread of flame on timber panels and tested as per IEC 332 part 3 standard for reduced spread of flame & tested as per FM Class 3971. It should have no derating effect on cables, free from fibre,asbestos, odourless and solvent free, flexible when dry after application. Item include scaffolding, finishing, cleaning etc. complete at. all heights, levels & floors. (Make:Hilti /3M or approved equivalent)							
15	**FIRE RESISTANT BOARD SYSTEM…**	5.00	SQM					
	Providing & fixing fire resistant board system having minimum of 2 hours fire rating when tested in accordance with BS 476 part 20 for horizontal and vertical openings in RCC slabs,beams, walls, Brick masonry or Gypsum partitions for passing service shafts. The fire resistant board system shall comprise of a mineral wool board having a minimum density of 160kg/m3 coated with an ablative coating at 0.7mm dft. All contact surfaces and cavities shall be sealed with an firestop filler. The service lines could be of various types like electrical cables trays, metal pipes, etc.The Mineral Wool Board should also have the Acoustic property ,Air and Smoke seal. Item include scaffolding, finishing, cleaning etc. complete at. all heights, levels & floors. (Make:Hilti CP 678/3M or approved equivalent)							
16	**GRAPHITE BASED INTUMESCENT FIRESTOP SEALANT…**	5.00	SQM					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidential Charges	Total
	Providing & applying graphite based intumescent firestop sealant having minimum of 2 hours fire rating when tested in accordance with BS 476 part 20 suitale for annular space for combustible pipes and cables.It should expand in fire , protecting pipe and cable penetration and must be halogen, solvent free and odourless. Firestop sealent should have property of Accoustic, Smoke and Air sealing. Item include scaffolding, finishing, cleaning etc. complete at. all heights, levels & floors. (Make:Hilti CP 611 A/3M or approved equivalent)							
17	**MAKING THROUGH HOLES...**							
	Making through holes in plain or reinforced cement concrete with Diamond core drilling system by using Bosch power tools.of following diameters. Rate in Dia/mm							
	a) 52 mm dia	1500.00	mm					
	b) 82 mm dia	3000.00	mm					
	c) 112 mm dia	2000.00	mm					
	d) 122 mm dia	4000.00	mm					
	e) 152 mm dia	4000.00	mm					
	f) 202 mm dia	4000.00	mm					
18	**SOFT BOARD WITH FIRE RATED FABRIC...**	5.00	SQM					
	Providing and Fixing approved shade and make FR grade Polyester-Cotton fabric over 12mm thick softborad of required size, on partition/wall etc. The fabric shall be certified to pass Surface Abrasion test of no yarn breakage after abrasion test across 10000 cycles; Fire Retardant finish as per BS EN 1021-1:1994, BS 7176:1995 low hazard section, IS 15061-2002 Clause 3.3 annex. B (Vertical test) and water repellent as per standard AATCC-118. Item to include all accessories, tools & labour, getting mock-up for approved by Architect/Engineer in charge; with Protecting with min. 20 micron polythene sheet cover till handover of facility, item complete with tight wrinkle free wrapping around soft board or approved boarding substrate, finished cleaned complete. The board shall be fixed on prepared surface with necessary hardware fittings etc. complete. Rate quoted shall be for the complete finished work including all the materials and labour mentioned above. Item to be completed in all respects as per instructions from Project- in-charge.							
19	**White board-Portable**	5.00	SQM					
	Providing and placing on location Portable framed Magnetic Glossy finish type White board avg. 900 x 1200 size, as per approved model and make, with particle board backer and encasing. Item to include all fixing accessories, a marker/duster tray, including keeping in packaged condition till handover, cleaned complete. The item shall be supplied with necessary accessories such as magnetic symbols, magnetic letters, magnetic strips, magnetic eraser, magnetic dry marker 4 Nos., spare felt for eraser, board fixing clips etc. complete and all as per manufacturer's specification and as directed by the EIC / Architect.							
20	**EXECUTIVE TABLES**	1.00	NO					
	Providing & fixing in position Executive tables with 18 mm MDF with drawers & storages, should have 1 mm thick Laminte of approved quality and shade of Laminate for all exposed surface .All unlaminated faces should have a melamine polish of matching shade of Laminate. Polish and chamfered for edge. The cost includes all necessary hardware like brass hinges/ locks, drawer channel, provision of cable manager, preparation of mockup etc complete. (For keeping keyboard special fixtures like INNOFITT or Equivelent to be provided)							
a	TRAVEL DESK (1350L x 750W x 750H)							
21	**LOW BACK CHAIRS**	3.00	NO					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidential Charges	Total
	Providing and supplying in position revolving chairs having 5 prong FR nylon in black finish or 5 prong aluminium in chrome finish with castors. The seat should be having gas lift adjustment with gas stroke. The mechanism for the chair should be synchronized tilt mechanism with multiple locking position. The seat and back of the chair should be made up of injection moulding PU foam with 12mm thick double ply backing. The seat and back should have fabric upholstry in specified colour and texture. The chair should have adjustable seat depth. The back rest should be made up of poly propylene with height adjustment. The arm rest should have height adjustment and to be made up of injection moulded PU foam and should be supported on a polypropylene hand rest assembled to the main body of the chair which is made up of polypropylene with fabric/rexine upholstry of approved color & texture. The colour of the fabric/rexine should be as specified by Architect. The chair should confirm the ANSI/BIFMA X5.1 standard. The cost of the chair includes preparation of mock up etc. complete. (The density of the foam should be 45 Kg/m3)							
22	**Room Signages/ Manager Cabins/ Utility Rooms(150x300)**	10.00	NOS					
	Providing & fixing Aluminium Modular Signage using Aluminium Alloy 6063 extrusion with Anodising (The thickness of the anodization is typically 30 microns. The integrity of the anodize coating is tested to meet the international specifications ISO 2143-1981.) With lifetime Warranty in normal working condition. **Clear Cover :** Clear UV protected 1mm thick Poly carbonate Sheet with Non Glare/Glossy Finish. **Plastic End Cap :** High Quality ABS End Caps with Screws which can be fastened into the extrusion. **Graphics :** Photo paper Insert							
23	**Way Finding Sign/Department Identification (150x600)**	10.00	NOS					
	Providing & fixing Aluminium Modular Signage using Aluminium Alloy 6063 extrusion with Anodising (The thickness of the anodization is typically 30 microns. The integrity of the anodize coating is tested to meet the international specifications ISO 2143-1981.) With lifetime Warranty in normal working condition. **Clear Cover :** Clear UV protected 1mm thick Poly carbonate Sheet with Non Glare/Glossy Finish. **Plastic End Cap :** High Quality ABS End Caps with Screws which can be fastened into the extrusion. **Graphics :** Photo paper Insert							
24	**Fire Evacuation Map (400x300)**	2.00	NOS					
	Providing 7 fixing Aluminium Modular Signage , fire evacuation map using Aluminium Alloy 6063 extrusion with Anodising (The thickness of the anodization is typically 30 microns. The integrity of the anodize coating is tested to meet the international specifications ISO 2143-1981.) With lifetime Warranty in normal working condition. **Clear Cover :** Clear UV protected 1mm thick Poly carbonate Sheet with Non Glare/Glossy Finish. **Plastic End Cap :** High Quality ABS End Caps with Screws which can be fastened into the extrusion. **Graphics :** Night Glow Vinyl with clear film Printing							
25	**Structural steelwork in hot rolled tubular sections...**	4.50	MT					
	Providing fabricating & erecting structural steelwork in hot rolled tubular Sections for trusses, purlins etc. with all bracings, gusset plates etc. as per detailed drawing or as directed at all heights and levels including removing the scales & burrs, cleaning with phosphoric acid ,marking, Cutting, fabrication, hoisting, erecting & fixing in position, making alignment of members making welded / bolted / riveted connections with one coat of approved red-oxide paint etc complete							

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidential Charges	Total
26	**Structural steelwork in hot rolled sections...**	1.50	MT					
	Providing fabricating & erecting structural steelwork in hot rolled sections (ISMB, ISMC, ISA) For columns, tie beams, trusses, purlins, gantry, monorail columns, plates, cable trays, pipe racks, castellated beams, staircase & other structural members with all bracings,gusset plates etc.as per detailed drawing or as directed at all heights and levels including removing the scales & burrs, cleaning with Phosphoric acid, marking, cutting, fabrication, hoisting, erecting & fixing in position, making alignment of members making welded / bolted / riveted Connections and finishing with two coats of synthetic enamel paint of approved quality and colour over one coat of approved red-oxide paint etc complete. Yield Stress FY = 250Mpa as per IS 2062							
27	**Auto Clave Masonry (Light weight blocks Masonry)**	40.00	SQM					
	Providing and constructing 200 mm thick Auto clave block masonry at all elevations and heights in cement mortar 1:4 using (150 x 300 x 600)size with required size block bats , including all scaffolding, staging, racking the joints, curing etc., at all heights, elevations above and below finished floor level etc., all complete shall be as per specification and laid as directed.							
28	**Internal cement plaster (neeru finish)...**	80.00	SQM					
	Providing and applying Plastering of internal walls and ceiling with cement mortar 1:4, 12 - 15 mm thick with neeru finish according to specifications. Rate includes providing & fixing in position expanded metal plaster mesh [Arpitha make] or equivalent minimum 6" wide strips at the junctions of R.C.C columns/ beams/slab with brick work or wherever necessary, properly fixed, abutting the wall surfaces so as to get the plaster in line and plumb, necessary staging,scafolding and curing at all levels and elevations etc.complete as directed.							
29	**Granite stone, skirting, treads, risers...**	8.00	SQM					
	Providing and laying high polished approved quality and shade 20 mm thick Granite stone for treads, risers and skirting in line and level on a bed of 1:4 cement plaster including cement float, filling joints with matching color Cement slurry, curing, edge high polishing, chamfering, cleaning, etc. complete. (Basic Rate - 150 Sqft)							
30	**Fire Rated Vision Glass Window…**	10.00	SQM					
	Min. 2 hr Fire Rated Vision Glass Window with all Framing & Fixtures (Note - Fire Rating should be for Hole Assembly ie Glass + framing)							
	TOTAL							
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note							