2 X 2000 KVA, 415V DG SYSTEM

TECHNICAL SPECIFICATIONS

FOR

PROPOSED DATA CENTRE

AT

NCMRWF, NOIDA, UP.

PROJECT INFORMATION

1.	Project	Proposed Data Centre At NCMRWF, NOIDA, UP.
2.	NCMRWF/Owner	NCMRWF, NOIDA, UP. Contact person: - Contact No: Email: -
3.	Nearest Town/City	Delhi
4.	Nearest Rail Station	Delhi
5.	Nearest Air Port	Delhi
6.	Site Conditions	Ambient Temperature: Maximum: 45 ^{O}C Minimum: 07 ^{O}C Relative Humidity: Maximum: 90% Minimum: 30% Design Altitude: less than 950m above Mean Sea Level

1. SCOPE

1.1 This specification covers the requirements of Design, Assembly, Testing, Supply and Commissioning of LT diesel Generator set along with AMF cum synchronizing panel with associated switchgears and control panels and exhaust piping as per CPCB norms.

1.2 Generator set shall have prime power rating based on power factor of 0.8 lagging.

1.3 Generator shall be capable of operating continuously on an unbalanced system within limit described in section 6 of IEC 60034.1

1.4 Generator shall be capable to withstand the over speed requirements specified in Table 15 of IEC 60064.1

1.5 Generator shall be capable of withstanding a current equal to 1.5 times of rated current for a period of not less than 30 sec. A stipulated by IEC 60034.1

1.6 Generator shall be supplied with weather proof acoustic canopy / enclosure as per CPCB norms.

2. ELECTRICAL SYSTEM DETAILS

Design Temp - 48^0 C

HT Supply: 22kV/0.433 kV +/- 10%, 50Hz +/- 3%

LT Supply: 3 Phase - 433/415VAC, +/- 10%, 1 Phase – 240VAC, +/- 10%, 50Hz+/- 3%

3. STANDARDS

The diesel generator sets, accessories and control panel shall comply with relevant BS/ IS or other internationally accepted standards including the following:

BS 649	:	Diesel Engines for general purpose.
BS 2613	:	Rotating Electrical Machinery.
IS 4722	:	Electrical performance of rotating electrical machinery.
IS 4728	:	Terminal markings for rotating electrical machines.
IS 4729	:	Measurement of vibrations of rotating electrical machines.
IEC60034	:	Rotating Electrical Machines
IEC60034.1	:	Rotating Electrical Machines Part1: Rating and Performance
IEC60947	:	Low Voltage Switchgear and Control Gear

ISO 8528 Part 1 to 10: Reciprocating Internal Combustion engine Driven Alternating current generating set

4. GENERAL REQUIREMENTS

Diesel Generator set shall comprise of following main equipment. Vendor shall also include any other accessories/ equipments required for the satisfactory operation of the DG set.

4.1. SCOPE

Scope of work under this section covers the Design, Detailed Engineering, Manufacture, Quality Control, Shop Testing, Delivery at Project Site, Unloading and placement at Site, Site Assembly, Erection, Testing and Commissioning including Performance & Acceptance Testing, Training of Owner's personnel as required, Putting into Commercial Operation and handing over to the Owner of Diesel Generating Sets complete with all parts like exhaust system including piping up to desired height as per CPCB norms, cabling

including control & power between the DG sets & AMF Cum Sync Control panel, Earthing, fuel system & all items, auxiliaries

i) Prime rated diesel engine suitable to give desired alternator output at site, complete with fuel system, lubrication system, cooling system, air intake and exhaust system, battery and battery charger, instruments and protection system, annunciations, coupling arrangements etc.

ii) 415V, 50Hz alternator with exciter, automatic Digital voltage regulator etc.

A) Supply:

Design, manufacture, supply, delivery to properly packed for transportation to site including loading/unloading etc .of the following materials-.

1. DG sets shall comprise of following items/accessories as specified-
2. Diesel engine shall be suitable to deliver required BHP.
3. Base frame, AVM pads &other standard accessories.
4. Microprocessor based integrated DG set controller with inbuilt logic for auto start, Auto
5. Synchronization & auto load sharing.
6. Synchronous AC brushless alternator suitable to deliver 2000kVA net output at NTP.
7. Cooling and exhaust system, complete with necessary extension piping's/ supports required as per CPCB norms.
8. Battery and battery charger.
9. Day fuel tank of suitable capacity to for backup of 8-10hr running of DG set.
10. Acoustic Enclosure for the DG sets suitable for outdoor installation.
11. Silencers and Cladding for silencer for DG sets.
12. Exhaust Piping and Support structure for DG sets at different location.
13. Composite LT panel for DG incomer, outgoing etc breaker as per single line diagram (SLD)
14. Panel Control cables for connection to Panel.
15. Complete earthing system.
16. Recommended maintenance tools &tackles.

B) Installation, testing & commissioning:

Installation, testing &commissioning of the equipment's mentioned under item(A) along with supply of all accessories required for installation, testing &commissioning of the entire plant including connections, terminations of the power &control cables, laying of the cables from the outdoor DG sets to Panel located inside the Utility building.

4.2. PERFORMANCE CRITERIA AND GUARANTEE

The DG sets along with all auxiliaries and accessories shall be capable of performing intended duties under specified conditions. It is the responsibility of the Contractor to supply the equipment as per guaranteed technical particulars and shall also guarantee the reliability and performance.

5. ENGINE SPARES, TOOLS & TACKLES

Vendor shall furnish complete list of spares for two years of satisfactory operation along with unit price and suggested quantity.

Vendor shall quote for complete set of tools and tackles required for maintenance of Engine and Alternator.

Vender shall forward quote for following items at the time of submission

Sr No	Description	Change Period in Hrs	Quantity	Net Price including Taxes
1	Lubricating Oil Change			
2	Lubricating Oil Top Up			
3	Air Filter Replacement			
4	Fuel Filter Replacement			
5	Lubricating Oil Filter Replacement			
6	Labour Charges for replacement of above.			
7	Comprehensive Annual maintenance charges during warranty period.			
8	Operation and maintenance contract charges during warranty period.			

6. DRAWING AND DATA

6.1. Following Documents shall be furnished along with the offer without which offer will not be considered.

a) Plan and Sectional Layout of DG Sets showing various auxiliaries and panels. Size of DG building shall be as attached layout.

b) GA of panels showing arrangement of various devices on panels.

c) P&I Diagrams for the following :

i) Lube Oil System.

ii) Fuel Oil System.

iii) Cooling Water System.

6.2. Following Documents shall be furnished in quadruplicate for NCMRWF's comments/ approval within four weeks after placement of LOI. Vendor shall incorporate Client/ Consultant's comments on these drawings and furnish revised/ final drawings in six sets. All documents shall be in English.

a) Layout of DG Room with all accessories, weight of equipments, maintenance space etc., clearly indicated.

b) Wiring & scheme diagram for HT, LT system and control system of DG Set.

c) P&I Diagrams for the following system.

i) Lube Oil System.

ii) Fuel Oil System.

iii) Cooling Water System.

d) Foundation drawing of DG Set with static and dynamic loading/ centre of gravity of loads and location of all loads.

e) Foundation requirement of all auxiliaries like compressors, heat exchangers, tanks, etc.

f) Bill of material for DG Set, fuel oil system, cooling water system, lube oil system, electrical system (including cables) engine and alternator control system (including cables).

g) GA of panels showing arrangement of various devices on panel and foundation details.

h) Test Certificates.

i) Installation and Operational Manual.

7. Approved Make of Supplier

Engine—Caterpillar/Cummins or equivalent

Alternator- Stamford / Lorey Somer

ACBs- Schneider/Siemens/ABB

8. INSPECTION AND TESTING

a) NCMRWF or his representative shall have free access for his manufacturing location of SUPPLIER.

b) All test procedures, test plan and inspection plan shall be submitted for approvals.

c) NCMRWF's representative shall have the rights to rejects any components which do not conform to purchase order.

d) Inspection package may include but not limit to

- § Review of Quality Assurance Document
- § Stage Inspection During Manufacturing
- § Surface preparation and painting
- § Dimensional and assembly inspection

e) Hydrostatic Test – All pressure containing parts shall be tested hydrostatically as per relevant standard.

f) Load Test – During this test generator set shall run for at least four hours under the following conditions

- § 30 minutes at 25% of rated output

- 30 minutes at 50% of rated output
- Two hours at 100% rated output
- One hour at 110% rated output
- Instantaneous swing in voltage and frequency after load removal and block loading
- Block Load test

Generator load test shall be based on resistive load.

g) Dynamic Load Test- Frequency and voltage regulation of the generator set shall be verified.

h) Functional test – Supplier shall perform functional test on complete generator set including generator and engine with synchronisation panel.

i) Insulation Resistance Test – Insulation resistance test shall be performed on Alternator, Exciter winding, panel components.

j) Noise Test and Vibration Test – Noise and Vibration test shall be carried out and overall level shall meet guaranteed values.

Equipment Data Sheet for Diesel Engine Generator (2000kVA) To Be filled by Supplier

Sr. No	Particular Of Equipment	Units	NCMRWF Requirement	Vender Response
	Generator			
1	Manufacturer		VTA	
2	Type and Model No		VTA	
3	Paint Specification and Colour		VTA	
4	Applicable codes and Standard		IEC	
5	Rated Voltage	V AC	415	
6	Rated Frequency	Hzs	50	
7	Duty Type		S1	
8	Maximum Continuous Rating at S1 Duty	KW	VTA	
9	Power Factor (lag/lead)	pf	0.8 lag	
10	Stator Connections		Star	
11	Neutral Earthing Method		Solidly	
12	Phase Rotation		R-Y-B	
13	System Max Fault Current (Isc symmetrical)		VTA	
14	Rotation facing Drive End		VTA	
15	Insulation Class		Class-H	
16	Temperature Rise		Class-H	
17	Speed	rpm	VTA	
18	X/R ratio			
19	Overload capability 30 Sec		150%	
	1 hour		110%	
20	Unbalanced load capability		VTA	
21	Voltage / frequency variations		Zone B	
22	Generator Efficiency Full Load		VTA	
	50% load		VTA	
	75 % load		VTA	
23	Type of Excitation		Self	
24	Telephonic Harmonic factor		VTA	
25	Suitable for parallel operation	Yes/ No	Yes	
26	Winding Temp detector type		6 off RTD	
27	Max Noise level at no load	DB	VTA	
28	Pole Pitch		2/3	
29	Space heater details		VTA	
30	Direct Axis Reactance			
	Synchronous		VTA	
	Transient		VTA	
	Sub - Transient		VTA	
31	Positive Sequence Resistance		VTA	
32	Negative Sequence Reactance		VTA	
33	Zero Sequence Resistance		VTA	

34	Zero Sequence Reactance		VTA	
35	Short Circuit Ratio (X/R)		VTA	
36	Quadrature Axis Reactance			
	Synchronous		VTA	
	Transient		VTA	
	Sub - Transient		VTA	
37	Direct Axis Open Circuit Time Constant			
	Transient		VTA	
	Sub Transient		VTA	
38	Direct Axis Short Circuit Time Constant			
	Transient		VTA	
	Sub Transient		VTA	
39	Quadrature Axis Open Circuit Time Constant			
	Transient		VTA	
	Sub Transient		VTA	
40	Quadrature Axis Short Circuit Time Constant			
	Transient		VTA	
	Sub Transient		VTA	
	Physical Characteristics			
1	Package Dimensions	mm	VTA	
2	Package Weight	Kg	VTA	
3	Wet		VTA	
4	Dry		VTA	
5	Mounting		VTA	
6	Enclosure Ingress Protection rating		VTA	
7	Generator Cooling Method		VTA	
8	Air Discharge (Top or Bottom)		VTA	
9	Air Filters		VTA	
10	Bearing Type – NDE		VTA	
11	Lubrication		VTA	
12	Terminal Box Type , size and arrangement		VTA	
13	Max Cable Size and No of runs per phase			
	Main	mm^2	VTA	
	Heater	mm^2	VTA	
	Aux	mm^2	VTA	
14	Rotor Moment of Inertia	Kg m^2	VTA	
15	Motor Inertia Constant		VTA	
	Excitation System			
1	Manufacturer		VTA	
2	Permanent Magnet Pilot Generator Type		VTA	
3	Brushless rotating rectifier type		VTA	
4	Voltage Rating (% of exciter ceiling voltage)	%	VTA	

5	Current Capacity (% of nominal)	%	VTA	
6	Diode bridge element failure detector		VTA	
7	Rated Current	A	VTA	
8	Rated Voltage	V	VTA	
9	Input Current	A	VTA	
10	Input Voltage	V	VTA	
11	Hermetically Sealed		Yes	
	Automatically Voltage Regulated System			
1	Manufacturer		VTA	
2	Type		VTA	
3	Solid State Regulator	Yes/ No		
4	Excitation Limitation			
	Max excitation limit	V	VTA	
	Min volt/hertz limit	V/Hz	VTA	
5	Out put voltage set point adjustment		+/- 10%	
6	Dip and Dwell Function	Yes/ No	Yes	
7	Under frequency Protection	Yes/ No	Yes	
8	Voltage regulation under transient condition	%	VTA	
9	Over Fluxing control	Yes/ No	Yes	
10	Functional without external power supply	Yes/ No	Yes	
	Exciter Model Parameter			
11	Excitation Time Constant			
12	Excitation Gain Constant			
13	Maximum exciter voltage	V	VTA	
14	Minimum exciter voltage	A	VTA	
15	Minimum regulator output		VTA	
	Automatic Voltage Regulator			
16	Forward Gain Constant Of AVR		VTA	
17	AVR amplifier time constant		VTA	
18	Feedback gain of AVR		VTA	
19	AVR Feedback Time Constant		VTA	
	Engine Governer			
1	Droop and Isochronous speed control	Yes/ No	Yes	
2	Frequency deviation for load condition			
3	100% load rejection	%	VTA	
4	50% load acceptance with base load 0%	%	VTA	
5	50% load acceptance with base load 50%	%	VTA	
6	Full load rejection with no over speed trip	Yes/ No	Yes	
7	Frequency range for steady state conditions	% (+/-)	1	
8	Engine Block Loading Capability at			
	0% of Base Load		VTA	
	50% of Base Load		VTA	

	Synchronizer			
1	Manufacturer			
2	Type			
3	Type of Synchronization and auto start	Auto/ Manual	Auto	
4	Load Shearing			
	Kw	Yes/ No		
	KVAr	Yes/ No	Yes	
5	PF control	Yes/ No	Yes	
6	Check Synch Relay Out put	Yes/ No	Yes	
	Engine			
1	Manufacturer		VTA	
2	Model No		VTA	
3	Fuel / Specifications		VTA	
4	Maintenance Interval	Period	VTA	
5	Mounting		VTA	
6	Rated Power		VTA	
7	Rated Speed		VTA	
8	Cylinder		VTA	
9	Turbocharged		VTA	
10	Governer manu./ model		VTA	
11	Duty		Prime	
12	Start System		Electrical	
13	Guaranteed fuel rate (Kw/KWH)			
14	@ full load	Kw/Kwh	VTA	
15	@ 75 %full load	Kw/Kwh	VTA	
16	@ 50% full load	Kw/Kwh	VTA	
17	@ 25% full load	Kw/Kwh	VTA	
18	Compression Ratio		VTA	
19	No Of Cylinders		VTA	
20	Bore		VTA	
21	Stroke		VTA	
22	Displacement		VTA	
23	Fuel Tank capacity	Lit	VTA	
24	Pump Type		VTA	
25	Filter Arrangement		VTA	
26	Filter Type		VTA	
27	Lub Oil Temperature Switch	Yes/ No	Yes	
28	Lub oil Pressure Switch	Yes/ No	Yes	
29	Over Speed Switch	Yes/ No	Yes	
30	Lub Oil Filter Type		VTA	
	Protections			
1	Lub Oil Pressure	Yes/ No	Yes	
2	Lub Oil Temp	Yes/ No	Yes	
3	Over Speed	Yes/ No	Yes	
4	High Water Temp	Yes/ No	Yes	
5	High canopy Temp	Yes/ No	Yes	

6	Over Load	Yes/ No	Yes	
7	No Of Cranks	Yes/ No	Yes	
8	Over Excitation	Yes/ No	Yes	
9	Over Current	Yes/ No	Yes	
10	Over Voltage	Yes/ No	Yes	
11	Under Voltage	Yes/ No	Yes	
12	Diode Failure	Yes/ No	Yes	
13	Over Fluxing	Yes/ No	Yes	
14	Pole Slipping	Yes/ No	Yes	
15	Differential	Yes/ No	Yes	
16	Earth Fault	Yes/ No	Yes	
17	Under Frequency	Yes/ No	Yes	
18	Reverse Power			
	Kw	Yes/ No	Yes	
	KVAr	Yes/ No	Yes	
19	Rotor Leakage Current	Yes/ No	No	
20	Synchronization Window	Yes/ No	Yes	

2.0 MVA, 33/0.433 KV TRANSFORMER TECHNICAL SPECIFICATION

FOR

PROPOSED DATA CENTRE

AT

NCMRWF, NOIDA, UP.

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A. GENERAL TERMS AND CONDITIONS

INSTRUCTIONS TO BIDDERS

1. **NCMRWF, NOIDA, UP wishes to receive Bids for manufacture, supply & delivery of Distribution Transformers as describing in below document.**
2. **In case, any clarification is required, the Bidders shall obtain the same from the Consultant in writing. All such clarifications shall be binding both on the NCMRWF/Consultant and the Bidder.**
3. **At any time prior to the deadline for submission of Bids, the NCMRWF/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 NCMRWF 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 NCMRWF / Consultant not later than 17.00 hrs on ------- at following address.**
8. **The acceptance/rejection of the quotation will rest with the NCMRWF, 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 NCMRWF, NOIDA, UP.**
2.	**Name Of Work**	**Supply,Installation,Testing & Commissioning of 2x2.0MVA,33/0.433 KV Transformers**
3.	**NCMRWF/Owner**	**NCMRWF, NOIDA, UP.**
4.	**Nearest Town/City**	**Delhi.**
5.	**Nearest Rail Station**	**Delhi**
6.	**Nearest Air Port**	**Delhi**
7.	**Site Conditions**	**Ambient Temperature:**
		Maximum **45^{0}C**
		Minimum **7^{0}C**
		Relative Humidity
		Maximum **90%**
		Minimum **30%**
		Design Altitude **at Sea Level**

TECHNICAL SPECIFICAIONS

1. ELECTRICAL SYSTEM DETAILS

Transformer fed with 33kV, 3 Phase, 50Hz. Fault level assumed @ 1000MVA

2. CODES AND STANDARDS

The Transformer and Accessories shall conform to the requirements of the following but not limited to, latest revision of all relevant Indian Standards or International Standards.

Colour of paint	IS 5
Ready mix paint, brushing Zinc Chrome plaster	IS 104
Ready mix paint, brushing,Priming plaster	IS 109
insulating oil	IS 335
Testing of steel sheets and strips For magnetic circuits	IS 649
Solid press boards for electrical purposes	IS 1575
Code of practice for maintenance Of mineral insulating oil in equipment	IS 1866
Impulse Voltage testing	IS 2070
High voltage testing	IS 2071
Porcelain bushings	IS 2099
Determination of water contents in oil	IS 2362
Painting of Transformer	IS 2932
Porcelain Transformer bushings	IS 3347
Gs operated relays	IS 3637
Application guide for gas operated relays	IS 3638
Fittings and accessories for power transformers	IS 3639
Clamping arrangements for porcelain transformer bushings	IS 4275
Electric power connectors	IS 5561
Testing of specific resistance of Electrical insulating liquid	IS 6262
Method of test for power factor and	IS 6262
Dielectric constant of electrical insulating liquid	IS 8468
Guide for loading of oil immersed transformer	IS 6600
Determination of electric strength of Insulating oils	IS 6792
Oil impregnated paper insulated condenser Bushings	IS 12676
Degree of protection	IS 2147
Electrical insulation classified by Thermal stability	IS 1271
OLTC	IS 8468
Installation and maintenance of transformer	IS 10028
New Insulating Oils	IS-335
Thermal evaluation and Classification of Electrical Insulation	IS-1271
Code of practice for installation and maintenance of transformers	IS-10028
Power Transformer	IS-2026
Part I Power Transformer - General	
Part II Power Transformer - Temperature Rise	
Part III Power Transformer - Insulation levels and di-electric tests	

Part IV Power Transformer - Terminal markings, tapings and connections.	
Bushings for alternating voltages above 1000 V.	IS-2099
Fittings and accessories for power transformers.	IS-3639
Guide for loading of oil-immersed transformers.	IS-6600

3. DESIGN AND PERFORMANCE REQUIREMENTS

Power transformer shall be oil filled type ONAN cooled. The transformer shall be in compliance with relevant standards.

Transformers shall operate without injurious heating at the rated capacity within +10 percent of the rated voltage of that particular tap.

Transformers shall be capable of delivering the rated current at a voltage equal to 105 percent of the rated voltage without exceeding the limiting temperature rise.
Overloads shall be allowed within the conditions defined in the loading guide of the applicable standard. Under these conditions, no limitations by terminal bushings, or other auxiliary equipment shall apply. Transformers, complete with bushings / cable boxes, shall be designed and constructed to withstand without damage, the effects of external short circuits as per the specified standards

4. CONSTRUCTION

4.1. TANKS

The tanks shall be fabricated from mild steel plates and shall be designed to withstand the pressure, which will be encountered under normal operation and abnormal conditions such as short circuit. Base channels shall be suitably reinforced to prevent any distortion during lifting. Oil tight gaskets shall be provided between the joints. The tank and other accessories shall be painted with heat resistant synthetic enamel paint of approved shade. Robust skid under base and fixing angles shall be provided to prevent bulging / warping.

Tanks shall be mounted on bi-directional rollers. When detachable radiators are fitted, isolating valves shall be provided to permit removal of any radiator unit without emptying the tank. Radiators shall be securely braced to prevent undue

vibration. In case of separate cooling units, isolating valves shall be fitted in both top and bottom of connecting pipes. Tanks shall be shot-blasted internally and externally to remove rust and welding scale. All tanks shall be tested at a pressure of 0.35 kg/sq.cm. in addition to the normal oil head. Immediately after shot-blasting, the exterior of the tank shall be given a coat of Zinc Chromate primer incorporating a rust inhibitor. All fasteners and bolts, etc. shall be galvanized or Zinc passivated.

All transformers rated up to and including 500 KVA rating shall have fixed radiators, Transformers rated above 630 KVA shall have detachable type radiators.

Each transformer shall be provided with following valves on the tank:

Drain valves so located as to completely drain the tank
Combined filling and filter valve at top of the tank of 50mm size
Oil sampling valves
One 15mm air release filing

4.2. CORE

The core shall be assembled from special scale free high grade cold-rolled grain oriented silicon steel with minimum loss with heat and oil resistant insulation. The cores and windings shall be suitably braced to prevent displacement or distortion of the coil during short circuit. Core clamping bolts shall be insulated with synthetic resin bonded paper or equivalent. Mitred joints of lamination shall be adopted.

All parts of magnetic circuit shall be bonded to earth system.

4.3. COPPER WINDING

All coils shall be wound from high conductivity copper annealed to remove spring tension. The design and arrangement of winding and their insulation shall be to ensure uniform distribution of voltage surges among all coils and windings.

The windings shall be subject to thorough shrinking and seasoning process to avoid absorption of moisture.

The windings shall be properly insulated from the core and between themselves.

The coils shall be axially and radially supported in such a way that deformation does not take place under short circuit

Adequate axial strips and blocks, number of spacer rows and number of anchoring and bracing tapes etc. shall be judiciously selected.

The core windings shall be initially dried under vacuum and then be placed in their tank and shall be treated in a vacuum Drying oven. Initially the heating shall be continued until the winding attain a temperature of about 1000C determined by measurement of winding resistance. The transformer shall be then subjected to vacuum. After obtaining satisfactory results, hot oil shall be allowed into the transformer under vacuum. This oil shall be then circulated through the transformer by the oil de-gasing plant until all gases trapped in the core and windings and insulation are removed and to ensure a high degree of stability in the insulation structure and early attainment of mature condition of insulation concerning di-electric strength.

4.4. TERMINAL BOXES

Windings shall be brought out and terminated on outdoor bushings, cable boxes or bus duct chamber, which will be located as specified on data sheets. The orientation and location of winding terminals shall be indicated in specific requirement. When outdoor bushings are specified they shall be supplied complete with adjustable spark gap and terminal connectors suitable for specified size of ACSR conductors.

The cable box shall be complete with gaskets between the joints. The cable boxes shall be provided with disconnecting chamber wherever specified in the data sheet.

Cable box for termination of high voltage PVC / XLPE cables shall be suitably dimensioned for air insulated termination. The air insulated terminal box shall be sized to permit use of all type of end termination kit including "PUSH-ON" type end termination kit. Such cable box shall also have arrangements for grounding the armour of PVC / XLPE cables inside the cable box.

Terminal chamber for bus duct termination shall have gasketted cover plate bolted to it. A separate inspection cover shall be provided to facilitate connection and inspection.

For transformers having provision for terminations TPN bus duct on 433V side neutral of star connected secondary winding shall be brought out to a secondary

terminal chamber. A CT shall be mounted at the neutral terminal with CT secondary wired up to the marshalling box.
An extra neutral bushing shall be provided for neutral grounding of transformers having secondary voltage of 433 V. In such cases, neutral CT shall be mounted before bifurcation of neutral.

4.5. MARSHALLING BOX

Weather proof type marshalling box shall be provided on the front side of the transformer tank and not on radiator. It shall be provided with terminals for oil temperature indicator, winding temperature indicator, magnetic oil gauge and Buchholz Relay and other control terminals as applicable. The box shall be complete with wiring up to terminal box. Whenever the control voltage is specified as D.C, the marshalling box shall be complete with D.C. Contactors and wiring. The gaskets provided shall be non deteriorating type and suitable for outdoor installation. The box shall have hinged door with locking arrangement. The marshaling box shall have removable undrilled gland plate at bottom. Inside the marshalling box, all the instruments shall be wired with 1.5sq.mm. PVC wires. Marshalling box shall be mounted at readable / approachable level.

4.6. RATING PLATES

All transformers shall be provided with rating plates conforming to Indian Standards. The rating plates shall be provided on the front side of the transformer.

4.7. OIL

The transformer shall be supplied complete with first filling of oil. The oil shall conform to relevant Indian Standards. In case the Conservator / Radiator / Cooling tubes of the transformer are sent separately, sufficient quantity of oil shall be sent loose including 10% additional oil in non returnable sealed drum. The transformer oil shall conform to IS-335.

4.7.1. The transformer and all associated oil filled equipment shall be supplied along with sufficient quantity of oil, free from moisture and having uniform quality throughout for first filling of the tank, coolers and radiators along with 10% extra oil for topping up in non returnable containers, suitable for outdoor storage. No inhibitor shall be used in the oil.

4.7.2. The design and materials used in the construction of the transformer shall be such as to reduce the risk of the development of acidity in the oil.

4.8. BUCHHOLZ RELAY

The transformer shall be complete with Buchholz Relay of double float type with isolating valves on either side and distance pipe. The relay shall be complete with independent voltage free alarm and trip contacts.

Separate buchholz relay shall be provided for main tank and OLTC chamber. For OLTC chamber the relay should be single float type with one normally open and one normally close contact.

4.9. OIL AND WINDING TEMPERATURE INDICATORS AND MAGNETIC OIL GAUGE

Oil temperature indicator shall be complete with maximum reading pointers, alarm and trip contacts. The indicators shall be of 150 mm dia. circular type and shall

be mounted inside Marshalling Box. They shall be complete with setting keys. The transformer shall be provided with 150 mm dia. magnetic oil gauge indicator with low level alarm contacts and minimum / maximum level marking on front side of the transformers. The minimum oil gauge indicator shall be provided on the conservator side.

Winding temperature indicator (wherever called for in specific requirements) shall be provided. This shall be 150 mm dia. and having maximum reading pointer, alarm contacts and trip contacts.

All these contacts shall be wired up to terminals provided in Marshalling Box.

All contacts shall be suitable for making and breaking D.C. inductive current. Minimum rating shall be 2 Amp, 110V D.C.

4.10. COOLING METHOD

All transformers shall be mineral oil immersed and natural air cool type (ONAN).

4.11. TAPPINGS AND CONTROL

Tapping shall be provided on high voltage side and shall be capable of carrying the external short circuit current. Percentage and Number of Taps shall be as specified in specific requirements.

Off circuit, tap-changing gear shall have an external operating handle mounted on the transformer side with locking arrangement and position indicator.

4.12. AXLES AND WHEELS

The transformer shall be provided with bi – directional plain rollers and axles of suitable dimensions and so support that under service conditions, they shall not deflect sufficiently to interfere with the movement of the transformer. Suitable locking arrangement shall be provided to prevent the accidental movement of the transformer. All wheels should be detachable and shall be made of cast iron or steel.

5. DUTY REQUIREMENT

5.1. The Transformer and all its accessories like current transformers etc. Shall be designed to withstand without injury, the thermal and mechanical effects of any external shot circuit to earth and of short circuits at the terminals of any winding for a period of two seconds. Transformer shall be capable of withstanding thermal and mechanical stresses caused by symmetrical or asymmetrical faults on any winding.

5.2. The transformer shall be capable of being loaded in accordance with IS: 6600. There shall be no limitations imposed by bushing, tap-changers, etc.

5.3. The overload capacity of the transformer and their emergency short time ratings call for any schedule shall be furnished.

5.4. The transformer shall be suitable for continuous operation with frequency variation of +/- 5% without exceeding the specified temperature rise.

5.5. The transformer shall be capable of being operated without danger on any tapping at the rated MVA with voltage variation of +/- 15% corresponding to the voltage of that tapping and at the same time with a frequency variation of +/- 5% below normal.

5.6. Similar ratio transformers shall operate satisfactorily in parallel with each other.

5.7. Radio interference and noise level:

5.7.1. The transformer shall be designed with particular attention to the suppression of maximum harmonic voltages, especially the third and fifth, so as to minimize interference with communication circuits.

5.7.2. The noise level, when energized at normal voltage and frequency, shall not exceed, when measured under standard conditions, the value specified by NEMA.

5.8. The maximum flux density in any part of the core and yoke at normal voltage and frequency shall be such that the flux density under over voltage conditions shall not exceed the maximum permissible values for the type of core and yoke material used. The type of material and values of flux density in the core/yoke for the 100%, 110%, 125% and 140% and the hysteresis characteristics curves shall be submitted.

5.9. Transformer shall be capable of operate below the knee of the saturation curve at 110% voltage to preclude Ferro – resonance and non-linear oscillations.

5.10. Transformer shall be capable of operating under natural cooled condition to the specified capacity. Transformer shall be capable of operating continuously in accordance with the application standard loading guide at their rated MVA and at any of the specified voltage ratio ratios.

6. CENTRE OF GRAVITY

The Centre of gravity of the assembled transformer shall be low and as near the vertical centreline as possible. The transformer shall be stable with or without oil. If the centre of gravity is eccentric, relative to track either with or without oil, its location shall be shown in the 'Outline' drawing.

7. TESTS

Transformers shall be completely assembled at Works to ascertain that all parts fit correctly.

Routine Tests

Routine tests as per specified standards shall be performed on all transformers. The following additional points may be noted

i) 2kV withstand test for all wiring.

ii) Zero phase sequence impedance test

iii) Dissolved gas analysis

iv) Temperature rise test

v) Voltage ratio at all taps

vi) Resistance of each winding of each phase shall be measured at principal and at all the taps and corrected to 75 deg. C.

vii) No load loss and exciting current shall be measured at rated frequency at 90%, 100% and 110% rated voltage. These tests shall be done after impulse tests if the latter is conducted. Exciting current shall be measured on each phase and recorded. Form factor shall be noted during the test and included in the test report.

viii) Magnetic balance test.

ix) Calibration of temperature indicators and relays.

Type Tests

CONTRACTOR shall furnish type test certificates along with the Tender. In the absence of the same, CONTRACTOR shall carry out the type tests without any cost implication to the EMPLOYER. Test certificates for short circuit test and Impulse test conducted for similar transformer shall be furnished.

Test Reports

Test results shall be corrected to a reference temperature of 75 deg.C.
Two copies of preliminary test results shall be submitted for the EMPLOYER'S approval before despatch of transformer.
Additional bound copies of complete test results including all tests on transformers, auxiliaries, and current transformer characteristics shall be furnished with the transformer

LOSSES

Tenders will be evaluated based as mentioned below:
No load losses:
Load losses:
For the purpose of evaluation of Tenders, the quoted load losses and iron losses will be increased to take into consideration tolerance as permitted by applicable standards, in the event the losses are indicated exclusive of tolerance.
Should the losses as measured on the transformer after manufacture be found in excess of the guaranteed losses with plus tolerance, the CONTRACTOR shall pay to the EMPLOYER, penalty charges based on the capitalisation of cost indicated above

8. ON LOAD TAP CHANGER (OLTC)

8.1. Whenever specifically specified, high speed on load tap changing gear shall be mounted on the transformer. The OLTC gear shall have diverter resistance or reactance and the current diverting contacts shall be housed in a separate oil chamber segregated from the main tank of the transformer. The contacts shall be accessible for inspection and shall be replaceable type. Separate Buchholz Relay shall be provided for OLTC tank.

Oil filled compartment shall be provided with filling plug, design valve with plug air release vent, inspection opening with gasketed and bolted cover.

8.2. OLTC driving mechanism shall consist of

a) Suitable motor rated for 433V, 3 phase, 50 Hz AC squirrel cage with gear.

b) Energy accumulator with springs.

c) Selector wheel and arm limit switches to prevent motor over travel in either direction.

d) Slip clutch.

8.3. OLTC shall be provided with following modes of control.

a) Manual and Electrical mode from local on the transformer itself.

b) Electric mode from remote manually.

c) Electric mode from remote automatically through voltage sensitive relay.

d) Individual / Parallel control on a master / follower.

8.4. Following technical features shall be incorporated in OLTC.

a) Device to ensure positive and full completion of tap change once it is initiated even if power fails.

b) Interlock to cut off electrical control automatically in case manual mechanical control is initiated and vice-a-versa.

c) Interlock to cut off a counter impulse for a reverse tap change, being initiated during a progressive tap change and until the mechanism comes to rest and resets circuits for a fresh operation.

8.5. LOCAL PANEL FOR OLTC (INTEGRAL TO OLTC)

Local OLTC panel shall be suitable for outdoor location. Local panel to be mounted on the transformer tank for operation of OLTC and shall consist of:

a) High torque electric motor suitable for 433 volts, three phase.

b) Motor drive and energy accumulator.

c) Phase and neutral isolator, fuse, forward and reverse contactors and overload relay.

d) Local remote selector switch (lockable in both positions)

e) Raise / Lower push buttons.

f) Raise / Lower limit switches.

g) Auxiliary transformer, if required.

h) Indicating lamps shall be provided to indicate following faults. One common fault condition shall be wired for remote annunciator.

i) AC Failure.

ii) Drive motor auto trip.

iii) Tap change delayed.

i) 240V, 50 Hz, AC space heater with switch and HRC fuses.

j) Mechanical digital operations counter with resetting arrangement.

k) Interior lighting fixture with switch and HRC fuse.

l) Mechanical tap position indicator.

m) Necessary relays, contactors, etc. for remote control of OLTC (relay shall be EE make)

n) Terminal blocks, internal wiring for power and control cables.

o) Gasketted and hinged door with locking arrangements.

p) Removable undrilled gland plate for cable entry.

q) Interlock between manual and electric operation.

r) Stepping relay.

It shall be possible to operate tap changer manually by handle. A micro switch shall be provided which shall cut off electrical operator in the manual mode.

8.6. REMOTE TAP CHANGER CUBICLE (RTCC)

A separate indoor mounted remote tap changer cubicle shall consist of following:

a) Control supply transformer with suitable isolators and HRC fuses on either sides.

b) Supply on indicating lamp.

c) Auto manual selector switch.

d) Raise lower push buttons.

e) Digital tap position indicator.

f) Master follower sequence selector switch.

g) Out of step relay.

h) Automatic voltage regulating relay with time delay element.

i) Lamp for tap changes in progress with suitable bell or alarm other than the one provided for annunciating faults.

j) Voltmeter with HRC fuses.

k) Annunciation windows with alarm and alarm cancellation to indicate following faults:

i) Drive motor auto tripped.

ii) Tap change delayed.

iii) Lower limit reached.

iv) Upper limit reached

v) Out of step

vi) AC failure

vii) Buchholz relay alarm on OLTC

l) 240V, 50 Hz, AC space heaters with switch and HRC fuses.

m) Interior lighting fixtures with ON-OFF switch and fuses.

n) Terminal blocks, internal wiring for power and control cables.

o) Gasketed and hinged doors with locking arrangement.

p) Removable undrilled gland plate for cable entry.

q) Sequence selector switch for parallel operation.

8.7. Any other components / equipments required for OLTC's operation shall be deemed included.

9. JACKING PADS

The Jacking Pad base extension shall be such that it shall be possible to locate a 3-ton Jack below the Pad. NCMRWF will design foundation suitably to accept 3 ton Jack.

10. DRAWING AND DOCUMENTS

The Supplier will be required to furnish all the necessary drawings, data etc. of the equipment with appropriate “status” stamp in adequate number of copies as indicated below.

All drawings submitted for approval shall contain the name of the NCMRWF, Name of the Consultant, Project Title, Drawing Title, Scale, and Supplier Drawing Number, Date of Drawing etc. in the lower right hand corner.

The submission of drawings and data shall be as per the manufacturer’s standard and to the satisfaction of the client.

While submitting Documents, the information shall be clearly indexed, flapped and filed in a folder of the Quality, which is expected for final Documentation.

Vendor to note that his final invoice will be cleared only after submission and acceptance of final record documentation. 5% of the order value is considered for above.

10.1. DRAWINGS & DOCUMENTS SCHEDULE

Following drawings/documents shall be provided along with order acceptance for approval/review to NCMRWF /Consultant:

a. **General Arrangement drawing. – 3 Sets**

b. **Connection diagram - 3 Sets**

c. **Type Tests certificates for Information – 3 Sets**

10.2. Operation maintenance manual & Inspection Tests Certificates (Routine Tests) - 3 Sets for Reference & Records along with final invoice.

11. SPARES

11.1. Commissioning Spares

The Supplier shall include the commissioning spares along with the main equipment as per the Supplier's experience, for replacement of damaged or unserviceable during commissioning at site.

11.2. Supplier shall quote spares separately for two years Operation & Maintenance of equipment.

11.3. Supplier will provide one set of special tools & tackles required for operation maintenance & inspection of the equipment along with the delivery of the equipment.

11.4. The Supplier will provide the NCMRWF with all the addresses and particulars of his Sub-Suppliers while placing the order on vendors for equipment covered under the Contract and will further ensure with his vendors that the NCMRWF, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors.

Vendor shall quote for recommended spares for two years of satisfactory operation with unit price.

12. STATUTORY REGULATIONS

All transformers shall conform to the requirement and shall be acceptable to local statutory authorities including Electrical Inspectorate.

13. SPECIFIC REQUIREMENTS

Specific requirements shall be additionally to that indicated in the Single Line diagram.
Vendor shall furnish Technical Particulars for transformer for client's approval.

14. REJECTION

Owner may reject any transformer if during tests any of the following conditions arise:
Load loss exceeds the guaranteed value by 20% or more.
Impedance value differs the guaranteed value by + 10% or more.
Oil or winding temperature rise exceeds the specified value by 5oC.
Transformer fails on impulse test.
Transformer fails on power frequency voltage withstand test.
Transformer is proved to have been manufactured not in accordance with the agreed specification

15. DATA TO BE FURNISHED BY THE VENDOR ALONG WITH OFFER

Positive Sequence impedance at maximum voltage tap.	
Positive Sequence impedance at minimum voltage tap.	
Zero sequence impedance at principal tap.	
Efficiency at 75 deg.C winding temperature	
At full load	
At 75% full load	
At 50% full load	
Maximum efficiency and load at which it occurs	
Regulation at full load at 750C winding temperature at	
Unity power factor	
0.85 power factor lag	
Resistance per phase at	
Primary winding: ohms	
Secondary winding: ohms	
Conductor area (sq. mm) and current density (amp / cm2)	
Primary winding	
Secondary winding	
Type of winding	
Primary	
Secondary	
Insulating materials for inter turn insulation	
Primary winding	
Secondary winding	
Insulating materials for inter winding insulation	
Insulating materials between	
Winding and core	
Laminations of core	
Make, type, dial size, number of contacts and contact ratings current and voltage rating for following items	
Magnetic oil level gauge	
Dial type thermometer	
Winding temperature indicator	
Gas and oil actuated relay	
Thermal withstand capability under full short circuit conditions, in terms of number of times of occurrence of short circuit and corresponding anticipated percentage reduction in transformer life. Relevant calculation shall be submitted.	

DRAWINGS

The following drawings shall be submitted for the EMPLOYER'S approval in the stipulated time

General outline drawings as submitted with the bid

General outline drawings showing plan, front elevation, and side elevation, with all fittings and accessories, locating dimensions of cable entries, earthing terminals, foundation/floor fixing details, jacking pads and weights of the following

Marshalling box

Cable boxes

Disconnecting chambers

Bushings

Plan, elevation, terminal details, mounting details, make and type number, current and voltage rating, creepage distances and principal characteristics.

Rating and diagram plates

Marshalling box terminal connections wiring diagram.

16. TECHNICAL DATA

A. For 2000KVA Distribution Transformer.

Sr. No	Description	Distribution Transformer
1	No. of Transformers	2
2	Maximum Continuous Rating (KVA) with ONAN cooling	2000KVA
3	Temperature raise above ambient of 50Deg.C	
	a. Winding	55
	b. Oil	50
4	Maximum flux density in any part of core of rated voltage and frequency	1.7 Tesla
5	Over fluxing withstand requirements	
	a. 110%	Continuous
	b. 125%	10 Sec.
6	Rated Voltage in kV	
	a. HV winding	33
	b. LV winding	0.433
	Voltage Variation	+/- 10%
7	Vector Group	Dyn11
8	Rated Frequency	50Hz
	Frequency Variation	+/- 3%
9	Neutral Earthing	Effectively Earthed.

10	Tap Changer	
	a. Type	On load
	b. Tapping Range	+10% to – 15% in Steps of 1.25.
	c. Make	
11	Percentage Impedance	6.25 %
12	Insulating Oil	Confirming to IS :335
13	Insulation Level In kV	
	(Highest/ Power frequency/Impulse)	
	a. H V	36/70/170
	b. L V	1/3
14	Maximum current Density of winding	300 Amps/Sq.cm
15	Termination arrangement	
	a. H V	Cable Box
	b. L V	3200A Al. Sandwich Busduct
16	Supply of Neutral bushing CT rating	Yes

17. DATA SHEET

(To be submitted by Supplier along with offer in this format only)

Sr. No	Description	2 X 2000KVA Dist. Transformer
1	Name of the Supplier	
2	Make	
3	Address	
4	Contact Person	
5	Rating of transformer Offered	
	a. Primary Voltage	
	b. Secondary voltage	
	c. Rating	
	d. Type	
	e. Vector Group	
6	Connection	
	a. Primary winding	
	b. Secondary winding	
7	Flux density considered	
8	Insulation Level	
	a. Primary winding	
	b. Secondary winding	

9	**Impedance**	
10	**Temperature raise**	
11	**Tap changing arrangement**	
12	**Percentage regulation**	
	a. At 0.8 lag power factor	
	b. At unity power factor	
13	**Efficiency**	
	a. At 50% Load at Unity Power Factor	
	b. At 50% Load at 0.8 lag Power Factor	
	c. At 75% Load at Unity Power Factor	
	d. At 75% Load at 0.8 lag Power Factor	
	e. At 100% Load at Unity Power Factor	
	f. At 100% Load at 0.8 lag Power Factor	
14	**Loss in kW**	
	a. No Load loss	
	b. Full Load loss at unity power factor	
	c. Full Load loss at 0.8 lag power factor	
15	**Make of Oil**	
16	**Quantity of Oil**	
17	**Class of insulation**	

18	**Neutral bushing CT rating**	**……../5A CL. PS**
19	**Capitalization formulae for evaluation of loss**	
20	**Accessories and fitting offered**	
21	**Transformer Size - Over all dimensions/weight**	
22	**Hours of operation per year**	
23	**Life of equipment**	
24	**Temp. correction factor**	

18. <u>TEST REPORTS</u>

Test results shall be corrected to a reference temperature of 750C.

18.1. Two copies of test results shall be submitted for EMPLOYER approval before dispatch of transformer.

18.2. Additional bound copies, as required by the EMPLOYER of complete test results including all tests on transformer, bushing, shall be furnished

NOTES TO SUPPLIER

Specific requirement of the transformer is indicated elsewhere. Supplier to furnish / confirm Technical Particulars for transformer attached as Annexure to Specific Requirements.

ALL DATA REQUESTED FOR IN TECHNICAL PARTICULARS SHALL BE FURNISHED. STATEMENTS LIKE "AS PER IS" AGAINST ITEMS IN TECHNICAL PARTICULARS ARE NOT ACCEPTABLE AND OFFER IS LIABLE FOR REJECTION IF DATA IS NOT FURNISHED.

DEVIATIONS FROM GENERAL CONDITIONS OF CONTRACT

All deviations from General Conditions of Contract shall be filled in hereby the Tenderer

SECTION	CLAUSE NO.	DEVIATION

The Tenderer hereby certificates that the above mentioned are only deviations from general conditions of contract of enquiry.

DATE: **Signature & Seal of Tenderer**

DEVIATIONS FROM TECHNICAL SPECIFICATIONS OF CONTRACT

All deviations from Technical Specifications shall be filled in hereby the Tenderer

SECTION	CLAUSE NO.	DEVIATION

The Tenderer hereby certificates that the above mentioned are only deviations from Technical Specifications of contract of enquiry.

DATE: **Signature & Seal of Tenderer**

19. PRICE SCHEDULE

A. FOR 2000 KVA TRANSFORMER

Sr. No.	Particulars	Unit	QTY	Price (Rs.)	
				Unit	Total
1.	Ex-works Price for 33/0.433 kV 2000kVA Dyn11, ONAN type Distribution Transformer.	Nos.	2		
2	Special Tools				
3	Packing & Forwarding				
4	Excise duty - @.....%				
5	VAT/CST @.....%				
6	Freight @				
7	Transit insurance charges				
8	Any Other taxes/duty				
9	Total Price for Design, Manufacture, Inspection, Testing, Packing & Forwarding, transport & Delivery at site.				

Sr. No.	Particulars	Unit	QTY	Price (Rs.)	
				Unit	Total
1	Scheduled Maintenance Spare Part				
2	Mandatory Spare Parts for Breakdown Maintenance				

33 kV HT PANEL
TECHNICAL SPECIFICATIONS
FOR
PROPOSED DATA CENTRE
AT
NCMRWF, NOIDA, UP.

CONTENTS

A. GENERAL TERMS AND CONDITIONS
B. TECHNICAL SPECIFICATIONS
C. PRICE SCHEDULE

A. GENERAL TERMS AND CONDITIONS

INSTRUCTIONS TO BIDDERS

1. **NCMRWF, NOIDA, UP wishes to receive Bids for Design, manufacture, supply & delivery of HT Panel as describing in below document.**
2. **In case, any clarification is required, the Bidders shall obtain the same from the Consultant in writing. All such clarifications shall be binding both on the NCMRWF /Consultant and the Bidder.**
3. **At any time prior to the deadline for submission of Bids, the NCMRWF /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 NCMRWF 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 NCMRWF / Consultant not later than 17.00 hrs on ------ at following address.**

pp

8. **The acceptance/rejection of the quotation will rest with the NCMRWF, 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 NCMRWF, NOIDA, UP.
2.	Name Of Work	Desig,Manufacture,Supply& Installation HT Panel
3.	NCMRWF /Owner	NCMRWF, NOIDA, UP.
4.	Nearest Town/City	Delhi
5.	Nearest Rail Station	Delhi
6.	Nearest Air Port	Delhi
7.	Site Conditions	Ambient Temperature:
		Maximum 45^0C
		Minimum 7^0C
		Relative Humidity
		Maximum 90%
		Minimum 30%
		Design Altitude at Sea Level

TECHNICAL SPECIFICATION

1. ELECTRICAL SYSTEM DETAILS

NCMRWF, NOIDA, UP having 33KV HT Supply, We have to tap 33 KV supply from Existing Metering Kiosk situated in CTPT Room.

2 STANDARD

The HT Switchgear shall conform to the requirements of the following but not limited to, latest revision of relevant Indian Standards or equivalent British or any other International Standard Specifications.

IS-5	Colors for ready mixed paints and enamels.
IS-722	AC electricity meters.
IS-1248	Direct acting Indicating analogue electrical measuring instruments and their accessories.
IS-2705	Current Transformers. Part I to IV
IS-3156	Voltage Transformers.
IS-3231	Electrical relays for power system protection.
IS-3427	Metal enclosed switchgear and control gear for voltage above 1000V but not exceeding 11000V.
IS-3618	Phosphate treatment of iron and steel for protection against corrosion.
IS-4483	Preferred panel cut out dimensions for electrical relays - flush mounting IDMTL relays.
IS-5082	Wrought aluminium and aluminium alloy bars, rods, tubes and sections for electrical purposes.
IS-5578	Guide for marking of insulated conductors.
IS-6005	Code of practice for phosphating of iron and steel.
IS-6875	Control switches (switching devices for control and auxiliary circuits including contactors relays) for voltages upto and including 1000V AC and 1200V DC - Push Button and related control switches.
IS-9046	AC contactors of voltages above 1000V upto and including 11000V.
IS-13118	High Voltage alternating current circuit breakers.
IEC-298	MV metal-enclosed switchgear
IEC-265	MV Switches
IEC-129	AC Disconnections and Eathing Switches
IEC-56	MV AC Circuit Breakers
IEC-801	Monitoring and Control
IS 1388 IEC 56	Circuit Breakers
IS:2544	Busbar support insulators
IS:13947, IS:3427,	Degree of Protection

IS:9385, IEC:282	High Voltage Fuses
IS:722	AC Electricity Meters
IS:4171, IEC:694	Copper Busbars
IEC:129	Offload isolators
IS:6005	Code of Practice for Phosphating Iron and Steel
IS:9224	HRC Fuses

33kV Vacuum Circuit Breaker

CONSTRUCTION

The switchboard shall be sheet steel fabricated, free standing, dust and vermin proof, totally enclosed, fully compartmentalised, floor mounted type. The circuit breaker panels shall be draw out, multi-panel unit type unless otherwise specified. The unit shall be robust design to withstand the stresses encountered in the event of an electrical fault.
The switchboard shall be constructed in suitable shipping sections for the purpose of shipping to site and correct re-erection on prepared foundations.
Adequate lifting facilities such as hooks for ease of handling at site shall be provided. These hooks when removed shall not leave any openings in the switchgear.
Front / Rear access shall be available to all components in each cubicle which requires adjustment, maintenance or replacement.
Rear access shall be available to all cable boxes and glands and multi-core terminal blocks. Rear side of cable chamber shall be provided with additional wire-mesh with high voltage danger notice board.
Each unit of switchgear shall have necessary interior sheet metal barriers to form separate compartments for buses, switching devices, entering cable connections, etc. Each compartment must be constructed and segregated to confine the damage caused by an internal fault to that compartment.
Automatic safety shutters shall be provided to shroud bus side and cable side main disconnecting contacts of the circuit breaker when the circuit breaker is taken to test position. Bus bar shutter shall be Permalli / Hylams of minimum 4.75 mm and shall have red paint

The instrument / control chamber shall incorporate the indicating instruments, lamps and components of the control circuit. The instrument chamber shall be provided with a separate door, which can be opened when the circuit breaker is `ON'. The instrument chamber shall also be totally segregated from the rest of the panel. Wherever equipments are mounted on the door, the wiring shall be with flexible wires. The wires shall be neatly bunched and clamped and shall be sufficiently long so that the door can be opened without causing unnecessary stress on the terminations at the instruments. All instrument and relays belonging to one panel shall be mounted on the same panel.

Pressure release plates/valves shall be provided for different compartments.

Doors of all switchgears shall be provided Synthetic or neoprene gaskets to prevent entry of vermin and dust. Steel screws, bolts and washers shall be plated.

240V 15A SPN Industrial socket outlet complete with switch and HRC fuse shall be provided in each cubicle and lamp should be provided in each cubicle.

The switchgear shall be fully draw-out, metal clad type and shall have Vacuum circuit breaker.

One vertical panel shall include one feeder. Extension chambers at rear portion shall be considered for termination of large size / number cables, if required. Necessary dummy cubicles complete with horizontal busbars, space heaters, power, control and annunciation, busbars / cables shall be included to avoid interference of beams with cable openings wherever required.

PAINTING AND FINISHING

All metal surfaces shall be thoroughly cleaned and degreased, pickled and phosphate and chrome passivated pre-treated should be carried out. Panel shall be powdered coated in RAL-7032/35 (MAT-Finish)

- **BUSBARS**

  All bus bars and their main current carrying connections shall have the same sectional area throughout their length. Bus bars shall be sized to continuously carry the rated current without exceeding the final temperature of 85 Deg. o C. and the same shall be capable of withstanding the full fault level without any deformation. The rating of bus bars shall be same as that of incoming breaker rating. Bus bars shall be of aluminium (unless otherwise mentioned in specific requirements) with proper plating at joints. The bus bars shall be provided with cast epoxy sleeving or nylon film of suitable insulation class throughout their lengths and vertical droppers and colour coded. Joints in bus bars shall be provided with shrouds. For long bus bars, suitable expansion joints may be provided.

  The bus bars shall be supported by insulators of non-carbonising material resistant to acid and alkali and having non-hygroscopic characteristics and braced to withstand the fault level specified.

  The clearance between live parts and the earth shall be as per the Indian Standard. In case of copper to aluminium connections, proper treatment shall be given to minimize the bimetallic effect.

  Bus bars and connections shall be secured in such a manner that the insulators are not subjected to bending forces under short circuit conditions. Dynamic stresses shall be calculated on the basis of peak short circuit current.

  The vertical droppers shall be sized to carry continuously at least the rated current of the connected circuit breaker.

  It shall be possible to extend the bus bars at either end of the switchboard for addition of future units. Both ends of bus bars must be suitably drilled for this purpose.

  Where bus bars are taken through the partitions of adjacent cubicles, shrouding shall be provided to prevent spread of fire from one unit to the next.

  Thermal design of the bus bars shall be based on installation of the switchgear in poorly ventilated conditions. The cooling air volume shall take into account only the bus enclosure.

- **EARTHING**

  A copper / aluminium earth bus of sizeof suitable .Aluminum bus bar shall be provided at the bottom extending through the entire length of switchgear. Each stationary unit of the cubicle shall be earthed directly to the earth bus through a contact bar so that the carriage is earthed at all times except when the primary disconnects are separated by a safe distance. Suitable clamp type connectors shall be provided at both ends of earth bus to suit external earthing conductor. Also hinged doors of the cubicle base plate of C/T and P/T shall be effectively earthed.Earth bus shall protrude outside the extreme end panels and by at least by 100 mm.

  One set of earthing accessories shall be supplied with the switchgear for earthing of the outgoing side of a feeder or 3 phase bus bars of the switchgear either through earthing facility comprises truck to be inserted in place of circuit breakers, separate earthing trucks shall be supplied where earthing is achieved through circuit the earth device unless the circuit breaker is in open and isolated position.

- **SEGREGATION OF EQUIPMENT**

  For safety reasons, each panel (Vertical Section) shall be divided into compartments to keep main equipment segregated.

  Partitions / separate compartments will be provided for:

  - **Bus bar compartment**
  - **Cable termination compartment and instrument transformers.**
  - **Circuit breaker**
  - **Metering & Relaying Devices**

  Bus bar compartment shall have degree of protection of IP-41. All other compartments shall have degree of protection of IP-41.

  Circuit breaker shall have Service-Test - Fully isolated positions with positive indication for each position.

- **SAFETY INTERLOCKS**

  Switchgear shall be provided with all necessary safety interlocks and features.

  Mechanical safety interlock shall be provided to prevent circuit breaker from following operations:-

  1. **Racking in or out of the service position when the breaker is closed. Racking in or out shall be possible when the front door is closed and breaker in open position. Operation of the breaker shall be possible in the service, test and isolated positions.**
  2. **Racking in unless self-aligning control contacts / control plug is fully engaged.**
  3. **Closing in any intermediate position between test & service position.**
  4. **Automatic safety shutters shall fully cover the female primary disconnects when the breaker is with drawn to test position.**

- **POTENTIAL TRANSFORMERS**

  All PT's shall be epoxy cast resin type

  All PT's shall be draw out type and connections between the bus bars and PT shall be completely shrouded. Automatic shutter shall be provided to shroud the bus bars when PT is taken out. For Incomer feeders PT may be mounted on circuit breaker truck and shall be of fixed type since the same are connected on the incoming cable side.

  It shall be possible to remove voltage transformer from the circuit breaker whenever required

  HRC fuse protection shall be provided on primary as well as secondary side. The primary connection shall be disconnected before PT or its primary fuses become accessible.

- **CURRENT TRANSFORMERS**

  All current transformers shall be epoxy cast resin type.

  All current transformers shall be capable of withstanding dynamic and thermal stresses originated by short circuit fault current for one second.

  Terminals shall be provided with plastic covers to prevent inadvertent contact.

- **CABLETERMINATION**

  HT CABLE

  HT switchgear will be connected to transformers or other equipment by PVC / PILC / 240Sqmm. HT XLPE cables. All power and control cables shall enter the switchgear from bottom. Sufficient space and support arrangement shall be provided in the cubicles to accommodate cables. The number of cables per circuit sizes and types shall be intimated to the supplier. If the required number of cable terminals cannot be accommodated in the circuit breaker chamber, additional dummy panel with bus extension suitable for the number of cables to be terminated shall be provided.

  The cable sockets shall be at such angle that the cable tails may be brought up for termination with minimum bending and setting.

  Terminals shall be located sufficiently away from gland plates or cable boxes to facilitate easy connection. If distance is not sufficient, adaptor panels shall be provided.

  Minimum distance between gland plate and termination shall be 700 mm. Additional termination points shall be provided in the outgoing bus links for power factor correction capacitor cable termination.

  In case cable terminations cannot be accommodated inside panel a suitable box for mounting of bottom/rear panel shall be supplied by vendor. Earth strip shall also be brought to this box. In lieu of this a dummy panel may be provided.

  The switchboard shall be supplied complete with supports for clamping outgoing and incoming cables. Terminal blocks shall not be used to support cables.

  CONTROL CABLES

  Control cables shall enter the switchgear from the bottom. Separate And adequate space shall be provided for termination. Supporting facilities shall be provided for clamping the control cables. All control cables shall be 2.5 sq.mm Cu conductors.

- **WIRING AND FERRULES**

  All control signalling, protection and metering wiring shall be by PVC insulated, 650 KV grade, copper stranded conductor wires of min. 2.5-sq.mm section. For CT secondary circuit wires of 2.5 sq.mm copper conductor min. shall be used. Wiring shall run in enclosed channel and shall leave at least 25% spare space for future use. Wires for connection between moving parts shall be flexible stranded copper conductors and the same shall be soldered at the ends before connections are made.

  At least 10% spare terminals shall be provided in each terminal strips.

  The switchgear Supplier shall do all inter-panel control wiring. The inter-panel wiring shall be taken through PVC sleeves or suitable rubber grommets.

- **CONTROL SUPPLY**

  External DC control supply shall be provided for tripping and closing circuits to one panel. Also external AC control supply shall be provided for auxiliary power and heater circuits to one panel. Supplier shall provide suitable control switch and fuse at the point of receiving control supply. Supplier shall be required to loop both these supply to all the panels in case of multi breaker panels forming one unit. Each panel shall also have control supply switch and HRC fuses or MCBs for isolation. One DC feeder shall be provided for each bus section. The bus coupler panel may be fed from any of the two supplies.

  a. 24V DC supply (Internal Power Pack)
  b. 240V AC supply shall be provided for feeding space heaters, etc.

- **SPACE HEATERS**

  The cubicles shall be provided with space heaters to prevent moisture condensation and maintain cubicle temperature 5o C above the ambient. The space heaters shall be located at the bottom of the switchboards and shall be controlled through a thermostat with an adjustable setting, a manually operated switch. The thermostat shall preferably be located in the metering / relay chamber.

- **VACUUM INTERRUPTER**

  Circuit breakers shall have completely sealed interrupting units for interruption of arc inside the vacuum. It shall be possible to isolate easily the vacuum interrupter unit from the breaker operating mechanism for mechanical testing of the interrupter to check loss of vacuum.

  The circuit breakers shall be complete with surge arrestors to provide protection to the equipment controlled by the breaker, against switching surges. Over voltage produced by the circuit breaker during switching off induction motor or switching on / off of transformer shall be limited to 2.5 times the peak value of rated phase to neutral voltage. Surge absorbers of either Z or Cr type with nonflammable, nontoxic liquid filled capacitors shall be used and located in switchgear cubicle if the over voltage limit exceeds. Surge diverters shall be provided for vacuum circuit breakers.

- **CIRCUIT BREAKER OPERATING MECHANISM**

  1. **Circuit breaker shall be power operated by a motor charged spring operated mechanism. It shall be strong, rigid, positive and fast in operation to ensure that the pole discrepancy does not exceed 10ms.**
  2. **Mechanism shall be such that failure of any auxiliary spring shall not prevent tripping and will not cause tripping or closing operation of the power operated closing devices.**
  3. **When the circuit breaker is already closed, failure of any auxiliary spring shall not cause damage to the circuit breaker or endanger the operator.**
  4. **The closing release shall operate correctly at all values of voltage between 85% and 110% of the rated voltage. A shunt trip shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity of the circuit breaker and all values of supply voltage between 70% and 110% of rated voltage.**
  5. **Auxiliary switches mounted on the fixed portion of the cubicles and directly operated from the breaker operating mechanism on each breaker having 6 'NO' and 6 'NC' potential-free contacts rated for 10 amp, 240V AC and 0.5 amp (inductive breaking) 220V AC shall be provided. The contacts shall be in addition to those utilised in control circuit of each breaker and shall be exclusively meant for EMPLOYER use in external interlocks and controls.**

- **SPRING OPERATED MECHANISM**

  1. **Spring operated mechanism, shall be complete with motor of adequate rating, opening spring, closing spring with limit switch for automatic charging and all necessary accessories to make the mechanism a complete operating unit.**
  2. **After failure of power supply to the motor, at least one open-close-open operation of the circuit breaker shall be possible.**
  3. **Operating mechanism shall normally be operated locally, when the breaker is in "Service" position. Electrical tripping shall be performed by shunt trip coils. Provision also shall be made for local electrical control when the breaker is in "Test" position by a control switch on the switchgear cubicle door. Also, "Local / Remote" selector switch lockable in "Local" position shall be provided on the cubicle door. 'Red' and 'Green' indicating lamps shall be provided on cubicle door to indicate breaker close and open positions. Breaker "Service" and "Test" positions shall be**

indicated by separate indicating lamps on the cubicle door, in case mechanical indication of “Service” and ”Test” positions are not available on the cubicle door.

- **INSTRUMENT TRANSFORMERS**

CTs and VTs shall be of cast resin type (with winding insulation of class E) and shall be able to withstand the thermal and mechanical stress resulting from the rated short time withstand and peak withstand current ratings of the switchgear. These shall be completely encapsulated.

CTs and VTs shall have polarity marks indelibly marked on each transformer and at the associated terminal block. Secondary connections of CTs & VTs will be made through disconnecting type terminals with necessary shorting and earthing facility.

VTs shall be of single phase type. VTs shall be protected on their primary and secondary sides by current limiting fuses. Interrupting rating on primary shall correspond to breaker rating. Provision shall be made such that the primary fuses can be handled only in the de-energised position. Drawout contacts for Phase and Neutral terminals shall be identical.

Metering CTs

For metering, main CTs and auxiliary CTs, if used, the accuracy class shall be normally 1.0.

All metering CTs shall have a adequate burden.

Instrument security factor shall be less than 5 unless otherwise specified.

Protection CTs

Protection CTs shall have class of accuracy of 5P10 and minimum burden 15VA.

Core balance CTs shall be such that the earth fault relay should be able to operate over its entire range.

CTs to be used for REF and Differential Protection will be PS Class.

CURRENT TRANSFORMER DETAILS

Type, Voltage & frequency	:	Cast resin, 33kv, 50 Hz
Class of Insulator	:	Class F or Better and Temp limited to B
Short time rating kA	:	26KA for 1 Sec. for CTs 100A & 125A 26kA for 3 Sec. for CTs rated above 125A
Dynamic rating kA (peak)	:	100
Withstand Test Voltage	:	
(a) One minute power frequency	:	70 kV (rms)
(b) 1.2/50 sec. Impulse withstand	:	170 kV (Peak)

VOLTAGE TRANSFORMER DETAILS

Type	: Cast resin, 3Nos. single phase, Single / Dual Secondary
Voltage ratio (Primary / Secondary)	: 33000 / √3 /110/√3
Method of connection Primary	: Star / Star
Secondary	: SI /S2
Rated Voltage Factor	: Continuous
Class of Insulation	: Class 'E' or Better
One Min. power frequency withstand Voltage kV (rms)	: 70
1.2/50 micro sec. Impulse withstand voltage kV (peak)	: 170

- **INSTRUMENTS & RELAYS**

Meters shall be provided as per single line diagram.

Indicating instruments

Unless otherwise specified, all electrical indicating instruments will be 96 mm square, with 240 degree scale (Taut band type). They shall be suitable for semi-flush with only flanges projecting on vertical panels.

Instruments shall have accuracy class of 1.5 or better. The design of the scales shall be such that it can read to a resolution corresponding to 50% of the accuracy class index.

Recording instruments

Recording instruments will be square or rectangular in shape and shall be suitable for semi-flush mounting on panels with only flanges projecting. They shall be of non-drawout type

Trivector meter shall be L&T ER300P with RS485 port or equivalent type

- **PROTECTIVE RELAYS AND FUSES**

Relays and fuses shall be provided as per single line diagram

Relay cat numbers are indicated are ANSI/ALSTOM cat numbers. Vendor shall select the and specify equivalent relay

The protective relays shall conform to standard requirements. Type of relays shall be of numerical/static type which meet the various performance requirements are considered acceptable.

All relays shall be adequately protected against external voltage surges and noise signals. In addition to this, all the input circuit of relays will include their own auxiliary current and voltage transformers with screened windings. Where auxiliary interposing transformers are not feasible in the input circuit, relays would have special surge suppression circuits to suppress external noise and surges.

Relays shall have at least the following electrically independent output contacts for the following purposes

a) Tripping circuit

b) Remote / local annunciation

If the main relay does not have sufficient number of output contacts inherently, these shall be multiplied using auxiliary relays. These auxiliary relays shall be used for annunciation, indication, etc. only. For tripping, only the contact of main relay shall be used directly.

Relays shall have display of currents, trip data and trip history for analysis and trouble shooting Built in self supervision and self testing to ensure continuous reliability ,Separate indication for power ON and programming mode or relay fault Separate fault indication Communication with computer and breaker control through RS 485 port Site selectable trip time character CT secondary site selectable Display of currents, trip count, self supervision etc. Drawout

HV Fuses

Fuses shall be provided as per single line diagram.

Type	:	HRC
Voltage Class	:	33 kV
Rated current	:	2 A
Symmetrical interrupting rating in kA peak	:	25

WIRING AND ACCESSORIES

Cubicles shall be completely wired up to equipment / terminal block. Inter-panel and inter-cubicle looping of control and cubicle space heating supplies to be carried out by CONTRACTOR. Wiring to be carried out with 650V grade single core PVC insulated stranded copper conductor of following sizes:

a)	All circuits except CT circuit	:	1.5	Sq.mm.
b)	CT circuit	:	2.5	Sq.mm.

Longitudinal troughs extending throughout the full length of the panels to be provided for inter-panel wiring, AC-DC supplies, PT circuits, annunciator circuits, etc. Ferrules for wire termination to be provided. Wire connected to trip circuit will have red coloured ferrule.

TERMINAL BLOCKS

Terminals blocks for CT and PT secondary leads shall be provided with test links and isolating facilities.

All spare contacts and terminals of the panel mounted equipment and devices shall be wired to terminal blocks.

Terminal blocks to be suitable for connecting the following conductors of the cables on each side:

All circuits except CT circuit:	Minimum of two 1.5 mm2 copper
CT Circuits	Minimum of four 2.5 mm2 copper

CABLE BOXES AND GLANDS

Connecting leads of adequate size with terminal clamps for connecting cable terminal kit to switchgear equipment terminals shall be included.Cable box shall withstand the short circuit rating of the switchgear.The switchgear shall be provided with cable entry facilities at top / bottom as per the layout requirement with 3 mm thick removable gland plates, with double compression cable glands. For single core cables, the gland plates shall be non-magnetic

ACCESSORIES

Space heater supply for the switchgear shall be obtained from Distribution boards by cross connecting. Cubicle space heaters with Thermostat for automatic switching and 15A, 3 pin receptacle suitable for 240V, 1 phase, 50HZ AC supply controlled by 15A single pole miniature circuit breaker of 10kA. Breaking capacity to be provided in each cubicle. Also one light fitting with 20W fluorescent tube and switch to be provided in each cubicle

AUXILIARY SYSTEM

It is proposed to have the status of 33kV feeder in the switchgear from remote. For this purpose, following contacts will be made available in switchgear.

(i) Breaker 'ON'

(ii) Breaker 'OFF'

(iii) Breaker 'TRIP'

(iv) Breaker 'Service'

(v) Breaker 'Test'

(vi) Breaker 'Remote'

(vii) Breaker Spring charged position

LIST OF MAKES FOR BROUGHT OUT COMPONENTS

Protective relays	**: Siemens/Schneider/ABB**
Auxiliary contractor	**: Siemens/ABB/Schneider**
Power / Control switches	**: Siemens/ABB/Schneider**
CTs / PTs	**: AE / PRAGATI / KAPPA**
Meters	**: kWh - SECURE /ABB**
Load Manager	**: Conzerv with Maximum Demand Indicator**
Terminals	**: WAGO / ELMEX/Phoenix**
Indicating Lamps (LED-Type)	**: Altos**

TECHNICAL DATA FOR HT Panel (1 IN + 4 OUT + EXTENDABLE PROVISION)

1	Incomer	1No. 1250A VCB.
2	Outgoing Feeders	1No. 1250A VCB for Transformer-1 (2000 KVA).
		1No. 1250A VCB for Transformer-2 (2000 KVA).
		1No. 1250A VCB for Existing HT Panel (3750 KVA).
		1No. 1250A VCB as SPARE Feeder
3	Circuit Breaker	Vacuum Circuit Breaker
	Rating	33kV, 1250A, 50Hz with Power Pack (30 min. Back up)
	Type	Draw-out type
	Rated Insulation Level	
	Rated Shot Circuit Breaking Current	26kA (rms)
	Short Time Withstand Current	1 sec
	Spring Charging motor	24V DC
	Shunt Released (Tripping Coil)	24V DC
	Closing Released (Closing Coil)	24V DC
	Under voltage Released (Under voltage coil)	24V DC
	Locking /Interlocking	
	Door Interlocking Mechanism	Required
	Main contact Position Indicator	Required
	Operation counter	Required
	Earthing Switch	Required
	Metering	KWh (Class-1) & Load Manager
	Protective Relays for outgoing VCB feeders (Numerical Type Only)	A. Over-current & Earth Fault Relay (50,50N, 51,51N) B. Master Trip Relay (86). C. Trip Supervision Relay. D. Antipumping Relay.

4	Current Transformers Incoming Feeder.	
	Core-1 Metering	Cl.1.0, 20VA, 200/5A
	Core-2 Protection	CL5P10 20VA, 200/5A
5	Current Transformer Outgoing Feeders	
a	Transformer feeder (2Nos.) – 2000kVA	
	Core-1 Metering	Class-1.0, 20VA 35/5A
	Core-2 Protection	5P10 Class, 20VA, 35/5A
b	Transformer feeder – Existing Panel	
	Core-1 Metering	Class-1.0, 20VA, 75/5A
	Core-2 Protection	5P10 Class, 20VA, 75/5A
6	Potential Transformers	Class-1 25VA, 33kV/110V
7	Indications	a. Breaker 'On' b. Breaker 'Off' c. Breaker in test Position d. Breaker in service Posit
8	Annunciations	16 Window Annunciation for following parameters viz. As shown in SLD
9	Aux.Contacts	4NO+4NC

TECHNICAL DATA FOR HT Panel (ICOG Single Panel – Outdoor Duty)

1	Incomer + Outgoing	1No. 1250A VCB.
2	Quantity	2Nos. for Transformer-1 & 2 of 2000 KVA each.
3	Circuit Breaker	Vacuum Circuit Breaker
	Rating	33kV, 1250A, 50Hz with Power Pack (30 min. Back up)
	Type	Draw-out type
	Rated Insulation Level	
	Rated Shot Circuit Breaking Current	26kA (rms)
	Short Time Withstand Current	1 sec
	Spring Charging motor	24V DC
	Shunt Released (Tripping Coil)	24V DC
	Closing Released (Closing Coil)	24V DC
	Under voltage Released (Under voltage coil)	24V DC
	Locking /Interlocking	
	Door Interlocking Mechanism	Required
	Main contact Position Indicator	Required
	Operation counter	Required
	Earthing Switch	Required
	Metering	KWh (Class-1) & Load Manager
	Protective Relays for outgoing VCB feeders (Numerical Type Only)	A. Over-current & Earth Fault Relay (50,50N, 51,51N) B. Auxiliary Relay C. Master Trip Relay (86). D. Trip Supervision Relay. E. Antipumping Relay. F. Restricted Earth Fault Relay (64 R)
	Transformer Protection Relay for VCBs	A. Bucholz Alarm and Trip. B. WTI Alarm and Trip. C. OTI Alarm and Trip.

4	Current Transformers	
	Core-1 Metering	Cl.1.0 20VA, 35/5A
	Core-2 Protection	CL5P10, 20VA, 35/5A
5	Potential Transformers	Class-1 25VA, 33kV/110V
7	Indications	a. Breaker 'On' b. Breaker 'Off' c. Breaker in test Position d. Breaker in service Posit
8	Annunciations	16 Window Annunciation for following parameters viz. As shown in SLD
9	Aux.Contacts	4NO+4NC

DATA TO BE FURNISHED BY THE VENDOR

Sr.No.	ITEM	UNIT	
1.0	GENERAL	–	
1.1	Manufacturer's Name	–	
1.2	Applicable Standard(s)	–	
1.3	Type of Circuit Breaker	–	VACCUM
1.4	Nominal System Voltage	kV	
1.5	Type Test Report	–	o Enclosed o Not Enclosed
1.6	Compliance with Specification	–	o Yes o No Deviations Attached
2.0	CONSTRUCTIONAL FEATURES	–	
2.1	Dimensions	–	
	a) Switchgear Cubicle	mm	L x W x D
	b) Adapter Panel	mm	L x W x D
	c) Overall Based on (a) & (b)	mm	L x W x D
2.2	Minimum Clear. Required	mm	Front : Rear :
2.2.1	Cubicle Weight with Circuit Breaker	Kg.	
2.2.2	Total Switchgear Weight	Kg.	
2.3	Dynamic Loading per Cubicle	Kg.	
3.0	BUSBARS	–	
3.1	Material	–	Al-Alloy/Copper
3.2	Applicable Standard	–	
3.3	Busbar Insulation	–	
3.5	Minimum Clearance :	–	
	A) Phase to Phase	Mm	
	B) Phase to Earth	Mm	

4.0	CIRCUIT BREAKERS	–	Compliance with Spec. o Yes o No, Deviations Attached
4.1	Feeder Ratings	Amps	As Per Spec. o YES o NO (Details Attached)
4.2	Switching over voltage		
	a) Switching Off Unloaded Transformer	PU / ms	Amps
4.2.1	Maximum Permissible Chopping Current.	–	
4.3	External Switching over voltage Limiting Devices Required	–	o Yes o No
4.3.1	Details of Voltage Limiting Device :	–	
	a) Type & Voltage	–	
	b) Continuous withstand Voltage between Line and Earth	–	Volts
	c) Residual Voltage at Discharge Current of	–	
	100A / 500A / 1000A	–	Volts
4.4	MAIN CONTACTS :		
	a) Type / Material	–	
	b) Silver Facing Provided	–	Yes / No
4.5	ARCING CONTACTS :	–	
	a) Type / Material	–	
	b) Silver Facing provided	–	Yes / No
4.6	Trip Coil consumption at Rated Voltage	Watts	
4.7	Satisfactory Operation of closing between 80% - 100% of Rated Control Voltage	–	o Yes o No
4.8	VACUUM BREAKERS	–	
	a) Pressure Inside the Interrupter	Mm.Hg.	
	b) Mechanical facility for checking Loss of Vacuum Provided	–	o Yes o No

			Reason Given
	c) Vacuum Monitoring Relay provided	–	o Yes o No (Reason Given)
	d) Adequate Shielding Against X-Ray Radiations Provided	–	o Yes o No (Reason Given)
4.9	Type Test Report	–	o Enclosed o Not Enclosed
5.0	CIRCUIT BREAKER OPERATING MECHANISM	–	
5.1	Type of closing Mechanism	–	
5.2	Spring Charging Mechanism :	–	
	a) Spring Charging Motor :	–	
	i) Rated Voltage	Volts	
	ii) Rating	Watts	
	Iii) Speed	RPM	
	iv) Class Of Insulation	–	
	v) Satisfactory Operation of Spring Charging Motor Between 80% - 100% of Rated Voltage	–	o Yes o No, Deviation Given
	vi) Time Required to charging the Spring from fully Discharged Condition	SEC.	
	vii) Overload and Short Circuit Protection Particulars	–	
	b) Mechanical Indication for Spring Charged Condition Provided	–	o Yes o No, Reason Given
	c) Whether Slow Closing/Opening is Feasible for Maintenance Testing	–	o Yes o No, Reason Given
5.3	Method of closing During Power Supply Failure	–	
6.0	INSTRUMENT TRANSFORMERS	–	
6.1	Current Transformers – Metering and Protection	–	Compliance with Specification & Project Dwgs ¨ Yes ¨ No, Deviations Attached
6.1.1	Make	–	
6.1.2	Type (Bar / Wound / Any Other)	–	
6.1.3	Applicable Standard	–	

6.1.4	Class of Insulation	–	
6.1.5	Type Test Report for All CT Designs	–	¨ Enclosed ¨ Not Enclosed
6.2	VOLTAGE TRANSFORMERS	–	Compliance with Spec. Project Dwgs ¨ Yes ¨ No (Deviations Attached)
6.2.1	Make	–	
6.2.2	Type	–	
6.2.3	Applicable Standard	–	
6.2.4	Type of Insulation	–	
6.3	Type Test Report	–	¨ Enclosed ¨ Not Enclosed
7.0	INDICATING METERS	–	Compliance with Spec. /Dwgs ¨ Yes ¨ No, Deviations Attached
7.1		–	
7.1.1	General Make	–	
7.1.2	Applicable Standard	–	
7.1.3	Mounting, Flush type other	–	
7.1.4	Range as per Specification	–	¨ Yes ¨ No, Deviations Attached
7.2	WATT HOUR METER	–	
7.2.1	Make	–	
7.2.2	Type	–	
7.2.3	Standard to which it conforms	–	
7.2.4	Maximum number of digits	–	
7.2.5	Voltage Coil Rating	Volts	
7.2.6	Current Rating	Amps.	
7.2.7	VA Burden	VA	
7.2.8	Accuracy	–	
7.2.9	Range as per specification	–	¨ Yes ¨ No Deviation Attached
7.2.10	Test Plug/Test blocks testing terminals with links	–	
8.0		–	MAKE TYPE
	Protection Relay Vendor to list all relays	–	

9.0	TERMINATION / WIRING	–	Compliance with Spec. ¨ Yes ¨ No Deviations Attached
9.1	Colour coding for wires for :	–	
	a) D.C. Control Circuits	–	
	b) A.C. Auxiliary Power Circuit Like Panel Space Heater, Panel Illumination Etc.	–	
	c) A.C. Metering Circuit	–	
	d) Earthing	–	
9.2	TERMINALS :	–	
	a) Make	–	
	b) Current Rating	Amps	
	c) Bolt Type	–	
	d) Moulded Inter-Terminal Barriers Provided	–	¨ Yes ¨ No
	e) Maximum conductor size and number of conductors which it can receive	sq.mm	
	f) Disconnecting type for CT circuits	–	¨ Yes ¨ No
	i) 10% Spare Terminal provided	–	¨ Yes ¨ No
10.0	SPARES	–	
10.1	List of recommended spares for normal maintenance for a period of 3 years furnished	–	¨ Yes ¨ No
11.0	TESTS		
11.1	All Test Certificates Furnished	–	¨ Yes ¨ No
11.2	List of routine tests to be carried out attached	–	¨ Yes ¨ No
12.0	DRAWINGS AND DATA		
12.1	Drawings submitted along with Bid	–	¨ Yes ¨ No

LIST OF DRAWINGS (TO BE SUBMITTED ALONG WITH THE OFFER)

1. Switchgear cubicles : Outline dimensions and general arrangement

2. Switchgear layout plan including floor openings and fixing arrangement

3. TEST CERTIFICATES (TO BE SUBMITTED ALONG WITH THE OFFER)

The vendor shall furnish the following type test certificates

A) Circuit Breakers, B) Disconnects, C) CTs, D) VTs, E) Relays, F) Bushing and Insulators

SWITCHGEAR CUBICLE DETAILS (TO BE SUBMITTED AFTER AWARD OF CONTRACT)

Final dimensions (L x W x D) mm	**_____ mm**
a) Minimum space required in front for drawing out the circuit breaker	**_____ mm**
b) Minimum space required at the back	**_____ mm**
Largest package for transport (L x W x D) mm	**_____ mm**

WEIGHTS

a) Circuit breaker with operating mechanism, oil etc	**_____ Kg.**
b) Cubicle without breaker truck	**_____ Kg.**
c) Cubicle complete with breaker	**_____ Kg.**
d) Impact loading for foundation design to include the dead load plus impact due to breaker operation in terms of the equivalent dead load	**_____ Kg./BKR.**
e) Heaviest package for transport	**_____ Kg.**

LIST OF DRAWINGS (TO BE SUBMITTED AFTER AWARD OF CONTRACT)

Switchgear Cubicles : Final outline dimensions and general arrangement, including plan, front elevation, rear elevation, side elevation and relevant cross-sectional views.

Schematic Control Circuit Diagrams

Detailed wiring diagrams including terminal block numbers, ferrule numbers and cable connections

Relay and instrument panel general arrangement

Inter panel interconnection wiring diagram.

TEST CERTIFICATES (TO BE SUBMITTED AFTER AWARD OF CONTRACT)

A) Circuit Breakers, B) Disconnects, C) CTs, D) VTs, E) Relays

F) Bushing and Insulators

Equipment shall not be despatched unless the test certificate are duly approved by the NCMRWF / engineer

At least 5 (five) sets of compiled and approved test certificates shall be submitted within one month of dispatch of the equipment

INSTRUCTION MANUALS(TO BE SUBMITTED AFTER AWARD OF CONTRACT)

The vendor shall furnish specified number of copies of the instruction manual which would contain detailed step by step instructions for

All erection, operational and maintenance requirements. The manual shall include, among other informations, the following aspects :

Storage for prolonged duration _____

Unpacking _____

Handling at site _____

Erection _____

Precommissioning tests _____

Operating procedures _____

Maintenance procedures

Precautions to be taken during operation and maintenance work _____

Outline dimension drawings showing relevant cross-sectional views and constructional features

Catalogue numbers of all components liable to be replaced during the life of the switchgear.

DEVIATIONS FROM GENERALCONDITIONS OF CONTRACT

All deviations from General Conditions of Contract shall be filled in hereby the Tenderer.

SECTION	CLAUSE NO.	DEVIATION

The Tenderer hereby certificates that the above mentioned are only deviations from general conditions of contract of enquiry.

DATE: **Signature & Seal of Tenderer**

DEVIATIONS FROM TECHNICAL SPECIFICATIONS OF CONTRACT

All deviations from Technical Specifications shall be filled in hereby the Tenderer.

SECTION	CLAUSE NO.	DEVIATION

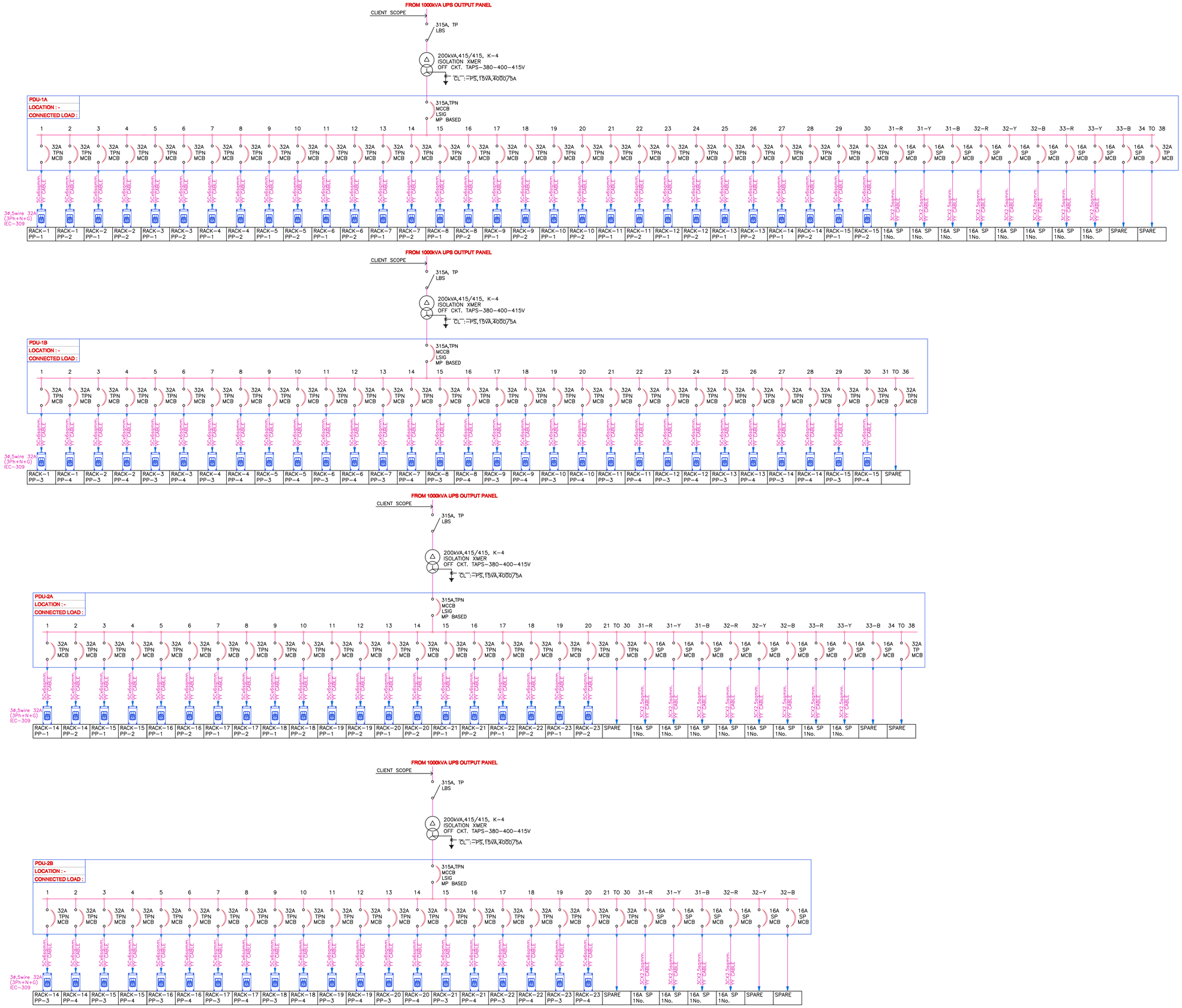
The Tenderer hereby certificates that the above mentioned are only deviations from Technical Specifications of contract of enquiry.

DATE: **Signature & Seal of Tenderer**

Sr. No.	Function	AI	DI	AO	DO		
	24 Hrs. Operation with 80 TR Chiller 4 Nos. Air-cooled (2w+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**		8		8	Potential free contact	
C	**Electrical System**						
I	**Main Power Panel HT, Main LT**						
1	Air Circuit Breaker On/Off and Status		20		15	Volt Free Contact from ACB to BMS	
2	Air Circuit Breaker TRIP Status		20			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		15		15	Volt Free Contact from ACB to BMS	
2	ACB/ MCCB TRIP Status		15			Volt Free Contact from MCCB to BMS	
III	**Chiller panels, pump, secondary pump panels**						
1	Air Circuit Breaker On/Off/ Status		10		10	Volt Free Contact from ACB to BMS	
2	ACB /MCCB TRIP Status		10			Volt Free Contact from MCCB to BMS	
III	**PAHU , PAHU fan,lightning, emergency lighting panels**						
1	MCCB On/Off/ and status		8		10	Volt Free Contact from MCCB to BMS	
2	MCCB TRIP Status		8			Volt Free Contact from MCCB to BMS	
	DG Breaker 1 , 2 ,3 & 4 in synch Panel		20				
	HT breaker 1 ,2 ,3 & 4		22				
	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	2				Sensors in BMS vendor scope	
2	CO2 Analysers	1				CO2 analyszers in BMS vendor scope	
8	Fresh Air fan for server room (1 no fan)		2	2			
	Total	**20**	**234**	**6**	**82**		
	Spare @20%	**4**	**47**	**1**	**16**		
	Total hardware points	**24**	**281**	**7**	**98**		
D	**Integration**						**Software Points**
1	Integration of Chiller Plant Manager to BMS on MODBUS RTU on RS485					4Nos. Chiller's supplied by HVAC vendor. (105 Points)	122
2	DG 1 & 2						60
3	DG flow meter1 & 2						40
	Load Manager						80
	ATS panel 1 and Panel -2						30
3	Integration of UPS' s on BACNet/IP / MODBUS RTU					2 Static UPS by UPS vendor (40 Points)	40
4	Integration of PAC' s on BACNet/IP / MODBUS RTU					2 Nos. of PAC's by PAC vendor (30 points)	30
6	Integration of EA on MODBUS RTU on RS485					60 EA supplied by Electrical vendor (120 points)	120
8	Integration with addressable Existing Fire alarm system					Software level Seamless integration with BMS (100 points)	100
9	Access Control system					Software level Seamless integration with BMS on Same platform. Unlock the main doors in case of emergency.	5
10	WATER LEAK DETECTION					MODBUS inetrface with BMS/ Hardwire Interface thru DDC	20
11	VESDA					MODBUS inetrface with BMS/ Hardwire Interface thru DDC	40
12	Gas supression system status					hardwired	2
13	Rodent repellant					MODBUS inetrface with BMS/ Hardwire Interface thru DDC	10
	Total Software points						699
	Spare of 20%						139.8
	Total software points						839

Total Hardwaired Points	410
Total Software Points	839
Total Hardwired and Softwired Points	1249



DWG.No.
NCMRWF_PD_ELEC_MSLD_002 R0

REVISIONS :

NO.	DATE	REMARKS
R0	13.06.2013	ISSUE FOR TENDER

CLIENT: NCMRWF
A-50 IISTITUTIONAL AREA, SECTOR-62
ADDRESS PHASE-II, NOIDA-201307

TITLE:
PDU PANEL SINGLE LINE DIAGRAM

DWG.No.
NCMRWF_PD_ELEC_MSLD_002 R0

JOB NO :	DRAWN BY : UJWAL
SCALE : N.T.S	CHECKED BY : AMOL
DATE : 13.06.2013	APPROVE BY : SHAILESH

33 KV FEEDER FROM UPPCL

LA

400 A TPN SWITCH

WITH DROP OUT FUSES

CT PT

1Rx3Cx300 Sq. mm. 33KV (E) AL. XLPE HT CABLE

ON OFF TRIP

PT 33000V/√3 / 110V/√3

CORE2 CL5P10 20VA/200/5A

CORE1 CL1.0 20VA/200/5A

33KV, 1250A 26kA, VCB

33000 V CT 200/5/5A CORE1-CL0.5,20VA CORE2- 5P10,20VA

V VSS

LOAD MANAGER WITH RS PORT

8 WINDOW ANNUNCIATION

EF/OC (IDMT) DIGITAL

AUX RELAYS
1 NO. MASTER TRIP RELAY
1 NO. ANTIPUMPING RELAY
1 NO. TRIP CIRCUIT SUPERVISION RELAY

UNIT C/W TRICKLE & BOOST CHARGE FACILITIES & 24v DC BATTERIES WITH 30MIN BACKUP

33 KV, 1250A TPN AL.BUSBARS: 26KA

33KV, 1250A BREAKER 26KA VCB PISTOL GRIP SWITCH GAP LESS SURGE ARRESTOR

33000 V CT 75/5/5A CORE1-CL0.5,20VA CORE2-5P10,20VA

AUX RELAYS 1 NO ANTIPUMPING RELAY

16 WINDOW ANNUNCIATION

1Rx3CX240 Sq. mm. 33 kV HT XLPE CABLE

TO EXISTING HT PANEL

SPARE

OUTDOOR HT PANEL-2

OUTDOOR HT PANEL-3

TO 64R RELAY IN HT PANEL

TRAFO-01 (2000 kVA)

TRAFO-02 (2000 kVA)

CL :-PS,15VA,3200/5A

9RX3.5CX400SQMM AZXFY CABLE

4C X4 SQMM YWY CABLE TO RTPFC PANEL

3200A FP EDO,LSIG MP RELEASE 55kA,CB OUTDOOR

1600A ATS PANEL-3

1600A ATS PANEL-4

1000kVA UPS

CLIENT SCOPE

UPS OUTPUT PANEL

FOR DATA CENTER REQUIRED FEEDERS
Note- 4Nos. 315A FEEDER FOR PDUS
2Nos. 32A FEEDER FOR CDU
2Nos. 63A FEEDER FOR OTHER AREA

2000 KVA D.G. SET-01 WITH ACOUSTIC ENCLOSURE

2000 KVA D.G. SET-02 WITH ACOUSTIC ENCLOSURE

OUTDOOR ISOLATOR PANEL

3200A TPN, MCCB MP RELEASE LSIG, 25kA

9Rx3.5Cx400 SQ.MM. AZXFY CABLE

AUTO SYNCHRONIZING EXTENDABLE PANEL WITH AUTO KW & AUTO KVAR MODULES

P.T. : 1-3 415V/110V, 20VA 1Ø √3 CL: 1.0

CT 1-3 3200/5A 15VA, CL:1.0

CT 4-6 3200/5A 15VA, CL:5P10

CT 7-10 3200/1A 15VA, CL:PS

CT-11 3200/5A 15VA, CL:5P10

PROTECTION RELAY & CT's SAME AS PER DG-01

BATTERY CHARGER

16 WINDOW ANNUNCIATOR

DL1 DL2 DL3

0V 3PH2 SYN

0-1000A ASS

0-500V VSS

KWH

HOOTER

CS TNC SWITCH

HR PF Hz 45-55Hz

BRK ON BRK OFF BRK TRIP DC SUPPLY 'ON' DG 'ON'

KW KVAR TEMP. SCANNER

EM DG STOP PB EM BRK TRIP PB ENGINE START ENGINE STOP TEST ACCEPT RESET

3200A FP ACB EDO,LSIG MP RELEASE 50kA

3200 A TPN Cu BUSBAR, 65 kA

25 50 51 67 74 86 32 50 N 64 R 67 N

3200A FP ACB EDO,LSIG MP RELEASE LSIG, 65kA

3200A TP+N,65 KA, CU SANDWICH BUSDUCT

AUTO SYNCHRONIZING

FROM 1000kVA UPS OUTPUT PANEL

4Cx25 SQ.MM. AZXFY CABLE

OTHER AREA UPS PANEL C.L.=4W SYM. FAULT CURRENT=35KA FOR 1 SEC

ELECTRICAL / MECHANICAL INTERLOCK FOR ANY 1 BREAKER TO CLOSE AT A TIME

63A TP MCCB

16A TPN MCCB

4Cx4 sqmm. YWY CABLE

Gr-CCTV Gr-ACS Gr-WLD Gr. RRP Gr. PAS Gr. BMS UDB SPARE SPARE

ATS PANEL-1 OLD HVAC PLANT ROOM

ATS PANEL-2 OLD HVAC PLANT ROOM

SYM. SC CURRENT 55kA FOR 1 SEC ATS PANEL-1

SYM. SC CURRENT 55kA FOR 1 SEC ATS PANEL-2

3200A,ATS

3200A FP ACB EDO,LSIG MP RELEASE

3200A TP+N,50 KA, CU SANDWICH BUSDUCT

MAIN LT PANEL-1 W.L. 65 kW CABLE ENTRY/EXIT:- BOTTOM LOCATION :- SHD PLR ELE. ROOM SYM. FAULT CURRENT=55KA FOR 1 SEC

MAIN LT PANEL-2 W.L. 65 kW CABLE ENTRY/EXIT:- BOTTOM LOCATION :- SHD PLR ELE. ROOM SYM. FAULT CURRENT=55KA FOR 1 SEC

3200/5A 3200/5A CL1, CT RTPFC SENSING

3200A ACB, EDO, LSIG BASED

3200A TPN Cu. BUSBAR 65kA

800A,TPN ACB, EDO LSIG MP BASED

1600A,TPN ACB, EDO LSIG MP BASED

315A,TPN MCCB LI MP BASED

1000A,TPN ACB, EDO,LSIG MP BASED

630A,TPN MCCB LI MP BASED

100A,TPN MCCB LI MP BASED

RTPFC PANEL BANK-1 400kVAR

UPS-1 1000kVA

UPS-2 1000kVA

SERVER PACDB-A

SERVER PACDB-B

CHILLER PANEL-1

CHILLER PANEL-2

HVSD PUMP PANEL

SPARE

FROM 1000kVA UPS OUTPUT PANEL

CDU PANEL-1 LOCATION :- CONNECTED LOAD :- 32A,COS

10A TP MCB

CDU PUMP 1 1.5kW ... CDU PUMP 8 1.5kW

SERVER PACDB - A LOCATION :- CONNECTED LOAD :- SYM. FAULT CURRENT =35KA FOR 1 SEC

315A TP MCCB

100A TP MCCB

SERVER HALL PAC - DB - B LOCATION :- CONNECTED LOAD :- SYM. FAULT CURRENT =35KA FOR 1 SEC

3.5Cx120 SQ.MM. A2XFY CABLE

CHILLER PANEL-1 SYM. FAULT CURRENT=35KA FOR 1 SEC

1000A, TNP, ACB, EDO,LSIG MP BASED

200A TPN MCCB LI,TM

250A TPN MCCB LI,TM

315A TPN MCCB LI,TM

3.5Cx120 SQ.MM. A2XFY CABLE

200A ATS-1 200A ATS-2 200A ATS-3 200A ATS-4 SPARE SPARE SPARE

CHILLER-1 100 KW CHILLER-2 100 KW CHILLER-3 100 KW(STANDBY) CHILLER-4 100 KW(STANDBY)

CHILLER PANEL-2 SYM. FAULT CURRENT=35KA FOR 1 SEC

PUMPS PANEL-1 C.L.=4W SYM. FAULT CURRENT=35KA FOR 1 SEC

3.5Cx120sqmm. A2XFY CABLE

160A, TPN MCCB LI,TM

10A TP MCB 10A TP MCB 10A TP MCB 10A TP MCB 63A TP MCB 63A TP MCB 16A TP MCB 32A TP MCB

4Cx4 sqmm. YWY CABLE

COS-1 COS-2 COS-3 COS-4 SPARE SPARE SPARE

COS-PUMP-1 COS-PUMP-2 COS-PUMP-3 COS-PUMP-4

10A 3P COS ON OFF

PUMP-1 3kW PUMP-2 3kW PUMP-3 (Standby) 3kW PUMP-4 (Standby) 3kW

PUMPS PANEL-2 SYM. FAULT CURRENT=35KA FOR 1 SEC

5Rx1Cx70sqmm. YY CABLE

160A, TPN MCCB LI,TM

10A TP MCB 10A TP MCB 10A TP MCB 10A TP MCB 63A TP MCB 63A TP MCB 16A TP MCB 32A TP MCB

PAC_UNIT-1 40kW

PAC_UNIT-2 40kW

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:

TRUTH TABLE

A	B	C	D
✓	✗	✗	✓
✓	✓	✓	✗
✗	✓	✓	✓

8 WINDOWS ANNUNCIATION PANEL	
1	BREAKER ON
2	GAS PRESSURE LOW
3	OC TRIP
4	TRIP CIRCUIT FAULTY
5	BREAKER TRIP ON FAULT
6	24V DC POWER SUPPLY FAIL
7	SPARE
8	SPARE

16 WINDOWS ANNUNCIATION PANEL	
1	BREAKER TRIP ON FAULT
2	OIL TEMP HIGH ALARM
3	OIL TEMP TRIP
4	OC TRIP
5	WDG TEMP. HIGH ALARM
6	WDG TEMP. TRIP
7	OIL LEVEL LOW
8	BUCHHOLZ ALARM
9	BUCHHOLZ TRIP
10	TRIP CIRCUIT FAULTY/HEALTHY
11	RESTRICTED EARTH FAULT ALARM
12	RESTRICTED EARTH FAULT TRIP
13	OSR ALARM
14	GAS PR LOW
15	PRV TRIP
16	SPARE

REVISIONS :

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R0	13.06.2013	ISSUE FOR TENDER

CLIENT: NCMRWF

A-50 IISTITUTIONAL AREA, SECTOR-62

ADDRESS PHASE-II, NOIDA-201307

TITLE:

HT & LT PANEL
SINGLE LINE DIAGRAM

DWG.No.

NCMRWF_PD_ELEC_MSLD_001 R0

JOB NO :	DRAWN BY : UJWAL
SCALE : N.T.S.	CHECKED BY : AMOL
DATE : 13.06.13	APPROVE BY : SHAILESH

DWG.No.

NCMRWF_PD_ELEC_MSLD_001 R0

STORAGE TANK FOR 50KL

2000 KVA DG-02

2000 KVA DG-01

TRAFO-2

TRAFO-1

E01 E02 E03 E04 E05 E06 E07 E08 E09 E10 E11 E12 E13 E14 E15 E16 E17 E18 E19 E20 E21 E22 E23 E24 E25 E26 E27 E28 E29 E30 E31 E32 E33 E34 E35 E36 E37 E38 E39 E40 E41 E42 E43 E44 E45 E46 E47 E48 E49

3200A 4P ACB ISOLATOR

3200A 4P ACB ISOLATOR

1200X1500(D)mm. CABLE TRENCH

750X1000(D)mm. CABLE TRENCH

3.5 MTR. WIDE GATE

3.5 MTR. WIDE GATE

4HRS. RATED FIRE WALL

2TIERS OF 3NOS. ø300MM RCC HUME PIPE

2TIERS OF 3NOS. ø300MM RCC HUME PIPE

1200X2000(D)mm. CABLE TRENCH

2000X2000(D)mm. CABLE TRENCH

3TIERS OF 4NOS. ø300MM RCC HUME PIPE

2000X2000X2000mm. DEEP CABLE CHAMBER

3TIERS OF 4NOS. ø300MM RCC HUME PIPE

3Rxø300MM HUME PIPE

1200X1200X1000mm. DEEP CABLE CHAMBER

2000X2000X2000mm. DEEP CABLE CHAMBER

3TIERS OF 4NOS. ø300MM RCC HUME PIPE

750X1000(D)mm. CABLE TRENCH

2000X2000X2000mm. DEEP CABLE CHAMBER

4Rxø300MM HUME PIPE

2000X2000X2000mm. DEEP CABLE CHAMBER

1500X2000(D)mm. CABLE TRENCH

2800X2000(D)mm. CABLE TRENCH

750X1000(D)mm. CABLE TRENCH

6Rx600x75mm CABLE TRAY

2Rx600x75mm CABLE TRAY

600x75mm CABLE TRAY

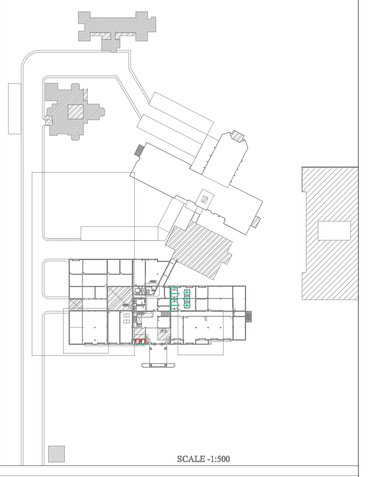
1200X2000(D)mm. CABLE TRENCH

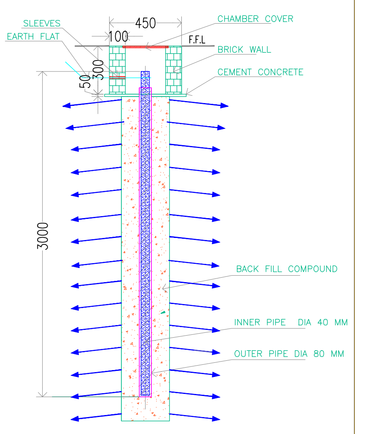
2Rx600x75mm CABLE TRAY

3Rxø300MM HUME PIPE

REFER DWG. NO. 524/3/WD/AR/453

Sr No	Equipments	Pit No	Strip Size	Earthing Type	No of Runs
1	2000 kVA DG Set-01 body	1 & 2	50 x 10 mm GI Strip	Maintenance free	2
2	2000 kVA DG Set-01 'N'	3 & 4	50 x 6 mm Cu Strip	Maintenance free	2
3	2000 kVA DG Set-02 body	5 & 6	50 x 10 mm GI Strip	Maintenance free	2
4	2000 kVA DG Set-02 'N'	7 & 8	50 x 6 mm Cu Strip	Maintenance free	2
5	2000 KVA Trafo-1 'N'	9 & 10	50 x 6 mm Cu Strip	Maintenance free	2
6	2000 KVA Trafo-1 Body	11 & 12	75 x 10 mm GI Strip	Maintenance free	2
7	2000 KVA Trafo-2 'N'	13 & 14	50 x 6 mm Cu Strip	Maintenance free	2
8	2000 KVA Trafo-2 Body	15 & 16	75 x 10 mm GI Strip	Maintenance free	2
9	HT Panel-1	17 & 18	50 x 10 mm GI Strip	Maintenance free	2
10	HT Panel-2 & 3	19 & 20	50 x 10 mm GI Strip	Maintenance free	2
11	Chimney	21	25 x 6 mm GI Strip	Maintenance free	1
12	ATS Panel 1	22 & 23	75 x 10 mm GI Strip	Maintenance free	2
13	ATS Panel 2	24 & 25	75 x 10 mm GI Strip	Maintenance free	2
14	Synchronising Panel	26 to 29	75 x 10 mm GI Strip	Maintenance free	2
15	Main LT Panel-01	30 & 31	75 x 10 mm GI Strip	Maintenance free	2
16	Main LT Panel-02	32 & 33	75 x 10 mm GI Strip	Maintenance free	2
17	400 KVA RTPFC Panel-01	34 & 35	50 x 6 mm GI Strip	Maintenance free	2
18	401 KVA RTPFC Panel-02	36 & 37	50 x 6 mm GI Strip	Maintenance free	2
19	Chiller Panel-01	38 & 39	32 x 6 mm GI Strip	Maintenance free	2
20	Chiller Panel-02		32 x 6 mm GI Strip	Maintenance free	2
21	Power Distribution Unit -01A	40 & 41	25 X 3 mm Cu strip	Maintenance free	2
22	Power Distribution Unit -02A	42 & 43	25 X 3 mm Cu strip	Maintenance free	2
23	Power Distribution Unit -03A	44 & 45	25 X 3 mm Cu strip	Maintenance free	2
24	Power Distribution Unit -04A	46 & 47	25 X 3 mm Cu strip	Maintenance free	2
25	Copper Earthing Grid Below Raised Floor at first floor		25 X 3 mm Cu strip		





MAINTENANCE FREE EARTH ELECTRODE

DWG.No. NCMRWF_SP_PD_ELEC_ER_001 R0

RELEASED FOR TENDER

PROJECT KEY PLAN

REVISIONS :

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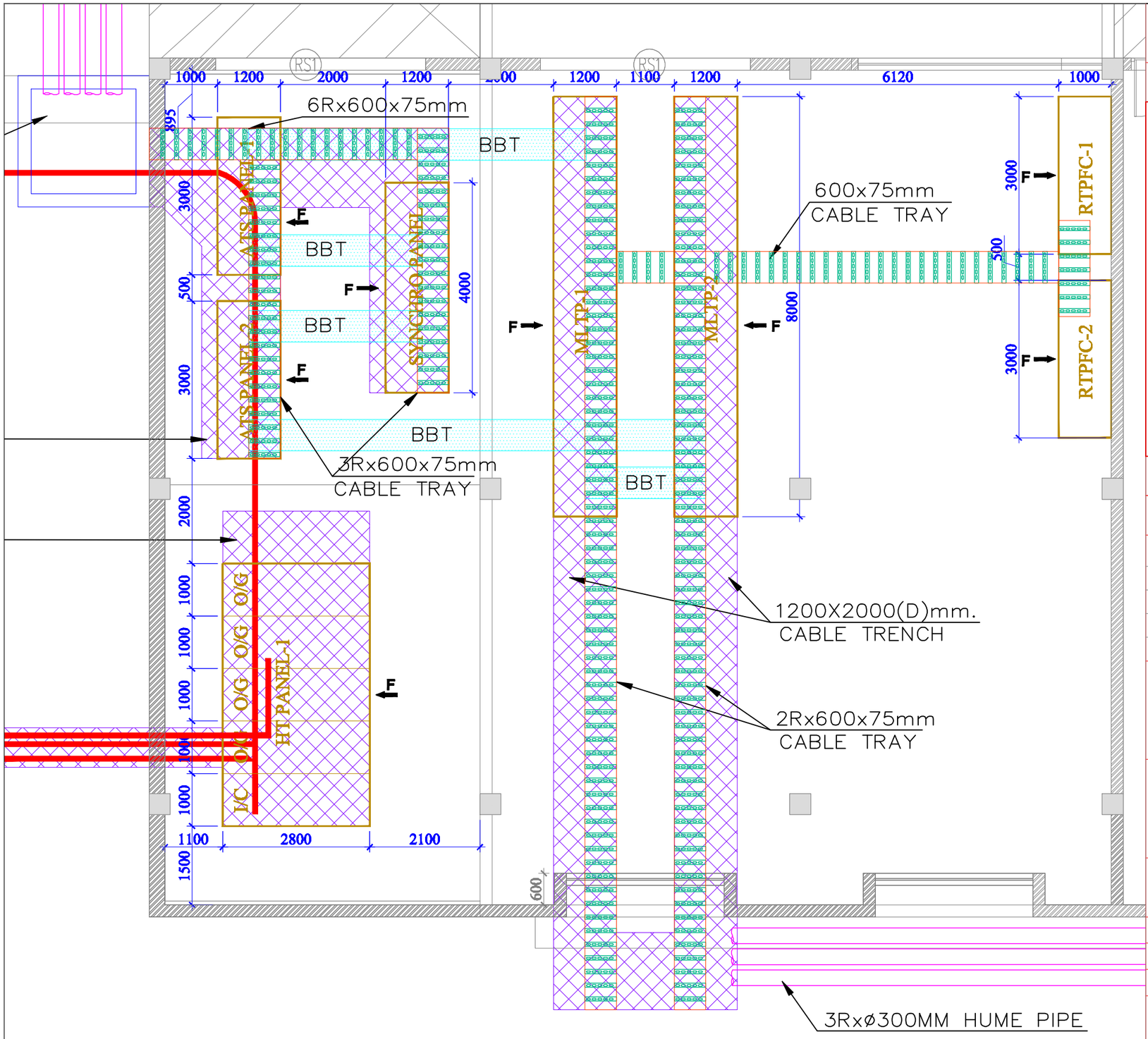
R0	13.06.13	ISSUE FOR TENDER

CLIENT: NCMRWF
A-50 IISTITUTIONAL AREA, SECTOR-62
ADDRESS PHASE-II, NOIDA-201307

TITLE:
SITE PLAN EARTHING LAYOUT

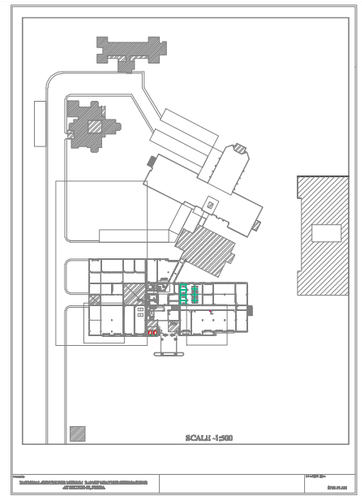
DWG.No. NCMRWF_SP_PD_ELEC_ER_001 R0

JOB NO :		DRAWN BY : KIRTI	
SCALE :	1: 150	CHECKED BY : AMOL	
DATE :	13.06.13	APPROVE BY : SHAILESH	



DWG.No.
NCMRWF_SP_PD_ELEC_EQ_002 R0

RELEASED FOR TENDER



PROJECT KEY PLAN

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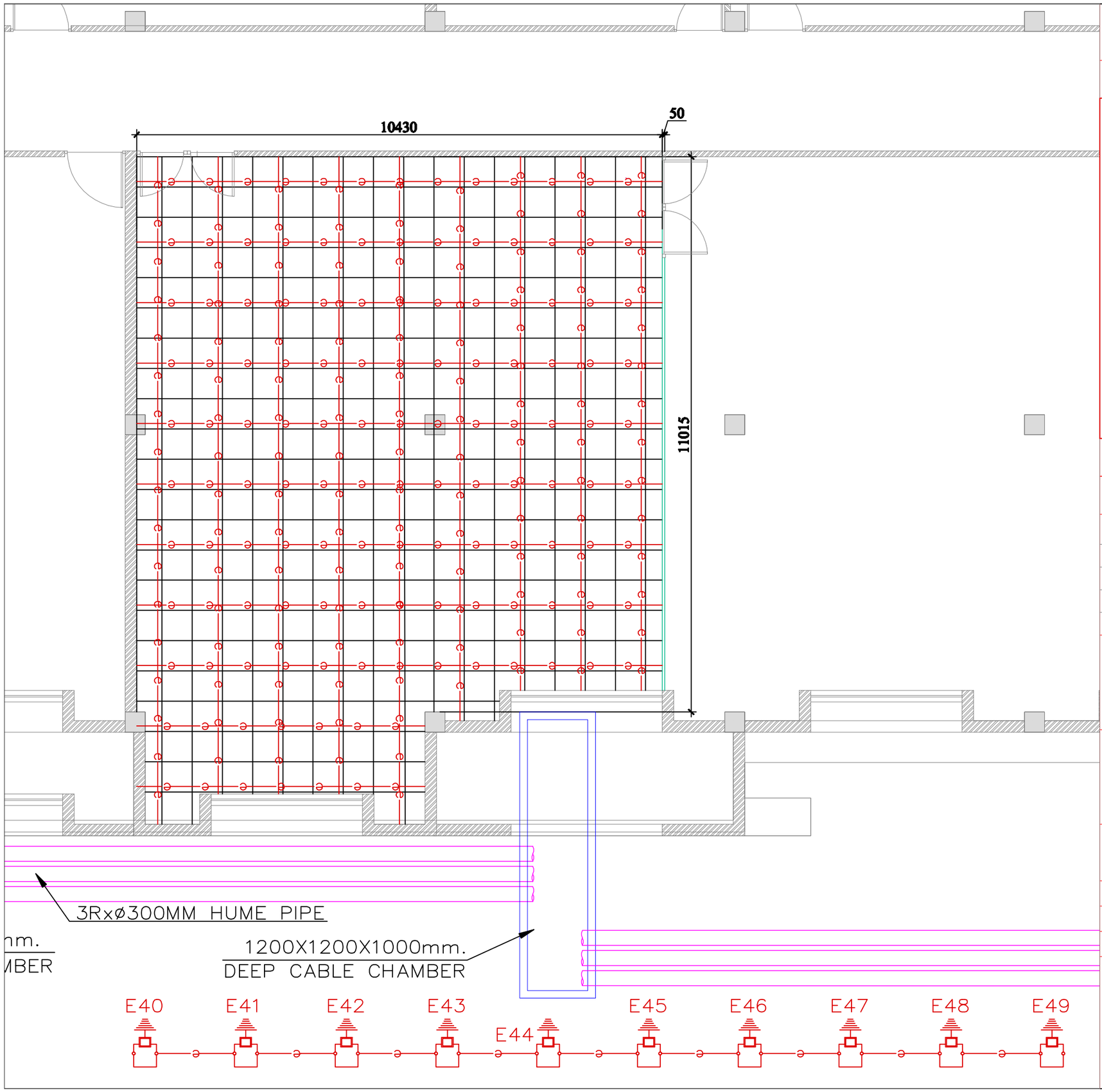
R0	13.06.2013	ISSUE FOR TENDER

CLIENT: NCMRWF
A-50 IISTITUTIONAL AREA, SECTOR-62
ADDRESS PHASE-II, NOIDA-201307

TITLE:
SERVER ROOM EQUIPMENT LAYOUT

DWG.No.
NCMRWF_SP_PD_ELEC_EQ_001 R0

JOB NO :		DRAWN BY :	KIRTI
SCALE :	1 : 75	CHECKED BY :	AMOL
DATE :	13.06.2013	APPROVE BY :	SHAILESH



DWG.No.

NCMRWF_SR_PD_ELEC_ER_001 R0

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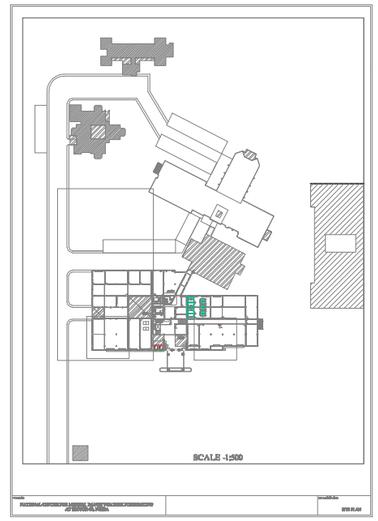

PROJECT KEY PLAN

REVISIONS :

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R0	13.06.2013	ISSUE FOR TENDER

CLIENT: NCMRWF

ADDRESS A–50 IISTITUTIONAL AREA, SECTOR–62 PHASE–II, NOIDA–201307

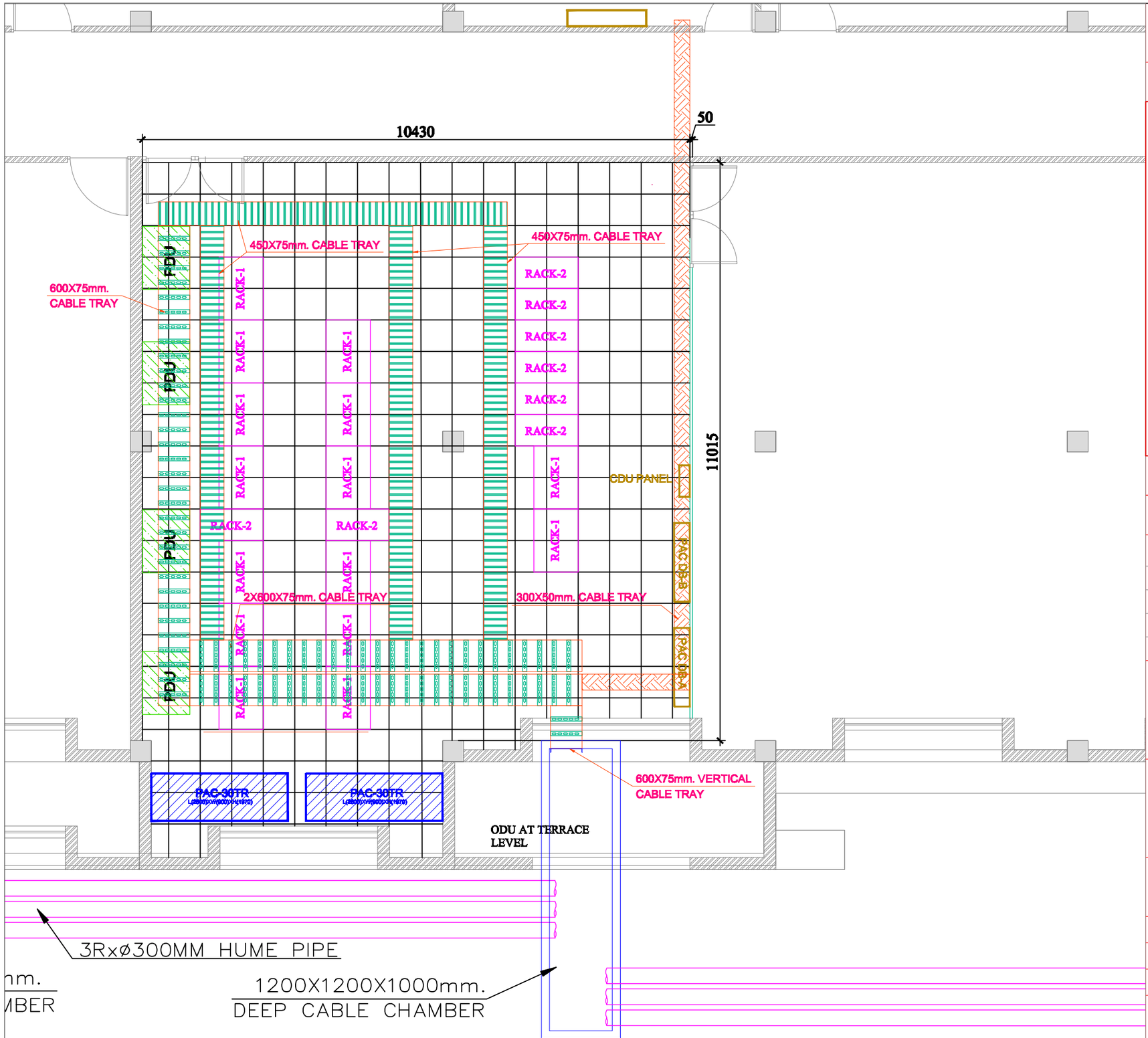
TITLE:

SERVER ROOM EARTHING LAYOUT

DWG.No.

NCMRWF_SR_PD_ELEC_ER_001 R0

JOB NO :	000000	DRAWIN BY :	KIRTI
SCALE :	1 : 75	CHECKED BY :	AMOL
DATE :	13.06.2013	APPROVE BY :	SHAILESH



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NCMRWF_SR_PD_ELEC_PW_001 R0

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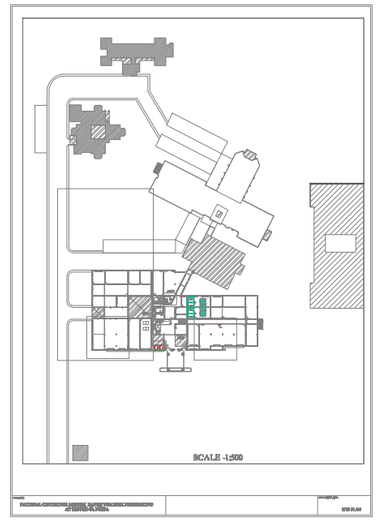

PROJECT KEY PLAN

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R0	13.06.2013	ISSUE FOR TENDER

CLIENT: NCMRWF
A-50 IISTITUTIONAL AREA, SECTOR-62
ADDRESS PHASE-II, NOIDA-201307

TITLE:
SERVER ROOM CABLE TRAY LAYOUT

DWG.No.
NCMRWF_SR_PD_ELEC_PW_001 R0

JOB NO :		DRAWIN BY :	KIRTI
SCALE :	1 : 75	CHECKED BY :	AMOL
DATE :	13.06.2013	APPROVE BY :	SHAILESH

DWG.No.
NCMRWF_SP_PD_ELEC_EQ_001 R0

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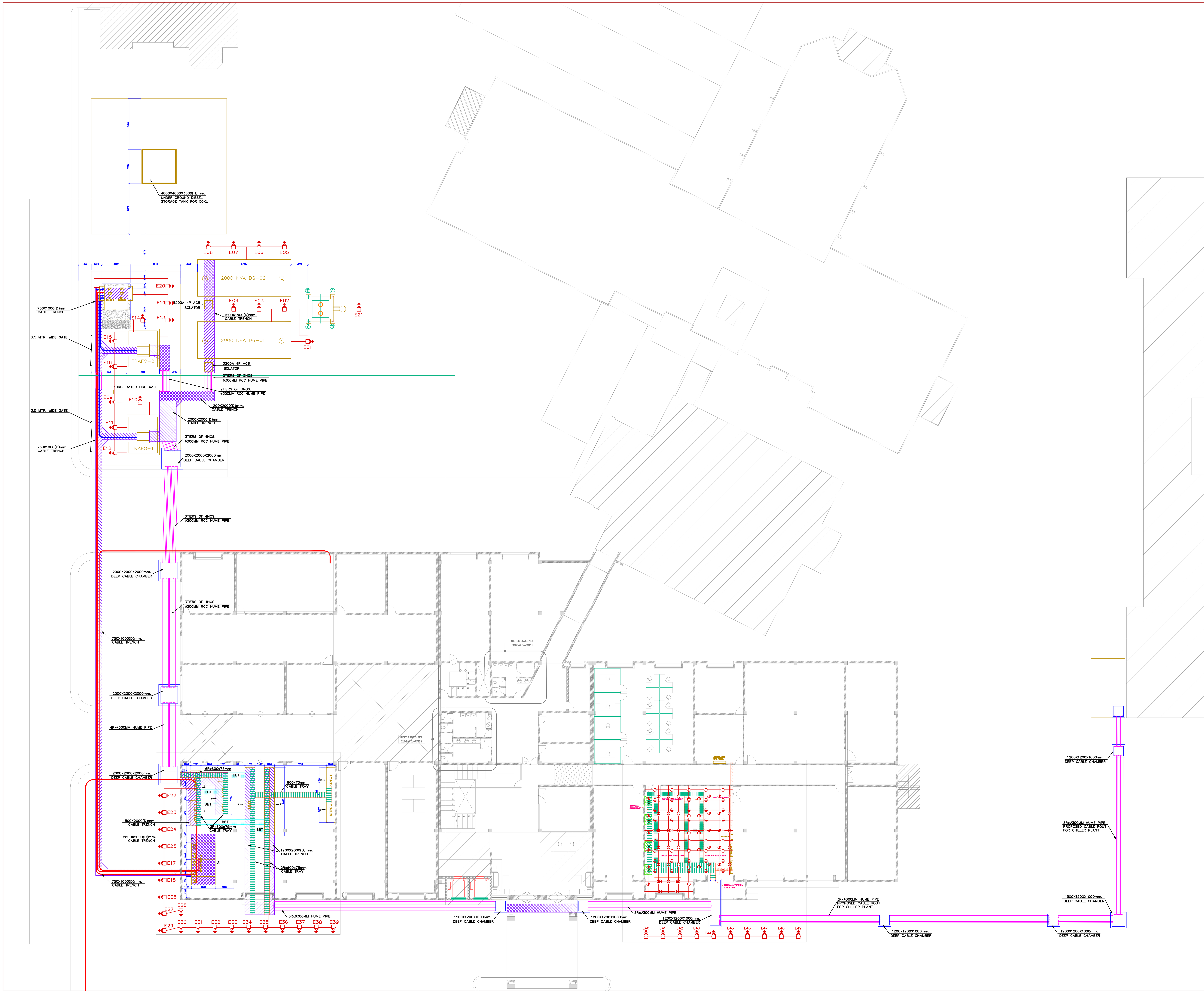
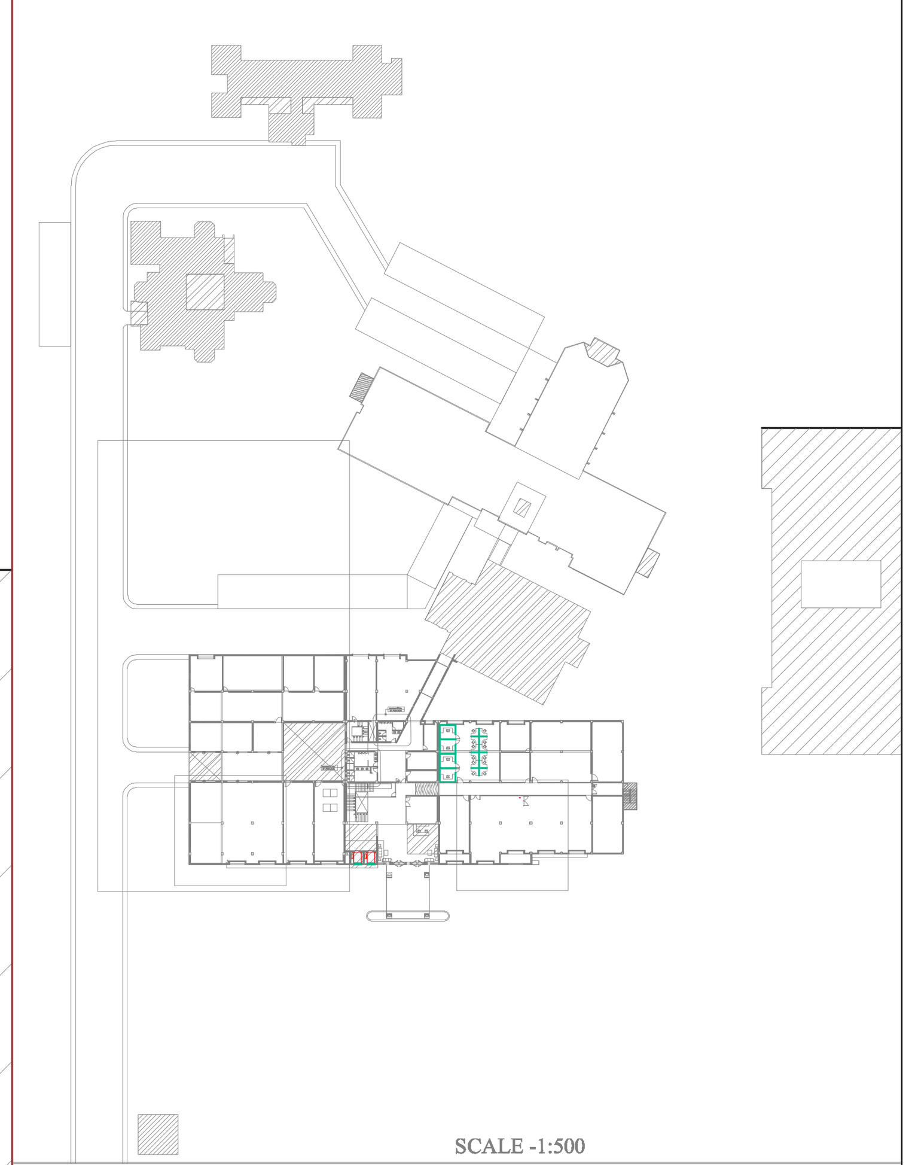


PROJECT KEY PLAN



REVISIONS :

NO.	DATE	REMARKS
R0	13.06.2013	ISSUE FOR TENDER

ENGINEER SIGN

CLIENT SIGN

CLIENT: NCMRWF

ADDRESS A-50 IISTITUTIONAL AREA, SECTOR-62 PHASE-II, NOIDA-201307

TITLE:

OVER ALL SITE PLAN

DWG.No.

NCMRWF_SP_PD_ELEC_SP_001 R0

JOB NO :	DRAWN BY : KIRTI
SCALE : 1 : 200	CHECKED BY : AMOL
DATE : 13.06.2013	APPROVE BY : SHAILESH

L 42

PROPOSED BMS ROOM

L 40

NO1 CONTROLLER WITH UPS POWER POINT

R

R

2.3 M WIDE PASSAGE

L 44

10430

50

R

R

RACK-2

RACK-1

SERVER ROOM

L 35

SERVER ROOM

L 36

11015

PAC-30TR

L(2600)XW(980)XH(1970)

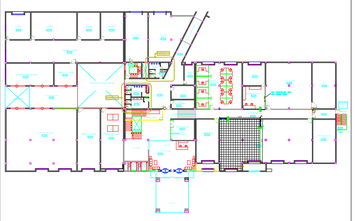
PAC-30TR

L(2600)XW(980)XH(1970)

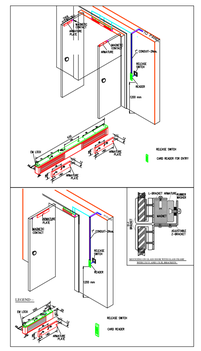
ODU AT TERRACE LEVEL

DWG.No.
NCMRWF_DC_TD_ACS_00 R0

RELEASED FOR TENDER



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 / MAGNETIC CONTACT
	UPS POWER POINT (230 V. 5 AMP.)
	LAN POINT

REVISIONS :

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

ARCHITECT SIGN

CLIENT SIGN

CLIENT: MINISTRY OF EARTH SCIENCES

ADDRESS: A-50 IISTITUTIONAL AREA, SECTOR-62 PHASE-II, NOIDA-201307

TITLE: GROUND FLOOR ACCESS CONTROL SYSTEM LAYOUT

DWG.No.
NCMRWF_DC_TD_ACS_00 R0

JOB NO :	-	DRAWN BY :	-
SCALE :	-	CHECKED BY :	-
DATE :	-		

2.5 M WIDE PASSAGE

L 44

10430

50

/ER ROOM

L 35

RACK-1

RACK-2

11015

SERVER ROOM

L 36

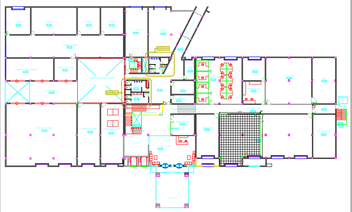
PAC-30TR
L(2600)XW(900)XH(1970)

PAC-30TR
L(2600)XW(900)XH(1970)

ODU AT TERRACE LEVEL

DWG.No.
NCMRWF_DC_TD_CCTV_00 R0

RELEASED FOR TENDER



PROJECT KEY PLAN

CLOSED CIRCUIT TELEVISION SYSTEM

	MOVEABLE COLOR SCAN DOME CAMERA
	CAT 6 Shielded cable

REVISIONS :

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

ARCHITECT SIGN

CLIENT SIGN

CLIENT:
MINISTRY OF EARTH SCIENCES

ADDRESS
A-50 IISTITUTIONAL AREA, SECTOR-62
PHASE-II, NOIDA-201307

TITLE:
GROUND FLOOR CCTV LAYOUT

DWG.No.
NCMRWF_DC_TD_CCTV_00 R0

JOB NO :	-	DRAWN BY :	-
SCALE :	-	CHECKED BY :	-
DATE :	-		

2.5 M WIDE PASSAGE

L 44

10430

50

FIRE EXTINGUISHER
ABC TYPE
5KG

FIRE EXTINGUISHER
CO2 TYPE
4.5KG

VER ROOM

L 35

RACK-1

RACK-2

11015

SERVER ROOM

L 36

PAC-30TR
L(2600)XW(900)XH(1970)

FIRE EXTINGUISHER
ABC TYPE
5KG

PAC-30TR
L(2600)XW(900)XH(1970)

ODU AT TERRACE
LEVEL

DWG.No.
NCMRWF_DC_TD_FE_00 R0

RELEASED FOR TENDER

PROJECT KEY PLAN

LEGEND

SYMBOL	DESCRIPTION	QUANTITY
	FIRE EXTINGUISHER ABC TYPE 5 KG TOTAL SHOWN ON DRAWING: 02 NOS	GRAND TOTAL: 02 NOS
	FIRE EXTINGUISHER CO2 TYPE 4.5 KG TOTAL SHOWN ON DRAWING: 02 NOS	GRAND TOTAL: 02 NOS
	FIRE EXTINGUISHER ABC TYPE 2 KG TOTAL SHOWN ON DRAWING: 02 NOS	GRAND TOTAL: 02 NOS

REVISIONS :

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

ARCHITECT SIGN

CLIENT SIGN

CLIENT: MINISTRY OF EARTH SCIENCES

ADDRESS: A–50 IISTITUTIONAL AREA, SECTOR–62 PHASE–II, NOIDA–201307

TITLE: GROUND FLOOR FIRE EXTINGUISHER LAYOUT

DWG.No.
NCMRWF_DC_TD_FE_00 R0

JOB NO :	–	DRAWN BY :	–
SCALE :	–	CHECKED BY :	–
DATE :	–		

2.5 M WIDE PASSAGE

L 44

10430

50

11015

VER ROOM

L 35

RACK-1

RACK-2

SERVER ROOM

L 36

PAC-30TR
L(2600)XW(900)XH(1970)

PAC-30TR
L(2600)XW(900)XH(1970)

ODU AT TERRACE
LEVEL

DWG.No.
NCMRWF_DC_TD_HVAC_00 R0

RELEASED FOR TENDER

PROJECT KEY PLAN

REVISIONS :

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

ARCHITECT SIGN

CLIENT SIGN

CLIENT: MINISTRY OF EARTH SCIENCES

ADDRESS: A-50 IISTITUTIONAL AREA, SECTOR-62 PHASE-II, NOIDA-201307

TITLE: HVAC GROUND FLOOR PLAN

DWG.No.
NCMRWF_DC_TD_HVAC_00 R0

JOB NO :	-	DRAWN BY :	-
SCALE :	-	CHECKED BY :	-
DATE :	-		

WATER TANK

PROPOSED FIRE STAIRS

PROPOSED FIRE STAIRS

TERRACE BELOW (G)

TERRACE BELOW (G)

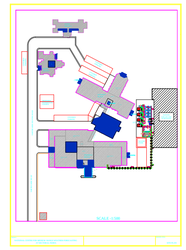
TERRACE BELOW (G+1)

(G+2)

LANDSCAPING

DWG.No.
NCMRWF_DC_TD_HVAC_100 R0

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
R0	11/06/13	ISSUED FOR TENDER

ENGG. SIGN

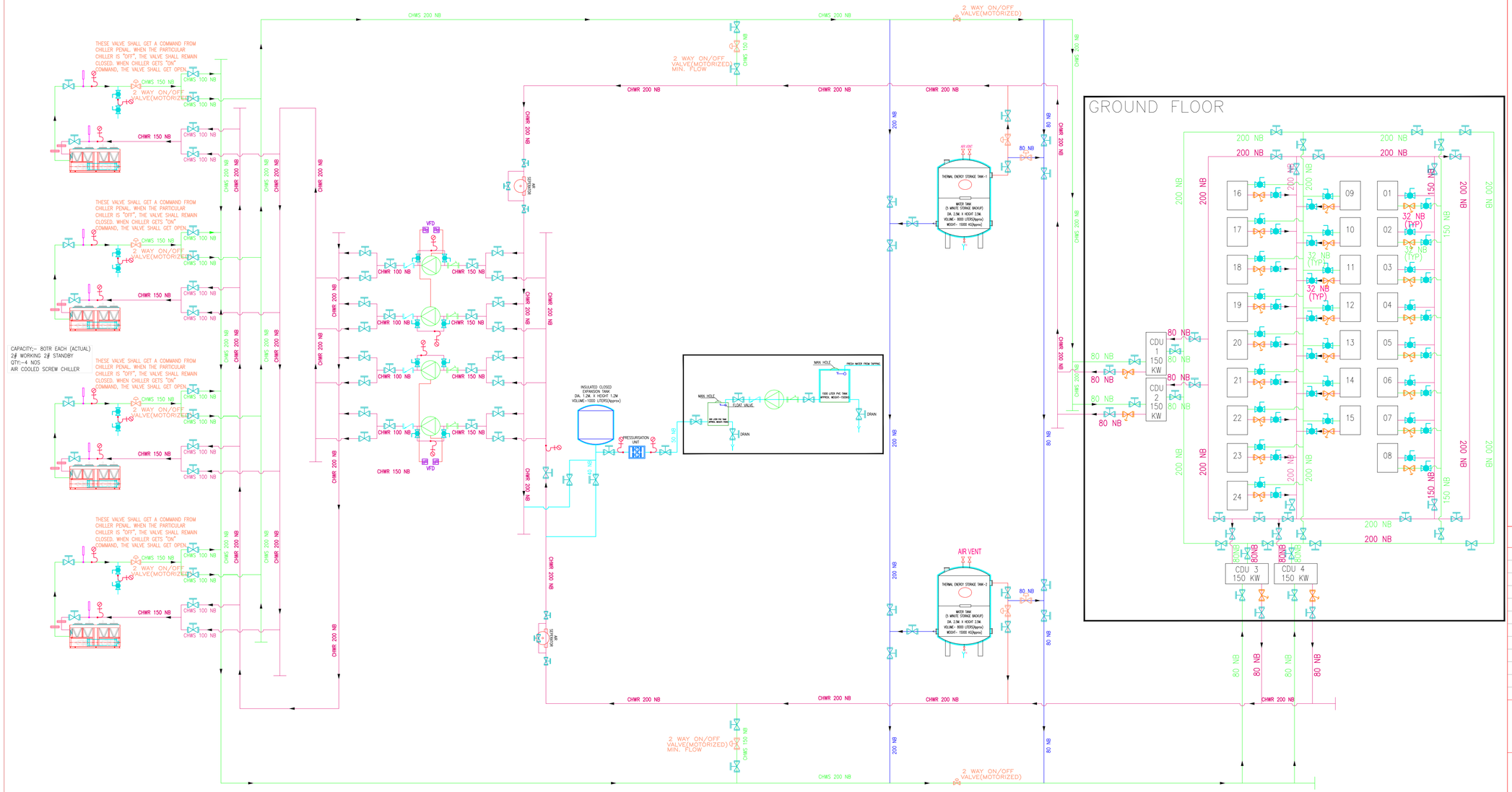
CLIENT SIGN

CLIENT:
MINISTRY OF EARTH SCIENCES
ADDRESS: A-50 IISTITUTIONAL AREA, SECTOR-62 PHASE-II, NOIDA-201307

TITLE:
SITE PLAN.

DWG.No.
NCMRWF_DC_TD_HVAC_100 R0

JOB NO :	–	DRAWN BY :	–
SCALE :	–	CHECKED BY :	–
DATE :	–		



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.
NCMRWF_DC_TD_HVAC_102 R0

RELEASED FOR TENDER

REVISIONS :

NO.	DATE	REMARKS
R0	11/06/13	ISSUED FOR TENDER

ARCHITECT SIGN

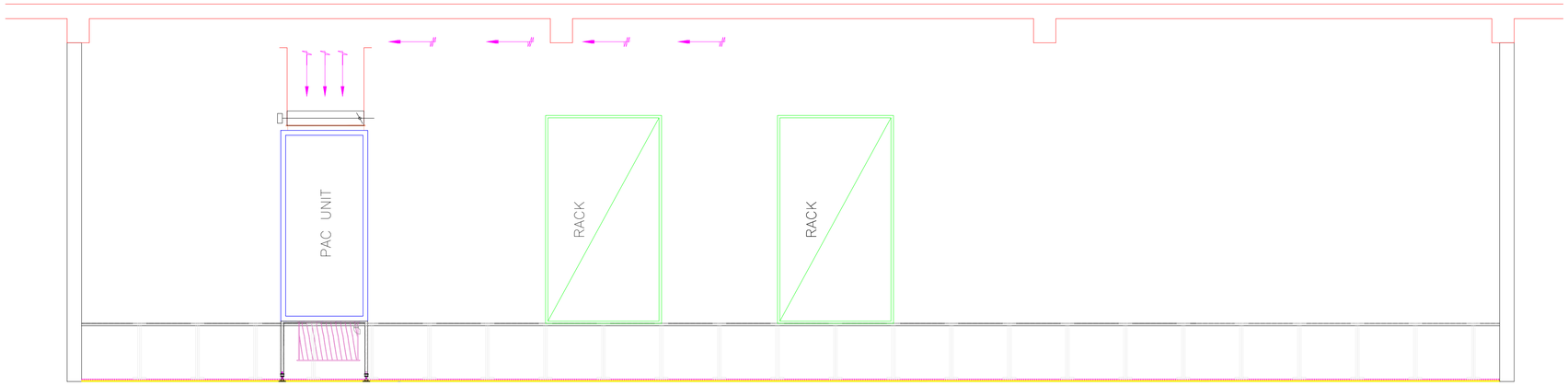
CLIENT SIGN

CLIENT:
MINISTRY OF EARTH SCIENCES
A-50 IISTITUTIONAL AREA, SECTOR-62
ADDRESS PHASE-II, NOIDA-201307

TITLE:
P&ID FOR CHILLED WATER

DWG.No.
NCMRWF_DC_TD_HVAC_102 R0

JOB NO :	-	DRAWN BY :	-
SCALE :	-	CHECKED BY :	-
DATE :	-		



DWG.No.
NCMRWF_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

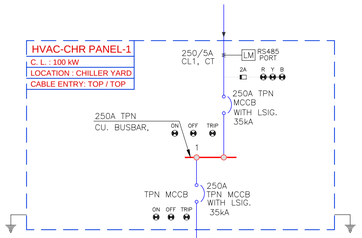
CLIENT:
MINISTRY OF EARTH SCIENCES
ADDRESS A-50 IISTITUTIONAL AREA,SECTOR-62 PHASE-II, NOIDA-201307

TITLE:
SERVER ROOM SECTION.

DWG.No.
NCMRWF_DC_TD_HVAC_103 R0

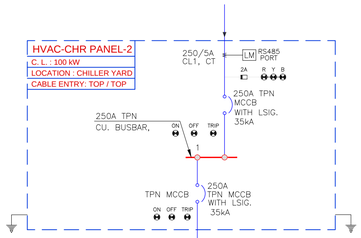
JOB NO :	--	DRAWN BY : --	
SCALE :	--	CHECKED BY : --	
DATE :	--		

ATS-1



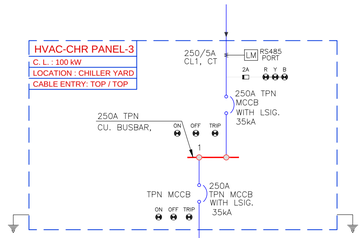
LOAD DESCRIPTION	CHILLER-1 (W)
CONN. LOAD	100 kW
CABLE SIZE	2Rx3.5Cx150 sq.mm A2XFY CABLE

ATS-2



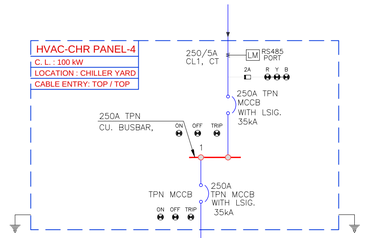
LOAD DESCRIPTION	CHILLER-2 (W)
CONN. LOAD	100 kW
CABLE SIZE	2Rx3.5Cx150 sq.mm A2XFY CABLE

ATS-3



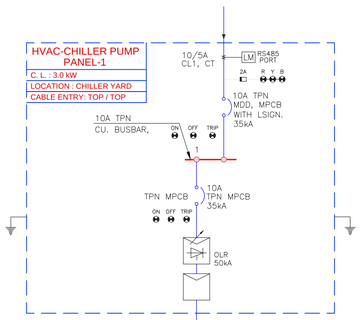
LOAD DESCRIPTION	CHILLER-3 (SB)
CONN. LOAD	100 kW
CABLE SIZE	2Rx3.5Cx150 sq.mm A2XFY CABLE

ATS-4



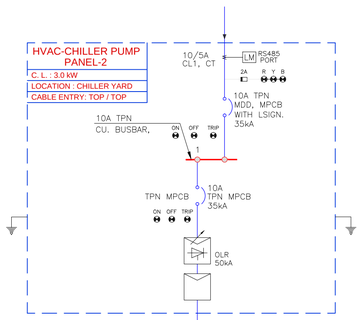
LOAD DESCRIPTION	CHILLER-4 (SB)
CONN. LOAD	100 kW
CABLE SIZE	2Rx3.5Cx150 sq.mm A2XFY CABLE

COS-1



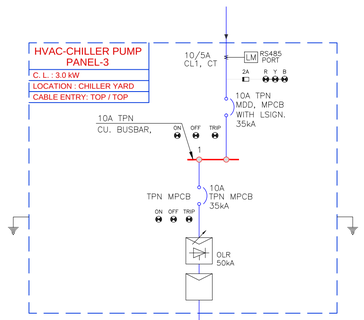
LOAD DESCRIPTION	PUMP-1 (W)
CONN. LOAD	3.0 kW
CABLE SIZE	1Rx4Cx4 sq.mm YWY CABLE

COS-2



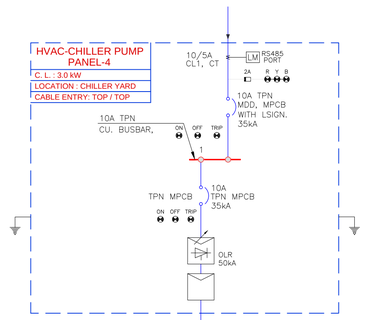
LOAD DESCRIPTION	PUMP-2 (W)
CONN. LOAD	3.0 kW
CABLE SIZE	1Rx4Cx4 sq.mm YWY CABLE

COS-3



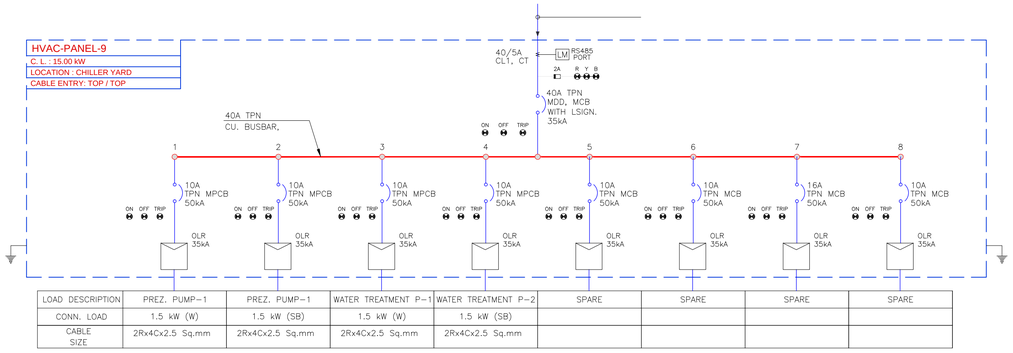
LOAD DESCRIPTION	PUMP-3 (SB)
CONN. LOAD	3.0 kW
CABLE SIZE	1Rx4Cx4 sq.mm YWY CABLE

COS-4



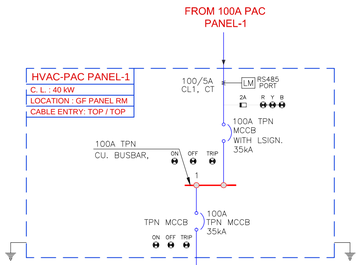
LOAD DESCRIPTION	PUMP-4 (SB)
CONN. LOAD	3.0 kW
CABLE SIZE	1Rx4Cx4 sq.mm YWY CABLE

FROM PUMP PANEL



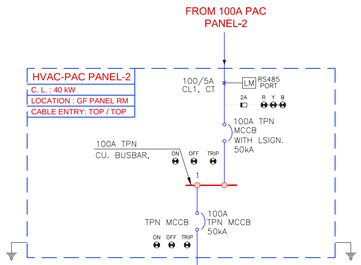
LOAD DESCRIPTION	PREZ. PUMP-1	PREZ. PUMP-1	WATER TREATMENT P-1	WATER TREATMENT P-2	SPARE	SPARE	SPARE	SPARE
CONN. LOAD	1.5 kW (W)	1.5 kW (SB)	1.5 kW (W)	1.5 kW (SB)				
CABLE SIZE	2Rx4Cx2.5 Sq.mm	2Rx4Cx2.5 Sq.mm	2Rx4Cx2.5 Sq.mm	2Rx4Cx2.5 Sq.mm				

FROM 100A PAC PANEL-1



LOAD DESCRIPTION	PAC-1 (W)
CONN. LOAD	40 kW
CABLE SIZE	1Rx3.5x50 sq.mm A2XFY CABLE

FROM 100A PAC PANEL-2



LOAD DESCRIPTION	PAC-2 (W)
CONN. LOAD	40 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.
NCMRWF_DC_TD_SLD_00 R0

RELEASED FOR TENDER

PROJECT KEY PLAN

REVISIONS :

NO.	DATE	REMARKS
R0	11/06/13	ISSUED FOR TENDER

ARCHITECT SIGN

CLIENT SIGN

CLIENT:
MINISTRY OF EARTH SCIENCES
ADDRESS A-50 ISTITUTIONAL AREA, SECTOR-62 PHASE-II, NOIDA-201307

TITLE:
ELECTRICAL SLD

DWG.No.
NCMRWF_DC_TD_SLD_00 R0

JOB NO :	-	DRAWN BY :	-
SCALE :	NTS	CHECKED BY :	-
DATE :			

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	3200A Outdoor Isolation Panel Consisting of 3200A,ACB,Ics=Icu=50kA & 2 nos of 3200/5A,15VA,CL-PS & 5P20 Resp.,Bottom incoming & top Outgoing (**Transformer Isolation Panel**)	Set	2								
1.2	ATS Panel-01 Consisting of 3200A,ATS & 3200A,ACB,60kA,LSIG Protections	Set	1.00								
1.3	ATS Panel-02 Consisting of 3200A,ATS & 3200A,ACB,60kA,LSIG Protections	Set	1.00								
1.4	Supply installation,testing & commissioning of 1600A 3P,50kA Automatic, Transition,Overlaping Neutral with enclosure ATS Switch -03(**UPS-01**)	Set	1.00								
1.5	Supply installation,testing & commissioning of 1600A 3P,50kA Automatic, Transition,Overlaping Neutral with enclosure ATS Switch -04(**UPS-02**)	Set	1.00								
1.6	Main LT Panel - 01	Set	1.00								
1.7	Main LT Panel - 02	Set	1.00								
1.8	Chiller Panel-01	Set	1.00								
1.9	Chiller Panel-02	Set	1.00								
1.10	Power Distribution Board -01A **with 200 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.11	Power Distribution Board -02A **with 200 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.12	Power Distribution Board -**03A with 200 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.13	Power Distribution Board -04A **with 200 KVA 415/415V,K-4 Isolation Transformer with Off circuit tapps-380/400/415V**	Set	1.00								
1.14	Pump Panel -01	Set	1.00								
1.15	Pump Panel -02	Set	1.00								
1.16	Server PACDB-A	Set	1.00								
1.17	Server PACDB-B	Set	1.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
1.18	Other Area UPS PDB	Set	1.00								
1.19	400 kVAR RTPFC-1 with 7% detuned reactor with Thyristor Switch	Set	1.00								
1.20	400 kVAR RTPFC-2 with 7% detuned reactor with Thyristor Switch	Set	1.00								
1.21	CDU Panel-01(**Prefabricated DB**)	Set	1.00								
1.22	Supply installation,testing & commissioning of 200A 3P,35kA Automatic, Transition,Overlaping Neutral with enclosure ATS Switch(**Chiller -01,02,03,04**)	Set	4.00								
1.22	Supply installation,testing & commissioning of 10A 3P,25kA Automatic, Transition,Overlaping Neutral with enclosure Change Over Switch(COS)(**Pump-01,02,03,04)**	Set	4.00								
1.23	Supply installation,testing & commissioning of 100A 3P,25kA Automatic, Transition,Overlaping Neutral with enclosure COS **(PAC-01,02)**	Set	2.00								
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	3200 Amps, 55kA TPN Aluminium, Sandwitch type Busduct Indoor/Outdoor as per datasheet.	Rmtr	40.00								
2.2	PCC end tinned copper flexible	Set	10.00								
3.0	Pre-fabricated, **IP 42** enclosure with power sockets, necessary cable glands & spare knockout holes comprising of:-										
3.1	1 No. - 20A 1ø 3 pin Industrial socket + 20A SP MCB.	Set	10.00								
4.0	Supply,Installation,Testing Commissioning of power sockets, necessary cable glands & spare knockout holes comprising of:-										
4.1	32Amps 3Ph + N + G (IEC 309) Socket Box with Plug (**below server rack**)	Set	120.00								
4.2	16 Amps P + N + G (IEC309) Socket Box with Plug (**below server rack**)	Set	20.00								
	TOTAL : SECTION - I										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	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	1800.00								
1.2	3.5C x 300 Sq.mm. A2XFY Cable.	Rmtr	1800.00								
1.3	3.5C x 185 Sq.mm. A2XFY Cable.	Rmtr	200.00								
1.4	3.5C x 120 Sq.mm. A2XFY Cable.	Rmtr	700.00								
1.5	3.5C x 35 Sq.mm. A2XFY Cable.	Rmtr	200.00								
1.6	4C x 25 Sq.mm. A2XFY Cable.	Rmtr	400.00								
1.7	4C x 16 Sq.mm. AYFY Cable.	Rmtr	120.00								
1.8	4C x 6 Sq.mm. YWY FRLS Cable.	Rmtr	180.00								
1.9	4C x 4 Sq.mm. YWY Cable.	Rmtr	400.00								
1.10	4C x 2.5 Sq.mm. YWY FRLS Cable.	Rmtr	600.00								
1.11	3C x 2.5 Sqmm YY FRLS Cable	Rmtr	550.00								
1.13	5C x 6 Sqmm YY FRLS Cable	Rmtr	3000.00								
1.14	1C x 300sqmm YY FRLS Cable	Rmtr	1500.00								
1.15	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 35 Sq.mm. A2XFY Cable.	Nos.	12.00								
2.2	4C x 25 Sq.mm. A2XFY Cable.	Nos.	4.00								
2.3	4C x 16 Sq.mm. AYFY Cable.	Nos.	2.00								
2.4	4C x 6 Sq.mm. YWY FRLS Cable.	Nos.	4.00								
2.5	4C x 4 Sq.mm. YWY Cable.	Nos.	24.00								
2.6	4C x 2.5 Sq.mm. YWY FRLS Cable.	Nos.	20.00								
2.7	3C x 2.5 Sq.mm. YY Cable.(PG Gland)	Nos.	20.00								
2.8	5C x 6 Sqmm YY Cable (PG Gland)	Nos.	240.00								
2.9	1C x 300sqmm YY Cable PG Gland Termination	Nos.	64.00								
2.10	24C x 2.5 Sqmm YWY Cable	Nos.	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 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.	72.00								
3.2	3.5C x 300 Sq.mm. A2XFY Cable.	Nos.	30.00								
3.3	3.5C x 185 Sq.mm. A2XFY Cable.	Nos.	4.00								
3.4	3.5C x 120 Sq.mm. A2XFY Cable.	Nos.	28.00								
	TOTAL : SECTION - II										
	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.	30.00								
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	280.00								
2.2	50 x 10 mm. Cu strip.	Rmtr	70.00								
2.3	50 x 6 mm. Cu strip.	Rmtr	160.00								
2.4	50 x 10 mm. GI strip.	Rmtr	140.00								
2.5	50 x 6 mm. GI strip.	Rmtr	400.00								
2.6	32 x 6 mm. GI strip.	Rmtr	100.00								
2.7	25 x 3 mm. Cu. strip	Rmtr	650.00								
2.8	25 x 6 mm. GI strip.	Rmtr	100.00								
2.9	8 SWG GI Wire.	Rmtr	100.00								
2.10	1C X 10 Sqmm YY FRLS Cable	Rmtr	200.00								
	TOTAL : SECTION III										

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	SECTION IV - 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	300 mm, 50x50 perforated tray. (14 SWG)	Rmtr	30.00								
1.2	450 mm, 75x75 Ladder tray. (14 SWG)	Rmtr	40.00								
1.3	600 mm, 75x75 Ladder tray. (14 SWG)	Rmtr	180.00								
2.0	Cable Tray Covers suitable for following size trays										
2.1	300 mm perforated tray.(16 SWG)	Rmtr	10.00								
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	1.50								
	TOTAL : SECTION IV										
	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								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
	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 150 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.3	3.5C x 95 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.4	3.5C x 70 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.5	3.5C x 50 Sq.mm. A2XFY Cable.	Rmtr	1.00								
3.6	4C x 16 Sq.mm. AYFY FRLS Cable.	Rmtr	1.00								
3.7	4C x 10 Sq.mm. AYFY FRLS Cable.	Rmtr									
3.8	4C x 10 Sq.mm. YWY Cable.	Rmtr	1.00								
3.9	4C x 6 Sq.mm. YWY Cable.	Rmtr	1.00								
3.10	4C x 1.5sqmm YWY Cable	Rmtr	1.00								
3.11	3C x 6 Sq.mm. YWY Cable.	Rmtr	1.00								
3.12	3C x 4 Sq.mm. YWY Cable.	Rmtr	1.00								
3.13	4C x 2.5 Sq.mm. YWY Cable.	Rmtr	250.00								
3.14	3C x 2.5 Sq.mm. YWY Cable.	Rmtr	500.00								
3.15	1C x 70 Sqmm YY FRLS Cable	Rmtr	800.00								
3.16	1C x 6sqmm YY Cable including Termination	Rmtr	1.00								
3.17	6C x 2.5 Sqmm YWY Cable	Rmtr	1.00								
3.18	8C x 2.5 Sqmm YWY Cable	Rmtr	1.00								
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	3C x 2.5 Sq.mm. YWY Cable.	Nos.	1.00								
4.9	1C x 6sqmm YY Cable PG Gland Termination	Nos.	1.00								
4.10	6C x 2.5 Sqmm YWY Cable	Nos.	1.00								
4.11	8C x 2.5 Sqmm YWY Cable	Nos.	1.00								
4.12	3.5C x 50 Sq.mm. A2XFY Cable.	Nos.	1.00								
4.13	4C x 16 Sq.mm. AYFY FRLS Cable.	Nos.	1.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
4.14	4C x 10 Sq.mm. AYFY FRLS Cable.	Nos.	1.00								
4.15	4C x 2.5 Sq.mm. YWY Cable.	Nos.	1.00								
4.16	1C x 70 Sqmm YY Cable PG Gland Termination	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 150 Sq.mm. A2XFY Cable.	Nos.	1.00								
5.3	3.5C x 95 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	32 x 6 mm. GI strip. Supported on Porcelain insulator/ J bolt at every 1.5 mtr interval for building L.A.	Rmtr	UR								
8.4	32 x 6 mm. Cu 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								
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								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
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										
###	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								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
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								
	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								
24.4	100mm, 50x50 perforated tray. (16 SWG)	Rmtr	1.00								
24.5	150mm, 50x50 perforated tray. (16 SWG)	Rmtr	1.00								
24.6	750 mm, 75x75 Ladder tray. (14 SWG)		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								
25.4	100mm perforated tray.	Rmtr	1.00								
25.5	150mm perforated tray.	Rmtr	1.00								
25.6		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 33 **kV / 0.433 kV, 2000 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 33 kV, 1250A, **26kA, Indoor HT Panel (Extendable)** including relay and control panel .Consisting of 1 I/C VCB , 4 O/G VCB,and Metering module Feeders as per SLD. (HT Panel 1).	Set	1.00								
2.2	Supply,Installation,Testing & Commissioning of 33 kV, 1250A, 26kA VCB **HT PANE 33**kV,1250A,26kA as incomer Panel **Extensible type** including Power Pack as per specifications , Data sheet and SLD.(HT Panel-02 & -03)	Set	2.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
3	Supply,Testing, tagging, laying, & commissioning of following 33 **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 300sqmm Al.XLPE HT Cable	Rmtr	115.00								
3.2	3C x 240sqmm Al.XLPE HT Cable	Rmtr	370.00								
4	Supply, installation, testing & commissioning of heat shrink jointing for 33**kV 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	3C x 300sqmm Al.XLPE HT Cable										
4.1 a	Indoor End Termination.	Set	2.00								
4.1 b	Outdoor End Termination.	Set	1.00								
4.2	3C x 240sqmm Al.XLPE HT Cable										
4.2 a	Indoor End Termination.	Set	10.00								
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. 3.5M 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 -- 62M)**.	job	1.00								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
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.	12.00								
7	Statutary Approval from local EB	job	1.00								
8	Supply, installation, material equipment required as per statutory provision & safety.										
8.1	33 kV grade Rubber matting 1000 mm width.	Mtr	9.00								
8.2	33 kV class Hand gloves.	Pair	1.00								
8.3	33 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	40.00								
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								
	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	Supply, installation, testing & commissioning of heat shrink jointing for 33**kV 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								
4	3C x 240sqmm Al.XLPE HT Cable										
4.1	Outdoor End Termination.	Set	0.00								
	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
1.0	Design, Supply, Installation, Testing & Commissioning at site 3-phase, 415V, 1500RPM, 50 HZ, Diesel generator set as per DG Technical Document, of **2 x 2000 KVA** Prime Rating at 0.8 pf lagging diesel engine with **Radiator (with standby fan provision)** and alternator set mounted on common base frame in Outdoor Type Acoustically Treated Enclosure, day tank capacity of **1 x 990** liters, battery, battery charger, return fuel color, anti vibration mounting pads including residential silencer, engine alternator safeties with accessories, **1No. of 3200A, ACB Isolator** as per the attached SLD, engine control panel, ventilation system, inside conopy lighting, etc. as per specification complete as required. Diesel engine shall conform to IS:10000 and alternator shall be self excited complete with AVR confirming to IS:4722. **MCC panels** for Radiator motors to be considered in the scope if required.	Set	**2**								
2.0	Supply, Installation, Testing & Commissioning of Cu. Unarmoured cables of following size from Alternator to 3200A ACB Isolator Panel near DG Set.										
2.1	1C X 240 sq.mm. 2XY Cu. UnArm. Cable **(6 Runs/phase + 3 Runs - Neutral)**	Mtrs.	500								
3.0	Cable Termination of above cable										
3.1	1C X 240 sq.mm. 2XY Cu. UnArm. Cable	Nos	84								
4.0	Supply Installation testing Commissioning of Synchronisation 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	16"M.S.Pipe Class B from Exhaust Bellow to Silencer	Mtrs.	10								
5.2	Supply of 16" MS Class B Exhaust pipe	Mtrs.	80								
5.3	Aluminium Cladding for the Exhaust Pipe	Mtrs.	90								
5.4	Cladding for the Residential Silencers	Nos	2								
5.6	Bends & Flanges 400 mm Dia or required size.	Set	6								
5.7	Steel for Exhaust Support structure (for 2No. Of D.G.Sets)	Ton	15								
5.8	Aviation Light with independent battery charger and battery (lead acid storage type)	Nos	1								
5.9	Lightening arrestor with GI earth strip for exhaust structure	Nos	1								
a	600mm x 75mm ladder tray.	Mtrs.	70								
b	300mm x 50mm perforated tray.	Mtrs.	60								
6.0	**FUEL PIPING**										
6.1	Supply ,Installation and Commissioning of ASTM Grade, seamless Pipe 40 mm (40NB)	Mtrs.	30								
6.2	Supply ,Installation and Commissioning of ASTM Grade, seamless Pipe 25 mm (25NB)	Mtrs.	40								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
6.3	Ball Valve										
a	40NB	Nos	4								
b	25NB	Nos	6								
6.4	Non Return Valves										
a	40NB	Nos	2								
6.5	Y Stainers	Nos	2								
6.6	Solenoid Valves for 25NB tapping lines for auto operation of Fuel pumping system.	Set	4								
6.7	Flow Meter	Nos	2								
6.8	Hardware for fuel piping	Set	1								
7.0	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.										
7.1	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	9								
8.0	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										
8.1	50 x 10 mm. GI strip.	Mtrs.	150								
8.2	50 x 6 mm. Cu strip.	Mtrs.	100								
8.3	25 x 6 mm. GI strip. (Chimney LA)	Mtrs.	40								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
9.0	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.										
9.1	3.5C X 400 sq.mm. A2XFY	Mtrs.	1500								
9.2	24C X 2.5 sq.mm. 2XWY	Mtrs.	175								
9.3	10C X 2.5 sq.mm. 2XWY	Mtrs.	175								
9.4	2C X 4 sq.mm. 2XWY	Mtrs.	150								
9.5	6C X 2.5 sq.mm. 2XWY	Mtrs.	175								
9.6	3C X 1.5 sq.mm. Cu. Sheilded Cable	Mtrs.	500								
9.7	2C X 2.5 sq.mm. 2XWY	Mtrs.	150								
9.8	Cable Termination of above cables with glands and lugs.										
9.9	3.5C X 400 sq.mm. A2XFY	Nos	36								
9.10	24C X 2.5 sq.mm. 2XWY	Nos	4								
9.11	10C X 2.5 sq.mm. 2XWY	Nos	4								
9.12	2C X 4 sq.mm. 2XWY	Nos	4								
9.13	6C X 2.5 sq.mm. 2XWY	Nos	4								
10.0	Cable Termination of above cables with glands and lugs.										
10.1	3C X 1.5 sq.mm. Cu. Sheilded Cable	Nos	12								
10.2	2C X 2.5 sq.mm. 2XWY	Nos	4								
11.0	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								
12.0	**Approvals**										
12.1	Approvals from Statutory Authorities like pollution control board ,electrical inspector etc. necessory to complete the job.	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										
1.00	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								
2.00	SITC of GI ladder and Perforated Cable Trays of following sizes										
a	1000mm x 75mm ladder tray.	Mtrs.	1								
b	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	4C X 25 sq.mm.	Mtrs.	1								
5.2	3C X 4 sq.mm. 2XWY	Mtrs.	1								
6.0	Cable Termination of above cables with glands and lugs.										
6.1	4C X 25 sq.mm.	Nos	1								
6.2	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			
	Provision of Precision AC For HPC, NCMRWF, Noida.			**Rate**	**BASIC COST**	**Duties and Taxes**	**Total**	**Rate**	**BASIC COST**	**Taxes**	**Total**
1	Supply of Precision AC as per the technical specification. (1W+1SB)										
1.1	30 TR Net Cooling Capacity	Nos	2								
2	Refrigerant Piping as per manufacturing standard with armaflex 25 mm thk rubber nitrile insulation. 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	15								
4	GI Class B, ERW pipe for fresh water from nearest taping										
4.1	25 NB	RMT	30								
5	Refrigerant gas R 407 C as per manufacturers specification and quantity as per requirtement	LOT	1								
6	Deep pleated 4" filters with an ASHRAE 52.2 MERV 8 rating (Spare)	Lot	2								
7	Perforated Tiles 600 x 600 mm 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	R.O.								
8	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	R.O.								
9	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										
9.1	18 guage	SQM	R.O								
9.2	20 guage	SQM	R.O.								
9.3	22 guage	SQM	R.O.								
9.4	24 guage	SQM	15								
10	SITC of Aluminum eggcrate powder coated return air grill with aluminum border and grid in in ½ x ½ x ½-inch sizes.										
10.1	600 mm X 600 mm	Nos	25								
11	SITC of Duct Inline fan with 20 Micron filtration of 200 CFM and 15 mm static pressure.	Nos	1								
	TOTAL VALUE FOR PAC										
	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			
	Provision of HVAC System For HPC for NCMRWF, Noida.			**Rate**	**BASIC COST**	**Duties and Taxes**	**Total**	**Rate**	**BASIC COST**	**Taxes**	**Total**
	PRICISION CHILLERS										
1	Supply, installation, testing & commissioning of 80 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 Noida City, and shall use R-134 a Refrigerant. The Chiller should be installed on Spring Mounted Antivibration mounts.Chiller shall be selected for 45 deg.C abmient temp.with starting to full load timing as 3.0 min. maximum.	Nos	4								
1.1.	**Cooling Capacity (80 TR x 4 Nos) (2 W + 2 SB)**										
	Chiller Flow rate : 215 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										
	OR										
	Supply, installation, testing & commissioning of 80 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 Noida City, and shall use R-134 a Refrigerant. The Chiller should be installed on Spring Mounted Antivibration mounts.Chiller shall be selected for 45 deg.C abmient temp.with starting to full load timing as 3.0 min. maximum.	Nos	4								
1.2	**Cooling Capacity (80 TR x 4 Nos) (2 W + 2 SB)**										
	Chiller Flow rate : 180 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										
	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 (IE-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 : 215 US GPM @ 25 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	R.O.								
3.1.2	200 mm Dia	RMT	935								
3.1.3	150 mm Dia	RMT	61								
3.1.4	100 mm Dia	RMT	83								
3.1.5	80 mm Dia	RMT	66								
3.1.7	65 mm Dia	RMT	247.5								
3.1.8	40 mm Dia	RMT	R.O.								
3.1.9	32mm Dia	RMT	210								

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	R.O.								
4.1.2	200 mm Dia	Nos	35								
4.1.3	150 mm Dia	Nos	25								
4.1.4	100 mm Dia	Nos	30								
4.1.5	80 mm Dia	Nos	25								
4.1.6	65 mm Dia	Nos	R.O.								
4.1.7	40 mm Dia	Nos	R.O.								
5	Flow Switch suitable for 150 mm Dia Pipe	Nos	4								
6	Diferential pressure switch suitable for 150 mm Dia Pipe	Nos	4								
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.		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 - 150 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									
11.1	15 mm Dia	Nos	R.O.								
11.2	25 mm Dia	Nos	R.O.								
11.3	32 mm Dia	Nos	50								
11.4	40 mm Dia	Nos	6								
11.5	50 mm Dia	Nos	10								
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	30								
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	65 mm Dia	Nos	6								

14	Automatic Air vent of 1/2 "	Nos	4								
15	Closed Expansion Tank with Expansion Vessel and pressurizing Pumps 1 Working + 1 Standby. The tank capacity to be 500 Ltr . Expansion tank to be of SS 309 Construction 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.Tank shall be internally coated with anti-corrosive coating. 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 200 mm Dia pipe	Nos	2								
18	SITC of SS 309 tank with capacity of 8000 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	Nos	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	4								
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	2								
21	Flanged "Y "Type starainer with SS mesh . Pressure class PN 16. Body: Ductile iron										
21.1	150 mm Dia	Nos	4								
22	Non return valves										
22.1	100 mm Dia	Nos	4								
23	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.										
23.1	Dia 32 mm	Rmt	75								
24	SITC Propeller type exhaust fan for Panel room exhaust										
	1000 CFM @ 10 mm static	Nos	1								
	TOTAL VALUE FOR CHILLED WATER PIPING										

	ELECTRIFICATION WORK										
25	Electrical Panel No 1 - 4 : Chiller panel										
	HVAC Utility Panels comprising of 1 Incoming Feeder (4 Pole ,250 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	4								
	Outgoing Feeder:- As per SLD										
26	Electrical Panel No 1 - 4, Chiller Pump panel										
	HVAC Utility Panels comprising of 1 Incoming Feeder (4 Pole ,10 Amp with Overload Earth Fault and Short Circuit protection, MPCB 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	4								
	Outgoing Feeder:- As per SLD										
27	Electrical Panel No 9, 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										
28	Electrical Panel , PAC panel - 1 & 2										
	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 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	2								
	Outgoing Feeder:- As per SLD										
29	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.)										
29.1	50mm, 50x50 perforated tray. (16 SWG)	Rmt.									
29.2	100mm, 50x50 perforated tray. (16 SWG)	Rmt.									

29.3	150mm, 50x50 perforated tray. (16 SWG)	Rmt.									
29.4	200mm, 50x50 perforated tray. (16 SWG)	Rmt.									
29.5	300 mm, 50x50 perforated tray. (14 SWG)	Rmt.									
29.6	450 mm, 50x50 perforated tray. (14 SWG)	Rmt.									
29.7	600 mm, 50x50 perforated tray. (14 SWG)	Rmt.									
29.8	450 mm, 75x75 Ladder tray. (14 SWG)	Rmt.									
29.9	600 mm, 75x75 Ladder tray. (14 SWG)	Rmt.									
29.10	750 mm, 75x75 Ladder tray. (14 SWG)	Rmt.									
30	Cable Tray Covers suitable for following size trays										
30.1	50mm perforated tray.	Rmt.									
30.2	100mm perforated tray.	Rmt.									
30.3	150mm perforated tray.	Rmt.									
30.4	200mm, perforated tray.	Rmt.									
30.5	300 mm perforated tray.	Rmt.									
30.6	450 mm perforated tray.	Rmt.									
31	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.)**										
31.1	3.5C x 400 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
31.2	3.5C x 300 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
31.3	3.5C x 240 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
31.4	3.5C x 185 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
31.5	3.5C x 150 Sq.mm. A2XFY Cable.	Rmt.	320								
31.6	3.5C x 120 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
31.7	3.5C x 95 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
31.8	3.5C x 70 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
31.9	3.5C x 50 Sq.mm. A2XFY Cable.	Rmt.	60								
31.10	3.5C x 35 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
31.11	3.5C x 25 Sq.mm. A2XFY Cable.	Rmt.	R.O.								
31.12	4C x 25 Sq.mm. AYFY Cable.	Rmt.	R.O.								
31.13	4C x 10 Sq.mm. YWY Cable.	Rmt.	R.O.								
31.14	4C x 16 Sq.mm. YWY Cable.	Rmt.	R.O.								
31.15	4C x 6 Sq.mm. YWY Cable.	Rmt.	R.O.								
31.16	4C x 4 Sq.mm. YWY Cable.	Rmt.	175								
31.17	4C x 2.5 Sq.mm. AYFY Cable.	Rmt.	350								
31.18	3C x 6 Sq.mm. YWY Cable.	Rmt.	R.O.								
31.19	3C x 4 Sq.mm. YWY Cable.	Rmt.	R.O.								
31.20	3C x 2.5 Sq.mm. YWY Cable.	Rmt.	R.O.								

32	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.										
32.1	3.5C x 70 Sq.mm. A2XFY Cable.	Nos	R.O.								
32.2	3.5C x 50 Sq.mm. A2XFY Cable.	Nos	12								
32.3	3.5C x 35 Sq.mm. A2XFY Cable.	Nos	R.O.								
32.4	3.5C x 25 Sq.mm. A2XFY Cable.	Nos	R.O.								
32.5	4C x 16 Sq.mm. AYFY Cable.	Nos	R.O.								
32.6	4C x 10 Sq.mm. YWY Cable.	Nos	R.O.								
32.7	4C x 16 Sq.mm. YWY Cable.	Nos	R.O.								
32.8	4C x 4 Sq.mm. YWY Cable.	Nos	18								
32.9	4C x 2.5 Sq.mm. YWY Cable.	Nos	20								
32.10	3C x 6 Sq.mm. YWY Cable.	Nos	R.O.								
32.11	3C x 4 Sq.mm. YWY Cable.	Nos	R.O.								
32.12	3C x 2.5 Sq.mm. YWY Cable.	Nos	R.O.								
33	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.										
33.1	3.5C x 400 Sq.mm. A2XFY Cable.	Nos	R.O.								
33.2	3.5C x 300 Sq.mm. A2XFY Cable.	Nos	R.O.								
33.3	3.5C x 240 Sq.mm. A2XFY Cable.	Nos	R.O.								
33.4	3.5C x 185 Sq.mm. A2XFY Cable.	Nos	R.O.								
33.5	3.5C x 150 Sq.mm. A2XFY Cable.	Nos	8								
33.6	3.5C x 120 Sq.mm. A2XFY Cable.	Nos	R.O.								
33.7	3.5C x 95 Sq.mm. A2XFY Cable.	Nos	R.O.								
34	Supply, laying and connection of copper earthing 25mm x 3mm thick copper strip.	Rmt	150								
	TOTAL VALUE FOR ELECTRIFICATION WORK										
	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			
	Access Control System			**Rate**	**BASIC COST**	**Duties and Taxes**	**Total**	**Rate**	**BASIC COST**	**Taxes**	**Total**
1	Supply, installation, testing & commissioning of **Proximity card readers** having a read range of minimum 3 inches with mounting box, plate & required accessories.	No.	6								
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.	5								
6	Supply, installation, testing & commissioning of Magnetic door Sensor (Door position sensor) with required accessories.	No.	5								
7	Supply, installation, testing & commissioning of Emergency release switch (Break glass type Green in colour)	No.	3								
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			
	Water Leak Detection System for Server Room			**Rate**	**BASIC COST**	**Duties and Taxes**	**Total**	**Rate**	**BASIC COST**	**Taxes**	**Total**
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.	45								
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.	15								
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			
	Building Management System			**Rate**	**BASIC COST**	**Duties and Taxes**	**Total**	**Rate**	**BASIC COST**	**Taxes**	**Total**
	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								
1.4	Online type 2 KVA UPS with 1 hour battery backup	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.The IBMS should have min 5 client user system and 5 user access license	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								
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								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
	Building Management System			**Rate**	**BASIC COST**	**Duties and Taxes**	**Total**	**Rate**	**BASIC COST**	**Taxes**	**Total**
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										
7.2	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 air temp sensor	Nos.	UR								
8.7	Return air temp sensor	Nos.	UR								
8.8	Room type temp & RH transmitter	No.	6								
8.10	DPDT relay with 230 VAC, 1A cont rating for fire damper actuators	Nos.	4								
8.11	Battery fumes detector sensor	Nos.	UR								
8.12	Level sensors for thermal storage	Nos.	2								
8.13	Temperature sensor for Thermal storage	Nos.	2								
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.									
9.2	DN 40,	Nos.									
9.3	DN 50,	Nos.									
9.4	DN 65,	Nos.									
9.5	DN 80,	Nos.									
9.6	DN 100,	Nos.									
9.7	DN 125,	Nos.									
9.8	DN 150,	Nos.	6								
9.9	DN 200,	Nos.	2								
9.10'	DN 250,	Nos.									

Sr. No.	Description	Unit	Qnty	Supply				Installation			
	Building Management System			**Rate**	**BASIC COST**	**Duties and Taxes**	**Total**	**Rate**	**BASIC COST**	**Taxes**	**Total**
9	**3 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.	R.O.								
9.2	DN 40,	Nos.	R.O.								
9.3	DN 50,	Nos.	R.O.								
9.4	DN 65,	Nos.	R.O.								
9.5	DN 80,	Nos.	R.O.								
9.6	DN 100,	Nos.	R.O.								
9.7	DN 125,	Nos.	R.O.								
9.8	DN 150,	Nos.	R.O.								
9.9	DN 200,	Nos.	R.O.								
9.10'	DN 250,	Nos.	R.O.								
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 Building Management 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
	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	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.	8								
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
	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.	4								
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.	6								

Sr. No.	Description	Unit	Qnty	Supply				Installation			
				Rate	BASIC COST	Duties and Taxes	Total	Rate	BASIC COST	Taxes	Total
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.	75								
	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
	Portable type of Fire Extinguishers										
1	Dry Powder Type : - Mono Ammonium Phosphate based dry chemical agent capable of fighting class A,B,C & E fires as per IS 14609 - Shall be CE Certified and mark - Shall be as per IS 15683 - The head valve shall be brass nickel plated with simple squuze operation and pressure guage. - Suitable for temparature 5 ~ 60 Deg C - The container shall be tested at 35 Barg pressure. The Unit shall be discharge hose, Hose holder, Discharge nozzle and base for floor mounting. A vertical support shall be provided for wall / Column installation										
1.1	5 Kg Capacity	No.	2								
1.2	2 Kg Capacity	No.	1								
2	Co2 Type : - Suitable for B,C and Electrical Class of fire. - Carbon dioxide, gas agent, Colourless, odourless and non toxic. - Shall be as per IS 15683 - Shall be CE Certified and mark - The container shall be made with high Mangenese steel - The head valve shall be brass with simple squuze operation and pressure relief disc. - The agent shall be non conductive in nature for electrical use without any risk to the operator. - The gas shall not leave any residue after release. - The discharge horn shall be swivel type - Suitable for temparature 5 ~ 60 Deg C - The container shall be tested at 35 Barg pressure. The Unit shall be discharge horn, Hose holder, and base for floor mounting.										
2.1	4.5 KG Capacity	No.	2								
	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 HPC DATA CENTRE FOR NCMRWF, NOIDA								
SR.NO	**DISCREPTION**	**QUANTITY**	**UNIT**	**RATE**	**BASIC COST**	**Duties and Taxes**	**Incidentia l Charges**	**Total**
1a	**FALSE FLOORING …**							
	Providing and Fixing of Unifloor FS2500 or Equivalent access floor system shall be made from steel pyrogrip lightweight cementitious infill and provide for adequate fire properties, acoustic barrier and air leakage resistance. The system shall be able to withstand a UDL of 3110 kg. Per sqmt. And a point load of 1150 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 composite unit. The entire panel shall be quoted with epoxy coating on the exposed surface and then the hollow panel shall have an infill of pyrogrip 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.							

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
	Pedestal and Stringer - 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, The stringer is zinc electro plated steel cold rolled construction specially designed with Rectangle sides for strength, lateral stability, and rolling loads and to support the panels on all four sides for alignment. The stringer to have a counter sunk holes at both ends to accommodate bolting of M6 machine screws to the pedestal head assembly. The stringers shall be 21 x 30 x0.8mm x 570 mm length. , all screws etc and design shall confirm speedy assembly and removal for relocation and maintenance. Pedestal assembly shall provide for easy adjustment of leveling and accurately align panels to ensure lateral restrain. for prevention of corrosion pedestals are either powder coated or zinc electroplated as required. Pedestal to withstand Axial 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 600mm.							
	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	455.00	SQM					
b	Raised Floor Pedestals including Stringer for panel support	470.00	SQM					
c	Perforated Panel 26 % with out damper	40.00	NOS					
d	Panel Lifter - Heavy Duty	4.00	NOS					
e	Grommets for cable Access	60.00	NOS					
2	**EPOXY FLOORING**	470.00	SQM					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
	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	**MODULAR FALSE CEILING…**	135.00	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							
4	**FIRE RATED PARTITION…**	180.00	SQM					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
	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.							
5	**FIRE RATED STEEL DOORS…**							

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
	providing and fixing 2 hr fire rated double 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.)							

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
a	Single Leaf Door - 2 Hr Fire Rated							
	i) 1200 x 2100 with vision panel	1.00	NOS					
b	Double Leaf Door - 2 Hr Fire Rated							
	i) 1800 x 2100 with vision panel	2.00	NOS					
6	**PANIC BARS …**							
	Supplying and fixing Dorma or Equivalent make panic bar with all fittings etc complete.							
	i) for Single Leaf Door	1.00	NOS					
	i) for Double Leaf Door	1.00	NOS					
7	**FIRE PAINT…**	125.00	SQM					
	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 leveling 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.							
8	**FIRE EXPANDING FOAM…**	3.00	SQM					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
	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)							
9	**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)							
10	**WATER SOLUBLE CABLE COATING…**	50.00	RMT					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
	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 protecting 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)							
11	**GRAPHITE BASED INTUMESCENT FIRESTOP SEALANT…**	5.00	SQM					
	Providing & applying graphite based intumescent firestop sealant having minimum of 2 hours fire rating when tested in accordance with BS 476 part 20 suitable 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 sealant should have property of Acoustic, 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)							
12	**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					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
13	**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.							
14	**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.							

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
15	**EXECUTIVE TABLES**	1.00	NO					
	Providing & fixing in position Executive tables with 18 mm MDF with drawers & storages, should have 1 mm thick Laminate 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 Equivalent to be provided)							
a	TRAVEL DESK (1350L x 750W x 750H)							
16	**LOW BACK CHAIRS**	3.00	NO					
	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)							

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
17	**Room Signages/ Manager Cabins/ Utility Rooms(150x300)**	10.00	NOS					
	Providing & fixing Aluminium Modular Signage using Aluminium Alloy 6063 extrusion with Anodizing (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							
18	**Way Finding Sign/Department Identification (150x600)**	10.00	NOS					
	Providing & fixing Aluminium Modular Signage using Aluminium Alloy 6063 extrusion with Anodizing (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							
19	**Fire Evacuation Map (400x300)**	2.00	NOS					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
	Providing 7 fixing Aluminium Modular Signage , fire evacuation map using Aluminium Alloy 6063 extrusion with Anodizing (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							
20	**Structural steelwork in hot rolled sections...**	0.60	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							
21	**Fire Rated Fixed Glass Window…**	24.00	SQM					
	Providing & fixing Min. 2 hr Fire Rated toughened 6 mm thk fixed Glass Window of approved make & shade/surface coating with all Framing & Fixtures as per manufacturers specification etc complete. (Note - Fire Rating should be for Whole Assembly i.e. Glass, framing and fixtures)							

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
22	**Modification & Relocation…**	1.00	LS					
	Modification & Relocation of lighting fixture, fire alarm, fire suppression system, sprinkler system etc in false ceiling of HPC data center as directed by engineer in charge. The work should be carried out strictly with safety and at most care so that no damage will occur while during the work. Item to include necessary labour , tool & tackles , cleaning etc complete. The dismantled material will be owner's property. (Approx Area - 150 Sqm)							
23	**Breaking of BBM**	10.00	CUM					
	Breaking of BBM including plaster by electric chipper including cleaning debris, removing the stuff up to a distance of 1500 m beyond a Battery limit area, stacking and / or spreading as directed, shoring, strutting, dewatering wherever required & preparing the bed as directed, including back filling in layers if required, etc. complete.							
24	**Breaking of RCC...**	2.00	CUM					
	Breaking of RCC by electric chipper including cleaning debris, removing the stuff up to a distance of 1500 m beyond a Battery limit area, stacking and / or spreading as directed, shoring, strutting, dewatering wherever required & preparing the bed as directed, including back filling in layers if required, etc. complete.							
25	**Breaking of PCC..**	5.00	CUM					
	Breaking of PCC by electric chipper including cleaning debris, removing the stuff up to a distance of 1500 m beyond a Battery limit area ,stacking and / or spreading as directed, shoring, strutting ,dewatering wherever required & preparing the bed as directed, including back filling in layers if required, etc. complete.							
26	**Removing of Existing False Flooring**	500.00	SQM					

SR.NO	DISCREPTION	QUANTITY	UNIT	RATE	BASIC COST	Duties and Taxes	Incidentia l Charges	Total
	Removing of existing False flooring including supports, tiles removing and carting scrap material outside the site premises or as directed by engineer in charge. The work should be carried out strictly with safety and at most care so that no damage will occur while during the work. Item to include necessary labour , tool & tackles , cleaning etc complete. The dismantled material will be owner's property.							
27	**Removing of Existing False ceiling…**	150.00	SQM					
	Removing of existing False ceiling including framing, tiles removing and carting scrap material outside the site premises or as directed by engineer in charge. The work should be carried out strictly with safety and at most care so that no damage will occur while during the work. Item to include necessary labour , tool & tackles , cleaning etc complete. The dismantled material will be owner's property.							
	TOTAL							
	Note : Rates of Duties, taxes in percentagle and nature of incidential charges for each item may be shown at foot note							