



Notice Inviting Tender (NIT)

Reserve Bank of India, Jammu invites open **Tender for Conducting Energy Audit of Bank's Office Building, RBI Jammu** in two part. The tender documents shall be uploaded on Bank's Website. All corrigendum, addendum and further communication shall be uploaded on Bank's Website. The Tenderer has to submit the tender physically in tender box situated at Reception/Estate, Jammu.

a. e-Tender Name	Tender for Conducting Energy Audit of Bank's Office Building, RBI Jammu
b. Estimated cost of the work	₹1,00,000/- inclusive of all taxes
c. Mode of Tender	Open (Tender shall be submitted at the Tender Box situated at Reception, Main Office Building, Jammu)
d. Date of NIT available to parties to download	11-07-2025
e. Eligible Vendors	<p>Open Tender</p> <p>The intending tenderer for conducting Electrical Safety Audit should be professionally qualified degree holder and experienced Electrical Safety Auditor.</p> <p>The firm should have the experience of carrying out at least two electrical safety audits in Banks, Financial institutions, major hotels or multi-storeyed office buildings or any other electrical installations with a minimum connected load of 500 kW (for single premises/building) in last 5 years (from date of issue of tender).</p>
f. Earnest Money Deposit	<p>₹2000/- shall be paid by the tenderer through NEFT RBI Jammu A/c No.8714295, IFSC Code: RBIS0JMPA01.</p> <p>MSE firms are exempted from the submission of EMD.</p>
g. Date of Starting of Tender for submission at Reception Tender Box	11-07-2025 from 14:00 Hrs onwards
h. Date & time of closing of open Tender	22-08-2025 up to 14:00 Hrs
i. Date & time of opening of Part I of Tender	22-08-2025 at 15:00 Hrs.
j. Date & time of opening of Part II of Tender	Date and time of opening of price bid will be informed separately to all the eligible bidders later

Note- 1. Please note that there is no tender fees to download the tender document from Portal.

2. Applicants intending to apply will have to satisfy the Bank by furnishing documentary evidence in support of their possessing required eligibility and in the event of their failure to do so, the Bank reserves the right to reject their candidature.

3. The Bank is not bound to accept the lowest tender bid and reserves the right to accept either in full or in part any tender. The Bank also reserves the right to reject all the tenders without assigning any reason, therefore.

4. Any amendments/ corrigendum to the tender, if any, issued in future will only be notified on the RBI Website (<https://www.rbi.org.in>)

5. This is e-tender bidder are not required to be present for opening.



**Reserve Bank of India
Estate Department
Jammu**

**Tender for Conducting Energy Audit of Bank's Office Building
at Jammu**

Part I

Techno-Commercial Bid

Name of Bidder:.....

Address:.....

Telephone no:.....

Email Address:.....

Last Date and time of submission of bid/tender: 22-08-2025 upto 14:00 Hrs

Note: Part I and Part II are required to be submitted in different-different envelope and both these envelopes must be kept another envelope.

Reserve Bank of India (RBI)	
Estate Department	
Jammu	
Tender: Part I / Techno- commercial bid	
Section I: Commercial Conditions	
1.1	Name of work: RBI JAMMU invites tender of “ <i>Energy Audit of Bank’s Office Building at Jammu</i> ” in two Parts from eligible bidders.
1.1.1	Estimated cost of work: Rs. 1,00,000/- inclusive of all taxes
1.1.2	Time for completion of work: 45 days from the 14 th day of issue of work order that includes time for submission of draft report & after this, submission of final report in triplicate hard copy.
1.1.3	Date of start of tender:
1.1.4	Last date and time of submission of tender (The tender received thereafter shall not be entertained in any circumstances): 22-08-2025 till 14:00 Hrs
1.1.5	Date and time of opening of Part I of tender: 22-08-2025 at 15:00 Hrs
1.1.6	Date and time of opening of Part II of the tender: Date and time of opening of price bid will be informed separately to all the eligible bidders later.
1.1.7	Contact person for clarification: Shri. Harshad Kelkar AM (Tech -Electrical) Contact no: 8828202902, Email: harshadkelkar@rbi.org.in ;
1.1.8	EMD needs to be submitted: Rs 2000/- online as mentioned in Para 1.8. However, MSE firms are exempted for submission of EMD. Necessary MSE registration certificate is needed to be submitted along with tender. EMD amount must be reflected in our account on and before last date and time of submission of tender.
1.1.9	<p>Eligibility Criteria:</p> <p>a. The intending tenderer for energy audit should be qualified accredited energy auditor by Bureau of Energy Efficiency during entire tendering process till completion of work. In support of the above, the firms should submit the letter of accreditation issued by Bureau of Energy Efficiency.</p> <p style="text-align: center;">AND</p> <p>b. Minimum 3 years of experience in the field of undertaking similar works viz “Energy audit for large office buildings / commercial Estate / industrial houses/Government organization/PSU’s” (from the date of issue of Tender)(Any one work order issued before 3 years from the date of issue of tender needs to be submitted).</p> <p style="text-align: center;">AND</p> <p>c. Have executed successfully similar type of energy audit in large office buildings / commercial Estate / industrial houses/Government organization/PSU’s with minimum sanctioned load of 500 kW and should have installations like HVAC plant, DG sets, transformers etc.” (Any one work order with details of sanctioned load and installations needs to be submitted).</p>
1.2	Tendering Process: The tender documents shall be available on RBI website. All corrigendum, addendum and further communication shall be uploaded on website only in “tender” section. The tenders for the above work in two parts i.e. Part I contains technical specifications & terms and conditions. Part II contains only rates of items. Tender shall be submitted in hard copy in tender box of Estate Dept. situated at Reception area/Enquiry, at RBI Jammu. Please note that Part I and Part II should be in different – different envelope, super scribed Part I /II,

	Tender Name. Both these documents should be put in another one envelopes addressed to “Regional Director, Reserve Bank of India, Rail Head Complex, Jammu-180012” along with name of tender.
1.3	<p>Part II (Financial bid): Part I will be opened on the date and time mentioned above. No deviation will be accepted in Part I of tender. If firm put deviation in the tender, their tender will be out rightly rejected. Part II of such tender will be returned. Part II will be opened for those bidders who qualified in Part I of the tender. Lowest quoted amount in the Part II will be declared L1 bidder/successful bidder and tender will be awarded to them.</p> <p>The Bank discourages the stipulation of any additional conditions by the tenderer. However, after opening of Part I any clarification/conditions etc. if any, will be examined and after discussions with all the tenderers, the conditions that are accepted to the Bank will be intimated to the tenderers. All the tenderers can quote a percentage above or below their tendered amount already submitted in part II. The quoting of such as a percentage above or below their tendered amount shall have a definite bearing on the condition/s the tenderers have to withdraw or additional benefit liable to be received as per the condition accepted by the Bank. The letter containing the tenderer's quoting percentage above or below their quoted tendered amount should be submitted in sealed cover on or before date fixed to Estate Department, subsequently and advised to the tenderers. This letter together with already submitted tendered rate shall be called Part II, will be opened in presence of the representatives of firms on the due date advised.</p>
1.3.1	If, in the price quoted by a bidder, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly, unless the Bank feels that the bidder has made a mistake in placing the decimal point in the unit price, in this case the total price as quoted shall prevail over the unit price and the unit price corrected accordingly.
1.3.2	If there is an error in a total price, which has been worked out through addition and / or subtraction of subtotals, the subtotals shall prevail and the total corrected; and
1.4	The rates quoted in Part II of tender shall be firm and shall include charges of GST, levies, consumables, labor, transport, insurance, Bidders are advised to inspect the site before quoting.
1.5	This contract is a fixed lump sum contract in respect of the entire energy auditing and to be paid for according to, at the rates contained in the schedule of rates and as provided in the said conditions.
1.6	The Employer reserve to itself the right of altering the items to be executed by adding to or omitting any items without prejudice to this contract. However, the auditors shall not be entitled to any payment for the works done exceeding the tender quantities unless specifically approved in writing by the Bank's Engineer.
1.7	The Reserve Bank of India does not bind itself to accept the lowest or any tender and reserves to itself the right to accept or reject any or all the tenders, either in whole or in part, without assigning any reasons for doing so.
1.8	All intended tenderers / bidders are required to submit the EMD (Earnest Money Deposit) as mentioned above shall be paid by the tenderer through NEFT RBI Jammu A/c No.8714295, IFSC Code: RBIS0JMPA01 through NEFT/ Mobile Banking/ RTGS

	<p>{Intimate/ forward the transaction details to estate@rbi.org.in}. If bidder fails to submit the EMD, tender shall not be accepted by the Bank. EMD should be interest free and shall be returned to unsuccessful bidders after awarding the work and EMD of L1 bidder/ successful bidder will be returned after completion of the work in all respect.</p> <p><u>EMD shall be forfeited if the Bidder:</u></p> <ul style="list-style-type: none"> (i) makes misleading or false representations in the forms, statements and attachments submitted, has suppressed any material information, details of any legal proceedings pending in the court which might otherwise have created any impact on the eligibility criteria; or (ii) Withdraws his Bid during the period of Bid validity; or does not sign the contract after award of Contract. (iii) has been blacklisted by any Government agency and the blacklisting is still in force. (iv) If bidder fails to complete the work.
1.9	<p><u>Validity of tender:</u> The tenders shall be valid for acceptance by the Bank for a period of 90 days from the date of opening of Part I of tender.</p>
1.10	<p><u>Signing of Contract Agreement</u></p> <p>The successful bidder shall be bound to implement the Contract within 14 days from the date of work order. The cost of necessary stamp paper (Rs 500) for execution of the agreement shall be borne by the Bidder. The format of agreement is attached at annexure-I.</p>
1.11	<p><u>Time Period:</u> Entire work shall be completed as indicated above. The site survey, data collection/measurements and draft report shall be completed in given time frame. The work is allowed to be carried out during office hours (9:30 AM to 5:30 PM). The successful bidder is required to make entry passes before start of work for their workers. Special permission is required for working on holidays/late ours apart from regular entry pass. The time for completion of the entire work is 45 days (including submission of final report in triplicate hard copy) from 14th day from the date of award of work. The site survey, data collection /measurements and draft report shall be completed in 15 days and the draft report shall be submitted for approval of Bank's Engineer within 30 days and final report on or before 45 days from 14th day from the date of award of work. Entire work shall be completed as indicated above, failing which liquidated damages at the rate of Rs. 250/- per week to a maximum of 10% of the contract value will be recovered for delay beyond the contractual period of completion</p>
1.12	<p><u>Extension of time: (before expiry of original date of completion)</u></p> <p>If the L1 bidders desire any extension of time for completion of work on grounds of there having been unavoidable hindrances in execution or any other ground, they shall apply in writing immediately after the occurrence of the hindrance. Such application shall contain complete details of hindrances, which hindered the contractors in the execution of the work and reference to record of entry in the Hindrance Register. The Bank will grant the extension of time, without prejudice to Bank's right to recover liquidated damages or compensation under relevant contract clause. The hindrance due to the Bank will not be the part of calculation of liquidated damages.</p>
1.13	<p><u>Safety and statutory measures:</u> The bidder shall take all safety measure during the execution of the work. The Bank will not accept any liability for any mishap / accident caused while working. The bidder shall indemnify and keep indemnified the Bank against all losses and claims, damages or compensation for breach of any provision of the Payment of Wages Act,1936 Minimum Wages Act 1948, Contract Labour</p>

	(Regulation and Abolition) Act, 1970, Payment of Bonus Act 1965 amended till date or any other labor law/statute in force in this regard.
1.14	Non-Disclosure clause: The Bidder shall not disclose directly or indirectly any information, materials and details of the Bank's infrastructure/systems/equipment etc., which may come to the possession or knowledge of the Bidder during the course of discharging its contractual obligations in connection with this agreement, to any third party and shall at all times hold the same in strictest confidence. The Bidder shall treat the details of the contract as private and confidential, except to the extent necessary to carry out the obligations under it or to comply with applicable laws. The Bidder shall not publish, permit to be published, or disclose any particulars of the works in any trade or technical paper or elsewhere without the previous written consent of the Employer. The Bidder shall indemnify the Employer for any loss suffered by the Employer as a result of disclosure of any confidential information. Failure to observe the above shall be treated as breach of contract on the part of the Bidder and the Employer shall be entitled to claim damages and pursue legal remedies. The Bidder shall take all appropriate actions with respect to its employees to ensure that the obligations of non-disclosure of confidential information under this agreement are fully satisfied. The Bidder's obligations with respect to non-disclosure and confidentiality will survive the expiry or termination of this agreement for whatever reason.
1.15	Sexual Harassment Clause: The Bidder / Agency shall comply with the provisions of "the Sexual Harassment of women at workplace (Prevention, Prohibition and Redressal) Act, 2013". In case of any complaint of sexual harassment against its employee within the premises of the bank, the complaint will be filed before the Internal Complaints Committee constituted by the Bidder / Agency and the Bidder/Agency shall ensure appropriate action under the said Act in respect to the complaint. The bidder shall be responsible for educating its employees about prevention of sexual Harassment at work place and related issues. (i) Any complaint of sexual harassment from any aggrieved employee of the bidder against any employee of the Bank shall be taken cognizance of by the Regional Complaints Committee constituted by the Bank.
1.16	Termination for Default: (a) The Bank may without prejudice to any other remedy for breach of Contract, by Seven Days (07) days written notice of default sent to the Bidder and upon the Bidder's failure and neglect to propose and/or execute any corrective action to cure the default, terminate this Contract in whole or in part: (i) If the Bidder fails to Complete the work within the time period(s) specified in the Contract; or (ii) If the Bidder fails to perform any other obligation(s) under the Contract. (b) On termination of the Contract for default, the EMD of the Bidder will be forfeited. (c) On termination of the Contract for default, action will be taken to blacklist the Bidder. (d) Bank has right to go in court of law if such case is arrived.
1.17	Solvency: If the Auditor being individual or a firm commits any act of insolvency or shall be adjudged an Insolvent or being an incorporated company shall have an order for compulsory winding up made against it or pass an effective resolution for winding up voluntarily or subject to 'supervision of the court and official Assignee or liquidator in such acts of solvency or winding up, as the case may be, shall be unable within seven days after notice of him requiring him to do so, to show to the reasonable satisfaction of the Bank's Engineer that he is able to carry out and fulfil the contract

	and to give security therefore, if so required by the Bank's Engineer. Or If the Bank's Engineer shall clarify in writing to the employer that the Auditor.
1.18	Jurisdiction: All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen at Jammu and only Courts in Jammu shall have jurisdiction to determine the same.
1.19	<p>Insurance: The contractor shall take all insurances at his cost to cover all kinds of risks from the time the equipment/materials leave the manufacturer's works till handing over work to the Bank, in the joint names of the Bank and the contractor and it shall cover the following risks.</p> <p>a) work man compensation for working men</p> <p>Note: These policies shall be valid till the completion of the site survey and shall be submitted prior to obtaining any permission to work at site. If the contractor does not provide these policies, the Bank reserves the right to take the above insurance policies themselves and/or recover the cost thereof from the bill of the contractor.</p>
1.20	<p>Payment Condition:</p> <p>a) 100% of the quoted amount after completion of energy audit & on submission of the final report in triplicate hard copy to the Bank.</p> <p>b) Bill is liable to deduct TDS@1% or 2% of contract amount (1% in case of individual firm and 2% for company) and 1% of contract value each of TDS on CGST and SGST or 2% of contract value for TDS on IGST.</p> <p>c) Bill will be paid within 45 days from the date of submission to the Bank.</p>
1.21	<p>Special Condition:</p> <p>Some additional table/formats related to green certification of the office building in future, have also been included under scope of work of the tender. So, bidders are advised to thoroughly acquaint himself with the scope of work before submission of the tender. No extra payment shall be done on account of it.</p>
Date	Signature of the firm
Place	(By a person holding the Authority/Power of Attorney)

Section-II
Details of Tenderers

A. Particulars of Firm:

Sr. No.	Particulars	To be filled by Tenderer
1	Composition of the firm (Whether partnership / proprietorship /Public Ltd.)	
2	Names of the proprietor/ partners / Directors of the firm	
3	Whether qualified accredited energy auditor by Bureau of Energy Efficiency	(Yes/NO) certificate of accreditation is to be attached
4	GST Number	
5	Address of the Firm	
	Telephone	
	Email	
	Fax	
6	Whether the firm is MSE(micro and small enterprise)	(yes/No) necessary certificate needs to be attached for EMD exemption)
7.	Udhyam Registration number (applicable for MSE firms only)	

B. The details of bankers are as below:

Sr. No.	Particulars (submit the crossed cancelled cheque)	To be filled by tenderer
1	Name of the Bank	
2	Branch Address	
3	Telephone and fax number	

4	Name of the contact person	
5	Credit facility / overdraft facility enjoyed by firm from the Bank	
6	The period from which the firm has been banking with Bank	

C. List of clients

Following are our Clients for whom we have executed "eligible" works required as per the eligibility criteria (Please submit the documentary evidence in support of)

Sr. No.	Details	Client (1) As per clause 1.1.9(b)	Client (2) As per clause 1.1.9(c)
1	Name of the Client Organization / Firm:		
	Address:		
	Name of the Contact Person:		
	His/her Mobile No.:		
	His/her Fax No.:		
	His/her Telephone No/s.:		
	His/her e-mail ID:		
2	Brief details of work with connected load and sanctioned load details		
3	Work order No. and date (Attach corresponding workorder)		
4	Cost of the "eligible" work		

Sr. No.	Details	Client (1) As per clause 1.1.9(b)	Client (2) As per clause 1.1.9(c)
	as per work order / letter of award:		
5	Whether the Establishment is with central air-conditioning system		
6	Date of commencement		
7	Stipulated date of completion		
8	Actual date of completion		
9	Amount of compensation levied by the client for delayed completion, if any:		
10	Gross value of the work completed and paid for :		

Note: All the details must be filled in the tender documents only no separate annexure will be accepted. Only Submit documents in support of details filled above.

Signature of Tenderer with stamp/Date

Section-III (Scope of the work)

Section III (Scope of the Work)

	<p>Name of work: Reserve Bank of India Jammu is desirous of undertaking Energy audit of the Electrical/Electromechanical installations provided in the office building.</p>																																	
	<p>Objective & scope of work: The objective of energy audit is -</p> <ul style="list-style-type: none">a) to have Energy Performance Assessment of equipment and utilities in the electrical sub-station, Electric power distribution network, HVAC systems, Electric motors and drives, Fans and blowers, Water pumping systems, UPS systems, Lighting systems, Diesel generator sets etc. including study of energy consumption pattern and management of power demand in the building.b) Based on the above observations, to identify opportunities for energy saving and to have recommendations for the same along with cost benefit analysis.c) The successful firm shall depute the qualified accredited energy auditor for the carrying out the energy audit.d) The all-necessary data shall be collected on-site, the report shall be prepared based on the actual data collected.																																	
	<p>Details of electrical supply distribution of Office: The office building receives 11 KV power supply from Electric Supply authorities which is step down to 415 V using transformers in office premises for further distribution to various electrical loads. Additionally, diesel generator sets of appropriate ratings are provided to cater essential applications during power outages like lighting, SBS machines, compressors etc. The building is ventilated, and air conditioned with chillers and cooling towers during summers and hot water generators during winters. UPS system is also provided for critical area needs and for the load where power disruption is not permitted like computers, DIT servers, CCTV servers, CVPS, etc.</p> <p>Equipment details: The major list of equipment/ electric installations for which energy audit is to be conducted are detailed below:</p> <table><tr><td>1.</td><td>Building description</td><td>Main building - 4 floors (B,G,1,2) and Annex building –3 floors (G,1,2)</td></tr><tr><td>2.</td><td>Sanctioned load</td><td>628.89 KVA</td></tr><tr><td>3.</td><td>Power supply</td><td>HT 11 KV which is step down to 415 V</td></tr><tr><td>4.</td><td>Transformers</td><td>2 nos.; 500 KVA each; ON load tap changer</td></tr><tr><td>5.</td><td>DG sets</td><td>250 KVA-1 no, 400 KVA-1 no</td></tr><tr><td>6.</td><td>LT panels and capacitor panels</td><td>Non-DG set load of AC plant; AMF panels for lighting and other loads</td></tr><tr><td>7.</td><td>HVAC Plant</td><td>210 TR; 2nos.; screw chilled centrifugal compressor</td></tr><tr><td>8.</td><td>Air Handling Units</td><td>8 nos.; 5000-28000 CFM</td></tr><tr><td>9.</td><td>Chilled water pumps</td><td>15HP; 2 nos.</td></tr><tr><td>10.</td><td>Condenser water pumps</td><td>20HP; 2 nos.</td></tr><tr><td>11.</td><td>Cooling Tower</td><td>250 TR; 2 nos. (Fan cooled)</td></tr></table>	1.	Building description	Main building - 4 floors (B,G,1,2) and Annex building –3 floors (G,1,2)	2.	Sanctioned load	628.89 KVA	3.	Power supply	HT 11 KV which is step down to 415 V	4.	Transformers	2 nos.; 500 KVA each; ON load tap changer	5.	DG sets	250 KVA-1 no, 400 KVA-1 no	6.	LT panels and capacitor panels	Non-DG set load of AC plant; AMF panels for lighting and other loads	7.	HVAC Plant	210 TR; 2nos.; screw chilled centrifugal compressor	8.	Air Handling Units	8 nos.; 5000-28000 CFM	9.	Chilled water pumps	15HP; 2 nos.	10.	Condenser water pumps	20HP; 2 nos.	11.	Cooling Tower	250 TR; 2 nos. (Fan cooled)
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12.	Hot water generator	1 Nos.-150 KW; 1 nos. 160 KW
13.	Air conditioners	Split, window, Precision, tower
14.7	UPS	2x80 KVA; 1 nos
15.	Lifts	3 nos of passenger lift; 1 nos of bullion lift
16.8	Firefighting system	Diesel Pump; Jockey Pump; Electric Pump
17.	Special equipment	SBS, CVPS, Kitchen equipment, water pumps, overhead pumps, LED Lighting, Fans, coolers, Ductable units
Any other equipment in existing electrical system not mentioned above but necessary to consider for complete the Energy audit report are also included		
<p><u>Work at Site:</u></p> <p>i) All the equipment/instruments required for site measurements for carrying out the energy audit will have to be arranged by the firm without any extra payment to the Bank.</p> <p>The firm should have the following minimum equipment/instruments for energy audit:</p> <ol style="list-style-type: none"> 1. Three-phase Power analyser 2. Ultra-sonic flow meter 3. Pressure gauges 4. Thermometers 5. Anemometers 6. Thermography camera 7. Harmonic Analyzer. 8. CO2 level sensor <p>ii) All testing instruments/meters shall be accompanied with valid calibration certificate.</p> <p>iii) The site measurements should be recorded in the presence of Bank's personnel.</p> <p>iv) The work must be carried out in a working office building without causing inconvenience to normal working of the Bank. No power shutdown shall be provided during office hours. Power shutdown required for the work shall be given on holidays and after office hours at the discretion of bank. No extra claims shall be admissible later these grounds.</p> <p>v) The firm should deploy only qualified and experienced Engineers/Technicians having requisite license to carry out such works. Utmost care shall be exercised by the firm in carrying out the work to ensure that no damage is caused to persons and properties. The bank will not be liable for any injury or damage to persons and any such happening will be entirely the responsibility of the firm.</p> <p>vi) Bank will not provide any kind of assistance in the form of men/material and the firm will have to make their own arrangement for all assistance</p>		

Scope of work

Energy audit activities shall include the following:

- a) Pre-Audit:** Meeting with Bank's technical team, Visual inspection of the site & verification of various documents regarding energy consumption and electrical installation.
- b) Audit:** Auditing and performance analysis to determine the condition of electrical installation as detailed below.
- c) Submission of Draft report** to Bank and discuss the report with Bank's representative.
- d) Submission of Final report** to Bank after incorporating the changes as per discussions with the Bank.

The energy audit of the electrical installation shall cover the following activities:

i) Building Energy Bills Analysis

Analysis of energy consumption pattern in the building with respect to peak demand, load pattern, power factor for the last 3 years.

ii) Electricity Supply and Distribution network-

Distribution Transformer

Study and analysis of the utility pattern of transformers, checking no load losses of the transformers, including all day Efficiency of each transformer etc. Load distribution pie chart for building (lighting loads, power loads and AC load); Energy consumption by services in the building

LT Distribution Panels

1. General inspection of the LT distribution panel(s) for its maintenance and working including checking all the meters mounted on it.
2. Performing thermography for the cable termination wherever required and analysis of the observations.
3. Measurement and analysis of demand and power factor, suggestions to reduce the demand and improve the power factor.
4. Study on Metering system and suggestion for improvement.
5. Study on V, I, KW fluctuation and profiling, V & I imbalances in the network.
6. Detailed examination of the existing energy use of the facility with break up.
7. Study and examination of judicious use of electric energy, cost balance with break up.
8. Performance evaluation of installed capacitors to ensure deliverance of desired output, level of losses, management of system power factor and operation of capacitors.

iii) Air Conditioning systems-

Centralised Air Conditioning System

1. Performance evaluation of existing central air conditioning system(s) in all the areas, measurement and analysis of indoor temperatures and suggest

optimising the energy utilisation.

Chillers -

1. Measuring all the operating parameters such as water flow (If the actual flow found to be in variation with the designed flow, the same needs to be adjusted to match designed flow before taking observations) inlet & out water temperatures, gas suction & discharge pressure, Power Consumption etc. after stabilising the parameters.
2. Calculation of operating Input KW per TR (IKW / TR) of Chillers at minimum three different available load conditions for each chiller.
3. Comparison of actual parameters with the design values, and suggestion for corrective actions to be implemented.

Pumps –

1. Measuring all the operating parameter such as water flow, suction & discharge head, power consumption etc.
2. Performance Evaluation of chilled water & Condenser water pumps and compare the same with the design or generally expected efficiency of such pumps.

Cooling Towers –

1. Measurement of various parameters for cooling tower fans, water flow rate, air flow rate, dry bulb temperature (DBT) wet bulb temperature (WBT) sump temperature, relative humidity etc.
2. Evaluation of cooling tower performance (Range, approach, and effectiveness) and comparing it with designed data.

Air Handling Units

1. Measurement of airflow, Relative Humidity (RH), Supply air temperature (Tsa), Return air temperature (Tra), Chilled Water Inlet and outlet temperature i.e. Tin, Tout through cooling coil and energy consumption of Air Handling Units (AHUs).
2. Examination of Air Handling Units for air delivery capacity, capacity utilization, temperature pattern, pressure drop and operational pattern with respect to time to identify potential energy saving measures.
3. Calculation of actual tonnage of AHUs and Measurement of operating zone temperatures under each unit. Comparison of actual parameters with the design values.

Package precision Air Conditioners / Split or window air conditioners

1. Evaluation of operating Coefficient of Performance (COP) of Precision and package Air Conditioner. Identification and suggestions for performance improvement and energy saving potential.
2. Calculation of actual tonnage and comparison of actual parameters with the design values and corrective actions.

UPS

1. Measurement and analysis UPS loading, redundancy, operating efficiency, no load and on load losses, load pattern to suggest measures for energy cost reduction, Measurement, and analysis of Harmonics as per standards and total harmonic distortion calculations.
2. Numerical Values of operating load losses and operating efficiency of UPS

Lighting

1. Examination of the performance of existing lighting system in all the areas, measurement of illumination levels and comparison with standards, etc
2. To look possibilities to reduce energy use by incorporating energy efficient lighting system.

Diesel generator sets

1. General Inspection of DG set.
2. The DG sets are to be tested for operational performance and parameters including fuel consumption, power generated, Voltage, Ampere, KW, KWh, KVA should be recorded during the audit.
3. Specific fuel consumption (kWH/Ltr) of DG sets.

Fire Hydrant Pumps and Domestic water pumps

1. Performance analysis of all major motors (above 10 HP) needs to be studied for possible energy saving opportunities by the application of following items
 - a) Possibility of on/off control
 - b) Interlocking
 - c) Downsizing motors

A. Energy Audit Report**i) Observations with detailed Analysis**

The report shall contain complete building information, inventory of all equipment. It should include the log sheet data collected/measured at site, analysis of data (Log sheet and actual measured), observations of operational performance of various equipment, findings, and recommendations for achieving energy and cost saving . The report shall explicitly include following:

ii) Additional Tables/formats

- a) Lighting power densities calculation for exterior area (Parking, landscape, roads, entry /exit walkways etc.) and building facades and their comparison with power limits applicable as per ECBC code section 7.3.5; site plan showing lighting fixtures in auto cad.
- b) EPI calculation for the building and compare with standards as prescribed in ECBC code for buildings having more than 50% area as air conditioned. And as required for IGBC system for green rating for existing office building.
- c) Table of fresh air ventilation rate in all regularly occupied areas and its

	<p>comparison with standard minimum ventilation rate as prescribed under IGBC system for green rating for existing office building.</p> <p>d) CO2 level details in various regularly occupied areas.</p> <p>iii) Recommendations-</p> <p>The recommended energy saving measures shall be categorized as (i) short term, (ii) medium term and (iii) long term measures for energy conservation. The report should also include energy use indices and comparison with industry averages.</p> <p>Further, the report should provide the estimated cost, estimated savings and simple pay back for each recommended energy saving measures in a chart. A detailed description of each energy conservation measure and supporting calculation with energy use and savings calculations, economic analysis and any assumptions that are made regarding operation or equipment efficiency shall be included. The recommendations for energy efficiency shall include the technical particulars of the equipment, life expectancy and details of manufacturer available near Jammu etc. The recommendation shall be provided with Payback period based on the actual site condition not the designed/ideal conditions.</p> <p>A sample covering page of the final report is attached as ANNEXURE II for reference of the tenderer.</p>
Date	Signature of the firm
Place	(By a person holding the Authority/Power of Attorney)

Section-IV (Un-priced financial- bid/ Part-II)

Name of work: Tender for Conducting Energy Audit of Bank's Office Building at Jammu

Sr. No	Description	Qty
1.	Rate for conducting energy audit and submitting energy audit reports as per the scope specified in tender Part I	Lumpsum

The bidder quoted lowest amount shall be considered as L1 bidder for the award of the contract. The rate shall be inclusive of all.

Date

Seal and Signature of the firm

Place

Annexure I

FORMAT FOR ARTICLES OF AGREEMENT (for successful bidder)

(On the Rs.100/- stamp paper)

यह समझौता अनुबंध भारतीय रिज़र्व बैंक, Jammu) जिसके बाद बैंक कहा जाएगा (और _____ के मध्य दिनांक _____ को) इसके बाद " ठेकेदार "कहा जाएगा(निष्पादित किया गया।

ARTICLES OF AGREEMENT made the _____ day of _____ between the Reserve Bank of India, Jammu (hereafter called "The Bank") of the one part and _____ (thereinafter called "the Contractor") of the other part.

जहां बैंक वांछित है, भारतीय रिज़र्व बैंक, जम्मू के बैंक कार्यालय भवन में ऊर्जा लेखा परीक्षा कराने का कार्य और किए गए कार्य का विशिष्ट वर्णन करें।

WHEREAS The Bank is desirous of Conducting Energy Audit of Bank's Office Building at Jammu and has caused specifications describing the works to be done.

और उक्त विशिष्टताओं के अनुसार, मात्रा और रेखाचित्रों की अनुसूची पर या पार्टियों की ओर से हस्ताक्षर किए गए हैं।

AND WHEREAS the said specifications, the Schedule of Quantities and drawings have been signed by or on behalf of the parties hereto.

और यतः ठेकेदार ने इसके आगे उल्लिखित शर्तों तथा परिणाम की अनुसूची तथा ठेके की शर्तें (जिन्हे) इसके आगे सामग्री रूप से "उक्त शर्तें" कहा गया है) के अधीन उक्त आरेखनों में दर्शाये गए और/या उक्त विनिर्देशों में वर्णित तथा परिणाम की अनुसूची में सम्मिलित निर्माण कार्य को उनमे निर्दिष्ट दरों के अनुसार हिसाब लगाई गयी कुल राशि पर या ऐसी अन्य राशि पर , जो उनके अधीन देय हो (जिसे इसके आगे "उक्त ठेके की राशि" कहा गया है) निष्पादित करना स्वीकार किया है।

AND WHEREAS the Contractor has agreed to execute upon the subject to the Conditions set forth herein and to the Conditions set forth in the Special Conditions and in the Schedule of Quantities and Conditions of Contract (all of which are collectively hereinafter referred to as "the said Conditions") the works shown upon the said drawings and/or described in the said specification and included in the Schedule of Quantities at the respective rates therein set forth amounting to the sum as therein arrived at or such other sum as shall become payable thereunder (hereinafter referred to as 'the said Contract Amount')

अब इस बात पर निम्न तरह से सहमति है:

NOW IT IS HEREBY AGREED AS FOLLOWS:

1	<p>उक्त शर्तों में निर्दिष्ट अवधियों में और प्रणाली से देय ठेके की राशि के बदले ठेकेदार उक्त शर्तों पर तथा उनके अधीन और उक्त आरेखनों में दर्शित तथा उक्त विनिर्देशों एवं परिमाणों की अनुसूची में उल्लिखित निर्माण कार्य निष्पादित करेगा और पूरा करेगा।</p> <p>In consideration of said Contract Amount to be paid at the times and in the manner set forth in the said conditions, the Contractor shall upon and subject to the said Conditions execute and complete the work shown upon the said Drawings and described in the said Drawings and described in the said Specifications and the Schedule of Quantities.</p>
2	<p>बैंक ठेकेदार को उक्त शर्तों में निर्दिष्ट अवधियों में तथा उनमें निर्दिष्ट प्रणाली से उक्त ठेके की राशि या ऐसी कोई अन्य राशि, जो देय हो जाए, अदा करेगा।</p> <p>The Bank shall pay the Contractor the said Contract Amount, or such other sum as shall become payable, at the times and in the manner specified in the said conditions.</p>
3	<p>उक्त शर्तों को और उनके परिशिष्ट को इस करार के भाग के साथ पढ़ा जाएगा तथा इस करार से संबन्धित पक्ष उक्त शर्तों का क्रपशः पालन करेंगे, अपने-आपको उनके अधीन मानेंगे तथा उसमें उल्लिखित शर्तों के अधीन अपनी और से करार का निष्पादन करेंगे।</p> <p>The said Conditions and Appendix thereto shall be read and construed as forming part of this agreement and the parties hereto shall respectively abide by, submit themselves to the said Conditions and perform the agreements on their part respectively in the said Conditions contained.</p>
4	<p>इसमें उल्लिखित नक्शे, करार और प्रलेख इस संविदा के आधार माने जायेंगे।</p> <p>The plans, agreement and documents mentioned herein shall form the basis of this Contract.</p>
5	<p>यह संविदा न तो निर्धारित एकमुश्त राशि की संविदा है और न ही फुटकर कार्य की संविदा, परंतु यह सम्पूर्ण" – भारतीय रिज़र्व बैंक, Jammu के बैंक कार्यालय भवन में ऊर्जा लेखा परीक्षा कराने के कार्य "के संबंध में कार्य को पूरा करने की संविदा है जिसके लिए दरों की अनुसूची तथा संभाव्य परिमाणों में उल्लिखित दरों पर या उक्त शर्तों में निर्दिष्ट दरों पर वस्तुतः हिसाब लगायी गयी मात्राओं के अनुसार अदायगी की जाएगी।</p> <p>This Contract is neither a fixed/ Lump sum Contract nor a Piece work Contract but is a Contract to carry out the “Conducting Energy Audit of</p>

	Bank's Office Building at Jammu" to be paid for according to actual measured quantities at the rates contained in the Schedule of Rates and Probable quantities or as provided in the said Conditions.
6	<p>अनुबंध में दिये अनुसार ठेकेदार को सिविल संबंधी सभी कार्यों हेतु वाजिब सुविधा वहन करनी होगी एवं ऐसे कार्यों के पूरा होने के बाद दीवारों, फर्श आदि को हुये नुकसान को ठीक करना होगा।</p> <p>The Contractor shall afford every reasonable facility for the carrying out of all works relating to civil works and other ancillary works in the manner laid down in the said Conditions, and shall make good any damages done to walls, floors etc. after the completion of such works.</p>
7	<p>बैंक इस अनुबंध में बिना किसी पूर्वाग्रह के किए जानेवाले कार्य में किसी भी मद को जोड़ने या हटाने एवं ड्राइंग और कार्य की प्रकृति को बदलने का अधिकार रखता है।</p> <p>The Bank reserves to itself the right of altering the Drawings and nature of the work by adding to or omitting any items of work or having portions of the same carried out without prejudice to this contract.</p>
8	<p>समय को इस अनुबंध के महत्वपूर्ण कारक के रूप में माना जाएगा, और ठेकेदार साइट को सौंपने के तुरंत बाद या औपचारिक कार्य आदेश जारी होने के 14 दिनों के बाद जो भी बाद में हो दी गई शर्तों एवं समय विस्तार के प्रावधानों के अनुसार दी गई शर्तों के अनुसार कार्य पूर्ण करेगा एवं समय विस्तार के प्रावधानों के अधीन है।</p> <p>Time shall be considered as one of the important factor of this Contract, and the Contractor hereby agrees to commence the work soon after the site is handed over to him or from 14 day after the day of issue of formal works order as provided for in the said Conditions, whichever is later, and to complete the entire work as provided in said condition, subject nevertheless to the provisions for extension of time.</p>
9	<p>इस अनुबंध के तहत बैंक द्वारा सभी भुगतान केवल जम्मू में किए जाएंगे।</p> <p>All payments by The Bank under this Contract will be made only at Jammu.</p>
10	<p>इस समझौते से जुड़े या किसी भी तरह से उत्पन्न होने वाले सभी विवादों को जम्मू में उत्पन्न माना जाएगा और इनका निपटान केवल जम्मू में न्यायालयों के ही अधिकार क्षेत्र में होगा।</p> <p>All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen at Jammu and only Courts in Jammu shall have jurisdiction to determine the same.</p>
11	<p>इस संविदा के विभिन्न अंशों को ठेकेदार ने पढ़ लिया है तथा उन्हें पूर्ण रूप से समझ लिया है।</p> <p>That the several parts of this Contract have been read by the Contractor and</p>

	fully understood by the Contractor.
12	<p>गैर-प्रकटीकरण खंड : ठेकेदार बैंक ,के बुनियादी ढांचे/प्रणालियों/उपकरणों आदि की प्रत्यक्ष या अप्रत्यक्ष रूप से किसी भी जानकारी, सामग्री और विवरण का किसी तीसरे पक्ष को खुलासा नहीं करेगा, जो इस समझौते के संबंध में अपने संविदात्मक दायित्वों के निर्वहन के दौरान ठेकेदार के कब्जे या ज्ञान के पास आ सकता है, और हर समय इस पर विश्वास रखेगा। ठेकेदार सिवाय इसके तहत दायित्वों को पूरा करने या लागू कानूनों का पालन करने के लिए आवश्यक सीमा के अलावा अनुबंध के विवरण को वैयक्त और गोपनीय मानेगा। ठेकेदार नियोक्ता की पिछली लिखित सहमति के बिना किसी भी व्यापार या तकनीकी पत्र या अन्य जगहों पर कार्यों के किसी भी विवरण का खुलासा, प्रकाशित होने की अनुमति नहीं देगा। ठेकेदार किसी भी गोपनीय जानकारी के प्रकटीकरण के परिणामस्वरूप नियोक्ता को होने वाले किसी भी नुकसान के लिए नियोक्ता को क्षतिपूर्ति करेगा। उपर्युक्त का पालन करने में विफलता को ठेकेदार की ओर से अनुबंध का उल्लंघन माना जाएगा और नियोक्ता नुकसान का दावा करने और कानूनी उपचारों को आगे बढ़ाने का हकदार होगा। ठेकेदार अपने कर्मचारियों के मध्य सभी उचित कार्रवाई करेगा ताकि यह सुनिश्चित किया जा सके कि इस समझौते के तहत गोपनीय सूचनाओं का प्रकटीकरण न करने के दायित्व पूरी तरह से संतुष्ट हों। गैर-प्रकटीकरण और गोपनीयता के संबंध में ठेकेदार के दायित्व किसी भी कारण से इस समझौते की समाप्ति या इस समझौते के टरमिनेशन के बाद भी बने रहेंगे।</p> <p>Non-Disclosure clause: The Contractor shall not disclose directly or indirectly any information, materials and details of the Bank's infrastructure/systems/equipment etc., which may come to the possession or knowledge of the Contractor during the course of discharging its contractual obligations in connection with this agreement, to any third party and shall at all times hold the same in strictest confidence. The Contractor shall treat the details of the contract as private and confidential, except to the extent necessary to carry out the obligations under it or to comply with applicable laws. The Contractor shall not publish, permit to be published, or disclose any particulars of the works in any trade or technical paper or elsewhere without the previous written consent of the Employer. The Contractor shall indemnify the Employer for any loss suffered by the Employer as a result of disclosure of any confidential information. Failure to observe the above shall be treated as breach of contract on the part of the Contractor and the Employer shall be entitled to claim damages and pursue legal remedies. The Contractor shall take all appropriate actions with respect to its employees to ensure that the obligations of non-disclosure of confidential information under this agreement are fully satisfied. The Contractor's obligations with respect to non-disclosure and confidentiality will survive even after the expiry or termination of this agreement for whatever reason.</p>

13	<p>यौन उत्पीड़न की रोकथाम संबंधी उपबंध-</p> <p>ठेकेदार/एजेंसी कार्य स्थल) रोकथाम, निषेध और निवारण (अधिनियम 2013 में महिलाओं के यौन उत्पीड़न के प्रावधान के पूर्ण अनुपालन के लिए पूरी तरह जिम्मेदार होगी। बैंक के परिसर के भीतर अपने कर्मचारी के खिलाफ यौन उत्पीड़न की किसी भी शिकायत के मामले में ठेकेदार/एजेंसी द्वारा गठित आंतरिक शिकायत समिति के समक्ष शिकायत दर्ज की जाएगी और ठेकेदार/एजेंसी शिकायत के संबंध में उक्त अधिनियम के तहत उचित कार्रवाई सुनिश्चित करेगी। बैंक के किसी भी कर्मचारी के खिलाफ ठेकेदार के किसी भी गंभीर कर्मचारी से यौन उत्पीड़न की किसी भी शिकायत का बैंक द्वारा गठित क्षेत्रीय शिकायत समिति द्वारा संज्ञान लिया जाएगा। यदि ठेकेदार के कर्मचारी द्वारा यौन हिंसा साबित हो जाती है, तो ठेकेदार किसी भी मौद्रिक मुआवजे के लिए जिम्मेदार होगा, जिसे घटना में कर्मचारी शामिल होने की स्थिति में भुगतान करने की आवश्यकता हो सकती है। ठेकेदार अपने कर्मचारी को कार्यस्थल पर यौन उत्पीड़न की रोकथाम और संबंधित मुद्दे के बारे में शिक्षित करने के लिए जिम्मेदार होगा।</p> <p>Prevention of Sexual harassment clause :-The contractor/Agency shall be solely responsible for full compliance with the provision of “the sexual Harassment of women at work place (Prevention, Prohibition and Redressal) Act 2013”. In case of any complaint of sexual harassment against its employee within the premises of Bank, complaint will be filed before the Internal complaint committee constituted by the Contractor/Agency and the Contractor/Agency shall ensure appropriate action under the said Act in respect to the complaint. Any complaint of sexual harassment from any aggravated employee of the contractor against any employee of the Bank shall be taken cognizance of by the Regional Complaints Committee constituted by the Bank. The Contractor shall be responsible for any monetary compensation that may need to be paid in case the incident involves the employee, if sexual violence by the employee of the contractor is proved. The contractor shall be responsible for educating its employee about prevention of sexual harassment at work place and related issue.</p>
यदि ठेकेदार एक भागीदारी या एक व्यक्ति है If the contractor is a Partnership or an Individual	<p>इसके साक्ष्य में बैंक तथा ठेकेदार ने इन दस्तावेजों तथा मूल प्रति पर इसके ऊपर उल्लेखित दिन और वर्ष में हस्ताक्षर किए हैं।</p> <p>IN WITNESS WHEREOF The Bank and the Contractor have set their respective hands to these presents and two duplicates hereof the day and year first hereinabove written.</p>

यदि ठेकेदार एक कंपनी है If the contractor is a Company	इसके साक्ष्य में बैंक ने अपने विधिवत प्राधिकृत किये हैं और ठेकेदार ने इन पर तथा उक्त दोनों प्रतिलिपियों पर अपनी नियमित मोहर लगवाई है/इसके पहले उक्त दिनांक और वर्ष को अपनी ओर से इन दस्तावेजों तथा उक्त दो प्रतिलिपियों का निष्पादन करवाया है। IN WITNESS WHEREOF The Bank has set its hand to these presents through its duly authorized official and the Contractor has caused its common seal to be affixed hereunto and the said two duplicate/has caused these presents and the said two duplicates hereof to be executed on its behalf, the day and year first hereinabove written.
---	---

Signature Clause

SIGNED AND DELIVERED by the Reserve Bank of India by the hand of
Shri

(name and designation)

.....
..... in the presence of

(1)

Address

(2)

Address

.....
.....
.....

Witnesses

SIGNED AND DELIVERED BY If the part is a partnership firm or any individual
..... should be signed by all or on behalf of all the
..... partners.

(1)

Address

.....
.....
.....

2)

.....
..

Address

.....
.....
.....

If the Contractor signs under its common Seal
the signature clause should tally with their
sealing clause in the Articles of Associations.

Witnesses

THE COMMON SEAL OF

Was hereunto affixed pursuant to
the resolutions passed

By its Board of Directors at the
meeting held on

.....
.....
.....
.....

In the presence of

(1
)

.....

....
(2
)

.....
Directors who have signed these
presents in taken thereof in the
presence of

(1)

.....
(2)

.....
SIGNED AND DELIVERED BY the
Contractor by the hand Of
Shri

.....
and duly constituted attorney.

The Contractor is signing by the hand of power
of attorney whether a company or individual.

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Report
On
Energy Audit of Bank's Office Building
at _____

Duration of Energy Audit:

Name of the Energy Audit Agency: _____

Address: _____

Summary of Recommendations

(The chart /table shall include the estimated cost, estimated savings and simple pay back for each recommended energy saving measures bifurcated under short term, medium term and long term measures detailed in a chart. The detailed description of measures may be mentioned separately in the report.)

Details of existing Electrical Systems

Details of Power Supply:

Sanctioned Load (KVA)	
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Details of Major Power Equipments:

Central AC Plant Data					
	Capacity (TR)	Compressor Motor 1 (KW)	Compressor Motor 2 (KW)	Chilled water flow (LPM)	Condenser water flow (LPM)
Chiller No. 1					
Chiller No. 2					

Chilled Water Pumps

	Flow (LPM)	Head (M)	Motor(KW)
Chilled Water Pump 1			
Chilled Water Pump 2			

Condenser Water Pumps

	Flow (LPM)	Head (M)	Motor(KW)
Condenser Water Pump 1			
Condenser Water Pump 2			

Cooling Towers

	Capacity (TR)	Flow (LPM)	Motor(KW)
Cooling Tower 1			
Cooling Tower 2			

Air Handling Units

Air Handling Units (AHUs)	Location	Capacity (TR)	Air Flow(CFM)	Motor (KW)	<u>Area Catered</u> (M2)
AHU 1					
AHU 2					
AHU 3					
AHU 4					
AHU 5					
AHU 6					
AHU 7					
AHU 8					

Lightening**Internal Lightening (Floor wise)**

Sr.No.	Floor	Type of Fitting	Wattage	Qty.	Total carpet area covered (M2)

External Lightening

Sr.No.	Floor	Type of Fitting	Wattage	Qty.	Tota carpet area covered (M2)

Lifts

Lifts No.	Location	Make	Passenger Capacity	Speed(M/S)	No. Of floors served	Whether controller V3F or
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						not
1						
2						
3						
4						

Standalone A. C. units where central AC is also provided (Area wise)

Sr.No.	Location	Type of AC(Window/ Split/Package etc.)	Qty	Capacity of each AC(TR)	Area Catered (M2)	Expected per day operating hrs.

DG Sets

	Location	Make	Rating(KVA)
DG Set No. 1			
DG set No. 2			

UPS Details

Sr.No.	Location	Make	Capacity(KVA)

Performance Evaluation of Main Equipments-Sample Formats

D. Central AC Plant

1. Chiller No. ____

Sr. No.	Chilled Water Inlet Temp. (Tin)°C	Chilled Water outlet Temp. (Tout)°C	Chilled Water Flow (LPM)	Suction Pressure	Discharge Pressure	Capacity (TR)	Input Power (KW)	/KW/ TR	Remarks/ Comments/ Suggestions

Capacity of the Chiller (TR) = (Tin -Tout)*Water Flow rate (LPM)*60/3024

Efficiency of Chiller in KW/TR = Total Power input (in KW)/Total Tonnage

2. Air Handling Units

Air Handling Unit (AHU) No. _____

	Return / Inlet Air		Supply / Outlet Air						
Sr.No.	Dry bulb Temp. T db (°C)	Wet bulb Temp. T wb (°C)	Dry bulb Temp. T db (°C)	Wet bulb Temp. T wb (°C)	Air Flow (CFM)	Tons of Refrigeration (TR)	Input (KW)	/KW/ TR	Remarks/ Comments/ Suggestions

AHU TR = 1.699*Air Flow (CFM)* Density of Air (Kg/M3)*(Hin-Hout)/(4.18* 3024)

Where:

Hin = Enthalpy of inlet Air at AHU (KJ/Kg)

Hout = Enthalpy of outlet Air from AHU(KJ/Kg)

Density of Air = 1.18 Kg/M3 at standard Temperature and Pressure

Note: Enthalpy is to be read from Psychrometric Chart corresponding to DB and WB Temp.

3. Chilled Water Pumps

Chilled Water Pump No. _____

Sr. No.	Discharge Pressure (Pdisc) Kg/cm ²	Suction Pressure (Psuc) Kg/cm ²	Chilled Water Flow (LPM)	Developed Hydraulic Power (KW)	Measured Input Power (KW)	Pump Efficiency	Remarks/ Comments/ Suggestions

Developed Hydraulic Power (KW) = Flow (LPM) * (Pdisc-Psuc) Kg/cm² *9.81/6000

Pump Efficiency = Developed Hydraulic Power (KW)/Input Electric KW

4. Condenser Water Pump

Condenser Water Pump No. _____

Sr. No.	Discharge Pressure (Pdisc) Kg/cm ²	Suction Pressure (Psuc) Kg/cm ²	Condenser Water Flow (LPM)	Developed Hydraulic Power (KW)	Measured Input Power (KW)	Pump Efficiency	Remarks/ Comments/ Suggestions

Developed Hydraulic Power (KW)= Flow (LPM)*(Pdisc-Psuc)*9.81/6000

Pump Efficiency =Developed Hydraulic Power (KW)/Input Electric KW

5. COOLING TOWER

Sr. No.	Water Inlet Temp. (Tin)°C	Water outlet Temp. (Tout)°C	Water Flow (LPM)	Wet Bulb Temp. Twb(°C)	Cooling Tower Capacity (TR)	Cooling Tower Efficiency	/KW/ TR	Remarks/ Comments/ Suggestions

Range= Tin-Tout

Approach= Tout-Twb

Cooling Tower Efficiency = Range*100/ (Range+Approach)

Cooling Tower Capacity (TR) = (Tin -Tout)*Water Flow (LPM)*60/3024

E. Internal Lightning (Floor wise)

[illegible]

F. DG set

1. Run the DG set at available load
2. The initial and final reading of the diesel tank and Energy meter needs to be recorded.

[illegible]

G. UPS

1. Measurement on each UPS needs to be recorded

[illegible]

HT/LT Panels: LT Panels at Substation including capacitor

Panel Name:

[illegible]