



**Reserve Bank of India
Estate Department
Kanpur**

Tender for “Conducting Energy Audit of Bank’s office building at RBI, Kanpur”

Reserve Bank of India, Kanpur invites Tenders in Part-I and Part-II for “**Conducting Energy Audit of Bank’s office building at RBI, Kanpur**”, the estimated cost of which is ₹1.25 Lakhs. The work is to be completed within a period of 45 days from 10th day of issue of work order and the final report should be submitted within 7 days thereafter.

Tender document can be downloaded from our Website www.rbi.org.in. (https://rbi.org.in/Scripts/BS_ViewTenders.aspx) from December 02, 2022 to December 30, 2022. Tender Forms will have to be submitted in a sealed cover at 2nd Floor, Estate Department, Reserve Bank of India, Mahatma Gandhi Road, The Mall, Kanpur up to December 30, 2022 till 13:00 Hrs.

The Bank reserves the right to accept or reject any or all Tenders without assigning any reason thereof.

Tender for “Conducting Energy Audit of Bank’s office building at RBI, Kanpur”	
Tender Issue Date	02.12.2022 from 17:00 hours
Last Date & Time of submission of tender documents	30.12.2022 till 13:00 Hrs.
Opening Date & Time of Tender Part-I	30.12.2022 at 15:00 Hrs.

**Regional Director
Reserve Bank of India
Kanpur**



Reserve Bank of India
Estate Department
Kanpur

Tender for Conducting
Energy Audit of Bank's Office Building at RBI Kanpur

(Part I)

Name of Tenderer: _____

Address : _____

Due Date of Submission : December 30, 2022 till 13:00 hours
Date of Opening of Part I of Tender : December 30, 2022 at 15:00 hours
Venue : Estate Department, RBI Kanpur.

CONTENTS

Sr.No.	Subject	Page No.
1.	Section I-Form of Tender	
2.	Section II-Article Of Agreement	
3.	Section III-Commercial Conditions	
4.	Section IV-Technical Specifications	
5.	Annexure-I	
6.	Annexure-II	

Section I Form of Tender

To,

Place _____

Date _____

The Regional Director/Principal
Estate Department
Reserve Bank of India
Kanpur

Dear Sir,

We have carefully examined the specifications, designs and schedule of quantities relating to the Energy Audit specified in the memorandum hereinafter set out and having visited and examined the site of the Energy Audit as specified in the said memorandum and having acquired the requisite information relating thereto as affecting the tender. We hereby offer to conduct the Energy Audit as specified in the said memorandum within the time specified in the said memorandum at the rates mentioned in the attached Schedule of Quantities and in accordance in all respects with specifications, designs and instructions in writing referred to in articles of agreement, general instructions to the tenderers and special conditions, conditions hereinbefore referred to, specifications, data sheet and schedule of quantities and with such equipments as are provided for, by and in all other respects, in accordance with such conditions so far as they may be applicable.

MEMORANDUM

(a)	Description of works	Conducting Energy Audit of Bank's Office Building at RBI Kanpur
(b)	Estimated Cost	Rs. 1,25,000/-
(c)	Terms of Payment	As per clause 11 of Commercial Conditions
(d)	Earnest Money	2500.00
(e)	Time allowed for completion of work from tenth day of issue of work order.	45 days

2. We also agree that our tender will remain valid for acceptance by the bank for 90 days from the date of opening of Part I of the tender and this period of validity can be

extended for such period as may be mutually agreed between the Bank and Us in writing.

3. Should this Tender be accepted, I/We hereby agree to abide by and fulfill all the Terms and conditions of the Tender and in default, to forfeit and pay to you or your successors, or assignees or nominees such sums of money as are stipulated in the conditions contained in the tender together with the written acceptance of the contract.

4. I/We understand that you reserve the right to accept or reject any or all the tender either in full or in part without assigning any reason therefore. We have deposited a sum of Rs. **2500.00** as earnest money with the Reserve Bank of India, which amount is not to bear any interest. Should we fail to execute the contract when called upon to do so, we do hereby agree that this sum shall be forfeited by the Reserve Bank of India.

5. The Tender is submitted in two parts in separate sealed envelopes as under:

- Part I shall have commercial terms and conditions and technical particulars
- Part II shall have the Price Bid in sealed cover in the Bank's proforma.

Dated this **day** of**2022**.

For and on behalf of M/s _____

(Signature with seal)

Name _____

Designation _____

Place _____

Date _____

(Certified true copy of the Power of Attorney of the above signatory should be enclosed).

Witnesses

(1) Signature with name, _____
Address and date _____

(2) Signature with name, _____
Address and date _____

Section II

Articles Of Agreement

ARTICLES OF AGREEMENT made the _____ day of _____
Between the Reserve Bank of India, having its Office at Mumbai (hereinafter called "the Employer") of the one part and _____ (hereinafter called "the Auditor") of the other part.

WHEREAS the Employer is desirous of **conducting Energy Audit for its Office Building at Kanpur** and has caused drawings and specifications describing the works to be done AND WHEREAS the said specifications, and the schedule of quantities have been signed by or on behalf of the parties hereto.

AND WHEREAS the Auditor has agreed to execute upon and subject to the Conditions set forth in the special conditions and in the Schedule of Quantities and conditions of Contract as modified and finally accepted by both the parties (all of which are collectively 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 there under (**hereinafter referred to as "the said Contract Amount"**).

NOW IT IS HEREBY AGREED AS FOLLOWS

- 2.1 In consideration of the said Contract amount to be paid at the times and in the manner set forth in the said Conditions, the Auditor shall, upon and subject to the said Conditions, execute and complete the work shown upon the said drawings and described in the said Specifications and the Schedule of Quantities.
- 2.2 The Employer shall pay the Auditor the said Contract Amount, or such other sum as shall become payable, at the times and in the manner specified in the said Conditions.
- 2.3 The term "Architect" in the said conditions shall mean CGM, Premises department, Central Office, Reserve Bank of India and on his ceasing to be the architect for the purpose of this Contract for whatever reason, such other person or persons as shall be nominated for that purposes by the Employer, not being a person to whom the Auditor shall object for reasons considered to be sufficient by the Employer PROVIDED ALWAYS that no person or perhaps persons subsequently appointed to be architect under this Contract shall be entitled to disregard or overrule any previous decisions or approval or direction given or expressed in writing by the architect for the time being.
- 2.4 The said Conditions and annexures 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.

- 2.5 The drawings, agreement and documents mentioned herein shall form the basis of this Contract.
- 2.6 This Contract is deemed to be Lump sum Contract as described in the bill of quantities and specifications in part I and part II of the tender documents.
- 2.7 The Auditor shall afford every reasonable facility for carrying out of all works relating to Energy Audit 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.
- 2.8 The Employer reserves to itself the right of altering the nature of the work by adding to or omitting any items of work or having portions of the same carried out by other without prejudice to this Contract.
- 2.9 Time shall be considered as the essence of this Contract and the Auditor hereby agrees to commence the work from the day of issue of works order/letter of acceptance as provided for in the said conditions and to complete the entire work **within 45 days** from tenth day of issue of work order subject nevertheless to the provisions for the extension of time.
- 2.10 All payments by the Employer under this Contract will be made only at Reserve Bank of India, **Kanpur**.
- 2.11 All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in **Kanpur** and only Courts in **Kanpur** shall have jurisdiction to determine the same.
- 2.12 That the several parts of this Contract have been read by the Auditor and fully understood by the Auditor.

If the Auditor is a partnership or an individual	IN WITNESS WHEREOF the Employer and the Auditor have set their respective hands to these presents and two duplicates hereof the day and year first herein above written.
If the Auditor is a company	IN WITNESS WHEREOF the Employer 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 duplicates/has caused these presents and the said two duplicates hereof to be executed on its behalf, the day and year first hereinabove written.

Non-Disclosure clause

The Contractor shall not disclosed 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 Contractors 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 of 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 the expiry or termination of this agreement for whatever reason.

Prevention of Sexual harassment

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.

The contractor shall provide a complete and updated list of its employee who are deployed within the Bank's premises.

Signature clause:

SIGNED AND DELIVERED by the Reserve Bank of India , _____

(Name and designation)

In the presence of

Witness-

(1) _____

Address _____

(2) _____

Address _____

If the party is a Partnership

Firm or individual

SIGNED AND DELIVERED by _____

In the presence of

Witness-

(1) _____

Address _____

(2) _____

Address _____

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-

Witness-

(1) _____

(2) _____

If the Auditor signs under Common seal, the signature Clause should tally with the Sealing clauses in the articles Of association

Directors, who have signed these presents in token thereof in the presence of

(1) _____

(2) _____

If the Contract is signed By the hand of power of Attorney,whethera company or an individual

SIGNED AND DELIVERED BY- the Auditor by the hand of Shri _____

_____ and duly constituted attorney.

Section III
Commercial Conditions

1. Sealed tenders are visited from accredited energy auditors for conducting energy audit in Bank's office buildings at **Kanpur**.
2. **Eligibility:**
 - a) The intending tenderer for energy audit should be **qualified accredited energy auditor** by Bureau of Energy Efficiency. In support of the above, the firms should submit **the letter of accreditation** issued by Bureau of Energy Efficiency.
 - b) The firm should have the experience of carrying out at least **two electrical energy audits** in Banks, Financial institutions, major hotels or multistoried office buildings or any other electrical installations in last 5 years and should submit proof for the same. In case of downloaded tender documents from website, tenderer shall require to submit the documents evidencing the eligibility criteria, on or before the last date of issue of tender forms.
3. The tenders for the above work shall be submitted in separate sealed covers (**Part I and Part II**) addressed to Dr. Ishan Shukla, Regional Director, Estate Department, Reserve Bank of India, Kanpur, so as to reach him not later than **13:00 hours** on December 30, 2022. Envelope shall be super-scribed "**Tenders for conducting energy audit for Bank's office building at RBI Kanpur (Part-I/Part-II)**". Part-I of the tenders will be opened on the same day at **15:00 hours**.
4. Part-II of the tenders will be opened on subsequent date which will be intimated to all the tenderers. Tenderers are advised to use only the forms uploaded on Bank's website. Incomplete tenders are liable for rejection. No terms and conditions or any other information /enclosures shall be included in tender part II. Tender submitted without EMD is liable for rejection. MSME registered firms are exempted from submitting EMD, on producing proof for MSME registration.
5. The Tenders shall be valid for acceptance by the Bank for a period of 90 days from the date of opening of tender Part-I and shall be extended by such period as may be mutually agreed to.
6. **Prices:** The price quoted for the work shall be firm till completion of the work and shall include all taxes including service tax as applicable and cost of transportation/accommodation etc. of the equipments and persons deputed i.e. energy auditing of the buildings shall include all taxes, duties levies imposed by Central/State Government/local bodies, charges for consumable, labour, transport, insurance for transit, storage and testing and third party liability etc. till the work is finally submitting the report to the Bank.
7. 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.
8. 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.

9. **Completion Period:** The time for completion of the entire work is **45 days** from the 10th day of date of award of work. The site survey, data collection/measurements and draft report shall be completed in **45 days** and the final report shall be submitted within **7** days thereafter.

10. **Terms of payment**

The following terms of payment shall be applicable for the work:

i) 80% of the quoted amount after completion of energy audit and submission of draft report to the Bank.

ii) Balance 20% of the quoted amount on submission of the final report to the Bank

All payments for the work will be made after statutory deductions.

11. All disputes arising out of or in way connected with this Agreement shall be deemed to have arisen at **Kanpur** and only courts in **Kanpur** shall have the jurisdiction to determine the same.

12. 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.

13. On receipt of intimation from the employer of the acceptance of his/ their tender, the successful tenderer shall be bound to sign the formal contract and within fourteen days thereof, the successful tenderer shall sign an agreement in accordance with the draft agreement and the schedule of conditions but the written acceptance by the Reserve Bank of India of a tender will constitute a binding contract between the RBI and the person so tendering, whether such formal Agreement is or is not subsequently executed. The cost of necessary stamp paper for execution of the agreement shall be borne by the successful tenderer.

14. 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 fulfill 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.

Date:
Place:

Signature of tenderer
Name and Address

List of clients

(For whom similar scope has been completed in the last 5 years.)

Sr. No.	Details	Name of client (1)	Name of client (2)	Name of client (3)
1	Address, fax and telephone numbers			
2	Establishment name, location and address.			
3	Brief details of the work			
4	Date of award of contract			
5	Date of completion of work			
6	Whether the Establishment is with central air-conditioning system			

Section IV

Terms and Conditions

1. Introduction

Reserve Bank of India **Kanpur** is desirous of undertaking Energy audit of the Electrical/Electromechanical installations provided in the office building at **Kanpur**. The office building receives power supply at **11 KV** from the Electricity supply authorities. In addition, diesel generator sets of suitable capacities have been installed to meet critical applications during power outages.

2. Objective

- a. The objective of energy audit is to have Energy Performance Assessment of equipments 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.

3. Terms & conditions

A. Equipments/measuring instruments

- i) All the equipments/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.

The firm should have the following minimum equipments/instruments for energy audit:

1. Three-phase Power analyser
2. Ultra sonic flow meter
3. Pressure gauges
4. Thermometers
5. Anemometers
6. Thermography camera
7. Harmonic Analyzer .

- ii) All testing instruments/meters shall be accompanied with valid calibration certificate.

- iii) The site measurements should be recorded in the presence of Bank's personnel.

Please note that the 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.

Scope of Work:

A. Methodology:

Energy audit activities shall include the following:

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

B. Equipment details:

The energy audit of the electrical/electromechanical installation as detailed in annexure-I shall be conducted. The major list of equipments is as under:

1. Electricity Supply and Distribution
2. Air Conditioning System
3. Air Handling Units
4. Split / Package Air Conditioners
5. UPS
6. Lighting
7. Kitchen Equipment's
8. Water Pumps
9. Lifts,
10. DG sets
11. Cooling Towers.
12. Any other existing electrical system not mentioned above but necessary to consider for complete the Energy audit report.

C. 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(s)**

Study and analysis of the utility pattern of transformer(s), checking no load loss of the transformers, measuring all Day Efficiency for each transformer etc.,

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 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 to optimise 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 & outlet 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 (T_{sa}), Return air temperature (T_{ra}), Chilled Water Inlet and outlet temperature i.e. T_{in} , T_{out} 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.

iv) UPS

1. Measurement and analysis UPS loading, redundancy, operating efficiency, load pattern to suggest measures for energy cost reduction, Measurement and analysis of Harmonics as per standards.

v) Lightning

1. Examination of the performance of existing lighting system in all the areas, measurement of illumination levels, etc
2. To look possibilities to reduce energy use by incorporating energy efficient lighting system.
3. Study of operating electrical parameters like voltage, current etc in the lightening circuits.

vi) 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.

vii) Kitchen equipments

1. Examination of the performance of the existing kitchen equipments, measurement of power consumption etc to improve efficiency and optimizing power consumption.
2. To look possibilities to reduce energy use by incorporating energy efficient equipments.

Viii) Fire Hydrant Pumps and Domestic water

Pumps

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

D. Energy Audit Report

The report shall contain complete building information, inventory of all equipments. 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 equipments, findings and recommendations for achieving energy and cost saving.

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.

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 etc.

Date:

Place:

Seal & Signature of Agency

Report

On

Energy Audit of Bank's Office Building

at _____

Duration of Energy Audit:

Name of the Energy Audit Agency: _____

Address: _____

Summary of Recommendations

Remarks

Details existing Electrical Systems

Details of Power Supply

Sanctioned Load (KVA)	1000 KVA
-----------------------	----------

Details of Major Power Equipments:

Central A C Plant Data	Capacity (TR)	compressor Motor 1 (KW)	compressor Motor 2 (KW)	Chilled Water Flow (LPM)	Condenser Water Flow (LPM)
Chiller No. 1	250	125 KW	125 KW		
Chiller No. 2	250	125 KW	125 KW		

Chilled Water Pumps

	Flow	Head (M)	Motor (KW)
Chilled Water Pump 1			22kw
Chilled Water Pump 2			22kw
Chilled Water Pump 3			22kw

Condenser Water Pumps

	Flow (LPM)	Head (M)	Motor (KW)
Condenser Water Pump 1			30KW
Condenser Water Pump 2			30KW
Condenser Water Pump 3			30KW

Cooling Towers

	Capacity (TR)	Flow (LPM)	Motor (KW)
Cooling Tower 1	300 TR		7.5HPx3nos
Cooling Tower 2	300TR		7.5HPx3 nos

Air Handling Units (AHUs)	Location	Capacity (TR)	Air Flow (CFM)	Motor (KW)
AHU 1	AOB Basement		14000	5.5
AHU 2	AOB GF		24000	11
AHU 3	AOB (OBO)		24000	11
AHU 4	AOB(CVPS)		24000	11
AHU 5	AOB(2 nd floor, CL)		24000	11
AHU 6	MOB (Basement)		20000	7.5
AHU 7	MOB (X-ray baggage)			5.5
AHU 8	MOB(DAD)		20000	7.5
AHU 9	MOB(PAD)		20000	7.5
AHU 10	DNBS		14000	5.5
AHU 11	FED & Issue		14000	5.5
AHU 12	Banking Hall		14000	5.5
AHU 13	Claims		14000	5.5
AHU 14	Board room		22000	7.5
AHU 15	Estate		20000	7.5
AHU 16	CES		12000	5.5
AHU 17	PDO& DIT		10000	5.5
AHU 18	HRMD		12000	5.5
AHU 19	HRMD		20000	7.5

Hot Water Generator

	Make	Capacity (KW)
Hot Water Generator 1	Rapit cool	300KW

Lighting

Internal Lighting (Floor wise)

Sr.No.	Floor	Type of Fitting	Wattage	Quantity
1	Telephone exchange	LED	1x20 watt	4
2	Below passage no 7	LED	2x20 watt	2
		LED	1x20 watt	4
3	Issue dept. Stationary	TL	36 watt	69
		TL	28 watt	3
4	MOB vault passage	LED	20 watt	79
		LED	20 watt	46
5	AOB basement & Lift	LED	20 watt	20
		LED	20 watt	36

		LED	20 watt	4
6	AOB Guard room and bath room	LED	20 watt	2
		LED	20 watt	10
7	Tunnel	LED	20 watt	15
8	CVPS – SBS passage	LED	20 watt	7
9	NE hall opposite to CVPS	LED	2x36 watt	20
10	SBS room	LED	2x36 watt	20
11	MOB Guard room	LED	20 watt	5
12	MOB Guard room Toilet	LED	20 watt	2
13	Basement Passage	LED	20 watt	21
14	AC Plant	LED	20 watt	2
		LED	20 watt	18
		LED	20 watt	14
15	Scooter stand	LED	12 watt	27
16	Generator room	LED	36 watt	4
		LED	36 watt	6
17	GM car park	LED	10 watt	6
18	Scooter stand	LED	20 watt	5
19	Scooter stand	LED	20 watt	2
20	Scooter stand	TL	20 watt	7
21	GM Issue	PL	2x11 watt	28
		LED	36 watt	4
		LED	20 watt	1
22	DNBS	LED	36 watt	56
		LED	15 watt	40
23	IPCCTV	LED	10 watt	30
24	FED	LED	15 watt	30
		LED	36watt	18
25	Old FED	2X2 LED	40 watt	26
		LED BULB	9 watt	28
		LED BULB	12 watt	14
26	Issue Dept	LED	36 watt	60
		LED	15 watt	75
27	Issue passage	LED	15 watt	15
28	Issue Pantry	LED	15 watt	4

29	Issue Electrical room	TL	1x20 watt	2
30	Issue server room	LED	18 W	4
32	DAD record room	LED	36 watt	2
	IBD	LED	20 watt	26
34	NCC	LED	20 watt	8
		LED		
35	IBD GM Chamber	LED	25 watt	4
36	Old CEPC	TL	20 watt	8
37	Banking hall (BH)	LED	20 watt	56
38	Issue Cash	LED	20 watt	21
39	Issue Claims	LED	20 watt	5
		LED	20 watt	11
40	CCVS	LED	20 watt	6
41	X-ray baggage machine	LED	36 watt	10
42	Gallery no 7	LED	20 watt	2
		LED	18 watt	4
		LED	20 watt	1
43	Estate	LED	25 watt	25
		LED	18 watt	19
44	HRMD GALLERY	LED	18 watt	48
45	HRMD Toilets	LED	18 Watt	21
46	PDO	LED	25 watt	87
		LED	15 watt	60
47	HRMD	LED	18 watt	72
		LED	37 watt	61
48	Rd chamber	LED	1x15 watt	12
		LED	1x12.5 watt	6
49	RD cabin	LED	1x15 watt	6
		LED	1x5 watt	2
50	RD secretariat	LED	1x15watt	7
51	DIT	LED	25 watt	20
		LED	15 watt	6

52	Conf hall Passage	LED	1x15 watt	31
53	DIT server & switch room	LED	25 watt	4
			18 watt	1
54	Conference hall	LED	25 watt	10
			15watt	16
55	Old CES	TL	2x36 watt	8
56	Lucknow society	LED	36 watt	7
57	Ladies rest room Class III	LED	20 watt	7
58	Union room	LED	20 watt	6
		LED	2x36 watt	1
59	Ladies rest room Class III	LED	20 watt	10
		LED	15 watt	1
60	Canteen passage			
		LED	9 W	17
61	Canteen	LED	9 watt	70
		LED	20 watt	12
		LED	20 watt	20
		LED	15 watt	3
62	Dispensary Store	LED	36 watt	6
63	Dispensary waiting area	LED	36 watt	6
64	Dispensary	LED	36 watt	16
		LED	20 watt	5
		LED	20 Watt	5
65	Police rest room	LED	2X36 Watt	11
66	Dog care taker room	LED	1X36 Watt	2
67	Ambedkar Library	LED	2X36 Watt	4
68	Co-operative Society	LED	36 Watt	11
		LED	20 watt	9
		LED	20 Watts	2
69	Homeopathic clinic	LED	20 Watt	1
		LED	18 watt	4
70	Officer's Association	LED	20 Watt	4
		LED	36 watt	4
72	OBO 2 nd floor	LED	15 watt 25 watt	35 55
73	Toilet Exec. Ladies	LED	20 watt	2
		LED	10 watt	1
74	GM (SB)	LED	20 watt	4
		LED	36 Watt	2
75	Meeting room	LED	20 watt	23
76	Store room	TL	2x36 watt	22
77	Scooter stand	LED	20 Watt	4
78	Passage	LED	15 watts	26

79	Computer lab	LED	20 watt	22
		LED	36 watt	4
80	Library	LED	20 Watt	20
81	Lecture Hall	LED	12 watt	12
		LED	36 watts	42
82	Stair case	TL	20 watt	10

External Lighting

Sr. No.	Location	Type of fitting	Wattage	Qty.
1	Street lights	LED	150 W	5
2	Street lights	LED	75 W	19
3	Street lights	LED	15 W	15

Lifts

Lifts No.	Location	Make	Passenger Capacity	Speed (M/S)	No. of floors served	Whether controller V3F or not
1	MOB main gate	KONE	6 Passenger	1 M/S	G+1	Yes
2	MOB staff entrance Gate	OMEGA	8 passenger	1 M/S	G+2	Yes
3	MOB Bullion lift	Evaan	2ton capacity	0.6M/S	B+G+2	no

4	AOB Main Gate	KONE	10 Passenger	1.0M/S	G+2	Yes
5	AOB Bullion lift	OTIS	2.0 TON capacity	0.6 M/s	B+2	no

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 ach AC (TR)	Area catered (M ²)	Expected per day operating hours
1	Issue GM Cabin	Split	1	1.5 TR	40	8
2	Issue DGM Cabin	Split	1	1.5 TR	20	8
3	OBO GM	Split	1	1.5 TR	40	8
4	OBO DGM	Split	1	1.5 TR	25	5
5	DGM HRMD	Split	1	2 TR	45	8
6	DGM CES	Split	1	1.5 TR	45	8
7	DIT (Engg room)	Window	1	1.5 TR	15	8

Standalone A. C. units where central AC is not provided (Area wise)

Sr. No.	Location	Type of AC (window / split / split /	Qty	Capacity of ach AC (TR)	Area catered (M ²)	Expected per day operating hours
1	CVPS	Ductable split	3	7.5	100	8
2	CVPS	Tower AC	6	3.5 TR	100	8
3	Computer lab	Split	5	1.5 TR	70	0
4	Guard Dressing room	Split	1	1.5 TR	10	0

5	Gym	Window	4	1.5 TR	60	2
6	Dispensary	Window	3	1.5 TR	40	8
7	Dispensary store	Split	1	1.5 TR	25	1
8	Ambedkar Library	Window	1	1.5 TR	20	2
9	Creche	Split	6	1.5 TR	60	
10	Homeopathic clinic	Window	1	1.5 TR	20	1
11	Class III association	Window	2	1.5 TR	25	2
12	Union Room	Window	1	1.5 TR	20	3
13	Lounge	Split	8	2 TR	120	2
14	EPABX	Split	1	1.5 TR	25	24
15	DNBS Switch room	Split	1	1.5 TR	2	24
16	DNBS Switch room	Split	1	1.5 TR	4	24
17	AC plant	Split	1	1.5 TR	15	8
18	Fire control room	Split	1	1.5 TR	15	24
19	guard room -1st	Ductable split	3	5.5 TR	80	24
20	guard room -2nd	Ductable split	2	4 TR	60	24
21	New NCC	Window	2	1.5 TR	25	8
23	Old FED meeting	Window	2	1.5 TR	30	1
24	PDO Server	Split	2	1.5 TR	4	24
25	CES Server	Split	2	1.5 TR	40	24
26	CES Server	Window	4	1.5 TR	40	24
27	CVPS Compressor	Split	2	1.5 TR	25	8
28	IPCCTV Room	Split	3	1.5 TR	30	8
29	Care taker	Window	1	1.5 TR	20	8
30	120 KVA UPS room	Split	4	1.5 TR	20	24
31	ISS	Tower	2	3 TR	60	8

32	VC room	Cassette	2	3 TR	50	1
33	Board room	Cassette	11	2.2 TR		1
34	RD Chamber	Cassette	3	2.2 TR	60	8
35	Executive room	Split	2	2.2 TR	40	0
36	New Conference	Cassette	2	3.5 TR	70	1
37	BO Switch room	Window	2	1.5 TR	2	12
38	Staff Canteen	Tower	4	4.6 TR	200	4

DG Sets

	Location	Make	Rating (KVA)
DG SET No. 1	Substation	Cummins	750KVA
DG SET No.2	Substation	Greaves	380KVA
DG SET No.3	Substation	Cummins	200Kva
DG SET No.4	Substation	Cummins	160KVA

Special Equipment viz. Shredding & Briquetting Machine, CVPS machine etc.

Sr. No.	Name of the machine	Make	Power Rating of the machine (KW)	Expected per day operating hours
1	CVPS	G &D	5.5 KVA x 3	8 hours
2	Shredder	Elmo	0.95 KW x 3	8 hours
3	Briquating	KAESER	7.5 KW X 3	8 hours

UPS Details

	Location	Make	Capacity (KVA)
1	AC plant	CONSUL NEWATT	2x120 KVA
2	Telephone Exchange room ,MOB building	DELTA	1X40KVa

Performance Evaluation of Main Equipments-Sample Formats**Central AC Plant****Chiller No. 1**

Sr. No.	Chilled water inlet Temp. (Tin)	Chilled water outlet Temp. (Tout)	Chilled Water Flow (LPM)	Suction Pressure	Discharge Pressure		Input Power (KW)	IKW/TR	Comments/Remarks/ Suggestions

Chiller No. 2

Sr. No.	Chilled water inlet Temp.	Chilled water outlet	Chilled Water Flow	Suction Pressure	Discharge Pressure		Input Power (KW)	IKW/TR	Comments/
1									

Capacity of the Chiller (TR) = (Tin - Tout) * Water Flow rate (LPM) * G0/3024

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

Air Handling Units

Air Handling Unit (AHU) No. _____

Sr No	Return Inlet Air		Supply outlet Air		Air Flow (CF M)	Tons of Refrigeratio n (TR)	Inp ut KW	KW / TR	Remarks/ Comments/ Suggestion s
	Dry Bulb Temp. Tdb (OC)	Wet Bulb Temp. Twb (OC)	Dry Bulb Tem p. Tdb (OC)	Wet Bulb Temp. Twb (OC)					

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
(KJIKg)
Enthalpy
of outlet
Air from
AHU

Hout = (KJIKg)

Density of Air= 1.18 KgiM³ at standard Temperature and Pressure

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

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

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)	Remarks/ Comments/ Suggestions

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

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

COOLING TOWER

Sr. No.	Water inlet Temp. (TintC)	Water outlet Temp. (ToutC)	Water Flow (LPM)	Wet Bulb Temp. Twb CC)	Cooling Tower Capacity (TR)	Cooling Tower Efficiency	IKW/ TR	Remarks/ Comments/ Suggestions

**Range= Tin-Tout
Twb**

Approach= Tout-

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

Cooling Tower Capacity (TR) = (Tin -Tout)*Water Flow (LPM)*S0/3024

Internal Lightening (Floor wise)

Sr. No.	Floor	Type of fitting	Calculated Wattage per Fitting	Qty	Total Wattage (KW)	Total carpet area covered	Light Power Density	Measured Average Light Level (Lux)	Light Efficiency (Lux/LPD)

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.

Sr. No.	Rating of DG set (KVA)	Make of DG set	Start Time	Stop Time	Period of Operation (Hrs.)	Diesel Consumed (Ltrs.)	Generated Energy (KWH)	Specific fuel Consumption (KWH/Ltr)	Remark /Observation

UPS

Measurement on each UPS needs to be recorded

Sr. No.	Rating of UPS (KVA)	Make of UPS	Input Voltage			Input			Total current Harmonic Distortion THDi	Total Voltage Harmonic Distortion THDv	Remarks
			Vrn	Vyn	Vbn	Ir	Iy	Ib			

LT Panels: LT Panels at Substation including capacitor

Panel Name:

Sr. No.	Input Voltage			Input Current			Input KW	Input KVA	P.F.	Total current Harmonic Distortion THDi	Total Voltage Harmonic Distortion THDv	Remarks
	Vrn	Vyn	Vbn	Ir	Iy	Ib						



**Reserve Bank Of India
Estate Department
Kanpur**

Tender for
Conducting Energy Audit of Bank's Office Building
at RBI Kanpur

**PART II
(PRICE BID)**

Name of Tenderer : _____

Address : _____

**Reserve Bank Of India
Estate Department
Kanpur**

Bill of Quantity

Name of Work: Tender for Conducting Energy Audit of Bank's Office Building at Kanpur

<u>Sr.No.</u>	Description	Qty	Rate	Amount
(1)	(2)	(3)	(4)	(5)
	Rate for conducting Energy Audit L.S. and Submitting Energy Audit Reports as per the scope specified in the tender Part-I.	Lump sum		
			<u>CGST(...%)</u>	
			<u>SGST(...%)</u>	
			<u>Total Amount (Rupees)</u>	

Date:

Seal and Signature of the Agency

Place: