



**BHARAT HEAVY ELECTRICALS LIMITED**  
**BHEL House, Siri Fort, New Delhi**

**Tender for Preparation of Engineering Design, Documents Drawings and consultancy services for civil, structural, electrical, plumbing & sanitary, fire systems, air-conditioning & ventilation systems, landscaping, furniture etc and other related infrastructural works including soil investigation & survey works for Construction of New Building with green building features at BHEL Complex, Sector 16-A, NOIDA (U.P)**

**Tender enquiry No: BHE/AA/ GAX/ 12/ NB-AR/ 011**

**SECTION V**

**TECHNICAL SPECIFICATION**

**BHARAT HEAVY ELECTRICALS LIMITED**  
**(A GOVERNMENT OF INDIA UNDERTAKING)**  
Corporate Administration  
BHEL House, Siri Fort, New Delhi-110049

## **SECTION - V**

### **TECHNICAL SPECIFICATION**

#### **1.0 BRIEF DESCRIPTION OF PROJECT**

Bharat Heavy Electricals Ltd. is setting up a new multi-storey office complex at sector-16A, Noida UP, for its staff and other utilities. New facility will be located adjacent to the existing HRDI & PPEI buildings of BHEL. The site area is about 10 Acre. The site location is about 16 Kms from New Delhi Railway Station. The nearest Airport is at Delhi (IGI)

#### **2.0 GENERAL TECHNICAL SPECIFICATIONS**

- i. Basic requirements various works will be provided by BHEL / their suppliers. However, detailing has to be done by bidder.
- ii. The bidder will be required to give break-up of quantities of each item as appearing in BOQ with respect to each drawing / sub-section either on the drawing or annexure separately.
- iii. Description of items provided in the BOQ should be self-explanatory, so that no separate procedure is to be written and if at all it is necessary the procedure should be given along with specification.
- iv. All calculations shall be performed and supervised by qualified and experienced personnel and shall be checked to ensure their correctness and completeness and shall be prepared in a neat, sequential & comprehensive form.

#### **3.0 TECHNICAL INPUTS AND COORDINATION**

- i. The technical inputs of supplies as available shall be provided by BHEL from time to time after award of work.
- ii. Preliminary layout drawing for the campus are attached. The Contractor is expected to assess the total work/ services involved and quote accordingly for items mentioned in Price Schedule. However, the drawings are only for information and may undergo changes during detail design stage. No price variation will be allowed due to this.
- iii. After award of work, all other necessary inputs required/ as available for preparation of Specifications & designs shall be provided by BHEL. The Contractor is expected to interact closely with BHEL for any inputs/ clarifications.
- iv. There may be certain cases, when on account of revision or change of inputs; certain designs/drawings may be required to be redone. No claim of additional payment on account of this shall be entertained and the Contractor is expected to have quoted considering all such eventualities. However, BHEL will try to limit these changes to the minimum.

- v. The Contractor shall promptly reply any clarification required at site or suggestion / clarification required due to any deviation in work with respect to specifications / drawings prepared by Contractor.

#### 4.0 DOCUMENTATION

- i. All Specifications and Design Documents, STAD analysis etc shall be neatly printed on A4/ A3 size paper. The format of design document shall be as approved by BHEL.
- ii. All drawings shall be prepared on latest AutoCAD or any other approved CAD software. All drawings shall be prepared on standard sizes (viz. A0, A1, A2, A3, & A4). The 'Title Block' shall be as per BHEL approved format. All prints of the drawings shall be clear and legible.
- iii. Upon completion of construction, the design drawings shall be revised to reflect accurately the facilities as built. The drawings shall be issued under the appropriate revision and marked "AS BUILT".
- iv. The number of copies of design documents and drawings required to be submitted shall be as follows: -

For approval	6
Design Calculations / reports / documents	6
Drawings / documents required for Construction/ Procurement	6
After completion of work:	
Drawings ("As Built")	6
Drawings in Soft copies in CD	6
Design Calculation (Final) (Hard Copy & in CD)	6

#### 5.0 DETAILED TECHNICAL SPECIFICATIONS :

Following technical specifications shall be followed in the works / services as per tender if not specifically mentioned elsewhere in the tender

**5.01 REFERENCE BUILDINGS/ AREAS :** Following are the reference buildings as per scope of Work of this tender :

1. Multi-storey / High-rise New building with Green building features.
2. Multilevel basement car parking
3. Two additional floors over existing PPEI building and southern annexe
4. Shifting of temporary offices (MPL, Canteen, PMX etc)
5. New utility buildings for the New building
6. Augmentation of existing utilities at the campus.
7. Any other infrastructure required for successful completion of work as per tender.

#### 5.02 OTHER FEATURES OF NEW BUILDING / CAMPUS DEVELOPMENT:

1. Underground multilevel parking facilities.
2. Central Archives Room with motorized compactors and Electronic document management system for storing, locating, retrieving & tracking documents

3. Recreation Room
4. Cafeteria & dining hall for 1000 PAX, VIP 100 PAX & Kitchen for 2000 PAX.
5. Security Management system comprising Access control and CCTV
6. Building Management System for efficient management and operation of the services.
7. Record Room
8. Auditorium for 350 persons & Audio Visual.
9. Modular furniture
10. Layout that facilitates maximum utilization of natural light
11. Energy efficient internal lighting based on LED luminaries
12. Energy efficient and eco-friendly air conditioning system (VRF)
13. DG sets to provide power backup full load
14. Centralized UPS
15. Intelligent fire detection and alarm System
16. Sprinkler and hydrant system for fire fighting
17. Dry Waste Management System of required capacity
18. Sewerage water Treatment Plant of the required capacity
19. Water Softening Plant of required capacity
20. Rain Water Harvesting System as per the recommendations of Central Ground Water Report.
21. Building integrated Photo – Voltaic Panels to cater to the emergency and external lighting power requirements.
22. Build an energy efficient green building and target to obtain upto 4-star GRIHA rating
23. Fire fighting hydrant and pump house & Under ground tank.
24. Drainage system
25. Road and pavements.
26. Street light & High Mast lights
27. Landscaping & Horticulture
28. Security Gate
29. Boundary wall
30. Bore- Well
31. Signage
32. Fire escape stairs for HRDI building
33. Portable water supply scheme with RO system
34. Various treatment plants

### **5.03 ARCHITECTURAL WORKS:**

The detailed works to be executed by the successful tenderer shall include the following, but shall not be limited to these:

1. PRELIMINARY PRESENTATION DRAWINGS.
2. WORKING DRAWINGS FOR CIVIL, ELECTRICAL, MECHANICAL, FURNISHING AND INFRASTRUCTURAL WORKS..
3. STRUCTURAL DRAWINGS.
4. BUILDING SERVICES DRAWINGS.
5. CONTRACT DOCUMENTATION.
6. LANDSCAPING & OPEN AREA DEVELOPMENT
7. LIAISONING WITH AUTHORITIES.

#### **5.04 Preliminary Presentation Drawings**

Conceptual rendered plans, elevations and views, derived from a thorough understanding of the functional requirements. Preparing detailed estimates, de-packaging, detailed project report (DPR) for presentation to BHEL for budgetary sanctions.

#### **5.05 Working Drawings**

Detailed and illustrative drawings, required for commencing work on the site and for proper execution of the project. These will include all good for construction drawings which shall be coordinated with MEP services, façade concepts and details and Interior concepts and details.

#### **5.06 Structural Drawings**

Structural drawings of foundations, columns, beams and slabs (of all floors and roofs) in R.C.C., steel, other structural building materials, as specified by the structural consultants duly vetted by IITs.

#### **5.05 Building Services Drawings**

All services drawings indicating electrical, plumbing, and other applicable services as per design approval.

#### **5.07 Contract Documentation**

Above shall include an abstract of specification and estimate of quantities. This will include BOQ, documentation or tenders as required.

#### **5.08 Landscaping & Open Area Development**

Rendered landscaping plans and horticulture details. Plantation schedule, open area development including boundary wall and gate etc., complete with lighting and water bodies details etc.

#### **5.09 Liasoning with Authorities**

Liasoning with statutory authorities, govt. bodies for obtaining time extension for construction, completion certificates, deeds, MOUs and NOCs including provisional NOCs if any along with submission of all the drawings and information needed by the authorities (e.g NOIDA, environmental clearance, pollution, electrical safety, UPPCL, UPSIDC, lifts, Fire, aviation, GRIHA , MNRE, TERI etc ) is in the scope of works of the bidder.

## 6.0 STRUCTURE DESIGN & DETAILING

### 6.01 Pre-Construction Phase

#### Concept

- 1) Preparation of Design Basis report/ Design philosophy.
- 2) Prepare preliminary structural GA drawings for inclusion in the schematic design.
- 3) Provide design concept for the structural system.
- 4) Seek Client's approval on the conceptual design.
- 5) Recommend foundation system with seismic structural safety factor and constructional arrangement.
- 6) Prepare Analytical Structural model in internationally renowned and accepted software.
- 7) Perform analysis and arrive at preliminary design.
- 8) Preparation & issue of preliminary structural BOQ

### 6.02 Design Development

- 1) Seek client's approval on the preliminary design and Design basis report.
- 2) Update and finalize the structural scheme according to comments from all concerned.
- 3) Prepare preliminary Drawings/Final Drawings.
- 4) Update/revise Analytical Structural model.
- 5) Perform Structural Analysis & Design and arrive at Optimum design sections.
- 6) Prepare drawings necessary for client's approvals, ensure compliance with codes, standards and legislations, as applicable, and furnish necessary information to client in obtaining the statutory approvals thereof, if required.
- 7) BOQ and drawings for tender purpose.
- 8) Prepare and issue Good for Construction Drawings
- 9) **Vetting of structural designs from IIT.**

### 6.03 Construction Phase

- 1) Prepare and issue revised drawings and details, if any for proper execution of works during construction.
- 2) Coordination with the client, specialist vendors, and contractors to resolve all design related problem.
- 3) To provide advice in resolving design and interface issues encountered on site.
- 4) Site visits, as per agreement.

## 7.00 INTERIOR WORKS

- Design of Partitioning, Ceiling and Paneling.
- Design of full height Directors' cabins.
- Design of full height Executive Directors' cabins
- Design of full height cabins for General Managers and Additional General Managers.
- Design of low height cabins for Deputy General Managers/ Sr. DGMs
- Design and layout of modular workstations for remaining employees
- Design of conference halls and meeting rooms

- Design of Attendant stations
- Design of Store, Library, Central Record Room, Travel Agent's Rooms, Bank Extension Counter(s), Cash Room, Auditor's Room, Union Office, BHEL Society Office, Security Room, Reception and Dispensary, etc.
- Design of Gymnasium and Recreation Room, transit flats , guest rooms, suites for VIPs etc.

## **8.0 ELECTRICAL WORKS (HT/LT)**

- Preparation of load list and calculation of electrical load feeder wise
- Based on load calculation,
  - (i) Design of HT/ LT substation, Electrical Distribution system, switchyards, transformers, panels etc
  - (ii) Design of Power –Backup system consisting of DG sets and centralized UPS
- Design of Solar LED Street lights or other energy efficient lighting for external /Façade lighting
- Design of energy efficient internal lighting system
- Design of lighting protection system.
- Roof top solar panels and piping for provision of hot water in kitchens and pantries and emergency lighting system for the building.
- Telephone/ LAN /PA system/CCTV/ Access control/ Gate pass system/ DTH TV/ smart card attendance system cabling from each workstation/cabin to MDF.

### **8.01 Electrification Work**

The consultant is to provide consultancy services in respect of:

1. Internal Elect. Installation and External Electrification complete. The Consultant will prepare Scheme for HT supply from Grid to 11 KV Sub-Station and get the same approved from BHEL. The consultant will prepare the scheme for compound and green area lighting and will get it approved from the department.
2. Lifts - Passenger and goods lifts having provision of stature with all control equipments & accessories, for the required number of landings/opening and speed of lifts in accordance with latest National Building Code amended up to date including safety provision as per statutory regulation, BIS recommendation under factory act
3. D.G. Set: The consultant will design the exhaust system and diesel storage tank and get approved from the department of Explosive, DPCB/CPCB before and after the same is not completed at site by the agency on award of the work.
4. Fire Alarm System: The consultant will prepare the scheme and will get the same approved by the department.
5. L.T. Supply: The consultant will prepare the LT Scheme and get the same approved from the department.
6. Water Supply Arrangement: The consultant will design the underground water storage tank for firefighting purpose and will get it approved from NOIDA Fire Services. The Consultant will design the underground water storage tank for

water supply arrangement in accordance with the guidelines and approved scheme of NOIDA and will get the same approved from NOIDA.

7. Fire Fighting: The consultant will prepare the scheme as per latest National Building code & latest CPWD specification and get the same approved first from NOIDA Fire Services.
8. Ventilation System: The consultant will prepare the scheme and get the same approved from the department.
9. P.A. System & Sound System: The consultant will prepare the scheme and get the same approved from the department.
10. CCTV, Talk Back System & Electronics Security Systems: The consultant shall arrange for provision for CCTV, Talk Back System & Electronics Security Systems for the entire building.
11. HVAC System: The consultant shall submit the scheme for HVAC for the complete building system based upon the relevant CPWD Specification.
12. Building Management System. The consultant will prepare the scheme for BMS system and further scope of work in BMS will be A.C. Controlling, Ventilation Controlling, Fire alarm integration, lift integration, lighting control & D.G. set integration.

#### **8.02 Internal Electrification & Ventilation System & HVAC**

1. The scope of work includes designing, preparation of plans including detailed estimate for the internal electrification, HVAC & ventilation system required for basement/double basement etc. for the building.
2. The consultant shall obtain statutory approval from the competent local Authority i.e. Delhi Fire Services.
3. The designing must be as per latest National Building Code applicable with up to date Correction slips/amendments.
4. The required number of sets complete with design and layout plan shall be submitted by the consultant to the respective approving authority. After approval of the ventilation system from NOIDA Fire Services, six sets complete with design, approved layout plan and detailed estimate shall be submitted to the Engineer-in-charge including a soft copy in duplicate.

#### **9.0 HVAC WORKS**

- Calculation of Heat load of all full height room, hall separately and the total heat load of the building.
- Design of an energy efficient HVAC system capable of maintaining the temperature and circulation of treated fresh air to maintain air quality.



## **10.0 PA SYSTEM**

- Design of PA system with volume control for all full height cabins/rooms , conference rooms for public announcement and channel music.
- Conference rooms to have internal voice address and amplification system.

## **11.0 FIRE DETECTION AND ALARM SYSTEM**

- Design of fire detection and alarm system with intelligent microprocessor based optical smoke detectors with selectable sensitivity at regular intervals.
- Detailed design of fire fighting system of the campus and new building., PPEI building expansion etc along with pump houses , tanks , hydrants etc.

## **12.0 ELEVATORS**

- Design/ specification of passenger/goods service elevators based upon planned traffic.

## **13.0 EIA (Environment Impact Assessment)**

- (i) The Scope of Services/Work is to secure environment clearance of the said "Project" from the ministry of Environment and Forest, Govt. of India, New Delhi and DPCC as the case may be including preparation of all the necessary drawings and documents etc, and the guiding the "Employers representative" and / or the "Engineer-in-Charge" in all related activities as per MOEF/DPCC notifications complete.

- (ii) To conduct the EIA study (works guidelines), prepare the detailed project report (DPR) including the Environmental Management Plan (EMP) as per requirement / guidelines of MOEF with up to date amendments including all necessary data/details collection and all required.

Laboratory tests etc. The EIA /EMP shall contain defined strategy for undertaking the responsibility & funding of the proposal and evaluation of the likely environmental impact during the construction period. The required details shall also be submitted to DPCC for approval/clearance as per terms and norms of the concerned departments.

- (iii) To submit the requisite number of copies as per terms of this agreement to the Engineer-in-Charge".
- (iv) To ensure that the DPR including the EIA report and EMP is not rejected due to submission of insufficient or inadequate data/details.
- (v) To present the DPR to the SPCB and the MOEF, make amendments/submit additional data/detail as required and represent for necessary processing/clearance at required stages.

#### 14.0 WATER SUPPLY SCHEME AND UNDER GROUND RESERVOIRS

1. External, Internal water supply system and underground reservoirs shall be designed by the consultant.
2. External water supply system scheme shall be submitted to “Engineer-in-Charge” and it shall be the responsibility of consultant to ensure approval of external water supply system scheme from BHEL.
3. Internal water supply from water meter box to various houses & building shall also be designed by the consultant and shall submit the same to the Deptt. Through “Engineer-in-Charge” and approval of the same shall be pursued of its implementation at work site.
4. Required number of sets of documents of each service for approval shall be submitted by the consultant to respective approving authority. After approval of the schemes of various services from competent authority, six no. of sets of drawings shall be submitted to “Engineers-in-Charge” for the purpose of execution of work at site.
5. Pipe lines:
  - a) Pipe line shall be designed for supply of water through dual system pipe line for supply of treated water to cistern & W.C & horticulture purpose.
  - b) Pipe line for supply of water for kitchen & bath.
6. Tanks of required capacity will be provided at the campus and roof tops both underground and overhead.
7. Any other requirement as per green building norms.
8. Sewerage Scheme

1. Suitable sewerage system as required shall be designed by consultant.
2. External sewerage system including suspended man-hole in basement etc. shall be submitted to BHEL through “Engineer-in-Charge” and it shall be the responsibility of consultant to ensure approval of external sewerage system approved from BHEL.

Scheme of all external and internal sewerage system shall be designed & submitted by Consultant through Engineer-in-Charge and shall be the responsibility of Consultant to ensure approval of the same from BHEL the agency concerned.

3. Suitable stack system for catering the sewage/waste disposal from W.C toilet and kitchen shall also be designed by the consultant and shall submit the same to the approving agency through “Engineer-in-Charge” and approval of the same shall be pursued for its implementation at work site.

Mini/ portable/ packaged type sewerage treatment plant (STP) shall be designed to treat full discharge to supply treated effluent for recycling for supply to the cistern, horticultural purpose etc.

4. Required number of sets of documents each service for approval shall be submitted by the consultant to respective approving authority. After approval of the services from competent authority, six no. of sets of drawings shall be submitted to "Engineer-in-Charge" for the purpose of executing the work at site.
5. Any other requirement as per green building norms

#### 9. Drainage Scheme

1. Drainage scheme for systems required for outflow of surfaces & roof top rain water/water from balconies/roof of building viz-a-viz drainage system to be provided in the basement needs to be designed by the consultant and it shall be the responsibility of the consultant to ensure approval of drainage system from "NOIDA AUTHORITY".
2. Required number of sets of documents of each service for approval shall be submitted by the consultant to respective approving authority. After approval of the scheme of services from competent authority six no. of sets of drawings/documents shall be submitted to "Engineer-in-Charge" for the purpose of executing the work at site.
3. Responsibility of taking levels/fixing of levels with reference to provision of all the services shall be ensured by the consultant and that no separate payment shall be allowed for the same.
4. Any other requirement as per green building norms.

#### 10. Rain Water Harvesting Schemes And Irrigation

Rain water harvesting scheme and irrigation shall be designed by the consultant and it shall be the responsibility of the consultant to ensure approval of rain water harvesting scheme and irrigation from central ground water board.

#### 11. Fire Fighting Service And Building Structures

- (i) (a) The scope of work includes designing, preparation of plans including detailed estimates for the various active and passive measure i.e fire alarm system, wet risers and sprinklers system required for the complete building.

The consultant shall obtain statutory approval from the competent local authority i.e, Delhi fire services.

- (b) The designing must be as per latest National Building Code applicable with up to date correction slips/amendments.

- (c) The required number of sets complete with design and layout plan shall be submitted by the consultant to the respective approving authority. After approval of the fire fighting scheme from Delhi Fire Services, six sets complete with design, approved layout plan and

detailed estimate shall be submitted to the Engineer-in-charge including a soft copy in duplicate.

- (d) The agency will get the scheme approved from Chief Fire Officer, NOIDA, at the start as well as after completion of the work.
- (ii) (a) Prepare complete structural design, drawing for foundation, super and for other related structure in this scheme including UGR, pump house etc. are to be provided in this scheme as per provision contained in IS: code/relevant codes.
- (a) Provision of protection against seismic forces as per relevant IS Codes for structure in Delhi Zone IV.
- (c) The structure design and drawing would be approved from IIT and charges if any will be borne by the agency.

### **15.00 ACOUSTICS**

The Designing and planning of acoustic work to the building structure wherever required shall be worked out and provide by the Consultant ensuring foolproof sounding system to the building eliminating noise & noise pollution in the area around.

- A. The Structural Design and detailed estimate for all Civil/Electrical works mentioned above should be submitted with schedule of quantity/rate/unit/amount well supported by quotations of materials/items (preferably 'ISI' marked) of reputed make and their comparative rates, working drawings, layout of the scheme and specifications etc. as required.
- B. The estimate must be as per the CPWD specification supported by technical specification required for execution of work.
- C. The structural design & drawings prepared for foundation and super structure after carrying out soil investigation work in detail are to be got approved from the office of BHEL and to provide 5 sets each of structural designs & Drawings duly got approved from NOIDA

### **16.00 HORTICULTURAL & LANDSCAPPING WORKS**

Preparation of landscape planning & other details for horticulture works, details showing unfiltered, recycled water supply line with sprinkler system etc.

**Note:**

- 1. Any other work not enlisted here but required to complete the Construction of BHEL Corporate office at Sector – 16A Noida, shall be required to be undertaken by the successful tenderer.
- 2. The Design wherever mentioned above shall include the following work: preparation of drawings, showing detailed calculations, framing the BOQ, working out the estimate on the basis of rate analysis duly supported by the latest budgetary offer.