VOLUME - IA

Technical Conditions of Contract (TCC) for "**CONSTRUCTION OF SITE ENABLING WORKS**"

FOR

Steam Generation Package for Bina Petchem & Refinery Expansion Project (BPREP) of M/s Bharat Petroleum Corporation Limited

BHARAT HEAVY ELECTRICALS LIMITED

Maharatna Company	**Technical Conditions Of Contract (TCC)**	Ref No: HY/HPEP/SC-PROJECTS/2025-26/TCC/BPCL/ Enabling/01, Rev.00
		Rev. No. 00

TECHNICAL CONDITIONS OF CONTRACT (TCC)

FOR

"SITE ENABLING WORKS"

FOR "STEAM GENERATION PACKAGE FOR BINA PETCHEM AND REFINERY EXPANSION PROJECT (BPREP) OF BHARAT PETROLEUM CORPORATION LIMITED (BPCL) AT BINA, MADHYA PRADESH, INDIA"

Revisions: Refer to record of revisions	Prepared By:	Checked By:	Approved By:	Date
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Part I

Contract specific details

Chapter I- Project Information

1.0	**Project Details**		
1	Customer	:	BPCL, Bina, Madhya Pradesh
2	Project Information	:	Steam Generation Package for Bina Refinery Petchem and Refinery Expansion Project of M/s Bharat Petroleum Corporation Limited. (BPCL)
3	Location	:	Bina, Madhya Pradesh
4	Address Detail	:	Refinery Complex, Petro chemical unit, post BORL residential complex-470124 Bina, District-Sagar, Madhya Pradesh,India
5	Nearest Railway Station	:	Bina, Madhya Pradesh
6	Road Approach	:	Well Connected with Roads
7	Nearest Air Port	:	Bhopal Airport (Approx. 164.0 Km), Indore Airport (Approx. 363.0 Km)
11	Ambient Air Temperature (Average)	:	a) Maximum : 25^0 C b) Minimum : 13^0 C
12	Average Relative Humidity	:	43%
13	Climatic Condition	:	Mediterranean, Hot summer Climate

Bidder is advised to visit the project site and appraise himself about the local conditions and infrastructure available in the area for fulfilling their commitments under the contract. BHEL will not admit any claims whatsoever on account of Contractor's non-familiarization of local conditions.

Chapter II- Scope of Work

1) Site development, viz. final dressing to leveling, grading, development of open storage yard, base/foundation preparation for installation of Porta cabins, installation of chain link mesh fencing with gates and storage areas, laying of water distribution network, soak pit, installation of water storage tanks, etc. for the site office area allotted to BHEL.
2) Illumination of the site office area/Porta cabins and open storage yard.
3) Electrical distribution board for providing power connection to E&C contractor & other contractors/vendors.
4) Design, supply and Construction of Pre-engineered Building with storage racks for closed storage shed.
5) Design supply and Construction of Pre-engineered Building for Integrated site office.
6) Fabrication, assembly, painting and supply of storage racks and storage stands for storage of materials.
7) The work has to be executed as per the approved drawings & bill of quantities for various items of the work as per the direction & instruction of engineer-in-charge.
8) All the construction materials, tools & tackles are in the scope of the contractor

Detailed scope of works is provided in Part-II “Technical Specification” of TCC

Chapter III- Facilities in the scope of BHEL/Contractor

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
a	Open space for office (as per availability)		Yes	
b	Open space for storage (as per availability)		Yes	
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipment, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc.		Yes	
f	Firefighting equipment like buckets, extinguishers etc.		Yes	
g	Fencing of storage area, office, canteen etc. of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labor colony (as per availability)		Yes	
b	Labor Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			
3.2.1	Electricity For construction purposes		Yes	Electricity shall be provided by BHEL/BPCL at one point free of cost. Further distribution shall be done by contractor at its own cost.
3.2.2	Electricity for the office, stores, canteen etc. of the bidder		Yes	

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc.		Yes	
3.3.0	**WATER SUPPLY**			
3.3.1	For construction purposes		Yes	Water shall be provided by BPCL at one point free of cost. Further distribution shall be done by contractor at its own cost .
3.3.2	Water supply for bidder's office, stores, canteen etc.		Yes	
3.3.3	Water supply for Living Purpose		Yes	
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc. during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Téléphone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		Yes	
3.8.0	**TRANSPORTATION**			

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	For site personnel of the bidder		Yes	
b	For bidder's equipment and consumables (T&P, Consumables etc.)		Yes	

Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	**Engineering works for construction:**			
a	Providing the construction drawings for all the works covered under this scope		**Yes**	Drawings shall be prepared by bidder and shall be approved by BHEL.
b	Drawings for construction works		Yes	
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	In consultation with BHEL
d	Shipping lists etc. for reference and planning the activities		Yes	In consultation with BHEL
e	Preparation of construction (Concreting B/W, etc.) schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site construction schedules in order to achieve the end dates and other commitments	Yes	Yes	
g	Weekly construction schedules based on S. No. e. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL

Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
h	Daily construction / work plan based on S. No. g. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
i	Periodic visit of senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two Weeks.		Yes	
j	Arranging the materials required for Work		Yes	
k	Coordination for inspection & checking and getting clearance from customer		Yes	
l	Preparation of formats for completion of activities		Yes	
3.10	**Work Permits, gate pass etc. from customer for manpower, machinery and material**		Yes	

Chapter IV- Tools & plants to be deployed by Contractor

LIST OF TOOLS AND PLANT:

The following tools and equipment but not limited to, are required for the efficient execution of the civil works. The contractor shall make them available for construction purposes, including all consumables likely to be used at his own cost at the time of mobilization.

S.No.	Description	Minimum Quantity	Remarks
1.	Concrete batching plant (Stationary/Movable) or RMC	1 nos.	Need based
2.	Needle Vibrator (Needle type 40mm)	4 nos.	Need based
3.	Needle Vibrator (Needle type 25mm)	2 nos.	Need based
3.	Surface Vibrator	1 no.	Need based
4.	Concrete Pump	1 no.	Need based
5.	Dewatering Pump	2 nos.	Need based
6.	Earth Compactor	2 nos.	Need based
7.	Reinforcement steel cutting & Bending machine	2 nos.	Need based
8.	Welding Machine	2 nos.	Need based
9.	Grinding Machine	4 nos.	Need based
10.	Excavator	1 no.	Need based
11.	Theodolite with staff	1 no.	Need based
12.	Dumpy level with staff	1 no.	Need based
13.	Compression testing machine (for concrete cubes)	1 no.	Need based
14.	Cube mould (15cm x 15cm x 15cm)	6 nos.	Need based
15.	Sieve analysis sieve sets for coarse & fine aggregates	1 set	Need based
14.	Jar/Beaker for Bulk density test of sand	1 no.	Need based
15	All the T & Ps required for Electrical works	1Set	Need Basis

BHEL will not provide any tool, plants, facilities or any testing facility/apparatus for the work. It will be contractor's responsibility to arrange all required tools, plants and other testing apparatus, etc. at their own cost. The prices quoted & finalized are inclusive of the charges towards providing such T&P. No extra payment will be entertained because of this.

However, subject to availability, BHEL may provide few T&P to the contractor for expediting and in larger interest of the project. In case any such facility is provided to the contractor, BHEL will make necessary recovery in the running account/final bills towards the hire charges. A departmental charge @ 5% will also be affected such cases. The decision of BHEL on the hire charges will be final and binding on contractor.

Chapter V- Time Schedule

5.1 TIME SCHEDULE

5.1.1
The entire work as detailed elsewhere in the Tender Specification shall be completed within **4 Months** from the date of commencement of work at site.

5.1.2
During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

5.1.3
The work shall be commenced on the mutually agreed date between the bidder and BHEL engineer. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

5.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be within 15days from **Work Order** . The commencement date shall be the as per BHEL engineer.

5.3 MOBILISATION

5.3.1
The activities shall be started as per directions of Construction manager of BHEL.
5.3.2
The contractor should mobilize sufficient manpower in order to complete the work in **Four (4) Months.**
5.3.3
Requisite Material, men and machinery should be arranged in order to complete the project within stipulated time.
5.3.4
The contractor has to augment his resources in such a manner that following major milestones of the project are achieved on specified schedules:

In order to meet above schedule in general, and any other intermediate targets set, to meet project, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

5.4 CONTRACT PERIOD

For the purpose of contract, the period shall be **Four (4) Months**. Completion of the work shall be as per BHEL Bar Charts revised from time to time. In order to expedite the work, the contractor has to deploy manpower as per site requirement without any extra cost to BHEL.

5.5 GUARANTEE PERIOD

The guarantee period of twelve months shall commence from the date of completion of all works as certified by the BHEL site engineer.

5.6 PROTECTION OF WORK

The contractor shall have total responsibility for protecting his works until it is taken over by the Employer. No claim will be entertained by the Employer or the representative of the Employer for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings. Should any such damage to the Contractor's Works occur because of other party not being under his supervision or control, the Contractor shall make his claim directly with the party concerned.

If disagreement, conflict, or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor's Works the same shall be rectified. The Contractor shall not cause any delay in the repair of such damaged Works because of any delay in the resolution of such disputes. The Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.

Chapter VI- Statutory Regulation

6.1 BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998 is applicable.

INTER-STATE MIGRANT WORKMEN ACT, 1979 (IN CASE BIDDER ENGAGE MANPOWER FROM OTHER STATE) is applicable

In case any portion of work involves execution through building or construction workers and/or inter-state migrant workers, then compliance to the above titled Acts as applicable shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances, it may be ensured as under: -

It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the Competent Authority under the BOCW Act and/or ISMW Act as applicable and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of license / permission to BHEL within a period of one month from the date of award of contract.

It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these acts and rules including that of payment / deposit of cess as per the applicability under above referred Acts within a period of one month from the receipt of payment.

It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building/Inter-state Migrant workmen) engaged by the sub-contractor during the preceding month.

It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.

6.2 The contractor shall fully comply with the following enactments:

a) Contract Labour (R & A) Act, 1970 and rules formed therein under Central Rules.
b) Minimum Wages Act 1948 .
c) Payment of Wages Act 1936
d) ESI Act, 1948
e) EPF Act, 1952
f) Employees' Compensation Act, 1923.
g) Provisions of Factories Act 1948 & Rules thereof
h) The inter-state migrant workmen (regulation of employment and conditions of service) Act, 1979
i) Payment of Bonus Act, 1965
j) Payment of Gratuity Act, 1972
k) Fatal accidents act 1985

l) Industrial disputes act 1947
m) Maternity benefits act 1961
n) Personal Injuries (Compensation Insurance act1963)
o) Persons with disability act 1995
p) Protection of Human rights act 1933
q) Public liability Insurance Act 1991
r) Right to information act 2005
s) Official Language act 1963(Implementation)
t) The sexual harassment of women at Working place9prevention, prohibition and redressal) Act 2013

6.3

i. The contractor shall obtain License from the Assistant Labor Commissioner (Central), or appropriate government if he engages twenty or more workmen.
ii. The Contractor shall produce the following Registers and forms before commencement of work, for verification by the Executing Officer.
a. Form XII - Register of contractors
b. Form XIII - Register of workmen employed by contractor (Rule 75)
c. Form XIV - Employment card issued by contractor (Rule 76)
d. Form XVI - Muster Roll (Rule 78(1)(a)(i))
e. Form XVII - Register of wages (Rule 78(1)(a)(i))
f. Form XVIII - Register of wages-cum Muster Roll (in case of weekly payment)
g. Form XIX - Wage Slip (Rule 78(b))
h. Form XX - Register of deduction for damages or loss (Rule 78(1)(a)(ii))
i. Form XXI - Register of files (Rule 78(1)(a)(ii))
j. Form XXII - Register of advances (Rule 78(1)(a)(ii))
k. Form XXIII - Register of overtime (Rule 78(1)(a)(iii))
l. Form XXIV - Return to be sent by the contractor to licensing officer (Rule 82(1))

iii. The contractor shall make himself or his representative (supervisor) available at the work spot every day during execution of work, for effective supervision.
iv. The contractor shall attend to all inspections notified/conducted by the Human Resource department, Labor department, P.F. authorities, Inspector of Factories, ESI inspectors, or any other such authorities.
v. Non-compliance of any provisions under the act/rule/instructions/guidelines shall make the contractor liable for penal action including termination of contract.
vi. Contractor shall furnish in a separate letter his place of residence and postal address. The delivery at the above-named place or posting in a Post Box regularly maintained by the Post and Telegraph Department or sending letters registered for acknowledgement of any notice, letter or other communication to the contractor shall be deemed sufficient service there upon he contractor. Change in address shall come into force at any time by an instrument executed by the contractor and delivered to the BHEL official who has signed the contract.

vii. The contractor must satisfy himself by personal study thoroughly the scope of proposed work in detail and all conditions affecting the work before entering into the contract. There shall not be at any time, dispute/complaint of any nature regarding scope of work and interpretation of specifications or any misunderstanding with regard to nature or omission of the work to be done nor shall any application for compensation in terms of time and money shall be accepted by BHEL regarding the above.

viii. Contractor shall in his absence keep competent agent constantly on the works and any directions or explanations given by the "Contract Executing Officer" or his representative to such agent shall be held to have been given to the contractor himself.

ix. Contractor on the advice of BHEL officials shall immediately remove any person employed by him, who may in the opinion of the BHEL official, is incompetent or involves himself in misconduct. Such persons shall not be again employed on the works without written permission of the BHEL official.

x. The contractor shall give all notices required by the Acts, regulation, bye laws, Legal Acts and pay all fees in connection therewith unless and otherwise arranged and decided in writing with BHEL. He shall also ensure that no attachments are made against materials or work forming part of or for the use of the contractor. In all such cases, contractor shall protect and indemnify BHEL against any claim or liability arising from or based on the violation of any such laws, ordinances, regulations, orders, decrees or attachment either by himself or by his employees.

xi. It shall be contractor's sole responsibility to protect the public and his employees against accident from any cause and provide required safety equipment and shall indemnify BHEL against any claims for damages for injury to the person or property resulting from any such accidents and shall, where the provisions of the Employees Compensation Act and Public Liability Act as applicable, take steps to properly insure against any claims thereunder.

xii. In the event of any accident in respect of which compensation may become payable under the Employees Compensation Act, VIII of 1923 whether by the contractor or by BHEL as Principal Employer, it

xiii. shall be lawful for BHEL to retain out of monies due and payable to the contractor such sum or sums of money as may, in the opinion of BHEL shall be final in regard to all matter arising in this clause.

xiv. No work shall be done on Sundays or on other declared Holidays of BHEL without the written permission of BHEL officer in charge of the work. The contractor shall comply with the provisions of the Factories Act 1948 if the same are applicable. No contract labour shall be engaged on any National Holidays.

xv. The contractor shall keep his work place clean and safe to avoid injuries to men and damage to finished products / equipment.

xvi. On the occurrence of an accident, which results in the death of any of the workmen employed by the contractor or which is so serious as to be likely to result in the death of any such workmen, the contractor shall within 24 hours of the happening of such an accident intimate in writing to the BHEL official in charge of the work.

xvii. The contractor shall indemnify BHEL against all losses or damages sustained by BHEL resulting directly or indirectly from his failure to give intimation in the manner aforesaid including the penalties or dues if any and become payable by BHEL, as a consequence of

failure, BHEL to give notice under the Employees Compensation Act 1923 or otherwise confirm to the provisions of the said Act in regard to such accident. 1.18 The contractor shall ensure adherence to all statutory requirements applicable to BHEL.

xviii. The contractor shall ensure abidance by all the labour laws especially including Contract labour (R&A) Act 1970, Payment of Wages Act 1936, Employees Compensation Act 1923, Minimum Wages Act 1948, ESI Act 1948, Payment of Bonus Act 1965, and Provident Fund Misc. Prov. Act 1952, as amended from time to time.

xix. The contractor shall comply with provisions of Provident Fund Misc. Prov. Act 1952 through PF code allotted to him / her.

xx. Notwithstanding the above clause, in case of any financial loss incurred by company on account of contravention of the Provident Fund regulations or any regulations of rule touching the same by the contractor, the contractor shall submit an undertaking to indemnify the company to the extent of the loss incurred by the company.

xxi. The contractor should engage only those laborers whose age is 18 (eighteen) years or more.

xxii. The contractor shall not resort to subcontracting under any circumstances without prior permission of BHEL. If found sub-contracting at a later date, BHEL reserves the right to take whatever action it deems fit, including cancellation of the Contract.

xxiii. The contractor shall provide the required safety equipment to the labors engaged by him / her.

xxiv. Contractor shall issue "Employment Card" as per statute to all labour and supervisors covered under the job work contract.

xxv. The contractor shall be responsible to settle any grievances of the labour deployed by him.

Chapter VII- Field quality control plan

1. Work shall be executed as per approved field quality control plan (FQCP). Submitted FQCP shall be reviewed and approved by BHEL/BPCL.

Chapter VIII: HSE (Health, Safety, Environment) and PPE (personal Protective Equipment) Guidelines

1. Contractor shall follow all the HSE guidelines as mentioned chapter IX off SCC and BPCL.
2. Contractor shall deploy one (1) number of qualified and experienced safety officer for the entire period of contract.
3. Contractor shall submit the biodata of safety officer to BHEL/Customer (BPCL), for approval.
4. In case of any dispute/ contradiction, BPCL HSE rules and guidelines shall prevail.
5. PPEs of Reputed make shall be made available to the workmen as per Chapter IX of SCC.
6. All the vehicle movements/ Loading and unloading shall be done by strictly following the safety norms.
7. **FARANA crane shall be used instead of Hydra.**

Part II

Chapter IX: Technical Specifications for Integrated Site Office

1. BIDDER'S SCOPE OF SUPPLY AND ERECTION-COMMISSIONING OF PRE-ENGINEERED BUILDING:

Design, Supply, Civil Works and Erection of one Pre-Engineered Integrated Office building of **25mX9.5mX3m** & two toilet blocks (Staff & CM) with wooden partitions, required electrical installations, toilet fittings and furniture as per attached drawing.

Major supply and services included in bidder's scope:

S.No	Description	Quantity
1.	Development and submission of required drawings for the approval by BHEL	As per BOQ & drawings provided in subsequent clauses
2.	Supply of PEB structural materials such as columns, rafters, beams, purlins, steel sheets, insulation etc.	
3.	Supply of PEB architectural items such as doors, windows, rolling shutters, etc.	
4.	Supply of all the Furniture as per the attached BOQ	
5.	Supply of Electrical Services	
6.	E&C: Erection of PEB structural materials including the civil and earthworks needed for erection	
7.	E&C: Erection of PEB architectural items.	
8.	E&C: Erection and Commissioning of Electrical Services	
9.	E&C: Erection of all Furniture as per attached drawing	

2 BIDDER'S SCOPE OF SERVICES

2.1 LIST OF MAJOR SERVICES INCLUDED IN BIDDER'S SCOPE:

I. Detailed Engineering, Development of drawings and certification of the design from third party as approved by BHEL
II. Technical services relating to planning, procurement, manufacturing, inspection, expediting, packing, shipping, storing, etc.
III. Submission and obtaining approval of all engineering documents before start of works
IV. Engineering for procurement
V. Preparation of all MTOs and MRs, as required
VI. ORDERING of all materials
VII. Overall Project Management and progress reporting to BHEL
VIII. Expediting suppliers and sub vendors
IX. Procurement
X. Conducting all required earthworks and civil works for erection like trenching, foundations, RCC and PCC works, etc.
XI. Manufacture, fabrication and assembly of all required materials at site
XII. Inspection and testing including third party Inspection
XIII. Painting of all works, painting at site including touch up paint
XIV. Dispatch and transportation of materials, consumables, construction aids etc. to site.
XV. Establishment of site office complete with all facilities and communication network, as required
XVI. Storage, loading, unloading, security and handling at site
XVII. Construction at site including earthwork, foundations, backfilling, PCC & RCC works, flooring, fabrication, erection and installation and Supervision of work during all the activities for completion of Pre-Engineered buildings.
XVIII. Insulation with cladding and painting
XIX. Engineering for interfacing all inputs and outputs
XX. Site clearing and cleaning
XXI. Total day to day supervision of construction including erection and specialized services, if any
XXII. Clearance for installations from the statutory and other concerned authorities on behalf of Purchaser. The Contractor shall also assist in preparing application forms, providing necessary drawings, documents, test certificates etc. including necessary co - ordination with statutory and other concerned authorities.
XXIII. Liaisoning with other contractors in the plant

XXIV. Handing over the completed PEB to BHEL
XXV. Supply of all test reports /certificates
XXVI. Providing as built drawings

Notes:

Bidder to note that the above list is not exhaustive and any other service required as per the intent of this specification / project requirements /good engineering practice shall be deemed to be included in bidder's scope without any commercial implication to the purchaser.

3. CLARITY OF SCOPE IN OTHER AREAS (In addition to Cl.2.0.0):

S.No	Item	By BHEL	By Vendor	Remarks
1	Complete civil foundation works for all the Pre-Engineered Integrated Office building.		YES	Vendor shall submit the loading details for foundation design
2	RCC cable-trenches within the office building		YES	
3	Flooring works within the office building		YES	
4	Plinth protection around the office building		YES	
5	Steps/ ramps on front/back sides of the room as applicable		YES	
6	Composite slab, if adopted by bidder, incl. all shuttering, reinforcement, bolts, decking, formwork, fasteners, painting, finishes, waterproofing, etc		YES	
7	Electrical works including supply and E&C of wiring, room appliances (lights, ceiling fans, exhaust fans, ventilators, etc), switchboards, MCB boxes etc for the office building as specified in clause 9.5. (A)		Yes	
8	Cut out/ provision of supports & fixtures for the room appliances		Yes	

9	Supply and Installation of all furniture including tables, chairs, modular work stations with power ports, Storage Almirahs, etc		Yes	

4.TECHNICAL DETAILS

4.1 Design, supply and erection of Pre-Engineered Buildings

4.1.1. Design and supply of PEB structural materials

a) After receipt of BHEL PO, following documents shall be submitted to BHEL for approval:
   1 Structural design calculations including STADD Pro
   2 GA drawings along with BOM.

b) Design calculations, checked and certified by IIT/NIT, shall be submitted to BHEL for approval.

c) Vendor shall supply the structural materials such as columns, rafters, beams, purlins, tie rods, sheets, wall cladding/roofing PUF insulation, hardware etc. to the site as per the BHEL approved drawings. Raw materials for steel sections, sheets etc. should be of reputed make of supplier to similar construction / infrastructure projects conform to relevant Indian / International Standards. The Bidder should furnish documentary evidence for the same.

To the extent possible, the Contractor shall consider the standard steel sections and plates available in India. In case the Contractor uses raw materials conforming to standards other than Indian Standards, the contractor should clearly indicate the Indian equivalent of the same and approval from the purchaser is to be obtained for use of such raw materials. In case for any raw materials standards other than Indian Standards is already specified in the Contract, approval as mentioned above is not required. In case of non-availability of raw materials in India, the Contractor shall switch over to import of the required raw materials expeditiously at its own cost and responsibility. The Purchaser shall not grant any time extension, on account of any delay in the procurement of raw materials. The Contractor shall take samples and test them in laboratories in India and/or abroad as may be required at his own cost & time, and fully satisfy himself of the suitability of the raw materials for the purpose of the plant & equipment offered by him. The Contractor shall furnish the test results to Purchaser for approval.

d) Vendor shall also supply the J bots/nuts/washers, alignment plates and other related hardware that are used for positioning and anchoring of the PEB structures to the RCC foundation plinth.

e) All the items shall be supplied directly to the project site.

4.1.2. Design and supply of PEB architectural items

a) After receipt of BHEL PO, vendor shall submit GA drawings along with BOM (item-wise description, quantity, make, model etc) of the architectural items for BHEL approval.

b) The architectural items submitted for approval shall meet the requirements of various aspects of the room such as electrical, illumination, ventilation, exhaust, thermal, safety, security etc.

c) Accordingly, this shall include all items such as windows with shades, doors with shades/lock/key, rolling shutters with lock/key, ventilator provisions, exhaust provisions, rain water gutters/ down comers/ pipes etc. Raw materials for steel sections, sheets etc shall be of reputed make such as Jindal Steel and Power, RINL, SAIL, TISCO, JSW Steel, Essar Steel, Ispat Industries, Lloyd Steel Industries. Vendor shall take prior approval from BHEL for the make prior to proceeding with procurement action.

d) Vendor shall supply the items directly to the project site.

4.1.3. Erection of structures of PEB

a) All the Civil works related to PEB are vendor scope, Vendor shall complete erect the structural items such as columns, rafters, beams, purlins, tie rods, sheets, wall cladding/roofing insulation, hardware etc. as per the BHEL approved drawings / BoM.

b) Vendor shall also carry out necessary finishing activities such as flooring, painting etc.

c) Vendor shall deploy qualified/competent team at site to carry out the above erection activity.

d) Vendor shall also deploy their specialized team during plinth casting of J bolts / alignment (base) plates etc. in order to provide the needed support/guidance to the team at site.

e) All necessary labour, tools & tackles, shuttering materials, measuring instruments, machinery shall be in vendor scope of supply. This shall include

spanner sets, drilling machines, welding machines, hydra, JCB, truck, trolley etc as required for the erection work.

4.1.4. Erection of architectural

a) Vendor shall carry out erection of the architectural items such as windows with shades, doors with shades/lock/key, rolling shutters with lock/key, structural provisions for ventilators / exhausts, rain water gutters/ down comers/ pipes etc as per the BHEL approved drawings / BoM.

b) Vendor shall also carry out necessary finishing activities such as painting etc.

c) Vendor shall deploy qualified/competent team at site to carry out the above erection activities.

d) Vendor shall carryout erection of rooms with wooden partitions as shown in the plot layout.

e) Vendor shall supply the items directly to the project site.

f) All necessary labour, tools & tackles, shuttering materials, measuring instruments, machinery shall be in vendor scope of supply. This shall include spanner sets, drilling machines, welding machines, hydra, JCB, truck, trolley etc as required for the erection work.

4.2.1. Structure & Material Specification:

The PEB room shall have a steel frame primary structural members. Primary members fabricated from plates shall conform to IS2062 min Grade E250 Quality BR/ ASTM A572-12 Grade 50 with minimum yield strength of 345 Mpa. Steel shall be semi-killed/killed. Minimum thickness of steel plates shall be 4 mm. Hot rolled primary structural members and Rod/Angle bracing shall conform to IS2062 Grade E250 Quality A. Secondary members for Purlins and Girts shall conform to the specification of IS 811 or ASTM A1003-12 made from steel sheets conforming to ASTM A1011-12b Grade 50 having a minimum yield strength of 345 Mpa. The minimum thickness of secondary members shall be 3.15 mm. All other miscellaneous secondary members shall have minimum yield strength of 250 Mpa.

Insulated wall cladding or roofing shall consist of double skin metal cladding with Poly Urethane Foam (PUF). PUF must be made of continuous method PU foam and must be CFC free, self-extinguishing, fire retardant type with density 40 +/-2 kg/m3 and thermal conductivity 0.019-2.2 W/(m.K) at 10°C. The PUF panels shall be a factory made item ready for installation at site.

4.2.2. Fasteners & Connections:

Special coated self-drilling screws/fastener shall be used conforming to class 3 as per AS: 3566.1 and AS: 3566.2. Steel bolts, nuts and washers complying with AS 1112:2000. High Strength Bolts for Primary Connections IS: 1367 (Part III) Gr. 8.8 / ASTM A325. Bolts for Secondary Connection IS: 1367 (Part III) Gr. 4.6 /ASTM A307. Anchor/foundation Bolts shall conform to IS: 5624 and relevant IS code.

4.2.3. Roof & Wall Cladding:

PUF panels shall be made of troughed permanently colour coated metal sheets of steel for roofing and side cladding (internal and external) shall conform to the requirements of Table1 and IS: 513 for Hot-dip Zinc coated or Al/Zn coated sheets. The insulation material thickness and details shall be as specified at relevant para in the specification.

PUF insulated panels Metal Sheet for Roofing and side cladding consist of external sheet as troughed permanently colour coated sheet & internal sheet as plain permanently colour coated sheet.

Chemical composition of Troughed permanently colour metal sheet for roofing and side cladding shall conform to the provisions of same reference code to which the mechanical properties conform to.

Plain permanently colour coated steel metal sheet for ridge and hips, flashing, trimming, closure for vertical and horizontal joints, capping etc. shall conform to the same requirements as those of troughed permanently colour coated metal sheet for roof and side cladding.

The maximum spacing of the fastener shall be 390 mm c/c along the length of purlins / runners. However exact spacing shall be as per the design done by the bidder of the fastener considering the wind load, self-load and other associated load. Minimum diameter of the fastener shall be 5.5 mm and at least 3 nos. of fastener shall be used per sheet.]

Fillers blocks as a trough filler shall be used to seal cavities formed between the profiled sheet and the support or flashing. The fillers blocks shall be manufactured from black synthetic rubber or any other material approved by engineer.

4.2.4. Roof Insulation & Type:

Both metal sheets shall have an under insulation of minimum 70 mm thick PUF with density 40 +/- kg/m3 and thermal conductivity 0.019-2.2 W/(m.K) at 10°C with gutters and down take pipes along with Flashing & Top cap of required size and colour complete with all necessary hardware complete. Roof shall be projected at-least 300 mm from the wall.

Stiffening ribs / subtle fluting for effective water shedding and special male/female ends with full return legs on side laps for purlin support and anti-capillary flute in side lap.

Both upper and lower sheets shall be separated through spacers and fastened through zinc /zinc-tin coated self-drilling screws. The fastener size shall be calculated as per the design or manufacturers recommendations.

4.2.5. Wall Insulation:

All voids of external and internal metalled walls shall have an under insulation of minimum 60 mm thick PUF with density 40 +/- kg/m3 and thermal conductivity 0.019-2.2 W/(m.K) at 10°C with proper supports etc. as approved.

Both the walls should be separated by spacers system made up of cold formed steel bars and fastened through zinc /zinc-tin coated self-drilling screws.

The external wall of Inverter room facing the transformer area shall be as per IS: 1646 – Code of practice for fire safety of buildings (general): electrical installations.

4.2.6. Doors Frames:

Door frames shall be of T-iron frame of mild steel Tee-sections as per DSR-2013 item no 10.13. All doors shall be provided necessary fittings like hinges, handles, mortice locks, tower bolts, stopper, hydraulic door closer, etc. of CP brass complete.

Black powder coated aluminium doors shall be with extruded built up standard tubular sections, appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixed to Pre-Engineered structure including necessary filling up of gaps at junctions with required PVC/neoprene felt etc. including hinges /pivots and double action hydraulic floor spring of approved brand and manufacture IS: 6315 marked, lock, handle and all necessary fittings as detailed in tender drawing or submitted by bidder in shop drawing and approved by BHEL.

The door entrance shall include Mild Steel single leaf door. The structural steel shall conform to IS: 7452 and IS: 2062. The holdfasts shall be made from steel flats (50 mm and 5 mm thick).

The fixtures, fastenings and door latch are to be made with same materials.

4.2.7. Windows Frames:

Aluminium black powder coated section, frame shall be of 92x31 mm, minimum 16G thick as per approved design. Tinted glass and aluminium grill shall be provided.

4.2.8. Ventilators:

Aluminium black powder coated frame of minimum size 62x25 mm and 16G thick as per approved design. Ventilators/duct shall be provided with bird guard. Size of opening at wall for ducts shall be as per PCU manufacture and min 18 gauge GI sheet. Ducts shall be supported with suitable means, as approved during detail engineering.

All accessible ventilators and windows of all buildings shall be provided with min. 4mm thick float glass, tinted for preventing solar radiations. Suitable sunshades made out of approved colour sheet will be provided to all external windows and door. The minimum projection for the sunshades will be 450 mm and 300mm wider than the width of the opening

4.2.9. Rolling Shutters:

Not Applicable

4.2.10. Plinth Protection:

1.50 M wide plinth protection of minimum 75mm thick of cement concrete 1:2:4 (1cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) over 75mm bed of dry brick ballast 40mm nominal size well rammed and consolidated and grouted with fine sand including finishing the top smooth, shall be provided around the Pre-Engineered Building.

4.2.11. Floor Finish:

Flooring, including preparation of surface, cleaning etc. shall be of cement concrete flooring as per IS:2571 with ironite hardener. The PEB Building floor shall be at least 600 mm above the ground level. Necessary ramps shall be provided for equipment entry.

4.2.12. Painting and Coating:

Steel shall be colour coated with total coating thickness of 25 microns (nominal) dry film thickness (DFT) comprising of silicon modified polyester (SMP with silicon content

of 30% to 50 %) paint or Super Durable Polyester (XRW) paint of 20 microns (nominal) on one side
(exposed face) on 5 micron (nominal) primer coat and 10 microns (nominal) SMP or Super Durable Polyester paint over 5 micron (nominal) primer coat on other side. SMP and polyester paints system shall conform to Product type 4 as per AS/ANZ 2728.

The structural steel shall be hot-dipped galvanized, conform to IS: 4759 or relevant Indian standard

4.2.13. Lighting:

The PEB Building shall be provided with electric light to achieve average illumination level of 300 Lux. Vendor shall ensure that the room is designed to utilize maximum natural light during the day.

4.2.14. Design Parameters & Loads:

The structure shall be designed for loads and load combination as per Indian Standards (latest revisions) such as IS: 875, IS: 1893, IS: 800, IS: 456 etc.

Dead Load: Self Weight of Structure including Purlins, Sheeting, Girts, Bracings, weight of turbo ventilators to be added as Dead load etc.

Imposed Load (Live Loads) Live loads shall be as per IS – 875. For sloped roofs up to 10 deg. It shall be 0.75 KN/M².
Wind Load: The basic wind speed of the site is taken as 160 km/hr. Design wind load coefficient shall be as per IS: 875-III, however the minimum value of these factors shall be considered as K1=1.0, K2=1.0 & K3 =1.0 for the design of PEB.

Earthquake Load: All PEB structures shall be designed for Seismic forces. Vertical Deflection and Horizontal Sway Limits:

a) Limiting Deflection: The limiting permissible vertical deflection for structural steel members shall be as per IS 800 2007.
b) The limiting permissible horizontal deflection for as per IS 800 2007 code.

4.2.15. Description of PEB Structures:

Primary Members: Primary structural framing shall include the transverse rigid frames, columns, corner columns, end wall wind columns, beams, truss member, base pate.

Secondary Members: Secondary structural framing shall include the purlins, girts, eave struts, bracing, flange bracing, base angles, clips, flashings and other

miscellaneous structural parts. Suitable wind bracings sag rods to be reckoned while designing the structure.

Sealant: Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non-staining material and be flexible enough not to interface with fit of the sheets.

Closures: Solid or closed cell closures matching the profiles of the panel shall be installed along the eaves, rake and other locations.

Flashing and Trim: Flashing and / or trim shall be furnished at the rake, corners, eaves, and framed openings and wherever necessary to provide weather tightness and finished appearance. Colour shall be matching with the colour of wall. Material shall be 26 gauge thick conforming to the physical specifications of sheeting.

Gutters and Downcomers: Gutters shall be fabricated out of same metal sheet. Material shall be same as that of sheeting. Down comers shall be of galvanized steel pipes or PVC designed to ensure proper roof drainage system.

Table-1

Group	Grade/Ref. Code	Yield Strength (min)	Tensile Strength (min)	Coating Class Designation	BMT	+ve Tole-rance	Upper Limit BMT	-ve Tole-rance	Lower Limit BMT
		Mpa	Mpa		mm	mm	mm	mm	mm
I	G250/ AS1397	250	320	Z275	0.6	0.04	0.64	-0.04	0.56
	SS255/ ASTM A653M	255	360						
	S250GD/ EN10326	250	330						
II	G350/ AS1397	350	420	AZ150	0.5	0.04	0.54	-0.04	0.46
	SS340 Class 4/ ASTM A792 M	340	410						
	S350GD/ EN10326	350	420						
Note: Minimum elongation % shall be as per relevant code & standard									

All steel materials supplied by the Agency shall be in a sound condition, of recent manufacture, free from defects, loose mill scale, slag intrusions, laminations, pitting, flaky, rust, etc. and be of full weight and thickness specified.

4.3. **Applicable Codes & Standards:**

Following codes and standards (latest editions) including their latest addenda shall be followed wherever applicable unless otherwise specified:

Sl No	Code	Description
1	IS:875-I	Code of Practice for Design Dead Loads for Building and Structures
2	IS:875-II	Code of Practice for Design Imposed Loads for Building and Structures
3	IS:875-III	Code of practice for design loads (other than earthquake) for buildings and structures.
4	IS:1893	Criteria for earthquake resistant design of structures.
5	IS:4326	Code of Practice for earthquake resistant design and construction of buildings
6	IS: 800	Code of practice for use of structural steel in general building construction
7	IS: 801	Code of practice for use of cold-formed light gauge steel structure members
8	IS:802	Code of practice for use of structural steel in overhead transmission line towers
9	IS:806	Code of practice for use of steel tubes in general building construction
10	IS:808	Dimensions for hot rolled steel beam, column channel and angle section
11	IS:811	Specification for cold formed light gauge structural steel sections
12	IS:813	Scheme of symbols for welding.
13	IS:1079	Hot rolled carbon steel sheet and strip – specification
14	IS:2062	Hot rolled medium and high tensile structural steel – specification
15	IS:4923	Hollow steel sections for structural use.
16	IS:1161	Steel tubes for structural purpose
17	IS:2721	Galvanized steel chain link fence fabric – specification

18	IS :4736	Hot dip zinc coatings on mild steel tubes
19	IS:4759	Hot dip zinc coatings on structural steel and other allied products – specification
20	IS:1868	Anodic coatings on aluminium and its alloys
21	IS:2395-I	Paintings of concrete, Masonry and plaster surfaces – code of operations and workmanship
22	IS:2995-II	Code of practice for painting concrete, masonry and plaster surfaces: schedule
23	IS:1477-I	Code of practice for painting of ferrous metals in buildings: pre-treatment
24	IS:1477-II	Code of practice for painting of ferrous metals in buildings: painting
25	IS:1905	Code of practice for structural use of un-reinforced masonry
26	IS:3067	Code of practice for general design details and preparatory works for damp/water proofing
27	SP:6	Handbook for structural engineers (all parts)
28	SP:7	National Building Code of India
29	SP:16	Design Aids for reinforced concrete to IS:456
30	SP:20	Handbook on masonry design and construction
31	SP:22	Explanatory handbook on codes for earthquake engineering
32	SP:24	Explanatory handbook on Indian Standard Code of Practice for plain and reinforced concrete
33	SP:25	Handbook on causes and prevention of cracks in buildings
34	SP:32	Handbook on functional requirements of industrial buildings
35	SP:34	Handbook of concrete reinforcement & detailing

For provisions not covered by any of the codes & standards, applicable good engineering practices and norms shall govern.

4.5. **ELECTRICAL SERVICES**

A. Supply, erection and commissioning of following electrical services items shall be in the scope of PEB vendor. The following items minimum shall be supplied by PEB vendor to meet the illumination level of 300 lux.

Electrical & Illumination, Air Conditioning & Networking Work of Integrated Office Building			
This Includes The supply ,Installation & commissioning of the following items			
SL NO	ITEM DESCRIPTON	UNIT	**QTY**
1	36W LED Panel Light 600x600	Nos	32
2	15W LED Utility Light	Nos	6
3	LED Emergency Light	Nos	4
4	6A Modular Switch with plate	Nos	50
5	Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 3 pin 5/6 A modular socket outlet and 5/6A modular switch, connections etc. as required	Nos	30
6	Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 6 pin 5/6A & 15/16A modular socket outlet and 15/16 A modular switch, Connections etc. as required	Nos	15
7	1200mm Ceiling Fan with regulator	Nos	8
8	12 Way SPN Lighting DB	Nos	2
9	TPN Power Distribution Board	Nos	1
10	63A MCCB Incomer	Nos	1
11	MCB Lighting Circuits	Nos	15
12	MCB Power Circuits	Nos	15
13	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface / recessed medium class PVC conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable etc. as required.	Meters	1500
14	2 x 2.5 sq. mm + 1 x 2.5 sq. mm earth wire through PVC conduit of required size with accessories and fixtures. Wiring shall be concealed type for computer room, office shed & for rest of sheds open and wherever required in PVC conduit of required size.	Meters	3000

15	2 x 4 sq. mm + 1 x 4 sq. mm earth wire through PVC conduit of required size with accessories and fixtures. Wiring shall be concealed type for computer room, office shed & for rest of sheds open and wherever required in PVC conduit of required size.	Meters	900
16	PVC Conduit with accessories	Meters	1800
17	Earthing Set with GI Electrode	Nos	2
18	Main LT Panel Cable 4Corex 35 sq.mm	Meters	80
19	Cable Tray with supports	Lot	1
20	Installation Testing Commissioning	Lot	1

Networking: Supply, Installation and Commissioning of networking works required for modular office all complete as per specification & approved drawing

SL NO	ITEM DESCRIPTON	UNIT	**QTY**
1	CAT6 LAN Cable	Meters	1800
2	RJ45 IO Outlet with face plate	Nos	30
3	24 Port Network Switch	Nos	2
4	24 Port Patch Panel	Nos	2
5	9U Network Rack	Nos	1
6	LAN Patch Cord	Nos	35
7	PVC casing/conduit for LAN cable	Meters	600
8	Cable Manager	Nos	2
9	UPS socket for network rack	Nos	2
10	Testing and LAN configuration	Lot	1

Supply, Installation & commissioning of Air Conditioning System

SL NO	ITEM DESCRIPTON	UNIT	**QTY**
1	1.5 Ton Inverter Split AC	Nos	12
2	Outdoor Unit Stand	Nos	12
3	Copper Refrigerant Piping with insulation	Meters	220
4	AC Drainage Pipe	Meters	150
5	AC Power Cable	Meters	200
6	AC Control Wiring	Meters	150
7	AC Isolator Switch/Socket with MCB Box	Nos	10
8	AC Distribution Board	Nos	1
9	Installation and Commissioning	Lot	1

Notes:

1. Illumination Layout shall be submitted by bidder and approved by BHEL after order placement. Illumination fixture, conduits etc. as mentioned in above table is indicative only

and bidder is required to plan and propose the same to have sufficient illumination in the office.

2. Air conditioning & Networking Layout shall be submitted by bidder and approved by BHEL after order placement. The quantities &Items as mentioned in above table is indicative only and bidder is required to plan and propose the same to have efficient cooling & Proper network set up in the office.

3. Installation & commissioning of above equipment and its associated cabling work within the PEB shall be in the scope of PEB vendor.
4. Above items shall be supplied as per the below makes and technical specification furnished elsewhere in this document.

5. Vendor's terminal point for cabling inside PEB shall be at the boundary point of PEB at two locations i.e. at loop in and loop out cable route

.

6. All the cables inside the building shall be directly routed on ceilings/walls.

4.6. **TECHNICAL SPECIFICATION FOR ELECTRICAL SERVICES**

Lighting panels shall be powder coated with colour shade RAL9002. Lighting panels shall have IP55 degree of protection.

Wires of different phase shall normally run in separate conduit.

Electrification of all building shall be carried out as per IS 732-1989, IS 4648-1968 and other relevant standards.

All luminaries and their accessories and components shall be of type readily replaceable by available Indian makes.

Following test reports to be submitted for LED chip/LED luminaires:

a) LED parameters like Lumen per watt, CRI, Beam angle from manufacturer. b) LM 80/IS: 16105 report.

c) LM 79/IS: 16106 report

LIGHTING WIRES

Lighting wires shall be 1100 V grade, light duty PVC insulated unsheathed, stranded copper/ aluminium wire for fixed wiring installation. Colour of the PVC insulation of wires shall be Red, Yellow, Blue and Black for R, Y, B phases & neutral, respectively. Minimum size of wire shall not be less than 1.5 sq.mm Copper for lighting fixture & 4 Sq.mm Copper for receptacles. Lighting panels etc. shall be earthed by two separate and distinct connections with earthing system.

RECEPTACLE

Receptacles boxes shall be fabricated out of MS sheet of 2mm thickness and hot dipped galvanised or of die-cast aluminium alloy of thickness not less than 2.5 mm. The boxes shall be provided with two nos. earthing terminals, gasket to achieve IP55 degree of protection, terminal blocks for loop-in loop-out for cable of specified sizes, mounting brackets suitable for surface mounting on wall/column/structure, gland plate etc. The ON-OFF switch shall be rotary type heavy duty, double break, AC23 category, suitable for AC supply. Plug and Socket shall be shrouded Die-cast aluminium. Socket shall be provided with lid safety cover. Robust mechanical interlock shall be provided such that the switch can be put ON only when the plug is fully engaged and plug can be withdrawn only when the switch is in OFF position. Also cover can be opened only when the switch is in OFF position. Wiring shall be carried out with 1100 V grade PVC insulated stranded aluminium/copper wire of adequate size. The Terminal blocks shall be of 1100 V grade. The Terminal blocks shall be of 1100 V grade made up of unbreakable polymide 6.6 grade with adequate current rating and size. The welding receptacles shall be provided with inbuilt ELCB rated for suitable mA sensitivity.

GALVANISING

Galvanising of steel components and accessories shall conform to IS:2629 , IS4759 & IS:2633.

Additionally galvanising shall be uniform, clean smooth, continuous and free from acid spots. The amount of zinc deposit over threaded portion of bolts, nuts, screws and washers shall be as per IS:1367. The removal of extra zinc on threaded portion of components shall be carefully done to ensure that the threads shall have the required zinc coating on them as specified.

CONDUITS/PIPES/DUCTS INSTALLATION

GI pull wire of adequate size shall be laid in all conduits before installation. Metallic conduit runs at termination shall have two lock nuts wherever required for junction boxes etc. Conduit runs/sleeves shall be provided with PVC bushings having round edge at each end. All conduits/pipes shall have their ends closed by caps until cables are pulled. After cables are pulled, the ends of conduits/pipes shall be sealed with Glass wool/Cement Mortar/Putty to prevent entrance of moisture and foreign material. Exposed conduit/pipe shall be adequately supported by racks, clamps, straps or by other approved means. Conduits /pipe support shall be installed square and true to line and grade with an average 1Meter spacing between the supports.

Ventilation

Provision shall be made to allow fresh air from outside to enter the compartment through suitable filter capable of preventing entry of sand during severe sand storms.

The ventilation system fans shall be mounted on side walls with suitable sand filter / louver having easy access for cleaning and maintenance.

10. OFFICE FURNITURE & FURNISHINGS

The bidder is required to procure & install office furniture & furnishings as per the attached "Office Layout Drawings" and BOQ provided below. Any changes must be with the approval of BHEL.
All Furniture in the BOQ shall be of Godrej or Equivalent make

Sl No.	Description	Units	Dimensions	Quantity
1	RCM Table	mm	2400X900	1
2	RCM cabin Side credenza	mm	1000X500	1
3	RCM Chair (Executive)	No.		1
4	Visitors chairs			17
5	Central Table in waiting area	mm	2000X900	1
6	Table and Chairs for15+1 sitting capacity in conference room. (Executive chair for presiding officer + 15 conference chairs)	Set		1
7	Storage cabinet	mm	900X450X1500	2
8	HOD Table	mm	1200X900	3
9	HOD cabin Side credenza	mm	900X450	3
10	HOD chair (Executive)			3
11	Twin sharing Modular Workstation for engineers, half partitioned at 1.5m height of pre lam board fitted in frame	Nos	3000mmX1500mm	8
12	Employee sitting chairs	No s		14
13	Full height storage Almirah	Nos	900mmX450mmX1800mm	6
14	Rectangular work stations for supervisors	Nos	1200mmX450mm	2

15	Curtain Blinds	Nos.	1200mm X 900mm	14
16	Vertical filing cabinets-4 drawers	Nos		6

10.1 Modular Work Station :

The modular workstation for engineers comprises two (2) L-shaped tables, each measuring 1.5 m × 1.5 m**,** providing sufficient workspace for engineering tasks, documentation, and equipment placement. Each unit includes two (2) ergonomically designed, height-adjustable chairs suitable for prolonged use.

For collaboration and display needs, the setup features two (2) whiteboards for writing, planning, and brainstorming, along with two (2) notice boards equipped with pinning facilities for posting schedules, drawings, and important information.

Each workstation is equipped with appropriately positioned electrical ports, including power sockets and data/charging points, to support laptops, peripherals, instrumentation, and other electronic equipment required for engineering operations.

This modular arrangement ensures efficient workflow, space optimization, and seamless accessibility to both communication and power utilities.

10.2 Pantry :

Pantry provision has to be given as per the drawing containing :

1. **Almirahs (2 Nos.)**
   - Two almirahs to be provided, each fabricated from **powder-coated CRCA sheet steel** or **commercial plywood with laminate finish**, as specified in drawings.
   - Minimum dimensions per almirah: **900 mm (W) × 450 mm (D) × 1800 mm (H)** or as shown on approved layout.
   - Each almirah to include adjustable shelves, lockable shutters with SS hinges, and necessary hardware.
   - Finish: **1 mm laminate** on external surfaces; internal surfaces with balancing laminate or enamel paint.
2. **Granite Countertop**
   - Countertop made of **20–25 mm thick polished granite slab**, colour and shade approved by Engineer-in-Charge.
   - Granite to be machine-cut, edge chamfered/bevelled, and fixed over a rigid base with cement mortar (1:4) including necessary supports.
   - Joints to be filled with matching epoxy/stone adhesive.
3. **Stainless-Steel Sink With Drain Board**

- One **SS sink with integrated drainboard**, **standard size** (approximately **37"–45" x 18"–20"**), heavy-gauge **304 grade** stainless steel (1.0–1.2 mm thick).
- Sink to be mounted to the Granite slab as per design, with proper sealing and supports.
- Includes CP waste coupling, bottle trap, and connections to inlet/outlet plumbing.

4. **Plumbing & Fixtures**
   - Hot and cold water lines in CPVC or as specified, including angle valves, unions, and flexible connection pipes.
   - Proper slope for drainage and secure connections to existing plumbing lines.
5. **General Requirements**
   - All work to conform to manufacturer specifications, relevant IS standards, and directions of the Engineer-in-Charge.
   - All edges, joints, and fixtures to be finished neatly and free from defects.
   - Site to be cleaned and all debris removed after completion.

10.4 Toilets

One toilet block of3000 mmX2000mm attached to RCM cabin fitted with one EWC along with all accessories and one wash basin with accessories should be made in brickwork.

One toilet block made of brick walls & RCC roof and having

- One cubicle for bathing fitted with a shower, tap, wall hanger, soap box, etc and door of 750mm doorway.
- Two cubicles one EWC and other IWC , each with a flush tank, tap and door (D75 i.e., 750mm as per drawing)
- one common area with two wash basins fitted with tap and other required provisions.
- Three urinal commodes fitted with a proper flush system as shown in the drawing
- Anti-skid ceramic/vitrified tiles, minimum **10 mm thick**, laid over cement mortar (1:4) flooring and Tile joints filled with epoxy grout; slopes provided towards floor trap
- Full-height wall tiling in glazed ceramic tiles (300×600 mm or as approved).
- Cement-based waterproofing behind wet walls prior to tiling.
- Moisture-resistant gypsum board or PVC panel ceiling with access panel for maintenance

- **Cubicle Partitions** are Pre-laminated compact laminate/FRP/GRP partitions, 12 mm thick, mounted on SS hardware of Height approx. **2100 mm** with ground clearance of 150–200 mm.
- **Doors** are to be Laminate/compact laminate door shutter with SS hinges, handle, latch & door closer. Occupancy indicator latch may be provided.

- **WC Fixtures** will be one European-type floor-mounted or wall-hung WC pan with seat cover with soft-close hinges and one Indian-type floor mounted WC pan (as per drawing). Concealed or exposed flush valve/flush tank with required CP fittings.

- **Wash Basin with CP Brass pillar taps, bottle traps, and waste couplings provided for each**

- Full-length mirror above counter with aluminum frame and backing is to be provided.

Plumbing Works include,

for Water Supply **- CPVC piping for hot and cold water lines with proper supports and clamps, CP angle valves, flexible connections for fixtures.**

For Drainage: UPVC/SWR pipes for waste lines with proper slope towards floor traps. Floor traps provided in each cubicle and under counter areas.

Electrical & Ventilation

- **Lighting**: Moisture-resistant LED ceiling lights above washbasins and cubicles.
- **Exhaust Fan**:
  - Adequately sized exhaust fan installed in external wall/shaft for ventilation.
- **Switches & Wiring**:
  - Modular IP-rated switches; wiring in concealed conduits.

General Requirements

- All workmanship to conform to IS standards and manufacturer specifications.
- All fixtures to be installed plumb, level, and securely anchored.
- Contractor shall test water supply, drainage, and flushing systems before handing over.
- Cleaning and removal of debris after completion.

10.5 CIVIL & INTERIOR WORKS

10.5.1 Flooring

- Civil Works including levelling, earthwork excavation, foundation ,plinth beams all associated civil works.
- Vitrified tiles 600×600/800×800 mm (premium grade), machine-cut.
- Skirting of 100 mm height, matching tile.
- Toilet area: Anti-skid ceramic tiles with slope towards floor traps.

10.5.2 Partition Work

For cabins and conference room:

- Paneled partition in Aluminium frame with panels of 18 mm thick prelaminated board18 mm thick prelaminated particle board with both side lamination.

For other areas:

- Paneled partition in Aluminium frame with panels of 18 mm thick prelaminated board & glass partitions:
    - 18 mm thick prelaminated particle board with both side lamination up to 1200 mm in bottom panel.
    - 6 mm thick clear glass on top panel.

10.5.3 **Doors, Windows & Ventilators**

- Doors annotated **D1, D2, D75** as per drawing mean a door way of 1000mm, 2000mm and 750mm respectively.
- Paneled doors in Aluminium frame with panels of 18 mm thick prelaminated board (Bottom panel 1200mm) & glass (6 mm thick clear glass on top panel)partitions for all doors except D75
- Solid core flush doors with laminate finish.
- Aluminium Glass windows (14 X 1200mm X 900mm) & Ventilators (6 X 300 mm X 150 mm)
- SS hinges, handles, door closers, locks.

10.5.4 False Ceiling

The false ceiling shall be made out of anti-corrosive painted 19mm square hollow section design to fix to the roof frame with suitable hangers. **The clear height of ceiling shall be 2.70M. from the finished floor level.** Cut out should be made properly wherever necessary for fixing electrical fitting. False ceiling shall be done with 8mm thick hollow extruded polymeric section (syntax or Equivalent) with tongue and grove arrangement. The colour of Ceiling should match with inner wall panels All vertical & Horizontal corners shall be neatly and smoothly finished with Aluminium sections & L-angles

10.6 ELECTRICAL WORKS

10.6.1 Cabling & Conduits

- FRLS/FR-LSH cables (IS: 7098/IS:694).
- PVC conduits concealed in walls/ceilings.

10.6.2 Power Distribution

- Main DB & Sub DBs installed in electrical room.
- Earthing as per IS:3043; minimum 3 earth pits.

10.6.3 Lighting

- LED panel lights for workstation, cabin, conference, and corridors.
- Task lights above workstations.
- Emergency lights near exit passage.

10.6.4 Server Room

- Dedicated UPS power circuit.
- Separate earth pits for server load.

10.7 HVAC (Heating, Ventilation & Air-Conditioning)

- Split AC units as per heat load calculation.
- Copper refrigerant piping with insulation.
- Fresh air ventilation for toilets and server room.
- Grilles, diffusers, dampers as required.

10.7.1 Pantry

- Granite countertop (20 mm thick) with edge chamfer.
- Stainless steel sink with drainboard (standard size).
- Two almirahs per pantry with laminate finish.
- CPVC water lines.
- UPVC/SWR drainage lines.

10.8 IT & NETWORKING

- CAT6A cables.
- 24-port/48-port network switches.
- Patch panels mounted in server rack.
- WLAN access point locations as shown.

10.9. SAFETY & EMERGENCY SYSTEMS

FIRE SAFETY

- Supply & Installation of Fire Extinguishers: following items shall be in the scope of the contractor.

Sl. No.	Items	Quantity	Unit
1.	50 Lit. Foam type Fire Extinguisher	4	No's
2.	25 kg DCP type Fire Extinguisher	4	No's
3.	25 kg CO2 type Fire Extinguisher	4	No's
4.	Sand Buckets (Stand with 4 buckets in each set)	4	Sets

- Emergency exit signage

10.10. PAINTING & FINISHES

- Plastic emulsion paint for walls.
- Enamel paint for metalworks.
- Textured paint (optional) in feature walls.

10. 10 TESTING & COMMISSIONING

- Contractor shall test:
  - Electrical circuits
  - Plumbing lines
  - AC performance
  - Network connectivity

As-built drawings to be submitted.

11. GENERAL TECHNICAL REQUIREMENTS:

For the design of the plant, it is necessary to consider the requirements (by suitably planning the layout) of the convenience of inspection, cleaning, maintenance and repair.

Equipment design and engineering shall incorporate adequate safety features (as per applicable specifications of respective installation as well as Health, Safety and Environment Codes & Standards applicable for the subject project) to provide protection to operating personnel, equipment and environment.

No claim in terms of cost or relaxation in time shall be entertained for any redesign, rework and for the safety measures provided. If at any stage of work, any dismantling or modification or relocation of any facilities is required to be done to complete the work in bidder's scope and which has been agreed by the Owner, the same shall be done by the bidder at no extra cost or time implication to the Owner. All such changes will be executed only after the proposed drawings and work plan are approved by the purchaser.

The Bidder shall take all necessary precautions to protect all the existing equipment, structures, facilities and buildings etc. from damage. In case any damage occurs due to the activities of the Bidder on account of negligence, ignorance, accidental or any other reason whatsoever, the damage shall be immediately made good by the Bidder at his own cost to the satisfaction of the Owner. The Bidder shall also take all necessary safety measures at his own cost, to avoid any harm or injury to his workers and staff from the equipment and facilities of the power station.

Warranty

Vendor shall provide warranty for 12 months for the supply and erection of PEB rooms from the date of start of erection or 18 months from the date of completion of erection whichever is earlier.

12. CONSTRUCTION REQUIREMENT:

Construction, Erection & commissioning of all the items supplied by bidder is included in bidder’s scope.

Bidder is advised to visit the project site and appraise himself about the local conditions and infrastructure available in the area for fulfilling their commitments under the contract. BHEL will not admit any claims whatsoever on account of Contractor’s non-familiarization of local conditions.

The Contractor shall make all necessary arrangements to deliver the equipment at the NLC site by wagons/trucks/trailers and receive the material at site, build his own stores for the proper storage of equipment, maintain the stores and all related documents and records, transport the equipment to site for erection purpose. Necessary security arrangements also shall be made by the Contractor. Area only for

construction of stores and construction site office shall be made available, free of cost, to the Contractor by the Purchaser.

b

The Contractor shall be provided with construction power at 415 V, three phase, 50 Hz for the purpose of the construction and erection at free of charge. The Contractor shall make his own arrangements for further distribution.

Construction water shall be supplied free of cost by the Purchaser to the Contractor at one point at each location of project.

All machinery such as cranes, hydra, JCBs, forklifts, transport trucks, trolleys, concrete mixers, Ajax machines etc necessary for movement and installation of materials shall be organized by the bidder. Bidder shall arrange all the items required like scaffolding, rope, sling etc. for construction of the facilities in their scope.

All necessary tools and tackles such as screw driver set, power screw drivers, cutting pliers, nose pliers, spanner sets, adjustable spanners, hole saw cutter set, bending tools, torque wrenches, hack saw blades, pipe wrenches, flat / round files, drilling machines, welding machines, steel bar bending tools / templates for RCC works, spade, shovel, hammer etc shall be organized by the bidder.

All necessary measuring instruments such as measuring tapes, digital multimeters, electrical testers, meggers etc shall be organized by the bidder.

The contractor shall submit to the employer, draft instruction manual specifically compiled for the project, containing full detail required for E&C and Maintenance if any. The E&C manuals/checklists shall be submitted prior to the commencement of erection activities.

Bidder shall make their own arrangements for necessary food, drinking water and accommodation for their labour and employees posted at the site. Similarly, food and drinking water required at the site, during the construction operations, shall also be in scope of the bidder.

Bidder shall organize all necessary steps to meet statutory requirements such as labour license, PF, ESI, insurance etc and also ensure compliance with relevant acts such as minimum wages act, income tax act, employee insurance act etc for their labour deployed at site.

Bidder shall maintain updated labour register, with name, age, qualification, salary, attendance details etc at the site.

It is advised to Bidders to visit the site and ascertain all site intensive requirements such as Health, Safety and Environment (HSE) requirement, work permits and other special requirements of site etc. Bidder shall ensure safety of man and machinery during work at site. For this necessary safety measures like use of PPEs, use of danger board/tapes etc to be ensured by the bidder. It is the ultimate responsibility of the bidder in all respect to prevent accidents at the site and safeguard man and machinery from accidents.

Bidder shall, at the completion of every work, clear off the debris, which resulted out of the work.

13. QUALITY ASSUARANCE:

13.1 All materials, components, and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages as per a comprehensive Quality Assurance Program (QAP). It is bidder's responsibility to draw such QAP duly approved by the purchaser. Schedule of finalization of such quality plans will be finalized before award on enclosed format

13.2 Bidder shall submit their comprehensive Manufacturing Quality Plan (MQP) and Field Quality Plan (FQP) on enclosed format for approval of BHEL.

13.3 It will be the responsibility of the bidder to adhere to the approved Quality Plans. The bidder shall further identify specific hold points beyond which work will not proceed without purchaser's consent so as to further ensure that he performs the above quality functions effectively.

13.4 MQP will detail out for all the components, various tests/inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by contractor's/subcontractor's/sub-supplier's Quality Control Organization, the relevant reference documents raised etc., during all stages of material procurement, manufacture, assembly and final testing/performance testing. The quality Plan shall be submitted on electronic media e.g. email in addition to hard copy, for review and approval. After approval the same shall be submitted in compiled form on CDROM.

13.5. Field Quality Plans will detail out for all the items, the quality practices and procedures etc. to be followed by the bidder at site, during various stages of site activities starting from receipt of materials at site.

13.6. Bidder to note that all the cost involved in the various Inspection and testing as per approved QAPs /ITPs shall be deemed to be included in bidder's quoted price.

Bidder at no point of time shall be eligible to raise any extra claim on account of any requirement necessitated as a part of approval of QAPs/ ITPs.

13.7. At various stages of manufacturing, procurement, construction, as per approved QAP inspection/testing shall be carried out by Inspection Agency (BHEL / Third Party appointed by BHEL / BHEL appointed third party). The inspection agency shall be indicated in the quality plan and shall be as per the approved quality plan.

13.8. Bidder shall notify in writing to the Purchaser, at least two weeks (Ten working days) in advance of the date and the place at which the items will be ready for witnessing of inspection / testing by Purchaser and / or PMC. In case any postponement becomes necessary, the CONTRACTOR shall provide written notification at least 48 hours prior to the original scheduled date.

13.9. In case bidder find any deviation or non- conformity with respect to the agreed specifications, during manufacturing of the item and where corrective action is not feasible, the bidder shall report the same to Purchaser and / or PMC in the designated "Waiver / Deviation Request" format and seek prior approval from Purchaser /PMC before proceeding with the job.

13.10. Bidder after satisfying that all inspection requirements as per approved ITP and applicable specifications / documents have been taken care by Inspection Agency, shall submit copy of the Inspection Certificate and all Quality control records to Purchaser in requisite copies along with Statutory Certificates if any, duly endorsed by their Quality Control Manager.

13.11. Purchaser and / or PMC – End customer reserve the right to carry out surprise checks on all material either at manufacturer's works or at site. In case of any rejection at site, the whole lot will be rejected and bidder shall get the entire lot replaced without any time or delivery implication to the purchaser.

13.12. Inspection Agency shall check the calibration status and traceability of all instruments used by the supplier, for testing. In case, TPIA uses their own instruments for testing purposes, similar certification shall be ensured.

13.13. Bidder shall submit, copy of each Inspection Certificate (IC) / Inspection Release Note (IRN) issued by Inspection Agency, along with all attachments mentioned therein.

13.14. No material shall be dispatched from the manufacturer's works before the same is accepted, subsequent to pre-dispatch final inspection including verification of records of all previous test/inspections by authorized Inspection Agency and duly authorized for dispatch by issuance of Material Dispatch Clearance Certificate (MDCC).

14. MARKING , PACKING AND DESPATCH

MARKING

14.1 All items shall be marked (stamped/etched) in accordance with the applicable Code/standard/specification. In addition, the item code, if available, shall also be marked.

14.2 For ease of identification, the color of painted strip (wherever required) shall be as per the applicable standard.

14.3 Paint or ink for marking shall not contain any harmful metal or metal salts which can Cause corrosive attack either ordinarily or in service. Special items/smaller items shall have attached corrosion resistant tag providing salient features.

DESPATCH

14.4 All the materials shall be divided into several sections for protection and ease of handling during transportation. The equipment shall be properly packed for transportation by hip/rail or trailer.

14.5 Special notations such as 'Fragile', 'This side up', 'Center of gravity', 'Weight', 'Owner's particulars', 'PO Nos.' etc. shall be clearly marked on the package together with other details as per purchaser order.

14.6 The equipment may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains/high ambient temperature, unless otherwise agreed.

14.7 The following minimum packing procedures shall be followed :

14.8 All items shall be dry, clean and free from moisture, dirt and loose foreign material of all kind.

14.9 All items shall be protected from rust, corrosion, and mechanical damage during Transportation, shipment and storage.

14.10 Rust preventive on machined surfaces to be welded shall not be harmful to welding and shall be easily removable with a petroleum solvent.

14.11 Ends shall be suitably protected, and the protectors shall be securely and tightly attached.

14.12 Each variety and size of item shall be supplied in separate packaging marked with the purchase order no., item code (if available), and the salient specifications.

Prior to shipment components of the unit shall be completely cleaned, Flange faces, threaded portion and other machined surfaces shall be protected by coating with easily removable rust preventive. All the items shall be properly packed to prevent damage during transit damage, loading, unloading and storage.

15 **DOCUMENTATION:**

MASTER DOCUMENT LIST

15.1 A master documentation shall be prepared during kick off meeting identifying all the DOCUMENTS / DRAWIGS to be submitted by the bidder as part of documentation.

15.2 Vendor shall ensure submission of all documentation as per approved Master Document
List.

15.3 The following minimum documentation shall be submitted by the vendor:

15.3.1 All PEBs GA drgs indicating base plates, anchor bolts connection Detail, purlin, roof panels, wall panels, scope demarcation etc.
15.3.2 BOM for Structural items.
15.3.3 BOM of architectural items with detail of item wise make, model Quantity etc.
15.3.4 Design analysis in STADD.PRO along with loading detail on Foundation.
15.3.5 Design certified by NIT/IIT
15.3.6 Civil interface details
15.3.7 Welding specification charts
15.3.8 Nondestructive Testing specifications
15.3.9 Quality plan

15.3.10 Painting schedule & procedure (shop painting & site painting)

XI. Packing procedure

XII. Erection drawings

XIII. Site storage procedure

XIV. Erection procedure XV. Testing procedure

XVI. 'AS BUILT' drawings

XVII. Any other document, as deemed necessary BY BHEL, during detail engineering or erection – commissioning stage.

16 DOCUMENTS SUBMISSION PROCEDURE

16.1 All Drawings/Datasheet/Design calculation etc. shall be submitted in soft as well as hard copy.

16.2 Soft submission of all drawings/documents is mandatory.

16.3 All drawings/ shall be submitted in AutoCAD format & all documents in MS office/PDF

16.4 BHEL shall furnish Approval/Observation of Drawings/Datasheet/Design calculation etc. on Soft Copy only.

17 DRAWINGS REVIEW AND APPROVALS

17.1 Review of drawings and documents issued by vendor shall be carried out by BHEL.

17.2 Approval/ review of the drawings/ documents by the BHEL would be only limited to the review of compatibility with basic designs and concepts.

17.3 The approval and /or review by BHEL shall not be construed by the bidder as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and drawings.

17.4 The sole responsibility of the correctness of Design, Engineering & construction shall lie with the bidder, irrespective of the fact that the Drawings / Documents submitted are reviewed or not by BHEL.

17.5 The bidder shall correct all faulty designs & constructions detected at any stage of work, without any cost and time implication to the Purchaser. The Bidder shall be responsible for and shall pay for any alterations of the Work to be accrued due to any discrepancies, errors or omissions in the Drawings or other Particulars supplied by him whether such drawings or particulars have been approved by the BHEL or not.

16.6. Revisions in drawings/documents shall be clearly marked within clouds. No revision without clouding shall be recognized and the same shall not be considered reviewed and approved.

16.7. Only the approved drawings duly stamped and signed by a competent engineer of BHEL shall be used for final erection.

17 Sub Vendor List:

A.1 For structural steel:

1. It should conform to relevant Indian / International Standards.
2. It should be of reputed make of supplier to similar construction /infrastructure projects.
3. The Bidder should furnish documentary evidence to prove (1) and (2) above **A.2**

Makes of Electrical and mechanical items

Item	Vendor	Remark
LED Lamp fixtures for indoor		
	BAJAJ	
	CGL	
	Havells	
	Philips	
	Wipro	
Lighting panel	Havels India Limited	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
	Indo Asian Fusegear	
	STANDARD ELECTRICALS LTD	
	C&S Electric Limited	
	ABB Limited	
Cable Lugs	Dowell, Mumbai	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
	Electromac Industries	
	Chenta Engineering Co	
	Forward Engineering Industries	
MCB	Any make-Model shall have mark of CE/VDE/UL/CSA/BIS with CML no.	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.

Furnitures	Godrej	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
Sanitary & Plumbing Items	Cera/Parryware/Aashirwad	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
Furnishing	NewTech	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
Axial flow Fans	Khaitan, Kolkata Marathon Electric, Kolkata CB-Doctor, Ahmedabad Solyvent Flakt, Kolkata Advance ventilation, Sonepat Krugar, Singapore TCH Nadi, Chennai Almonard, Chennai	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
Propeller Fan (Up to 2 HP)	Khaitan, Kolkata Marathon Electric, Kolkata CB-Doctor, Ahmedabad Solyvent Flakt, Kolkata	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.

Part II

Chapter X: Technical Specifications for

Design, Manufacture and Installation of Pre-Engineered Building for Site Store Building

10.1. SCOPE OF SUPPLY AND ERECTION-COMMISSIONING OF PRE-ENGINEERED STORE BUILDING:

The bidder is required to Design, Manufacture, Supply and Install One Pre-Engineered closed store Buildings sized 15mx30mx6m (approximately).

Bidder will submit the design (Including foundation, plinth beams & flooring) for approval of BHEL.

Structural steel framed structure for the building to be considered as per basic engineer design.

One closed shed pre engineered building is to be provided with rack facilities for storage and stacking, design of which is to be finalized and drawings of the same have to be submitted.

Supply and Fixing of external sheet of Permanent colour coated metal cladding with troughed M.S. sheets manufactured out of 0.55 mm TCT(Total coated thickness) permanently colour coated zincalume sheet (150 gsm zinc-aluminium alloy coating total of both sides as per AS 1397:1993) having 300 Mpa yield strength. The colour coating shall comprise of 20 microns finish coat over a 5-micron primer coat on the exposed side and a back coat of 5 microns over a primer coat of 5 micron on the reverse side. The metal cladding shall have 500 mm cover width, 47 mm high crests at 250 mm centers with special male/female side laps and anti-siphoning feature to prevent leakage. The sheet shall be fixed with the help of concealed compatible interlocking clips and wafer head zinc coated self-drilling fastener/screws 4.2X25 mm long on to the sub-girts. The clips shall be concealed and no fastener are to be penetrate the external sheeting all complete as per specification. Measurement of cladding shall be of the elevation/plan area of side covered by cladding as per approved drawing. No overlap shall be considered in measurement for the purpose of payment.

Major supply and services included in bidder's scope:

S.No	Description	Quantity
1.	Supply of PEB structural materials such as columns, rafters, beams, purlins, steel sheets, insulation etc. (Note: 1 set is for one PEB).	1 Set
2.	Supply of PEB architectural items such as doors, windows, rolling shutters, etc . (Note: 1 set is for one PEB).	1 Set
3.	Supply of Electrical Services as mentioned earlier (Note: 1 set is for one PEB).	1 Set
4.	E&C: Erection of PEB structural materials (Note: 1 set is for one PEB).	1 Set
5.	E&C: Erection of PEB architectural items. (Note: 1 set is for one PEB).	1 Set
6.	E&C: Erection and Commissioning of Electrical Services (Note: 1 set is for one PEB).	1 Set

7.	Storage Racks for Closed storage	1 set

10.2 LIST OF MAJOR SERVICES INCLUDED IN BIDDER'S SCOPE:

i. DETAILED Engineering
ii. Technical services relating to planning, procurement, manufacturing, inspection, expediting, packing, shipping, storing, etc.
iii. Submission and obtaining approval of all engineering documents before start of works
iv. Engineering for procurement
v. Preparation of all MTOs and MRs, as required
vi. ORDERING of all materials
VII. Overall Project Management and progress reporting to owner/consultant
VIII. Expediting suppliers and sub vendors
IX. Procurement
X. Manufacture, fabrication and assembly at works and site
XI. Inspection and testing including third party Inspection
XII. Painting at works, painting at site including touch up paint
XIII. Dispatch and transportation of materials, consumables, construction aids etc to site.
XIV. Establishment of site office complete with all facilities and communication network, as required
XV. Storage, loading, unloading, security and handling at site
XVI. Construction at site including minor fabrication, erection and installation. Supervision of work during fixation of foundation bolts. Grouting, alignment and necessary activities for installation of complete Pre-Engineered buildings. XVII. Insulation with cladding and painting
XVII. Engineering for interfacing all inputs and outputs
XVIII. Site clearing and cleaning
XIX. Total day to day supervision of construction including erection and specialized services, if any
XX. Clearance for installations from the statutory and other concerned authorities on behalf of Purchaser. The Contractor shall also assist in preparing application forms, providing necessary drawings, documents, test certificates etc. including necessary co-ordination with statutory and other concerned authorities.
XXI. Liaisoning with other contractors in the plant
XXII. Handing over the PEBs to purchaser
XXIII. Supply of all test reports /certificates
XXIV. Providing as built drawings for storage rack.

Notes:

Bidder to note that the above list is not exhaustive and any other service required as per the intent of this specification / project requirements /good engineering practice shall be deemed to be included in bidder's scope without any commercial implication to the purchaser.

10.3.CLARITY OF SCOPE IN OTHER AREAS :

Sl. No	Item	By BHEL	By Vendor	Remarks
1	Complete civil foundation works for all the PEB store rooms		Yes	Vendor shall submit the loading details for foundation design:
2	RCC cable trenches, if any, within all PEB store rooms		Yes	
3	Flooring works within all PEB rooms		Yes	
4	Plinth protection around all PEB rooms		Yes	
5	Steps/ ramps on front/back sides of the room as applicable		Yes	
6	Composite slab, if adopted by bidder, incl. all shuttering, reinforcement, bolts, decking, formwork, fasteners, painting, finishes, waterproofing, etc		Yes	
7	Electrical works including supply and E&C of wiring, room appliances (lights, ceiling fans, exhaust fans, ventilators, etc), switchboards, MCB boxes etc as specified in clause 7.3. (A)		Yes	
8	Cut out/ provision of supports & fixtures for the room appliances		Yes	

10.4. TECHNICAL DETAILS

Design, supply and erection of Pre-Engineered Buildings

10.4.1. Design and supply of PEB structural materials

b) After receipt of BHEL PO, following documents shall be submitted to BHEL for approval:

1.GA drawings along with BOM.

b) Vendor shall supply the pre-fabricated structural materials such as columns, rafters, beams, purlins, tie rods, sheets, wall cladding/roofing PUF insulation, hardware etc. to the site as per approved drawings. Raw materials for steel sections, sheets etc. should be of reputed make of supplier to similar construction / infrastructure projects conform to relevant Indian / International Standards. The Bidder should furnish documentary evidence for the same.

To the extent possible, the Contractor shall consider the standard steel sections and plates available in India. In case the Contractor uses raw materials conforming to standards other than Indian Standards, the contractor should clearly indicate the Indian equivalent of the same and approval from the purchaser is to be obtained for use of such raw materials. In case for any raw materials standards other than Indian Standards is already specified in the Contract, approval as mentioned above is not required. In case of non-availability of raw materials in India, the Contractor shall switch over to import of the required raw materials expeditiously at its own cost and responsibility. The Purchaser shall not grant any time extension, on account of any delay in the procurement of raw materials. The Contractor shall take samples and test them in laboratories in India and/or abroad as may be required at his own cost & time, and fully satisfy himself of the suitability of the raw materials for the purpose of the plant & equipment offered by him.

f) Vendor shall also supply the J bots/nuts/washers, alignment plates and other related hardware that are used for positioning and anchoring of the PEB structures to the RCC foundation plinth.

g) All the fabricated items, fasteners & materials required for complete assembly etc. shall be supplied to the project site.

10.4.2 Design and supply of PEB architectural items

e) After receipt of BHEL PO, vendor shall submit GA drawings along with BOM (item-wise description, quantity, make, model etc) of the architectural items for BHEL approval.

f) The architectural items submitted for approval shall meet the requirements of various aspects of the room such as electrical, illumination, ventilation, exhaust, thermal, safety, security etc.

g) Accordingly, this shall include all items (except the electrical wiring and appliances as listed under BHEL scope) such as windows with shades, doors with shades/lock/key, rolling shutters with lock/key, ventilator provisions, exhaust provisions, rain water gutters/ down comers/ pipes etc. Raw materials for steel sections, sheets etc. shall be of reputed make such as Jindal Steel and Power, RINL, SAIL, TISCO, JSW Steel, Essar Steel, Ispat Industries, Lloyd Steel Industries

10.4.3 Erection of structures of PEB

f) Vendor shall erect the structural items such as columns, rafters, beams, purlins, tie rods, sheets, wall cladding/roofing insulation, hardware etc. as per the BHEL approved drawings / BoM.

g) Vendor shall also carry out necessary finishing activities such as painting etc.

h) Vendor shall deploy qualified/competent team at site to carry out the above erection activity.

i) Vendor shall also deploy their specialized team during plinth casting of J bolts / alignment (base) plates etc. in order to provide the needed support/guidance to the BHEL civil construction team at site.

j) All necessary labour, tools & tackles, shuttering materials, measuring instruments, machinery shall be in vendor scope of supply. This shall include spanner sets, drilling machines, welding machines, hydra, JCB, truck, trolley etc. as required for the erection work.

10.4.5 Erection of architectural

a) Vendor shall carry out erection of the architectural items such as windows with shades, doors with shades/lock/key, rolling shutters with lock/key, structural provisions for ventilators / exhausts, rain water gutters/ down comers/ pipes etc. as per the BHEL approved drawings / BoM.

g) Vendor shall also carry out necessary finishing activities such as painting etc.

h) Vendor shall deploy qualified /Competent team at site to carry out the above erection activities.

i) All necessary labour, tools & tackles, shuttering materials, measuring instruments, machinery shall be in vendor scope of supply. This shall include spanner sets, drilling machines, welding machines, hydra, JCB, truck, trolley etc. as required for the erection work.

10.5 Structure & Material Specification:

The PEB room shall have a steel frame primary structural member. Primary members fabricated from plates shall conform to IS2062 min Grade E250 Quality BR/ ASTM A572-12 Grade 50 with minimum yield strength of 345 Mpa. Steel shall be semi-killed/killed. Minimum thickness of steel plates shall be 4 mm. Hot rolled primary structural members and Rod/Angle bracing shall conform to IS2062 Grade E250 Quality A. Secondary members for Purlins and Girts shall conform to the specification of IS 811 or ASTM A1003-12 made from steel sheets conforming to ASTM A1011-12b Grade 50 having a minimum yield strength of 345 Mpa. The minimum thickness of secondary members shall be 3.15 mm. All other miscellaneous secondary members shall have minimum yield strength of 250 Mpa.

10.5.1 Fasteners & Connections:

Special coated self-drilling screws/fastener shall be used conforming to class 3 as per AS: 3566.1 and AS: 3566.2. Steel bolts, nuts and washers complying with AS 1112:2000. High

Strength Bolts for Primary Connections IS: 1367 (Part III) Gr. 8.8 / ASTM A325. Bolts for Secondary Connection IS: 1367 (Part III) Gr. 4.6 /ASTM A307. Anchor/foundation Bolts shall conform to IS: 5624 and relevant IS code.

10.5.2 **Roof & Wall Cladding:**

Permanent color coated metal cladding with troughed M.S. sheets manufactured out of 0.55 mm TCT(Total coated thickness) permanently color coated zincalume sheet (150 gsm zinc-aluminium alloy coating total of both sides as per AS 1397:1993) having 300 Mpa yield strength. The color coating shall comprise of 20 microns finish coat over a 5-micron primer coat on the exposed side and a back coat of 5 microns over a primer coat of 5 micron on the reverse side. The metal cladding shall have 500 mm cover width, 47 mm high crests at 250 mm centers with special male/female side laps and anti-siphoning feature to prevent leakage. The sheet shall be fixed with the help of concealed compatible interlocking clips and wafer head zinc coated self-drilling fastener/screws 4.2X25 mm long on to the sub-girts. The clips shall be concealed and no fastener are to be penetrate the external sheeting all complete as per specification. Measurement of cladding shall be of the elevation/plan area of side covered by cladding as per approved drawing. No overlap shall be considered in measurement for the purpose of payment.

10.5.3. Doors Frames:

Door frames shall be of T-iron frame of mild steel Tee-sections as per DSR-2013 item no 10.13. All doors shall be provided necessary fittings like hinges, handles, mortice locks, tower bolts, stopper, hydraulic door closer, etc. of CP brass complete.

Black powder coated aluminum doors shall be with extruded built up standard tubular sections, appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixed to Pre-Engineered structure including necessary filling up of gaps at junctions with required PVC/neoprene felt etc. including hinges /pivots and double action hydraulic floor spring of approved brand and manufacture IS: 6315 marked, lock, handle and all necessary fittings as detailed in tender drawing or submitted by bidder in shop drawing and approved by BHEL.

The door entrance shall include Mild Steel single leaf door. The structural steel shall conform to IS: 7452 and IS: 2062. The holdfasts shall be made from steel flats (50 mm and 5 mm thick). The fixtures, fastenings and door latch are to be made with same materials.

10.5.4 Rolling Shutters:

Rolling shutter (Hand operated) shall be fabricated from 18-gauge steel and machine rolled with 75 mm rolling centers with effective bridge depth of 12 mm lath sections, interlocked with each other and ends locked with malleable cast iron clips to IS:2108 and shall be designed to withstand a wind load without excessive deflection. Metal rolling shutters and rolling grills as IS: 6248.

10.5.6 Painting and Coating:

Steel shall be color coated with total coating thickness of 25 microns (nominal) dry film thickness (DFT) comprising of silicon modified polyester (SMP with silicon content of 30% to 50 %) paint or Super Durable Polyester (XRW) paint of 20 microns (nominal) on one side (exposed face) on 5-micron (nominal) primer coat and 10 microns (nominal) SMP or Super Durable Polyester paint over 5-micron (nominal) primer coat on other side. SMP and polyester paints system shall conform to Product type 4 as per AS/ANZ 2728.

The structural steel shall be hot-dipped galvanized, conform to IS: 4759 or relevant Indian standard

10.5.7 Lighting:

The PEB Building shall be provided with electric light to achieve average illumination level of 100 Lux. Vendor shall ensure that the room is designed to utilize maximum natural light during the day.

10.5.8 Description of PEB Structures:

Primary Members: Primary structural framing shall include the transverse rigid frames, columns, corner columns, end wall wind columns, beams, truss member, base pate.

Secondary Members: Secondary structural framing shall include the purlins, girts, eave struts, bracing, flange bracing, base angles, clips, flashings and other miscellaneous structural parts. Suitable wind bracings sag rods to be reckoned while designing the structure.

Sealant: Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non-staining material and be flexible enough not to interface with fit of the sheets.

Closures: Solid or closed cell closures matching the profiles of the panel shall be installed along the eaves, rake and other locations.

Flashing and Trim: Flashing and / or trim shall be furnished at the rake, corners, eaves, and framed openings and wherever necessary to provide weather tightness and finished appearance. Color shall be matching with the color of wall. Material shall be 26-gauge thick conforming to the physical specifications of sheeting.

Gutters and Down comers: Gutters shall be fabricated out of same metal sheet. Material shall be same as that of sheeting. Down comers shall be of galvanized steel pipes or PVC designed to ensure proper roof drainage system.

All steel materials supplied by the Agency shall be in a sound condition, of recent manufacture, free from defects, loose mill scale, slag intrusions, laminations, pitting, flaky, rust, etc. and be of full weight and thickness specified.

10.6. **ELECTRICAL SERVICES**

A. Supply, erection and commissioning of following electrical services items shall be in the scope of PEB vendor. The following items minimum shall be supplied by PEB vendor to meet the illumination level of 100 lux.

A.1 Electrical services BOQ per PEB room			
SL No.	**DESCRIPTION (FIXTURES / LAMPS / ACCESSORIES)**	**UNIT**	**Tentative QTY as min required**
1	22W LED tube lights with frame, of standard manufacturer, for illumination	Nos	20
2	SSB-2 + R surface mounted swbd with 2 nos 5A piano type switches and one electronic fan regulator. (modular type)	Nos	6
3	SSB-2 surface mounted swbd with 2 nos 5A piano type switches (modular type)	Nos	6
4	Domestic type 5/15A receptacle with switch (Surface mounted mounted modular)	Nos	6
5	6 Way TPN Indoor type Lighting Panel (Surface mounted) with 32A, 4pole RCBO at the incomer & 6 Nos 10A SPN MCB at the outgoing .	Nos	1
6	32A TPN Welding receptacle with Plug & interlock Switch	Nos	1
7	Industrial Wall mounted Fan of 18 Inch to 24 Inch	Nos	4
8	Flexible Wires 1.5sqmm for fixture & 4sqmm for sockets, cable, conduits (rigid and GI stripped flexible), accessories for Conduits (All conduits shall be 25mm dia heavy duty GI type), ISA/ISMC/GI FLAT and any other accessories for installation of above items - 1 LOT	LOT	1
9	Exhaust Fan with DOL starter (415V, 3 PHASE) (Industrial grade)	Nos	5

Notes:

7. Illumination Layout & BOQ shall be prepared by the bidder and submitted for approved by BHEL after order placement. Illumination fixture, conduits etc. as mentioned in above table are tentative and final nos. and position shall be supplied and fixed as pe approved “Illumination Layout” and BOQ.
8. Installation & commissioning of above equipment and its associated cabling work within the PEB shall be in the scope of PEB vendor.

B. Supply & Installation of Fire Extinguishers: following items shall be in the scope of PEB vendor

Sl. No.	**Items**	**Quantity**	**Unit**

1.	45 Lit. Foam type Fire Extinguisher	8	No.s
2.	25 kg DCP type Fire Extinguisher	8	No.s
3.	4.5 kg CO2 type Fire Extinguisher	8	No.s
4.	Sand Buckets (Stand with 4 buckets in each set)	4	Sets

10.7 **TECHNICAL SPECIFICATION FOR ELECTRICAL SERVICES**

Lighting panels shall be powder coated with color shade RAL9002. Lighting panels shall have IP55 degree of protection.

Wires of different phase shall normally run in separate conduit.

Electrification of all building shall be carried out as per IS 732-1989, IS 4648-1968 and other relevant standards.

All luminaries and their accessories and components shall be of type readily replaceable by available Indian makes.

Following test reports to be submitted for LED chip/LED luminaires:

a) LED parameters like Lumen per watt, CRI, Beam angle from manufacturer. b)

LM 80/IS: 16105 report.

c) LM 79/IS: 16106 report

LIGHTING WIRES

Lighting wires shall be 1100 V grade, light duty PVC insulated unsheathed, stranded copper/ aluminium wire for fixed wiring installation. Color of the PVC insulation of wires shall be Red, Yellow, Blue and Black for R, Y, B phases & neutral, respectively. Minimum size of wire shall not be less than 1.5 sq.mm Copper for lighting fixture & 4 Sq.mm Copper for receptacles. Lighting panels etc. shall be earthed by two separate and distinct connections with earthing system.

RECEPTACLE

Receptacles boxes shall be fabricated out of MS sheet of 2mm thickness and hot dipped galvanised or of die-cast aluminium alloy of thickness not less than 2.5 mm. The boxes shall be provided with two nos. earthing terminals, gasket to achieve IP55 degree of protection, terminal blocks for loop-in loop-out for cable of specified sizes, mounting brackets suitable for surface mounting on wall/column/structure, gland plate etc. The ON-OFF switch shall be rotary type heavy duty, double

break, AC23 category, suitable for AC supply. Plug and Socket shall be shrouded Die-cast aluminium. Socket shall be provided with lid safety cover. Robust mechanical interlock shall be provided such that the switch can be put ON only when the plug is fully engaged and plug can be withdrawn only when the switch is in OFF position. Also cover can be opened only when the switch is in OFF position. Wiring shall be carried out with 1100 V grade PVC insulated stranded aluminium/copper wire of adequate size. The Terminal blocks shall be of 1100 V grade. The Terminal blocks shall be of 1100 V grade made up of unbreakable polymide 6.6 grade with adequate current rating and size. The welding receptacles shall be provided with inbuilt ELCB rated for suitable mA sensitivity.

GALVANISING

Galvanising of steel components and accessories shall conform to IS:2629 , IS4759 & IS:2633. Additionally galvanising shall be uniform, clean smooth, continuous and free from acid spots. The amount of zinc deposit over threaded portion of bolts, nuts, screws and washers shall be as per IS:1367. The removal of extra zinc on threaded portion of components shall be carefully done to ensure that the threads shall have the required zinc coating on them as specified.

CONDUITS/PIPES/DUCTS INSTALLATION

GI pull wire of adequate size shall be laid in all conduits before installation. Metallic conduit runs at termination shall have two lock nuts wherever required for junction boxes etc. Conduit runs/sleeves shall be provided with PVC bushings having round edge at each end. All conduits/pipes shall have their ends closed by caps until cables are pulled. After cables are pulled, the ends of conduits/pipes shall be sealed with Glass wool/Cement Mortar/Putty to prevent entrance of moisture and foreign material. Exposed conduit/pipe shall be adequately supported by racks, clamps, straps or by other approved means. Conduits /pipe support shall be installed square and true to line and grade with an average 1 Meter spacing between the supports.

Ventilation

Provision shall be made to allow fresh air from outside to enter the compartment through suitable filter capable of preventing entry of sand during severe sand storms. The ventilation system fans shall be mounted on side walls with suitable sand filter / louver having easy access for cleaning and maintenance.

10.8 **GENERAL TECHNICAL REQUIREMENTS:**

For the design of the plant, it is necessary to consider the requirements (by suitably planning the layout) of the convenience of inspection, cleaning, maintenance and repair.

Equipment design and engineering shall incorporate adequate safety features (as per applicable specifications of respective installation as well as Health, Safety and Environment Codes & Standards applicable for the subject project) to provide protection to operating personnel, equipment and environment.

No claim in terms of cost or relaxation in time shall be entertained for any redesign, rework and for the safety measures provided. If at any stage of work, any dismantling or modification or

relocation of any facilities is required to be done to complete the work in bidder's scope and which has been agreed by the Owner, the same shall be done by the bidder at no extra cost or time implication to the Owner. All such changes will be executed only after the proposed drawings and work plan are approved by the purchaser.

The Bidder shall take all necessary precautions to protect all the existing equipment, structures, facilities and buildings etc. from damage. In case any damage occurs due to the activities of the Bidder on account of negligence, ignorance, accidental or any other reason whatsoever, the damage shall be immediately made good by the Bidder at his own cost to the satisfaction of the Owner. The Bidder shall also take all necessary safety measures at his own cost, to avoid any harm or injury to his workers and staff from the equipment and facilities of the power station.

10.9.CONSTRUCTION REQUIREMENT:

Erection & commissioning of all the items supplied by bidder is included in bidder's scope.

Bidder is advised to visit the project site and appraise himself about the local conditions and infrastructure available in the area for fulfilling their commitments under the contract. BHEL will not admit any claims whatsoever on account of Contractor's non-familiarization of local conditions.

The Contractor shall make all necessary arrangements to deliver the equipment at the site by wagons/trucks/trailers and receive the material at site, build his own stores for the proper storage of equipment, maintain the stores and all related documents and records, transport the equipment to site for erection purpose. Necessary security arrangements also shall be made by the Contractor. Area only for construction of stores and construction site office shall be made available, free of cost, to the Contractor by the Purchaser.

The Contractor shall be provided with construction power at 415 V, three phase, 50 Hz for the purpose of the construction and erection at free of charge. The Contractor shall make his own arrangements for further distribution.

Construction water shall be supplied free of cost by the Purchaser to the Contractor at one point at each location of project.

All machinery such as cranes, hydra, JCBs, forklifts, transport trucks, trolleys, concrete mixers, Ajax machines etc necessary for movement and installation of materials shall be organized by the bidder. Bidder shall arrange all the items required like scaffolding, rope, sling etc. for construction of the facilities in their scope.

All necessary tools and tackles such as screw driver set, power screw drivers, cutting pliers, nose pliers, spanner sets, adjustable spanners, hole saw cutter set, bending tools, torque wrenches, hack saw blades, pipe wrenches, flat / round files, drilling machines, welding machines, steel bar bending tools / templates for RCC works, spade, shovel, hammer etc. shall be organized by the bidder.

All necessary measuring instruments such as measuring tapes, digital multimeters, electrical testers, meggers etc. shall be organized by the bidder.

The contractor shall submit to the employer, draft instruction manual specifically compiled for the project, containing full detail required for E&C and Maintenance if any. The E&C manuals/checklists shall be submitted prior to the commencement of erection activities.

Bidder shall make their own arrangements for necessary food, drinking water and accommodation for their labour and employees posted at the site. Similarly, food and drinking water required at the site, during the construction operations, shall also be in scope of the bidder.

Bidder shall organize all necessary steps to meet statutory requirements such as labour license, PF, ESI, insurance etc. and also ensure compliance with relevant acts such as minimum wages act, income tax act, employee insurance act etc. for their labour deployed at site.

Bidder shall maintain updated labour register, with name, age, qualification, salary, attendance details etc. at the site.

It is advised to Bidders to visit the site and ascertain all site intensive requirements such as Health, Safety and Environment (HSE) requirement, work permits and other special requirements of site etc. Bidder shall ensure safety of man and machinery during work at site. For this necessary safety measures like use of PPEs, use of danger board/tapes etc. to be ensured by the bidder. It is the ultimate responsibility of the bidder in all respect to prevent accidents at the site and safeguard man and machinery from accidents.

Bidder shall, at the completion of every work, clear off the debris, which resulted out of the work.

10.11 QUALITY ASSUARANCE:

10.11.1 All materials, components, and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages as per a comprehensive Quality Assurance Program (QAP) to be submitted by bidder and approved by the purchaser.

10.11.2 It will be the responsibility of the bidder to adhere to the approved Quality Plans. The bidder shall further identify specific hold points beyond which work will not proceed without purchaser's consent so as to further ensure that he performs the above quality functions effectively.

10.11.3. Field Quality Plans will detail out for all the items, the quality practices and procedures etc. to be followed by the bidder at site, during various stages of site activities starting from receipt of materials at site.

10.11.4. Bidder to note that all the cost involved in the various Inspection and testing as per approved QAPs /ITPs shall be deemed to be included in bidder's quoted price. Bidder at no point of time shall be eligible to raise any extra claim on account of any requirement necessitated as a part of approval of QAPs/ ITPs.

10.11.5. At various stages of manufacturing, procurement, construction, as per approved QAP inspection/testing shall be carried out by Inspection Agency (BHEL / Third Party appointed by BHEL). The inspection agency shall be indicated in the quality plan and shall be as per the approved quality plan.

10.11.6. Bidder shall notify in writing to the Purchaser, at least two weeks (Ten working days) in advance of the date and the place at which the items will be ready for witnessing of inspection / testing by Purchaser. In case any postponement becomes necessary, the CONTRACTOR shall provide written notification at least 48 hours prior to the original scheduled date.

10.11.7 In case bidder find any deviation or non- conformity with respect to the agreed specifications, during manufacturing of the item and where corrective action is not feasible, the bidder shall report the same to Purchaser and / or PMC in the designated "Waiver / Deviation Request" format and seek prior approval from Purchaser /PMC before proceeding with the job.

10.11.8. Bidder after satisfying that all inspection requirements as per approved ITP and applicable specifications / documents have been taken care by Inspection Agency, shall submit copy of the Inspection Certificate and all Quality control records to Purchaser in requisite copies along with Statutory Certificates if any, duly endorsed by their Quality Control Manager.

10.11.9. Purchaser reserve the right to carry out surprise checks on all material either at manufacturer's works or at site. In case of any rejection at site, the whole lot will be rejected and bidder shall get the entire lot replaced without any time or delivery implication to the purchaser.

10.11.10. Inspection Agency shall check the calibration status and traceability of all instruments used by the supplier, for testing. In case, TPIA uses their own instruments for testing purposes, similar certification shall be ensured.

10.11.11. Bidder shall submit, copy of each Inspection Certificate (IC) / Inspection Release Note (IRN) issued by Inspection Agency, along with all attachments mentioned therein.

10.11.12. No material shall be dispatched from the manufacturer's works before the same is accepted, subsequent to pre-dispatch final inspection including verification of records of all previous test/inspections by authorized Inspection Agency and duly authorized for dispatch by issuance of Material Dispatch Clearance Certificate (MDCC).

10.12.0 MARKING, PACKING AND DESPATCH

10.12.1

1. All items shall be marked (stamped/etched) in accordance with the applicable Code/standard/specification. In addition, the item code, if available, shall also be marked.

2. For ease of identification, the color of painted strip (wherever required) shall be as per the applicable standard.

3.Paint or ink for marking shall not contain any harmful metal or metal salts which can Cause corrosive attack either ordinarily or in service. Special items/smaller items shall have attached corrosion resistant tag providing salient features.

10.13.0 DESPATCH

1.All the materials shall be divided into several sections for protection and ease of handling during transportation. The equipment shall be properly packed for transportation by hip/rail or trailer.

2.Special notations such as 'Fragile', 'This side up', 'Center of gravity', 'Weight', 'Owner's particulars', 'PO Nos.' etc. shall be clearly marked on the package together with other details as per purchaser order.

3.The equipment may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains/high ambient temperature, unless otherwise agreed.

4.The following minimum packing procedures shall be followed :

a. All items shall be dry, clean and free from moisture, dirt and loose foreign material of all kind.

b. All items shall be protected from rust, corrosion, and mechanical damage during Transportation, shipment and storage.

c. Rust preventive on machined surfaces to be welded shall not be harmful to welding and shall be easily removable with a petroleum solvent.

d. Ends shall be suitably protected, and the protectors shall be securely and tightly attached.

e. Each variety and size of item shall be supplied in separate packaging marked with the purchase order no., item code (if available), and the salient specifications.

f. Prior to shipment components of the unit shall be completely cleaned, Flange faces, threaded portion and other machined surfaces shall be protected by coating with easily removable rust preventive. All the items shall be properly packed to prevent damage during transit damage, loading, unloading and storage.

10.14.0 DOCUMENTATION:

1. A master documentation list shall be prepared during kick off meeting identifying all the DOCUMENTS / DRAWIGS to be submitted by the bidder as part of documentation.

2.Vendor shall ensure submission of all documentation as per approved Master Document List.

3.The following minimum documentation shall be submitted by the vendor:

i. All PEBs GA drgs indicating base plates, anchor bolts connection detail, purlin, roof panels, wall panels, scope demarcation etc.
ii. BOM for Structural items.
iii. BOM of architectural items with detail of item wise make, model Quantity etc.
iv. Civil interface details
v. Welding specification charts
vi. Nondestructive Testing specifications
vii. Quality plan
viii. Painting schedule & procedure (shop painting & site painting) X
ix. Packing procedure
x. Erection drawings
xi. Site storage procedure
xii. Erection procedure
xiii. Testing procedure
xiv. 'AS BUILT' drawings
xv. Any other document, as deemed necessary BY BHEL, during detail engineering or erection – commissioning stage.

10.15.0 Sub Vendor List:

A.1 For structural steel:

4. It should conform to relevant Indian / International Standards.
5. It should be of reputed make of supplier to similar construction /infrastructure projects.
6. The Bidder should furnish documentary evidence to prove (1) and (2) above

A.2 Makes of Electrical and mechanical items

Item	Vendor	Remark
LED Lamp fixtures for indoor		
	BAJAJ	
	CGL	
	Havells	

	Philips	
	Wipro	
Lighting panel	Havels India Limited	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
	Indo Asian Fusegear	
	STANDARD ELECTRICALS LTD	
	C&S Electric Limited	
	ABB Limited	
Cable Lugs	Dowell, Mumbai	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
	Electromac Industries	
	Chenta Engineering Co	
	Forward Engineering Industries	
MCB	Any make-Model shall have mark of CE/VDE/UL/CSA/BIS with CML no.	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
Axial flow Fans	Khaitan, Kolkata	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
	Marathon Electric, Kolkata	
	CB-Doctor, Ahmedabad	
	Solyvent Flakt, Kolkata	
	Advance ventilation, Sonepat	
	Krugar, Singapore	
	TCH Nadi, Chennai	
	Almonard, Chennai	
Propeller Fan (Up to 2 HP)	Khaitan, Kolkata	Equivalent other make also may be proposed by bidder and prior approval shall be obtained from purchaser before finalization of make.
	Marathon Electric, Kolkata	
	CB-Doctor, Ahmedabad	
	Solyvent Flakt, Kolkata	

Part II

Chapter XI : Technical Specifications for

General Civil and Electrical Works for Development of Open storage

Chapter-I: SCOPE OF WORK

1. Earthwork, cutting, filling and levelling in proposed open storage yard of 10,000 Sq Meters approximately in which 1 Nos of PEB has to be developed of size 450 Sq Meter (15m X 30m X 6m) each. Chain Link Fencing of the proposed Open Storage Yard including installation of 3 No of MS Gates.

2. Micro Grading:

The entire area shall be micro graded up to required levels by the contractor to achieve the ground profile as per pavement level requirement. Filling/ cutting required to bring the site up to the required finished levels is in the scope of the contractor. Extra earth required to make up to paved levels shall be arranged by the contractor at his own cost from approved borrow areas.

3. The bidder is required to comprehensively Design, Manufacture, Supply and Install two numbers of Pre-Engineered closed store Building sized 15mx30mx6m (approximately). Bidder will submit the design (Including foundation, plinth beams & flooring) for approval of BHEL.

4. The work to be performed under the scope of this tender mainly consists of but not limited to complete underground civil works including excavation for foundations, backfilling, leveling and grading, RCC foundation works, and other miscellaneous structures and services.
   1. Construction of WBM approach roads, Fencing, Drain laying and Hume pipe installation, flooring, foundation, pedestal etc. including providing and installing foundation bolts, templates, inserts, lugs, pockets etc. for foundations etc. as per drawings.
   2. Providing and laying 150 mm thick plane cement concrete (1:2:4 mix) flooring over 150m m thick well compacted GSB on properly compacted subgrade, including surface finishing curing and all necessary preparations as per drawings and specifications as a part of PEB Flooring.

   For building/ structure sizes and number of equipment refer plot plan, please note that these are tentative and likely to change.

1.0 Construction of following services

1) Storm Water drain system

2) Soak Pits.
3) Road Crossings
4) Strengthening of existing roads for crane movement if required.
5) All approach roads from existing main roads as per detailed engineering requirement for maintenance and operation.
6) Maintenance and erection approach roads/ by strengthening of roads.
7) Preparation of basic/ detailed engineering drawings for construction, and getting approval of the same from PMC/ Owner/ Licensor.
8) Any temporary activities required to complete the work.
9) Micro grading & disposal of surplus and unserviceable material beyond Site complex's compound wall. Contractor to assess the lead by physically visiting the Plant site.
10) Approval from statutory and local authorities.
11) The sub-grade for roads & pavements and soil improvement/ preparation below foundation level of drains, culverts, pipe way bridges, manholes, etc. shall be carried out as per Geo- Technical recommendation.
12) The plot for construction area/ fabrication yard/ field office/ construction stores has to be developed by the contractor of its own and the Client shall only identify the space on as in where is basis if the same is available else bidder to develop plot on his own. All the infrastructure facilities which include roads, approaches, drainage system, pavements etc. shall be developed & provided by the contractor of its own.

1.1 THE WORK WILL INVOLVE

All civil, structural and architectural works connected with the above mentioned structures such as earth work, concrete work, brick work, steel work, embedment, plastering and painting, waterproofing, flooring, plumbing, road work, drainage, grouting etc.

1.2 CIVIL AND ARCHITECTURAL AND ELECTRICAL WORKS

The scope covers all Civil and Architectural within the battery limits. The important works covered are as below.

1) Excavation of earth and backfilling including dewatering of excavations for foundations, trenches, tunnels pits, etc. till the construction of the same is completed and disposal of surplus.
2) Construction of foundation footing for lightly loaded structures, trenches, Sumps, grade beams, tie beams at foundation level, etc.
3) Complete civil and architectural works such as brick work, plastering, painting, all types of floor/roof finishes, all types joinery etc.
4) Preparation and submission of detailed calculations, arrangement drawings and detail drawings of formwork, staging and scaffolding for all reinforced concrete structures and foundations as directed by the Engineer for his checking and approval.

5) Preparation of detailed working drawings and bar bending schedules for all reinforced concrete work and getting them approved by the BHEL Engineer.
6) Supply, fabrication and fixing structural steelwork including MS Gates as per approved drawing (Approximately 3 Gates).
7) Supply, fabrication and fixing of anchor bolts, sleeves, fixing frames, embedment etc. in concrete.
8) Supply of all instruments and personnel for conducting necessary tests at site as specified/as directed by the Engineer.
9) Making appropriate fabrication drawing as per agreed schedule before starting fabrication work for any structural GA drawing.
10) Preparation of bar bending schedules for all reinforced concrete work and getting them approved by the BHEL Engineer.
11) Supply of all equipment/ instruments and personnel for conducting necessary tests at site as specified/as directed by the Engineer.
12) Type of cement shall be one of the following:
    a. 43 or 53 grade ordinary Portland cement (OPC) as per IS:8112 / IS:12269.
    b. Portland slag cement (PSC) conforming to IS:455.
    c. Portland pozzolana (fly ash based) cement conforming to IS:1489 part-1
    d. Portland pozzolana (calcined clay based) conforming to IS:1489 part-2
13) All the Electrical and Illumination works shall be carried out as per BOQ following standard operating Procedures. Main work includes Poles Erection, Cable laying, Lights fixing, Feeder pillar installation. Sufficient illumination shall be ensured in the completed Open Storage Yard.

1.3 STRUCTURAL WORKS

The work involves:

1) Supplying and/or Taking delivery from BHEL stores fabrication and erection of structural steel work including all interfacing work and miscellaneous work. Supply of steel will be made by BHEL. The nature of work shall include columns, beams, splicing of steel works as needed, bracings, purling, sheeting runners, sag rods, ties, struts walkways, galleries, stairs, ladders, handrails, floor gratings, chequered plate work, M.S, pipes, equipment supporting platforms and all other structures required for successful completion of project.
2) Supplying and providing reinforcement HYSD - TMT Fe 500D, Fe500D CRS (AS PER IS 1786), Mild Steel as detailed elsewhere in the contract/BOQ (Bill of Quantities).
3) Supplying and providing of M.S pipes, fabrication and erection of handrail as per drawing and specifications. (if required)
4) Supply and fixing of floor gratings as per Specifications.
5) Supply of high tensile bolts, mild steel bolts, nuts, plain/taper and spring washers, all electrodes required for shop and field work.
6) Shop and final painting as per Technical Specification after properly cleaning the Steel surfaces.

1.4 ALSO INCLUDED IN THE SCOPE

Unless otherwise specified, the work to be provided by the contractor for the items mentioned in the "Schedule of items" shall include but not be limited to the following.

1) Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and from the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works, except in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.
2) Furnishing samples of all materials required by the engineers for testing/inspection and approval for use in the works. The samples may be retained by the engineer for final incorporation in the works.
3) Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.
4) Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that are required for all works including temporary works.
5) Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.
6) Carrying out topographic survey of the entire and establish levels and coordinates at suitable intervals from existing grid levels and coordinates furnished by the owner established bench marks, setting out the locations and levels of proposed structures, constructions and marking of reference pillars and other identification works etc., The contractor shall provide the owner/BHEL such a assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.
7) Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.
8) Sample testing of reinforcement.

2.0 GENERAL

1) The drawings enclosed with this tender are intended to give the tenderer a general idea of the type and extent of work involved. The drawings are as such only indicative and not to be considered as the exact construction drawings.
   Further this is to be noted that the drawings and the documents furnished along with this specification are the sole property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.

a) The scope of work will also include such other related works although they may not be specifically mentioned in the above paragraph and all such incidental items not specified but reasonably imply and necessary for completion of the job as a whole all as desired and as directed by the engineer.

b) The detail scope of work covered above is not a comprehensive list of items of work involved. The detail scope of work may vary considerably depending on the actual construction requirements.

2) The Measurement of quantities for items 13.1, 13.2, 13.3 of the BOQ should be length X breadth X height and then reduced by 7.5% (as per CPWD guidelines)

3) Rates will be applicable to net quantities approved by the BHEL Engineer/Supervisor at site.

WORK BY OTHERS.

No work under the specification will be provided by any agency other than the contractor unless specifically mentioned elsewhere in the contract.

Part II

Chapter XII Technical Specifications for

Design, manufacture, supply and erection of Porta Cabins

1.1 SCOPE OF WORK:

The bidder is required to Design, manufacture, supply and erect the following porta cabins at 1x265 TPH Steam Generator Package at BPCL ,Bina Refinery .

i) Office Porta Cabin without partition of size 20ft x 10 x 8.6ft as per this specification – 01 nos

ii) Toilet Block Porta Cabin of size 12ft x 10ft x 8.6ft as per this specification – 01 nos.

iii) Security Porta Cabin of size 5ft x 6ft x 8.6ft as per this specification – 01 nos.

Note:

a) Earth work, levelling and preparation of ground with R.C.C. below the Portable cabin is in the scope of BHEL. Skid arrangement to be provided (By welding) below the porta cabin frame shall be in the scope of the bidder.

b) Supply, installation and satisfactory functional test (performance test) of all the bought out Electrical & Instrumentation fittings, Toilet fittings and miscellaneous items shall be in the scope of Portable Cabin supplier.

1.2 **CONSTRUCTION MATERIAL**:

Steel Load Bearing Members: IS 1079 or IS 2062 or equivalent.

Side-End Walls: IS 1079 or IS 513 or equivalent.

Roof: IS 1079 or IS 513 or equivalent.

Base members & bottom frame: IS 1079 or IS 2062 or equivalent

Plywood: Marine grade plywood, (IS710 - 2017)

Paint: Zn-rich Epoxy

1.3 **TECHNICAL SPECIFICATIONS FOR PORTABLE CABINS:**

TECHNICAL SPECIFICATIONS FOR PORTABLE CABINS

Sl. No	COMPONENT	DESCRITION
01	Bottom Frame (9 mm thick)	150mm x 75mm G section OR C-section made from 9 mm thick plates conforming to IS:2062 Grade A. Suitable purlins are included.
02	Top Frame (3 mm thick)	50mm x 50mm M.S. square rectangular hollow sections (RHS). Suitable purlins are included.
03	Stiffener Bottom (2.5 mm thick)	100mm x 50mm C channel, 100mm x 50mm, 50mm x 50mm MS Rectangular Hollow sections& Angles.
04	Stiffener Top (2.5 mm thick)	50mm x 50mm, 50mm x 25mm, 25mm x 25mm MS Rectangular Hollow sections.
05	Side Post (2.5 mm thick)	50mm x 50mm, 50mm x 25mm, MS Rectangular Hollow sections.
06	Side Wall Stiffeners	Specially formed CR sheets of thickness 2 mm, conforming to relevant IS.
07	Panelling Outside	Specially formed CR sheets of thickness 2mm conforming to relevant IS(Indian Standards).
08	Internal Wall Panelling	The interior shall be aesthetically finished to give custom built appearance with good workmanship. Wall Panelling shall be of **CONTIUOUS SANDWITCHED PANEL (CSP)** with **PUF (Polyurethane Foam)** insulation of density 40±2 Kg/M3 and overall thickness 60mm with 0.5mm thick PPGI (pre painted galvanized iron) sheet of approved color (preferably light gray colour) on both sides. An additional off white coloured wall panelling of 8mm thick hallow extruded polymeric section (syntax or Equivalent) with tongue and grove arrangement on inner surface of **CSF** panel to be fixed with suitable anticorrosive frame grid arrangements. All electrical wiring shall be concealed with PVC conduit between CSF and Inner polymeric panel. All vertical & Horizontal corners shall be neatly and smoothly finished with Aluminium sections & L-angles. .
09	Roof Outside	2 mm thick CR sheet conforming to relevant IS. properly sloped & water tight.
10	False Ceiling	The false ceiling shall be made out of anti corrosive painted 19mm square hollow section design to fix to the roof frame with suitable hangers. **The clear height of ceiling shall be 8 ft. from the finished floor level.** Cut out should be made properly wherever necessary for fixing electrical fitting. False ceiling shall be done with 8mm thick hallow extruded polymeric section (syntax or Equivalent) with

		tongue and grove arrangement. The colour of Ceiling should match with inner wall panels All vertical & Horizontal corners shall be neatly and smoothly finished with Aluminium sections & L-angles.
11	Flooring	The floor shall consist of min. 0.80mm thick PPGI (pre painted galvanized iron) sheet as outer most Skin followed by 25 mm thick Cemented board conforming to IS:710-2017 shall be fixed by means of self-tapping screws & 1.5 mm thick PVC Vinyl carpet shall be fixed on the panel. (100% water & termite proof should be assured after vinyl carpet). PPGI sheet make shall be ISPAT INDIA LIMITED/JSW or Approved Equivalent.
12	Aluminium Windows	Double shutter sliding aluminium powder coated windows (size as per drawings) of thickness 1.2mm with 4mm thick glass of make Saint Gobain or equivalent for all windows, safety grills from outside & canopy on the top of windows.
13	Door	The door shall be of external opening type made with Metallic frame outside and inside laminated plywood screwed (1982mm x 915mm) with door closer, Glass vision panel (500 mm X 500 mm), Night Latch, Handle, Tower Bolt, AL drop, with weather shed with good quality hydraulic door closer, Locks, Handles etc as per requirements
14	Insulation	40mm thick glass wool insulation of density 64kg/m3 on side wall & 50mm thick on ceiling.
15	Wiring	All wiring shall be concealed with PVC insulated copper wires of ISI quality, suitable for 240volt, 50 HZ single phase AC power supply.
16	Electrical Fittings	• All electrical fittings in portable cabin shall be 220-240V.AC 50Hz. • Provision for split A.C. as per drawings with internal wiring along with separate MCB. • Complete AC fitting of Bluestar or equivalent make. • LED Tube lights, Bulkhead, Fan, switches & Sockets of ISI Make
17	Earthing	Complete Earthing points shall be provided for safety.

18	Outside Painting	The surface preparation of all fabricated steel components shall be done by manual grit blasting to achieve SA-2 quality finish followed by One coat of Zinc based primer and Two coats of Epoxy paint by air spray method. The base frame shall be painted with bituminous paint of reputed make. White Colour shade shall be used for all Portable cabins.
19.	Hooks	Specially formed hooks for easy& safe lifting and shifting.
20.	Height of the portable cabins	(Inside clear height measured from top of floor to ceiling shall be minimum 2439mm, with permissible tolerance of +/- 25mm)
21.	Plumbing	• **Pipes**: PVC or CPVC of Finolex/Astral/Ashirvad equivalent make • **Sanitary ware:** **Washbasins** – Ceramic, pedestal or wall hung, with CP brass bottle trap. **Urinals**- Flat back, ceramic with manual flush **Water closet** – EWC & IWC, ceramic, white glazed, flush fittings inclusive. **Kitchen Sink:** Stainless steel single bowl with drainboard. **Taps**: Chrome plated, quarter turn. • **Water storage:** HDPE overhead tank on toilet portable cabin with 1000L capacity, Food grade and having threaded lid. • **Accessories, Valves and fittings:** Standard make, conforming to relevant IS. **Note:** All the plumbing accessories, fittings and Equipment should be from a reputed make and warranty of 2 years or more is to be provided.

1.4 GENERAL DESIGN AND CONSTRUCTION:

SHELL:

The shell structure shall comprise of side walls, end walls and self-draining Roof.

SKID: Portable Cabins shall be mounted on a skid arrangement made of Two build-up I-sections (200x100x10 mm thick) having 3 Nos. cross members of formed C-sections (150x75x8mm thick). Materials of structural steel members shall conform to IS: 2062 Grade-A.

DOORS:

Main doors made of steel sheets at the main entry of the portable cabin shall be provided as shown in the drawings. The main doors dimensions shall be (min.) 1982mm H x 915mm W. These doors shall comprise of a frame work of min. 3 mm thick sheets conforming to IS: 1079

Grade O / IS: 2062 Grade A. Main door with Metallic from outside and inside laminated plywood screwed (1982mm x 915mm) with DOOR closer, Glass vision panel, Night Latch, Handle, Tower Bolt, AL drop, with weather shed with good quality hydraulic door closer, Locks, Handles etc as per requirements.

The peripheral edges of the door shall be provided with rubber seal to prevent ingress of water and dust. The door shall have locking arrangements from both internal and external side.

STEPS:
Fabricated steel steps of detachable type having Two / Three steps (as per the site conditions) shall be provided in each Portable Cabin at the main entry door.

1.5 **WELDING:** The Shell of the structural cabins shall be of all weld construction. All the external welding shall be continuous and Uniform to impart strength and effective sealing.

1.6 **PROTECTION AGAINST INGRESS OF RAIN WATER:** The Portable cabins shall be constructed in such a way that; all joints shall be effectively sealed against water ingress in closed condition by welding / rubber gasket profiles for windows and doors / weather proof sealants wherever necessary.

1.7 **SIDE & END WALLS:** External wall are vertically corrugated 2 mm thick MS steel sheet equivalent to IS 1079 or IS 513 or equivalent. The corrugated panels are continuously welded to form entire side wall and the assembled side wall is continuously welded to the peripheral frame members.

1.8 **ROOF (SELF DRAINING TYPE)**: The roof of the shell shall be manufactured from 2 mm thick plane MS sheet conforming to IS 1079 or IS 513 or equivalent with self-draining type (proper slope shall be maintained). The entire panel is continuously seam welded and is welded to the peripheral members.

1.9 **PAINTING:** The surface preparation of all fabricated steel components shall be done by manual grit blasting to achieve SA-2 quality finish followed by One coat of Zinc based primer and Two coats of Epoxy paint by air spray method. The fresh steel plate shall be painted as per the following scheme using airless spray-painting process. The total dry films thickness shall not be less than 115 microns on the exterior surface and 75 microns on the interior surface.

The Portable cabin shall be painted internally & externally with two coats of Epoxy Primer followed by two coats of Epoxy Paint. White Colour shade shall be used for all Portable cabins.

Scheme	Interior	Exterior	Under structure
Primer Coat	Zinc Rich Epoxy Primer	Zinc Rich Epoxy Primer	Zinc Rich Epoxy Primer
	15-20 microns	15-20 microns	15-20 microns
Intermediate Coat	Epoxy polyamide	Epoxy polyamide	----
	60 microns	50 microns	----
Top Coat	----	Epoxy paint	Bituminous paint
	----	50 microns	60 microns

1.10 **FLOORING SYSTEM:** 20 mm thick Cement boards (IS710,2017) shall be laid on top and secured by self-tapping screw to the base members. The base frame shall be painted with bituminous paint of reputed make. Bitumen preservative paint shall be applied on the lower side of the fiber board. The top layer of the fiber board will again be covered with 1.8 mm thick joint-free PVC vinyl sheets. Flooring of the portable cabin is to be ensured of sufficient water resistance and termite proof.

1.11 **INNER PANELLING:** The interior would be aesthetically finished so as to give a pleasing appearance with high quality Workmanship. All joints as well as vertical and horizontal corners shall be neat and smoothly finished Wall Paneling shall be of **CONTIUOUS SANDWITCHED PANEL (CSP)** with **PUF (Polyurethane Foam)** insulation of density 40±2 Kg/M3 and overall thickness 60mm with 0.5mm thick PPGI (pre painted galvanized iron) sheet of approved color (preferably light gray colour) on both sides. An additional off white coloured wall paneling of 8mm thick hallow extruded polymeric section (syntax or Equivalent) with tongue and grove arrangement on inner surface of **CSF** panel to be fixed with suitable anticorrosive frame grid arrangements. All electrical wiring shall be concealed with PVC conduit between CSF and Inner polymeric panel. All vertical & Horizontal corners shall be neatly and smoothly finished with Aluminium sections & L-angles. Joints will be covered with anodized Aluminium strip.

1.12 **ELECTRICAL**: All wiring shall be concealed type inside the panelling and shall be of PVC insulated copper wire of ISI quality in PVC/Reinforced Steel Flexible Tubing/conduits grade. As a measure of safety, continuous copper Earth wire shall be provided as necessary. 3/20 size wire shall be used in the electrical circuit for light, fan and socket. 7/20 wire shall be used in all Air-conditioner circuits and 7/16 size for main incoming. Weather prop junction box with 40 Amps/63 Amps with (3p+1E) Industrial socket shall be provided for connecting the mains and shall be located as per requirement & drawing. Terminating of the main incoming cable into the structural cabin shall be 63 Amps TPN switch\ MCB. Continuous earth wire shall be provided throughout the circuit and external earth terminal shall also be provided. MCB's and weatherproof junction boxes and metal clad plug socket shall be provided wherever necessary. All switches and socket shall be of ISI marked. Power factor capacitor and copper wound ballast shall be used. Vendor shall provide ELCB support for earthing per cabin. All electrical wiring shall be as per the rules and regulation of industrial Safety norms.

1.13 **Wiring:** concealed wiring-PVC conduits using Fire Resistant wires (ISI Mark)

1.14 **Electrical Fittings:** Tubes, Door lights, Fans, Switches, Sockets, Telephone, AC points (ISI Mark)

1.15 **HANDLING AND TRANSPORTATION**: Necessary lifting arrangements shall be provided at four corners for safe and easy lifting and Transportation of the bunk houses.

First installation at site:

During the first installation (for each cabin) at site, manufacturers shall depute their technician to check placement of cabins over the pedestal, all fittings, fixtures and electrical installation, AC etc. and to ensure successful operation of Bunk House at site. Minor wear and tear occurred during transit which involves denting and painting shall be done by Manufacture free of cost.

1.16 Delivery Period: All porta cabins shall be delivered and installed at site within 01 months after getting instructions from the Site -In-Charge

1.17 GUARANTEE PERIOD:

The supplier shall give guarantee of the supplied portable cabins against manufacturing defect for a period of 12 months from the date of acceptance by BHEL. During the Guarantee period if any of the portable cabin leaks or any of the electrical installations/ instrumentation / Equipment like Air Conditioner (ACs), Fans, Lighting / toilet fittings / furniture is found to be nonworking, the vendor shall attend the repair and arrest the leaks / replace items with new items and achieve the normalcy within 5 working days from the receipt of intimation from BHEL Engineer. A warranty of 3 years for painting as per European scale of rusting RE3 (10% of total surface). However normal wear & tear and damage by external impact etc. are not covered.

Note:

1. As during monsoon heavy rains are expected around 3.5 mtr to 4 mtr annually, proper care shall be taken to ensure Zero leakage/ seepage through the Roof joints, side wall joints and doors and windows.
2. Canopy (chazza) of suitable size& design shall be provided above all doors & window openings.
3. Along with the bid the vendor shall submit the manufacturing schedule of all Portable Cabins to match the BHEL requirement date.
4. All materials used shall be brand new and free from pitting / rust. If the materials used or finished works are not found acceptable, the supplier shall arrange for the replacement of material required for re-execution of the work as per the contract.

5. Vendor shall submit all warrantee/ guarantee certificates of concerned items and product catalogues at the time of bidding.

6. Material handling like unloading and Installation arrangements etc. shall have to be arranged by supplier within the quoted price.

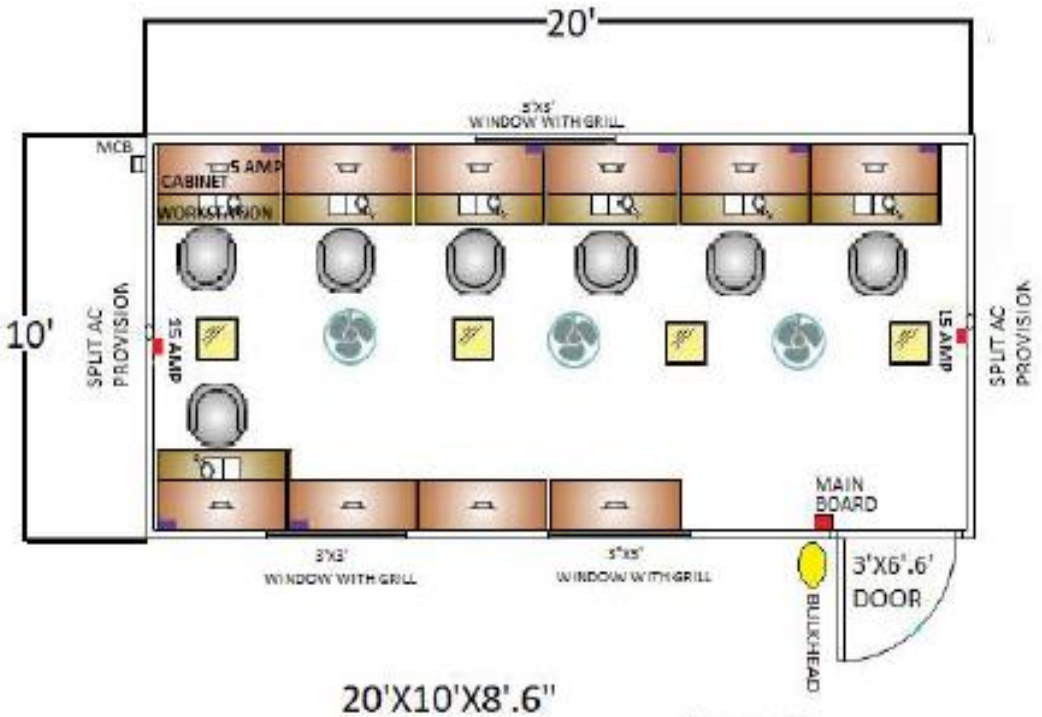
7. Delivery period: Delivery period shall be strictly adhered to, there shall not be any relaxation in delivery period.

8. Sub-contracting: Sub-contracting is not allowed for portable cabin work.

9. Complete portable cabins with all electrical fittings including ACs, Plumbing fittings including sanitary ware etc. as per drawings and all furniture of Godrej or equivalent make, including office tables, revolving chairs, visitors' chairs, document storage cabins and other facilities as envisaged in drawings and agreed in contract, has to be executed and delivered.

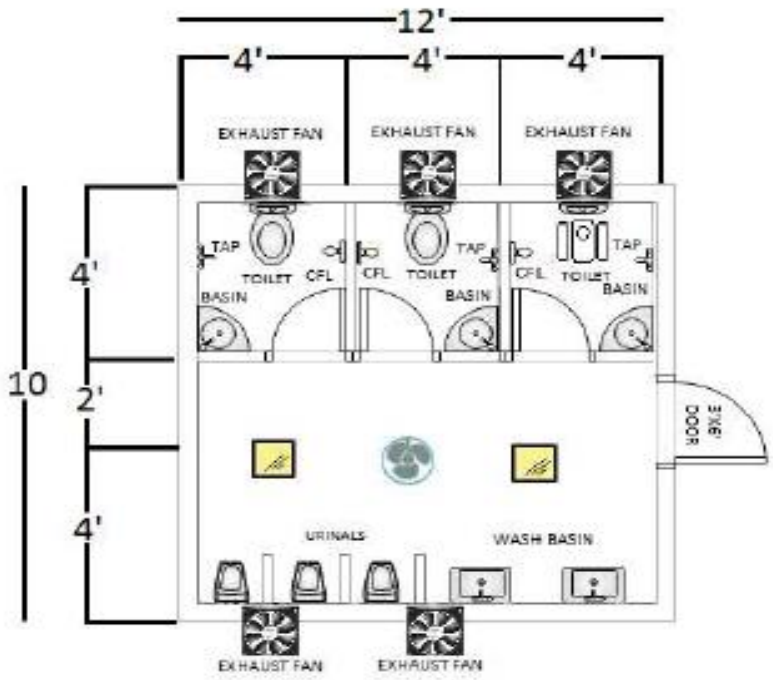
Accessories for Porta cabin

1. Portable cabin for staff :



Material Quantities			
Sl No.	Description	Size	Quantity
1	Fan	300mm	3
2	LED Light	15W	4
3	5 Amp Switch&6A Socket	-	8
4	15 Amp Switch	-	2
5	Main Board	-	1
6	Split AC	1.5Ton	2
7	MCB & Bulkhead	-	1
8	Window	3'x3'	3
9	Door	3'x6'6"	2

2. Portable cabin For Toilet



12'X10'X8'.6"
PORTABLE TOILET CABIN

Material Quantities			
Sl No.	Description	Size	Quantity(Nos)
1	CFL	-	3
2	LED Light	15W	2
3	IWC toilet	-	1
4	EWC toilet	-	2
5	Exhaust Fan	-	5
6	Wash Basin	-	5
7	MCB & Bulkhead	-	1
8	Jet Spray	-	2
9	Main Board	-	1
10	Door	3'x6'	1
11	Mirror/soap case	-	5

3.0 The size of the Security Porta cabin is - (5ftX6ftX8.6ft)

Material Quantities for Security Porta Cabin			
Sl No.	Description	Size	Quantity(Nos)
1	CFL	-	1
2	LED Light	15W	1
3	Exhaust Fan	-	1
4	MCB & Bulkhead	-	1
5	Door	3'x6'	1
6	Window	3'x3'	1
7	Wall Mounted fan		1no

Note:

1. Structural safety has to be adhered keeping the site environmental conditions in view.
2. Waterproof flooring in toilets and leak proof joints for pipes have to be maintained.
3. Fire and electrical safety have to be ensured.
4. Necessary arrangements (roof slope) for avoiding Water clogging on the roofs has to be made.
5. Any missing items in material quantities described above and are felt necessary, have to be incorporated for the better and long-term functioning of the cabins.
6. Necessary arrangements in the structure for Transportation and installation have to be made.
7. Floors of all the cabins have to be designed in such a way to prevent denting and collapsing

All required furniture and wood work have to be provided.

Part II

Chapter XIII

Technical specification for Feeder Pillar

CONTENTS

8.0	Documentation
9.0	Guarantee
10.0	Packing and Dispatch
11.0	List of Sub-Vendors
12.0	Special Conditions

ANNEXURES

SL. NO.	ANNEXURE NO.	DESCRIPTION
1.0	Annexure-III	Construction Power Supply Arrangement SLD Annexure-02

1.0 INTENT OF SPECIFICATION:

This specifications covers the design, manufacture, assembly, testing at manufacturer's works, packing and transportation to site, Installation and commissioning at Site of Feeder Pillars Package for Construction Power, complete with all accessories (Including civil and Cabling work), for efficient and trouble free safe operation.

It is not the intent to specify completely herein all details of the equipment; nevertheless, the equipment shall be complete and operative in all respects and shall confirm to the highest standard of engineering, design and workmanship.

2.0 SCOPE OF SUPPLY:

a. Supply of Feeder Pillars.

b. Supply of Incoming side Power Cables for each Feeder Pillar.

c. Supply of Cable Glands and Lugs for Feeder Pillar end for all Incoming side Power Cables.

d. Supply of Above Ground Earthing Materials.

e. Supply of Civil foundation materials

3.0 CODES AND STANDARDS:

3.1 The equipment to be furnished under this specification shall be in accordance with the applicable section of the latest version of the following BIS standards unless otherwise specified:

Standard	***Description***
IS 60947	LV Switchgear and controlgear
IS 60529	Degree of protection
IS 8623, IS 61439	Factory built assemblies of switchgear & controlgear for voltages up to & including 1000 V AC & 1200 V DC
IS 10118	Code of practice for installation & maintenance of switchgear
IS 5578 & 11353	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS 13703	HRC cartridge fuses
IS 4237	General Requirements for Switchgear and Control gear for Voltages not exceeding 1000 V
IS 5	Colors for ready mixed Paints and Enamels
IS 6875	Switches and Push Buttons
IS 8828	Miniature circuit breaker
IS 2705	Current transformers
IS 3231	Relays

IS 1248	Indicating instruments
IS 8530	AC electricity meters
IS 3202	Climate proofing of electrical equipment
IS 6005	Code of practice for Phosphating iron & steel
IS 5082	Wrought aluminium & aluminium alloys for electrical purposes
IS 694	PVC insulated cables for working voltages up to and including 1100 V

3.2 The equipment shall also confirm to the provisions of Indian Electricity Rules and other statutory regulations currently in force in the country.

3.3 In case Indian Standards are not available for any equipment, Standards issued by the IEC/ BS/ VDE/ IEEE/ NEMA or equivalent agency shall be applicable.

4.0 ORDER OF PRIORITY:

4.1 In case of any contradictions between various referred Standards/ Specifications/ Data Sheets/ Statutory regulations/ enclosed annexures, the following sequence shall be followed as order of priority:

1. Statutory regulations
2. This specification
3. Codes and Standards

4.2 In case of further contradiction among above documents, it is bidder's responsibility to highlight the same during bid stage itself. Else, BHEL's decision shall be final during execution. The same shall be complied without any time/ cost implication to BHEL.

5.0GENERAL REQUIREMENTS:

a. The offered equipment shall be brand new with state of art technology and proven field track record. No prototype equipment shall be offered.

b. Only major relays, meters and controls are indicated in the SLD. Any auxiliary relays, timers, switches, contactors, contacts, indications etc. as required while developing

the control schematics and felt necessary for safe operation, even if these are not specifically mentioned, shall be supplied without any time and price implications.

6. TECHNICAL REQUIREMENTS:

6.1 Operating Conditions:

Sl. No.	*Description*	*Data*
1	Voltage	415V ± 10%
2	No. of Phases	3-phase
3	Frequency	50Hz ± 5 %
4	Fault Level	As specified in SLD
5	System Earthing	Solidly Earthed
6	Auxiliary Supply	240V ± 10%, 1-ph, 50Hz AC
7	Control Supply	240V AC for Indication Lamps, ELR and other Control Circuit

6.2 Feeder Pillars:

6.2.1 The Feeder Pillars of following ratings shall be supplied:

a. **415V 125A Feeder Pillar - 1 no.**
b. **415V 250A Feeder Pillar - 1 no**.

Feeder details are as per attached Annexure-02 i.e. Construction Power Supply Arrangement SLD, (SLD of 125 A& 250 A DRAWINGS to be considered)

6.2.2 The Feeder Pillars shall be **Weatherproof** suitable for installation and satisfactory operation in **outdoor area**. The service conditions shall be considered as typical of a refinery/ petrochemical plant within a coastal environment. The atmosphere is to be considered saliferous, sulphurous and dusty.

6.2.3 All the equipment described in this specification is intended for continuous duty at the specified ratings under the specified ambient conditions.

6.2.4 The equipment design shall be suitable to render satisfactory operation under the conditions prevailing at site, and the equipment shall operate satisfactorily under normal

load and voltage variations. The design shall further include all necessary provisions ensuring the safety of the operating and maintenance personnel.

6.2.5 All equipment shall be capable of carrying their full load currents without undue heating.

6.2.6 Minimum degree of enclosure protection shall be **IP 55** for the Feeder Pillars. Additionally, GI/ FRP canopy shall be provided.

6.2.7 **The Feeder Pillars shall be of non-compartmentalized design.**

6.2.8 The doors and enclosure shall be made from 2.0 mm thick CRCA sheet steel while the gland plate shall be made from 3.0 mm thick CRCA sheet steel.

6.2.9 The Feeder Pillars shall be suitable for mounting on brick/ RCC pedestal and necessary hardware shall be provided for mounting.

6.2.10 Operating height for any component shall not exceed 1600 mm.

6.2.11 Continuous lifting angle or lifting hooks shall be provided to facilitate installation.

6.2.12 Close fitting, gasketed, hinged, lift-off doors shall be provided. The doors shall be provided with integral lock and master key.

6.2.13 The Feeder Pillars shall be vermin proof.

6.2.14 All potential free contacts including unused contacts shall be duly wired to the terminal block.

6.2.15 All incoming and outgoing connections will be by cables entering from bottom.

6.2.16 Removable gland plates shall be provided and adequate working clearance shall be ensured for the termination of cables.

6.2.17 The Feeder Pillar shall be provided with door switched lighting fixture, single phase 5/15A socket for power outlet and space heater with thermostatic control.

6.2.18 Bus bar conductors/ links shall be made of Aluminium. All connections shall be in accordance with the best modern practice.

Adequate provisions must be made for the expansion and contraction of the bus bars conductors/ links and other bus bar connections with variation in temperature.

Electrical clearances shall conform to applicable standards and shall not require cutting away of adjacent framework.

6.2.19 Ground bus with 50 x 6 mm Al shall be provided extending throughout the length. All metallic parts not forming part of the live circuits, all instrument transformer terminals to be earthed and other earthing terminals as well as all cable screens shall be connected to the earthing bar. Doors and movable parts shall be connected to the earth bus with flexible copper connections.

Each end of this bus shall be drilled and provided with suitable bolts and nuts for connection to 50x6 GI strip.

6.2.20 Clearances in air of live parts shall be at least 25.4 mm between live conductors and 19.4mm for phase-to-earth. However, clearances between terminals at components shall be as per applicable individual standards for components.

6.2.21 All instruments, control knobs and indicating lamps shall be flush mounted on the front side.

The meters shall be of standard size (at least 72 x 72 mm). The front glasses shall be non-reflecting anti-glare type.

All instruments shall be dust and moisture-proof.

AC ammeters and voltmeters shall be analogue / digital type of not less than 1.5 accuracy class.

6.2.22 Moulded Case Circuit Breakers: MCCBs shall be of single break type having one pole per phase. These shall be of 2 or 3-pole type as required having adjustable thermal magnetic release for overload and short circuit protection, with "On-Trip-Off', indicating/ operating mechanism.

MCCBs shall be manually operated and shunt trip type.

6.2.23 CBCT and ELR: The CBCT and ELR shall be provided for earth fault currents of range 30mA30A.

6.2.24 Terminal Blocks: All terminal blocks shall be mounted in an accessible position with the spacing between adjacent blocks not less than 100 mm and space between the bottom blocks and the cable gland plate being a minimum of 200 mm.

Sufficient terminals shall be provided to allow for the connection of all incoming and outgoing cables of sizes as mentioned in the attached SLD.

Terminal blocks shall be provided with mounting identification numbers and/or letters.

Terminals shall be of the channel mounting type and shall comprise a system of individual terminals so that terminal blocks can be formed for easy and convenient cabling.

Not more than two conductors shall be connected under one terminal clamp.

The live terminals shall be shrouded to avoid accidental contact.

Current transformer terminal blocks shall have provisions for short-circuiting and disconnecting.

Control circuits and power circuits shall be completely separated by use of divided or separate terminal blocks.

At least 10% spare terminals shall be provided.

6.2.25 Wiring: All secondary and control wiring shall be stranded copper; PVC insulated and shall not be smaller than 1.5 sq. mm with voltage rating 1.1 kV.

For current and potential transformer secondary circuits, the minimum cross section of the conductors shall not be less than 2.5 sq. mm with voltage rating 1.1 kV.

Larger size wiring shall be used where needed for the current carrying capacity requirements.

All connections shall be made with solder less lugs.

Wiring shall terminate at terminal blocks at one side only. Where tap connections are required, they shall be made on terminal blocks.
Splices or tee connections between terminal points are not acceptable. Wire runs shall be neatly dressed inside the panels or in wiring troughs.

6.2.26 Indicating and Signaling Lamps: Indication Lamps shall be of Clustered LED Type.

Each indicating and signaling lamp shall have a removable cap, which can be inscribed with wording and shall not be affected with the heat of the lamp.

Light bulbs shall be replaceable from the front of the panel.

6.2.27 Name Plates: The Feeder Pillars shall be provided with suitable nameplates, identifying the name of the panel. Each feeder shall be clearly identified with suitably located nameplates. Nameplates shall also be furnished for all feeder components, instruments, lamps etc.

Warning/ Danger labels shall be provided outside and inside the Feeder Pillars.

6.2.28 The Feeder Pillars shall be provided with epoxy based powder coated painting as per manufacturer standard. Paint shade shall be 632 of IS-5.

6.3 Cables:

6.3.1 **Incoming side Power Cables for each Feeder Pillar shall be supplied** as per sizes mentioned in attached SLD. The length requirement is mentioned below:

4C x 95 sq. mm Al XLPE Armoured Cable: **100m**
2Rx4C x 120 sq. mm Al XLPE Armoured Cable: **150 m**

Above cable quantity is tentative. BOQ may vary by ± 20% during detailed engineering. Same shall be confirmed during drawings approval.

The scope of work w.r. t cables includes the following –

125 A Feeder Pillar

a. Supply of cables 3 -1/2 core x 95 sq.mm aluminium armoured PVC insulated cable of approved make confirming to IS 1554 (part -I)/IS 7098(Part -1) respectively along with double compression type brass cable glands, required nos of termination lugs, Jointing kits, straight throughs and suitable glands.
b. Installation of cables 3 -1/2 core x 95 sq.mm aluminium armoured PVC insulated cable confirming to IS 1554 (part -I) including laying of cable below ground, excavation of trench of 600 mm depth in all kind of soil, termination of cables cores with crimp type luggs, providing sand layer below/ above the cable, brick laying both side /above the above the cable and back filling etc complete. Cables are to be laid from 415-volt AC distribution board to feeder pillar board

250 A Feeder Pillar

c. Supply of cables 2RX 4 core x 120 sq.mm aluminium armoured PVC insulated cable of approved make confirming to IS 1554 (part -I)/IS 7098(Part -1) respectively along with double compression type brass cable glands, required nos of termination lugs, Jointing kits, straight throughs and suitable glands.
d. Installation of cables 2R X4 core x 120 sq.mm aluminium armoured PVC insulated cable of approved make confirming to IS 1554 (part -I)/IS 7098(Part -1) respectively along with double compression type brass cable glands, required nos of termination lugs, Jointing kits, straight throughs and suitable glands.

6.3.2 **Outgoing Power Cables are not in the scope of this enquiry.**

6.4 Cable Glands and Lugs:

6.4.1 Cable Glands and Lugs shall be supplied for Feeder Pillar end for **incoming side power cables**.

6.4.2 Cable sizes for incoming side power cables shall be considered as mentioned in attached SLD.

6.4.3 Cable glands for 3-core cables shall be weatherproof double compression nickel plated brass type and Cable lugs shall be of tinned heavy duty copper/ aluminium.

6.5 **Above Ground Earthing Materials:**

6.5.1 50 x 6 GI Strip - 120 m (For above ground earthing of 125A and 250A feeder pillars to nearby riser).

7.0 INSPECTION, TESTING AND ACCEPTANCE:

All equipment supplied by vendor shall have proven design and shall comply with the requirements of type tests prescribed in the relevant IEC/IS standard. For Feeder Pillars, suitable valid type test certificate for IP Class made on equipment of similar type and capacity shall be submitted before supply and these type test certificates shall not be older than 5 years from the date of bid submission. In case valid type test certificates are not available or are older than 5 years, vendor shall conduct these tests free of cost and submit the certificates before dispatch without any time and price implications to BHEL.

8.0 DOCUMENTATION:

8.1 Documents to be submitted before supply

1. Feeder Pillar-wise GA, dimensions and weights
2. Type test certificate for Feeder Pillars as per relevant standards not older than 5 years for IP Class made on equipment of similar type and capacity.

8.2 Documents to be submitted after award of contract:

1. GA, SLD, BoM and Schematic Drawings of Feeder Pillars
2. Power Cable Data Sheets
3. Cable Glands and Lugs BoM

4. Quality Plan
5. Catalogues/ O&M Manuals
6. Inspection Test Reports
7. Packing List

9.0 GUARANTEE:

9.1 The supplier shall be fully responsible in respect of design, selection of components, manufacture, and quality of workmanship and operation of all the equipments, accessories etc. supplied under this scope of contract up to the Guarantee period.

9.2 Guarantee period shall be as per the commercial terms and conditions of the NIT.

10.0 PACKING AND DISPATCH:

10.1 The equipment shall be properly packed for selected mode of transportation i.e. by ship/ rail or trailer. The panels shall be wrapped in polyethylene sheets before being placed in wooden cases
to prevent damage to the finish. Cases shall have skid bottoms for handling. Cases shall be suitable for lifting by cranes. Special precaution notations such as Fragile, This side up, center of gravity, weight, Owner's particulars, Purchase order number etc. shall be clearly marked on the package together with other details as per purchase order.

10.2 The detailed packing list shall be furnished for BHEL's review and acceptance before seeking dispatch clearance. Vendor shall dispatch the Feeder Pillars generally with all components mounted. If, for reason of preventing transit damage or for any other reasons, the components/ items have to be packed separately and dispatched then such loose items have also to be listed in the packing list. The list shall have references duly tracing them to the respective packing box/ crate. If such loose items are not declared then it shall be deemed that there are no such loose items.

10.3 The equipment may be stored outdoors for long periods before installation. The packing should be suitable for outdoor storage in areas with heavy rains and high ambient temperature unless otherwise agreed.

11.0 LIST OF SUB-VENDORS:

Sl. No.	***Item***	***Make/ Sub-Vendor***
1	Auxiliary Relays	ABB/ Alstom T&D/ Areva (now Schneider Electric)/ Easun Reyrolle/ Schneider Electric/ Jyoti/ Omran

2	Control Switches/ Selector Switches	Alstom T&D/ Hotline Switchgear & Controls/ Kaycee Industries/ L&T/ Reliable Electronic Components/ Siemens/ Switron Devices
3	Fuses	Cooper Bussman/ GE/ Havells/ L&T/ Novateur Electrical & Digital Systems/ Siemens
4	CT & PT	Controls & Switchgear/ Gilbert & Maxwell Electricals/ Kalpa/ Kappa/ L&T/ Narayan Powertech/ Pragati/ Precise/ Silkaans Electricals
5	MCB	ABB/ C&S Electric/ Havells/ Novateur Electrical & Digital Systems/ Indiana Current Control/ Legrand/ Siemens/ Standard Electricals/ Schneider Electric
6	MCCB	GE/ L&T/ Siemens/ Schneider Electric/ ABB/ Havells
7	Push Button & Indicating Lamps	C&S Electric/ Essen Deinki/ Hotline Switchgear & Controls/ L&T/ Precifine Products/ Schneider Electric/ Shri Tulsi Switchgears/ Siemens/ Teknic
8	Protection Relays	ABB/ Alstom/ Easun Reyrolle/ GE/ Schneider Electric/ Siemens
9	Power Cables	Govind Cable Industries/ Gupta Power Infrastructure Ltd./ Zenium Cables Limited/ Apar Industries Limited/ Elkay Telelinks Limited/ Suyog Electricals Ltd./ Torrent Power Limited (Cable Unit)/ Polycab India Limited/ Gemscab Industries Ltd./ Special Cables Pvt. Ltd./ Paramount Communications Ltd./ Delton Cables Limited/ KEI Industries Limited/ CMI Limited/ Cords Cable Industries Ltd./ KEC International Limited/ Thermo Cables Limited/ Universal Cables Ltd.
10	Cable Glands	Flexpro Electricals Pvt. Ltd./ FCG Power Industries/ Kaysons Techno Equipments Pvt. Ltd./ Metal Craft Industries/ Prompt Engineering Works, Mumbai/ Flameproof Equipments Pvt. Ltd./ FCG Flameproof Control Gears/ Electromac Industries/ Braco Electricals India Pvt. Ltd./ Sigma Instruments Company
11	Cable Lugs	Automic Electric & Refrigeration Co/ Chetna Engineering Co./ Electromac Industries/ Braco Electricals India Pvt. Ltd./ Forward Engineering Industries/ Dowells Elektro Werke, Mumbai
12	Earthing Material	Industrial Perforation (I) Pvt. Ltd./ Unitech Fabricators & Engineers/ Ratan Projects & Engg./ India Electricals Syndicate/ Premier Power Products/ Saral Industries/ Rajasthan Metal Smelting Co./ Anil Steels Pvt. Ltd./ Patny Systems Pvt. Ltd./ Reputed Make

12.0 SPECIAL CONDITIONS:

12.1 Bidder should confirm that "after-sales service" facilities will be made available free of cost for proper commissioning/ maintenance of equipment offered. The vendor should depute their Technician/ Engineer at their cost for rectification of any defects during guarantee/ warranty period.

NOTES:

The Price quoted against the feeder pillar is inclusive of Supply, Design, Erection and commissioning including Civil /Foundation and Cable and other accessories

Chapter XIV- List of Documents

Work shall be performed as per below listed documents, customer/ BHEL specifications, standard engineering practices/specification and approved drawings issued by BHEL:

Sl No	Description	Reference	Remarks
1	Plot Plan for Enabling Works	Drawing no. BPCL BINA/ENAB/001	
2	Office Layout Plan	Drawing No. BPCL BINA/ENAB/002	
3	Safety & HR & Other Documents of M/s BPCL		
4.	SLD for Feeder Pillar(Only 125A & 250 A)		

Note: In case of any contradiction between two documents following order of precedence shall be applicable:

1. Price Schedule
2. Customer Specification (M/s BPCL)
3. BHEL Specification
4. CPWD Specification
5. Standard engineering Practices/specifications