Bharat Heavy Electricals Limited

High Pressure Boiler Plant
Tiruchirappalli – 620 014. India
Civil Engineering Department (Factory)

TENDER DOCUMENT (PRICE BID)

Name of work	:	**Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.**
Tender Notice No.	:	**09 / 13-14**
Tender Schedule No.	:	**18 / 13-14**
Period of Contract	:	**10 Months**
Issued to	:	

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI – 620 014

CIVIL ENGINEERING DEPARTMENT (FACTORY)

BHE: SM: CF: P: Bhandara TS No. 18 / 13-14:
Dt. 07.02.2014.

To

The Tenderer

Dear Sirs,

Sub: Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.

Ref: 1. Tender Notice No. **09** / 13-14
2. Tender Schedule No. **18** / 13-14

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Please find enclosed / attached non-transferable tender document containing I) Qualification bid consisting, Preamble, Specifications, General Conditions of Contract, Norms for Qualification, Pro-forma and Work & safety procedure ii) Price bid consisting of Preamble, Instruction to Tenderers, Bill of Quantities to offer your most competitive rates for all the items, drawings, Schedules A,B,C,D & E.

Tender for the work should be submitted in a sealed cover consisting of three inner sealed covers such as I) EMD cover ii) Qualification bid cover & iii) Price bid cover, all superscribing the name of work, tender schedule number, the contents etc.

1) **EMD cover shall contain requisite EMD in the form of DD.** Tenderers who had already remitted one time EMD should furnish the details of cash receipt No._____ dt. _____, on the top of EMD cover. Tender without EMD / without reference to one time EMD will be summarily rejected and the respective qualification bid shall not be opened.

   In case of tender documents downloaded from website, tender shall accompany the tender cost of Rs.750/- in the form of Demand Draft (separate) in addition to the EMD amount in the form of Demand Draft.

   All Demand Draft shall be drawn in favour of **BHEL, Trichy** payable at Tiruchirappalli.

2) Qualification bid cover shall contain duly filled in qualification bid document signed by the tenderer in all the pages with documentary evidences for pre-qualification such as experience, value of work executed in the similar nature of work, etc. Any bid without proper documentary evidence for pre-qualification shall not be considered for further evaluation.

3) The Price Bid cover shall contain price bid document duly filled in and signed by the tenderer in all the pages. **The tenderer has to quote most competitive rates for all the items in the Bill of Quantities from page No. 92 to 165 of Price Bid.**

The completed qualification bid and price bid along with requisite EMD of **Rs.2,00,000/-** for the work in the form of Demand Draft drawn in favour of BHEL, Trichy shall reach the office of the undersigned on or before **21.02.2014 at 10.00 hrs.** EMD in any other form will not be accepted. The qualification bid will be opened on the **same day at 10.15 hrs. at the Office of the DY GEN MANAGER / CIVIL / FACTORY (Plg. & Design), Bldg. No. 53 Ground Floor, BHEL, Tiruchy – 620 014, Tamilnadu.** In case of opening day falls on holiday or happened to be declared as a holiday, the receipt and opening of the tender shall automatically fall on the same timing of the next working day. Date and time of opening of the Price Bid shall be intimated only to the bidders those who have qualified after evaluation of the qualification bid. You / your authorized representative may participate in the tender opening.

Complete set of drawings as indicated in SCHEDULE D of Qualification Bid can be obtained from the undersigned on request and the same shall be signed and submitted along with the tender document.

The tenderers who is desirous of sending their tender documents by post or courier are advised to send the same well in advance so as to reach the **Office of the DY GEN MANAGER / CIVIL / FACTORY (Plg. & Design), Bldg. No. 53 Ground Floor, BHEL, Tiruchy – 620 014, Tamilnadu on or before 21.02.2014 at 10.00 hrs.**

The late tenders received after the tender submission / opening time will be summarily rejected and will not be considered for any reason.

Clarification if any, can be obtained contacting following e-mail ids.

For PEB works: kguna@bheltry.co.in

For Electrical works:vragu@bheltry.co.in

Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information.

One set of tender documents shall be retained by the bidder for their reference.

Kindly acknowledge the receipt of the entire set of tender document.

Thanking you,

Yours faithfully
For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED,

DGM / CIVIL / FACTORY (PLG. & DESIGNS)

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI – 620 014

CIVIL ENGINEERING DEPARTMENT (FACTORY)

PREAMBLE

PROJECT INFORMATION:

BHEL is proposed to install a Power Equipment Fabrication Plant at Sakoli Tehsil, district Bhandara of Maharashtra State in the land area of about 475 acres which consists of **Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.**

Site information:

Location : Tehsil : Sakoli (Villages covered: Mundipar, Bamhani and Khairi)

Dist : Bhandara

State : Maharashtra

Latitude : 21º 05’ 00”N

Longitude : 79º 59’ 00” E

Nearest Railway Station : SONDAD - 10 Kms away from Sakoli.

Nearest Village : Sakoli (10 KM from Site.)

Nearest Seaport : Mumbai

Nearest Airport : Nagpur (around 100 kms from Site)

Access Road : **Sakoli** is located on Hazira-Kolkata NH-6. Sakoli is well connected to the major and minor cities. The National Highway 6 mainly connects Nagpur and Kolkata (via Bhandara, Deori, Jabalpur etc).

CLIMATIC CONDITIONS:

Temperature: Maximum: 47 Deg. Celsius and Minimum: 11.6 Deg. Celsius

Humidity: 52.3 %

Rainfall: In South West monsoon (June-Sep): 50 days.
Average total rainfall: 1250 - 1500 mm.

Seismic data:

Seismic Intensity : As per IS: 1893-2002 - Zone II.

1. The scope of work includes but not limited to **Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.**

2. **The tender value includes cost of structural steel and all other materials, as applicable.**

3. **Supply of materials like structural steel, all crane rails, etc. are also included in the scope of the contractor** and the contract is a combination of (turnkey) and item rate contract.

4. **Validity of the offer shall be for six months from the latest due date of offer submission.**

5. **No Price Variation Clause is applicable for this contract.**

6. **The contract period will be 10 (Ten) months.**

7. Time is the essence of the contract. Being a time bound Project with capital expenditure, the contractor should make all efforts to complete the work in time. Even though the overall completion period is indicated as **10 months**, the shop floor and other works shall be completed and handed over progressively.

8. Usually, working hours are limited to day time only. In emergency cases to carryout works during nights, it may be done so with the specific prior permission of BHEL. In such case, it is to be carried out in the presence of BHEL officials or their authorized persons.

9. Quoted rate shall be firm throughout the contract period of **10 months** and no cost escalation is allowed on any account.

10. If required, the tenderer may have to execute additional scope of work at proportionate cost upto 20 % of the present contract value, keeping other terms and conditions unaltered

11. The rate offered is for finished items of works and shall provide for the complete cost towards fuel, tools, tackles, plant & machinery, temporary works, labour, materials, levies, taxes**,** transport, lay-out, repairs, rectifications, maintenance till handing over, supervision, labour colonies, establishment, services, revenue expenses, overheads, profits & all other incidentals including insurance coverage for the total cost of the PEB structures, etc., complete.

    The rate quoted shall not include service tax and BOCW Cess. However the service tax as applicable for this contract work and the same can be claimed from BHEL along with their monthly bills for further payment to be made to the authorities concerned. At present the rate of service tax is 4.944%. (Service tax + Edu. Cess+ Sec. Higher Edu. Cess). This is applicable for Package – I only. For packages II, III, IV Service Tax @ 12.36% is applicable for erection and commission portion for supply items in packages II, III & IV the rate quoted shall include packing and forwarding charges, freight charges, insurances and all taxes like octroi, VAT / CST, Excise Duty, etc. However the tenderer has to submit the service tax structure of applicability to their firm nature to arrive at the total cost to BHEL based on which the final award of work will be done. The contractor has to submit the payment challan as a documentary proof of having paid the service tax for the previous bill for which he has received the service tax payment along with the subsequent bill for which payment has to be processed.

The successful tenderer should remit applicable cess as per Building and Other Construction Workers Act 1996 as applicable to the authorities (Maharastra Government) concerned from time to time. The same can be reimbursed from BHEL on production of valid documentary proof for having paid the applicable cess of the value of work done to the authorities concerned. As soon as the BHEL – PEFP Factory Registration obtained, the BOCW Act will not be applicable.

The successful tenderer in the Reverse Auction / lowest tenderer in the Price Bid opening should submit the price break up for all the items of work with justification to prove the price break up given are in line with the market rate and the same should be acceptable to BHEL or mutually agreed rates have to be arrived at by BHEL and the contractor.

12. The work shall be carried out as per Civil Engineering Department Work & Safety procedure, AWS / BIS specifications, standard code of practice and as per the instructions of Engineer-in-charge. The brief description of items of work is given in the bill of quantities provided in the Price Bid. **Tenderer has to quote rates both in figures and in words for all the items given in the Bill of Quantities provided in the Price Bid. (From page No. 92 to 165).**

13. **New Taxes / Levies**

In case the Government imposes any new levy / tax on the output service / goods / work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax / levy / duty etc. becomes applicable after the date of Bidder's offer, the Bidder / Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same **before opening of Price Bid**. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

14. For any item of work not covered in Bill of Quantities, the rate will be arrived at based on the conditions given in BHEL General Conditions of Contract in force.

15. The works contract to be entered into with the successful tenderer will be governed by the BHEL Revised General Conditions of Contract in force

16. The tenderers are advised to visit **PEFP Project site at Sakoli, Bhandara Dist., Maharastra State** and get themselves acquainted with the site conditions before submitting the offer. Since the job shall be executed at site**,** bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, labour laws, etc. before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

17. BHEL will arrange to depute their representative on specific dates to co-ordinate and accompany the tenderers to visit the site

18. For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

19. In the event of any conflict between requirement of any clause of this specification / documents / drawings / data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error / missing pages / other clerical errors in the tender documents, noticed must be pointed out before submission of offer, else BHEL's interpretation shall prevail.

20. Order of Precedence:

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

a. Amendments / Clarifications / Corrigenda / Errata etc issued in respect of the tender documents by BHEL
b. Notice Inviting Tender (NIT)
c. Price Bid
d. Qualification Bid
e. Codes of Standards
f. General Conditions of Contract

21. The decision of Engineer-in-charge shall be final and binding on the contractor regarding clarification of items in this tender schedule.

22. The following eligibility criteria shall be complied to fulfill the Qualification Bid :-

For PEB Works: (Package – I)

The tenderer should have separate registration for EPF, PAN, Sales Tax, Service Tax, Excise Duty, proof of having submitted IT return for the last three years (2010-11 to 2012-13), Profit & Loss account and balance sheet certified by the auditor.

Average annual turnover of similar works executed in PEB in the last three financial years should be Rs. 2100 Lakhs

During last seven financial years should have successfully completed works either

Three similar works not less than (Rs. 2800 L) or

Two similar works not less than (Rs. 3500 L) or

One similar work not less than (Rs. 5600 L)

Should possess own Pre Engineering Building components manufacturing facility and design capability to match the present requirement of 7000 Lakhs.

Should have designed and supplied PEB's with EOT crane capacity of 30 Tonnes and higher.

Latest Solvency (obtained within 6 months) from Nationalised / Schedule Bank shall be at least for Rs. 3123.20 Lakhs

For HT Sub Station works: (Package – II)

Qualification Criteria for executing the HT Substation Equipment Supply and Erection Contract at PEFP Bhandara

Sl. No	Description	bidder to confirm
1	The lead bidder/ agency i.e. PEB (Package-1 bidder) can tie up with an agency who have designed, engineered, supplied and commissioned at least one Substation of same (Voltage rating-33kV & transformer capacity-5 MVA) or higher rating for similar applications in the past three years on EPC/JV basis and such substation is presently working satisfactorily for more than one year after commissioning.	

Sl. No	Description	bidder to confirm
2	List of the customers / companies to which similar/higher rated substation is supplied & commissioned by the bidder.	
3	Performance certificate from minimum one customer, regarding satisfactory performance of the equipments for a minimum period of one year supplied to them in last five years as per the suggestive format given in Annexure-XIV.	
4	Bidder for Package-2 (substation) should submit the audited copy of last three years (2010-11,2011-12 & 2012-13) balance sheet and Profit & Loss account.	
5	Bidders should quote for supply, erection, testing, commissioning and obtaining all statutory approvals for the substations and allied equipments as per BOQ.	
6	Bidder should have a valid Electrical ESA licence - issued by the respective licencing board.	
7	Bidder should have the TIN , PAN card and Service tax documemts for their firm. bidder should produce the registration/ certification copies along with the offer.	

Note: Bidder should conform all the above said points without which the offer will not be technically considered.

For Electrification of shop floor works: (Package – III)

PART-A

Pre-Qualification Criteria for the Electrification of Shop floor at PEFP Bhandara

Sl. No	Description	bidder to confirm
1	The lead bidder/ agency i.e. PEB (Package-1 bidder) can tie up with an agency who have supplied, erected, tested and commissioned atleast one shop/ factory electrification project (lighting distribution) and other allied works as indicated in the tender in the past five years on EPC/ JV basis and such installation presently working satisfactorily more than one year after commissioning, should quote.	
2	List of the customers / companies on which similar / installations supplied & commissioned by the bidder.	
3	Performance certificate from minimum one customer / company (as per the suggestive format given in Annexure-VII) regarding satisfactory performance of the equipment/ electrification of shop floor/ lighting projects for a minimum period of one year supplied to them in last five years.	
4	Bidder for Package-III (Shop Electrification) should submit the audited copy of last three years (2010-11, 2011-12 & 2012-13) balance sheet and Profit & Loss account.	
5	Bidders should quote for supply, erection, testing and commissioning of the installations and allied equipments as per the entire scope of items identified in the NIT.	
6	Bidder should have a valid Electrical ESB license – issued by the respective licensing board.	
7	Bidder should have the PAN, TIN and Service Tax Registration documents for the Firm and copies should be submitted along with the offer.	

Note: bidder/bidder should conform all the above said points without which the offer will not be technically considered.

For Highmast Lighting System works: (Package – IV)

PART-A
Pre-Qualification Criteria for the Supply, Erection and commissioning of Highmast Lighting at PEFP Bhandara

Sl. No	Description	bidder to confirm
1	The lead bidder/agency i.e. PEB (Package-1 bidder) can tie up with an agency who have supplied and commissioned similar or higher capacity high mast and working satisfactorily for at least one yhear on EPC/JV basis after commissioning.	
2	List of the customers / companies on which similar / installations supplied & commissioned by the bidder.	
3	Performance certificate from minimum one customer / company regarding satisfactory performance of the Highmast lighting system for a minimum period of one year supplied to them in last five years as per the suggestive format given in Annexure-B.	
4	Bidder for package-IV (Highmast lighting system) should submit the audited copy of last three years (2010-11, 2011-12 & 2012-13) balance sheet and Profit & Loss account.	
5	Bidders should quote for supply, erection, testing and commissioning of the installations and allied equipments as per the entire scope of items as per BOQ.	
6	Bidder should have a valid Electrical ESB license – issued by the respective licensing board.	
7	Bidder should have the PAN, TIN and Service Tax Registration documents for the Firm and copies should be submitted along with the offer.	

Note: bidder/bidder should conform all the above said points without which the offer will not be technically considered.

NOTE: The minimum qualification criteria mentioned for PEB and electrical works together should be met by the tenderer. Otherwise the tender will be summarily rejected. Technical evaluation will be done based on the eligibility criteria, pre-qualification, norms for qualification for PEB works, committee visit report, etc. Evaluation on similar works turn over for the last three financial years / seven financial years for each category as described in point No. 22 of preamble.

23. The norms for qualification for PEB works with prescribed score are attached in the Qualification Bid. Minimum score required for PEB Work qualification is 60. Evaluation will be done for PEB accordingly. For electrical works as given above in point 22 of this preamble.

24. The tenderer has to satisfy the Pre-Qualifying Requirements stipulated for this Tender in the NIT in order to be qualified. The date of opening of price bids / conducting reverse auction shall be intimated to only such technically qualified bidders. BHEL reserves the right not to consider offers of parties under HOLD.

25. The tenderer shall submit documents in support of possession of 'Qualifying Requirements' duly self-certified and stamped by the authorized signatory, attested by gazetted / Notary public, indexed and properly linked in the format for PQR. In case BHEL requires any other documents / proofs, these shall be submitted immediately.

26. Documentary evidences (Xerox copies - attested) for turnover on similar works, works experience, EPF, Sales Tax, Service Tax, Excise Duty, PAN Registration etc., all as indicated & required in the tender document should be furnished without which it will not be taken into account.

27. The tenderer may have to produce original document for verification if so decided by BHEL.

28. The works executed in the own name of the tenderer only will be considered for eligibility criteria. The nominated committee may also visit the works executed by the contractor to ascertain the nature of work relating to PEB works before qualifying.

29. Dissimilar / irrelevant works will not be considered for eligibility criteria.

Similar works means:

For PEB works – Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors.

For Electrical works – Internal electrification for various industrial structural steel buildings, high mast lighting system with all arrangements, HT Substation equipment supply and erection works, etc.

30. In case of tender documents downloaded from website, tender shall accompany the tender cost of Rs.750/- in the form of Demand Draft (separate) in favour of BHEL payable at Tiruchy in addition to the EMD amount in the form of Demand Draft. Tenders without tender cost will also be summarily rejected. However tender committee may consider exemption in the case of SSI registered with MSME as per applicable Law and the tenderer has to submit proof for the same.

31. Tender without EMD / one time EMD reference will be summarily rejected and the qualification bid and price bid shall not be considered.

IMPORTANT INFORMATION:

32. The offers of the tenderer / bidders who are on the banned list and also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site (www.bhel.com ---> Tender Notification - List of Banned Firms)

33. BHEL reserves its right to reject the tender on account of unsatisfactory past performance by the tenderer in any other project / sister unit, awarded under different enquiry. The tenderer who has executed / is executing / is carrying out business with BHEL and its manufacturing units / Power Sector regions shall necessarily submit all the list of works / supplies executed / under execution with performance reports in the prescribed format as per annexure III given in this tender document (Refer page No. **252 of Qualification Bid)**
The tenderer has to declare the facts of performance with all his customers and their contact details with phone & e-mail ids.

34. BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure / modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction.

The successful tenderer in the Reverse Auction / lowest tenderer in the Price Bid opening should submit the price break up for all the items of work with justification

to prove the price break up given are in line with the market rate and the same should be acceptable to BHEL or mutually agreed rates have to be arrived at by BHEL and the contractor.

35. The tenderer is required to execute integrity pact in the prescribed pro-forma with BHEL if qualified. The price bid of the respective tenderer will be opened / qualified for Reverse Auction only on submission of the said pact.

36. The successful tenderer has to furnish the security deposit, as per Clause 13 of Tender Notice, attached in the Qualification Bid if the work is awarded. Also it is to be noted that after award of work the successful tenderer has to furnish atleast 50 % of security deposit before the commencement of work.

37. Bank Guarantee format and the list of consortium banks are enclosed for BG submission against EMD / Security Deposit / PBG. **The Bank Guarantee shall be obtained from any one of the banks in the list of consortium banks in India as per the enclosure.**

38. Tenderers are requested to furnish the duly filled in E format (attached as separate in the Qualification Bid) sheet along with a cancelled cheque leaf to accept Electronic Fund Transfer / R T G S transfer for any payment from BHEL, Trichy.

39. **No advance / mobilization advance will be given and the part-payment or advance for raw materials brought by the successful tenderer will not be paid. The payment for the finished items of works only will be paid after incorporating the required raw materials into the work, if any.**

40. The successful tenderer has to ensure payment of Minimum Wages as per Maharastra State Minimum Wages including its periodical revision as applicable under law from time to time.

The labourers engaged in this contract shall be paid additional payment as mentioned below in addition to the payment of Minimum wages as stated above.

a)	**Unskilled Worker**	**Rs. 2000 per month**
b)	**Semi-skilled Worker**	**Rs. 2300 per month**
c)	**Skilled Worker / Supervisor**	**Rs. 2500 per month**

Also the labourers shall be paid a minimum bonus which shall be 8.33% as per the payment of Bonus Act 1965 for the total wages paid (i.e) Payment of minimum wages and additional payment as mentioned above.

The successful tenderer shall have to remit EPF & ESI contributions at the rates applicable under law to the authorities concerned for the total wages paid (i.e) Payment of minimum wages and additional payment as mentioned above.

If ESI is not applicable to the work site, the tenderer has to cover his all workmen including supervisors and executives with contractor's all risk insurance policies.

41. The successful tenderer should pay Bonus to their workmen engaged for this contract work as per the payment of Bonus Act 1965.

42. BHEL may insist for witnessing the regular payment to the labour. They may also like to verify the relevant records for compliance with statutory requirements. The successful tenderer shall enable such facilities to BHEL.

43. The successful tenderer will deduct the necessary amount from his employees towards provident fund & ESI and contribute the equal amount as per Government of India rules. This amount will be deposited regularly to the Provident Fund & ESI Authorities concerned and account code obtained. The successful tenderer shall submit the above account code duly certified by PF & ESI authorities to BHEL project – in -charge. Also all other employees' benefits are to be borne by the contractor as per statutory laws. **If ESI is not applicable to**

the work site, the tenderer has to cover his all workmen including supervisors and executives with contractor's all risk insurance policies.

44. The successful tenderer should submit labour records such as attendance, wage acquittance, ESI and PF remittance challans for the labourers engaged in the Project site only. **If ESI is not applicable to the work site, the tenderer has to cover his all workmen including supervisors and executives with contractor's all risk insurance policies.**

45. The successful tenderer has to deploy adequate labour of required categories such as Unskilled, Skilled, Welder, Fitter, Mistry, Technically experienced, etc. so as to execute the works simultaneously in all areas of work. Expertise labour only to be engaged for specialized items of work and the technical persons with experience shall have to produce valid certificate for verification.

46. The successful tenderer shall engage all the unskilled, skilled, especially skilled labour and supervisory staff for the work. Only trained and competent personnel with previous experience in the job shall be employed. However, BHEL reserves the right to decide on the suitability of the workers and other personnel who will be employed by the contractor. BHEL reserves the right to insist on removal of any employee of the contractor at any time, if they found him unsuitable. The successful tenderer shall be bound to follow the instruction of BHEL.

47. It is the responsibility of the contractor to engage his workmen in shifts and /or on overtime basis for achieving the target set by BHEL. This target may be set to suit BHEL's requirements or to advance date of completion of events or due to other reasons. The decision of BHEL in regard to setting the targets will be final and binding on the successful tenderer.

48. The successful tenderer shall employ only qualified and experienced engineers/supervisors for this job. They shall have professional approach in executing the work having adequate knowledge and experience in the fields. The successful tenderer shall give an organization chart indicating the staffing pattern.

49. The successful tenderer is required to carry out erection activities as directed by the department officials. It is required to engage certain minimum strength of staff for effective supervision of works as indicated below:

Site in-charge / Construction Manager	-	1 No.
Planning Engineer and coordinator	-	1 No.
Qualified Surveyor	-	1 No.
Civil Engineer (Graduate in Civil Engineering)	-	1 No.
Structural Engineer (Graduate in Mechanical / Civil Engg.)	-	1 Nos.
Supervisor/Engineer (Diploma Holder)	-	2 Nos.

50. Adequate number of Quality Engineer and qualified Safety Engineer should be deployed at site.

51. The successful tenderer shall provide the names and details of Engineer / Supervisors at the time of mobilization to BHEL as per the proposed organization chart.

52. Exclusive Stores personnel should be engaged who would co-ordinate with department official for clearance and collection of BHEL supplied materials if any for works.

53. Separate non-technical persons should be engaged for arranging daily gate passes for labours and vehicles entry in all the gates of the site Complex.

54. The successful tenderer shall depute a civil engineer during the execution of civil foundation work by other contractor in order to ensure the alignment of bolts, levels of concrete, screed bars, etc.

55. The successful tenderer's supervisory staff shall execute the work in the most substantial and workmanlike manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. They shall be responsible to ensure that the assembly and workmanship conform to dimensions and tolerances given in the drawings/ instructions given by BHEL Engineer from time to time.

56. The supervisory staff employed by the successful tenderer shall ensure proper outturn of work and discipline on the part of the labour put on the job by the successful tenderer and in general, see that the works are carried out in a safe and proper manner and in coordination with other labour and staff employed directly by BHEL or other contractors of BHEL or BHEL's Client.

57. An industrial relations supervisor shall coordinate for the implementation of local labour laws, maintenance of records as required by contract labour (regulation and abolition act) and also coordinate with the local labour authorities. The successful tenderer has to ensure minimum wages payment to their labours as per the rule of the state and they have to produce documentary evidence to that effect to BHEL.

58. If at any time during the execution of work, it is noticed that the work is suffering on account of non-availability / shortfall in provision of resources from the successful tenderer's side BHEL will make suitable alternate arrangements at the risk and cost of contractor. The expenditure incurred with overheads thereby shall be recovered from the successful tenderer.

59. It shall be the responsibility of the successful tenderer to see that the workmen do not utilize the departmental canteen facilities. The successful tenderer has to make his own arrangements to provide refreshment for the workmen.

60. The successful tenderer shall carry out health performance test at his cost for all the workmen engaged in the work through a registered medical practitioner and produce certificate on demand.

61. The successful tenderer shall obtain independent Labour License under the Contract Labour (regulation and abolition) Act from the concerned authorities based on the certificate (form-V) issued by BHEL.

62. The successful tenderer shall strictly adhere to various labour laws in force.

63. The successful tenderer shall also comply with the requirements of local authorities / project authorities calling for police verification of antecedents of the workmen, staff etc.

64. **The successful tenderer should remit applicable cess as per Building and Other Construction Workers Act 1996 as applicable to the authorities concerned from time to time. The same can be reimbursed from BHEL on production of valid documentary proof for having paid the applicable cess of the value of work done to the authorities concerned. As soon as the BHEL – PEFP Factory Registration obtained, the BOCW Act will not be applicable.**

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.

In case any portion of work involves execution through building or construction workers, then compliance to the above titled Acts 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:-

i. 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 licence to the Competent Authority under the BOCW Act 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 licence / permission to BHEL within a period of one month from the date of award of contract.

ii. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these act and rules including that of payment / deposit of 1% cess on the extant of work involving building or construction workers engaged by the contractor.

iii. 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 workers) engaged by the sub-contractor during the preceding month.

iv. 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.

65. **The successful tenderer shall make his own arrangements for accommodation with necessary facilities such as drinking water, sanitation and lighting etc. for his workmen and the staff. The electricity for labour accommodation shall be arranged by the contractor on his own. Also, the contractor has to make his own arrangement for transportation of his workmen and other employees. BHEL shall not provide any facility in this regard. However, BHEL may consider to allot space for labour colony at free of rent if sufficient land is available for this purpose.**

66. **The successful tenderer should establish his own site office, fabrication yard, handling facility, storage facility, security arrangements, etc., for which vacant land will be allotted on specific request for which the rent will not be collected.**

67. **The successful tenderer shall make his own arrangements for field office and stores for accommodating necessary equipments, tools room for execution of the work. Only open space will be provided by BHEL free of charges within the project premises at the available location.**

68. **The successful tenderer will have to make his own arrangements for water without any extra claims and water required for the work and drinking for the workmen shall be arranged by the successful tenderer.**

69. **The successful tenderer will have to make his own arrangements for Electrical energy without any extra claims and electrical energy required for the work and for other purposes shall be arranged by the successful tenderer. The successful tenderer shall make leak proof / fire proof shed and provide control panel board of required capacity and lay the required cables at their own cost for further distribution to other required area of work.**

70. **The successful tenderer should be in a position to make his own arrangement for compressed air without any extra claim for the uninterrupted operation of jack hammer with silencer.**

71. **The successful tenderer should have their own well established laboratory for conducting various tests as per scope of work mentioned in the Tender document at their manufacturing centre / unit.**

72. The successful tenderer shall arrange adequate floodlights, hand lamps and area lighting. Provision of distribution lines for lighting from the single point to the required place with proper distribution boards, observing the safety rules laid down by the electrical authorities

of the state shall be done by the successful tenderer including all the materials like cables, fuses, switch boards etc.

73. The successful tenderer shall provide at different elevation suitable arrangement for urinal and drinking water facility with necessary plumbing & disposal arrangements including construction of septic tank. These installations shall be maintained in hygienic condition at all times.

74. On completion of work, all the temporary buildings, structures, etc shall be dismantled and levelled and debris shall be removed as per instruction of BHEL by the successful tenderer at his cost. In the event of his failure to do so, the same will be arranged to be removed and expenditure thereof will be recovered from the successful tenderer. The decision of BHEL engineer in this regard shall be final. However, the scope of dismantling and levelling the area is limited only to the successful tenderer's site office, yard and other spaces occupied by the contractor.

75. The successful tenderer shall follow norms of BHEL security system for movement of men including bio-metric system & materials within the complex

76. All safety measures are to be followed during execution of work, particularly while working at heights. Sufficient care shall be taken by the contractor to avoid damages to the buried pipe lines, cables and other infrastructure like railway lines if any etc.

77. To safeguard the persons working at height in roof, wall etc., sufficient number of Industrial Safety nets shall be provided at tenderer's cost in appropriate level and locations. The working hand including Supervisors, Engineers should wear the personal protective items and safety measures such as helmets, safety belts, shoes, etc., before entering into working place.

78. The tenderer is required to quote their rates inclusive of cost of all materials, T&Ps, labour, etc. BHEL reserves the right to inspect and reject any T&P not found satisfactory.

79. The successful tenderer has to submit the list of machineries to be deployed exclusively for this work, organization chart of their set up for the works and any change thereafter in the organization set up shall have the prior approval of BHEL.

80. The successful tenderer should submit the programme for the completion of work and the list of machineries and site personnel to be deployed for the work along with tender.

81. The successful tenderer should deploy precise instruments like total station, measuring devices using laser beam to ensure error free line, level and alignment of holding down bolts etc. The successful tenderer is required to deploy skilled experienced labourers in handling such instruments and has to coordinate with other agencies like Civil contractors to achieve accuracy for trouble free erection of structures.

82. The successful tenderer should deploy the erection machineries like crane etc., required for the work at site till completion and handing over of the building. Also adequate number of the following tools & Plants / instruments shall be made available always at site for the works.

Precise Leveling instruments and total station
Laser beam instruments for accurate measurements
Inter carting vehicle (tractor, hand trolley etc)
Hydra cranes
Power operated winches
Mobile / Hydraulic crane
Welding machine etc.

83. All tools and plants required for all the works covered under this contract will have to be brought by the successful tenderer.

84. The successful tenderer's materials and tools & plants shall have to be brought inside factory with proper invoice / voucher and make necessary entry in the security gate. They should maintain proper record for tools and plants, materials, etc., brought inside the project site.

85. The successful tenderer is required to provide all necessary Tools and Plants (T&P), measuring instruments and handling equipments for this scope of work. BHEL is not providing any T&P for this work.

86. The successful tenderer shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

87. Timely deployment of adequate quantity of T&P is the responsibility of the successful tenderer. The successful tenderer shall be prepared to augment the T&P at short notice to match the planned programme and to achieve the milestones.

88. The successful tenderer shall submit periodical reports in respect of following aspects of operation:

    1) Availability and utilization of contractor's Tools & Plants
    2) Daily manpower reports
    3) Daily progress reports of activities & incidents
    4) Calibration reports
    5) Records of wages payment
    6) Any other report/record as may be specified by BHEL.

    BHEL at site will suggest formats for these reports.

89. Since the responsibility for the quality, workmanship and accuracy of any work being carried out under this contract lies with the successful tenderer, the successful tenderer should ensure that no work is done without the presence of successful tenderer's representative at the work spot.

90. All the works shall be executed as per the standard specifications as provided in Standard Building Practice in Maharastra / BIS.

91. All materials brought by the successful tenderer for incorporation in the work shall be got inspected and approved by the Engineer-in-charge before they are incorporated in the work.

92. The successful tenderer should use only the materials of brand and quality as approved by BHEL.

93. All materials and consumables brought by the successful tenderer should have manufacturer's certificate.

94. The successful tenderer shall provide all consumables required for carrying out the work covered under this scope of work excepting those which are specifically indicated as BHEL supply.

95. All consumables, to be procured and used for the work shall have prior approval of BHEL engineer in regard to brand and quality specification.

96. The successful tenderer should maintain proper accounts for materials brought by the him and if any materials supplied by the department and the same should be available at the site of work for verification and check by the Officials of this Organization at any time.

97. The successful tenderer should extend full co-operation to the other contractors who may be doing other works in the same area to enable them to execute their portions of work without any delay or difficulty.

98. **The successful tenderer should extend full co-operation with the third party inspection agencies engaged by BHEL to adhere to the Quality Control Procedures at the successful tenderer's Fabrication Plants during fabrication and as well as at erection site.**

99. The successful tenderer shall effect and maintain professional indemnity insurance for the amount equal to Indian Rupees 50 Lakhs. The successful tenderer shall produce evidence of coverage of the professional indemnity insurance before any payment is released. The insurance which shall insure **the contractor's liability by reason of professional negligence and errors in the design of the works**, shall be valid for 5 years from the date of issue of Completion certificate. The BHEL will not issue final payment certificate until the contractor has produced evidence that coverage of professional indemnity insurance has been provided for the aforesaid period.

100. The successful tenderer shall furnish the total quantity and cost - break up each item of work covered in the BOQ. The successful tenderer has also to inform the total tonnage involved against the BOQ approximately for steel materials, roofing sheet, cladding materials, etc.

101. The successful tenderer shall furnish the crane girder materials, crane rails - tonnage involved in the work

102. The successful tenderer shall ensure to fabricate and dispatch the PEB components based on erection sequence with matching components.

103. A hypothecation deed must be executed by the successful tenderer for the total value of PEB components going to be supplied and erected at Bhandara in favour of PEFP, BHEL in order to release payment for the items supplied, erected at site. The format of the hypothecation deed is also enclosed in this tender document.

104. The successful tenderer should insure the finished pre-fabricated components and structures of PEB after inspection and clearance from BHEL on the name of PEFP, BHEL with Insurance company acceptable to BHEL. The insurance coverage should be for 10% value of contract against theft, fire, all risk, etc. complete for those materials lying in the site. The contractor must safeguard the goods against losses due to any delay in execution of work or to the shortage or misuse of materials. The goods should be in the name of the contractor with account BHEL. All the insurance policies shall be obtained from the insurance companies acceptable to BHEL.

105. The successful tenderer should dispatch the finished pre-fabricated components and structures of PEB with all Test Certificates and other relevant documents after inspection and clearance from BHEL Engineer or the Third Party inspection agency as fixed by BHEL and the document clearance from the consultant with necessary invoices addressed to in the name of the contractor A/c **BHEL near Sakoli, Bhandara District, Maharatsra State, transit insurance coverage for the dispatched products of the full value of the invoice.**

106 Statement of completed works with detailed measurements and DODL along with material consumption statements shall be submitted by the successful tenderer in the last week of every month for processing bill.

107. Being a lump sum contract the payment for all the items of works will be restricted to the quantity as indicated in the final offer of the successful tenderer. No extra payment will be made for additional quantity of materials / PEB components deployed by the contractor for the completion of the work. However suitable recovery will be made in case of deployment of lesser quantity of materials / PEB components than the quantity given in the final offer.

108. The successful tenderer has to send the invoices addressed to Site-in-charge / Civil Works, PEFP, BHEL, Bhandara in running bills based on the measurements written in the Measurement Book.

A Payment terms for Civil package-I:

1. 100% payment against design, supply, erection and commissioning against 10% PBG for PEB structural work package alone as per point No. 116 of preamble.

B Payment terms for Electrical packages-II, III &IV:

1. 100% payment against supply , erection and commissioning against 10% PBG for electrical packages alone.

2. Composite rate of Service tax of 4.944 % is applicable for PEB package alone

3. The service tax component of 12.36% is applicable only for the E&C portion for Electrical packages. Other taxes like ED,VAT/CST is applicable for the supply portion for Electrical packages.

4 BOCW is not applicable for the electrical package.

109. The successful tenderer has to take care to claim with insurance company for the damages, if any due to various reasons, during transit, erection, etc., even though the insurance obtained on the name of PEFP, BHEL. BHEL will extend necessary help to associate with him.

110. After completion of entire work, the successful tenderer will be allowed to take away the excess quantity and damaged PEB components, roofing sheets, cladding materials, other cloaking items, etc. that are not paid but brought in the name of the contractor A/c BHEL by proper gate pass issued by Site – In – charge / Civil Works.

111. The successful tenderer has to submit Performance Bank Guarantee for 10% of contract value, valid for a period of 1 (ONE) year from the date of completion.

112. The successful tenderer shall furnish Corporate Guarantee for 10 (TEN) years in Non-judicial stamp paper of appropriate value against structural stability and roof leak proofness for all structures.

113 The Main letter of Intent / work order will be released Purchase Orders only on the successful tenderer and the same will be split into many sub work orders / Purchase Orders with period of completion. The individual sub work order / Purchase Orders should be executed and completed within the completion period stipulated in it. In case of delay caused by BHEL due to non-availability of site and other reasons extension of time should be obtained by the contractor stating the reasons for delay. In case of delay due to contractor's performance in the execution of work suitable action will be taken.

114 **The successful tenderer has to give preference to employ local labourers for construction and other development works from the nearby villages of Mundipar, Bahmini and Khairi of Bhandara District, Maharashtra State.**

115 **All the tenderers who desire to participate in the tender are required to execute integrity pact in the prescribed pro-forma with BHEL and submit the same in the qualification bid cover along with tender. The price bid of the those tenderers who had submitted the integrity pact only will be opened in the case of price bid opening. The tenderers who had submitted the integrity pact only will be allowed to participate in the Reverse Auction of this tender.**

Shri Kanwarjit Singh, IRS (Retd)., **D6/12, Vasant Vihar, Ground Floor, New Delhi – 110 057** is the Independent External Monitor for this tender

116 Statement of completed works with detailed measurements and DODL if any, along with material consumption statements shall be submitted by the successful tenderer in the last week of every month for processing bill.

117. **Payment will be made only for the quantities actually executed for a finished item of work as measured and accepted finally for electrical works.**

118. The successful tenderer has to raise invoice in running bills based on the measurements written in the Measurement Book.

119. After completion of entire work, the successful tenderer will be allowed to take away the excess quantity of materials that are not paid but brought by the successful tenderer through proper gate passes.

120. LD / Penalty clause is applicable as per General Conditions of Contract in force which is reproduced below.

Compensation for Delay:

If the contractor fails to maintain the required progress in terms of condition 7 or to complete the work and clear the site on or before the contracted or extended period of completion, he shall, without prejudice to any other right or remedy of the B.H.E.L on account of such breach, pay as agreed compensation an amount calculated as stipulated below or such smaller amount as may be fixed by the BHEL on the contract value of the work for every week that the progress remains below that specified in condition 7 or that the work remains incomplete.

This will also apply to items or group of items for which separate period of completion has been specified.

For this purpose the term 'Contract Value' shall be the value at contract rates of the work as ordered.

a. Completion period (as originally-stipulated) -- at 1 percent per week.
Not exceeding 6 months.

b. Completion period (as originally-stipulated) -- at ½ percent per week
Exceeding 6 months and not exceeding 2 years.

c. Completion period (as originally-stipulated) -- at¼ percent per week
Exceeding 2 years.

Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed the under noted percentage of the contract value or of the contract value of the item or group of items of work for which a separate period of completion is given:

a. Completion period (as originally-stipulated) -- 10 percent.
Not exceeding 6 months.
b. Completion period (as originally-stipulated) -- 7½ percent.
Exceeding 6 months and not exceeding 2 years.
c. Completion period (as original-stipulated) -- 5 percent.
Exceeding 2 years

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the B.H.E.L.

121. Risk Purchse clause is applicable to this contract and it will be oprated in case of failure on completion of the works. The balance works will be executed with an alternate agency at contractor's risk and cost.

122. In case of any conflict between the General Conditions of Contract and Special Conditions of Contract, provisions contained in the Special Conditions of Contract shall prevail.

123. The contractor shall use only properly insulated and armoured cables which conform to the requirement of Indian Electricity Act and Rules for all wiring, electrical applications at site. BHEL reserves the right to replace any unsafe electrical installations, wiring, cabling etc. at the cost of the contractor. All electrical appliances used in the work shall be in good working condition and shall be properly earthed. No maintenance work shall be carried out on live equipment. The contractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installations. Area wise Electrical safety inspection is to be carried out on monthly basis as per "Electrical Safety Inspection checklist" and the report is to be submitted to BHEL safety officer.

124. BHEL shall not be liable for any expenses incurred by the bidder in the preparation of the tender irrespective of whether the tender is accepted or not.

125. While every endeavour will be made by BHEL to this end, they cannot guarantee uninterrupted work due to conditions beyond their control. The Contractor will not be normally entitled for any compensation / extra payment on this account unless otherwise specified elsewhere in the contract.

126. The contractor shall comply with all applicable State and Central Laws, Statutory Rules, Regulations, Notifications, etc. such as Payment of Wages Act, Minimum Wages Act, Workmen Compensation Act, Employer"s Liability Act, Industrial Disputes Act, Employers Provident Act, Employees State Insurance Scheme, Contract Labour (Regulation and Abolition) Act, 1970, Payment of Bonus & Gratuity Act, Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, The Building and Other Construction Workers" Welfare Cess Act, 1996 and other Acts, Rules, and Regulations for labour / workers as applicable and as may be enacted by the State Government and Central Government during the tenure of the Contract and having force or jurisdiction at Site. The Contractor shall also comply with provisions of and give all such notices to the local Governing Body, Police and other relevant Authorities as may be required by the Law.

127. The Contractor shall obtain independent License under the Contract Labour (Regulations and Abolition) Act, 1970 for engaging contract labour as required from the concerned Authorities based on the certificate (Form- V) issued by the Principal Employer/Customer.

128. The contractor shall pay and bear all taxes, fees, license charges, Cess, duties, deposits, tolls, royalties, commission or other charges which may be leviable on account of his operations in executing the contract.

129. It is the sole responsibility of the lead contractor to insure his materials, equipments, workmen, etc. against accidents and injury while at work and to pay compensation, if any, to workmen as per Workmen"s compensation Act. The work will be carried out in a protected area and all the rules and regulations of the client / BHEL in the area of project which are in force from time to time will have to be followed by the contractor.

130. Contractor may also be required to comply with provisions of ESI Act in vogue if applicable and submit evidence to BHEL.

131. In case of „Unsatisfactory performance" for a continuous period of three or more months for a package or packages, BHEL has the right to get the balance works executed at the risk and cost of the contractor.

132. In all matters of dispute, the decision of General Manager (Stationed at Bhandara), BHEL, Tiruchirappalli – 620 014 is final and binding on the successful tenderer.

133. Any claim or dispute arising from the tender stage, till / after completion of the work under the terms and conditions stipulated in the tender document / contract agreement shall only be enforced or settled in the courts at Tiruchirappalli, TamilNadu only.

CONSORTIUM AGREEMENT

(To be executed on Rs. 50/- Non – Judicial Stamp Paper)

THIS AGREEMENT is made and executed on this _____ day of _____, by and between (1) M/s _____ , (The First Party, i.e, the Bidder) a company incorporated under the Company's Act 1956, having its registered office at _____(herein after called the "Bidder", which expression shall include its' successors, administrators, executors and permitted assigns) and (2) M/s _____, (The Second Party, i.e, the associates), a company incorporated under the Company's Act 1956, having its registered office at _____ (herein after called the "Associates", which expression shall include its' successors, administrators, executors and permitted assigns).

WHEAEAS the Owner, Bharat Heavy Electricals Ltd, a Government of India Undertaking, proposes to issue / issued an NIT (herein after referred to as the said NIT) inviting bids from the individual Bidders for undertaking the work of _____, at _____ (herein after referred to as the said works).

WHEREAS the said NIT enables submission of a bid by a Consortium subject to fulfillment of the stipulations specified in the said NIT.

AND WHEREAS M/s _____ (The First Party, i.e, the Bidder) will submit its proposal in response to the aforesaid invitation to bid by the Owner for _____ as detailed in the Bid doc. no. < TENDER REF---->

AND WHEREAS M/s _____ (The First Party, i.e the Bidder) itself is meeting all the qualifying requirements except the qualifying requirements of _____ (as detailed in the NIT) and in order to fully meet the qualifying requirements of NIT, this tie-up agreement is being entered into with M/s _____ (The Second Party, the Associates), who fully meet the balance part of the said works (_____).

WHEREAS the First Party and the Second Party are contractors engaged in the business of carrying out various items of works.

WHEREAS the two parties have agreed to constitute themselves into a consortium for the purpose of carrying out the said works, and that the consortium will be continued till the completion of the works in all respects.

WHEREAS the parties have agreed to certain terms and conditions in this regard:

NOW THEREFORE THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. First and Second parties hereby constitute themselves into a Consortium for the purpose of bidding and undertaking the said works pursuant to the said NIT as hereinafter stated.

2. The First Party will be the leader (Lead Partner) and will be responsible for the entire works.

3. The First Party shall undertake the following part(s) of work detailed in the NIT namely _____

4. The Second Party shall undertake the following part(s) of work detailed in the said NIT namely _____

5. The parties hereby declare and confirm that each of them will fulfill the required minimum qualifying requirements as prescribed in the said NIT for the works agreed to be undertaken by them as stated here-in-above.

6. It is also agreed between the parties hereto that all of them shall be individually and severally responsible for the completion of the said works as per the schedule. Further, if the Employer / Owner sustains any loss or damage on account of any breach of the Contracts, we the, consortium partners individually and severally undertake to promptly indemnify and pay such losses / damages caused to the Employer/Owner on its written demand without any demur, reservation, contest or protest in any manner whatsoever.

7. The parties hereby agree and undertake that they shall provide adequate finances, suitable Tools, Plants, Tractors, Trailers, other transportation equipment, other Tools & Plants, Measuring & Monitoring Equipments (MMEs), Men and Machinery etc. for the proper and effective execution of the works to be undertaken by them as specified here-in-above.

8. It is agreed interse between the parties hereto that all the consequences liabilities etc., arising out of any default in the due execution of the said works shall be borne by the party in default, that is by party in whose area of works default has occurred, provided however, so far as M/s Bharat Heavy Electricals Limited is concerned, all the parties shall be liable jointly and severally.

IN WITNESS HEREOF the parties above named have signed this agreement on the day month and year first above written at _____(Place) .

WITNESS For

1. NAME (FIRST PARTY)
2. OFFICIAL ADDRESS

WITNESS For

1. NAME (SECOND PARTY)
2. OFFICIAL ADDRESS

[The successful bidder shall have to execute the “JOINT DEED OF UNDERTAKING “in the format to be made available by BHEL at the time of awarding].

(TO BE STAMPED IN ACCODANCE WITH STAMP ACT)

BANK GUARANTEE FOR SECURITY DEPOSIT (PROFORMA)

In consideration of the Bharat Heavy Electricals Limited, having its registered office at BHEL House, Siri Fort, New Delhi – 110 049 the concerned division being (indicate name of the concerned division of BHEL) (hereinafter called BHEL). ……

having agreed to exempt …… (hereinafter called "the said Contractor(s)" from the demand, under terms and conditions of agreement dated …….. made between BHEL and …… for ……. (hereinafter called "the said Agreement) of security deposit for the due fulfillment by said contractors of the terms and condition contained in the said agreement, on production of bank guarantee for Rs. ……

(Rupees …… only)

1. We …… (hereinafter referred to as "the Bank") at the request of (indicate the name of Bank)

   contractor(s) do hereby undertake to pay to BHEL an amount not exceeding Rs. ……. against any loss or damage caused to or suffered or would be caused to or suffered by BHEL, by reason of any breach by the said contractor(s) of any of the terms or conditions contained in the said Agreement.

2. We …… do hereby undertake to pay the
   (indicate the name of Bank)
   amounts due and payable under this guarantee without any demur, merely on a demand from BHEL stating that the amount claimed is due by way of loss or damage caused to or would to or suffered by BHEL by reason of breach by the said contractor(s0 of any of the terms and conditions contained in the said Agreement or by reason of the contractor(s) failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, out liability under this guarantee shall be restricted to an amount not exceeding Rs……..

3. We ……..undertake to pay to BHEL any money so demanded not withstanding
   (indicate the name of Bank)
   any dispute or disputes raised by contractor (s) supplier(s) in any suit or processing pending before any court or tribunal relating thereto our liability under these presents being absolute and unequivocal. The payment so made by under this bond shall be valid discharge of our liability for payment thereunder and the contractor(s) shall have no claim against us for making such payment.

4. …… further agree that the guarantee herein
   (indicate the name of Bank)
   contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and the it shall continue to be enforceable till all the dues of BHEL under or by virtue of the said Agreement have been fully paid and its Agreement have been fully and properly carried out by the said contractor(s) and accordingly discharge this guarantee unless a demand or claim under this guarantee is made on us in writing on or before …… we shall be discharged form all liability under this guarantee thereafter.

i. We ……further agree with BHEL that BHEL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder, to vary any of the terms and conditions of the said Agreement or to extend tim of performance by the said contractor(s) from time to time or to postpone any time or from time to time any of the powers exercisable by the BHEL against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement

and we shall not be relieved from our liability by reasons of any such variation, of extension being granted to the said Contractor(s) or for any forbearance, act, or commission on the part of BHEL or any indulgence BHEL to the said Conference(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for its provisions, have effect of so relieving us.

ii. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s) / Supplier(s)

iii. We …… lastly undertake not to revoke this
(indicate the name of Bank)
guarantee during its currency except with the previous consent of BHEL in writing.

iv .Any claim or dispute arising under the terms of this document shall be enforced or settled in the courts in Tiruchirapalli located in Tamilnadu.

v. The address of BHEL of services, correspondence in respect of matters relating to this guarantee shall be :

5. The guarantor hereby declare that it has power to execute this guarantee and the executant has full powers to do so on its behalf under the proper authorities granted to him/them by the the guarantor.

6. We ……(indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing.

ADDRESS OF THE CONCERNED DIVISION OF BHEL.

Address of the Bank in full

Dated the …… Day of …… 19.

Pin Code :

Telegraphic Code : For ……
(Indicate the name of Bank)

Bank Phone No.
Bank e-mail ID
Bank FAX No

In witness whereof we……, (indicate the name of Bank) have hereunto setout Bank Seal the_____day _____month 20

Witness :

1.

2.

(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT AND THE EXPIRY DATE OF BG MUST BE AFTER 60 DAYS FROM THE DATE OF COMPLETION OF WARRANTY PERIOD)

PERFORMANCE BANK GUARANTEE

1. In accordance of M/s. Bharat Heavy Electricals Limited (A Government of India undertaking, a company incorporated under the Companies Act 1956 having its Registered Office at "BHEL House", SIRI Fort, New Delhi 110 049) through its High Pressure Boiler Plant Division located at Tiruverumbur, Tiruchirapalli- 620 014 (hereinafter called 'the Company') having entered into a contract with ……hereinafter called ' the said contractor ' which term includes 'suppliers' for the purpose of this Bond and under the terms and conditions of the contract No…… Dt …… Between BHEL, Trichy and as per the contract, the contractor / supplier is to furnish a performance Bank guarantee for Rs. …… for the due performance of the equipment to be supplied under the above referred contract and for the fulfillment of all the terms and conditions of the contract, We ……(indicate the name of the bank) (herein after referred to as the bank) at the request of …….. (Contractor(s)) do here by undertake to pay the company an amount not exceeding Rs…….against any loss or damage caused to or suffered or would be caused to or suffered by the company by reason of any breach by the said contractor (s) of any of the terms and conditions contained in the said agreement.

2. We ……(indicate the name of the bank with full address), do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of breach by the said Contractor(s) of any of the terms and conditions contained in the said Agreement or by the reason of the contractor(s) 'failure to perform' the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs._____.

3. We undertake to pay unconditionally to the Company any money so demanded notwithstanding any dispute(s) raised by the Contractor in any suit, or proceedings pending before any Court or Tribunal or Arbitration or before any other authority relating thereto our liability under this present being absolute and unequivocal. The payment under this guarantee would not wait till the disputes have been decided by any Court or Tribunal or in the arbitration proceedings or by any other authority. The payment so made by us under this Bond shall be a valid discharge of liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We……(indicate the name of Bank), further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till_____Office / Department/ Division of the Company certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. (I) Unless a demand or claim under this guarantee is made on us in writing on or before the _____we shall be discharged from all the liability under this guarantee thereafter. But where such claim or demand has been preferred by the Company with the Bank before the expiry of the said date, the claim shall be enforceable notwithstanding the fact that the said enforcement is effected after the said date.

(ii) For the purpose of this clause, any letter making demand on the Bank by M/s. BHEL dispatched by Registered Post with Ack.Due or by Telegram or by any Electronic media addressed to the above mentioned address of the Bank shall be deemed to be the claim / demand in writing referred to above irrespective of the fact as to whether and when the said letter reaches the Bank, as also any letter containing the said demand or claim is lodged with the bank personally.

6. We ……..(indicate the name of Bank), further agree with the company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said Contractor(s) or for any forbearence, act or omission on the part of the company or any indulgence by the company to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating would, but for this provision, have effect of not so relieving us.

7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

8. It shall not be necessary for the company to proceed against the contractor before proceeding against the guarantor-bank and the guarantee herein contained shall be enforceable against them notwithstanding any security, which the company may have obtained or obtain from the Contractor shall, at the time when proceedings are taken against the guarantor hereunder be outstanding or unrealised.

9. Any claim or dispute arising under the terms of this document shall only be enforced or settled in the Courts at Tiruchirapalli.

10. The guarantor hereby declare that it has power to execute this guarantee and the executant has full powers to do so on its behalf under the proper authorities granted to him/them by the guarantor.

11. We ……(indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing.

In witness whereof we……., (indicate the name of Bank) have hereunto setout Bank Seal the_____day _____month 200

BANK E-MAIL ID:
BANK PHONE NO.
BANK FAX NO:

(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT)

BHARAT HEAVY ELECTRICALS LIMITED

DIVISION ----------

HYPOTHECATION DEED FOR SECURED PAYMENTS

THIS INDENTURE made this _____ day of _____ Two thousand and _____ between M/s. _____ (hereinafter called the 'Contractor' which expression shall, where the context so admits or implies, be deemed to include their executors, administrators, legal heirs and assigns) of the ONE PART and Bharat Heavy Electricals Limited (a Government of India Undertaking) a Company having its registered office at BHEL House, Siri Fort, New Delhi - 110049 through its Unit_____ (here-in-after called 'The Company', which expression shall, where the context so admits or implies, be deemed to include its successors in office and assigns) of the OTHER PART.

WHEREAS by a Contract / Work Order No. _____ dated _____ issued by the Company which has been accepted by the contractor (here-in-after called "The said Agreement") the Contractor has interalia agreed to execute and perform _____

(Nature of job to be mentioned here)

AND WHEREAS the Contractor has applied to the Company that he may be allowed payment on the security of materials absolutely belonging to him and brought by him to the site of the works, the subject of the said agreement for use, in the construction / execution of such of the works as he has undertaken to execute at rates fixed for the finished work (inclusive of the cost of materials and labour and other charges)

AND WHEREAS the Company has agreed to make payment to the Contractor a sum of Rs._____(Rupees _____) on the security of materials, the quantities and other particulars of which are detailed in the Running Account Bill for the said works signed by the Contractor on the _____ and the Company has reserved to itself the option of making any further payment or payment on the security of other materials brought by the Contractor to the site of said works.

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* 1. For use in cases in which the contract is for finished work and the contractor has entered into an agreement for the execution of a certain specified quantity of work in a given time.

2. To be executed on non-judicial stamp paper of appropriate value in accordance with the Stamp Act as applicable at the place of execution.

NOW THIS INDENTURE WITNESSETH that in pursuance of the said Agreement and in consideration of the sum of Rs. _____ (Rupees _____) on or before the execution of these presents paid to the Contractor by the Company (the receipt where of the contractor doth hereby acknowledge) and of such further payment (if any) as may be made to him as aforesaid the Contractor doth hereby covenant and agree with the Company and declare as follows:

1. That the sum of Rs._____ (Rupees _____) so paid, by the Company to the Contractor as aforesaid and all or any further sum or sums being paid as aforesaid shall be employed by the Contractor in or towards the execution of the said works and for no other purpose whatsoever.

2. That the materials detailed in the said Running Account Bill which have been offered to and accepted by the Company as Security are absolutely the Contractor's own property and free from encumbrances of any kind. The Contractor will not make any application for or receive any payment on the security of materials which are not absolutely his own property and free from encumbrances of any kind. The Contractor agrees to indemnify and keep the Company indemnified against all claims and proceedings with respect to any materials in respect of which payment has been made to him as aforesaid. If any proceeding is taken or pending against the contractor, intimation and particulars thereof shall be sent to the Company forthwith and no such proceeding(s) shall be compromised save with the written consent of the Company. The Contractor shall take all effective steps in the defence of such proceedings and if so required by the Company engage counsel of their choice at the cost of the Contractor.

3. That the materials detailed in the said Running Account Bill and all other materials on the security of which any further payment or payment as may hereafter be made as aforesaid (hereinafter called 'THE Said Materials') shall be used by the Contractor, solely in the execution of the said works in accordance with the directions of the Company's official (hereinafter called the "EXECUTIVE") nominated by the Company from time to time as per the terms of the said Agreement. Such direction shall not however relieve the contractor of his obligation under the Agreement.

4. That the Contractor shall make at his own cost all necessary and adequate arrangements for the proper watch, safe custody and protection against all risks of the said Materials and that until used in construction as aforesaid the said materials shall remain at the site of the said works in the Contractor's custody and on his own responsibility and shall at all times be open to inspection by the Company's Executive or any official authorised by him. In the event of the said materials or any part thereof being stolen, or otherwise lost, destroyed or damaged or becoming deteriorated in a greater degree than is due to reasonable use and wear thereof the Contractor will forthwith replace the same at his cost with other materials of like quality or repair and make good the same if so required by the Company's Executive or such official.

   The Contractor will at all times during the continuance of this security at his own expense insure and keep insured the said materials in the name of the Company and with an Insurance Company acceptable to the Company.

5. That the said materials shall not on any account be removed from the site of the works except with the written permission of the Company's Executive or an official authorized by him in that behalf.

6. That the payment shall be repayable in full before or at the time the contractor receives payment from the Company of the price payable to them for the said works under the terms and provisions of the said Agreement. Provided that if in the opinion of the Company any intermediate payments are to be made to the Contractor on account of work done, then on the occasion of each such payment, the Company will be at liberty to make recovery from the Contractors' bill for such payment by deducting therefrom the value of the said materials then actually used in the construction / execution and in respect of which recovery has not been made previously, the value for this purpose being determined in respect of each description of materials at the rates at which the payment has been made under these presents were calculated.

7. That if the Contractor shall at any time make any default in the performance or observance of the terms and provisions of the said Agreement or of these presents, the total amount of payment or payments that may still be owing to the Company shall immediately on the happening of such default be repayable by the Contractor to the Company together with interest thereon @ _____from the date or respective dates of such payment or payments to the date of repayment and with all costs, charges, damages and expenses incurred by the Company in or for the recovery thereof or the enforcement of this security or otherwise by reasons of the default of the Contractor and the Contractor hereby covenants and agrees with the Company to repay and pay the same respectively to them accordingly.

8. That the Contractor hereby hypothecates and charges by way of all the said Materials with the clear Intent that the said Materials shall remain and form as Security for the repayment to the Company of the said sum of Rs. _____ (Rupees _____) and any further sum or sums paid as aforesaid and all costs, charges, damages and expenses payable under these presents provided always and it is hereby agreed and declared that notwithstanding anything in the said Agreement and without prejudice to the powers contained therein if and whenever the covenant for payment, and repayment hereinbefore contained shall become enforceable and the money owing shall not have been paid or recovered in accordance therewith, the Company may at anytime thereafter adopt all, or any of the following courses as it may deem fit and proper.

   a) Seize and utilize the said materials or any part thereof in the completion of said works on behalf of the Contractor in accordance with the provisions in that behalf contained in the said Agreement debiting the Contractor with the actual cost of effecting such completion and the amount due in respect of payment under these presents and crediting the Contractor with the value of work done as if they had carried it out in accordance with the said Agreement and at the rates thereby provided, if the balance is against the Contractor, he is to pay the same to the Company on demand.

   b) Remove and sell by public auction the seized materials or any part thereof and out of the money arising from these sales retain all the sums aforesaid repayable or payable to the Company under these presents including costs and expenses incurred in conducting such sale, and pay over the surplus (if any) to the Contractor.

   c) Deduct all or any part of the moneys owing to the Company out of the security deposit or any sums due to the Contractor under the said Agreement.

9. That except in the event of such default on the part of the Contractor as aforesaid, interest on the said payment shall not be payable. In the event of default the Contractor shall be liable to pay interest @ ____per annum.

10. That in the event of any conflict between the provisions of these presents and the said Agreement, the provisions of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents the settlement of which has not been hereinbefore expressly provided for the same shall be referred to the arbitration by the _____ _____ (Designation of the Head of the Unit to be indicated here)

of the Company or by a person appointed by him on his behalf, whose decision shall be final and binding on both parties and the provisions of the Arbitration & Reconciliation Act,1996 for the time being in force shall apply to any such reference. The Arbitrator shall give reasons for the award.

IN WITNESS WHEREOF the said contractor and Shri_____ on behalf of the Company have hereunto set their respective hands the day and year first above written.

Signature & Seal	For and behalf of Bharat Heavy Electricals Limited
In the presence of:	In the presence of:
Witness:	**Witness:**
Signature : Name: Occupation: Address:	Signature: Name: Occupation: Address:

The Bank Guarantee bonds (BG) are to be submitted on non-judicial stamp paper of Rs. 100/- and should be only from any one of the below mentioned Banks in India.

LIST OF CONSORTIUM BANKS IN INDIA

(as on 15.12.2011)

List of Consortium Bank			
	Nationalised Bank		**Nationalised Bank**
1	Allahabad bank	19	Vijaya Bank
2	Andhra bank		**Public Sector Banks**
3	Bank of Baroda	20	IDBI
4	Canara Bank		**Foreign bank**
5	Corporation bank	21	CITI Bank N.A
6	Central bank	22	Deutsche Bank AG
7	Indian Bank	23	The Hongkong and Shanghai Banking Corporation Limited
8	Indian Oversea Bank	24	Standard Chartered Bank
9	Oriental bank of Commerce	25	The Royal Bank of Scotland N.V.
10	Punjab National Bank	26	J P Morgan
11	Punjab & Sindh Bank		**Private bank**
12	State Bank of India	27	Axis Bank
13	State Bank of Hyderabad	28	The Federal Bank Limited
14	Syndicate Bank	29	HDFC
15	State Bank of Travancore	30	Kotak Mahindra Bank
16	UCO Bank	31	ICICI
17	Union Bank of India	32	Indusind Bank
18	United Bank of India	33	Yes Bank

(1) It should be typed in the Rs. 100 value of stamp paper.

(2) It should be signed by TWO bank officials with Rubber stamp containing names & employee numbers of bank officials.

(3) It should be submitted with bank covering letter with sign and seal of the bank official.

INTEGRITY PACT

(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT)

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi – 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

And

_____,
(description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____ _____ _____ _____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s). In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.of 2 7

Section 1 – Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in of 3 7 order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidders(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines for Suspension of Business Dealings with Suppliers/ Contractors" framed by the Principal. of 4 7

Section 4 – Compensation for Damages

4.1 If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process. 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

6.1 The Bidder(s)/ Contractor(s) undertake(s) to demand from his sub-contractors a commitment consistent with this Integrity Pact. This commitment shall be taken only from those sub-contractors whose contract value is more than 20% of Bidder's/ Contractor's contract value with the Principal.

6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.of 5 7

Section 7 – Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 –Independent External Monitor(s)

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or of 6 7 take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

9.1 This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded. 9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL. of 7 7

Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

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For & On behalf of the Principal Contractor (Office Seal)	For & On behalf of the Bidder/ (Office Seal)
Place----------	
Date----------	
Witness: _____ (Name & Address) _____ _____	Witness: _____ (Name & Address)_____ _____

REVERSE AUCTION

BHEL reserves the right to go for a Reverse Auction (RA) instead of Opening the submitted sealed bid, which will be decided after technical evaluation. Information and general terms and conditions governing RA are given below.

GENERAL TERMS AND CONDITIONS OF RA

Against this tender for the subject work / system with detailed scope of work as per tender specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING ON INTERNET.

- For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
- BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
- BHEL will inform the vendor in writing in case of reverse auction, the details of Service Provider to enable them to contact & get trained.
- Reverse Auction rules like event date, time, Start price, bid decrement, extensions etc. also will be communicated through service provider for compliance.
- Vendors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of Reverse auction. Without this, the vendor will not be eligible to Participate in the event.
- Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
- Bidders shall be required to read the "Terms and Conditions" section of the auctions site of service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the 'Business Rules of Reverse Auction', which will be communicated before the Reverse Auction.
- Vendors have to fax / e-mail the compliance form in the prescribed format (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
- Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit 'online sealed bid' in the Reverse Auction. Non-submission of 'online sealed bid' by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.
- Only those vendors, who participate in the Online Initial Sealed Bid, will be eligible to participate in the subsequent Online English Reverse Auction.
- The H1 bidder (whose quote is highest in the online sealed bid) will not be allowed to participate in further RA process.

New Taxes / Levies

- In case the Government imposes any new levy / tax on the output service / goods / work after award of the contract, the same shall be reimbursed by BHEL at actuals. In case any new tax / levy / duty etc. becomes applicable after the date of Bidder‟s offer, the Bidder / Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of Price Bid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer as stipulated in the tender document.

- Quoted rate shall be firm throughout the contract executing period of **10 months** from the date of commencement of the work

- BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Taxes and Duties, Freight charges, Insurance and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the vendor to enable them to fill-in the price and keep it ready for keying in during the Auction.

  The rate offered is for finished items of works and shall provide for the complete cost towards fuel, tools, tackles, plant & machinery, temporary works, labour, materials, levies, taxes, transport, lay-out, repairs, rectifications, maintenance till handing over, supervision, labour colonies, establishment, services, revenue expenses, overheads, profits & all other incidentals including insurance coverage for the total cost of the entire project works as per the scope of work detailed in this tender document etc., complete.

  The rate quoted shall not include service tax and BOCW Cess. However the service tax as applicable for this contract work and the same can be claimed from BHEL along with their monthly bills for further payment to be made to the authorities concerned. The service tax applicable for this works contract is 4.944% at present and you are requested to furnish the tax details applicable to your firm. This is applicable for Package – I only. For packages II, III, IV Service Tax @ 12.36% is applicable for erection and commission portion for supply items in packages II, III & IV the rate quoted shall include packing and forwarding charges, freight charges, insurances and all taxes like octroi, VAT / CST, Excise Duty, etc. However the tenderer has to submit the service tax structure of applicability to their firm nature to arrive at the total cost to BHEL based on which the final award of work will be done. The contractor has to submit the payment challan as a documentary proof of having paid the service tax for the previous bill for which he has received the service tax payment along with the subsequent bill for which payment has to be processed.

  The successful tenderer should remit applicable cess as per Building and Other Construction Workers Act 1996 as applicable to the authorities (Maharashtra Government) concerned from time to time. The same can be reimbursed from BHEL on production of valid documentary proof for having paid the applicable cess of the value of work done to the authorities concerned. As soon as the BHEL – PEFP Factory Registration obtained, the BOCW Act will not be applicable.

- Reverse auction will be conducted on scheduled date & time.

- If the bidder or any of his representatives are found to be involved in Price manipulation / cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per BHEL guidelines, shall be initiated by BHEL and the results of the RA scrapped / aborted.

- The bidder shall not divulge either his bids or any other exclusive details of BHEL to any other party.

- At the end of Reverse Auction event, the lowest bidder value will be known on the network.

- **The reverse auction will be treated as closed only when the bidding process gets closed in all respects for the item listed in the tender**.

- The lowest bidder has to fax / e-mail the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider within 24 hours of action without fail.

- The tenderer who has won the bid in the RA is required to submit this price breakup containing rates for all the items given in template shall be typed in their letter head duly signed by the L1 agency and stamped with company seal within 24 hours after successful winning in the reverse auction.

- The lowest bidder has to submit the price break up matching the quoted value

- Any variation between the on-line bid rate quoted and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.

- In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL's standard practice.

- BHEL reserves the right to negotiate if need be, with the "L1" vendor of the Reverse Auction.

- **In case of awarding the works contract, the same will be awarded to a single tenderer only based on the L1 total cost of the Reverse Auction final bidding which is inclusive of service tax and other taxes.**

221-038

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Unit : TIRUVERUMBUR, BOILER PROJECT, P.O.
TIRUCHIRAPALLI - 620 014.

CIVIL ENGINEERING DEPARTMENT

NOTICE INVITING TENDER

01. Name of Work :

Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.

02.	Estimated Cost	:	------
03.	Earnest Money Deposit	:	**Rs.2,00,000/-**
04.	Completion Time	:	**TEN (10) Months** (From the date of commencement of the work which will be reckoned from the date of handing over of the site to the Contractor)
05.	Cost of Tender Document	:	**Rs.750/-** (Rs. 825/- if required by post) including Sales Tax in DD form This amount will not be refunded under any circumstances
06.	Last Date for Receipt of Tenders	:	**10.00 Hrs. on 21.02.2014**
07.	Date of Tender Opening	:	**10.15 Hrs. on 21.02.2014**
08.	Maintenance Period	:	12 (Twelve Months from the date of actual completion of the entire work and handing over to Bharat Heavy Electricals Limited)

Tender document contains totally 436 pages, Qualification Bid - 259 pages, Price Bid - 177 pages including Bill of Quantities and 3 pages as Drawings etc.

Issued to Messrs. / Thiru : ……

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ISSUING OFFICER

CONTRACTOR **ACCEPTING OFFICER**

INSTRUCTIONS TO TENDERERS

1. The tender is open to all Contractors. The Contractors not borne on the approved list of contractors of this Organisation must submit the following testimonials simultaneously with their tenders.

    i. A Certificate to establish that the tenderer is an independent contractor working on his own

    ii. At least two certificates from responsible Officers of Government of Firms of repute, regarding the tenderer's capacity to undertake and carryout the work tendered for or similar work satisfactorily.

NOTE :

a) Copies of testimonials unless attested by a Gazetted Officer will not be accepted

b) Non – Submission of the above testimonials simultaneously with the tenders may result in the tender being rejected

2. The tenders should be accompanied by a list of contracts already held by the contractor at the time of submitting the tender and giving the following particulars

a) Value of each contract

b) The balance value of work to be done on the same

3. The tenderer is advised to obtain the tender documents in person or by a messenger duly authorized to do so. The BHARAT HEAVY ELECTRICALS LIMITED will not under any circumstances accept responsibility for the non – receipt of delay in the receipt of the tender documents by the tender.

4. Rate for each item of the tender schedule should be quoted in FIGURES and in WORDS. In case of any difference in the rates quoted in figures and in words, the lower of the two rates will be taken as the tendered rate. Unit rate quoted shall be the basis for arriving the total value of the tender. The total amount for every item shall be arrived by multiplying the unit rate with the quantity indicated for that item. In case of any arithmetic deviation is noticed in the total amount, the same will be corrected and evaluated by taking unit rate as basis and multiplying with the quantity indicated.

5. Rate quoted shall include all royalties, terminal taxes, Octroi duties, Central or Provincial Excise Tax, Sales Tax and any other taxes leviable under the State or Central Government rules. The Bharat Heavy Electricals Ltd., will not entertain any claim whatever in this respect.

    The rate quoted shall not include service tax and BOCW Cess. However the service tax as applicable for this contract work and the same can be claimed from BHEL along with their monthly bills for further payment to be made to the authorities concerned. At present the rate of service tax is 4.944%. (Service tax + Edu. Cess+ Sec. Higher Edu. Cess). This is applicable for Package – I only. For packages II, III, IV Service Tax @ 12.36% is applicable for erection and commission portion for supply items in packages II, III & IV the rate quoted shall include packing and forwarding charges, freight charges, insurances and all taxes like octroi, VAT / CST, Excise Duty, etc. However the tenderer has to submit the service tax structure of applicability to their firm nature to arrive at the total cost to BHEL based on which the final award of work will be done. The contractor has to submit the payment challan as a documentary proof of having paid the service tax for the previous bill for which he has received the service tax payment along with the subsequent bill for which payment has to be processed.

    The successful tenderer should remit 1% cess as per Building and Other Construction Workers Act 1996 as applicable to the authorities concerned from time to time. The same can be reimbursed from BHEL on production of valid documentary proof for having paid the 1% cess of the value of work done to the authorities concerned. As soon as the BHEL – PEFP Factory Registration obtained, the BOCW Act will not be applicable.

6. Should a tender find discrepancies or omissions in the drawings or any of the tender documents or should be in doubt as to their meaning, he should at once address the authority inviting the tender for clarification. Every endeavor is made to avoid any error which can materially affect the basis of the tender but the successful tenderer shall take upon himself to provide for the risk of any error which may be subsequently by discovered and shall make no subsequent claim on account thereof.

7. Tenders submitted by post should be sent "Registered Post with Acknowledgement due". These should be posted with due allowance for any delay in postal delivery. Tenders received after the due date and time of opening, tenders are liable to be rejected.

8. Where the tender called for covers only the building work and excludes internal services such as sanitary and water supply installations, electrification etc., the building contractor will have to leave pockets, holes, etc., as required for other works and will have to phase his work to ensure smooth progress of the work of the other agencies also as directed by the Engineer – in – charge.

9. Where the tender schedule contains special items of work such special floor finishes, foam concrete for insulation, special water proofing treatment to roofs etc., it will be entirely at the discretion of the Project Authorities to allot these items of work to other contractors specialized in these works. In such cases, the main building Contractor will have to tender all necessary co-operation to the agencies involved so as to ensure the smooth progress of all work.

10. The contractor's responsibility under this contract shall commence form the date of receipt of the LOI by the tenderer. The scheduled period of completion for this work will be as mentioned in page No. **37**, and the Contractor will have to plan his work accordingly.

11. The maintenance period for this work is TWELVE (12) MONTHS.

12. **Earnest Money Deposit**:

Earnest Money is to be paid by each tenderer to ensure that the tenderer does not refuse to execute the work after it is awarded to him. Shall also be furnished in the form of Pay Order or Demand Draft in favour of BHEL, EMD in any other form will not be accepted. The rate of earnest money deposit shall be as under:

Works costing up to Rs. 2 lakhs	NIL
Works costing more than Rs.2 lakh and up to Rs. 5 lakhs	Rs. 10,000/-
Works costing more than Rs.5 lakhs and up to Rs.10 lakhs	Rs. 20,000/-
Works costing more than Rs.10 lakhs and up to Rs.20 lakhs	Rs. 40,000/-
Works costing more than Rs.20 lakhs and up to Rs.30 lakhs	Rs. 60,000/-
Works costing more than Rs.30 lakhs and up to Rs.50 lakhs	Rs. 1,00,000/-
Works costing more than Rs.50 lakhs and up to Rs.100 lakhs	Rs. 1,50,000/-
Works costing more than Rs.100 lakhs	Rs. 2,00,000/-

One time EMD will also be Rs.2 Lakh.

EMD by the Tenderer will be forfeited if,

a) After opening the tender, the tenderer revokes his tender within the validity period or increases his earlier quoted rates.

c) The tenderer does not commence the work within the period as per LOI / Contract. In case the LOI / contract is silent in this regard then within 15 days after award of contract.

c) EMD given by all unsuccessful tenderers shall be refunded normally within fifteen days of acceptance of award of work by the successful tenderer.

d) EMD shall not carry any interest.

13. Should a tenderer or a contractor on the list of approved Contractors have a relative, or in the case or a firm or Company of contractors any of its share-holders or shareholder's relative, employed in a gazette capacity in the Engineering Department of the Bharat Heavy Electricals Limited, the authority inviting tenders shall be informed of this fact at the time of submission of the tender, failing which tender, may be disqualified or if such fact subsequently comes to light, the contract may be rescinded in accordance with the relevant provisions in the General Conditions of Contract.

14. If tenderer expires after the submission of his tender or after the acceptance of his tender the BHEL may, at their discretion, cancels such tender. If a partner of a firm expires after submission of tender or after the acceptance of the Tender, BHEL may cancel such Tender at their discretion unless the firm retain its character.

15. The Bharat Heavy Electricals Limited will not be bound by any power of attorney granted by the tenderer or by changes in the composition of firm made subsequent to the execution of the contract. They may however dispatch such power of attorney and changes after obtaining proper legal advice the cost of which will be chargeable to the contract concerned.

16. If the tenderer deliberately gives wrong information in his tender or creates conditions favourable for the acceptance of his tender, the Bharat heavy Electricals Limited, reserves the right to reject such tender at any stage. Also BHEL reserves its right to finalize the contract through reverse auction for which only qualified tenderers will be provided with necessary documents containing reverse auction rules, terms and conditions for this purpose.

17. Words importing the singular number shall also be deemed to include the plural number and vice versa where the context so requires.

18. The expenses for completing and stamping the agreement shall be paid by the contractor.

19. The General and special conditions are complementary to each other and where they are conflict the Special Conditions shall prevail. In regard to matters not covered by the General and Special Conditions of Contract, those contained in the Tamil Nadu Building Practice Standard Specifications or other specifications approved by the Bharat Heavy Limited, Shall apply.

20. Tenderers shall not increase their quoted rate in case the Bharat Heavy Electricals Limited, negotiates for negotiation for reduction of rate. Such negotiation shall not amount to cancellation or withdrawal of the original offer and the rate originally quoted shall be binding on the tenderes for a period of three months from the date of opening of tenders.

21. Canvassing in any form in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection

22. All contractors will have to produce copy of Income tax Return for the last three years along with their tenders. Those Contractors whose income is not taxable will be required to give an affidavit of their income on the prescribed form.

23 TIME ALLOWED (Period of Contract)

The following programme should be strictly followed.

1	After necessary approval of design as mentioned in this document, the load details and HD bolt spacing of column foundation (pedestal) has to be issued	Within two weeks from the date of LOI
2	Design and issue of holding down bolts	Progressively from the completion of first month of issue of LOI to suit uninterrupted progress by Civil contractor
3	Design, fabrication and supply of PEB components including accessories.	Progressively within 12 weeks of approval of drawing.
4	Painting and erection of PEB including roofing, side cladding and all accessories as in scope	Progressively within 12 weeks of receipt of first consignment at site

TENDER NOTICE

NAME OF WORK: **Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.**

1. SEALED TENDERS for the above noted work are hereby invited from contractor experienced in works of similar kind and magnitude. Tenders will be received by DY GEN MANAGER / CIVIL / FACTORY (PLANNING & DESIGNS) Bharat Heavy Electricals Limited, Tiruchirappalli – 620 014. up to **10.00 Hrs** on **21.02.2014** and will be opened on the same day at **10.15** hrs. At the Office of the DY GEN MANAGER / CIVIL / FACTORY (PLANNING & DESIGNS) in the presence of such of those tenderers. Or their agents who may choose to attend.

2. TENDER FORMS and other particulars regarding the proposed work can be obtained on any working day from 8.00 A.M. to 4.30 P.M. up to **20.02.2014** on payment of the prescribed sum of **Rs.750/** - per set in person (Rs. 825/- if required by post) including Sales Tax in the form of Demand Draft Amount nor refundable..

3. TENDERS must be submitted in sealed covers and should be addressed to DY GEN MANAGER / CIVIL / FACTORY (PLANNING & DESIGNS) with full name and address of the tenderer and the name of work being noted on the cover

4. All entries in the tender documents should be in one ink. Erasers and over-writings are not permitted. All cancellations and insertions should be duly signed by the tenderer concerned.

5. TENDERERS should fill in all the required particulars in the blank spaces provided for this purpose in the tender documents and also sign each and every page of Tender Documents including the drawings attached there to before submitting their tender.

6. UNIT rate should be quoted in figures as well as in words with reference to each item and for all the items shown in the attached schedule. These rates shall be for the finished work in site. Amount of each item and the total page by page and also the grand total amount of the whole contract should be filled in by the tenderers. Unit rate quoted shall be the basis for arriving the total value of the tender. The total amount for every item shall be arrived by multiplying the unit rate with the quantity indicated for that item. In case of any deviation is noticed in the total amount, the same will be corrected and evaluated by taking unit rate as basis and multiplying with the quantity indicated.

7. QUANTITIES shown in the attached schedule are only approximate and are liable to variation without entitling the contractors to any variation in the Quoted rates till the total value of the Contract does not vary by more than 20% (twenty percent)

8. In quoting their rates, the tenderers are advised to take account all factors including any fluctuations in the market rates etc. No claim will be entertained on this account after acceptance of the tender or during the currency of the contract.

9. Before tendering, the tenderers are advised to inspect the site of work and its environments and be well acquainted with the actual working and other prevalent conditions position of materials and labour, General and Special Conditions of Contract. Instructions to tenders, drawings and Specifications and all other documents which form part of the Agreements to be entered into.

10. Quoted rate shall be firm throughout the contract period of **10 months** and no cost escalation is allowed on any account.

11. In the event of tender being submitted by firm the tender must be signed separately and legibly by each partner of member of the firm or in their absence, by the person holding the power of attorney on behalf of the firm concerned in the latter case a copy of the power of attorney duly attested by a Gazetted Officer must accompany the tender.

12. Every tender must be accompanied with EMD for the amount as specified in Page No. **37** in any of the form mentioned in Para 12 of the "Instruction to Tenderers". This Earnest Money will be refunded to the unsuccessful tenderers within fifteen days of finalisation of the award of work. In case of the successful tenderer, the Earnest Money will be retained as part of the Security Deposit for satisfactory completion of the work in accordance with Clause 16 of the General Conditions of Contract

NOTE: Cheques, Currency Notes and Money Orders will not be accepted in lieu of the deposit receipt referred to above

13. Security Deposit

13.1 Security Deposit should be collected from the successful tenderer.
The rate of Security Deposit will be as below:

Up to Rs. 10 lakhs	10%
Above Rs. 10 lakhs up to Rs.50 lakhs	Rs.1 lakh + 7.5% of the amount exceeding Rs. 10 lakhs.
Above Rs. 50 lakhs	Rs.4 lakhs + 5% of the amount exceeding Rs. 50 lakhs.

The security Deposit should be collected before start of the work from the contractor.

13.2 Security Deposit may be furnished in any one of the following forms

i) Cash (as permissible under the Income Tax Act)

ii) Pay Order, Demand Draft in favour of BHEL.

iii) Local cheques of scheduled banks, subject to realization.

iv) Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc.

(Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back).

v) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act subject to a maximum of 50% of the total security deposit value. The balance 50% has to be remitted either by cash or in the other form of security. The Bank Guarantee format should have the approval of BHEL.

vi) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act . The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.

vii) Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be collected before start of the work and the balance 50% may be recovered from the running bills.

viii) EMD of the successful tenderer shall be converted and adjusted against the security deposit.

ix) The security deposit shall not carry any interest.

NOTE: Acceptance of Security Deposit against Sl. No. (iv) and (vi) above will be subject to hypothecation or endorsement on the documents in favour of BHEL. However, BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

14. Unless the contractor whose tender is accepted signs the Contract Agreements and makes the necessary security deposit specified in Para 13 above within Seven days of the date of the order directing him to do so the amount of Earnest Money Deposit already deposited by him will be forfeited and acceptance of his tender withdrawn.

15. After tender opening if tenderer revokes his tender or increases his earlier quoted percentage rate or after acceptance of his tender does not commence the work in accordance with the instruction of the Engineer-in-charge, the Earnest Money deposited by him will be forfeited and acceptance of his tender withdrawn. If only a part of the work included in the tender had been awarded to the tenderer, the amount of Earnest Money to be forfeited will be based on the value of the contract so awarded.

16. The Bharat Heavy Electricals Limited reserved the right to reject any or all the received or accept any tender or part thereof without assigning any reason thereof. In the case acceptance of part of tender, time for completion may also be reduced to the extent considered appropriate by the Accepting Authority. Also BHEL reserves its right to finalize the contract through reverse auction for which only qualified tenderers will be provided with necessary documents containing reverse auction rules, terms and conditions for this purpose.

17. Conditional and Un-witnessed tenders, tender containing absurd rates and amounts tenders which are incomplete or otherwise considered defective and tenders not in accordance with the tender conditions laid down by the Accepting Officer are liable to be rejected.

18. Tenders not submitted on the prescribed form are liable to be rejected

19. The work must be completed within a period as mentioned in page No.**37**.

20. The Chairman / General Manger / Deputy General Manager / Deputy Manager / Senior Engineer shall be Accepting Officer, herein after referred to as such for the purpose of this contract.

21. This tender notice shall be deemed to form an integral part of the contract to be entered into for this work.

22. The tenderers are advised to go through the condition stipulated in Tender document & code of conduct for 'Health & Safety of Contract Labourer' in details. Any violation thereof will invite punitive action being taken against them. While quoting the rate all the above factors are to be taken into account.

23. The rates quoted in the tender shall remain valid for a period **SIX MONTHS** from the date of opening of tenders.

ISSUING OFFICER

MANDATORY COMMERCIAL ACCEPTANCE TERMS

Terms of Payment:

1) 75% progressive payment on receipt of sequential acceptable PEB components at site on pro-rata basis against approved BOQ with necessary documents as described in point No. 108 & 109 of preamble.
2) 15% on erection on pro rata basis of identified PEB components.
3) 10% on successful commissioning and handing over of the PEB against a performance bank guarantee valid up to the warranty period of one year.
4) No mobilization advance is entertained.

Corporate Guarantee:

The tenderer shall furnish Corporate Guarantee for 10 years in Non-judicial stamp paper of appropriate value against structural stability and roof leak proofness for all structures.

Nature of award of Contract:

Only an indivisible contract shall be executed including supply, erection and handing over. No other form of contract shall be entertained.

Material & QCP

Before commencing fabrication, the tenderer shall obtain BHEL's prior approval for the usage of material. The tenderer shall produce necessary documentation (material test reports). The material should be sourced from the under mentioned sources preferably.

Steel for Frames- **Essar Steel / Jindal / SAIL / ISPAT/ Tata / RINL**

Roof and wall cladding coils - As per the specification and strength requirements given in this tender documents.

The tenderer shall submit the proposed quality control procedure for fabrication and erection along with the tender document.

General:

The general approach and methodology proposed for carrying out the items covered in the Scope of work should be submitted, including such detailed information as deemed relevant. Apart from the above, contractor shall provide details and number of equipments, to be mobilized to complete the work as per specifications, in stipulated time schedule.

Detailed overall work programme and a bar chart indicating the duration and timing of all major activities showing the desired milestones.

List of codes of standards in addition to those mentioned in the specifications.

The tenderers shall submit the quality assurance plan duly signed by the corporate head or any other authorized person.

No information relating to financial terms of services should be included in the Qualification bid. Proposals are to be submitted to determine that the tenderer has a full comprehension of the work. Where a tenderer's technical submittal is found non-complaint with the requirement or work, it may be rejected. This process is to assure that only technically acceptable proposals are considered for the work.

SECTION A

1.1 INTERFACES:

The scope of work for the interfaces work under the purview of this contract are detailed below. The interfaces include but are not limited to:

a. Issue of loading details for foundation designer shall be furnished within two weeks from the date of LOI.

b. Design and Supply of holding down bolts to Civil Contractor in time for the timely and uninterrupted progress of pedestal casting.

c. Interfacing with Civil & Electrical Contractors.

1.1.1 The rates are inclusive of all cost but not limited to the cost such as for plants, Equipments, tools, all type of labours, supervision, all materials from the source of supplies as approved by Engineer in charge/Employer including all lead and lifts, transport, all temporary works, erection maintenance, contractors profits & establishments/overheads together with preparation of designs and drawings. All general risks, taxes, royalties, duties, CESS, OCTROI and other levies, insurance liabilities and all other obligations set out or implied in the contract for completion of work except otherwise specified in Bill of Quantities and preamble.

1.1.2 The Contractor shall plan his works keeping in view restriction of approach and availability of space and time.

1.2 DESIGN CRITERIA:

The shop drawings should cover all the items pertaining to all temporary works required for fabrication, shop assembling, transportation scheme for various structural elements, erection sequence, etc. The Contractor shall himself formulate a practical and viable scheme for fabrication of all structural members and launching scheme. The tenderer should, along with the tender specify the scheme that he proposes to adopt for carrying out all the works including fabricating &, transporting the same to site and Launching scheme.

1.3 REFERENCE TO THE STANDARD CODES OF PRACTICE:

1.3.1 The contractor shall make available at site all relevant Indian Standard Codes of practice as applicable and other relevant British / German /American Standards.

1.3.2 Wherever Indian Standards do not cover some particular aspects of design / construction, relevant British / German / American Standards will be referred to.

1.3.3 In case of discrepancy among Standard codes of practice TECHNICAL Specifications and provision in sub-clauses in this NIT, the order of precedence will be as below:

i. Provision in N.I.T.

ii. Technical Specifications

iii. IS 800 -2007

iv. Standard Codes of Practice

v. In case of discrepancy among Standard Codes of Practice, the decision of the Engineer in charge will be final.

1.4 FABRICATION DEPOT:

Contractor shall use his own premises / workshop for fabrication of structural steel work.

1.5 ASSOCIATED WORKS:

Works to be performed shall also include all general work preparatory to the fabrication of structural steel work, launching of steel structures during the works of any time necessary for the due and satisfactory construction completion and maintenance of the works to the intent and meaning of the drawings adopted and technical specifications, to best Engineering standards and orders that may be issued by the Engineer in charge from time to time, compliance by the agency with all Conditions of Contract, supply of all materials, apparatus, plants, equipment, transport, offices, stores, workshop, staff, labour and the provision of proper and sufficient protective works, temporary fencing, lighting and watching required for the safety of the public and protection of works on adjoining land, first-aid equipment, sanitary accommodation for the staff and workmen, effecting and maintenance of all insurances, the payment of all wages, salaries, contributions towards provident fund, ESI, fees, royalties, duties or the other charges arising out of the fabrication of works and the regular clearance of rubbish, clearing up, leaving the site perfect and tidy on completion.

1.6 PRELIMINARY DRAWINGS:

Preliminary drawings in tender documents represent Employer's proposal based on preliminary design. Detailed working drawings will be submitted by the contractor based on the approval of structural design by the Engineer in charge.

1.7 TIME SCHEDULE:

The agency shall submit with the tender "Time Schedule" for completion of various portions of works. This schedule is to be within the overall completion period of **10 Months** for the supply and erection of structural steel work. The detailed programme in the form of a quantified bar chart or CPM network shall include all activities from start to completion.

SECTION B

SCOPE OF WORK

1.0 GENERAL:

The scope of work for Pre-Engineered Steel Building System is as defined in the following sections under the contract which includes design of PEB and foundation HD bolt, manufacture, supply and erection of Structural Steel System, Metal Roof System, Wall System, Trims and Flashings, Turbo Ventilators and all accessories as required for the successful and satisfactory completion of the contract.

The scope of work comprises of but not limited to the following: -

DETAILED SCOPE OF WORK:

1.1. Building components

- Roof & Side sheeting
- Purlins, sag rods cleats, bolts and nuts
- Ridge ventilator of size 900 mm throat for the entire length
- Turbo Ventilators of required numbers as per the design
- 2 mm thick Polycarbonate sheet for day lighting for 5% on roof area
- Purlins spacing based on load and deflection limits,
- Provision in the column and crane girder for running water line, compressed air line, LPG line, DSL
- Steel Portal Frames with base plates arrangements including Crane leg, roof leg / stepped column,
- Rafter bracings, Column bracings - Diagonal rod / Angle Bracing
- Gable end sheeting, purlin, columns,
- FRP lined Gutters - calculation to be shown to justify the size,
- Down take pipes, calculation to be shown to justify the size,

- EOT Crane girders, legs connections, bolts to roof Leg and Crane leg,
- Semi gantry girders including brackets as shown in the drawing
- EOT crane rails CR80,semi-gantry crane rails R45, cup type rail clamp with accessories as per drawing.
- Buffer stop 4 nos. in each Bay
- Stair case monkey ladder to approach crane walkway and monkey ladders to roof as per drawing
- Crane walk way and Hand Rails on either sides with toe plate and 6mm chequered plates, on both sides of the bay.as per the drawing.
- Sliding doors 6 nos. 6mx6m,
- Framed openings (5.50 x 5.50M) for sliding doors
- Canopy for openings totally 7 Nos. of 7.5M length and 3m cantilever with ends closed.
- Louvers, Canopy for full length of the building, eaves strut as per drawing
- Foundation Bolts as per design.
- Connecting bolts (high strength),
- Base plates with Gussets for stiffening as per design.
- Flashing, trims, eave gutter & down spouts
- Fasteners: Mechanically galvanized Hex - washer head self-drilling fasteners with integral EPDM seals
- All primary members with factory applied one coat of zinc phosphate primer (1 x 40 µ) dft, two coats of red oxide zinc phosphate primer (1 x 40 µ) dft / one coat epoxy primer of 30 µ dft, Two site coats of epoxy finish paint (2 x 40 µ) dft
- Purlins and grits are to be pre-galvanized.
- Double side welding for built up members.

1.2. Testing of all materials and quality control as per quality plan.

1.3. Erection of all the components mentioned in the scope of work.

1.4. Load test on crane girders (after crane erection).

1.5. Lifeline arrangement in the rooftop for maintenance purpose to be provided.

1.6. Necessary cut out opening in the roof sheet shall be provided wherever furnace chimneys are to be placed

All aspects of quality assurance, including procurement & testing of materials and other components of the work, as specified or as directed:

a. Clearing of site and handing over of all the works, as directed,
b. Maintenance of the completed work during the **maintenance period of ONE YEAR.**
c. Submission of completion (i.e., 'as-built') drawings and other related documents as specified:

Any other requirement for the commissioning of the buildings in all respects in accordance with the provisions of the Contract and/or to ensure the structural stability and safety during and after construction.

1.7 All the civil works like foundation, wall construction, flooring, etc. are excluded from the scope of this contract work.

SECTION –C

BUILDING DESCRIPTION

The brief building description for all the seven bays are not limited to as given below:

	Bay A	Bays 1 - 5	Bay B
Bay width	30 M	30 M	30 M
Length	240 M c/c of column	234 M c/c of column	240 M c/c of column
Clear Height	12.50 M clear at Knee	12.50M clear at Knee	12.50M clear at Knee
EOT span	28.5m Rail c/c	28.5m Rail c/c	28.5m Rail c/c
Semi gantry Span	Nil	14.00 m Rail c/c	14.00 m Rail c/c
Roof slope	I in 10	I in 10	I in 10
Bay spacing	8 Bays @ 30 M	18 Bays@ 12M + 1 Bay @18.00 M	8 Bays @ 30 M
Roof & Side cladding	Silicon Modified Polyester paint coated high tensile standing seam profiled aluminium + zinc alloy coated sheets of yield strength of 345 Mpa sheets to make 0.58mm TCT for roof and 550 Mpa sheets of 0.50mm TCT for wall cladding as indicated in Section F.		
Framed openings	2Nos.– 6.0m x 6.0m	2 Nos. 6.0m x 6.0m	2 Nos. 6.0m x 6.0m
Canopies	3Nos. – 7.50M(L)x 3.0M projection	2Nos. – 7.50M(L)x 3.0M projection	2Nos. – 7.50M(L)x 3.0M projection
EOT	30 MT – 1 No + 20 MT – 1 No + 10 MT – 2 No	20 MT – 2 Nos + 10 MT – 1 No in Bay 1,3 &4, 20 MT – 2 Nos + 10 MT – 2 Nos in Bay 2, 30 MT – 1 No + 20 MT – 1 No + 10 MT – 1 No in Bay 5	20 MT - 2 No + 10 MT- 2 Nos + 30 MT – 1 No (Future Crane)
Semi gantry	Nil	5 MT – 2 Nos - full length in bay 3 & 4 (except gangway) and 5 MT – 2 Nos - between column D9 to D21 in bay 5	Nil
Sliding door	2 Nos.– 6 x 6 M matching exterior	2 Nos. 6 x 6 M matching exterior	2 Nos. 6 x 6 M matching exterior
Crane rail	Supply and fixing of ISCR80 rail with cup type rail clamps with required accessories for all cranes running on +9.00M elevation and R45 rail with cup type rail clamps with required accessories for all semi gantry cranes running on +5.63M elevation by PEB manufacturer.		
Crane girders, semi-gantry crane girders	All crane girders are made up of plate formed sections only. Splice plate to be provided between crane girders. Atleast 4 bolts are to be provided to connect one end of crane girder to column. Auxiliary girder, surge lacings, diaphragm connections, buffer stop are to be provided		
Stair cases, ladders and lifeline system	Approach staircases to crane walkway and monkey ladders to reach roof are to be provided as per drawing. Suitable lifeline/safety system in the roof area are to be provided for maintenance.		
Crane columns & roof legs	By PEB manufacturer		

Ridge ventilator	900 mm dia. throat for the entire length		
Turbo ventilator	Atleast 160 Nos of 900mm dia. are to be provided for the entire roof area		
Eaves Gutter & Down take pipes	Eaves gutter and valley gutter (minimum 6mm thick MS plate) with 3mm thick fibre glass reinforcement with UV resistant polyurethane compound lining. Down take pipes are of same material as that of roof sheet.		
Louver	Silicon Modified Polyester paint coated high tensile standing seam profiled aluminium + zinc alloy coated sheets of yield strength of 550 Mpa sheets of 0.50mm TCT for wall cladding as indicated in Section F for full length as per GA drawing.		
Provision for future expansion	Yes	Yes	Yes
Expansion Joint	As per IS 800:2007		
Utilities	Necessary provision in the column and crane girder for running water line, compressed air line, LPG line, DSL etc.		

SECTION – D

DESIGN SPECIFICATIONS

1.0 **GENERAL :** The scope of designs comprises of but not limited to the following: -

The design considerations given hereunder establish the minimum basic requirements for the design. However, structure shall be designed for the satisfactory performance of the functions for which the same is to be constructed.

1.1 Whenever any reference to IS Code is made, the same shall be taken as the latest revision (with all amendments issued thereto) on the notified date of submission of tender. **For this work IS 800-**2007 (or Latest Revision) / relevant international code is **to be followed.**

1.2 Apart from the IS Codes mentioned in particular for wind, live and earthquake loads in the various clauses of this specifications, all other relevant codes such as American standards (AISC, MBMA, AISI & AWS specifications) related to the specific job under consideration and / or referred to in the above mentioned codes may be followed wherever applicable, if the specifications for the same are not available in the relevant IS codes.

1.3 In case of any variation / contradiction between the provisions of Codes and the specifications given hereunder, the provisions given in these specifications shall be followed.

2.0 **LOADING**

2.1 **General**

The structure shall be designed for all loads, including the weight of structure, live load, wind or earthquake. Due consideration shall be given to loading during the construction/erection phase and accounted for in the design. The design to be cater for the proposed future expansion also.

2.2 **Design Loads**:

2.2.1 **Dead Load :**

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

2.2.2 **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.

2.2.3 **Wind Load** :

Wind loads shall be as per IS : 875.

The basic wind speed of the site is taken as 44 m/s

Values of coefficients K_1, K_2, K_3 shall be as K_1 = 1.0 for permanent structures. K_3 = 1.0, K_2 shall be taken for relevant class of the structure with Category 2 terrain with respect to the actual height of the structure. **The design life span of all structures shall be taken as 50 years.**

Internal pressure coefficient= +/-0.5

2.2.4 Earthquake Load :

Seismic forces shall be as per IS:1893, ZONE II.

Importance Factor, I = 1.5

Response reduction Factor, R = 4

Damping factor = 2%

Average response acceleration coefficient Sa / g will be obtained from figure 2 of IS1893 (Part I), considering medium soil and approximate fundamental natural period calculated as per clause 7.6 of IS 1893

3.0 **VERTICAL DEFLECTION AND HORIZONTAL SWAY LIMITS :**

a) Limiting Deflection : The limiting permissible vertical deflection for structural steel members shall be as specified below :

- Structures / structural components :as per IS 800 2007 code.

b) The limiting permissible horizontal deflection for as per IS 800 2007 code where `h' is height of building at eaves,

4.0. **FRAME ANALYSIS :**

The frame shall be analyzed with fixed base, suitable for future expansion along end walls, as given in the general arrangement drawings(1-TP-CEG-01073 Rev0) and specifications.

5.0 **DESIGN CHECK** :

The design calculation should be checked and vetted by nearby reputed institution like IIT/ IISc / SERC at the successful tenderer's cost. BHEL may cross check the same set of document with another third party institution of their choice and get the approval. Comments/corrections by the third party consultant should be incorporated in the drawing and executed at site at no extra cost to BHEL. It shall be the responsibility of the successful tenderer to ensure structural stability of the building. The total design of the building shall be done to meet the design parameters given in design or technical specifications.

01. Loads as per clause 3.2 of IS-800 -2007 , IS-875, IS 1893

Design as per IS-800-2007.

Loading combinations as per Clause 3.5 and Table-4 IS-800-2007.

Deflection both lateral & Vertical as per Table 6 – IS-800-2007.

Design should be based on Limit State method.

02. Both Limit States of strength as well as serviceability should satisfy the performance requirements refer Clause 5.2.2.1 and 5.2.2.2 of IS-800-2007.

Factors governing the ultimate strength as per clause 5.5. of IS-800-2007 should be ensured.

Limit states of serviceability as per clause 5.6 of IS-800-2007 should be ensured.

Method of analysis may any one of the method prescribed as per clause 4.1 of IS-800-2007.

Notional Horizontal loads as applicable as per clause 4.3.6 should be applied on the structure and checked.

If Elastic analysis is carried out it should be based on 4.4 of IS-800-2007.

Effective length of compression member should be as per clause 7.2 and maximum values of effective slenderness ratios should be as per Table 3 of IS-800-2007.

Limiting width to thickness ratio of elements may be as per Table 2 0f IS-800-2007.

Transfer of Horizontal forces due to wind and EQ to the foundation should be ensured by proper means. Uplift due to wind and EQ should also be checked for beams and columns, purlins.

Columns should be treated as fixed at foundation level.

Erection loads to be taken in design.

For bolts nuts and washers reference to be made to clause 2.4 of IS-800-2007.

Effective sectional area should be as per clause 7.3.2.

Gusseted column bases should be as per clause 7.4.2.

In the design laterally supported beams reference should be made to clause 8.3.4

Combined stresses refer clause 9.3 of IS-800-2007.

The Design of Crane Girder should account for the following:

01. Impact Factor 25%.
02. Limiting deflection as per IS-800-2007.
03. Minimum thickness of web refer clause 8.6.
04. Crane Girder to be designed for Tandem operation
05. Buffer stopper to be designed for Energy absorption as per clause 6.1.4 of IS875 part 5.
06. Knee braces from the crane girder to the crane run way columns are not recommended.
07. Crane runway girders are to be designed as simply supported.
08. Crane runway girders shall be designed, detailed and fabricated to resist fatigue damage
09. Crane runway girders have to be stiffened by means of a bracing system connected to adjacent crane girders or stiffening truss in both top and bottom flanges. Wherever stiffening girders are provided, they must be connected with bolted connection only to facilitate future expansion.
10. Intermediate stiffeners shall be welded to the top flange with a full penetration (beveled) weld and should be stopped short of bottom flange. The end bearing stiffness should be welded to the top and bottom flange with a full penetration (beveled) weld. Alternatively end bearing stiffeners may be welded to the bottom flange to obtain full bearing.
11. All welds between stiffeners and web plates or flange plates are to be continuous weld.
12. Brackets should not be used to support crane runway girders.
13. Web plate and Flange plate splice welds shall be 100% inspected by radiographic or ultrasonic inspection. Where flange to web welds are complete penetration welds they should be 100% inspected by ultrasonic inspection. Where flange to web welds are fillet welds they should be 100% inspected by liquid penetration or magnetic particle inspection.
14. In the design of crane girder web, it is to be noted that tension field design introduced into the AISC specification in 1961 is not permitted for crane runway girders.

Design and detailing for earthquake loads should be as per section 12 of IS800:2007.
For Fatigue resistance design for Crane graders etc. refer section 13 of IS800:2007.
For durability refer section 15 of IS800:2007.

Please refer the following drawings for the loading details for EOT and Semi gantry cranes.

6.0 APPLICABE CODES:

IS - 875 PART 1 TO 5,

IS 1893- 2002 ,

IS 800-2007,

IS 801 -1975 ,

IS 807 - 2006

7.0 **DETAILED ENGINEERING:**

7.1 The contractor shall design the structures and prepare all the required drawings needed for correct and accurate construction. The design shall be strictly in accordance with the "Design Specifications" and building description given elsewhere in the tender .

7.2 The contractor shall submit Design basis and General Arrangement(G.A) of the structure along with required explanatory sketches / drawings in three sets plus one soft copy and get the same reviewed by BHEL before starting the final design and Ready for Construction (RFC) drawings. Ten days time will be required by BHEL for approval. The contractor shall furnish the foundation loading details and base plate arrangement with bolt embedment depth for concrete mix of M20 grade and bolt spacing to BHEL to design the column foundation.

7.3 Fabrication /erection of the structure shall not be taken up at site till all the drawings are reviewed by BHEL and comments/suggestions given by consultants/BHEL are incorporated.

7.4 BHEL reserves the right to review any/all or none of the designs and drawings. Review done by BHEL shall not relieve the contractor of his responsibility for correct design and execution of the works.

7.5 The final design and RFC drawings shall directly adhere to the reviewed design basis and general arrangement and shall incorporate all the comments / suggestions given by BHEL without any extra cost to the Owner and any implication on time schedule for completion of work.

7.6 The contractor shall submit six sets of hard copy of working drawing along with soft copy and on completion of erection and construction, shall submit to BHEL "As Built" drawings in 6 sets of hard copy along with a soft copy.

8.0 CONSTRUCTION :

8.1 Erection of all structural works, roofing, cladding, framed openings etc., including supply of all materials, labour, supervision, plant, tools and tackles etc., shall be carried out by the Contractor.

8.2 All materials and construction shall conform to the Material and Painting Specifications given elsewhere in this document.

8.3 Erection of Pre-Engineered Building shall be done in the presence / guidance of PEB Manufacturing experts/ BHEL Engineer Incharge.

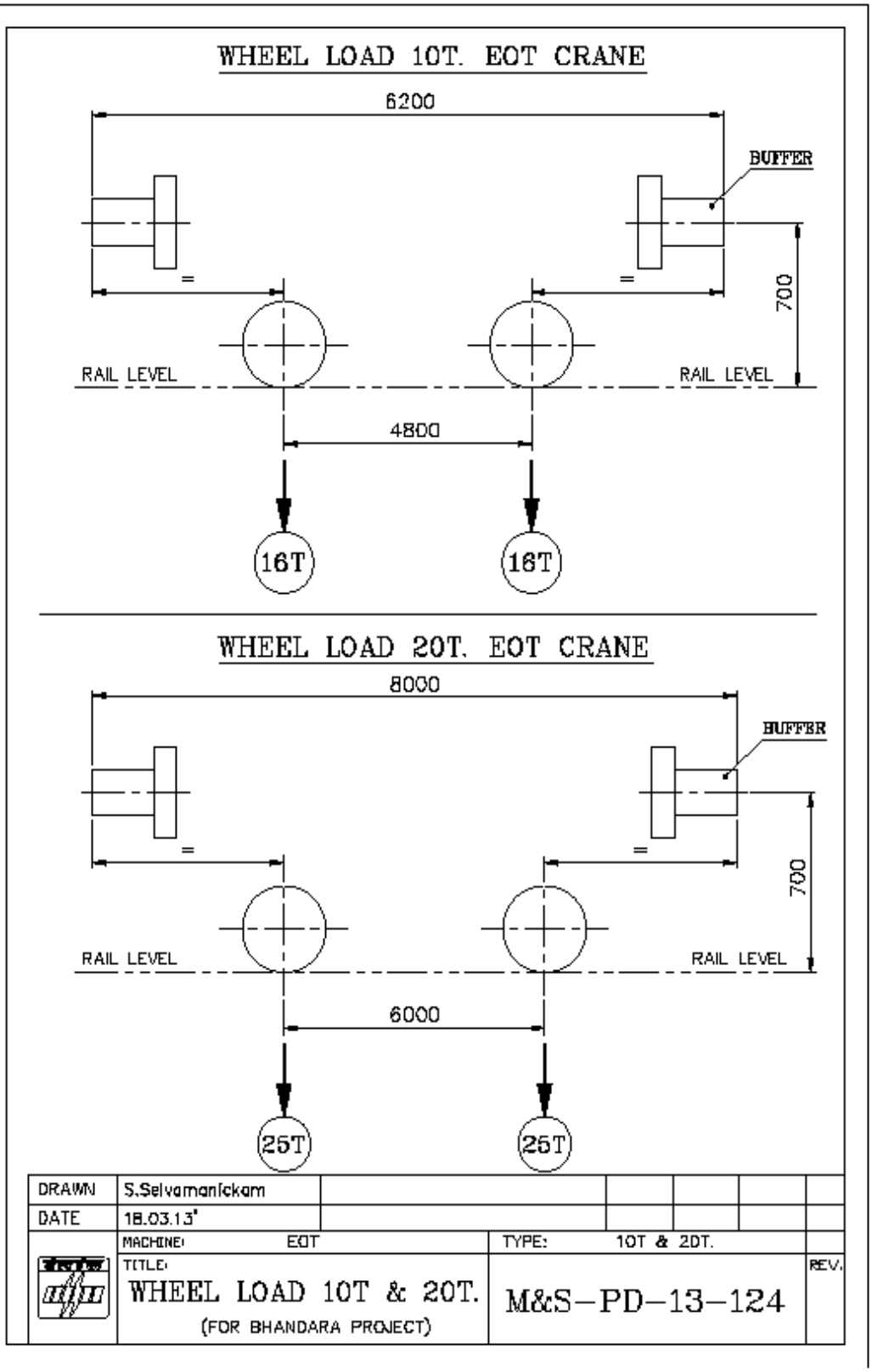
8.4 Foundation Bolts shall be aligned, leveled, fixed and grouted by the civil contractor. The alignment and levels are to be checked and certified by the PEB Manufacturer's Engineer before concreting by Civil contractor.

8.5 No welding is permitted at site unless otherwise cleared by the Consultant / BHEL.

8.6 No wire bracing is permitted.

8.7 Crane leg (column) should be designed without flange bracing.

8.8 Columns are to be designed for minor axis eccentricity.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BUFFER
700
RAIL LEVEL
RAIL LEVEL
4800
16T
16T
WHEEL LOAD 20T. EOT CRANE
8000
BUFFER
700
RAIL LEVEL
RAIL LEVEL
6000
25T
25T
DRAWN
S.Selvamanickam
DATE
18.03.13
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(FOR BHANDARA PROJECT)
M&S-PD-13-124
REV.

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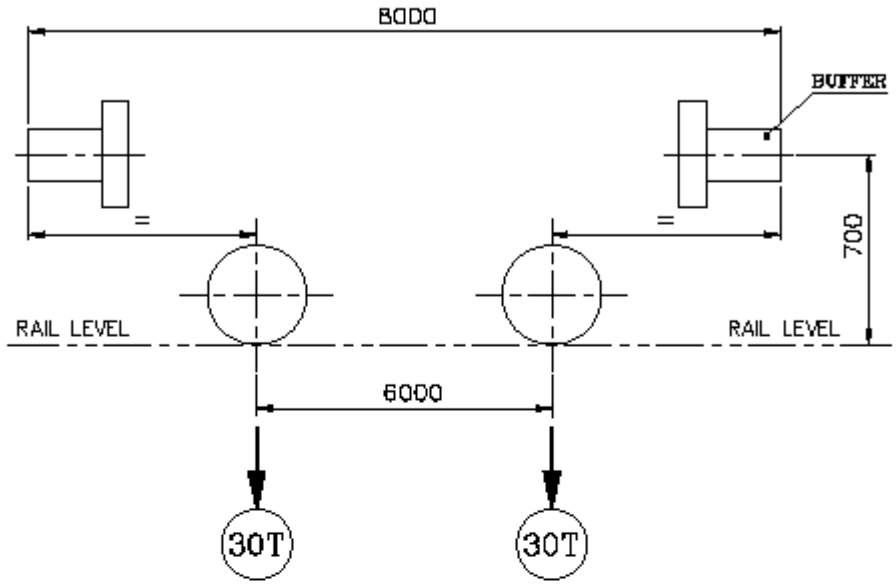
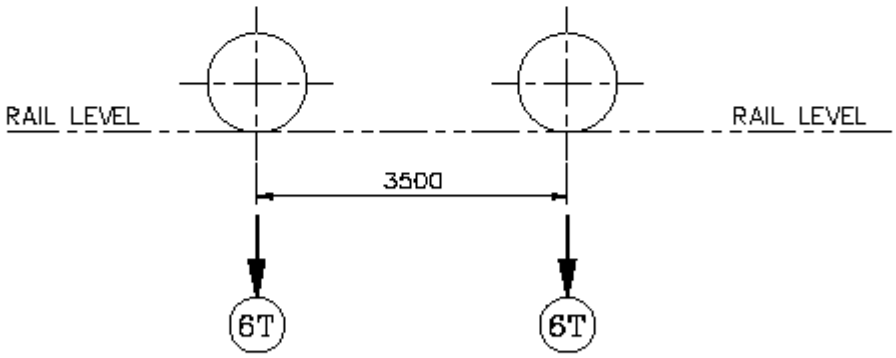


WHEEL LOAD 5T. SEMI GANTRY CRANE



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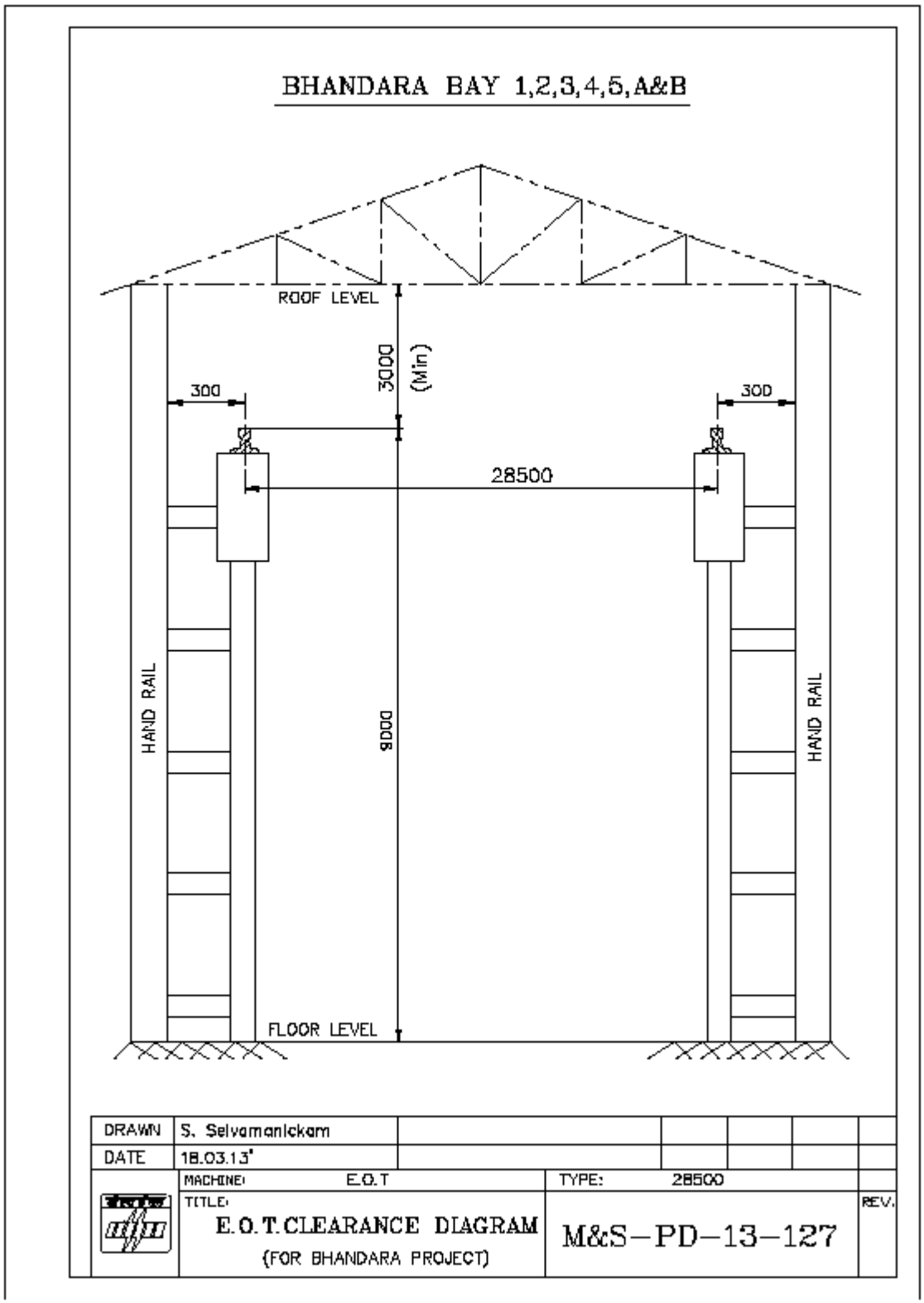

BHANDARA BAY 1,2,3,4,5,A&B
ROOF LEVEL
3000 (Min)
300
300
28500
HAND RAIL
9000
HAND RAIL
FLOOR LEVEL
DRAWN
S. Selvamanickam
DATE
18.03.13
MACHINE: E.O.T
TYPE: 28500
TITLE:
E.O.T.CLEARANCE DIAGRAM
(FOR BHANDARA PROJECT)
M&S–PD–13–127
REV.

E- REFERENCE TO STANDARDS & PROCEDURES

1.0. **STEEL STRUCTURES**: The scope of work comprises of but not limited to the following: -

1.1. This section covers the general requirements of designing, preparing necessary drawings, and providing, fabricating, painting, transporting, erecting, fixing in position Structural steel work for buildings, including all necessary temporary works and conducting of associated tests.

1.2. Contractor shall ensure that the Technical specifications detailed herein are carefully read and understood in conjunction with, and related to BILL of quantities, and the contractor in his rates includes all requirements defined herein and in other parts of the Contract Document. Works to be performed shall also include all general works preparatory to the fabrication of structural steel work, launching of steel structures during the works of any kind

1.3. **APPLICABLE CODES AND STANDARDS:**

The codes and standards generally applicable to the work of this section are listed below. Latest revisions of the codes shall only be applicable.

IS-875 Part I:Code of Practice for Design Dead Loads for Building and Structures
IS-875 Part II:Code of Practice for Design Imposed Loads for Building and Structures
IS-875 Part III:Code of Practice for Design Wind Loads for Building and Structures

IS-875 Part IV:Code of Practice for Design Loads (other than earthquake) for Building and Structures
IS-875 Part V:Code of Practice for Design Loads (other than earthquake) for Building and Structures
IS-1893 (2002): Criteria for Earth Quake Resistant Design Structures
IS-800 (2007):Code of Practice for General Construction in Steel. And all the codes listed in annex-A of the code
IS-801 (1975):Code of Practice for use of Cold-Formed Light Gauge Steel Structure

IS-807 (2006):Design, Erection & Testing (Structural Portion) of Cranes and Hoists – Code of Practice.

IS-816 (1969): Code of Practice for use of Metal Arc Welding for General Construction.

IS: 102 Ready mixed paint, brushing, red lead non-setting, priming

IS: 104 Ready mixed paint, brushing, zinc-chrome, priming.

IS: 800 Code of Practice for General Construction in Steel

IS: 801 Code of Practice for use of Cold Formed Light Gauge Steel

Structural Members in General Building Construction.

IS: 806 Code of Practice for use of Steel Tubes in General Building Construction.
IS: 808 Dimensions of Hot Rolled Steel Beam, channel and angle sections

IS:811 Cold Formed Light Gauge Structural Steel Sections.

IS:813 Scheme of Symbols for Welding

IS:814 Covered Electrodes for Manual Metal Arc Welding of Carbon and Carbon-Manganese Steel

IS:816 Code of Practice of use of Metal Arc Welding for General construction in Mild Steel.

IS:818 Code of Practice for Safety and Health requirements in electric and Gas Welding and Cutting operations.

IS:822 Code of Procedure for Inspection of welds.
IS:875 Code of Practice for Structural Safety of Building, Loading standards

IS:1024 Code of Practice for use of welding in Bridges and Structures Subject to Dynamic Loading.

IS:1120 Coach Screws

IS:1161 Steel Tubes for Structural Purposes

IS:1182 Recommended practice for Radiographic Examination of Fusion Welded butt Joints in Steel plates.

IS:1363 Hexagon Head Bolts, Screws and Nuts (Grades –C)

IS:1364 Hexagon Head Bolts, Screws and Nuts (Grades A&B)

IS:1365 Slotted Counter-sunk Head Screws

IS:1367 Technical Supply condition for threaded fasteners.

IS:1852 Rolling and Cutting Tolerances for Hot Rolled Steel Products.

IS:1977 Low Tensile Structural Steel

IS:2016 Plain washers

IS:2062 Steel for General Structural Purposes

IS:2074 Ready Mixed Paint, Air drying, Red Oxide-Zinc chrome priming.

IS:3063 Fasteners-Single Coil Rectangular Section Spring Washers

IS:3443 Crane Rail Sections

IS:3600 Testing methods of fusion welded joints and weld metal in steel.

IS:3613 Acceptance tests for wire flux combination for submerged, arc welding.

IS:3757 High strength structural bolts.

IS:4000 Code of practice for high strength bolts in steel structures

IS:4923 Hollow Steel sections for structural use.

IS:5369 General Requirements for plain washers and lock washers

IS:5624 Foundation bolts.
IS:6227 Code, of practice for use of metal arc welding in tubular structures

IS:6623 High strength structural nuts.

IS:6639 Hexagonal bolts for steel structures.

IS:8500 Structural Steel Micro-alloyed (Medium and high strength qualities)

IS:8640 Recommendations for dimensional parameters for industrial buildings

IS:12843 Tolerances for erection of steel structures

IS:7215 Tolerances for fabrication of steel structures

IS:3757 Specification for High strength structural bolts

SP-6 Handbook for structural engineers (All parts)

SP 7 National building code of India

SP22 Explanatory handbooks on codes on earthquake engineering

SP64 (S & T) Explanatory handbook on Indian standard code of practice for design loads (other than earthquake) for buildings and structures

Apart from the above the following below mentioned codes may also be used.

Hot Rolled sections and built up components have to be designed in accordance with AISC (American Institute of steel construction) Manual of steel construction Allowable stress design, 1989 edition

Cold formed components have to be designed in accordance with AISI :American Iron and steel institute" Cold formed steel design manual, 1996 Edition

Welding has to be applied in accordance with AWS D1.1.2008 :American welding society structural welding code-Steel Manual, 2008 edition

1.4 DESIGN:

1.4.1 The contractor will be required to carry out the structural analysis by STAAD Pro or any other computer package and detailed design of the members shall be separately carried out by manual or excel formats, prepare engineering drawings and detailed 'shop drawings', get the approval from BHEL/Third party design checking agency, and then carry out the fabrication work based on approved drawings.

1.4.2 Contractor's designs shall be based on provisions of relevant BIS codes, unless otherwise specified. Design guidelines and design parameters are mentioned in this document.

Where corresponding parameters mentioned in BIS codes are different from those mentioned in Design Specification the latter shall take precedence.

1.4.3 Contractor's designs shall be based on general description of buildings given in earlier pages of this document and those shown in tender drawings Where information given in general description of the building does not tally with the tender drawings, information given in tender drawings shall take precedence.

1.4.4 Where codes and standards listed in earlier pages do not cover the requirements of design, the contractor may refer to other international standards of design only in those cases, However such references should be made only with the approval of the BHEL.

1.4.5 Contractor shall submit his design calculations and 'Engineering Drawings' along with proof design to BHEL for their approval. The contractor is advised to discuss his design philosophy and design procedure with the BHEL before proceeding with the final design work.

1.4.6 It shall be the responsibility of the contractor to obtain all relevant design information from the BHEL for preparing his design, and other utility services supported by the structure.

1.5 DRAWINGS:

1.5.1 Tender Drawings shall be the 'Basic' drawing for developing design drawings. Design drawings shall then be developed in to final 'Shop Drawings' to be prepared by the contractor. For preparing shop drawings, the contractor shall obtain written approval from BHEL.

1.5.2 Tender drawings furnished to the contractor shall form a part of these specifications. The contractor shall consult these in detail for all the information contained therein, which pertains to and is required for his work.

1.5.3 Revisions to drawings, even after release for preparation of shop drawings, are likely to be made to reflect additional data, or, additional details defining updated requirements. Revisions to drawings and any new drawings made to include additional work for the Contractor shall be considered a part of this specification and contract. Extra claims by the contractor on this account shall not be entertained.

1.5.4 It shall be clearly understood that the Tender drawings are only informative drawings and are not intended to show exact and final information or specific connection details.

1.5.5 In case of variations in 'Drawings' and 'Specifications', the decision of BHEL shall be final and binding. Should the Contractor during the execution of his work, find discrepancies in the information furnished to him, he shall refer such discrepancies to BHEL before proceeding with such work.

1.5.6 Contractor shall prepare all fabrication and erection drawings necessary for completing the work satisfactorily.

1.5.7 Drawings shall be of ISO standard size, and shall be clear and legible. Drawings shall be based on Tender drawings supplied to the contractor, but he shall verify actual clearances and dimensions from site on works executed by other agencies and from Engineer in charge.

1.5.8 Shop drawings shall include, but not be limited to:-

a. Detailed marking plans.

b. Details member connections and connections to other structures and components of building.

c. Detailed dimensions for fabrication indicating dimensional modifications required for field conditions

d. Welding and bolting procedures to be used both at shop and field.

e. Cambers required to be provided, and permissible tolerances in fabrication.

f. Assembly and Erection sequences indicating components to be connected at field.

g. Complete bill of materials for each component (preferably drawing wise.)

1.5.9 Before submitting of shop drawings and design calculations to the Engineer in-charge for his approval, these shall be checked and certified by reputed institution like IIT/ IISc / SERC at the tenderer's cost.. Till such time the shop detail of a component is approved, fabrication work for the component shall not be started.

1.5.10 If necessary and called for by the Engineer, shop drawings shall be revised to suit modified requirements and these shall be resubmitted for approval of the Engineer in charge.

1.5.11 While the shop drawings prepared by the contractor, and approved by the Engineer in charge represent the correct interpretation of work to be done, the contractor is not relieved of his responsibilities for:-

a) Dimensional accuracy

b) Correctness of engineering and design of connections

c) Fit of parts

d) Details

e) Errors or omissions

f) Material and workmanship

g) Methodology of fabrication and erection

h) Safety of performance

1.6 SUBMITTALS:

1.6.1 On commencement of the Project, the Contractor shall submit the following to the Engineer in charge:-

A. Prior to the technical submittals, the contractor shall submit detailed baseline program and methodology indicating the proposed overall schedule for documentation such as calculations, shop/working drawings, plan/procedures and records. Submission of samples, process of fabrication / delivery to site storage yard for the approval of the Engineer in charge.

B. Complete fabrication drawings, materials lists, cutting lists, bolt lists, welding schedules and QC schedules, based on the design drawing furnished to him and in accordance with the approved schedule. It is highlighted that structural steel members, dimensions thereof indicated in tender drawings are tentative only and may be modified during final design stage.

C. Results of any tests, as and when conducted and as required by the Engineer in charge.

D. Manufacturer's mill test reports in respect of steel materials, bolts, nuts and electrodes, wires as may be applicable.

E. A detailed list of all constructional Plant & Equipment, such as cranes, derricks, winches, welding sets etc. their makes, model, present condition and location, available to the contractor and the ones he will employ on the job to maintain the progress of work in accordance with the contract.

F. The total number of experienced personnel of each category, like fitters, welders, riggers etc., which he intends to deploy on the project.

G. The contractor shall submit complete design calculations for any alternative sections proposed by him for approval of the Engineer in charge. Use of any alternative section shall be subject to approval of the Engineer in charge. However, no extra payment will be entertained on account of this except as specified in schedule of quantities.

1.7 MATERIALS :

1.7.1 STEEL SUPPLIED BY THE CONTRACTOR:

1.7.1.1 The Contractor shall furnish to the Engineer in charge all mill orders covering the material ordered by him for this work and also the test reports received from the Mills for his approval and information. It is not intended that all the steel materials to be supplied by the Contractor for the work shall be specially purchased from the rolling mills. The Contractor's stock material may be used, provided the mill test reports identified with the materials, satisfactorily demonstrate the specified grade and quality. The Engineer in charge shall have the right to test random samples to prove authenticity of the test certificates produced by the Contractor, at the Contractor's cost.

1.7.1.2 All steel materials supplied by the Contractor 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.

1.7.1.3 Wherever the Contractor, in order to accommodate his other materials in stock, desires to substitute structural steels or plates for the sizes shown on drawings, such substitutions shall be made only after authorization in writing by the Engineer in charge.

1.7.1.4 The Engineer in charge may direct that substitution be made, when he considers such substitution is necessary.

1.7.2 HANDLING AND STORAGE:

1.7.2.1 Proper storage of steel (sections and fabricated members) at the job site shall be the responsibility of the Contractor.

1.7.2.2 Structural steel shall be stored out of mud and dirt. Proper drainage of the storage area shall be provided. These shall be protected from damage or soiling by adjacent construction operations.

1.7.2.3 Fabricated steel shall not be handled until the paint has thoroughly dried. Care shall be taken to avoid paint abrasions and other damage. Steel work shall be transported in such a way so as not to over stress the fabricated sections. All pieces bent or otherwise damaged shall be rejected and shall be replaced by the contractor at his own cost.

1.7.2.4 Checking and inspection of fabricated structural steel work by the Engineer in charge shall be done at various stages of completion of fabrication work. The contractor is required to ensure that fabricated steel work is properly stacked such that all joints of all members are either visible or accessible for inspection at all stages of inspection work. Care should also be taken to ensure that fabricated members are not subjected to stresses due to defective stacking.

1.7.3 FABRICATION:

1.7.3.1 All fabrication work shall be done in accordance with IS: 800: 2007 read in conjunction with relevant codes mentioned therein.

1.7.3.2 Fabrication shall be done in workshops approved by Engineer in charge, unless specifically permitted by Engineer in charge that fabrication can be done at site. Under such circumstances work shall be done on a specially designed and constructed platform. Location, size, specification and construction of such a platform shall have prior approval of Engineer in charge. Loads associated with such platforms shall be provided to Engineer in charge.

1.7.3.3 Steel rolled sections and plates shall be cut by shearing/machining and grinding the surfaces to true sizes and shapes. Gas cutting of steel may be permitted by the Engineer in charge, provided that every cut face and edge is smoothened by grinding operation. Prior approval of Engineer in charge must be obtained for using gas-cutting techniques either by mechanized gas cutters or manually operated gas cutters. While, using gas-cutting methods, proper allowance must be made for grinding to bring the cut piece to exact required dimensions.

1.7.3.4 Extensive use of templates shall be made in doing fabrication work. Templates shall be clean and should have true surfaces prepared for every successive use. Reinforcements for the structural steel members if required shall be included. In case actual members are used as templates for similar pieces are fit to be incorporated in the finished structure. Jigs and manipulators shall be used, where practicable, and shall be designed to facilitate welding and to ensure that all welds are easily accessible to the operators.

1.7.3.5 All material shall be straight and free from twist and bends unless required to be curvilinear in form. If necessary the material shall be straightened and / or flattened/straightened by pressure. Heating of rolled sections and plates for purpose of straightening shall not be permitted.

1.7.3.6 Curvilinear members shall be formed by bending with the help of pneumatic press. Final shaping, to a very limited extent, however, may be done by local heat application. This shall be done only on receiving approval from the Engineer in charge.

1.7.4 HOLING:

1.7.4.1 All holes shall be made at right angles to the surface of the member. Holes shall be clean cut without any torn or jagged edges. Holes shall be done by drilling. Punching shall not be resorted to, unless previously approved by the Engineer. In any case, punching of holes in materials having a thickness in excess of the connector diameter, or, for materials thicker than 16mm, the hole shall be punched 3mm less in diameter than the required size and then reamed to the full size. Holes shall not be formed or enlarged by burning or gas cutting under any circumstances.

1.7.5 WELDING:

1.7.5.1 GENERAL:

In general only Automatic submerged arc welding will be used for fabrication. Subject to approval of Engineer in charge, Metal inert gas welding may be done for short length where access to the location of the weld does not permit submerged arc welding. The welding and the welded work shall conform to IS:816, unless otherwise specified. As much work as possible shall be welded in shops and the layout and sequence of operations shall be so arranged as to eliminate distortion and shrinkage stresses. Unless otherwise specified all weld shall be for full contact for all sides.

1.7.5.2 Electrodes for shielded-arc manual welds shall comply with the requirements of IS: 814 and shall be amenable to radiographic tests and shall be of approved make. The electrodes for manual arc welding shall be suitable for use in the position and type of work, as laid down in the above specifications and as recommended by the manufacturers. Electrodes classification group 1 or 2 as given in IS: 814 shall be used for welding steel conforming to IS:2062. Joints in materials above 20mm thick, and, all important connections shall be made with low hydrogen electrodes Electrode flux covering shall be sound and unbroken. Broken or damaged coating shall cause the electrodes to be discarded. Covered electrodes for manual arc-welding shall be properly stored in an oven prior to use in a manner recommended by the Manufacturer and only an hour's quota shall be issued to each welder from the oven.

1.7.5.3 Electrodes larger than 5mm diameter shall not be used for root-runs in butt-welds. Welding plant and accessories shall have capacity adequate for the welding procedure laid down and shall satisfy appropriate standards and be of approved make and quality, the Contractor shall maintain all welding plant in good working order. All the electrical plant in connection with the welding operation shall be properly and adequately earthed and adequate means of measuring the current shall be provided.

1.7.5.4 All welds shall be made only by welders and welding operators who have been properly trained and previously qualified by tests to perform the type of work required as prescribed in the relevant applicable standards.

1.7.5.5 All welds shall be free from defects like blow holes, slag inclusions, lack of penetration, undercutting, cracks etc. All welds shall be cleaned of slag or flux and show uniform sections, smoothness of weld metal, feather edges without overlap and freedom from porosity.

1.7.5.6 Fusion faces and surfaces adjacent to the joint for a distance of at least 50mm on either side shall be absolutely free from grease, paint, loose scales, moisture or any other substance which might interfere with welding or adversely affect the quality of the weld. Joint surfaces shall be smooth, uniform and free from fins, tears, laminations etc. Preparation of fusion faces shall be done in accordance with the approved fabrication drawings by shearing, chipping, machining or machine flame cutting except that shearing shall not be used for thickness over 8mm

1.7.5.7 In the fabrication of cover-plated beams and built up members all shop splices in each component part shall be made before such component part is welded to other parts of the member. Wherever weld re-enforcement interferes with proper fit-up between components to be assembled for welding, these welds shall be ground flush prior to assembly.

1.7.5.8 Members to be joined by fillet welding shall be brought and held a close together as possible and in no event shall be separated by more than 3mm. If the separation is 1.5mm or greater, the fillet weld size shall be increased by the amount of separation. This shall only apply in the case of continuous welds. The fit-up of joints at contact surfaces which are not completely sealed by welds shall be close enough to exclude water after painting.

1.7.5.9 The separation between fraying surfaces of lap joints and butt joints with backing plate shall not exceed 1.5mm. Abutting parts to be butt welded shall be carefully aligned and the correct root gap maintained throughout the welding operation. Misalignments greater than 25 percent of the thickness of the thinner plate or 3mm whichever is smaller shall be corrected and in making the correction the parts shall not be drawn into a slope sharper than 2 degree (1in 27.5)

1.7.5.10 Welding procedures recommended by appropriate welding standards and known to provide satisfactory welds shall be followed. A welding procedure shall be prepared by the Contractor and submitted to the Engineer in charge for approval before start of welding.

1.7.5.11 Approval of the welding procedure by the Engineer in charge shall not relieve the Contractor of his responsibility for correct and sound welding without undue distortion in the finished structure.

1.7.5.12 Voltage and current (and polarity if direct current is used) shall be set according to the recommendations of the Manufacturer of the electrode being used, and suitable to thickness of material, joint from etc. The work shall be positioned for flat welding wherever practicable and overhead weld shall be avoided.

1.7.5.13 No Welding shall be done when the surface of the members is wet, not during periods of high wind unless the welding operator and the work are properly protected. In joints connected by fillet welds, the minimum sizes of single run fillet welds or first runs and minimum full sizes of fillet welds shall conform to the requirements of IS:816 and IS:823, Fillet welds larger than 8mm shall be made with two or more passes.

1.7.5.14 All ‘full penetration butt welds’ made by manual arc-welding, except when produced with the aid of backing material or welded in flat position, from both sides in square-edge material, not over 8mm thick with root opening not less than one-half the thickness of the thinner part joined, shall have the root of the initial layer gouged out on the back side before welding is started from that side, and shall be so welded as to secure sound metal and complete fusion throughout the entire cross section.

1.7.5.15 Butt welds shall be terminated at the ends of a joint in a manner that will ensure their soundness where abutting parts are 20mm or more in thickness, run-on and run-off plates with similar edge preparation end having a width not less than the thickness of the thicker part joined shall be used. These extension pieces shall be removed upon completion of the weld and the ends of the weld made smooth and flush with the abutting parts. Where the abutting parts are thinner than 20mm the extension pieces may be omitted but the ends of the butt welds shall then be chipped or gouged out to sound metal and side welded to fill up the ends to the required reinforcement.

1.7.5.16 Each layer of a multiple layer weld except root and surface runs may be moderately peeled with light blows from a blunt tool. Care shall be exercised to prevent scaling or flaking of weld and base metal from over-peeling.

1.7.5.17 Before commencing fabricating of a member or structure in which welding is likely to result in distortion and/or locked up stresses, a complete programme of fabrication, assembly and welding shall be made and submitted to the Engineer in charge for his approval. Such a programme shall, include, besides other appropriate details, full particulars in regard to the following:-

i) Proposed pre-bending of components such as flanges and presetting of joints to offset expected distortion.

ii) Make up of sub-assemblies proposed to be welded before incorporation in final assembly.

iii) Proposed joint forms, classification of wire and flux or covered electrodes, welding process including fitting and welding sequence with directions in which freedom of movement is to be allowed.

iv) Proposed number, spacing and type of strong details of jigs and fixtures for maintaining proper fit up and alignment during welding.

v) Any other special features like assembling similar members back to back or stress relief.

Suggestive minimum preheating of metals:-

Thickness of thickest part at point of welding	Minimum Preheat & Inter pass Temperature	
	Manual Arc welding (MAW) with E6013 (Rutile electrode)	MAW with E7016 or E7018 (Low hydrogen Electrode) Submerged arc welding or flux cored arc welding
Up to 20 mm incl.	None	None
Over 20mm to 38 mm incl.	100º C	Upto 25mm – None Over 25mm and upto 38mm - 80 º C
Over 38mm	200º C	100º C

In case if BHEL desires to have preheating temperature of 200 º C and interpass temperature of 250 º C for the plate thickness of more than 25mm and upto 50mm, the same has to be executed by the contractor and no additional payment will be made in this regard.

Preheat is assumed locally applied and measured for atleast 75mm in each side of weld line. If possible, the temperature should be measured on the face opposite to that being he` ated. Alternatively, if there is access to only one face, the heat source should be removed to allow for temperature equalization (1 minute for each 25mm thickness) before measuring.

Preheat shall be applied using electric resistance heaters of air with producer/fuel gas, High intensity heating such as oxyacetylene is forbidden. Use of self-preheat from welding procedure is not permitted.

When electrodes 3mm dia or smaller are used the minimum preheat temperature shall be increased by above 50 º C above that required by table given above.

1.7.5.18 All the butt-welds when thickness of one or both the plates joined is beyond 50mm shall be relieved. The fillet welds, for fixing attachments like pads etc made on tension flange 50mm thick, shall also be stress relieved . However, the fillet welds joining the tension flange to web need not be stress relieved. Stress relieving is to be done at 600 to 650 º C with a soaking of 1 hour / 25mm, thickness of the thicker part. The heat treatment mentioned above shall be carried out as “local Stress relief”. No stress relief using oxy-acetylene flame is permitted. In local “Stress Relief” the width of the heated band on each side of the greater width of the finished weld shall not be less than two times the maximum material thickness. The ends or the finished girder may be flame cut to size, provided proper preheat is used. No “Stray arc Striking” shall be done on heat treated elements.

1.7.5.19 If so desired by the Engineer in charge, mock up welding shall be carried out at the contractor’s cost to establish the efficacy of the proposed programme, with any modification suggested by the Engineer in charge in limiting distortion or/and residual stress to acceptable levels. Such modifications will not relieve the contractor of any of his responsibilities.

1.7.5.20 The ends of butt joints shall be welded so as to provide full throat thickness. This may be done by the use of extension pieces, cross-runs or other approved means. The weld face shall, at all places, be deposited projecting the surface of the parent metal. Where a flush surface is required, the surplus metal shall be dressed off. Splices and butt joints of compression members, depending on contact for stress transmission, shall be accurately machined over the whole section. In column bases, the ends of shafts together with the attached gussets, angles, channels etc., after bolting and/or welding together as the case may be, shall be accurately machined so that the parts connected butt over the entire surface of contact. Care shall be taken that connecting angles or channels are fixed with such accuracy that they are not reduced in thickness by machining by more than 0.80mm.

1.7.5.21 The minimum leg length of a fillet weld as deposited shall be not less than the specified size. In no case shall a concave weld be deposited, unless specifically permitted. Where permitted, the leg length shall be increased above that specified length, so that the resultant throat thickness is as great as would have been obtained by the deposition of a flat-faced weld of the specified leg length.

1.7.5.22 After making each run of welding, all slag shall be thoroughly removed and the surface cleaned. The weld metal, as deposited (including tack welds), shall be free from cracks, slag inclusions, porosity, cavities and other deposition faults. The weld metal shall be properly fused with the parent metal without under cutting or overlapping at the toes of the weld. The surface of the weld shall have a uniform consistent contour and regular appearance.

1.7.6 INSPECTION OF WELDS:

All welds shall be inspected for flaws by any of the methods described in these Specifications, and as per IS: 822. The choice of the method to be adopted, shall be determined by the Engineer in charge.

The contractor shall arrange for all tests as called for, at his own cost.

In case the tests uncover defective work, such tests shall be at the Contractor's cost and the Contactor shall correct such defects at his own cost and prove the soundness of rectified work.

The correction of defective welds shall be carried out as directed by the Engineer in charge without damaging the parent metal. When a crack in the weld is removed, magnetic particle inspection or any other equally positive means as prescribed by the Engineer in charge shall be used to ensure that the whole of the crack and material up to 25mm beyond each end of the crack has been removed. Cost of all such tests and operations incidental to correction shall be to the Contractor's account.

1.7.7 FABRICATION TOLERANCES:

1.7.7.1 Unless otherwise shown on drawings, the fabrication tolerances shall generally be as detailed hereunder.

1.7.8 STRAIGHTNESS:

1.7.8.1 The dimensional and weight tolerance for rolled shapes shall be in accordance with IS: 1852 for indigenous steel and equivalent applicable codes for imported steel. The acceptable limits for straightness (sweep and camber) fro rolled or fabricated members shall be:-

Struts and columns: L / 1000 or 10mm whichever is smaller. For all other members not primarily in compression such as purlins, beams, bracings & web members of trusses and latticed girders: L/500 or 15mm whichever is less.(Where L is the length of finished member, or such lesser length as the Engineer in charge may specify).

1.7.9 TWISTS:

1.7.9.1 A limit of twist (prior to erection) in:-

Box girders and heavy columns:	L/1500
Other members	L/1000

1.7.10 CAMBER:

1.7.10.1 Tolerance in specified camber of structural members shall be ±3mm.

1.7.11 LENGTH:

1.7.11.1 Tolerance in specified length shall be as follows:-

Type of member	Tolerance
A column finished for contact bearing	: ± 1 mm
Other members (e.g. beams) under 10 m	: + 0 and -3mm
Other members (e.g. beams) 10 m long and over	: + 0 and -5mm

1.7.12 SQUARE-NESS AT END OF MEMBERS:

1.7.12.1.1 Beam to beam and beam to column connections where the abutting parts are to be joined by butt welds, permissible deviation from the square-ness of the end is:-

Beams up to 600mm in depth: 1.5mm

Beams over 600mm in depth : 1.5mm every 600 mm depth up to a max of 3mm

1.7.12.1.2 Where abutting parts are to be joined by bolting through cleats or end plates, the connections require closer tolerance.

Beams up to 600mm in depth: 1.0mm

Beams over 600mm in depth : max of 1.5mm

1.7.16 BUTT JOINTS:

For full bearing, two abutting ends of columns shall first be aligned to within 1 in 1000 of their combined length and then the following conditions shall be met:

(a) Over at least 80% of the bearing surface the clearance between the surfaces does not exceed 0.10mm.

(b) Over the reminder of the surfaces the clearance between the surfaces does not exceed 0.30mm.

Where web stiffeners are designed for full bearing on either the top flange or bottom flange or both, at least half the stiffener shall be in positive contact with the flange. The reminder of the contact face could have a max. gap of 0.25mm.

1.7.17 DEPTH OF MEMBER:

1.7.17.1 Acceptable deviation from the specified overall depth is:

For depths of 900 mm and under:	± 3mm.
For depths over 900 mm and under 1800mm:	± 5mm
For depths of 1800 mm and over:	+8 mm: - 5mm

1.7.18 WEB PLATES:

1.7.18.1 Acceptable deviation from flatness in girder webs in the length between the stiffeners or in a length equal to the girder depth shall be 1/150th of the total web depth.

1.7.19 FLANGE PLATES:

1.7.19.1 Limit for combined warp-age and tilt on the flanges of a built up member is 1/200 of the total width of flange or 1.5 mm whichever is smaller measured with respect to centre line of flange.

1.7.19.2 Lateral deviation between centre line of web plate and centre line of flange plate at contact surfaces, in the case of built up sections shall not exceed 3 mm.

1.7.20 INSPECTION:

1.7.20.1 The contractor shall give due notice to the Engineer in charge in advance if the materials or workmanship getting ready for inspection.

1.7.20.2 All rejected material shall be promptly removed from the shop and replaced with new material for the Engineer in charge's approval / inspection. The fact that certain material has been accepted at the Contractor's shop shall not invalidate final rejection at site by the Engineer in charge, if it fails to be in proper condition has fabrication in accuracies which prevents proper assembly. No materials shall be painted or dispatched to site without inspection and approval by the Engineer in charge unless, such inspection is waived in writing by the Engineer in charge.

1.7.20.3 Shop inspection by the Engineer in charge or his authorized representative, or submission of test certificates and acceptance thereof by the Engineer, shall not relieve the Contractor from the responsibility of furnishing material conforming to the requirements of these specifications. Nor shall it invalidate any claim, which the Engineer in charge may make because of defective or unsatisfactory material and/or workmanship.

1.7.20.4 The Contractor shall provide all the testing and inspection services and facilities for shop work except where otherwise specified. For fabrication work carried out in the field, the same standard of supervision and quality control shall be maintained as in shop fabricated work. Inspection and testing shall be conducted in a manner satisfactory to the Engineer in charge.

1.7.20.5 **Column Fabrication Tolerances**: The work point at about the elevation of the crane girders seat shall not be vary more than ±1/8th inch from the straight line struck between top and bottom points. The AWS straightness tolerances will control between the work points. The girder seat plates are to be located from the work centre line with a tolerance of ±1/32 inch.

1.7.20.6 **Crane Runway Girder Fabrication tolerances**:

Crane Girders: Horizontal sweeps in crane runway girders shall not exceed 1/4th inch per 50 feet length of girder span. Camber shall not exceed ± 1/4th inch per 50 feet girder span over that indicated on the design drawing.

Girder ends: The ends of the girder supported by the columns, the bottom flange shall be flat and perpendicular to the web. The flatness tolerance shall be ±1/32 inch at any point supported by the column cap plates.

Girder Depth: The depth of crane girder shall be detailed and fabricated to a "KEEP" at their ends of ±1/32 inch by use of a variable thickness sole plate.

Crane Girder alignment: The centre line top of each crane girder at each column shall be aligned horizontally within ±1/4th inch of the theoretical base lines both sides of the runway.

1.7.21 TESTING:

1.7.21.1 MATERIAL TESTING:

If mill test reports are not available for any steel materials, the same shall be got tested by the contractor to the satisfaction of Engineer in charge to demonstrate conformity with the relevant specification.

1.7.22 TESTS ON WELDS:

1.7.22.1 MAGNETIC PARTICLE TEST:

Only where the Engineer in charge requires that flaw-detection of welds be done by 'magnetic particle test', in such cases the tests are to be done in accordance with IS:3703. if heat treatment is performed, the completed weld shall be examined after the heat treatment. All defects shall be repaired and re-tested. Magnetic particle tests shall be carried out using alternating current. Direct current may be used with the explicit written permission of the Engineer in charge.

1.7.23 DYE PENETRATION TEST:

Where welds are required to be examined by dye penetration inspection method, such tests shall be carried out in accordance with IS:3658.

1.7.24 RADIOGRAPHIC INSPECTION:

Whether instructed by Engineer in charge, or not, all 'Butt' welds shall be inspected by radiographic examination method. Such examination shall be done in accordance with the recommendations of IS:1182.

1.7.25 TEST FAILURE:

At any stage, in the event of any material or work failing to meet an inspection of test requirement, which is not overseen by the Engineer in charge, the Contractor shall notify the Engineer in charge immediately. The contractor must obtain permission from Engineer in charge before repair is undertaken. The quality control procedures to be followed to ensure satisfactory repair shall be subject to approval by the Engineer in charge. The Engineer in charge has the right to specify additional inspection or testing as he deems necessary, and the additional cost of such testing shall be borne by the Contractor. The Contractor shall maintain records of all inspection and testing which shall be made available to the Engineer in charge on demand.

1.7.26 SHOP MATCHING:

Some steel work, particularly columns along with tie beams, bracings etc. may have to be shop assembled to ensure satisfactory fabrication, if the Engineer in charge so desires, he may order such assembly at shop for verification. The Contractor shall comply with such instructions without claiming any extra cost.

1.7.27 SHOP ASSEMBLY:

1.7.27.1 Steel work shall be temporarily shop assembled, as necessary, so that the accuracy of fit may be checked before dispatch. The parts shall be shop assembled with a sufficient number of parallel drifts to bring and keep the parts in place.

1.7.27.2 Since parts drilled or punched, with templates having steel bushes shall be similar and, as such, interchangeable, such steel work may be shop erected in part only, as agreed by the Engineer in charge.

1.7.28 ASSEMBLY:

1.7.28.1 All parts assembled for bolting shall be in close contact over the whole surface.

1.7.28.2 The component parts shall be so assembled that they are neither twisted nor otherwise damaged, specified cambers, if any, shall be provided.

1.7.28.3 All parts of bolted and welded members shall be held firmly in position by means of jigs or clamps while bolting or welding. No drifting of holes shall be permitted, except to draw the parts together and no drift used shall be larger than the nominal diameter of the bolt. Drifting done during assembling shall not distort the metal or enlarge the holes.

1.7.28.4 Trial assemblies shall be carried out at the fabrication stage to ensure accuracy of workmanship, and these checks shall be witnessed by the Engineer in charge/Authorized inspecting agency. Such trial assembly shall be at the cost of the contractor.

1.7.29 FIELD BOLTS:

1. Requirements stipulated under bolting shall apply for field bolts also. Field bolts nuts and washers shall be furnished by the contractor in excess of the nominal numbers required. He shall supply the full number of bolts, nuts and washers and other necessary fittings required completing the work, together with the additional bolts, nuts and washers totaling to 10% of the requirement subject to minimum of 10 Nos.
2. At the time of assembly, the surfaces in contact shall be free of paint or any other applied finish, oil, dirt, loose rust, loose scale, burrs and other defects which would prevent solid seating or the parts or would interfere with the development of friction between them.
3. If any other surface condition, including a machined surface, is specified, it shall be the responsibility of the Contractor to work within the slip factor specified for the particular case.
4. Each bolt and nut shall be assembled with washers of appropriate shape, quality and number in cases where plane parallel surfaces are involved, such washers shall be placed under the bolt head or the nut, whichever is to be rotated during the tightening operation. The rotated nut or bolt head shall be tightened against a surface normal to the bolt axis, and the appropriate tapered washer shall be used when the surfaces are not parallel. The angle between the bolt axis and the surface under the non-rotating component (i.e. the bolt head or the nut) shall be 90+3 degree. For angles outside these limits, a tapered washer shall be placed under the non-rotating component. Tapered washers shall be correctly positioned.
5. No gasket or other flexible material shall be placed between the holes. The holes in parts to be joined shall be sufficiently well aligned to permit bolts to be freely placed in position. Driving of bolts is not permitted. The nuts shall be placed so that the identification marks are clearly visible after tightening. Nut and bolts shall always be tightened in a staggered pattern and where there are more than four bolts in anyone joint, they shall be tightened from the centre of the joint outwards.
6. If after final tightening, a nut or bolt is slackened off for any reason, the bolt, nut and washer or washers shall be discarded and not used again.

1.7.30 MARKING OF MEMBERS:

1.7.30.1 After checking and inspection, all members shall be marked for identification during erection. This mark shall correspond to distinguishing marks on approved erection drawings and shall be legibly painted and stamped on it. The erection mark shall be stamped with a metal dye with figures at least 20mm high and to such optimum depth as to be clearly visible, even after a member is galvanized.

1.7.30.2 All erection marks shall be on thee outer surface of all sections and near one end, but clear of bolt-holes. The marking shall be so stamped that they are easily discernible when sorting out members. The stamped marking shall be encircled boldly by a distinguishable paint to facilitate easy location. Erection marks on like pieces shall be at identical location. Members having lengths of 7.0m or more shall have the erection mark at both ends.

1.7.30.3 Each fabricated member, whether assembled prior dispatch or not so assembled, shall bear an erection mark, which will help to identify the member and its position in respect of the whole structure, to facilitate re-erection at site. This erection mark shall be incorporated in the shop detail and erection drawings.

1.7.31 ERRORS:

Any error in shop work which prevents proper assembling and fitting up of parts in the field by moderate use of drift pins or moderate amount of reaming will be classified by the Engineer in charge as defective workmanship. All charges incurred by the Engineer either directly or indirectly because of the poor workmanship will be deducted from the amount due to the contractor before payment is made. The amount of such deduction will consist of the sum total of the costs of labour direct or indirect, material, plant, transportation, equipment rental and overhead expenses. In case the Engineer chooses to reject the material because of poor workmanship, the cost of all handling and returning the material to the contractor, if he so desires, shall entirely be the contractors account. All the replacement materials shall be supplied free and in all such cases, the cost of handling, transport and delivery to site shall be borne by the contractor.

1.7.32 ERECTION:

1.7.32.1 Erection of structural steel fabricated components shall be done generally in accordance with provisions of IS 800.-2007

1.7.32.2 Before starting of erection work, the contractor shall ensure the fulfillment of the following activities:-

a) The contractor shall submit, for examination by the Engineer in charge, detailed particulars of his proposed methods of erection of the superstructure steel work, together with complete calculations relating to strength and deflection, if the erection scheme necessitates the attachment of strength steel work to the permanent steel work, the contractor shall submit, for approval of the Engineer in charge, the methods he proposes for making good the permanent steelwork after removing the temporary work. The contractor shall also submit the design and fabrication drawings including detailed calculations of temporary nose, counter weight all temporary support, staging, braces etc. required for safe erection, for approval of the Engineer in charge.

b) The contractor shall provide all construction and transport equipment, tools, tackle and consumables, materials, labour and supervision required for the erection of the structural steel work.

c) Handing, assembling, bolting, welding and satisfactory installation of all fabricated structural steel materials in proper location, according to approved erection drawings and/or as directed by the Engineer in charge.

d) Setting out, aligning, plumbing, leveling, bolting, welding and securely fixing the fabricated steel structures in accordance with the erection scheme or as directed by the Engineer in charge.

1.7.33 ERECTION TOLERANCES:

Erection tolerances shall be as per table-33 OF IS 800-2007

1.7.34 QUALITY CONTROL & TESTING REQUIREMENTS:

1.7.34.1 The contractor shall submit the following:

- ❖ Proposed overall schedule for documentation of shop drawings, plan/procedures and records, submission of procedure of fabrication.
- ❖ The contractor shall himself inspect all materials and shop work to satisfy the specified tolerance limits and quality norms before the same are inspected by Engineer in charge.

1.7.34.2 The contractor shall through appropriate planning and continuous measurements in the workshop and the erection at site ensure that the tolerances specified in this specification are strictly adhered to.

1.7.34.3 Fabricating agency shall have in house facilities for all testing of weld.

1.7.35 VISUAL EXAMINATION:

The contractor shall conduct visual examination and measurement of the external dimensions of welds for all joints. Before examining the welded joints, areas close to it on both sides of the weld for a width not less than 20 mm shall be cleaned of slag and other impurities. Examination shall be done by a magnifying glass which has a magnification power of ten (10) and measuring instrument which has an accuracy of ± 0.10 mm or by weld gauges. Welded joints shall be examined from both sides. The contractor shall examine the following during the visual checks.

i) Correctness and shape of the welded joints

ii) Incomplete penetration of weld metal

iii) Influx

iv) Burns

v) Un welded craters

vi) Undercuts

vii) Cracks in welded spots and heat affected zones

viii) Porosity in welds and spot welds.

ix) Compression in welded joints as a result of electrode impact while carrying out contact welding

x) Displacement of welded element.

The contractor shall, document all data as per sound practices.

1.7.35.1 In order to exercise proper control of the quality of the welding, contractor shall enforce methods of control as tabulated below:

Purpose	Control subjects	Methods of control
1	2	3
1. Control of welding materials and basic metal quality	Quality control of electrodes, welding wire, flux and protective gases.	Weldability test to determine the technological properties of materials. Mechanical test of weld metal. Metallographic investigations of welds macro-structure and microstructure. Checking of weld metal resistance for inter-crystalline corrosion. Study if weld metal solidity by physical control methods.
2. Checking of welders qualifications	Welding of specimens for quality determination.	Mechanical tests, metal graphical investigation & checking of welded joints by physical control methods
3. Control of welded joint quality	Control of assembly accuracy and technological welding process.	Checking of assembly quality & centering of welded members. Checking of welding equipment conditions. Checking corrective ness of welding procedure. Visual examination of welds.

SECTION- F

MATERIAL & PAINTING SPECIFICATIONS

1.0 MATERIAL

1.1 SPECIFICATIONS

1.1.1 Primary members fabricated from plates and sections with minimum yield strength of 345 Mpa or to suit design by continuous welding.

1.1.2 Secondary members for Purlins and Grits shall conform to the physical specification of ASTM A653 SS (Grade 50) or equivalent IS Standards having a minimum yield strength of 340 MPa. The minimum thickness of secondary members shall be 2.5mm.

1.1.3 Rod /ANGLE bracing shall conform to the physical specification IS 2062, of min 250 MPa yield strength

1.1.4 All hot rolled sections shall conform to the physical specifications IS 2062. All other miscellaneous secondary members shall have minimum yield strength of 250 MPa.

1.2 DESCRIPTION

1.2.1 **PRIMARY MEMBERS :**

Primary structural framing shall include the transverse rigid frames, columns, corner columns, end wall wind columns and crane gantry girders and Frames at Door openings.

1.2.2 **SECONDARY MEMBERS** :

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

1.2.3 PURLINS:

Purlins should be of Pre Galvanised steel of 340 MPa ASTM A653 SS (Grade 50) having a coating thickness of 275 gsm

1.2.4. **ROOF SHEETING :**

Roof panels shall be made out of SMP paint coated high tensile steel standing seam profiled sheets having min. yield strength of 345 Mpa conforming to ASTM-A446 with coating conforming to AZM-150, as per ASTM A-792-AZM to make TCT of 0.58mm. The profile shall be trapezoidal shaped to satisfy the loading requirements or any other profile if proved to have sufficient strength to take DL, LL ,wind loads.

1.2.5 **SIDE CLADDING :**

Wall panels shall be made out of SMP paint coated high tensile steel standing seam profiled sheets having min. yield strength of 550 MPa conforming to ASTM-A446 with galvalume coating to AZM-150, as per ASTM A-792-AZM to make TCT of 0.50mm. The profile shall be trapezoidal shaped to satisfy the loading requirements or any other profile if proved to have sufficient strength to take DL, LL ,wind loads.

1.2.6 **SHEETING FASTENERS**:

Standard fasteners shall be self tapping zinc plated metal screws with EPDM bonded zinc plated washers. All screws shall be color coated to match roof and wall sheeting.

1.2.7 **SEALER**:

This is to be applied at all side laps and end laps of roof panels and around self flashing windows. Sealer shall be pressure sensitive elastomeric Butyl tapes. The sealer shall be non-asphaltic, non-shrinking and non toxic and shall be superior adhesive metals, plastics and painted to take care of the prevailing temperature.

1.2.8 **CLOSURES**:

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

1.2.9 **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.

1.2.10 SKY LIGHTS :

Skylight is translucent corrugated sheets matching the profile of Roof. The translucent sheets are made from 2mm thick Polycarbonate sheets and shall provide an economic form of general-purpose day lighting. Skylights shall be provided for 5% of the roof area. Colour of the panel shall be white with smooth surface finish with a light transmitting capacity of 70% $\pm$ 5%.

1.2.11 GUTTERS AND DOWN SPOUTS:

FRP lined Gutters and downspouts shall be adequately designed to ensure proper roof drainage system. Material shall be same as that of sheeting.

1.3 **CONNECTIONS :**

1.3.1 SITE CONNECTIONS

a) All primary bolted connections shall be provided with galvanized high strength bolts, washers, nuts conforming to specifications of grade 8.8 OF IS 1367/ASTM A 325 grade 8S

b) All secondary bolted connections shall be furnished with bolts, nuts, washers conforming to the specifications of grade 4.6 of IS 1363, IS 1367 or ASTM-A307.

1.3.2 SHOP CONNECTIONS

All shop connections shall be welded with appropriate arc welding process and welding shall be in accordance with IS 816,IS-819 ,IS1024,IS-1261 ,IS1323,IS-9595, AWSD 1.1. as appropriate. The Webs should be welded on to the flanges at both the faces at top and bottom for columns, beams and crane girders. Weld material should have strength more than the parent metal.

1.4 ROOF & WALL BRACINGS

Roof and wall bracings shall have a minimum yield strength of 250 Mpa and shall conform to the specifications IS 2062.

Portal Bracings connecting columns should be min. at two places on both the side walls @ 50m. c/c.

1.5 **PAINTING FOR STRUCTURAL STEEL WORK**:

The cleaning & painting specifications for the Structural Steel work shall be as below

a) Sandblasting / shot blasting to SA 2 – 1 / 2.
b) One shop coat of red oxide zinc phosphate primer (1 x 40 µ) dft /one coat epoxy primer of 30 µ dft
c) Two site coats of epoxy finish paint (2 x 40 µ)

The colour of the finish paint shall be approved by BHEL.

SPECIAL CONDITIONS OF CONTRACT

STRUCTURAL STEEL WORKS

1. The contractor will be required to submit the necessary test certificates for the materials so supplied for use on this work.

2. Based on the detailed shop Drawings approved by the BHEL the Contractor shall prepare at his cost, the Drawing Office Despatch Lists (abbreviated as D.O.D.L.'s) and get them approved by BHEL. These shall contain the drawing number, the designation of items, number of pieces, based on the section weights as adopted for supply of raw materials without deduction for bolt holes and skew cuts. The DOD Lists shall form the basis for payment.

3. a) Fabrication shall generally be in accordance with IS 800 (latest issue) entitled "Code of practice for use of structural steel in general building constructions". Welding shall be in accordance with IS 816 entitled "Code of practice for use of metal arc welding for general construction in mild steel". The contractor shall provide necessary splicing as approved by the Engineer-in-charge, to suit the available lengths of raw steel, and no extra amount shall be paid on this account. Any specifications not covered by the Relevant Indian Standard Codes of practice shall be in accordance with the relevant BS or in its absence in accordance with the well-established standard Engineering practice to be acceptable to BHEL.

   b) Under the contract, where site fabrication is to be adopted, a suitable site near and inside the factory premises will be made available by BHEL at free of ground rent. The Contractor shall provide all plant and equipments, tools covered sheds and other facilities required for site fabrication work at his own cost.

4. Normally no night work will be permitted. But in case of emergency and urgent in nature where night work is warranted, the Contractor shall arrange for night works providing all facilities including illumination at his own cost, after obtaining written permission from Engineer-in-charge under intimation to Security and Safety Departments.

5. The contractor shall submit schedules showing the programme and order in which the Contractor proposes to carry out the fabrication and erection works with dates and estimated completion times for various portions of the work. Such schedules shall be approved by the Engineer-in-charge prior to the starting of the relevant works.

6. BHEL would expect the contractor to take up simultaneously wherever possible both fabrication and erection of structures especially where a good deal of assembly work, which is in fact a continuation of the fabrication work, is required to be done at site. The painting and cloaking items of works, wherever possible, should be done simultaneously to save time. The Contractor may with the prior approval of BHEL sublet the work. The main contractor shall however, be responsible for all works executed on his behalf by the sub-contractors.

7. SETTING OUT AND ERECTING OF STEEL WORK:

a) Erection of steel work shall generally be in accordance with the provision of IS 800 (Code of practice for use of structural steel in General Constructions).

b) Site assembly of members on the ground by bolting or otherwise as specified in shall be inspected thoroughly by the Engineer-in-charge, or his authorized representative and approved before erection.

c) All equipments, facilities and consumables for site fabrication as well as erection plant requirement, etc., such as derricks, cranes, lifting tackles, wire ropes, chain pulley blocks, jacks, winches etc. as necessary shall be arranged for by the Contractor at his own cost. Care shall be taken to see that all equipments, tools and tackles and wire ropes etc. in use are always in good working conditions and fit for use. For all the tools and plants periodical calibration certificate from approved agency should be obtained. **The above lists should be enclosed along with the tender.**

d) Frames shall be lifted at such points that they will not buckle or deform. Portals/ Trusses shall be lifted only at nodes. Temporary bracing shall, if required, be provided at no extra cost, to relieve erection stresses.

e) In the case of portals/trusses and similar roof structures all or atleast a majority of the purlins and wind bracings, shall be erected side by side with the erection of these structures. Columns shall be erected true to plumb, (no screed bars provided and fixed by the Contractor over the prepared pedestals), true to center line, level and gauge of traveling cranes. Alignment of the columns, crane girders and rails shall be done very carefully using high precision survey instruments and necessary adjustments made to suit actual requirements. **A list of survey instruments proposed to be used shall be furnished in the tender.**

f) All damages to the steel work caused during the transit or otherwise shall be made good to the full satisfaction of BHEL at Contractor's own cost, before erection.

g) It shall be the sole responsibility of the Contractor to ensure accuracy of level, plumb, span and alignment of steel work before erection of other components.

8. **PAINTING AFTER ERECTION:**

a) All steel work shall be given two coats of approved brands of first quality synthetic enamel ready mixed paint / epoxy paint as the case may be. (over the priming coat already provided). The shade, make, quality and other particulars of the paint proposed to be used, shall be subject to prior approval by BHEL.

9. **TIME ALLOWED (Period of Contract)**

The following programme should be strictly followed.

1	After necessary approval of design as mentioned in this document, the load details and HD bolt spacing of column foundation (pedestal) has to be issued	Within two weeks from the date of LOI
2	Design and issue of holding down bolts	Progressively from the completion of first month of issue of LOI to suit uninterrupted progress by Civil contractor
3	Design, fabrication and supply of PEB components including accessories.	Progressively within 16 weeks of approval of drawing.
4	Painting and erection of PEB including roofing, side cladding and all accessories as in scope	Progressively within 16 weeks of receipt of first consignment at site

11. The contractor will have to provide and fix the necessary screed bars etc. at his own cost in proper line, level and position to facilitate the erection work. Further, the contractor should lay and maintain necessary temporary approaches within his working areas at his own cost to facilitate his work and for easy movement of vehicles, cranes etc. deployed on the work. Only reasonable areas will be provided by BHEL.

12. Till the expiry of the maintenance period of ONE YEAR after the completion of the entire contract work and handing over to BHEL, the contractor should retain the minimum equipments and staff required and should carry out the maintenance works with the least possible interference to the routine works of the new shop. Till the expiry of the maintenance period the contractor shall be responsible for all damages occurring due to any fault on his part or on the part of his workmen, sub-contractor or other agencies engaged by him.

13. BHEL shall have the right to take possession of or use any completed or partially completed part of the work. Such possession or use shall not be deemed to be acceptance of any work not in accordance with the contract.

14. The contractor shall observe all safety regulations and take necessary safety precautions as called for under the Factories Act or other relevant statute as applicable including the use of safety boots, safety belts, helmets and other equipments and accessories for ensuring safe execution of the contract and freedom from accidents.

15. The Contractor should co-operate with other contractors who may be executing their work in the same area in order to facilitate efficient execution of the entire project work in this area.

16. The Guarantee / Warranty period for this contract shall be ONE YEAR from the date of completion of the entire work and handing over to BHEL. During this period the successful tenderer shall be at site on his own expense for replacement or repair of all defects arising out of faulty materials and/or workmanship.

17. Further particulars relating to design, fabrication and clarifications, if any, may be obtained on reference to the Dy Gen Manager/Civil/Planning & Designs & QC or his nominee.

18. The contractor shall engage a level-II NDT Inspector for inspection of NDT works.

19. Inspection will be done by BHEL Staff/Agencies appointed by BHEL for the works covered in the tender.

20. Painting, DFT of primer should be 30/40 micron.

21. Finish coat Painting, DFT 40 micron for each coat. Paint shall be of first quality product of approved brand.

22. Pre heating and post heating required shall be as per AWS (latest).

23. Welder qualification is to be done before commencement of the work and approved & qualified welder only shall be engaged in work. Necessary testing charges shall be borne by the contractor.

24. For the supply of material the manufacturer's test certificate is to be produced.

GENERAL QUALITY CONTROL PROCEDURE FOR STRUCTURAL STEEL WORKS

The following quality standards are required to be maintained in all the structural steel fabrication components.

1. All the raw materials will be generally conform to IS 2062-2011 or equivalent.
2. The welding electrodes shall be kept in oven only.
3. 100% visual check shall be carried out for raw materials and welding on all components and the welding areas during inspection, to be tested for LPI / MPI / UT / Radiography / PWHT as provided in the Quality Control Procedure.
4. Base plate to column shall be perfectly checked for perpendicularity.
5. All the components shall be checked for dimension at fit-up stage itself before the commencement of welding operation.
6. Contractor shall buy & use Black Hex. bolts and nuts/HSFG bolts as per IS Specifications as detailed below for fabrication & erection of steel structures.

Black Hex Bolts	IS 1363 - 2002 Part – I (Class 8.8)
Black Hex Nuts	IS 1363 - 2002 Part - III
Plain MS washer	IS 2016 - 1967
Taper washer	IS 5372 - 1975
Spring washer	IS 3063 - 1994

7. Contractor shall buy & use the following welding consumables as detailed below:

a) SMAW

No.	Electrodes	Manufacturer
1.	E 6013 & E 7018	D & H Secheron
2.	E 6013 & E 7018	ESAB India Ltd.
3.	E 6013 & E 7018	Modi Arc Electrode Co.
4.	E 6013 & E 7018	D & H Welding Electrode (I) Ltd.
5.	E 6013 & E 7018	Mantek Electrods (P) Ltd.
6.	E 6013 & E 7018	Ador Welding Ltd.
7.	E 6013 & E 7018	Varun Electrodes Pvt. Ltd.

b) SAW Wire

Sl.No.	Brand	Manufacturer
1.	AUTO melt Grade A	Ador Welding
2.	Mantek Grade A	Mantek Wires
3.	Metaspool S1 dia. 4mm	Precision Wires
4.	OK Aut Rod 12.08 L	ESAB India Ltd.

c) Flux

Sl.No.	Brand	Manufacturer
1.	Super S41	Super Elec Inds
2.	Mantek 22	Mantek Welded Flux Co.
3.	RMH Auto Weld Grade 1	RMH Chemicals
4.	SWP 40 T	Super Weld Prod

d) GMAW (Co2)

Electrode	Brand	Manufacturer
ER70S-6 Co2 WIRE	Automig-1	Ador Welding Ltd.
ER70S-6 Co2 WIRE	Esab MW1	Esab India Ltd., Chennai
ER70S-6 Co2 WIRE	Mantek Mig	Mantek Wiress
ER70S-6 Co2 WIRE	Nouvarc	Nouveax Industries (P) Ltd., Kangayam
ER70S-6 Co2 WIRE	Autofil-6	Voltrac Electrode Pvt. Ltd., Tirupathi.
ER70S-6 Co2 WIRE	Prima Mig/Mag	Varun Electrodes Pvt. Ltd., Panipat.

8. Rolled steel sections of depth greater than 450mm need to be visually checked for lamination before the process of fabrication. The doubtful area to be tested for LPI and if lamination is found UT Test to be carried-out.

9. The welding code of practice, procedures, specifications for electrodes / consumables etc., for manual welding and auto welding shall conform to AWS D1.1/D1.1M:2008 (Latest) and as per the QCP issued by BHEL component-wise.

10. All the fabrication and erection works shall have to be executed as per the QP approved by BHEL.

11. All the fabrication and erection works will be inspected for Quality Control by a third party inspection agency as fixed by BHEL.

GENERAL CONDITIONS

1. No night work will be permitted without the written permission of the Engineer – in – charge.

2. Items of work other than those mentioned in the Bill of Quantities (Tender Schedule) attached hereto will be carried out at the rates to be fixed by this organization as per relevant clauses of the General Conditions of Contract.

3. The Contractor will have to make his own arrangements for water, electrical power & compressed air without any extra claims.

4. Permission for erection of temporary work sheds etc., at site will have to be obtained from BHEL in writing in advance.

5. The works contract to be entered into with the successful tenderer will be governed by the BHEL revised General Conditions of Contract in force.

6. The successful tenderer / Contractor shall observe all safety regulations and take necessary safety precaution as called for under the "BHEL General Conditions of Contract and Safety Precautions" enclosed herewith.

7. In all matters of dispute, the decision of the General Manager, Bharat Heavy Electricals Ltd., Tiruchirappalli – 620 014. shall be final and binding on the tenderer / contractor.

8. All the materials to be used in the work and nature of work shall conform to respective IS and National Buildings Organisation Standard Specifications and shall be got approved by the Engineer – in – charge before actual incorporation in the work

9. All materials brought by the Contractor for incorporation in the work shall be got inspected and approved by the Engineer-in-charge before they are incorporated in the work

10. The Site-in-charge / Civil or his duly authorized representative shall have all reasonable times access to Contractor's premises of work and shall have the power at all the reasonable times to inspect and test any portion of the work or examine the materials and workmanship of the structures during their manufacture and test. The contractor shall give due notice in writing to the Inspecting Engineer of BHEL when the materials supplied to be incorporated in the work are ready for Inspection and test. No material shall be incorporated in the work until the inspecting Engineer certified in writing that such materials have been inspected and approved by him.

11. The contractor should submit in advance every fortnight a detailed programme of work to be undertaken from time to time strictly in conformities with the "Time and Progress Chart" covering the entire constructed work and reschedule them wherever necessary during the progress of the work so as to achieve the target set.

12. The contractor should extend full co-operation to the other contractors who may be doing other works in the same areas to enable them to execute their portions of work without any delay or difficulty.

Terms and conditions regarding structural steel

The tender value includes cost of structural steel but excludes service tax.

Supply of materials like structural steel is also included in the scope of the contractor.

The supply of structural steel for the works by the tenderer should meet the minimum requirements as stipulated in the relevant IS codes / international codes.

Structural steel:

All Structural steel like angle, channels, beams, gusset plates, web plates, etc. meeting the minimum requirements as per IS 2062 Grade - E250 A/B/C shall be supplied and used in the fabrication after getting approval from the Site Engineer-in-charge.

The contractor has to submit the Drawing Office Dispatch List for the structural steel consumed in the fabrication and erection works separately and the payment will be made for the quantum of work done as per Drawing Office Dispatch List only. The allowance on invisible wastage for cutting and scrap should be taken care by the contractor in the quoted rate.

The quoted rate shall include all such contingencies. However, the contractor is expected to maintain proper accounts for material tallying.

Recommended Brand: SAIL / RINL / JSPL / TISCO / ESSAR Steel / ISPAT

The recommended brand also should meet the IS / relevant international codes requirements. The supply should accompany the Test Certificates meeting out the IS requirements. If warranted, the Site Engineer-in-charge may require to conduct the test at any point of time to verify the strength at the contractor's risk and cost.

The contractor should store all the materials brought inside the BHEL – PEFP Project site / complex for the works in proper stock yard to handle them in an easy manner and safe custody of contractor. BHEL will not be responsible for any loss / theft of contractors' material brought for the works.

The contractor should maintain proper accounts for cement, reinforcement steel and structural steel sections and other materials and these should be available at the site of work for verification and check by the Officials of this Organization at any time.

All materials brought by the Contractor for incorporation in the work shall be got inspected and approved by the Engineer-in-charge before they are incorporated in the work.

All the structural works including fabrication, erection etc., are subjected to inspection and clearance by BHEL or Third Party Agency as fixed by BHEL.

The contractor should use only the materials of brand and quality as approved by BHEL.

All materials and consumables brought by the contractor should have manufacturer's Test certificates.

For the materials supplied to BHEL works, all taxes including increase / revision in taxes (except service tax) shall be absorbed by the contractor. No extra claim on this account will be entertained. The quoted rate shall include all such contingencies

NOTE:

No advance / mobilization advance will be given and the part-payment or advance for raw materials brought by the successful tenderer will not be paid. The payment for the finished items of works only will be paid after incorporating the required raw materials into the work, if any.

GENERAL SAFETY PRECAUTIONS TO BE FOLLOWED AT WORK SITE DURING EXECUTION

The following safety measures should be strictly adhered to during execution of works at sites.

1. Providing the working platform with toe board and handrail for continuous working at heights.
2. Providing safety belt and life line at all times for men working at heights.
3. Providing dust or fume respirator in places where dust and fume concentration exists.
4. Providing goggles and welding screens.
5. Providing acid and alkali proof rubber gloves for handling acid and alkali and chemical which are corrosive.
6. Providing rubber gloves for working on electrical works.
7. Ensuring proper lashing of the components while being transported in vehicles.
8. The vehicles must have side supports or have body to support the materials conveyed.
9. The materials should not be allowed to extend or overflow the sides of the vehicles.
10. Materials should not be allowed to overhang from the rear edge of the body of the vehicle.
11. Driver of the vehicle must possess license.
12. Vehicle must not be overloaded prescribed limits.
13. Red flags and lights for parts projecting from the body of vehicle must be provided.
14. The speed restrictions within the factory premises must be strictly adhered to.
15. The gas cylinders must be always handled on trolleys or kept tied down not in use. They should never be rolled as Roller for conveying.
16. Cylinders should not be used without regulators.
17. All excavations must be barricaded and red lamps must be provided.
18. All electrical connections must be properly earthed.
19. No work should be taken up for execution inside shop floor, without obtaining necessary work permit.
20. Providing helmet, safety belt, etc., for high level work and sufficient number of Industrial Safety nets at appropriate level to safeguard the persons working at high level particularly nin trusses, girders, roofing etc., of industrial and high roof buildings.
21. The contractor should maintain a register regarding the driver license particulars.
22. All personal protective equipment conform with standard specification as per the details given in the code of conduct.

Contractor including their sub contractors, agents and labour engaged on the work are required to scrupulously adhere to the safety regulations, safety precautions and measurers. Any violation thereof will invite punitive action being taken against them. Also contractors with frequent violations of safety regulations will not be entrusted with further work in this organization.

SAFETY PRECAUTIONS TO BE OBSERVED WHILE TRANSPORTING MATERIALS

I. VEHICLE

1. Vehicles carrying material should have proper registration documents and must be produced on demand by our Security Staff.

2. The light on right side, i.e., over the drivers cabin shall be in working condition.

3. Both the head lights as well as park lamps must be in working conditions.

II. MOVEMENT OF VEHICLE

1. The vehicle should not travel at more than 20 km.ph in our premises.

2. The Driver of the vehicle must possess heavy duty licence and produce on demand by the Security Staff.

3. Vehicles carrying inflammable liquids in the tank containers should have grounding chain or the tank should be coated with insulating material also to avoid Static Electricity.

4. In road junctions, speed breakers and railway crossing, the speed should be lowered and vehicle should proceed cautiously.

5. The driving should 'KEEP TO THE LEFT' at all places.

6. The vehicle should not be parked in road which could obstruct the vehicular traffic.

7. No person other than driver should be allowed to sit or stand on the prime mover or trailer.

8. The vehicle should pass only through the approved routes. Short cuts should be forbidden.

9. There must be a safe distance behind another moving truck.

10. The driver should avoid making quick starts, jerky stops or quick turns at excessive speed.

III SHIPPING

1. Strong side supports should be provided on both sides of the trailer. The side supports should be fixed in such a way that it cannot be removed even temporarily.

2. Adequate packing must be given for easy slinging operation. The packing materials should be good enough to withstand the load.

3. The stacking of loads in the truck should be evenly placed. The load should not be heaped together or dumped over the chassis.

4. The loaded materials should be fastened tightly with 'WIRE ROPE'. Manila rope or coir rope should not at all be used. There must be side packing such as gunny or rubber tyre between the sharp edge of the job and wire rope in order to avoid cut in the wire rope.

5. There must be minimum two fastenings and it should be more in case of lengthier loads.

6. The wire rope should be in sound conditions i.e, there should not be links, knots or bristles etc.,

7. The wire rope ends should be clamped with 'U' clamps.

8. The load on the truck should not be beyond its standard capacity. The carrying capacity must be clearly marked on the trailer also.

9. The loose pieces should be bundled before loading on the truck.

10. There must be red flags or red lamps for the lengthy loads which extend beyond chassis.

11. The load should not be over hanging more than 3 ft. from the end of the body.

12. The materials should not be stacked too high to avoid hitting against live electric lines.

13. While transporting the scraps, there must be wire knitting cover to prevent falling of scrap.

IV GENERAL

The vehicles should not be moved directly inside the production building in case the materials are to be unloaded there. But the vehicle should be parked outside the building and the driver should ascertain the passage as well as the unloading points with the help of shop officials. This will avoid the congestion of blocking of traffic in the gangway.

TERMS AND CONDITIONS REGARDING COMPLIANCE WITH VARIOUS LABOUR LAWS BY THE CONTRACTORS FOR BHEL

1. The Contractor shall not employ in connection with the work any person who has not completed 18 years of age.

2. The Contractor shall in respect of labour employed by him either directly or through subcontractors, comply with or cause to be complied with the following statutory provisions and rules and in regard to all matters provided therein.

a) The Contract Labour (Regulation & Abolition) Act 1970 and the related Maharastra State Rules.
b) The Minimum Wages Act 1948 and the related Maharastra State Rules.
c) The Payment of Wages Act 1936 and the related Maharastra State Rules.
d) The Factories Act 1948 and the related Maharastra State Rules.
e) The Employee's Provident Fund & Miscellaneous Provisions Act 1952.
f) The Employees State Insurance Act 1948.
g) The Workmen Compensation Act 1923.
h) The Industrial Disputes Act 1947.
i) **The Payment of Bonus Act 1965**.
j) **BOCW Act**. 1996 and rules of 1998, etc.

and any other law or modifications to the above or to the Rules made thereunder from time to time.

REGISTRATION AND LICENSING

3. Every Contractor shall register his name with the Welfare Section of BHEL - PEFP Project site before taking up the work awarded to him by giving the following information and getting a Code Number :

a) The Name of the Contractor
b) Nature of Contract Work
c) Period of work
d) Number of maximum labour employed by him on any one day
e) License No. & Date (Applicable in case of contractor employing 20 or more workers)
f) Whether enrolled for PF, ESI, etc., and enrolment No.

If ESI is not applicable to the work site, the tenderer has to cover his all workmen including supervisors and executives with contractor's all risk insurance policies.

This information is called for, for the purpose of informing the Inspectorate of Factories whenever they call for information regarding contracts.

4. The Contractor employing 20 or more workmen is required to obtain license from the authorities (The Deputy Chief Inspector of Factories / Assistant Commissioner of Labour as the case may be). The license shall be amended and / or renewed wherever, there is an increase in the workmen employed by him or in the event of contract being extended or renewed. The Contractor shall inform the licence number to the BHEL Management before taking up the work.

5. The Contractor (Licensed or unlicensed) shall promptly furnish every information and document required by BHEL authorities for the purpose of fulfilling their obligations as Principal Employer and / or Occupier of the Factory and shall render all necessary assistance for the same.

WAGES

6. The tenderer has to ensure payment of Minimum Wages as per Maharastra State Minimum Wages including its periodical revision as applicable under law from time to time.

The labourers engaged in this contract shall be paid additional payment as mentioned below in addition to the payment of Minimum wages as stated above.

1. **Unskilled Worker** **Rs. 2000 per month**
2. **Semi-skilled Worker** **Rs. 2300 per month**
3. **Skilled Worker / Supervisor** **Rs. 2500 per month**

Also the labourers shall be paid a minimum bonus which shall be 8.33% as per the payment of Bonus Act 1965 for the total wages paid (i.e) Payment of minimum wages and additional payment as mentioned above.

The Contractor shall have to remit EPF & ESI contributions at the rates applicable under law to the authorities concerned for the total wages paid (i.e) Payment of minimum wages and additional payment as mentioned above.

If ESI is not applicable to the work site, the tenderer has to cover his all workmen including supervisors and executives with contractor's all risk insurance policies.

7. The Contractor shall fix wage periods in respect of which wages shall be payable. No wage period shall exceed one month.

8. The Contractor shall ensure payment of wages to the contract labour employed by him within three days from the end of wage period in case the wage period is one week or a fortnight and in all other cases before 10th day of the following month.

9. All Payment of wages shall be made on working days at the work site and during the working time and on date notified in advance. In case the work is completed before the expiry of the wage period final payment shall be made within 48 hours of the last working day.

10. Where the employment of any worker is terminated by or on behalf of the Contractor, the wages earned by him shall be paid before the expiry of the second working day from the day on which his employment is terminated.

11. Wages due to every worker shall be paid to him direct or to the person authorized by him in this behalf. All wages shall be paid in current coin or currency in both.

12. The Contractor shall ensure the disbursement of wages in the presence of such authorized representative of BHEL Management.

13. The above payment shall be verified by the authorized officer / representative of BHEL with the following certificate of the payment sheet "Certified that the amount shown in Column No……. has been paid to the workmen concerned in my presence on ……..at……

14. A certificate of payment shall be furnished in duplicate by the Contractor to the Engineer in charge each month in Form 'A'.

15. A notice showing the wage period and the place and time of disbursement of wages shall be displayed at the place of work and a copy to be sent to the Welfare Department by the Contractor under acknowledgement.

16. Notices showing the rate of wages, weekly rest days, hours of work, wage period, date of payment of wages, names and addresses of the Inspector having jurisdiction, the date of unpaid wages shall be displayed in Tamil and English in conspicuous places at the establishment and at work site by the Contractor. The Contractor shall inform the BHEL Management every month the details of contract labour engaged for contract in this following form :

a) Serial Number
b) Location
c) Period of work
d) No. of contract labour engaged during the month
e) No. of days worked
f) No. of men worked
g) Wages paid to workers

The above statement shall be furnished to BHEL Management at the end of every month.

REGISTERS AND RECORDS AND COLLECTION OF STATISTICS

17. The following documents / formats under Contract Labour (Regulation & Abolition) Act 1970 and Maharastra State Government Rules thereunder shall be maintained by each contractor.

a) Register of persons employed by the Contractor
b) Employment Card
c) Service Certificate
d) Muster Roll, Wage Register, Deduction Register, Wage slip, Overtime Register, Register of Fines, Register of Advances etc.,

18. The Contractor shall display the abstract of the Contract Labour (Regulation&Abolition) Act and the Rules thereunder both in English and Tamil.

19. Half yearly Return shall be sent by the Contractor in duplicate to the Licensing Officer.

20. The Contractor shall submit the returns required under the Contract Labour (Regulation & Abolition) Act 1970 periodically to BHEL Management.

21. The Contractor shall without fail give upto date information in writing of the attendance of the workers employed by him.

22. The Contractor shall ensure that his workers keep and produce their Employment Card when coming to duty and take them back when leaving duty.

23. All the above registers and records shall be preserved in original for a period of three years. All the registers, records and notice maintained under the Act and rules shall be produced on demand by Inspector or any authority under the Act.

WORKING HOURS AND WORKING CONDITIONS

24. No worker shall be required or allowed to work on Sunday unless he has or will have a holiday on anyone of the three days before or after the said day.

25. The Contractor shall inform BHEL Management in the prescribed form details of the contract workers scheduled to work on Sunday, the day of rest and also indicate the substituted holiday in lieu thereof. This shall be intimated two days in advance before his workmen are booked for work on Sunday.

26. The contract labour working for more than nine hours in any day or for more than 48 hours in any week shall be paid wages at the rate of twice the ordinary rate of wages in accordance with the provisions of Sections 59 of the Factories Act 1948.

27. The Contractor shall provide all safety devices and personal protective equipment to his workmen at his own cost and shall ensure that his workmen wear / use such devices or equipment provided to them while doing the work and there should not be any relaxation on this.

28. The Contractor shall give four paid National Holidays to his workers, viz., 26th January, 1st May, 15th August and 2nd October.

29. The Contractor shall ensure that his workmen vacate the premises after the shift is over.

30. The Contractor shall give leave with wages to his workmen who have worked for a period of 240 days or more in the Factory premises during a calendar year. This leave shall be allowed during the subsequent calendar year at the rate of one day for every 20 days of work performed by the worker during the previous calendar year. The worker whose services commences on a day other than the first of January shall be entitled to leave with wages at the above rate (One day for every 20 days of work) only if he had worked for a minimum of 2 /3 of the total number of days in the reminder of the calendar year. This leave will be admissible only during the subsequent calendar year.

31. No woman worker shall be required or allowed to work in the Factory except between the hours of 6.00 A.M. and 7.00 P.M.

32. The Contractor shall comply with the provisions relating to Welfare and Health facilities as provided in the Contract Labour (Regulation and Abolition) Act 1970 read with the Maharastra State Governments' Contract Labour Rules, if any.

NOTICE OF ACCIDENTS

33. Not-withstanding anything contrary to this, in the event of accident the contractor shall be required to fill injury report and submit the Engineer in charge immediately and ensure the compliances of ESI / Workmen's compensation Act, Factories Act and Rules made thereunder. He shall also maintain a register of accident as per the Act.

34. The Contractor shall get the contract labour engaged by him insured under Workmen's Compensation policy from General Insurance Corporation of India before actually starting the work of contract. The insurance coverage should be for the entire period of Contract. The Contract shall comply with the provisions of the Workmen's Compensation Act 1923. (This should be read in conjunction with the provisions of ESI Act)

COVERAGE UNDER THE ESI ACT / PF AND MISCELLANEOUS PROVISIONS ACT

35. The contractor shall ensure that all his workmen are covered under the Employee's State Insurance Act and produce to BHEL such Registration Number / Enrolment Number before executing the contract work.

If ESI is not applicable to the work site, the tenderer has to cover his all workmen including supervisors and executives with contractor's all risk insurance policies.

36. The Contractor shall regularly pay the amount of contribution. i.e., employer's contributions as well as employees' contribution pursuance of the above scheme as fixed from time to time. The Contribution payable presently is 1.75% wages to be recovered from his workmen and 4.75% of wages to be contributed by the Contractor. Contributions recovered from employee and contribution made by the contractor may be rounded to the next higher multiples of five paise.

37. The Contractor shall take note of any amendment that may be brought forth in the above contribution rate and act accordingly.

38. The contractor shall ensure that his workmen are covered under the EPF & Miscellaneous Provisions Act 1952 and accordingly produce to the BHEL Management the registration / enrolment number before awarding of contract work. As per the existing provisions every worker shall be entitled and required to become a member of the fund. The employee's contribution payable at present is 12% of wages which will be recovered by the contractor from the wages of his workmen and the contractor should pay equal contribution. The contractor is also liable to pay any administrative charges in this behalf that may be decided from time to time. It will be the responsibility of the contractor to ensure such contribution payable in respect of workmen employed through sub-contractors also.

39. The Contractor shall take note of any amendment in the rate of contribution payable under the scheme from time to time.

40. The Contractor shall within seven days of the close of every month submit to BHEL a statement showing the amount of contribution payable / paid for employees engaged by him or through him and shall also furnish to BHEL such information as Principal Employer is required to furnish under the provisions of the ESI Act and PF as well as the schemes made thereunder to the authorities concerned.

41. Whenever any sum of money is found to be recoverable from or payable by the contractor under the above Act, the sum shall be deducted from any sum that may be due or which at any time thereafter may become due to the Contractor under this contract or under any other contract or from his security deposit. In case the recoveries are not sufficient to satisfy the claim, the contractor shall pay the balance thereof on demand. In case any recoveries are made under this clause from security deposit, the contractor shall immediately thereafter pay such further sums as may be required to replenish the shortage caused by such recoveries in amount of security deposit.

42. The Contractor shall abide by all the labour and other laws applicable to contract labour / worker under this contract and shall at all times keep BHEL indemnified against all loses, claims, prosecutions under any law.

43. In case of non-compliance of any of the provisions of the Acts and in case BHEL having complied with the same, BHEL will be entitled to recover the same from the contractor / sub-contractor.

44. Non-exercise of any of the powers or rights available to BHEL hereunder or under any law, shall not in any way operate as waiver thereof.

Note : The Specimen forms for the following are available in BHEL.

1)	Form 'A'	-	Payment Certificate
2)	Form IV	-	Application for License
3)	Form XIII	-	Register of Workmen employed by contractor
4)	Form XIV	-	Employment Card
5)	Form XV	-	Service Certificate
6)	Form XVI	-	Muster Roll
7)	Form XVII	-	Register of wages
8)	Form XIX	-	Wage slip

SHEDULE 'A'

LIST OF WORKS AND PRICES

NAME OF WORK: Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.

DETAILS & QUANTITIES of each item of work shown in the BILL OF QUANTITIES are only approximate. They are given as a guide for the purpose of tendering only and are liable to variation and alteration of the Competent Authority. The work under each item as executed shall be measured and priced at the corresponding rate quoted by the contractor in the BILL OF QUANTITIES

Sl.No.	Description of work / supplied	Total amount of work / supplies (in figures and words) Rs. Ps.	Period of contract
1.	**Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.**		**10 MONTHS**

BILL OF QUANTITIES

Sl. No.	Appx. Qty.	Description of work	Rate (Both in Unit fig & Words	Amount Rs. Ps.

AS PER SEPARATE SHEETS ATTACHED CONTAINING **73** PAGES

FROM SERIAL No. **93 to 165 of Price Bid**

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI- 620 014

BILL OF QUANTITIES – PACKAGE – I PEB WORK

Name of work: Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, roof & side cladding, accessories, sky light panels, roof / turbo ventilators etc. of production shop floors for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.

Sl. No.	Quantity	Description of work	Rate (both in figures and in words)	Unit	Amount Rs. Ps.
1		**Design, fabrication supply and erection of pre-engineered structural steel shop floor Buildings including crane girder, roof & side cladding, accessories, sky light panels, roof / turbo ventilators etc. of production shop floors as per IS: 800-2007 and relevant codes for the following buildings all as per the technical and commercial specifications given in the tender documents and as per the attached drawings.**			
a	1	Bay A - 1 No of size 30 M x 240 M (8 @ 30M) with EOT crane capacity of 30T - 1 No, 20T - 1 No & 10 T – 2 Nos for the entire bay with the detailed scope of work specified in the tender document & attached drawings. The building shall be designed with a provision for future expansion.		LS	
b	5	Bays (in between A & B Bays) 5 Nos (Bay Nos.1 to 5) of each bay size: 30 M x 234 M (18 Bays @ 12M + 1 Bay @ 18M) with EOT crane capacity of 20 MT – 2 Nos + 10 MT – 1 No in Bay 1,3 & 4, 20 MT – 2 Nos + 10 MT – 2 Nos in Bay 2, 30 MT – 1 No + 20 MT – 1 No + 10 MT – 1 No in Bay 5 and Semi gantry crane of capacity 5 MT – 2 Nos - full length in bay 3 & 4 F row (except gangway) and 5 MT – 2 Nos - between column E9 to E21 in bay 5 with the detailed scope of work specified in the tender document & attached drawings. The building shall be designed with a provision for future expansion.		LS	

Sl. No.	Quantity	Description of work	Rate (both in figures and in words)	Unit	Amount Rs. Ps.
c	1	Bay B - 1 No of size 30 M x 240 M (8 @ 30M) with EOT crane capacity of 30T - 1 No (Future), 20T - 2 Nos & 10 T – 2 Nos for the entire bay with the detailed scope of work specified in the tender document & attached drawings. The building shall be designed with a provision for future expansion.		LS	

Total -- -- --

Applicable Service Tax @ % (Amount in Rs.) --

Grand Total -- --

(RUPEES …… ONLY)

NOTE

1 **The rate offered is for finished items of works and shall provide for the complete cost towards fuel, tools, tackles, plant & machinery, temporary works, labour, materials, levies, taxes, transport, lay-out, repairs, rectifications, maintenance till handing over, supervision, labour colonies, establishment, services, revenue expenses, overheads, profits & all other incidentals including insurance coverage for the total cost of the PEB structures, etc., complete.**

The rate quoted shall not include service tax and BOCW Cess. The service tax as applicable for this contract work and the same can be claimed from BHEL along with their monthly bills for further payment to be made to the authorities concerned. At present the rate of service tax is 4.944%. (Service tax + Edu. Cess+ Sec. Higher Edu. Cess). However the tenderer has to submit the service tax structure of applicability to their firm nature to arrive at the total cost to BHEL based on which the final award of work will be done. The contractor has to submit the payment challan as a documentary proof of having paid the service tax for the previous bill for which he has received the service tax payment along with the subsequent bill for which payment has to be processed.

The successful tenderer should remit 1% cess as per Building and Other Construction Workers Act 1996 as applicable to the authorities concerned from time to time. The same can be reimbursed from BHEL on production of valid documentary proof for having paid the 1% cess of the value of work done to the authorities concerned. As soon as the BHEL – PEFP Factory Registration obtained, the BOCW Act will not be applicable.

2 The period of contract is TEN months. The contractor is required to plan accordingly as indicated under Instructions to Tenderers.

3 The tenderer is required to provide breakup quantity & cost of the major components like structural steel, sheeting, polycarbonate sheet, ridge ventilator, turbo ventilator etc. for items 1(a), (b) & (c) separately, matching the quoted value to arrive at unit cost for payment purpose in the price bid cover

4 However no extra payment will be entertained on account of any increase in the indicated quantity subsequent to detailed Engineering and as supplied to site by the tenderer.

PACKAGE-II

HT SUBSTATION EQUIPMENT SUPPLY, ERECTION AND COMMISSIONING

PART B
Supply, installation, erection, testing and commissioning of Main Receiving Substations & CSS at PEFP Bhandara on Turnkey basis

Item: A Supply Items

S.No.	DESCRIPTION	QTY.	UNIT	RATE	AMOUNT
1	33/11KV 5 MVA Power transformer as per the technical specifications of Annexure-II.	2	No.		
2	Outdoor Plinth mounted type 1000 KVA, 11KV/415 Volts, Compact Substation (CSS) with Cast resin Transformer. Technical specifications for the CSS as Per Annexure-X.	10	No.		
3	24 Volts/ 100AH DC maintenance free Battery and Battery charger as per Annexure-IIIA & IIIB respectively.	6	No.		
4	50x6 mm size Hot dipped GI flat .MS flat shall conform to IS2062 &Galvanisation shall conform to IS4759.The thickness of the ZINC coating shall be min 80 microns with test certificate .	3000	Meters		
5	33 KV grade, 3 core 300 Sq.mm XLPE Cable with specification as per Annexure-IV.	500	Meters		
6	11 KV grade, 3 core 240 Sq.mm XLPE Cable with specification as per Annexure-V.	4000	Meters		
7	Heat Shrinkable Indoor end Termination Kit with suitable for 240sq mm 3 Core 11KV XLPE un earthed system cable indoor application. Cable Jointing kit should confirm to IS 13573-1982 and the offered joints should have been type tested by CPRI / ERDI.	12	No.		
8	Heat Shrinkable indoor/outdoor end Termination Kit suitable for 300sq mm 3 Core 33KV XLPE un earthed system cable. Cable Jointing kit should confirm to IS 13573-1982/relevent IS and the offered joints should have been type tested by CPRI / ERDI. Indoor--------- 10 nos Outdoor-------2 nos	12	No.		
9	Heat Shrinkable Straight through joint Kit with copper ferrule suitable for 240 Sq.mm 3 Core 11KV XLPE un earthed system cable. Cable Jointing kit should confirm to IS 13573-1982 and the offered joints should have been type tested by CPRI / ERDI.	10	No.		
10	Floor mounting cubicle type MV Switch gear panel (PCC) consisting of 19 nos of ACB breakers with technical specifications as per Annexure-VI	5	No.		

S.No.	DESCRIPTION	QTY.	UNIT	RATE	AMOUNT
11	Floor mounting detuned 300 KVAr APFC panels with technical specifications as per Annexure: VII	10	No.		
12	25 X 3 mm pure copper earth flat for earhing of lightning arrester to the earth pit.	500	Meters		
13	4 core 1.5 sqmm FRLS ISI marked copper conductor armoured cable for connecting auxillary relays and battery in SS.(200 m/ SS).	1000	Meters		
14	1100V 3.5C 185 Sqmm XLPE Armoured copper cable with technical specification as per Annexure-IX.	2000	Meters		
15	1100V 3.5 core 185sq.mm XLPE AA cable (for APFC panels) with technical specifications as per Annexure: VIII	1000	Meters		
16	Synthetic insulating mat as per IS: 15652-2006 as per the Annexure-XI. Note:- 1) The Synthetic insulating mat IS approved mark CPRI/ERDI tested should be supplied by contractor with TC 2)Size of mat required: a) 2.0mm Thick mat (for 415V)	75	Sq. Metre		
	b) 2.5mm Thick mat (for 11kV)	15	Sq. Metre		
	c) 3.0 mm thick mat (for 33kV)	10	Sq. Metre		
17	33kV indoor cubicle floor mounting type metering box confirming to MSEDCL norms equipped with 3 nos 33000/110V cast resin type PT and 200/5A cast resin type CT with suitable bus bar, connectors as per the Annexure-XII.	2	No.		
18	Supply of copper lightning arrester spike with complete set of 4 feet height copper tube of thickness/as per IS , one number bowl, one number copper base plate for earthing shopfloor and buildings.	10	No		
19	Supplying of the required substation tool & tackles and safety equipment as per Annexure-XIII.	2	Sets		
			TOTAL		

Item: B Service Work					
S.No.	**DESCRIPTION**	**QTY.**	**UNIT**	**RATE**	**AMOUNT**
1	Suppy & erection of 10 m long 152x152mm RSJ double pole structure consisting of 33 KV,600 A double breaking isolators along with Earth switch, 33 KV disc insulators, support insulators , 33 KV lightning arrestors, mechanical interlocks for OPEN/CLOSE of main poles (R Y B) and earthing , jumpering, angle iron supports, 2 nos. stay wires with guy insulators , painting ,earthing, bus conductors,stringing, steel member, fastners, clamps, etc as per the model drawing as per Annexure-I. Note: 1) The operation of the isolator with earth switch for trouble free operation for opening/closing should be ensured.	1	Lot		
2	Assembling ,Erection,testing and commissioning of BHEL make ,HT,33KV, Model VM36 VCB panel size 1300mm width x 1831mm Length x 2712mm Height and weight 1000kg (appx) at Main Receiving sub station on the RCC floor with supply of suitable foundation bolts, mounting on the floor/cable trench, grouting etc. The VCB panel interlinking bus bar/earth connections should be done after properly matching all the VCB's on the floor/cable trench. The Breakers shall be completely checked up for its wiring as per the supplier drawing, tightness, working of the spring closing mechanism as per the instruction of the Electrical incharge during the time of erection. Interlocking arrangement between the incoming breaker and the Isolator switch at douvle pole structure in MRSS to be done by the contractor. Note: VCB panel with trunking panel, interlinking bus bars only will be issued by BHEL at the site stores.	6	Sets		
3	Assembling ,Erection,testing and commissioning of BHEL make ,HT,11KV, Model VM12 VCB panel size 820mm width x 1831mm Length x 2712mm Height and weight 1000kg (appx) at Main Receiving sub station on the RCC floor with supply of suitable foundation bolts, mounting on the floor/cable trench, grouting etc. The VCB panel interlinking bus bar/earth connections should be done after properly matching all the VCB's on the floor/cable trench. The Breakers shall be completely checked up for its wiring as per the supplier drawing, tightness, working of the spring closing mechanism as per the instruction of the Electrical incharge during the time of erection. Interlocking arrangement between the 33kV transformer breaker and the transformer 11kV breaker in MRSS to be done by the contractor. Note: VCB panel with trunking panel, interlinking bus bars only will be issued by BHEL at the site stores.	12	Sets		

S.No.	DESCRIPTION	QTY.	UNIT	RATE	AMOUNT
4	Erection, testing & commissioning of 33/11KV, 5 MVA Power transformer . The erection of the traformer includes providing suitable concrete plinth . Note: Contractor should engage suitable mobile crane during erection	2	Nos.		
5	Foundation preparation and erection of chain link mesh of size 3 inch x 3 inch to a height of 2.4 mtr with supporting pole span of 3 meter using suitable ISI angle 50x50x6mm around the power transformer yard and double pole structure yard including painting, earthing etc. Suitable weld mesh door with frame work for transformer yard and double pole structure yard should be provided. The supporting angle should be grouted with suitable concrete mixture. 1)Chain link mesh to be earthed as per the IS standards. 2)Corners should be properly supported by suitable angles.	60	Meter		
6	Supply & spreading of 40mm size blue metal jelly in the transformer yard and double pole structure yard to a height of 150mm.	100	Sq. metre		
7	Construction of brick wall (fire wall) of dimensions 5m height x 5 m length x 0.3m width with necessary concrete foundation, masonry, finishing, whitewashing, painting, etc., along with suitable RCC column & beam.	2	Lot		
8	Excavation of earth and construction of burnt oil pit of size 2mx2mx2m, 150mm thick with RCC mix and connection should be made between TR-1 & TR-2 to Burnt oil pit with 6 inch PVC pipe to a length of 35 meters appx. including required bends and fixing on the ground with required slope to burnt oil pit. The pit should be covered with RCC slab and man hole to be provided	1	Set		
9	Erection, testing and commissioning of outdoor type 1000 KVA, 11KV/415 Volts, Compact Substation (CSS) with suitably positioning on the concrete foundation. Making end termination using the screened seperable termination kit (4 nos/SS). Note: 1)Crane facility to be provided by contractor. 2)Foundation required for the CSS will be done by BHEL.	10	Sets		
10	Erection, testing and commissioning of 24 Volts/ 100AH DC maintenance free Battery and Battery charger with supply of necessary angle iron frame works, etc on the floor/cable trench.	6	Sets		

S.No.	DESCRIPTION	QTY.	UNIT	RATE	AMOUNT
11	Supply & Providing earth electrodes as per IS standards as follows: Excavation of earth, supply and installation of earth electrode generally conforming to IS: 3043-1987. The electrode should be of 100 mm dia. C.I. pipe with suitable welded earth flat connecting arrangments, having wall thickness of 13 mm and height 2750 mm with supply and filling of alternate layers of Bentonite, river sand and charcoal around the electrode, construction of masonry chamber size of inner size 600mm x 600mm and RCC slab cover etc., with supply of masonry materials.Earth resistance value (to be measured using earth megger), earth electrode No. and date of inspection are to be painted inside the chamber wall and on the top of the cover. Earth electrode Locations: MRSS - 8 Nos SS1to5 - 50 Nos Metering point - 4 Nos Lightining Arrestors - 10 Nos **Total - 72 Nos** SPECIAL INSTRUCTIONS for making earth pits: a) Before commencement of work, contractor should discuss with Electrical in charge and finalise the location plan for the installation of earth electrodes. b) Contractor should fill earthing materials like bentonite, river sand, charcoal around electrode. c) Unique earth pit number should be allotted for every earth pit and same is to be painted with black colour paint on the inside wall of masonry chamber and cover. d) After erection of earth pit, the ohmic value to be measured and final report to be submitted. e) All the earthing works should be carried out in the presence of BHEL electrical staff.	72	No.		
12	Laying of 50 mm x 6 mm GI earth flat in formed/excavated trench/wall between the earth pit and the PCC. After laying,the earth flat should be connected with Earth electrode on one side and PCC on other side. All sub-items are under the contractor's scope.	3000	Meters		
13	Excavation of earth (ordinary soil) up to a depth of 1mtr, width 0.6mtr and with supply & laying of quality bricks (box type arrangement) , supply & filling with quality sand and closing the trench with excavated earth to make it good ,to facilitate cable laying. Note: Sand filling to be done with 0.075 m below the cable then cable laying,and then again sand filling to be done for 0.075m, arrangement of bricks in box type and then to be closed with the excavated earth.	6000	Meters		

S.No.	DESCRIPTION	QTY.	UNIT	RATE	AMOUNT
14	Removing and replacing back the RCC/ MS slabs/ plates over the formed cable trenches of width 0.3 to 1 meter, to facilitate laying or removal of 240 sq.mm HT XLPE cable.	3500	Meters		
15	Laying of Single runs of 33 KV, 3 core 300 Sq.mm XLPE Cable in already excavated trench/ open trench/ pipe.	500	Meters		
16	Laying of single run of 11 KV, 3 core 240 Sq.mm XLPE Cable in already excavated trench/ open trench/ pipe.	4000	Meters		
17	Making Indoor Cable End Termination for 11KV, 3 core 240 sq.mm XLPE cable using Heat shrinkable cable jointing Kit.	12	No.		
18	Making indoor/outdoor Cable End Termination for 33KV, 3 core 300 sq.mm XLPE cable using Indoor--------- 10 nos Outdoor-------2 nos Heat shrinkable cable jointing Kit.	12	No.		
19	Making Straight thru joint of 11KV, 3core 240 sq mm. XLPE cable using heat shrinkable straight through joint kit.	10	No.		
20	Erection, testing and commissioning of floor mounting cubicle type MV Switch gear (PCC) panel with supply of required foundation bolts ,grouting, earthing, mansionary works etc. During erection all the panel inner wirings should be checked up as per the drawings and other required interlocks and proper tightning, coupling the panel comparments bus bars. Minor touching up of panel painting, writing of the cables sizes of incomer & outgoings and feeder names etc should be carried out as per Engineer instructions at the time of commissioning.	5	Sets		
21	Erection, testing and commissioning of floor mounting detuned 300 KVAr APFC panels with supply of suitable foundation bolts, grouting, earthing, mansionary works etc.	10	No.		
22	Fixing of copper lightning arrester spike with complete set of 4 feet copper tube, one number bowl, one number copper base plate on the top of the building of height approx 15 M (for earthing shopfloor and buildings).	10	No.		
23	Laying of 25 X 3 mm electrical grade copper earth flat from the lightning arrester to the earth electrode with necessary support clamps (with porcelain bush insulator) on the truss / wall including terminating rigidly at both ends. 25 mtrs per lightning arrester (approximately). Total length = 250 metres. NOTE: - 1. Earth flat jointing with suitable size cadmium bolts is under the scope of contractor.	250	Meters		

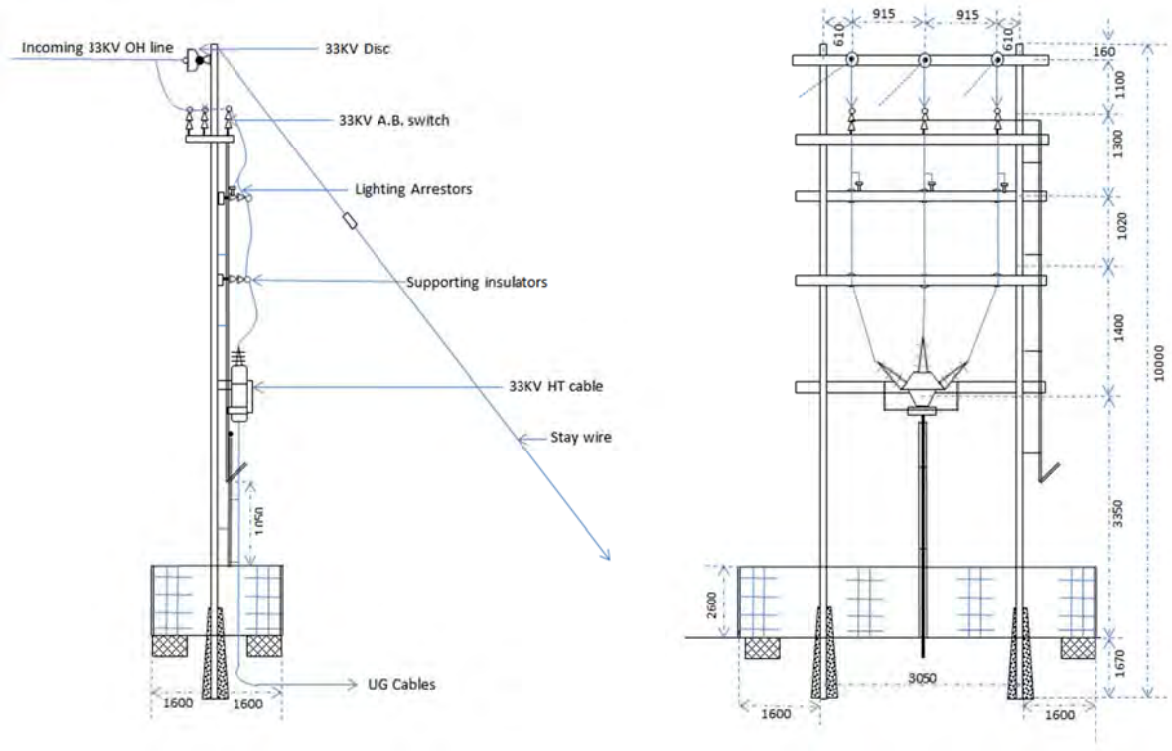
S.No.	DESCRIPTION	QTY.	UNIT	RATE	AMOUNT
	2. Skilled electricians with valid license and high roof level work experience should only be involved in this work. Before starting the work contractor should get safety clearance from the Electrical incharge 3. Earth pit value to be maintained and proved to be less than 1 ohm.				
24	Laying of 4 core 1.5 sqmm copper conductor armoured cable in the cellar room for connecting auxillary relays and battery in SS. 200 m/ SS approximately .	1000	Meters		
25	Supply & making end termination of 4 core 1.5 sqmm insulated copper conductor cable with supply of glands ,lugs , earthing etc. 40 Nos / SS approximately . Total : 200 Nos	200	No.		
26	Laying of 5 runs of medium voltage 3.5 Core 185 Sqmm XLPE Armoured copper cable between the CSS outgoing and MV switchgear incomer in the ground/formed trench. Total length:(5 runs of 80 mtr length for each SS) = 2000 meter	2000	Meters		
27	Supply of double compression brass cable gland, necessary cable termination copper lugs and making end termination of 3.5 Core 185 Sqmm XLPE Armoured copper cable at the CSS outgoing side and MV switchgear incomer side.	120	No.		
28	Supply of steel materials, fabrication and erection of necessary cable racks and supports in the cable cellar room using 100 X 50 mm M.S channel for vertical support, 50 X 50 X 6 mm angle, 25 X 3 mm M.S. Flat and 100 X 100 X 6 mm M.S. plate as per the instruction of electrical incharge. Cable rack drawing to be submitted by the contractor for the approval by BHEL. Cable tray should be in the dimension of 300mm and 600 width. Note: All sub-items including necessary MS Channel/ angle/ flat/base plate are under the scope of the contractor.	2000	Kg.		
29	Laying of single runs of 3.5 core 185sq.mm XLPE AA cable in the excavated trench/formed trench /wall(for APFC panels).	1000	Meters		
30	Supply of double compression brass cable gland, necessary cable termination aluminium lugs and making end termination of 3.5 Core 185 Sqmm XLPE Armoured alluminium cable at the MV switchgear outgoing end and APFC side.	70	No.		

S.No.	DESCRIPTION	QTY.	UNIT	RATE	AMOUNT
31	Laying and pasting of Synthetic insulating mat in front of newly commissioned HT switch gear and MV Panel in RSS ,SS 1 to SS 5. The insulating mat should be cut to the required length of the HT switch gear and MV Panel as per the insruction of the electrical incharge. Cleaning the surface of the floor by cleaning agent ,cutting the required size of the synthetic insulating mat and applying PEDILITE make SR998 / 998FW resin and pasting neatly on the floor in front of HT switch gear and MV Panels. Note:- 1)All other required materials including required qty. of cleaning agent ,PEDILITE make SR998 / 998FW resin and other materials are under the scope of the contractor.	100	Sq. Meter		
32	Installation of 33kV metering box at the identified location with required civil grouting.	2	No.		
	Special Instructions: Preparation of equipments layout drawings /single line diagrams incorporating all the supplied and installed equipments in this order and obtain necessary approval as per IE rules 1956/ Electricity Act 2003 and Safety Act 2010. The safety certificate from the Central Electrical authority for energising the equipments has to be obtained. Scope includes submission of application, completion certificate, valid ESA licence and coordination with the inspection of officials of CEA or any other statutory requirements applicable for the approval of all substations and allied installations.	Vendor to confirm			
	1. The contractor should supply necessary civil materials for grouting, floor concreting etc. 2. Cable tags should be provided for all power and control cables. 3. Letter painting work in all panels mentioning the cable size, bus bar arrangement identification of the breaker etc should be done by the contractor as per the instruction of Electrical in charge. 4. Electric Power for welding and other erection purpose in contractor scope. 5. All the tools including Welding m/c, welding consumables, gas cutting set, regulator, etc., are under contractors scope.. 6. Any clarification & modification of the work should be directly discussed with the Electrical In charge. 7. Minor paint touching should be done in the panel for damages caused during transport are under contractors scope. 8.Storing, unloading, transportation of the electrical equipment/materials to specified location are in the contractor scope. 9.The contractor should get proper registration/permission from the security Gate/ personnel while taking their supply materials inside and outside the site. They should maintain an invoivce register ,which is liable for inspection by the BHEL authorities 10. Crane facility required for Unloading/movement of the equipment are in contractor scope. 11. Any other misellanious items necessary for the erection, tesing and commissioning is in the scope of contractor. 12. All the cable glands should be earthed with suitable copper bare conductor				

	General instructions to the Tenderers: 1. All the equipment supplied like power transformer, switchgear, cables are required along with the routine test certificates for obtaining the Statutory approvals. 2. Pre-despatch Inspection should be offered for the equipment like power transformer, CSS, cables, MV switchgear, APFC panels, etc. 4. Contractor should clearly mention the point to point confirmation of the specifications mentioned in the Annexures for all the items. 5. Quoted electrical equipments like power transformer, MV switchgear, APFC panel, battery and battery chargher should be supported with the performance certificate from the earlier customers for its satisfactory performance for a minmum period of 2 years of similar or higher capacity/size items. 6. Necessary drawing/GTP approval should be obtained from BHEL Engineer In-charge for quoted items like Power transformer, CSS, MV switchgear, APFC panels, battery chargers, cables etc. 7. All the electrical substation works should be carried out as per MSEDCL/Indian electricity rules & regulations/all applicab;e Indian Standards, guides, quotes etc. 8. Complete postal address of the customer along with the year of commissioning where similar kind of work is carried out. 9. Name, designation and contact details of the customers where similar kind of work is carried out.	Vendor to confirm		
	10. For the safety of the working personnel/staffs using of the Personal Protective Equipment (PPE) is to be strictly followed by the contractor. Necessary exclusive safety officer has to be deputed by the contractor to ensure the safe working environment. 11. For the erection of the items, quantity on Pro-Rata basis to be considered.			
	12.With regard to civil works what ever explicitly mentioned in the specifications should be carried out and as well as over and above if it is required for system completion it should be in the bidder scope.			
	<u>Note:</u> **Incase of any quantity over & above the tolerance limit (of +10%) during the commissioning period (not exceeding 6 months), the vendor may confirm their willingness to supply the same at the original rate mentioned in the offer.**	Vendor to confirm		

ANNEXURE-I

DOUBLE POLE STRUCTURE MODEL DIAGRAM



ANNEXURE-II
TECHNICAL SPECIFICATIONS FOR 5 MVA 33/11KV OIL IMMERESED TRANSFORMER

Sl. No	Description/Specifications	Vendor to confirm	Deviations
1.0	Supply of 33/11kV 5MVA oil immersed transformer with OLTC confirming to Specification: IS 2026-1977 (Part I to V) and below specifications:	Vendor to confirm	
1.1	Type	: Two winding Transformer	
1.2	Primary Voltage	: 33kV (Delta)	
1.3	Secondary Voltage	: 11kV (Star)	
1.4	No. of Phases	: 3	
1.5	Frequency	: 50 Hz	
1.6	Power Rating	: 5 MVA	
1.7	Transformer Connection	: Dyn 11	
1.8	Winding	: Copper	
1.9	Type of cooling	: ONAN	
1.10	Tap Changer	: On load tap changer +5% to -15% in steps of 1.25 % (17 Taps) with RTCC panel. -Outside main tank mounted type OLTC	
1.11	Make & model of the OLTC	Vendor to confirm	
1.12	Performance certificate from the OLTC manufacturer		
1.13	Application	: Outdoor application	
1.14	Cooling Equipment	: Radiators	
1.15	Primary Terminals Type	: Cable Adapter Box	
1.16	Secondary Terminal	: Cable Adapter Box	
1.17	Suitability	: To suit Parallel operation	
1.18	Max. ambient temperature	: 50 deg. C	
1.19	% Impedance at rated current	Vendor to confirm	
1.20	Value of load and no load loss	Vendor to confirm	
1.21	Details of aux. Power supply	Vendor to confirm	
1.22	Insulation level for each winding (Power frequency & Impulse)	Vendor to confirm	
2.00	Protection Devices and accessories:	Vendor to confirm	
2.1	Oil surge relay / Buchholz relay	Vendor to confirm	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
2.2	Pressure relief valve/ Explosion vent	Vendor to confirm	
2.3	Dehydrating Breather	Vendor to confirm	
2.4	Temperature Indicator to indicate oil and winding temperature and to operate an alarm/ trip circuit at preset temperatures.	Vendor to confirm	
2.5	Oil level indicators	Vendor to confirm	
2.6	Insulating silicon oil as per IS:335-1993.	Vendor to confirm	
2.7	Conservator tank	Vendor to confirm	
2.8	Oil drain Valve	Vendor to confirm	
2.9	Air release device	Vendor to confirm	
2.10	Oil filling hole with cover	Vendor to confirm	
2.11	Filter Valve	Vendor to confirm	
2.12	Lifting lugs	Vendor to confirm	
2.13	Jacking lugs	Vendor to confirm	
2.14	Rollers/skids	Vendor to confirm	
2.15	Inspection cover	Vendor to confirm	
2.16	Rating Plate	Vendor to confirm	
2.17	Terminal Marking Plate	Vendor to confirm	
2.18	Two Earthing Terminals	Vendor to confirm	
2.19	Nitrogen Fire fighting system for the transformer	Vendor to confirm	
2.20	Tests and Measurements	: As per IS:2026	
2.21	3 sets of operation and maintenance manual should be submitted along with a copy of the routine test certificate for the BOI.	Vendor to confirm	
3	Preferred Makes	EMCO Limited, Kanohar Electricals Ltd., KRYFS Power Components Ltd., Marsons Limited, Southern Power Equipment Company Pvt Ltd., Schneider Electric Infrastructure Limited, Transformers and Rectifiers (India) Ltd., Technical Assosiates Ltd., Universal Power Transformers Pvt Ltd., Voltamp Transformers Ltd. ABB India Ltd, , SIEMENS, General Electric.	

ANNEXURE-IIIA
TECHNICAL SPECIFICATIONS FOR 24 V MAINTENANCE FREE BATTERIES

Sl. No	Description/Specifications	Vendor to confirm	Deviations
1.0	**Battery Particulars:**		
1.1	Battery Type	Maintenance free Valve Regulated Lead Acid (MF-VRLA).	
1.2	Battery Rating	24V-100Ah to 1.75 ECV C10 at 27°C.	
1.3	Manufacturers cell Designation.	Vendor to specify	
1.4	No of Cells	12	
1.5	Cell Dimensions	(82.0X170.0X215.0) mm Approx.	
1.6	Single cell Weight	6.5Kg Approx.	
1.7	Battery bank dimensions	(746X350X495) mm Approx.	
1.8	Battery bank weight	95 kg Approx.	
2.0	**Charge Regime**		
2.1	Float charging Voltage	2.23-2.25 volts per cell	
2.2	Boost charging voltage	2.30 volts per cell	
2.3	Current limit	Minimum 10 Amps to Max 20 Amps.	
3.0	**Battery Details:**		
3.1	AH efficiency	Above 90%	
3.2	WH efficiency	Above 80%	
3.3	Self Discharge/Week	<1% of rated capacity	
3.4	Max allowable Ambient Temp. at which cell can safely operate.	55°C continuous & 70°C short time	
3.5	Recommended max period of storage.	Vendor to specify	
3.6	Material of container	polypropylene co-polymer.	
3.7	Type of separator	Highly absorbent Micro porous spun glass matrix(AGM).	
3.8	Type of +ve & -ve plates	Flat pasted	
3.9	Material of tray	Mild steel coated with acid resistance paint.	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
3.10	Method of connection between cells	Bolted	
3.11	Voltage ripple allowable	<2% of the RMS value	
3.12	Type of connectors	Lead coated Heavy duty copper strips	
3.13	cycle life of Battery at 27°C	2000 cycles for 50% Depth of Discharge(DOD) (or) 1200 cycles for 81% Depth of Discharge.	
3.14	Suitable rack assembly with provision for vertical stacking to be provided.	Vendor to confirm	
3.15	Safety valve	Pressure regulated, self re-sealing, explosion proof.	
3.16	Battery Terminals	Lead terminal with highly conductive copper inserts for high current discharge.	
3.17	Container	Hermatically sealed	
3.18	Status of supply	Supply in charged condition and ready to use.	
3.19	Battery to be Eco friendly with no emission of corrosive fumes or gases in normal operating conditions.	Vendor to confirm	
4.0	Technical leaflet indicting the features, dimensions, Model number to be enclosed with the offer.	Vendor to confirm	
5.0	3 sets of Operation, Maintenance manual in English Required with each battery set	Vendor to confirm	
6.0	Note: Point by point confirmation is required from the supplier otherwise the offer will not be considered	Vendor to confirm	
7	Preferred makes of Battery	Exide Industries Ltd, HBL Power Systems Ltd, Hoppecke Batterien GMBH & CO.KG, Amara Raja batteries.	

Annexure-IIIB			
Technical Specification for 24 V Battery Charger			
Sl. No	**Description/Specifications**	**Vendor to confirm**	**Deviations**
1.0	Charger Type	Float cum Boost charger	
2.0	Charger Rating.	Suitable for 24V,100AH battery.	
3.0	**AC Input Supply Details.**		
3.1	Voltage	230V +/- 10%	
3.2	Frequency	50HZ +/- 5%	
3.3	Phase	Single phase	
4.0	**DC Output details.**		
4.1	Nominal Voltage	24v, DC	
4.2	Float Voltage	Vendor to specify	
4.3	Boost Voltage	Vendor to specify	
4.4	Ripple Content.	3% RMS or better	
5.0	**Meters :**		
5.1	DC Voltmeter with charger / Battey selector switch.	Vendor to confirm	
5.2	Charger output Ammeter.	Vendor to confirm	
6.0	**Indication Lamps :**		
6.1	Lamp for input mains availability(LED)	Vendor to confirm	
6.2	LED indications for charger ON, Float ON, Boost ON, Over Voltage.	Vendor to confirm	
7.0	**Circuit Protections** :		
7.1	AC Input Circuit Breakers(MCB of reputed make acceptable to BHEL).	Vendor to confirm	
7.2	Semi Conductor fuses for bridge circuit.	Vendor to confirm	
7.3	DC overload protection.	Vendor to confirm	
7.4	DC Output Circuit Breaker.(MCB of reputed make acceptable to BHEL)	Vendor to confirm	
8.0	Controls.		
8.1	Float Voltage adjust potentiometer	Vendor to confirm	
8.2	Boost Voltage adjust potentiometer.	Vendor to confirm	
8.3	Float / Boost selector switch.	Vendor to confirm	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
9.0	Free standing steel cabinet with provision for bottom cable entry and enamel painting or powder coating.(500mm stand to support the cabinet).	Vendor to confirm	
10.0	Technical leaflet indicating the features, dimensions, Model number to be enclosed with the offer.	Vendor to confirm	
11.0	3 sets of Operation,Maintenance manual in English.wiring diagram& circuit details to be supplied along with the charger Required with each panel. Single copy of make,rating details,technical details and catalogue of all the bought out items used in the panel.	Vendor to confirm	
12.0	Note: Point by point confirmation is required from the supplier otherwise the offer will not be considered.	Vendor to confirm	
13	Preferred makes:	Amara Raja Power systems limited, Chhabi Electricals pvt.ltd., Chloride power systems & solutions limited, Dubas Engg pvt ltd, HBL Power systems ltd, Mass-Tech controls pvt.ltd., Statcon Power controls ltd, ICD	

ANNEXURE-IV
TECHNICAL SPECIFICATIONS FOR THE 33kV, 3Cx300 Sqmm XLPE CABLE

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of High Voltage, 33 KV- XLPE insulated PVC inner / outer sheathed Aluminium armoured Power Cable conforming to the specification given below.		
1	**High Voltage Power Cable :**		
1.1	Normal area of conductor	300sq.mm	
1.2	Number of cores	3core	
1.3	Voltage Rating	33KV, 50Hz. A.C.	
1.4	Type of system	unearthed	
1.5	**Conductor:**		
1.5.1	Material	Strandard circular Aluminium conductor as per IS:8130-1984	
1.5.2	Conductor Screen Material	Non- metallic semiconducting tape or extruded semiconducting material.	
1.5.3	Min number of Strands	30	
1.6	Insulation:		
1.6.1	Material & Type	XLPE as per IS:7098-Part-2 of 1985.	
1.6.2	Nominal thickness of Insulation in mm.	8.8	
1.6.3	Core Identification	Coloured strips applied on the core.	
1.6.4	Insulation Screen	Extruded semiconducting material.	
1.6.5	Metallic Copper Tape	Vendor to specify	
1.7	Innersheath:		
1.7.1	Material	Extruded PVC type ST-2 as per IS:5381	
1.7.2	Nominal thickness of inner sheath in mm.	0.7mm	
1.8	Armour :		
1.8.1	Material	Galavanished steel flat strip as per IS: 3975	
1.8.2	Normal strip size in mm	4X0.8	
1.9	Outersheath:		
1.9.1	Material.	PVC compound type - ST2of IS:5831/1984	
1.9.2	Minimum thickness in mm	3.00 mm (Min.)	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
1.10	Conformance to Indian Standard Specification	IS:7098(Part-2)-1985	
2	Technical leaflet of the cable indicating the approx diameter, weight, thickness of insulation / sheathing / armour wire, current rating etc. to be enclosed with the offer.	Vendor to furnish	
3	General Features of the H V Cable:		
3.1	Cable shall have the manufacturer name embossed / printed / idented on the outer sheath at regular intervels.	Vendor to confirm	
3.2	Cable shall have voltage grade, cable size embossed on the outer sheath.	Vendor to confirm	
3.3	Routine tests shall be conducted on the cables as per IS and test certificate shall be produced against supply.	Vendor to confirm	
3.4	CPRI/ERDA test certificates for 33KV XLPE cables of IS 7098 Part II 1988: shall be attached along with the offer.	Vendor to confirm	
3.5	Length variation in the quantity of supply if any.	Vendor to specify	
3.6	Cable length shall be of 500Mtrs per Drum	Vendor to confirm	
4	3 copy of make,rating,details,technical details along with the materials required.		
5	Special Note:Point to point confirmation is required from the supplier technical suitability, otherwise the offer will not be considered.	Vendor to confirm	
6	Preferred makes:	APAR industries limited, Cable corporation of india ltd., Diamond power infrastructure ltd, Hindusthan vidyut products ltd., Havells india limited, kei industries ltd., Krishna electrical industries ltd., KEC International limited, Nicco corporation ltd., Paramount communications ltd., Polycab wires pvt. ltd., Ravin cables limited, Sriram cables pvt. ltd., Torrent cables ltd., Universal cables ltd.	

ANNEXURE-V
TECHNICAL SPECIFICATIONS FOR THE 11kV, 3Cx240 Sqmm XLPE CABLE

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of High Voltage,11 KV- XLPE insulated PVC inner / outer sheathed Aluminium armoured Power Cable conforming to the specification given below.		
1	**High Voltage Power Cable :**		
1.1	Normal area of conductor	240sq.mm	
1.2	Number of cores	3core	
1.3	Voltage Rating	11KV, 50Hz. A.C.	
1.4	Type of system	unearthed	
1.5	**Conductor:**		
1.5.1	Material	Strandard circular Aluminium conductor as per IS:8130-1984	
1.5.2	Conductor Screen Material	Non- metallic semiconducting tape or extruded semiconducting material.	
1.5.3	Min number of Strands	30	
1.6	**Insulation:**		
1.6.1	Material & Type	XLPE as per IS:7098-Part-2 of 1985.	
1.6.2	Nominal thickness of Insulation in mm.	5.5	
1.6.3	Core Identification	Coloured strips applied on the core.	
1.6.4	Insulation Screen	Extruded semiconducting material.	
1.6.5	Metallic Copper Tape	Vendor to specify	
1.7	**Innersheath:**		
1.7.1	Material	Extruded PVC type ST-2 as per IS:5381	
1.7.2	Nominal thickness of inner sheath in mm.	0.7mm	
1.8	Armour :		
1.8.1	Material	Galavanished steel flat strip as per IS: 3975	
1.8.2	Normal strip size in mm	4X0.8	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
1.9	**Outersheath:**		
1.9.1	Material.	PVC compound type - ST2of IS:5831/1984	
1.9.2	Minimum thickness in mm	2.84 mm (Min.)	
1.10	Conformance to Indian Standard Specification	IS:7098(Part-2)-1985	
2	Technical leaflet of the cable indicating the approx diameter, weight, thickness of insulation / sheathing / armour wire, current rating etc. to be enclosed with the offer.	Vendor to furnish	
3	General Features of the H V Cable:		
3.1	Cable shall have the manufacturer name embossed / printed / idented on the outer sheath at regular intervels.	Vendor to confirm	
3.2	Cable shall have voltage grade, cable size embossed on the outer sheath.	Vendor to confirm	
3.3	Routine tests shall be conducted on the cables as per IS and test certificate shall be produced against supply.	Vendor to confirm	
3.4	CPRI/ERDA test certificates for 11KV XLPE cables of IS 7098 Part II 1988: shall be attached along with the offer.	Vendor to confirm	
3.5	Length variation in the quantity of supply if any.	Vendor to specify	
3.6	Cable length shall be of 500Mtrs per Drum	Vendor to confirm	
4	3 copy of make,rating,details,technical details along with the materials required.		
5	Special Note:Point to point confirmation is required from the supplier technical suitability, otherwise the offer will not be considered.	Vendor to confirm	
6	Preferred makes:	APAR industries limited, Cable corporation of india ltd., Diamond power infrastructure ltd, Hindusthan vidyut products ltd., Havells india limited, kei industries ltd., Krishna electrical industries ltd., KEC International limited, Nicco corporation ltd., Paramount communications ltd., Polycab wires pvt. ltd., Ravin cables limited, Sriram cables pvt. ltd., Torrent cables ltd., Universal cables ltd.	

ANNEXURE-VI
TECHNICAL SPECIFICATION FOR MV SWITCH GEAR PANEL

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Design., manufacture and supply of Medium Voltage, floor mounting, free standing, indoor, cubicle type switchgear panel comprising Air Circuit Breaker feeder and conforming to the specification and features given below.		
1.0	Air Circuit Breaker Make : L & T or GE or SIEMENS or SCHNIEDER or ABB.	Vendor to confirm	
2.0	**Incomer Breaker** : 2000A, 415V, Three Phase and neutral, draw-out type, true, trip free, electrically operated spring closing type, Air Circuit Breakers having 24 V DC shunt trip, emergency hand trip, 4No + 4NC auxiliary contacts, ON / OFF mechanical indication, Integral self powered current release, current transformers of required quantity, burden and accuracy for metering and for protection and confirming to IEC 60947 /2 / IS 13947 (Part 2). **Quantity - 2 Nos**.	Vendor to confirm	
3.0	**Outgoing Breaker** : 1000A, 415V, Three Phase and neutral, draw-out type, true, trip free, electrically operated spring closing type, Air Circuit Breakers having 24V DC shunt trip, emergency hand trip, 4No + 4NC auxiliary contacts, ON / OFF mechanical indication, Integral self powered current release, current transformers of required quantity, burden and accuracy for metering and for Protection and confirming to IEC 60947 /2 / IS 13947 (Part 2). **Quantity - 16 Nos**.	Vendor to confirm	
3.1	**Bus coupler Breaker (ACB):** 2000A, 415V, Three Phase and neutral, draw-out type, true, trip free, electrically operated spring closing type, Air Circuit Breakers having 24V DC shunt trip, emergency hand trip, 4No + 4NC auxiliary contacts, ON / OFF mechanical indication and confirming to IEC 60947 /2 / IS 13947 (Part 2) **Quantity - 1 No.**		

Sl. No	Description/Specifications	Vendor to confirm	Deviations
4.0	**Bubars 2000A, TPN aluminium busbars.**(Size -2 runs of 100mmx10mm for phase & 1 run of 100mmx10mm for neutral.)		
5.0	**INCOMER BREAKER PANEL SPECIFICATIONS.**		
5.1	Air Circuit Breaker rated current, Voltage, short circuit breaking capcity.	2000A,415V,75KA	
5.2	Current Transformer Ratio	2000/5A for incomer & main bus bar CT.	
5.3	C T Make(reputed make accepted by BHEL)	Vendor to specify	
5.4	Digital multifunction meter of class 1.0 to show the readings of Voltage, Current, Power,PF, frequency and %THD of voltage & current.Required makes of CONSERV,L&T,AE, SECURE , ELmeasure, RISHAB along with RS 485 communication port.	Vendor to specify	
5.5	Digital multi function meter make:	Vendor to specify	
5.6	Voltmeter detail(reputed make accepted by BHEL).	Analog type, 0-500V, 96mm square, accuracy class 1.0	
5.7	Voltmeter Selector switch make.	Vendor to specify	
5.8	Digital type Three Phase Over Current & Earth fault Relays with High set Communication and breaker control. (L&T, ABB, C&S, SIEMENS, SCHNEIDER or other reputed make accepted by BHEL).	Vendor to specify the make & model no with cataloque.	
5.9	Energy Meter 3 phase, 4 wire, 5A, Class 1.0 Digital meter of reputed make acceptable to BHEL with RS 485 communication port- (L&T, ABB, C&S, SIEMENS, SCHNEIDER or other reputed make accepted by BHEL).	Vendor to specify the make & model no with cataloque.	
5.10	Indication lamp for panel (R,Y,B, ON, OFF & TRIP)	LED type	
5.11	Cable Entry (Detachable type)	Aluminium, PVC armoured cables, bottom entry.	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
6	**OUT GOING BREAKER PANEL SPECIFICATIONS**		
6.1	Air Circuit Breaker rated current, Voltage, short circuit breaking capcity.	1000A, 415V, 50KA as specified.	
6.2	Current Transformer Ratio	1000 /5A	
6.3	C T Make(reputed make accepted by BHEL)	Vendor to specify	
6.4	Digital multifunction meter of class 1.0 to show the readings of Voltage, Current, Power,PF, frequency and %THD of voltage & current.Required makes of CONSERV,L&T,AE, SECURE , ELmeasure, RISHAB along with RS 485 communication port.	Vendor to specify	
6.5	Energy Meter 3 phase, 4 wire, 5A, Class 1.0 Digital meter of reputed make acceptable to BHEL with RS 485 communication port- (L&T, ABB, C&S, SIEMENS, SCHNEIDER or other reputed make accepted by BHEL).	Vendor to specify the make & model no with cataloque	
6.6	Digital type Three Phase Over Current & Earth fault Relays with High set Communication and breaker control. (L&T, ABB, C&S, SIEMENS, SCHNEIDER or other reputed make accepted by BHEL).	Vendor to specify	
6.7	Indication lamp for panel (ON, OFF & TRIP)	LED type	
6.8	Cable Entry (Detachable type)	PVCAA - PVC Aluminium armoured cables, bottom entry.	
7.0	BUS COUPLER BREAKER PANEL SPECIFICATIONS		
7.1	Air Circuit Breaker rated current, Voltage, short circuit breaking capcity.	2000A, 415V, 50KA as specified.	
7.2	Indication lamp for panel (ON, OFF & TRIP)	LED type	
8.0	Specification for MV Switchgear Panel.	Vendor to specify	
8.1	Approx. overall dimensions of the Panel(Max-7000mm length, 1500mm depth & 2200mm height acceptable).	Vendor to specify	
8.2	Make of the accessories in the panel, type, no of ACB, technical leaflet of the ACB and protection release, copy of the type test report of the ACB to be furnished in the offer.	Vendor to confirm	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
9.0	3 sets of O & M manual for each panel including spare parts list for the breakers and panel, general arrangement, drawing, power schematic drawing wiring diagram shall be supplied along with the panel.	Vendor to confirm	
10.0	General Features.		
10.1	The panel shall be of modular construction, Incomer feeder & bus coupler panels shall house one ACB whereas outgoing feeder panels shall house two Air Circuit Breakers in two-tier formation along with busbars, metering and other accessories. Sufficient space for maintenance shall be provided in the panel.	Vendor to confirm	
10.2	Bus bars shall be made of high conductivity alluminium alloy with adequate cross section to operate at low operating temperatures. Busbars including neutral and earth bars shall be short circuit tested as per IS: 8623 for a fault withstand level of 75 KA for one second and CPRI/ERDA/Govt.approved Test centre test certificate should be enclosed.	Vendor to confirm	
10.3	The neutral busbars shall have a continuous current rating of 50% of the phase busbars. All busbars shall be insulated with heat shrinkable insulating sleeve, colour coded for easy identification of individual phases and neutral.	Vendor to confirm	
10.4	The earth busbar of size 50x6 mm copper shall run through out the length of the switch board and be terminated at the two ends with cable eyes.	Vendor to confirm	
10.5	High tensile bolts and spring washers shall be provided on all busbars and connection joints.	Vendor to confirm	
10.6	All sheet steel work used in the panels shall undergo a rigorous metal treatment process involving alkaline degreasing descaling in dilute sulphuric acid, phaspating and painting.	Vendor to confirm	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
10.7	The panel shall have cable chamber housing with cable suitable supports, end connections and power / control cable terminations. Adequate safety shall be provided for working in one vertical section without accidental contact with the live parts in an adjacent section.	Vendor to confirm	
10.8	Adequate number of cable riser supports shall be provided to withstand rated short circuit current.	Vendor to confirm	
10.9	Front and rear doors shall be fitted with dust excluded neoprene gaskets with vermin proof.(protection of IP20)	Vendor to confirm	
10.10	External aperture for ventilation shall be covered with a perforated sheet to prevent entry of vermin.	Vendor to confirm	
10.11	The ACBs shall have three distinct positions i.e. service, test and isolated with position indicators. (Mech/elec)	Vendor to confirm	
10.12	Automatic shutters shall be provided to screen the live parts when the breaker is drawn out of the cubicle.	Vendor to confirm	
10.13	The ACB shall be equipped with an integral self powered microprocessor based current release, which works on true RMS values for ensuring accurate protection, Overload, selective short circuit, instantaneous circuit and earth fault protections shall be provided along with the LED indication/LCD screen. The protection unit should confirm to the EMI / EMC requirement.	Vendor to confirm	
10.14	The min. setting range of protection release should be as follows. (a) Over load protection shall have adjustable setting from 50% to 100% of the circuit breaker rated current in steps of 5% preferably. (b) Short time delayed short circuit protection shall have adjustable current setting from 200% to 1000% of the overload setting and adjustable time setting for time discrimination from 20ms to 400ms.		

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	(c) Instantaneous short circuit protection shall be adjustable from 2 to 15 times rated current. (d) Earth fault protection shall have current setting from 20% to 60% of rated current and adjustable time setting from 100ms to 400ms.	Vendor to confirm	
10.15	Trip indication shall be provided to display the exact nature of fault(LED/LCD screen) like OL/EF/SC. Test facility to test the healthiness of the release and the trip circuit of the breaker shall be provided.	Vendor to confirm	
10.16	The ACB shall be provided with mechanical anti-pumping feature to prevent auto reclosing of the breaker on fault and necessary safety interlocks for closing the ACB.	Vendor to confirm	
10.17	The control panel of ACB along with its operating device shall project through the cutout in the door which is provided with suitable gasket (without any air gap).	Vendor to confirm	
10.18	The ACB shall be suitable and should be able to carry the rated current for an ambient temperature of not less than 45 degree C without any derating and suitable for working in Indian condition.	Vendor to confirm	
10.19	The Ultimate breaking capacity (Icu) should be equal to service breaking capacity (Ics) and short time withstand capacity (Icw) for 1 sec.	Vendor to confirm	
10.20	Provision should be available for the following. (a) to swtich "ON" and switch "OFF" ACB from a PLC/SCADA using the closing coil and shunt trip. (b) to monitor the ON / OFF status of the breaker through a PLC/SCADA (c) to monitor and acquire the data regarding parameters like current, voltage, power, energy through the communication port of the digital/energy meter.	Vendor to confirm	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
10.21	The cassette and the breaker shall be provided with standard interlocks related to the opening / closing of the doors and the positions of the breaker.	Vendor to confirm	
10.22	All control wiring shall be carried out with 1100 V single core PVC cable having standard FRLS copper conductors of min. 1.5 sq.mm. section for potential circuits and 2.5 sq.mm. section for current transformer circuit wires shall be identified with number ferrules at either end.	Vendor to confirm	
10.23	Removable gland plates shall be provided at the bottom of panel for cable termination.	Vendor to confirm	
10.24	The construction of the panel shall generally confirm to the Indian Electricity Rules/CEA regulations.	Vendor to confirm	
10.25	Technical catalogue furnishing the features of the controller (ACBs,Meters etc.,) and panel shall be enclosed with the offer Required.	Vendor to confirm	
11	Note : 1) GA drawings and bill of materials to be submitted for approval before manufacturing of the panels. 2) Final inspection to be offered at supplier works before despatch. 3) During commissioning the MV panel in the substation, programming of the ACB,Protection relays and Energy meters to be supported by the supplier / firm and necessary training to our staffs should be given. 4) 3 sets of Operation,Maintenance & programming manual in English . Circuit/ wiring diagram to be supplied along with the each panel Required. Single copy of make,rating,technical details and catalogue of all the bought out items used in each panel. 5) Point by point confirmation is required from the supplier otherwise the offer will not be considered.		

ANNEXURE VII
TECHNICAL SPECIFICATION FOR Detuned APFC PANEL OF 300KVAR

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply and commissioning of Automatic Power Factor Improvement Capacitor Panel as per below Specification for Automatic PF Improvement Capacitor Panel		
1.0	Capacitor Bank Rating	300 KVAR.	
1.1	No. and rating of capacitor stages, type (min 10 stages)	50KVAR/ 3Nos., 25 KVAR / 5Nos., 12.5 KVAR / 2 Nos.	
1.2	Model of capacitor	MD Heavy Duty capacitor, MDXL Super Heavy Duty capacitor.	
1.3	Make of the capacitors	L&T/EPCOS/Neptune/ABB/ Electronicon/ Ducati	
1.4	Rated Voltage	415 Volts +/-10%	
1.5	Rated Frequency	50 HZ.+/-5%	
1.6	Current measurement CT ratio	600/5.	
1.7	System	3 Phase, 4 wire system.	
2.0	Type of service	Continuous, indoor operation.	
3.0	Automatic PF control should be Intelligent Microprocessor based power factor controller.-	Make Electronican/ L&T/ABB/ICD /Schnider /Ducati	
4.0	Switching Time	Variable and selectable.	
5.0	Protection.	Over voltage	
6.0	Detection and display.	Over voltage, over current, harmonics (%THD)	
7.0	Manual operation.	Selectable option	
8.0	Contactors for capacitor switching and MCB of suitable capacity as incomer 630 Amps.Capacitor duty contactors-63Amps contactor for 25KVAR,100A contcator for 50KVAR,and 32A contactor for 12.5KVAR.	Capacitor duty contactors of make Schnider/Telemecanique/ ABB/ GE/ Seimens/ L&T	
9.0	Digital indicating meters for current ,voltage and power factor , %THD should be to be provided in the panel front	Vendor to confirm	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
10.0	No volt release in the event of power failure Required.	Vendor to confirm	
11.0	Necessary switchgear, contactors, HRC fuses Required.	Vendor to confirm	
12.0	Dimension- Appr. H1500 X W1200 X D 500 mm and weight App.600 Kg. .(Panel should be CRCA sheet with thickness of 3mm).	Vendor to confirm	
13.0	Panel ventilation 2 nos. of 510 CFM exhaust fan to be provided.	Vendor to confirm	
14.0	Max. temperature range Ambient .	+/- 50 deg. C	
15.0	Panel shall conform to IE Rules with provision for earthing, fully wired, painted Required.	Vendor to confirm	
16.0	3 sets of Operation,Maintenance and Programming manual in English for Micro Processor, with circuit/ wiring diagram to be supplied along with the panel Required. Single copy of make,rating details,technical details and catalogue of all the bought out items used in the panel.	Vendor to confirm	
17.0	Technical catalogue furnishing the features of the controller and panel shall be enclosed with the offer Required.	Vendor to confirm	
17.1	The capacitor, APFC controller and contactors/switch gears offered should be reputed make acceptable to BHEL.	Vendor to confirm	
18.0	Detuned harmonic suppression filters rated for 5.67% of capacitive reactance for individual capacitor controls has to be provided.--	Vendor to confirm	
	Note : 1)GA drawings and bill of materials to be submitted for approval before manufacturing of the panels. 2)Final inspection to be offered at site before despatch. 3)During commissioning the APFC panel in the substation, programming of the capacitors to suit the reactive compensation to be supported by the firm and necessary training to our staffs should be given. 4)3 sets of Operation,Maintenance manual in English . Circuit/ wiring diagram to be supplied along with the panel Required. Single copy of make,rating details,technical details and catalogue of all the bought out items used in the panel. 5)Point by point confirmation is required from the supplier otherwise the offer will not be considered.	Vendor to confirm	

ANNEXURE-VIII TECHNICAL SPECIFICATIONS FOR THE 1.1kV, 3.5Cx185 Sqmm XLPE ALLUMINIUM CABLE			
Sl. No	**Description/Specifications**	**Vendor to confirm**	**Deviations**
	Supply of High Voltage,1.1 KV- XLPE insulated PVC inner / outer sheathed Aluminium armoured Power Cable conforming to the specification given below.		
1	**High Voltage Power Cable :**		
1.1	Normal area of conductor	185 sq.mm	
1.2	Number of cores	3.5 core	
1.3	Voltage Rating	1.1KV, 50Hz. A.C.	
1.4	Type of system	unearthed	
1.5	**Conductor:**		
1.5.1	Material	Strandard circular Aluminium conductor as per IS:8130-1984	
1.5.2	Conductor Screen Material	Non- metallic semiconducting tape or extruded semiconducting material.	
1.5.3	Min number of Strands	30	
1.6	**Insulation:**		
1.6.1	Material & Type	XLPE as per IS:7098-Part-1 of 1985.	
1.6.2	Nominal thickness of Insulation in mm.	1.1 (min)	
1.6.3	Core Identification	Coloured strips applied on the core.	
1.6.4	Insulation Screen	Extruded semiconducting material.	
1.6.5	Metallic Copper Tape	Vendor to specify	
1.7	**Innersheath:**		
1.7.1	Material	Extruded PVC type ST-2 as per IS:5381	
1.7.2	Nominal thickness of inner sheath in mm.	0.5 mm min.	
1.8	Armour :		
1.8.1	Material	Galavanished steel flat strip as per IS: 3975	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
1.8.2	Normal strip size in mm	4X0.8	
1.9	**Outersheath:**		
1.9.1	Material.	PVC compound type -ST2of IS:5831/1984	
1.9.2	Minimum thickness in mm	1.88 mm (Min.)	
1.10	Conformance to Indian Standard Specification	IS:7098(Part-1)-1985	
2	Technical leaflet of the cable indicating the approx diameter, weight, thickness of insulation / sheathing / armour wire, current rating etc. to be enclosed with the offer.	Vendor to furnish	
3	General Features of the H V Cable:		
3.1	Cable shall have the manufacturer name embossed / printed / idented on the outer sheath at regular intervels.	Vendor to confirm	
3.2	Cable shall have voltage grade, cable size embossed on the outer sheath.	Vendor to confirm	
3.3	Routine tests shall be conducted on the cables as per IS and test certificate shall be produced against supply.	Vendor to confirm	
3.4	CPRI test certificates for 1.1KV XLPE cables of IS 7098 Part II 1988: shall be attached along with the offer.	Vendor to confirm	
3.5	Length variation in the quantity of supply if any.	Vendor to specify	
3.6	Cable length shall be of 500Mtrs per Drum	Vendor to confirm	
4	3 copy of make,rating,details,technical details along with the materials required.		
5	Special Note:Point to point confirmation is required from the supplier technical suitability, otherwise the offer will not be considered.	Vendor to confirm	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
6	Preferred Makes	RPG,KEI, Gloster, Universal, Mansfield, , APAR industries limited, Cable corporation of india ltd., Diamond power infrastructure ltd, Hindusthan vidyut products ltd., Havells india limited, kei industries ltd., Krishna electrical industries ltd., KEC International limited, Nicco corporation ltd., Paramount communications ltd., Polycab wires pvt. ltd., Ravin cables limited, Sriram cables pvt. ltd., Torrent cables ltd., Universal cables ltd.	

ANNEXURE-IX TECHNICAL SPECIFICATIONS FOR THE 1.1kV, 3.5Cx185 Sqmm XLPE COPPER CABLE			
Sl. No	**Description/Specifications**	**Vendor to confirm**	**Deviations**
	Supply of High Voltage,1.1 KV- XLPE insulated PVC inner / outer sheathed Copper armoured Power Cable conforming to the specification given below.		
1	**High Voltage Power Cable :**		
1.1	Normal area of conductor	185 sq.mm	
1.2	Number of cores	3.5 core	
1.3	Voltage Rating	1.1KV, 50Hz. A.C.	
1.4	Type of system	unearthed	
1.5	**Conductor:**		
1.5.1	Material	Strandard circular Copper conductor as per IS:8130-1984	
1.5.2	Conductor Screen Material	Non- metallic semiconducting tape or extruded semiconducting material.	
1.5.3	Min number of Strands	30	
1.6	**Insulation:**		
1.6.1	Material & Type	XLPE as per IS:7098-Part-1 of 1985.	
1.6.2	Nominal thickness of Insulation in mm.	1.6mm min.	
1.6.3	Core Identification	Coloured strips applied on the core.	
1.6.4	Insulation Screen	Extruded semiconducting material.	
1.6.5	Metallic Copper Tape	Vendor to specify	
1.7	**Innersheath:**		
1.7.1	**Material**	Extruded PVC type ST-2 as per IS:5381	
1.7.2	**Nominal thickness of inner sheath in mm.**	0.5mm min.	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
1.8	**Armour :**		
1.8.1	Material	Galavanished steel flat strip as per IS: 3975	
1.8.2	Normal strip size in mm	4X0.8	
1.9	**Outersheath:**		
1.9.1	Material.	PVC compound type -ST2of IS:5831/1984	
1.9.2	Minimum thickness in mm	2.04 mm (Min.)	
1.10	Conformance to Indian Standard Specification	IS:7098(Part-1)-1985	
2	Technical leaflet of the cable indicating the approx diameter, weight, thickness of insulation / sheathing / armour wire, current rating etc. to be enclosed with the offer.	Vendor to furnish	
3	General Features of the H V Cable:		
3.1	Cable shall have the manufacturer name embossed / printed / idented on the outer sheath at regular intervels.	Vendor to confirm	
3.2	Cable shall have voltage grade, cable size embossed on the outer sheath.	Vendor to confirm	
3.3	Routine tests shall be conducted on the cables as per IS and test certificate shall be produced against supply.	Vendor to confirm	
3.4	CPRI test certificates for 1.1KV XLPE cables of IS 7098 Part II 1988: shall be attached along with the offer.	Vendor to confirm	
3.5	Length variation in the quantity of supply if any.	Vendor to specify	
3.6	Cable length shall be of 500Mtrs per Drum	Vendor to confirm	
4	3 copy of make,rating,details,technical details along with the materials required.		
5	Special Note:Point to point confirmation is required from the supplier technical suitability, otherwise the offer will not be considered.	Vendor to confirm	

Sl. No	Description/Specifications	Vendor to confirm	Deviations
6	Preferred Makes	RPG,KEI, Gloster, Universal, Mansfield, , APAR industries limited, Cable corporation of india ltd., Diamond power infrastructure ltd, Hindusthan vidyut products ltd., Havells india limited, kei industries ltd., Krishna electrical industries ltd., KEC International limited, Nicco corporation ltd., Paramount communications ltd., Polycab wires pvt. ltd., Ravin cables limited, Sriram cables pvt. ltd., Torrent cables ltd., Universal cables ltd.	

ANNEURE-X

TECHNICAL SPECIFICATIONS FOR THE 1000KVA, 11KV/415V COMPACT SUBSTATION

Specification and Scope of supply:

Design, manufacture and supply of Compact Substation of 11KV/415 Volts, equipped with 1000kVA Cast Resin Transformer, 3 way 11kV Ring Main Unit consisting of 2 nos. 630A at 11kV fault making load breaking switch with one no tee-off as SF6 Circuit Breaker for the primary side controls & with MV 2000A Air Circuit Breaker as secondary side control as detailed below. The detail bill of material for each Compact Substation shall be as under:

S.No	Description	Specification / Confirmation	Deviation
1.0	**HT Switchgear:** Three way 11kV Non-Extensible Ring Main Unit Compact switchgear consisting of two nos. 630A at 11KV fault making/ load breaking switch and one number Fixed manual / auto Vaccum Circuit breaker(VCB) in SF6 insulated enclosure with self- powered relay having over current and earth fault protection. Interconnection between RMU and transformer shall be using suitable size Aluminum/copper unarmored XLPE Cable. Incomer and outgoing LBS of HT Switchgear should be suitable for termination of 1 run x 3C x 240 sq. mm aluminum armoured XLPE Cable (along with the supply of necessary termination boots).	Vendor to confirm	
1.1	Make of the HT Ring Main Unit (RMU) shall be ABB/ Siemens/ Areva / Alstom make only.	Vendor to specify	
2.0	**Transformer:** 1000 KVA, 11KV / 415V, DYn11, Air Natural cooling Cast Resin Dry Type Transformer with off circuit tap links 5% to -5% @ 2.5% on HT side of transformer with WTI Scanner with Alarm and trip contact Qty: 1 no	Vendor to confirm	
2.1	Make of the transformer. BHEL/ ABB/ Volt Amp/ Ames Impex/ Siemens/ Areva make only.	Vendor to specify	
2.2	Impedance, no-load/ load losses, efficiency, temperature rise above ambient of winding of the transformer	Vendor to specify	

S.No	Description	Specification / Confirmation	Deviation
3.0	**MV Switchgear:** 415V indoor MV panel with Aluminum Bus bars, fabricated using 1.5/2 MM CRCA sheet steel, Ingress protection IP4X, complete with internal wiring consisting of following. **Incomer: 2000** A, 415V, 3P, 50Hz, 50KA, Fixed manual / auto type ACB with Microprocessor based release. Qty: 1 set	Vendor to confirm	
3.1	Make and type number of the ACB. Siemens/ ABB/ GE/ L&T/ Areva / Alsthom make only.	Vendor to specify	
4.0	**Enclosure:** Outdoor type enclosure having modular construction of Galvanised Sheet Steel. The degree of protection for HT & LT switchgear compartment & transformer compartment of the enclosure shall be minimum IP23. The enclosure exterior shall be painted with polyurethene paint/ powder coated and tropicalised to Indian weather conditions. Each compartment will be provided with the door and pad locking arrangement. The Compartment illumination lamp with door-operated switch shall be provided for each compartment. Qty: 1 set	Vendor to specify the actual degree of protection.	
5.0	Interconnection between HT switchgear & Transformer using XLPE cable & Interconnection between Transformer & LT switchgear using copper busbars. Internal earthing connections by GI strips. Qty: 1 set	Vendor to confirm	
6.0	Dimension of the compact substation (approx.)	Vendor to specify	
7.0	1.Packge Sub-Station shall be outdoor plinth mounted type. 2. Erection, Commissioning and Civil work for package substation is in the scope of BHEL. However the bidder shall furnish the foundation details clearly. 3.Package sub-station will be complete with the internal interconnections & earthing (GI) and extending of earth bar of Neutral and body terminals to the frame of the CSS for connecting to the earth pits.	Vendor to confirm	

S.No	Description	Specification / Confirmation	Deviation
	4. Vendor shall assemble the Compact substation at site if the same is dispatched in disassembled condition. 5. Vendor shall make necessary supervision at site free of cost during the time of commissioning CSS. 6. Required technical data sheet of the transformer, HV/ MV switchgear, relay etc. should be furnished with the offer. 7. Colour of paint to be mentioned in the offer and to be decided mutually. 8. The equipments should be SCADA compatible. 9. Metering on HV side required and details to be furnished.		
8.0	Pre-fabricated CSS shall be type tested for internal arc, temperature rise test in approved laboratory like CPRI, ERDA and reports should be furnished along with the offer. Degree of protection IP54 for HT and LT switch gear and IP 23 for transformer compartment should be ensured as per IEC 61330 - 1995 &/ IEC 62271-202 . Routine test to be conducted and original test certificate to be submitted at the time of supply.	Vendor to confirm	

Annexure 1

Technical Specifications for the Compact Substation

1.0.0 **CODES & STANDARDS**:

1.1.0 All equipment and material shall be designed manufactured and tested in accordance with the latest applicable IEC standards. The 11KV Package Substation Design must be as per IEC 61330.

1.2.0 The Package Sub-station offered shall in general comply with the latest issues including amendments of the following standards.

Title	Standards
High Voltage Low Voltage Pre-Fabricated Substation	**IEC:61330**
High Voltage Switches	**IEC 60265**
Metal Enclosed High Voltage Switchgear	**IEC 60298**
High Voltage Switchgear	**IEC 60694**
Low Voltage Switchgear and Control gear	**IEC 60439**
Power Transformers	**IEC 60076**

2.0.0 **DESIGN CRITERIA**

2.1.0 Package Sub-station consisting of 3 way 11KV SF6 insulated Switchgear with 630A at 11kV fault making, Load breaking switch with tee-off as 11kV SF6 Circuit Breaker + 11kV/415V, 1000KVA, DYn11 Transformer + LT 415V, 2000A ACB incoming with all connection, accessories, fitting & auxiliary equipment in an enclosure to supply Low-voltage energy from high-voltage system as detailed in this specification. The complete unit shall be installed on a substation plinth (base) as Outdoor substation.

2.2.0 The prefabricated-package substation shall be designed for a) Compactness, b) fast installation, c) maintenance free operation, d) safety for worker/operator & public.

2.3.0 The Switchgear and component thereof shall be capable of withstanding the mechanical and thermal stresses of short circuit listed in ratings and requirements clause without any damage or deterioration of the materials.

2.4.0 For continuous operation at specified ratings temperature rise of the various switchgear components shall be limited to permissible values stipulated in the relevant standard and / or this specification.

2.5.0 Service Conditions:

The Package substation shall be suitable for continuous operation under the basic service conditions indicated below

Ambient Temperature:	40 Deg C
Relative Humidity	upto 95%
Altitude of Installation	upto 1000m

The Enclosure of High Voltage switchgear-control gear, Low Voltage switchgear-control gear & Transformer of the package substation shall be designed for use under normal outdoor service condition as mentioned. The enclosure should take minimum space for the installation including the space required for approaching various doors & equipment inside.

3.0.0 **SPECIFICATION:**

3.1.0 The main components of a prefabricated- package substation are Transformer, High-voltage switchgear-control gear, Low-voltage switchgear-control gear and corresponding interconnections (cable, flexible bus bars) & auxiliary equipment. The components shall be enclosed, by either common enclosure or by an assembly of enclosure. All the components shall comply with their relevant IEC standards.

OUTDOOR ENCLOSURE:

3.2.0 **Outdoor enclosure**:

3.2.1 The enclosure shall be made of Sheet Steel tropicalised to local weather conditions.

3.2.2 The metal base shall ensure rigidity for easy transport & installation.

3.2.3 The protection degree of the Enclosure shall be appropriate one for LT & HT switchgear compartment & IP23 for Transformer compartment. Proper / adequate ventilation aperture shall be provided for natural ventilation by way of Louvers etc.

3.2.4 The doors shall be provided with proper interlocking arrangement for safety of operator.

3.2.5 The H.V. & L.V. outgoing of the transformer are to be connected to SF6 Circuit Breaker of 3 way 11kV RMU & incomer of the Low Voltage Switchgear by means of Copper Cables / Flexible Busbars.

3.2.6 **Internal Fault**: Failure within the package substation due either to a defect, an exceptional service condition or mal-operation may initiate an internal arc. Such an event may lead to the risk of injury, if persons are present. It is desirable that the highest practicable degree of protection to persons shall be provided. The Design shall be tested as per IEC 61330.

3.2.7 **Covers & Doors**: Covers & doors are part of the enclosure. When they are closed, they shall provide the degree of protection specified for the enclosure. Ventilation openings shall be so arranged or shielded that same degree of protection as specified for enclosure is obtained. Additional wire mesh may be used with proper Danger board for safety of the operator. All covers, doors or roof shall be provided with locking facility or it shall not be possible to open or remove them before doors used for normal operation have been opened. The doors shall open outward at an angle of at least 90^0 & be equipped with a device able to maintain them in an open position.

3.2.8 **Earthing**: All metallic components shall be earthed to a common earthing point. It shall be terminated by an adequate terminal intended for connection to the earth system of the installation, by way of flexible jumpers/strips & Lug arrangement. The continuity of the earth system shall be ensured taking into account the thermal & mechanical stresses caused by the current it may have to carry. The components to be connected to the earth system shall include:

a) The enclosure of Package substation,
b) The enclosure of High voltage switchgear & control gear from the terminal provided for the purpose,
c) The metal screen & the high voltage cable earth conductor,
d) The transformer tank or metal frame of transformer,
e) The frame &/or enclosure of low voltage switchgear,

3.2.9 There shall be an arrangement for internal lighting activated by associated switch for HV, Transformer & LV compartments separately.

3.2.10 **Labels**: Labels for warning, manufacturer's operating instructions etc. shall be durable & clearly legible.

3.2.11 Cleaning & Painting:
The paints shall be carefully selected to withstand tropical heat and rain. The paint shall not scale off or crinkle or be removed by abrasion due to normal handling.

11KV SF6 Non-extensible RMU Circuit Breaker:

3.3.0 **11KV SF6 RMU Circuit Breaker:** The requirement of 11kV Ring Main Unit is as under.

3.3.1 SF6 Gas filled Non-extensible Ring Main Units with Circuit Breaker comprising of 3 panels as indicated below:

3.3.2 **Panel No.1 & 2**: Isolator panel with one number SF6 insulated load- breaking fault making isolator switch with one cable box.

3.3.3 **Panel No.3:** Vaccum Circuit Breaker complete with operating mechanism, protection system and one number of cable box.

3.3.4 The above Isolators, breaker, Busbars should be mounted inside a robotically welded sealed for life, stainless steel tank. The tank should be filled with SF6 gas at adequate pressure.

3.3.5 The Circuit Breaker is required to control 11kV/415 volts distribution Transformer of rating 1000KVA and relay settings shall be selected accordingly.

3.3.6 **General Finish**: Totally enclosed, metal clad, vermin and dust proof suitable for tropical climate use as detailed in the specification.

3.3.7 **Ratings**: The busbars shall have continuous rating of 630 Amps. The isolator shall have a continuous rating of 630 Amps, Circuit Breaker shall have a continuous rating of 630 Amps. in accordance with relevant IEC standard

3.3.8 **Breaking & Making Capacity**: The isolators shall be capable for breaking rated full load current. Circuit Breaker shall be capable of having rupturing capacity of 20kA symmetrical at 11KV.

3.3.9 **Busbars**: Switchgear shall be complete with all connections, busbars etc. The continuous rating of copper busbars shall be 630 Amps and they shall be fully encapsulated by SF6 gas inside the steel tank.

3.4.0 **Isolator**:

The Isolators offered shall conform to IEC60129. The isolator shall be triple pole, spring assisted, hand operated, and non-automatic type with quick break contacts. The operating handle shall have three positions 'ON', 'OFF' and 'EARTH' which shall be clearly marked with suitable arrangement to padlock in any position. A safety arrangement for locking shall be provided by which the isolator operation shall be prevented from 'ON' position to 'EARTH' position or vice versa in a single operation.

3.5.0 **Switchgear:**

The SF6 RMU shall be sealed for life, the enclosure shall meet the "sealed pressure system" criteria in accordance with IEC: 298. There shall be no requirement to 'top up' the SF6 gas. It shall provide full insulation, making the switchgear insensitive to the environment. Thus assembled, the active parts of the switchgear unit shall be maintenance free.

The switchgear & switchboard shall be designed so that the position of different devices is visible to the operator on the front of the switchboard & operations are visible as well. The switchboard shall be designed so as to prevent access to all live parts during operation without the use of tools.

RMU should be tested for internal arc fault test.

3.5.1 **Circuit Breaker**:

The Unit shall consist 630A Tee-off spring assisted three position, three pole circuit breaker, with integral fault making / dead breaking earth switch. The function shall be naturally interlocked to prevent the main & earth switch from being switched 'ON' at the same time & the CB not allowed to trip in 'Earth On' position. The selection of the main/earth switch lever on the panel, which is allowed to move only if the main or earth switches in the off position. The lever shall be able to pad locked in either the main or earth position.

The manual operation of the circuit breaker shall not have an effect on the trip spring. This should only be discharged under a fault (electrical) trip condition; the following manual reset operation should recharge the trip spring & reset the CB mechanism in 'main off' position.

Protection Relay: The CB shall be fitted with self-powered relay inside the front cover to avoid any tampering. The relay should be 2 Over Current + 1 Earth Fault, fed by protection CTs mounted in the cable box.

3.5.2 **Cable Box**:

Every isolator shall be provided with suitable and identical cable boxes in front for connecting 3 core, 11kV cable from vertically below. The cable boxes shall be so located at convenient height to facilitate easy cable jointing work. The height available for cable termination should be minimum 500 mm. The Cable termination shall be done by Heat shrinkable Termination method so adequate clearances shall be maintained between phases for Termination. It shall be possible to terminate 1 run of 240 sq.mm three core XLPE cable.

3.5.3 **Locking Arrangement**: Suitable padlocking arrangements shall be provided as stated below…

a) CB manual operating handle in the "OFF" position.
b) Each feeder Panel operating handle in 'Closed' 'Open" or 'Earth' position.
c) Each isolator-operating handle in 'Closed', ' Open', or 'Earth' position.

3.6.0 **Ratings**:

Non-Extensible ring main unit with SF6 CB		
3.6.1	**Switchgear Data**	
a)	Service	Outdoor but inside Enclosure
b)	Type	Metal clad
c)	Number of phases	3
d)	Voltage	11000V
e)	Rated Frequency	50 Hz
f)	Rated Current	630 Amp (isolator)
g)	Short Circuit rating	
	i) Breaking	20 kA rms for Breaker
	ii) Short time withstand for 3 Sec.	201 KA rms
	iii) Rated S/c making	52.5 kA peak for Breaker
h)	Short duration pwer freq.	28 kV

i)	Insulation Level	75 KVpeak
j)	System earthing	Solidly earthed at substation
3.6.2	**Breaker**	
a)	Type	SF6 Breaker
b)	Rated voltage	11kV
c)	Breaking current	
	i) Load breaking	21 KArms.
d)	Making current	52.5 KA peak
e)	Rated current	630 Amps.
f)	No. of poles	3
g)	Operating mechanism.	Trip free & free handle type with mechanically operated indication & pad locking.
3.6.3	**Isolators**	
a)	Type	load breaking and fault making in SF6 tank
b)	Rated current	630 Amps.
c)	Rated breaking capacity	630 amps.
d)	Fault making capacity	52.5 KA peak
e)	No. of poles	3
f)	Operating mechanism	Operating handle with ON, OFF, Earth positions with arrangement for padlocking in each position.
3.6.4	**Busbars: (If any)**	
a)	Material	Copper
b)	Type	SF6 insulated
c)	Rated Current	630 Amps
d)	Short time rating for 3 Sec.	

11kV/415V, 1000kVA CAST RESIN DRY TYPE TRANSFORMER:

4.0 **Requirement**: 11000/415 Volt Cast Resin Dry Type 1000KVA, AN cooled transformer Suitable for installation at outdoor in Enclosure for Floor mounting.

4.1 **Voltage Ratio:** No load voltage 11000/415 volt within tolerance as stipulated in IS.

4.2 **Rating:** The transformer shall have a continuous rating as specified at any of the specified tapping position and with the maximum temperature Rise specified.

SPECIFICATION FOR 1000KVA CAST RESIN DRY TYPE TRANSFORMERS

Sr.No.	Descriptions	Unit	Specification
1			
2			
3	Rating	KVA	1000
4	Rated frequency	Hz	50
5	Number of Phase		
	HV Side		3
	LV Side		3
6	Rated Voltage		
	HV Side	kV	11
	LV Side	kV	0.415
7	Vector Group		Dyn 11
8	Type of Cooling		AN (Air Natural)
9	Class of Insulations		Class F
10	Method of earthing-LV		Solidly Earthed
11	Duty		Continuous
12	Taps		
	a) Range	%	+ 5% to -5 %
	b) No. of Steps		Four
	c) In steps of		2.5
	d) Tapping provided on HV Side		Taps Provided on HV side
13	Tap Changer Type		By Off Circuit Tap Links
14	Reference Standards		IS 2026/IS 11171
15	Fittings and Accessories		
	a) Off circuit tap links		Yes
	b) 02 Nos. Earthing Terminal		Yes
	c) Rating and Diagram Plate		Yes
	d) Lifting Lugs for Complete Transformer		Yes
	e) Cover Lifting lugs		Yes
	f) Rollers		Yes

5.0 **L.T. Panel**

5.1.0 **System**:

a) **Nominal voltage**: 3 Phase, 415V, 50 Hz
b) **Neutral**: Solidly earthed at substation.
c) **Busbar**: Aluminum

5.2.0 **Circuit Ways:**

1 No. 2000A or higher, 3 Pole ACB, fixed Type with Over Current, short circuit and Earth Fault Releases (Microprocessor Based)

5.3.0 **Earthing**:

5.3.1 Earthing arrangement shall be provided for earthing each cable, PVC cable gland, neutral busbar, chassis and framework of the cubicle with separate earthing terminals at two ends. The main earthing terminals shall be suitably marked. The earthing terminals shall be of adequate size, protected against corrosion, and readily accessible. These shall be identified by means of sign marked in a legible manner on or adjacent to terminals.

5.3.2 Neutral bus bar strip shall be connected to Earthing terminal with help of GI strip of suitable capacity & nut-bolt arrangement.

ROUTINE TEST ON PACKAGE SUBSTATION:

6.0.0 **ROUTINE TESTS FOR THE PACKAGE SUBSTATION COMPLETELY ASSEMBLED:**

6.1.0 **Routine Tests**: The routine tests shall be made on each complete prefabricated substation.

a) Voltage tests on auxiliary circuit.
b) Functional test.
c) Verification of complete wiring.

6.2.0 **Test Certificates:**

Certified reports of all the tests carried out at the works shall be furnished in three (3) copies for the approval from CEA.

Annexure-XI

Specification for Synthetic High Voltage Insulating Mats as per IS-15652:2006

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of High Voltage Insulating Synthetic Mats,with High die-electric Strength, Fire Retardant. Insulation Resistance Up to 100,000 Mega Ohm with 5000V Megger. Good Mechanical Properties to With Stand Load and Movement of Breaker Trolleys and Associated Electrical Equipment. No Adverse Effect of Acids, Alkalis and Transformer Oil. to the specification given below		
1.0	**High Voltage Insulating Synthetic Mats**		
1.1	Nominal Thickness of earthmat	2.0 mm, 2.5mm & 3mm	
1.2	Width	1 Mtr.	
1.3	Roll Length	Upto 20 mtrs.	
1.4	Synthetic High Voltage Insulating Mats as per latest IS-15652:2006	Vendor to confirm	
1.5	Di Electric Strength	Vendor to confirm	
1.6	Conformance to Indian Standard specification	IS:15652 / 2006	
1.7	Tensile strength: 15 N/sqm & elongation: 250	Vendor to confirm	
2.0	Technical leaflet of the insulating earth mats indicating the approx. diameter,length, weight, thickness of insulation, current rating etc. to be enclosed with the offer.	Vendor to confirm	
3.0	**General Features of the Insulating Synthetic Mats:**		
3.1	Insulating Synthetic Mats shall have the manufacturer name embossed/ printed/ indented on the mats at regular intervals.	Vendor to confirm	
3.2	ERDA/CPRI test shall be conducted as per IS on the insulating earth mats and test certificate shall be produced.	Vendor to confirm	
4.0	Reference List/ Qualifying Conditions:		
4.1	Only those vendors who have supplied similar or higher rating of insulating earth mats should quote.		
4.2	Information about the customers to whom similar insulating earth mats have been supplied is to be submitted for qualification of the offer.		
5	Preferred Makes	A.M. Vinyl Pvt. Ltd., Premier Polyfilm Limited, RMG Polyvinyl INDIA Limited, Vardhman Hoses (P) Ltd., V.R. Enterprises.	

Annexure-XII			
Technical specifications for the 33kv meetering box as per the MSEDCL norms			
Sl. No	**Description/Specifications**	**Vendor to confirm**	**Deviations**
1	Design, fabrication, painting and supply of sheet metal cubicle, supply of coppercomponents, wiring, testing at works, packing and supply on destination basis and performance testing of 33KV self equipped metering cubicle	Vendor to confirm	
2	Construction should of four cabins viz HT, metering and two nos termination compartment	Vendor to confirm	
3	**System parameters:**	Vendor to confirm	
3.1	Rated voltage: 33kV	Vendor to confirm	
3.2	Highest system voltage: 36kV	Vendor to confirm	
3.3	Frequency: 50Hz	Vendor to confirm	
4	**Current Transformer:**	Vendor to confirm	
4.1	Type: Single Phase, Cast resin	Vendor to confirm	
4.2	Rated voltage: 33kV	Vendor to confirm	
4.3	CT ratio: 200/5A	Vendor to confirm	
4.4	Burden: 15VA	Vendor to confirm	
4.5	Accuracy class: 0.2	Vendor to confirm	
4.6	Applicable standard: IS:2705-1992 or latest	Vendor to confirm	
5	**Potential Transformer:**	Vendor to confirm	
5.1	Type: Single Phase, Cast resin	Vendor to confirm	
5.2	Rated primary voltage: 33000V/√3	Vendor to confirm	
5.3	PT secondary voltage: 110V/√3	Vendor to confirm	
5.4	Burden: 50VA	Vendor to confirm	
5.5	Accuracy class: 0.2	Vendor to confirm	
5.6	Applicable standard: IS:3156-1992 or latest	Vendor to confirm	
6	Metal Cabinet:	Vendor to confirm	
6.1	Material: Mild steel	Vendor to confirm	
6.2	Plate thickness: 2mm	Vendor to confirm	
6.3	Busbar thickness: 200 Sqmm	Vendor to confirm	
6.4	Ingress Protection class: IP 53	Vendor to confirm	
7	The metering box should have the following:	Vendor to confirm	
7.1	3 nos 33kV class CTs	Vendor to confirm	
7.2	3 nos 33kV class PTs	Vendor to confirm	
7.3	Tinned copper busbars/connecting links totally covered by resin casting	Vendor to confirm	

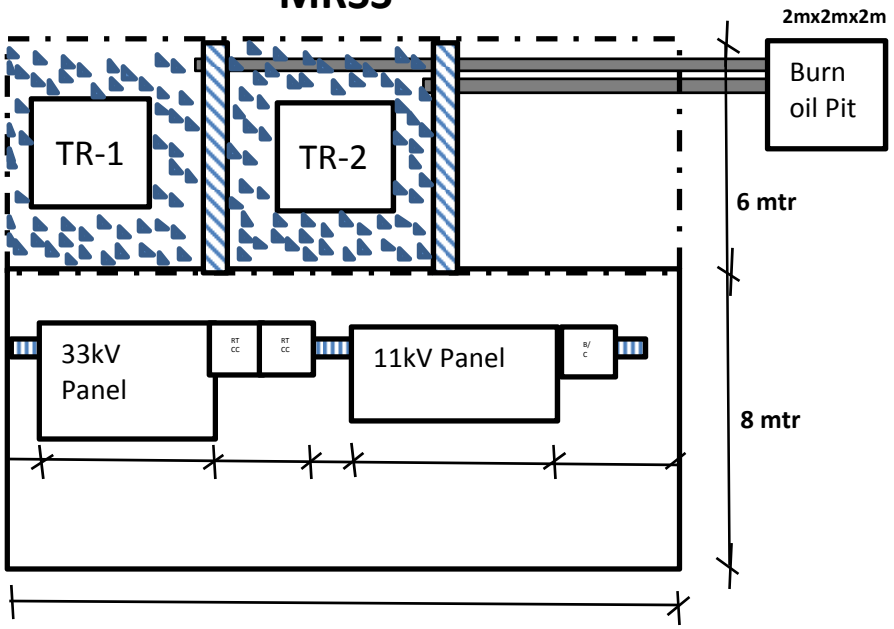
Sl. No	Description/Specifications	Vendor to confirm	Deviations
7.4	The secondary wires from the terminals of CTs & PTs in the CT/PT. Compartment shall be covered by resin cast blocks and the secondary wires shall be brought in the metering compartment through rubber bush and shall be left open duly crimped with suitable pin type copper lugs	Vendor to confirm	
7.5	Resin cast bushing board/s with arrangement to receive Reychem or equivalent type of cable terminations (240Sqmm) for incoming and outgoing supply points.	Vendor to confirm	
7.6	Electronic safety lock (optional)	Vendor to confirm	
7.7	All four cabninets should be provided with the removable type doors with neoprene gaskets. HT compartment should be provided with suitable ventilation for cooling.	Vendor to confirm	
7.8	Cable termination from Top	Vendor to confirm	
8	**Special Condition:** Drawing should be submitted to BHEL before starting the manufacturing.	Vendor to confirm	
9	Metetering box should be tested as per the relevent standards and reports should be submitted to BHEL.	Vendor to confirm	

Annexure-XIII
TOOLS & TACKLES AND SAFETY EQUIPMENT

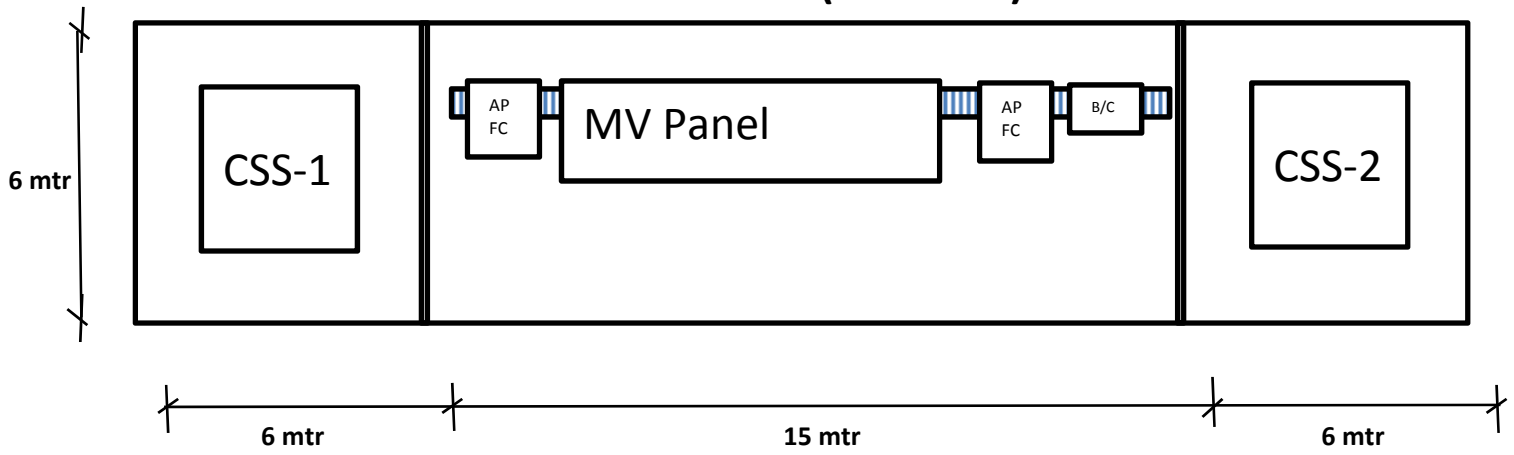
Sl No	Equipment	Unit	Quantity	Preferable Makes	Vendor to confirm	Deviations
1	Digital multimeter (Voltage: AC/DC- 0 to 750V Current: AC/DC- 0 to 200A Resistance: 0 - 20 Mega Ohm)	No	2	Fluke, Motwani, Krycard	Vendor to confirm	
2	Insulation Tester (0-5000V)	No	1	Krycard, Kyoritsu, Fluke, Megger	Vendor to confirm	
3	Insulation Tester (0-500V)	No	1	Krycard, Kyoritsu, Fluke, Megger	Vendor to confirm	
4	Tong Tester (Voltage: AC/DC- 0 to 750V Current: AC/DC- 5mA to 200A)	No	1	Fluke, Motwani, Krycard	Vendor to confirm	
5	3 meter length Earth rods	No	4	Reputed make	Vendor to confirm	
6	Double End Spanner Generally Conforming to IS 2028-2004 (Size: 6x7 to 24x27)	Set	1	Taparia, Gedore	Vendor to confirm	
7	Ring Spanners Generally Conforming to IS 2029-1998 (Size: 6x7 to 24x27)	Set	1	Taparia, Gedore	Vendor to confirm	
8	Allen Keys Generally Conforming to IS 3082-1988 (Size: 1.5mm to 14mm)	Set	1	Taparia, Gedore	Vendor to confirm	
9	Seamless 33kV, 11kV and 415V grade Hand gloves (Each voltage grade 3 Sets)	Set	9	Reputed make	Vendor to confirm	
10	Danger Boards (caution board) written with Marathi, Hindi and English for 33000V, 11000V, 415V (10 nos each)	No	30	Reputed make	Vendor to confirm	
11	Danger Stickers (caution sticker) written with Marathi, Hindi and English for 33000V, 11000V, 415V (20 nos each)	No	60	Reputed make	Vendor to confirm	
12	Combination Plier Generally Conforming to IS 6149-1984 Grade II	No	2	Taparia, Gedore	Vendor to confirm	
13	Screwdriver set	Set	2	Taparia, Gedore	Vendor to confirm	

General Layout of Substations

MRSS



Individual Substations (SS1 - SS5)



ANNEXURE-XIV

Suggestive Format of Performance Certificate:

The Performance certificate should contain minimum of the below said data and it shall be produced on **Customer's Letter Head** and submitted along with the offer.

1.0	Equipment Supplied to (Customer Details)	
2.0	Substation Capacity	
3.0	Details of Equipment supplied	
3.1	Transformer: Rating/voltage class	
3.2	Medium Voltage Panel (PCC): Busbar rating	
4.0	Purchase Order Number	
5.0	Scheduled date of completion	
6.0	Actual date of completion	
7.0	Reasons for delay (if any)	
8.0	Performance of the contractor during erection & commissioning on turnkey basis	Satisfactory/ Not-satisfactory
Date:		Signature & Seal of the Authority Issuing the Performance Certificate

Commercial Terms for Package-II

a) Delivery Schedule for supply of all the items of substation package:
- 6 months from the PO date.

b) Time period for Installation and Commissioning of all the items of substation package.
- 4 months up on receiving the material.
- The total time period for the supply, installation, commissioning etc should not be more than 10 months from the PO date.

c) 100% Payment will be made after supply, installation, commissioning of the total substation upon producing 10% Performance Bank Guarantee.

PACKAGE-III

ELECTRIFICATION OF SHOP FLOOR (SHOP LIGHTING)
PART B
ELECTRFICATION OF SHOP FLOOR AT PEFP BHANDARA

Item No: A Electrification of Shop Floor- Supply of electrical & lighting installation material					
ITEM No.	**ITEM TEXT**	**Unit**	**QTY**	**RATE**	**AMOUNT**
1	Supply of 8 ways 16 A MCB Lighting distribution Boards with 100A, 4 pole MCB as incomer as per Annexure-I.	NO	**32**		
2	Supply of 400W, metal Halide High bay Industrial light fitting with lamp and luminaire as per Annexure-II.	NO	**830**		
3	Supply of 65W, CFL High performance high bay luminaries with prismatic reflector with lamp as per Annexure-III.	NO	**70**		
4	Supply of 2KVA UPS as per Annexure-IV.	NO	**10**		
5	Supply of roof light timer boxes as per Annexure-V.	NO	**32**		
6	Supply of single core,unsheathed,Flame retarant,Low smoke heat resistant (FRLS),bare high conductivity,Flexible multistrand Bright Annealed Electrolytic copper conductor,IS 8130/1984, insulated with PVC type A of IS 5831/84,650/1100 Volts grade, confirming to PVC insulated and rated upto 1100v as per IS 694/1990. Size. 2.5 sqmm with 100 Mtr. per roll. Preferable makes: Elkay/ Delton/ Gloster/ Nicco/ L&T/ Havells/ Finolex/ Kundan/ Mardia/ Siechem/ RR .	Rolls	**550**		
7	Supply of 2.0mm thick, 20mm diameter Rigid Fire Retardent low Smoke PVC Conduits conforming to IS : 9537 : 2006 and embossed with ISI mark. Preferable makes: KUNDAN/AVONPLAST/FINOLUX	KM	**14**		
8	Supply of 16 SWG Copper Earth wire.	Kg	**175**		
9	Supply of 25x3mm size Hot dipped GI flat .MS flat shall conform to IS2062 &Galvanisation shall conform to IS4759.The thickness of the ZINC coating shall be min 80 microns with test certificate.	M	**300**		
10	Supply of 15A 2-way bakelite connector block.	NO	**830**		
11	Supply of 3.5 core 50 sq.mm XLPE cable as per Annexure-VI	M	**2500**		
		TOTAL			

Item No: B Erection of Electrical & Lighting materials for the Electrification of Shop Floor					
ITEM No.	**ITEM TEXT**	**Unit**	**QTY**	**RATE**	**AMOUNT**
1	Assembling, fixing and testing of 8 ways 16 A MCB Lighting distribution Boards. The MCB DB (DL) should be provided with necessary angle iron frame work on the wall / column. Necessary cable adopter boxes for both incoming & outgoing, support channels with required fasteners are to be supplied by the contractor.	NO	**32**		
2	Assembling, Fixing & Testing of 400W, metal Halide High bay Industrial light fitting with lamp & lid on the truss with the supply of necessary MS clamps, bolts and nuts secured by suitable size cotter pin and safety chain. Safety chain shall be GI of suitable dia and required length with 'D' Shackle at one end for connecting to the fitting hook and other end to be connected to the nearby truss member. Note: Clamp and GI Safety chain samples should be produced and get the approval from the Electrical Incharge before fixing the same at the site .Required mobile crane to a height of 20m is under contractor scope.	NO	**830**		
3	Assembling, fixing and testing of 65W, CFL High performance high bay luminaries with prismatic reflector with lamp & lid on the truss with the supply of necessary clamps and safety chains. Safety chain shall be GI of 4 mm dia. and required length with 'D' Shackle at one end for connecting to the fitting hook and other end to be connected to the nearby truss member. Note: - 1)Clamps shall be painted with one coat of red oxide and two coats of Aluminium paint.	NO	**70**		
4	Installation & commissioning of 2KVA UPS on the wall / column with suitable iron frame. Necessary support channels / iron frame works with required fasteners are to be supplied by the contractor.	NO	**10**		
5	Fixing of roof light timer boxes on column near by the MCB DL boards in the shop floors. The timer boxes should be fixed on the 25 mm x 6 mm MS flat with suitable bolts and nuts. **Note:** The materials required like 25 mm x 6 mm MS flat and fasteners are under contactor's scope.	NO	**32**		
6	Wiring with **6 runs of 2.5sqmm** stranded copper conductor unsheathed cable in the medium quality,1.5mm thick,20mm dia,pvc conduit pipe with continuous running of 16 SWG GI wire as earthing on the steel structural members of the roof with suitable clamping .	M	**3500**		

ITEM No.	ITEM TEXT	Unit	QTY	RATE	AMOUNT
	Note: 1.One running meter of wiring consist of 1m PVC conduit, 1m earth wire and 6 runs of 1m copper wire with suitable clamps. 2. Necessary materials like Tees,L bends, Clamps,PVC flexible conduits required for the wiring are under contractor's scope.				
7	Wiring with **4 runs of 2.5sqmm** stranded copper conductor unsheathed cable in the medium quality,1.5mm thick,20mm dia,pvc conduit pipe with continuous running of 16 SWG GI wire as earthing on the steel structural members of the roof with suitable clamping . **Note:** 1.One running meter of wiring consist of 1m PVC conduit, 1m earth wire and 4 runs of 1m copper wire with suitable clamps. 2. Necessary materials like Tees,L bends, Clamps,PVC flexible conduits required for the wiring are under contractor's scope.	M	**4000**		
8	Wiring with **2 runs of 2.5sqmm** stranded copper conductor unsheathed cable in the medium quality,1.5mm thick,20mm dia,pvc conduit pipe with continuous running of 16 SWG GI wire as earthing on the steel structural members of the roof with suitable clamping . **Note:** 1.One running meter of wiring consist of 1m PVC conduit, 1m earth wire and 2 runs of 1m copper wire with suitable clamps. 2. Necessary materials like Tees,L bends, Clamps,PVC flexible conduits required for the wiring are under contractor's scope. **Break up:** 1) Roof light wiring :1700m 2) Emergency light wiring : 3300m **Total :4900m.**	M	**5000**		
9	Running of 2 core 2.5 sq.mm stranded copper conductor PVC insulated unsheathed TRS flexible cable in the 20 mm dia flexible conduit with required connections at lamp and terminal box. Note: Flexible TRS conduit is in contractor's scope	M	**830**		
10	Laying of 25 X 3 mm GI earth flat for earthing the MCB DB's in the wall/column and terminating in the trench.	M	**300**		
11	Fixing of 15A 2-way bakelite connector block on the truss for facilitating power supply to high bay luminaire in a suitable polycarbonate junction box.	NO	**830**		
12	Laying of 3.5 core 50 sq.mm XLPE cable in the excavated/formed trench between: 1. ML and the roof light timer box 1. 16A MCB DB and roof light timer box.	M	**2500**		

ITEM No.	ITEM TEXT	Unit	QTY	RATE	AMOUNT
13	Making of end termination for Medium voltage 3.5 core 50 sq.mm XLPE cable with suitable brass cable glands, copper lugs, gland earthing, cable clamping etc. **Note: -** 1)Brass cable glands, copper lugs, gland earthing, cable clamping and PVC insulation tape etc. are contractor's scope. 2) Crimping tools and other materials required for carrying out the work will be in the scope of the contractor. 3) The cable Glands should be properly earthed by suitable copper earth plate with 16 SWG copper wire.	NO	**150**		
14	**Special Instructions:** 1. The contractor should arrange the lifting tools like ladder/ hydraulic lift for fixing the lamps to the shop floor roof (Max. 18 meters). 2. Cable tags should be provided for all power and control cables. 3. Letter painting work in all breakers mentioning the cable size, bus bar arrangement identification of the breaker etc should be done by the contractor as per the instruction of Electrical in charge. 4. Electric Power for welding and other erection purpose are to be arranged by contracor scope. 5. Welding m/c,gas cutting set and regulator should be brought by the contractor. 6. Any clarification & modification of the work should be directly discussed with the Electrical In charge. 7. Minor paint touching shall be done in the panel for damages caused during transport are under contractors scope. 9.The contractor should get proper clearance from the security personnel while taking their materials inside and outside the site.They should maintain an invoivce register ,which is liable for inspection by the Electrical Incharge. 10. Crane facility required for the unloading/movement of the equipment are under the contractor scope. 8. Pre dispatch inspection for all the equipment should be arranged at the supplier works. 9. For the erection of the items, quantity on Pro-Rata basis to be considered.	SET`	**1**		
		TOTAL			
	Note: Incase of any quantity over & above the tolerance limit (of +10%) during the commissioning period (not exceeding 6 months), the vendor may confirm their willingness to supply & erection the same at the original rate mentioned in the offer.	Vendor to confirm			

ANNEXURE-I

Specification for 16A MCBDB Lighting Distribution Board

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of Medium Voltage, 8 Way MCB distribution boards with 16A, single pole MCB per way as outgoing, 3 nos. 63A DP MCB as phase controller,100A , 4 pole MCB incomer,Metalic Double door. The DB should be Phase Segregated and Separated between incomer and outgoings , suitable for flush / surface mounting. The distribution boards conforming to the specification and features given below.		
1.0	**MCB Distribution Board**		
1.1	Current rating: 100A, 4 pole MCB for main incomer. 63A, 2 pole MCB in each phase for phase isolation. 16A, 1 pole MCB for each outgoing way.		
1.2	Configuration: Three poles and neutral DB with per phase isolation		
1.3	Type of enclosure: Fabricated Sheet steel		
1.4	Number of ways per phase: 8 Ways		
1.5	Busbar Rating: 100A		
1.6	Make of the MCB distribution Board should be Legrand/ Siemens /L&T/ Hager/ ABB makes only acceptable.		
2.0	**Miniature Circuit Breaker**		
2.1	Current rating: 16 A/ 100 A (as specified for outgoing/incomer)		
2.2	Number of MCB: 24 nos. 16A, 1P, MCB 3 nos. 63A, 2P, MCB 1 no. 100A, 4P. MCB		
2.3	Breaking capacity of the MCB: 10kA		
3.0	**General Features of the Lighting Distribution board:**		
3.1	The DBs shall be ready to use with neutral links, earth links, Busbar and interconnecting wires/links.		
3.2	DB shall be provided with gland plates at the top and bottom with knockouts.		
3.3	Earth bar for facilitating individual earth for each outgoing circuit with necessary terminallugs, bolts and nuts.		
3.4	Label to be permanently and securely fixed inside the case to mark the name, current rating of the circuit.		
3.5	Neoprene Gaskets shall be provided to ensure vermin proof condition.		
3.6	The DB shall be painted with one coat of red oxide primer and two coats of enamel paint.		
3.7	The DB should conform to IS:13032-1991 and Indian Electricity Rules.		
3.8	The MCB shall conform to IS:8828-1996		
3.9	Double earthing provison for the DB shall be provided with suitable i-bolts on both the sides.		

ANNEXURE-II

Specification for 400W Industrial Highbay Luminaire and MH lamp

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of High Performance, Integral, Industrial, High Bay, closed version Luminaire with control gear box, reflector and lamp as specified below:		
1.0	Luminaire Suitability: Suitable for operation with **400 Watts** Metal Halide lamp		
1.1	Housing: Made out of die cast aluminium and powder coated in black/ grey and to ensure IP65 ingress protection.		
1.2	Reflector construction: Parabolic, anodized and electrochemically brightened and made of aluminium. To be provided with heat-resistant and toughened glass with gasket to ensure IP54 ingress protection.		
1.3	Reflector suitability: Reflector suitable for narrow beam application.		
1.4	Input Power supply: 1 phase,230V, 50 Hz. A.C supply.		
1.5	Control Gear: Control gear shall comprise of Copper wound ballast, power factor improvement capacitor, mains connector and electronic ignitor all prewired upto terminal block and mounted on a gear tray/ base for ease of maintenance.		
1.6	Safety chain: Safety chain to be provided in the fitting		
1.7	Access for Maintenance: Access to gear compartment shall be provided to facilitate easy maintenance, replacement and connection		
1.8	Dimensional details and net weight		
1.9	Nominal Power factor, mains current for the lamp to be mentioned by the vendor.		
1.10	Technical catalogue/ drawing: Vendor to furnish with the offer		
2.0	Specification for lamp: Metal Halide 400 Watts, elliptical version, suitable for 230V, 50Hz, 1 phase supply with E40,screw cap to house the lamp.		
3.0	Preferable make of the luminaire/ lamp: Philips, GE, Crompton Greaves, Bajaj		
3.1	Type no. /Make offered		

ANNEXURE III

Specification for 65 W Highbay Luminaire and CFL lamp

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of High Performance, Integral, Industrial, High Bay, open version Luminaire with necessary accessories like lamp holder, eye bolt etc, reflector and lamp as specified below:		
1.0	Luminaire Suitability: Suitable for operation with 65 watts CFL lamp		
1.1	Housing: Made out of die cast aluminium and powder coated.		
1.2	Reflector construction: Special transluscent poly corbonate prismaytic refractor with more vertical lighting in the area		
1.3	Input Power supply: 1 phase, 230V, 50 Hz. A.C supply.		
1.40	Technical catalogue/ drawing: Vendor to furnish with the offer		
2.0	Specification for lamp: CFL 65 watts lamp suitable for 240V, 50Hz, 1 phase supply with E27 holder to house lamp .		
3.0	Make of the luminaire/ lamp: Philips, GE, Bajaj,Crompton Greaves makes makes only acceptable.		
3.1	Type no. /Make offered		

ANNEXURE-IV

Specification for the 2 kVA Emergency Power Supply Unit

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	General purpose of 2KVA Emergency power supply unit for Emergency light with 4 hrs. backup. and suitable for operation on 1phase, 230V, 50Hz AC.supply.		
1.0	**Specification**		
1.1	Preferable Make: Powertronics, Hitachi Hirel, Emerson, Aplab, APS Model: Vendor to specify.		
1.2	AC input Voltage: 1 Phase, 170 - 270 VOLTS ,50 Hz, AC supply.		
1.3	Output Voltage: 1 Phase,Voltage: 230 Volt AC, Frequency: 50 + 0.1% Wave form: Pure sine wave.		
1.4	Efficiency: 90% and above on Resistive load. Vendor to specify.		
1.5	Time delay: The out put voltage should be switched OFF (OFF delay) after 5 minutes . Vendor to speify.		
1.6	Overload capacity: 110 % for 5 minutes.		
1.7	Metering: Output AC and DC metering (LED type) for voltage & current. Vendor to specify.		
1.8	Indication: Inverter ON, Mains On, Charger ON, Low battery, overload, Present battery full. Vendor to specify.		
1.9	Protection: Input under voltage and over voltage.Battery Low voltage, Output short circuit, Out put under / over voltage,Out put overload, Over temperature, DC over current protection,Output voltage regulation,Spike protection. Vendor to specify.		
2.0	**Control switches:** Input, out put, and inverter MCB'S HRC fuses for the above, Beep sound for tripping, Over/under/low voltage, Short circuit & inverter trip control. Vendor to specify.		
3.0	**Battery specification**		
3.1	Type: Maintenance Free Tubular Battery.		
3.2	Make: Exide Industries Ltd, HBL Power Systems Ltd, Hoppecke Batterien GMBH & CO.KG, Amara Raja batteries. Model: Vendor to specify		
3.3	Specification: 12Volts,Battery AH to be offered for the connected load of 1000 Watts for a barttery back up of 4 Hrs . Vendor to specify.		

ANNEXURE-V

Specification for the supply of Timer Controller Box

Sl. No	Description	Vendor to Confirm	Deviations
1	Manufacturing and supply of weather proof outdoor type , street light Timer controller of approx size 750x400x250 mm using 1.6 mm thick CRCA sheet, with continuously hinged door & 10mm gasket to be provided in the door for protection from water and dust with locking arrangement. The timer box should contain the following components &suitable to mount on the columns.		
2	63 Amps three pole Siemens/L&T/Schneider/ABB make power contactor suitable for coil voltage 230 V AC-1no		
3	EAPL make timer 203B model digital timer suitable for coil voltage 230 V AC-1no		
4	63 Amps 4 pole MCB (make ; Siemens/L&T/Legrand/ABB)-1no		
5	32 Amps single pole MCB (make ; Siemens/L&T/Legrand/ABB)-6no		
6	6Amps single pole toggle switch-1 no		
7	63 Amps 6 way din rail mounting terminal strip elmex make -1no		
8	Steel Mounting clamps .		
9	One No. of punch hole of size 25mm dia to be provided in the back side of box.		
10	Three Nos. of punch hole of 25mm dia. to be provided for cable/ conduit entry at the bottom of the terminal box.		
11	32 X 6 mm GI flats 2 Nos. are to be provided as a mechanical support for clamping arrangement of the box with pole.		
12	Two Nos. of separate earth terminals duly welded to the box.		
13	All the above items should be mounted on a base plate duly wired with 6 sq.mm multi strand flexible insulated copper wires for the power wiring and with 1.5 sqmm single strand copper wire for control wiring for automatic controls of street lights . The sheet steel MS box should be undergone with Degreasing, De rusting, Phosphating and applied with 2 coat of primary enamel paint and powder coating of finishing paint –colour-Siemens Grey.		

ANNEXURE-VI

Specification for Medium Voltage Power Cable

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of Medium Voltage, 50 Sqmm XLPE insulated conductor, PVC inner & outersheathed insulation , armoured Power Cable conforming to the specification given below.		
1.0	**Medium Voltage Power Cable:**		
1.1	Nominal area of conductor: 50 sq.mm		
1.2	Number of cores: 3.5 cores specified in the scope of supply. Cores identified with different colours		
1.3	Conductor: Stranded, Circular/ shaped, Aluminium as specified in the scope of supply.		
1.4	Voltage rating: 1.1KV, 50Hz, AC		
1.5	Conductor Insulation: Insulation material XLPE as per IS -7098, Part-I		
1.6	Innersheath: PVC innersheath- Type ST2 as per IS-5831 -Black colour		
1.7	Armouring: Galvanized steel wire/ strip armouring as per IS-3975 & IS-7098		
1.8	Outersheath: XLPE insuation as per IS: 7098 Part-1		
1.9	Conformance to Indian Standard specification: IS:7098(Part 1)/IS-5831		
2.0	Technical leaflet of the cable indicating the approx. diameter, weight, thickness of insulation/ sheathing/ armour wire, current rating etc. to be enclosed with the offer.		
3.0	**General Features of the M.V.Cable:**		
3.1	Cable shall have the manufacturer name embossed/ printed/ indented on the outer sheath at regular intervals.		
3.2	Cable shall have Voltage grade, cable size embossed on the outer sheath.		
3.3	Routine tests shall be coducted on the cables as per IS and test certificate shall be produced		
4	The cable offered should have been 'Type Tested' as per relavent standards, in any one of the government approved laboratory like CPRI, ERDA. Copy of the 'Type Test Certificate' should be enclosed along with the offer for acceptance of the make of the cable offered.		
5	Preferable make of cable: RPG,KEI, Gloster, Universal, Mansfield, , APAR industries limited, Cable corporation of india ltd., Diamond power infrastructure ltd, Hindusthan vidyut products ltd., Havells india limited, kei industries ltd., Krishna electrical industries ltd., KEC International limited, Nicco corporation ltd., Paramount communications ltd., Polycab wires pvt. ltd., Ravin cables limited, Sriram cables pvt. ltd., Torrent cables ltd., Universal cables ltd.		

ANNEXURE-VII

Suggestive Format of Performance Certificate:

The Performance certificate should contain minimum of the below said data and it shall be produced on **Customer's Letter Head** and submitted along with the offer.

1.0	Equipment/Project Supplied to (Customer Details)	
2.0	Project Name	
3.0	Details of Equipment/installation supplied	
3.1	Roof Lights: Type/ Make	
3.2	MV Cable : Size/ Make	
4.0	Purchase Order/ Work order Number	
5.0	Scheduled date of completion	
6.0	Actual date of completion	
7.0	Reasons for delay (if any)	
8.0	Performance of the contractor during erection & commissioning on turnkey basis	Satisfactory/ Not-satisfactory
Date:		Signature & Seal of the Authority Issuing the Performance Certificate

Commercial Terms for Package-III

a) Delivery Schedule for supply of all the items for Electrification of shop floor package:
- 6 months from the PO date.

b) Time period for Installation and Commissioning of all the items of Electrification of shop floor package.
- 4 months up on receiving the material.
- The total time period for the supply, installation, commissioning etc should not be more than 10 months from the PO date.

c) 100% Payment will be made after supply, installation, commissioning of the total Electrification of shop floor upon producing 10% Performance Bank Guarantee.

PACKAGE-IV
HIGHMAST LIGHTING SYSTEM
PART B
Specification of High Mast for PEFP BHEL Bhandara Site, Total Nos of HM - 11 Nos

Sl.No.	Description	Vendor to confirm	Comment/Deviation
1	The scope of this specification covers the manufacture, transport, installation, testing and commissioning of the complete lighting system, using Raising and Lowering type of High Mast Towers, including the Civil Foundation Works. BHEL will only provide the supply point at inlet of isolator switch. Isolator switch, feeder pillar & its connecting cable are in the scope of vendor. However, all items required for the safe and efficient operation and maintenance of the lighting system, including the high mast, whether explicity stated below or not, shall be included by the Vendor.		
2	Supply of 20 meters High Mast system with all accessories including but not restricted to the following. (a) Mast shaft in two section, hot dip galvanised and suitable for wind velocity as per IS 875 part 3. (b) Head frame, steel wire rope of min. 6 mm dia, double Drum winch (c) Galvanised Lantern carriage arrangement suitable for 12 nos. luminaries & its control gear boxes and lighting finial. (d) Integral power tool installed inside base compartment for its operation. (e) The 20 mtr. Himast lighting system should be of BAJAJ,PHILIPS,CROMPTON,GE or any reputed makes approved by BHEL is acceptable.		
3	Supply of foundation bolts manufactured from special steel along with nuts, washers, anchor plate and templates .		
4	Design, supply and casting of suitable shallow foundation with M-15 concrete for the High mast considering safe soil bearing capacity & wind pressure at PEFP, BHEL Bhandara/Maharasrta site. The Wind force and wind pressure for PEFP, Bhandara, Nagpur city can be taken from IS 875: part 3 (Wind load) and the soil bearing capacity for the shallow foundations are given in the attached **Annexure C.**		
5	Supply of 12 nos. Non - Integral 2 x 400 watts High Pressure Sodium vapour floodlight luminiaire with two nos. 400W HPSV lamps in each luminaires and required control gear boxes suitable for operation of 230V, 50 Hz, a.c. supply. Philips : Type RVP 301-2 X 400 SON T/HP 1-T 400 or Bajaj : Type BGENF 22 R or Crompton Greaves : Type FHD 1524 or G E Type : GELF 2 X 400 (N 1) makes only acceptable.		

Sl.No.	Description	Vendor to confirm	Comment/Deviation
6	Supply of twin dome aviation obstruction light with 2 nos. Red LED lamps & lightning arrester.		
7	Supply of 3 nos. of 50 mm dia.length of 2.5mts with Class "C" GI pipe earthing system confirming to I.S.3043 for high mast (1 no. for Mast,1 no for lightening arrestor, 1 no. for power control panel)).Inter connections of equipment to earth pit shall be made by using 50X6 mm Hot Dip GI flat.		
8.0	Supply of control panel housing suitable control circuit for the operation of the mast, precision digital timer for automatic ON / OFF control of lights and required controls for the power tool motor.(make of the timer EAPL /L&T/MDS/GE/SIEMENS)		
9.0	Erection / Installation and commissioning of the High Mast system comprising of foundation, mast and its accessories, aviation warning lamps, lightning arrester, trailing cable, earthing, luminaires, control panel etc. with the help of suitable equipments.		
10.0	3 sets of wiring / connection diagram, O&M manual to be supplied along with each high mast.Single copy of make,rating details,technical details and catalogue of all the bought out items used in the panel should be submitted along with the material.		
11.0	Technical leaflet giving the dimensions, features are to be attached with the offer. The fitting and control gear boxes offered should be suitable for outdoor application confirming to IP 65 or better. The lamp holders and fitting bracket fasteners and any other fasteners outside the fitting should be SS material. The gaskets sealing should be pasted around the fitting firmly to prevent rain water entry into the fitting. The glass door locking clips should be provided with rigid SS material. The glass door shall be hinged type for easy maintenance confirming to IP 65. The lamps should be independently connected and the plated brass gland position shall be at the bottom to prevent rain water entry. The connecting wires to the holders should be insulated with hi temp resistance material like FRLS/ glass wool only. The lamp fixing bracket on the tower shall be designed to hold all the fittings in the same axis.		
11.1	The electrical works should be carried out by a licensed electrical contractor.		
12.0	General Features		

Sl.No.	Description	Vendor to confirm	Comment/Deviation
12.1	Winch		
	The winch shall be of completely self sustaining type, without the need for brake shoe, springs or clutches. Each driving spindle of the winch shall be positively locked when not in use. Individual drum also should be operated for fine adjustment of lantern carriage. The capacity, operating speed, safe working load, recommended lubrication and serial number of the winch shall be clearly marked on each winch. The winch drums shall be grooved to ensure perfect seat for stable and tidy rope lay, with no chances of rope slippage. The rope termination in the winch shall be such that distortion or twisting is eleminated and at least 5 to 6 turns of rope remains on the drum even when the lantern carriage is fully lowered and rested on the rest pads. It should be possible to operate the winch manually by a suitable handle by an integral power tool.(winch should be standard reputed make)		
12.2	Head Frame		
	The head frame, which is to be designed as a capping unit of the mast, shall be welded steel construction, galvanised both internally and externally after assembly. The top pulley shall be of appropriate diameter, large enough to accommodate the stainless steel wire rope and the multi-core electric cable. The pulley block shall be made of non-corrodible material, and shall be of die cast Aluminium Alloy. Pulleys made of synthetic materials such as Plastic or PVC are not acceptable. Self-lubricating bearings and stainless steel shaft shall be provided to facilitate smooth and maintenance free operation for a long period. The pulley assembly shall be fully protected by a canopy galvanised internally and externally. Close fittings guides and sleeves shall be provided to ensure that the ropes and cables do not get dislodged from their respective positions in the grooves. The head frame shall be provided with guides and stops with PVC buffer for docking the lantern carriage.		
12.3	Stainless Steel Wire Ropes. The suspension system shall essentially be without any intermediate joint and shall consist of only non-corrodible stainless of AISI 316 or better grade. The stainless steel wire ropes shall be of suitable size, the central core being of the same material. The overall diameter of the rope shall not be less than 6 mm. The thimbles shall be secured on ropes by compression splices. Two continuous lengths of stainless steel wire ropes shall be used in the system and no intermediate joints are acceptable in view of the required safety. No intermediate joints / terminations either bolted or else, shall be provided on the wire ropes between winch and lantern carriage.Certificate to this effect has to be obtained from the manufacture of this rope to confirm the above requirement.		

Sl.No.	Description	Vendor to confirm	Comment/Deviation
12.4	Electrical system, cable and cable connections.		
	A suitable terminal box shall be provided as part of the contract at the base compartment of the high mast for terminating the incoming cable. The electrical connections from the bottom to the top shall be made by special trailing cable(FRLS) and size of the cable shall be minimum 4 core 6 sq.mm. multistrand PVC flexible copper cable. At the top there shall be weather proof junction box to terminate the trailing cable. Connections from the top junction box to the individual luminaries shall be made by using 3 core 2.5 sq.mm. Copper flexible HR PVC cables of reputed make with ISI mark.The system shall have inbuilt facilities for testing the luminaries while in lowered poistion. Also suitable provision shall be made at the base compartment of the mast to facilitate the operation of internally mounted, electrically operated power tool for raising and lowering of the lantern carriage assembly. The trailing cables of the lantern carriage rings shall be terminated by means of metal clad, multipin plug and socket provided in the base compartment to enable easy disconnection whenever required.		
12.5	Power Tool for the Winch		
	A suitable high-powered, electrically driven, internally mounted power tool, with manual over ride shall be supplied for the raising and lowering of the lantern carriage for maintenance purposes. The speed of the power tool shall be to suit the system. The power tool shall be single speed, provided with a motor of the required rating. The power tool shall be supplied complete with suitable control. The capacity and speed of the electric motor used in the power tool shall be suitable for the lifting of the design load installed on the lantern carriage. The power tool mounting shall be so designed that it will be not only self-supporting but also aligns the power tool perfectly with respect to the winch spindle during the operations. Also, a handle for the manual operation of the winches in case of problems with the electrically operated tool shall be provided.The quality of the gear box to withstand minimum 500 operations to be ensured by supplier,Gears(worm gear with worm shaft) from good quality material ensure for durability.		
12.6	Lightning Finial		
	One number heavy duty hot dip galvanised lightning finial shall be provided for each mast. The lightning finial shall be minimum 1.2 M in length and 12mm dia. shall be provided at the center of the head frame. It shall be bolted soildly to the head frame to get a direct conducting path to the earth through the mast.		
12.7	Aviation Obstruction Lights :		
	Suitable 2 Nos. 230 V, LED Aviation Obstruction Lights of reliable design and reputed manufacturer shall be provided on top of each mast		

Sl.No.	Description	Vendor to confirm	Comment/Deviation
12.8	Earthing Terminals :		
	Suitable earth terminal shall be provided at a convenient location on the base of the mast, for lighting and electrical earthing of the mast.		
12.9	Feeder Pillar		
	Each mast shall be provided with a feeder pillar and control box of size 750mm height 450mm breadth and 250mm depth fabricated with 14 SWG CRCA sheet with hinged doors and locking arrangement,out door type,stand mounting,dust and vermin proof as per IP55,panel will have powder coat finish to shade 631 of IS and stand black enamel paint. The feeder pillar control box to be fixed on the stand by 50mm X 50mm X5 mm MS angle and comprise of incoming as 4 pole 63amps 415 volt Legrand/Havells/siemens/L&T make TPN MCB. for incoming, one no.32amps TP MCB for outgoing, one no. 6amps TP MCB for motor control circuit. The 6sq.mm PVC multi strand copper cable for power circuit wiring with colour sleeve and ferrule and 1.5sq.mm PVC multi strand flexible copper cable for control circuit wiring with No. ferrules and insulated copper lug should be used. All the electrical aceessories should be fixed on the 2mm thick base plate with suitable size self threading holes and 3mm thick detachable cable entry bottom plate with suitable cutouts for cable entries. Din rail mounting type ELMEC make 63 amps strips for control circuit feeders pillar shall be mounted near to high mast. Suitable digital timer (as per the Point nos.8) for automatic on-off control with the siemens/L&T make 63amps contractor for incoming supply and 16 amps for motor control and ON-OFF control of the lamps should be provided and connected in the circuit.		
12.10	Each High Mast must be supplied with 1 No 63A SFU (Iron glad / Metal glad) as incomer to feeder piller along with 50mm x 50mm x 5mm Angle frame for fixing feeder piller box and 63 A SFU . The SFU should be provided with required canapy and suitable for mounting in outside . The grouting of frame and interconnecting with suitable cable are supplier scope.		
12.11	Power Cable.		
	The cable of size 3.5 core25 sq.mm. Aluminium conductor, Armoured cables to be used for power supply from the TPN swich disconnector to the feeder pillar by the supplier . The supply of 4 core 6sq.mm HR PVC flexible multi strand copper cable shall be taken from the base compartment of the high mast to the feed pillar control box through the cable entry hole made in the foundation by the supplier.		
	Note: Point by point confirmation is required from the supplier otherwise the offer will not be considered		
	The tentative location of High Mast at PEFP BHEL/ Bhandara Site (attached Annexure 'D')		

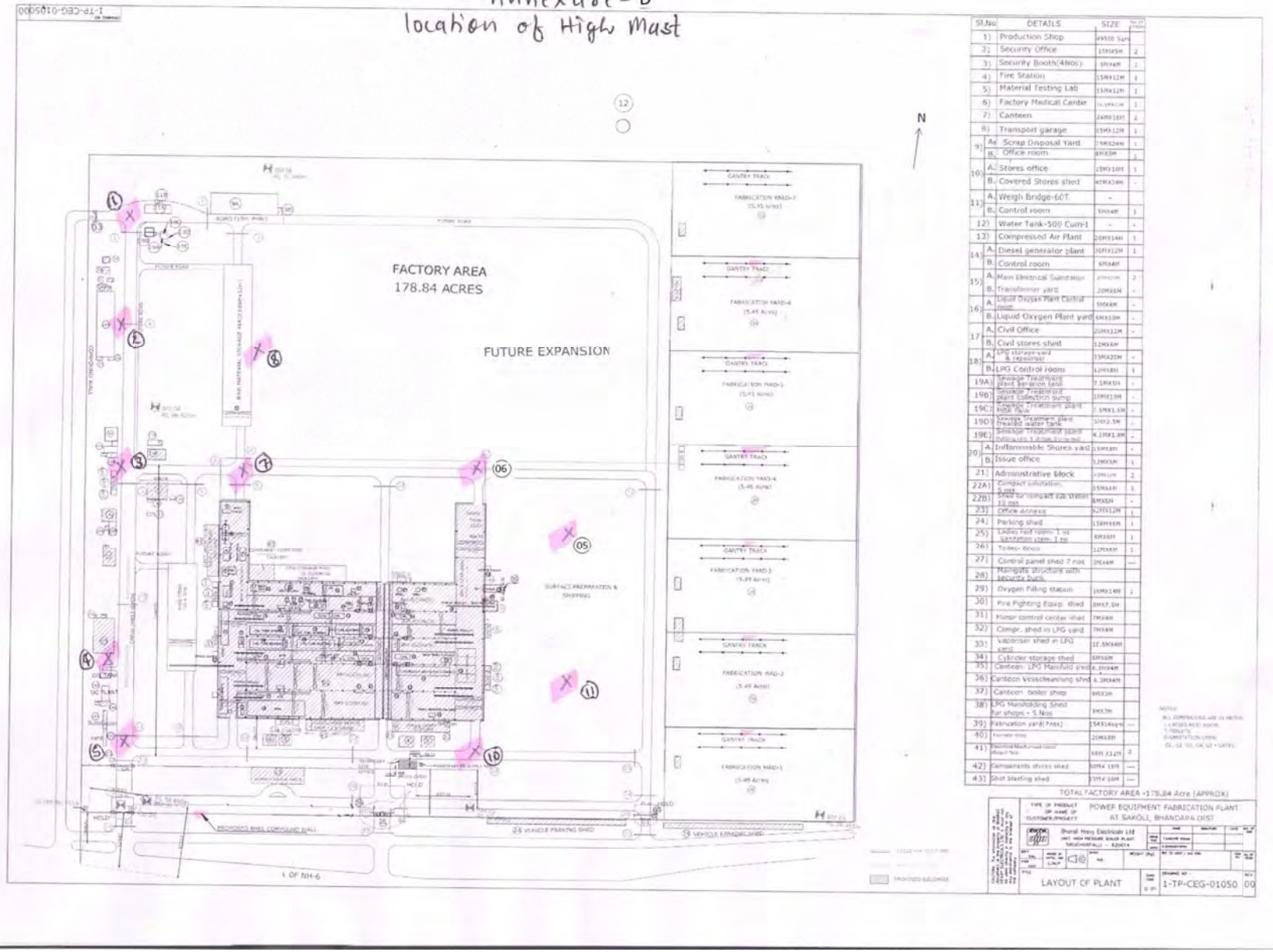
Annexure C

Soil bearing capacity at PEFP BHEL Bhandara Site		
DEPTH	FOUNDATION WIDTH	NET SAFE BEARING CAPACITY (T/m^2)
1.5m	1m to 3m	15
	3m to 5m	7
	More then 5 m	13
2 m	1m to 3m	15
	3m to 5m	8
	More then 5 m	13
2.5 m	1m to 3m	17
	3m to 5m	7
	More then 5 m	13
3 m	1m to 3m	15
	3m to 5m	8

Table 8: Net Safe Bearing Capacity for Open Foundation (BH-02 to BH-10)

Annexure - D

location of High Mast



Sl.No	DETAILS	SIZE	
1)	Production Shop	44500 Sqm	
2)	Security Office	15M X 5M	2
3)	Security Booth(4Nos)	3M X 4M	2
4)	Fire Station	15M X 12M	1
5)	Material Testing Lab	15M X 12M	1
6)	Factory Medical Center	15.5M X 12M	1
7)	Canteen	24M X 16M	2
8)	Transport garage	15M X 12M	1
9)	A. Scrap Disposal Yard	75M X 24M	1
	B. Office room	6M X 5M	1
10)	A. Stores office	15M X 10M	1
	B. Covered Stores shed	40M X 24M	-
11)	A. Weigh Bridge-60T	-	
	B. Control room	5M X 4M	1
12)	Water Tank-500 Cum-1	-	-
13)	Compressed Air Plant	20M X 14M	1
14)	A. Diesel generator plant	30FIX 12M	1
	B. Control room	6M X 4M	
15)	A. Main Electrical Substation	4M X 3M	2
	B. Transformer yard	20M X 8M	-
16)	A. Liquid Oxygen Plant Control room	5M X 4M	-
	B. Liquid Oxygen Plant yard	6M X 10M	-
17)	A. Civil Office	20M X 12M	-
	B. Civil stores shed	12M X 6M	
18)	A. LPG storage yard & operator	15M X 20M	-
	B. LPG Control room	12M X 8M	1
19A)	Sewage Treatment plant Separation tank	7.5M X 5M	-
19B)	Sewage Treatment plant Valve Collection Sump	10M X 1.5M	-
19C)	Sewage Treatment plant Inlet Pipe	2.5M X 1.5M	-
19D)	Sewage Treatment plant treated water tank	5M X 2.5M	-
19E)	Sewage Treatment plant Collection & pump Room	4.1M X 1.8M	-
20)	A. Inflammable Stores yard	15M X 8M	-
	B. Issue office	12M X 5M	1
21)	Administrative Block	30M X 12M	2
22A)	Compact substation, 5 nos	15M X 8M	1
22B)	Diesel for compact sub station 10 nos	8M X 5M	-
23)	Office Annexe	52M X 12M	1
24)	Parking shed	15M X 6M	1
25)	Ladies toilet room- 1 no Sanitation room- 1 no	8M X 6M	1
26)	Toilet- Gents	12M X 6M	1
27)	Control panel shed 7 nos	3M X 4M	---
28)	Manager structure with security Cabin		
29)	Oxygen Filling station	16M X 14M	1
30)	Fire Fighting Equip. shed	8M X 7.5M	
31)	Compr. control center shed	7M X 6M	
32)	Compr. shed in LPG yard	7M X 4M	
33)	Vaporiser shed in LPG yard	10.5M X 6M	
34)	Cylinder storage shed	6M X 6M	
35)	Canteen- LPG Manifold shed	6.3M X 4M	
36)	Canteen Vessel washing shed	6.3M X 4M	
37)	Canteen boiler shop	9M X 3M	
38)	LPG Manifolding Shed For shops + 5 Nos	9M X 3M	
39)	Fabrication yard(7 nos)	154.914sq m	---
40)	Painter shed	20M X 8M	
41)	Electrical Mech.Fitter Locker/ Rest Shed	6M X 12M	2
42)	Consumables stores shed	30M X 18M	---
43)	Shot blasting shed	33M X 10M	---

Commercial Terms for Package-IV

a) Delivery Schedule for supply of all the items of High-mast Lighting system package:
   - 6 months from the PO date.

b) Time period for Installation and Commissioning of all the items of High-mast Lighting system package.
   - 4 months up on receiving the material.
   - The total time period for the supply, installation, commissioning etc should not be more than 10 months from the PO date.

c) 100% Payment will be made after supply, installation, commissioning of the total High-mast Lighting system upon producing 10% Performance Bank Guarantee.

SCHEDULE 'B'

1. The following materials will be issued FREE of cost to contractor at **Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.**

Sl.No	Name of Material
01	----NIL---

SCHEDULE 'C'

ISSUE OF TOOLS AND PLANTS TO CONTRACTORS

Sl.No.	Qty.	Particulars	Details of BHEL Crew Supplied	Hire Charges Per unit Per Day	Place of Issue	Remarks
……..Nil……						

SCHEDULE 'D'

NOTE: All Drawings are to be signed by the Contractor as well as the officer entering into contract.

SL.No.	DRAWING NUMBER	DESCRIPTION
1	**1-TP-CEG-01050**	Layout of Plant.
2	**0-TP-CEG-01413**	General arrangement of production shop
3	**M&S-PD-13-124**	Wheel Load for 10T EOT and 20T EOT
4	**M&S-PD-13-125**	Wheel Load for 30T EOT and 5T SEMI GANTRY
5	**M&S-PD-13-127**	Clearance diagram and Rail Level for EOT Cranes
6	**BHE:CP:04:39:2001**	Details of cup type rail clamp

SCHEDULE 'E'

LEAD STATEMENT

Sl.No	Name of Material	Name of Source	Lead Particulars
1	Cement	NOT APPLICABLE	
2	M.S Rounds,CTD Bars &Structural Steel, rails and all railway materials		
3	Al-Zn alloy coated HT Steel / Polycarbonate Sheets		
4	Cast iron pipes & Specials including pig lead for jointing		

C.A……Date ……
(To be used in conjunction with BHE Ltd., General Conditions of Contract)

AUTHORITY TO TENDER

Tender Notice No. **09 / 13-14**

Office of the
SR. MANAGER / CIVIL / FACTORY (PLANNING)
BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHY – 14.

Tender Schedule No. **18 / 13-14**

Item rate tender for the work required," Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State."

Messrs / Mr. ……..

……of……

are / is hereby authorized to tender for the above work. The Tender is to be delivered at the Office of the SR. MANAGER / CIVIL / FACTORY (PLANNING) Bharat Heavy Electricals Limited Unit, Thiruverumbur, Tiruchirappalli – 620 014, **up to 10.00 hrs. on 21.02.2014** addressed to the DY GEN MANAGER / CIVIL / FACTORY (PLANNING & DESIGNS), BHEL. Tiruverumbur, Tiruchirapalli – 620 014 superscribing the name of work as mentioned above.

Any correspondence concerning this tender should be addressed as indicated above quoting the Tender Notice, Schedule No. and other relevant particulars.

BHARAT HEAVY ELECTRICALS LIMITED DO NOT BIND THEMSELVES TO ACCEPT THE LOWEST OR ANY TENDER.

Issuing Officer with

Designation

Contract Agreement No……

TENDER

To

The DY GEN MANAGER / CIVIL / FACTORY (PLANNING & DESIGNS)
Bharat Heavy Electricals Limited
Unit : Tiruverumbur
TIRUCHIRAPPALLI – 620 014.

I / We hereby offer to carry out the **Design, fabrication, supply and erection of Pre-Engineered structural steel shop floor Buildings including crane girder, rail, roof & side cladding, accessories, sky light panels, roof/ turbo ventilators etc. of production shop floors including Electrification of Shop floor (Shop Lighting), High mast lighting system and HT Substation equipment supply and erection works for the Power Equipment Fabrication Plant near Sakoli, Bhandara district in Maharastra State.**

I / We hereby carefully perused the following documents connected with the above noted work and agree to abide by the same.

1. Specifications (General & Particular)
2. Drawings
3. Schedule 'A', 'B', 'C', 'D' & 'E'
4. Preamble, BOQ with detailed specifications, terms and conditions, etc.
5. BHE Ltd., General & Special Conditions of Contract, Tender Notice and Instructions to Tenders attached hereto.

I / We forward herewith the sum of Rs……..as Earnest Money, which shall be refunded should this tender be rejected. I / We further agree to deposit such sum which along with the sum of Rs……mentioned above shall make up 50% of the fully Security Deposit for this work as provided for under conditions of the BHARAT HEAVY ELECTRICALS LIMITED General Conditions of Contract.

I / We further agree to execute all the work referred to in the said documents upon the terms & conditions contained or referred therein and as detailed in Schedule 'A' and Bill of Quantities annexure thereto and to carry out such deviations as may be ordered, vide conditions 6 of the BHEL Ltd., General Conditions of Contract up to a maximum of 20% of the tendered amount of Rs…….

I / We further agree to refer all disputes, as required by condition 62 of the General conditions of Contract to the sole arbitration of an Officer, to be appointed by the General Manager, B.H.E Ltd., in his sole discretion whose decision shall be final and binding.

WITNESS Signature of the Contractor

Date :

1. ……

2. ……

GENERAL SUMMARY

1. (a) Net Cost of works or building etc., from Schedule 'A' Rs.

2. Provisional sum Rs.

……

Total Rs.

……

Rupees……

……

……

Shri…… in the capacity of …… has been duly authorized by me / us to sign the tender for and on behalf of ……

(in block letters)

Date : SIGNATURE OF CONTRACTOR

Witness : Postal Address :

1…… Telephone No.
Address

2. ……
Address

………………………………………………………………………….. alterations have been made in the Tender Document and as evidence that these alterations were made before the execution of contract agreement, they have been initialed by the Contractor and the ……………………………………………
…………………………………………………………………………………………………..…………
…………………………………………………………………………………….………..………………
…………………………………………………………………………..………………………………..…
……………………………………………………………………the said officer is hereby authorized to sign and initial on my behalf the documents forming part of this contract (Number of alternation in figures and words to be given here)

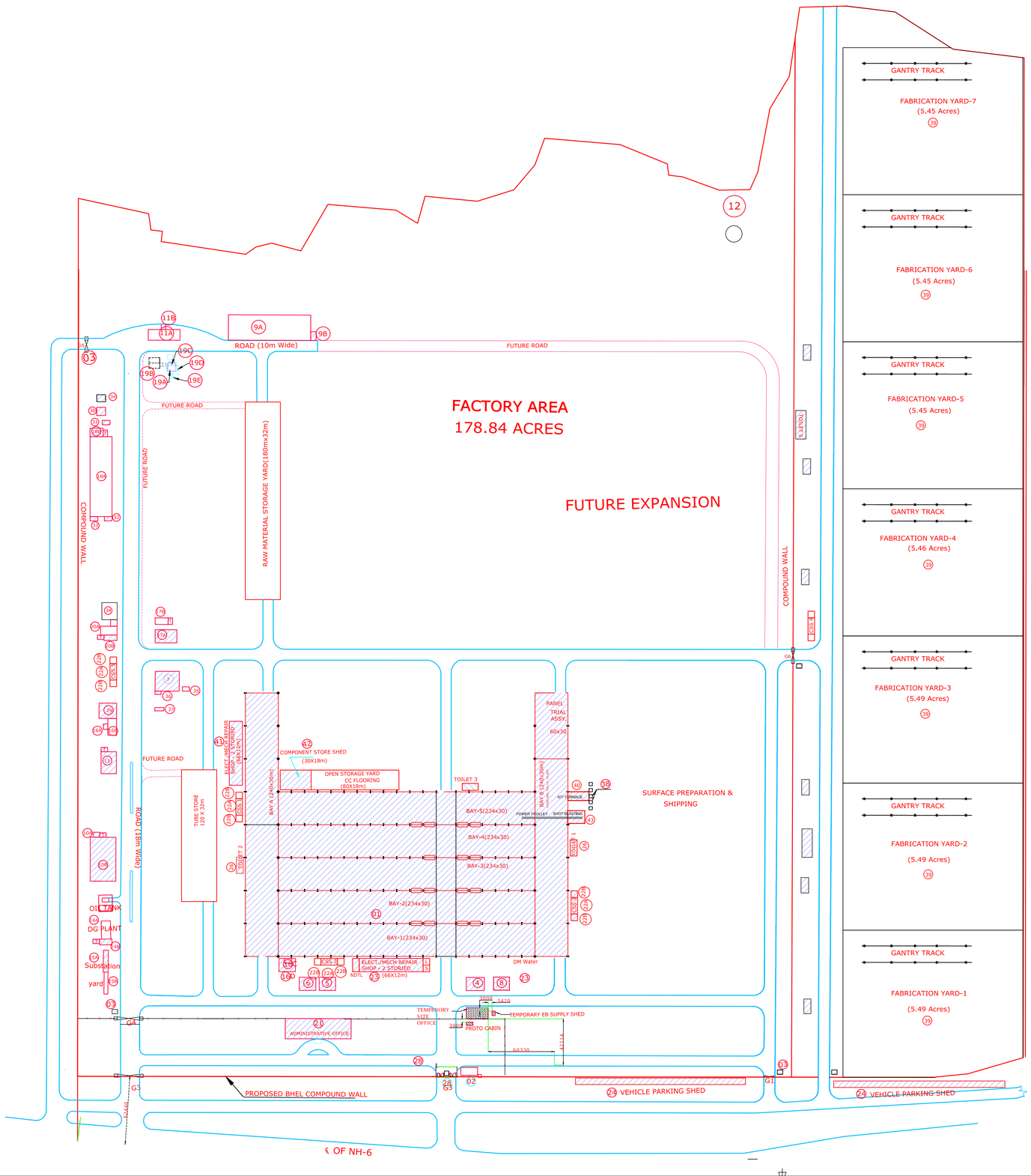
The above tender is accepted by me on behalf of the Bharat Heavy Electricals Limited, Unit: Thriuverumbur, Tiruchirappalli – 620 014. for a sum of Rs……………………………… ………………
……………………………………………………………………………………...……….……………
………
……………………………………………………………………………...…at the rates as indicated in Schedule 'A'.(Bill of Quantities)

Signature ……………………………………….Date…………………………………………..

Designation ………………………………………………………………………………

DRAWING NO: 1-TP-CEG-01050

ALL DIMENSIONS ARE IN MILLIMETERS



Sl.No		DETAILS	SIZE	NO OF STOREY
1)		Production Shop	49500 Sqm	
2)		Security Office	15MX5M	2
3)		Security Booth(4Nos)	5MX4M	1
4)		Fire Station	15MX12M	1
5)		Material Testing Lab	15MX12M	1
6)		Factory Medical Center	16.5MX12M	1
7)		Canteen	24MX18M	2
8)		Transport garage	15MX12M	1
9)	A.	Scrap Disposal Yard	75MX24M	1
	B.	Office room	8MX5M	1
10)	A.	Stores office	15MX10M	1
	B.	Covered Stores shed	40MX24M	-
11)	A.	Weigh Bridge-60T	-	
	B.	Control room	5MX4M	1
12)		Water Tank-500 Cum-1	-	-
13)		Compressed Air Plant	20MX14M	1
14)	A.	Diesel generator plant	30MX12M	1
	B.	Control room	6MX4M	
15)	A.	Main Electrical Substation	20MX10M	2
	B.	Transformer yard	20MX8M	-
16)	A.	Liquid Oxygen Plant Control room	5MX4M	-
	B.	Liquid Oxygen Plant yard	6MX10M	-
	C.	Argon plant mixing room	5MX4M	-
	D.	Argon Plant yard	16MX10M	-
17)	A.	Civil Office	20MX12M	-
	B.	Civil stores shed	12MX6M	
18)	A.	LPG storage yard & vapouriser	75MX20M	-
	B.	LPG Control room	12MX8M	1
19A)		Sewage Treatment plant aeration tank	7.5MX5M	-
19B)		Sewage Treatment plant collection sump	10MX10M	-
19C)		Sewage Treatment plant MBR tank	7.5MX1.5M	-
19D)		Sewage Treatment plant treated water tank	5MX2.5M	-
19E)		Sewage Treatment plant Holding tank & sludge drying bed	4.1MX1.8M	-
20)	A.	Inflammable Stores yard	15MX8M	-
	B.	Issue office	12MX5M	1
21)		Administrative block	60MX18M	2
22A)		Compact substation, 5 nos	15MX6M	1
22B)		Shed for compact sub station 10 nos	6MX6M	-
23)		Office Annexe	62MX12M	1
24)		Parking shed	156MX6M	1
25)		Ladies rest room- 1 no Sanitation crew- 1 no	6MX6M	1
26)		Toilet- 6nos	12MX6M	1
27)		Control panel shed 7 nos	3MX4M	---
28)		Maingate structure with security bunk		
29)		Oxygen Filling station	16MX14M	1
30)		Fire Fighting Equip. shed	8MX7.5M	
31)		Motor control center shed	7MX4M	
32)		Compr. shed in LPG yard	7MX4M	
33)		Vaporiser shed in LPG yard	10.5MX4M	
34)		Cylinder storage shed	6MX6M	
35)		Canteen LPG Manifold shed	6.3MX4M	
36)		Canteen Vesselwashing shed	6.3MX4M	
37)		Canteen boiler shop	9MX3M	
38)		LPG Manifolding Shed for shops - 5 Nos	3MX3M	
39)		Fabrication yard(7nos)	154914sqm	---
40)		Furnace shed	20MX8M	
41)		Electrical Mechanical repair shop-2 Nos	66M X12M	2
42)		Components stores shed	30MX 18M	---
43)		Shot blasting shed	15MX 10M	---

TENDER PURPOSE ONLY

NOTES:

1. ALL DIMENSIONS ARE IN METERS
   L-LADIES REST ROOM
   T-TOILETS
   S-SANITATION CREW
   G1, G2, G3, G4, G5, G6, G7 - GATES

PROPOSED BUILDINGS

CAUTION: The information on this drawing is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any detrimental to the interest of BHEL

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: POWER EQUIPMENT FABRICATION PLANT AT SAKOLI, BHANDARA DIST

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014

	NAME	SIGNATURE	DATE	NO. OF SHT
DRN	T.AARUYR YOGAA			
CHD				
APPD	K.GUNASEKARAN			

DEPT: CIVIL | GRADE OF UNITOL DW: C/M/T | SCALE | WEIGHT (Kg) | REF TO ASSY / OLD DWG | ITEM NO | No. OF ITEMS

CODE: 2200

TITLE: LAYOUT OF PLANT

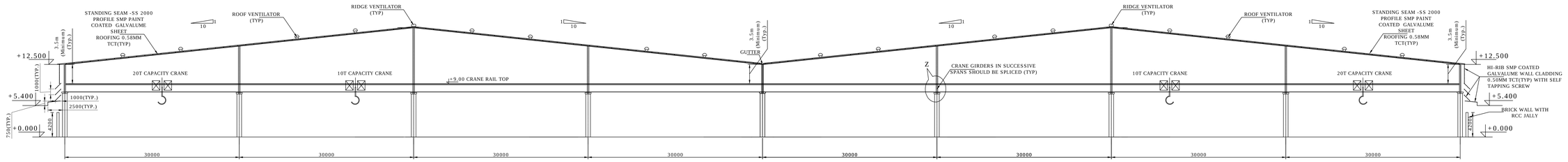
CARD CODE: U 01

DRAWING NO : 1-TP-CEG-01050

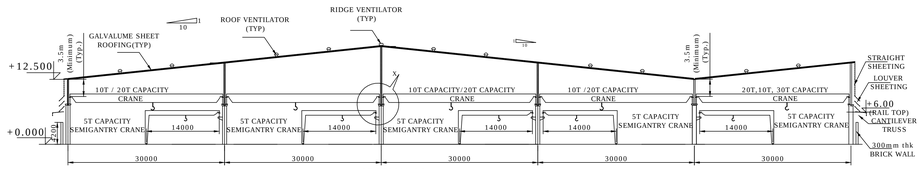
REV: 00

DRAWING NO: 0-TP-CEG-01413 | 00

ALL DIMENSIONS ARE IN MILLIMETERS



SECTION-CC



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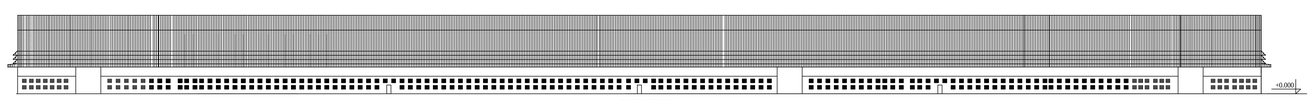
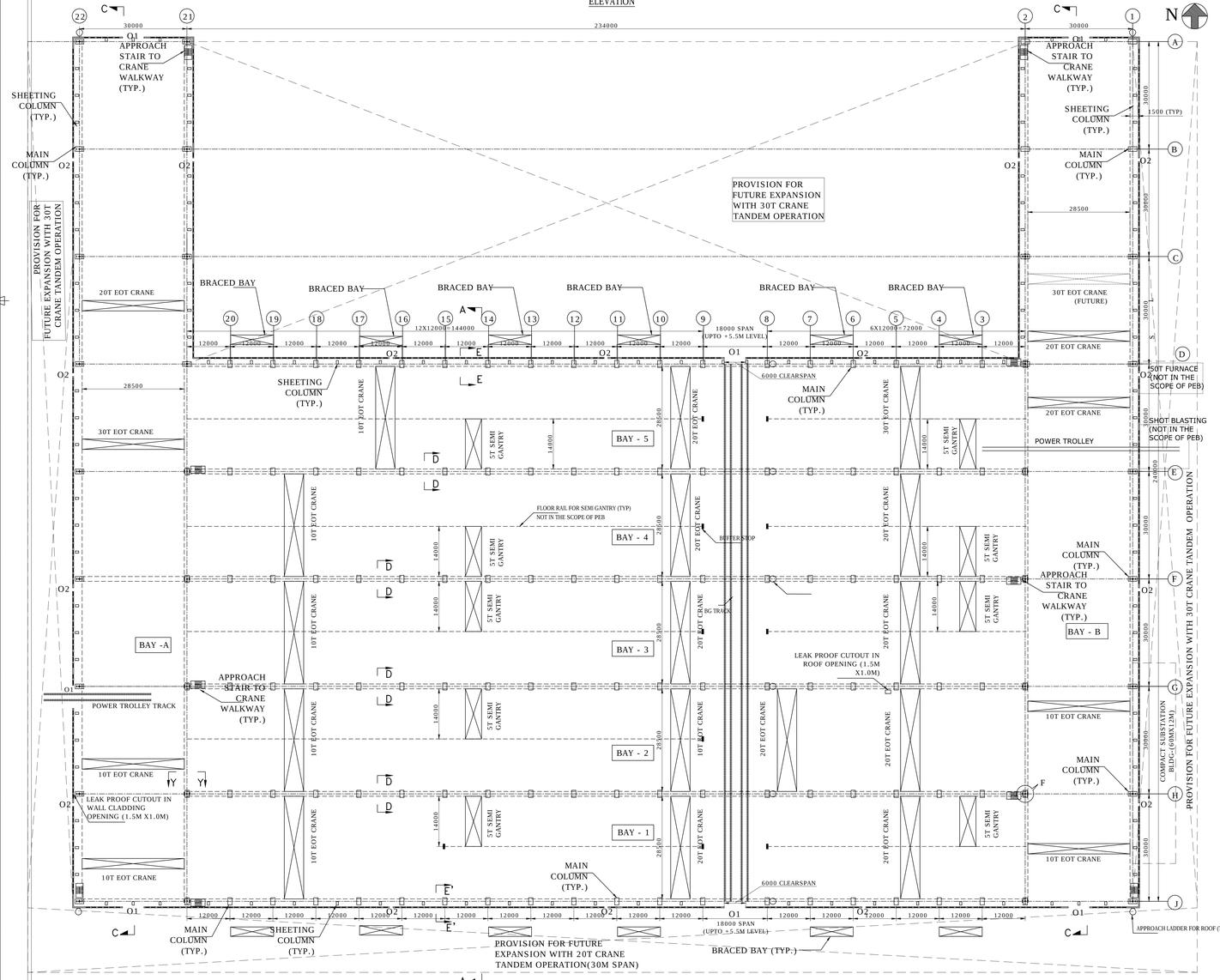
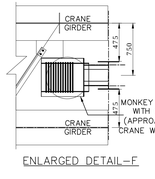


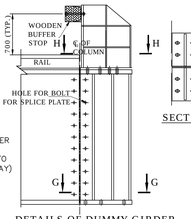
ELEVATION



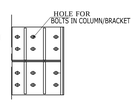
PLAN



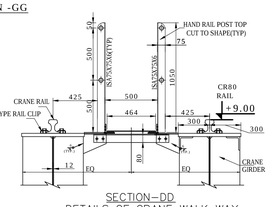
ENLARGED DETAIL -F



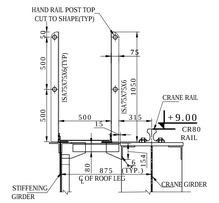
DETAILS OF DUMMY GIRDER



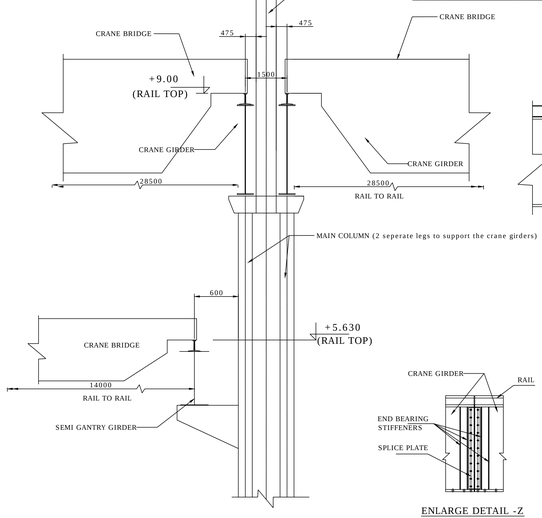
SECTION -GG



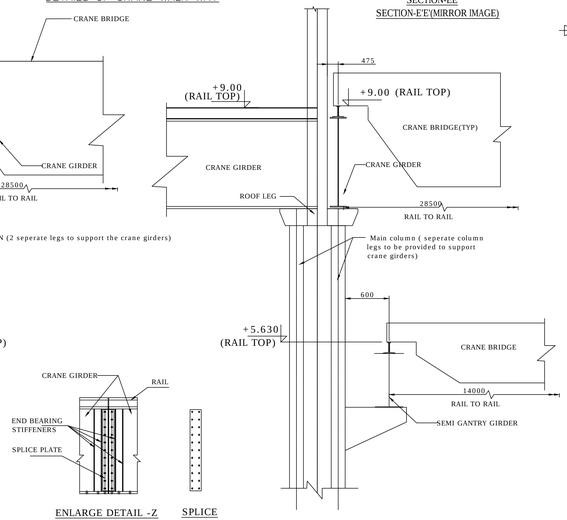
SECTION–DD
DETAILS OF CRANE WALK WAY



SECTION-EE
SECTION-E'E'(MIRROR IMAGE)



ENLARGE DETAIL -X



ENLARGE DETAIL -Y

ENLARGE DETAIL -Z

SPLICE PLATE (TYP.)
(TO BE PROVIDED ON EITHER SIDE OF CRANE GIRDERS)

S No	Description	Level (in m)			RAIL TO BE USED
		Bay A	Bay 1 to 5	Bay B	-
1	Eaves Level of Portal	12.50	12.50	12.50	-
2	Crane Rail Top Level	9.00	9.00	9.00	ISCR80
3	Semigantry Crane rail Top Level	-	5.630	-	R45

NOTES:–

1) ALL DIMENSIONS ARE IN 'MM' &LEVELS ARE IN 'M'

2) DO NOT SCALE THE DRAWING. FOLLOW WRITTEN DIMENSION ONLY

3) ATLEAST 5 % OF ROOF AREA IS TO BE COVERED USING POLYCARBONATE ROOF SHEETING FOR LIGHTING PURPOSE.
4) TWO CUT OUT OPENINGS TO BE PROVIDED WHEREVER CHIMNEY IS TO BE PLACED
5) NECESSARY LIFELINE ARRANGEMENT TO BE PROVIDED ON ROOF TOP FOR ITS MAINTENANCE.
6) SOLDIER/SHEETING COLUMNS CAN BE PROVIDED AT
- 6M SPACING WHERE MAIN COLUMNS ARE SPACED AT 12M
-7.5M SPACING WHERE MAIN COLUMNS ARE SPACED AT 30M
7) UTILITY LOAD OF 500 KG PER RUNNING METRE ON ALL STEEL COLUMNS AT 2.4M ABOVE CRANE BEAM LEVEL WITH AN ECCENTRICITY OF 750MM MAY BE CONSIDERED.

LEGEND:–

O1- OPENING -6000MM X 6000MM
O2- OPENING 2100MM x 1200MM
1. Turboventilators (900mm dia) - 160 Nos. (Total)
2. Ridge ventilators (900mm throat) - Full length of the building ridge
3. 6mm Thick MS valley gutters with 3 mm thick FRP coating
4. Approach ladder to roof - 4 Nos

REV	DATE	DESCRIPTION	SIGN

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: POWER EQUIPMENT FABRICATION PLANT AT SAKOLI, BHANDARA DIST. BLDG NO–01

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014

	NAME	SIGNATURE	DATE	NO. OF VAR
DRWN CHD	T.Aarujir Yogaa			
APPD	K.Gunasekaran			

DEPT CODE: CIVIL/PROJ 2200 | GRADE OF UNITOL GM: C/M/F | SCALE: 1:100 1:50 1:50/1:20 1:500 1:400 1:250 | WEIGHT (Kg): | REF TO ASSY / OLD DWG NIL | ITEM NO | No. OF ITEMS

TITLE: GENERAL ARRANGEMENT OF PRODUCTION SHOP

CARD CODE: U 01

DRAWING NO : 0-TP-CEG-01413 | REV 00